Алматы (727)345-47-04
Ангарск (3955)60-70-56
Архангельск (8182)63-90-72
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Благовещенск (4162)22-76-07
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Владикавказ (8672)28-90-48
Владимир (4922)49-43-18
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Иваново (4932)77-34-06
Ижевск (3412)26-03-58
Иркутск (395)279-98-46
Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
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Красноярск (391)204-63-61
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Курган (3522)50-90-47
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
Мурманск (8152)59-64-93
Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
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Петрозаводск (8142)55-98-37
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Саратов (845)249-38-78
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Тамбов (4752)50-40-97
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Челябинск (351)202-03-61
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Чита (3022)38-34-83
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Ярославль (4852)69-52-93

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# КАТАЛОГ


GEDİK was established in Turkey in 1963 and is today a global industry leader in the field of welding consumables and equipments. Under its intemationally-registered trademarks GeKa and GeKaTec, the company manufactures about 90,000 tons/year of superior quality coated welding electrodes, brazing rods, special repair and maintenance products, as well as gas-shielded arc, submerged arc and flux-cored arc welding wires. The company also produces its own GeKaMac brand of rectifiers, gas shielded arc and submerged arc welding generators (conventional and inverter types)

GEDİK is one of the largest manufacturers in Europe and exports its products to more than 80 countries around the world. Keeping abreast of the largest technological developments in the domain.

Able and willing to serve all industrial sectors, GEDİK WELDING is fully prepared to explore alternative solutions in order to satisfy its customers. The company is therefore able to supply customized welding products and innovative engineering solutions, tailor-made to respond to the diverse needs of its clientele.

Continuous efforts are also undertaken to expand and improve its wide of range of multi-sector products and services, relying on its own in-house know-how and technology. The company's R&D efforts are managed by expert teams at its modem laboratory facilities in Istanbul, where cutting-edge, durable, relevant and economical solutions and products are constantly being generated.

GEDİK also contributes to the advancement of welding science and technology via R&D projects carried out in collaboration with İSTANBUL GEDİK UNIVERSITY. Further, the non-profit organisation, Gedik Educational Foundation (GEV), conducts various internationally-recognised welding education, training and certification programmes.

## Product Categories

- Welding Electrodes
- Gas Shielded Arc Welding Wires
- Flux Cored Arc Welding Wires
- Submerged Arc Welding Wires & Fluxes
- Repair & Maintenance Products
- Brazing Rods & Fluxes
- Welding & Cutting Machines

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GeKa® Welding Consumables

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| ELIFLUX BFB | SA AB 1 68 AC H5 | F6A2-EL12/F7A4-EM12<br>F7A2-EM12K/F7A4-EH12K | 222 |
| ELIFLUX PIPE | SA AB 1 78 AC H5 | F7A4-EM12/F7A4-EA2-A4<br>F8A4-EA4-A4 | 223 |
| ELIFLUX BAB-S | SA AB 1 68 AC H5 | F7A4-EH12K/F7A4-EM12<br>F7A4-EM12K/F8A4-EA2-A3/<br>F11A4-EM4(mod.)-M4 | 224 |
| ELIFLUX BFPP | SA AB 1 66 AC H5 | F7A2-EM12/F7A2-EM12K<br>F8A4-EA2-A2 | 225 |
| ELIFLUX BFPV | SA FB 1 66 AC H5 | F7A2-EM12/F7A2-EM12K<br>F8A4-EA2-A2/F8A5-EA4-A3<br>F11A8-EM4(mod)-M4 | 226 |
| ELIFLUX BFF | SA FB 1 65 DC H5 | F7A4-EH12K/F7A4-EM12<br>F7A4-EM12K/F8A4-EA2-A2<br>F9A4-EF3(mod)-F3<br>F11A8-EM4(mod)-M4 | 227 |
| ELIFLUX BMS | SA CS/MS 1 68 AC | F6A0-EM12/F6AZ-EL12 | 228 |
| ELIFLUX BSS-A | SA FB 2 65 DC | --- | 229 |
| ELIFLUX BSS-D | SA FB 2 65 DC | --- | 230 |
| ELIFLUX BSS-F | SA FB 2 / SA FB 3 | --- | 231 |
| ELIFLUX 350 | SA FB 2 C Cr H5 | --- | 232 |
| **Gas Welding Wires** | | | GeKa |
| ELIGAS 1 | O I | R 45 | 233 |
| ELIGAS 2 | O Z | R 60 | 234 |
| ELIGAS 4 | O IV | R 60-G | 235 |

# WELDING ELECTRODES


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# Rutile Electrode
# ELIT

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 0 RR 12 |
| EN ISO 2560-A | : E 42 0 RR 12 |
| AWS A5.1 | : E 6013 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.07 | 0.3 | 0.5 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/0°C) | Elongation ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 510-610 | min. 47 J | min.22 |

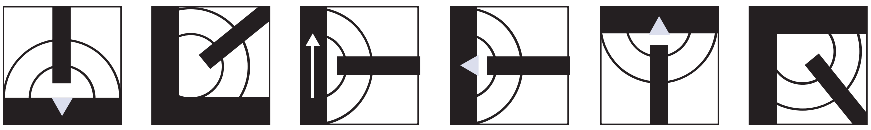
## Typical Base Material Grades

- S 235JR, S275JR, S235J2G3-S355J2G3, P235 GH, P265 GH, P255NH, P235T1-P355T1, P235T2-P355T2, P235G1TH, P255G1TH, L210-L360NB, S235JRS1-S235J2S1, S235JRS2 - S235J2S2

## Features and Applications

- The mostly-used type among the rutile electrodes
- Electrode coating of high thickness
- Spatter and fume formation in low amounts
- Good welding beads
- Easy striking

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100003 | 2.00 x 300 | 5/64 x 12” | 45 - 80 | 1160 |
| 3010100012 | 2.50 x 350 | 3/32 x 14” | 60 - 110 | 2000 |
| 3010100018 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3220 |
| 3010100024 | 4.00 x 350 | 5/32 x 14” | 140 - 180 | 4740 |
| 3010100027 | 4.00 x 450 | 5/32 x 18” | 140 - 180 | 6220 |
| 3010100030 | 5.00 x 350 | 3/16 x 14” | 170- 240 | 7640 |
| 3010100033 | 5.00 x 450 | 3/16 x 18” | 170 - 240 | 9680 |

**Approvals:** TSE, CE, TL, DNV-GL, BV, ABS, LR, NK, RINA, TÜV, DB, SEPRO, CWB

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Rutile Electrode

# PANTERA

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 0 RR 12 |
| EN ISO 2560-A | : E 42 0 RR 12 |
| AWS A5.1 | : E 6013 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.08 | 0.4 | 0.5 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/0°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 510-610 | min. 47 J | min.22 |

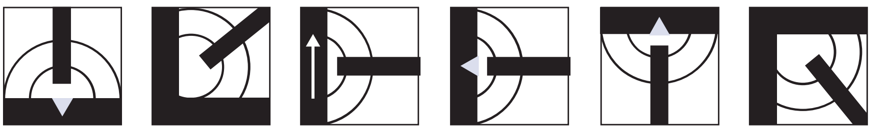
## Typical Base Material Grades

- S 235JR,S275JR, S235J2G3-S355J2G3, P235 GH, P265 GH, P255NH, P235T1-P355T1, P235T2-P355T2, P235G1TH, P255G1TH, L210-L360NB, S235JRS1-S235J2S1, S235JRS2-S235J2S2

## Features and Applications

- Resistance to high current
- Soft and stable welding
- Spatter and fume formations in low amounts
- Formation of self-removable slags

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100045 | 2.50 x 350 | 3/32 x 14” | 60 -110 | 2120 |
| 3010100048 | 3.20 x 350 | 1/8 x 14” | 90 -150 | 3370 |
| 3010100054 | 4.00 x 350 | 5/32 x 14” | 130- 200 | 5130 |
| 3010100057 | 4.00 x 450 | 5/32 x 18” | 130- 200 | 6660 |
| 3010100060 | 5.00 x 350 | 3/16 x 14” | 170 - 250 | 8090 |
| 3010100063 | 5.00 x 450 | 3/16 x 18” | 170 - 250 | 10410 |

**Approvals:** TSE, CE, TL, DNV-GL, BV, ABS, LR, SEPRO

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# LOTUS

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 0 RC 11 |
| EN ISO 2560-A | : E 42 0 RC 11 |
| AWS A5.1 | : E 6013 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.07 | 0.3 | 0.4 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength (ISO-V/0°C) | Elongation $(L_0=5d_0)$ (%) |
|---|---|---|---|
| min. 420 | 510-610 | min. 47 J | min.22 |

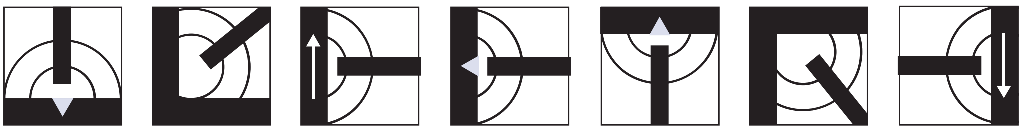
## Typical Base Material Grades

- S 235JR,S275JR, S235J2G3-S355J2G3, P235 GH, P265 GH, P255NH, P235T1-P355T1, P235T2-P355T2, P235G1TH, P255G1TH, L210-L360NB, S235JRS1-S235J2S1, S235JRS2-S235J2S2

## Features and Applications

- Electrode coating of medium-thickness
- Electrode coating of flexible type, providing electrode bendability
- Usability in welding of materials at hardly-reachable places
- Suitability for welding at vertical-down welding position

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100072 | 2.50 x 350 | 3/32 x 14” | 60-110 | 1760 |
| 3010100075 | 3.20 x 350 | 1/8 x 14” | 90-140 | 2920 |
| 3010100081 | 4.00 x 350 | 5/32 x 14” | 130-200 | 4290 |
| 3010100084 | 4.00 x 450 | 5/32 x 18” | 130-200 | 5510 |
| 3010100087 | 5.00 x 350 | 3/16 x 14” | 170-240 | 6955 |
| 3010100090 | 5.00 x 450 | 3/16 x 18” | 170-250 | 8800 |

**Approvals:** TSE, CE, TL, LR, TÜV, DB, SEPRO

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# Rutile Electrode
# EGE

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 38 0 RC 12 |
| EN ISO 2560-A | : E 38 0 RC 12 |
| AWS A5.1 | : E 6013 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.08 | 0.4 | 0.5 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/0°C) | Elongation ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 380 | 470-550 | min.47 J | min.22 |

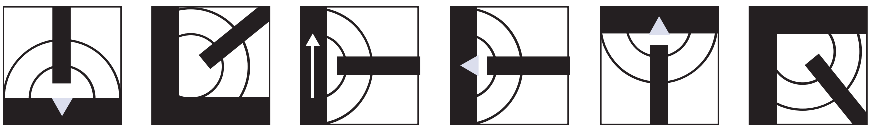
## Typical Base Material Grades

- S 235JR,S275JR, S235J2G3-S355J2G3, P235 GH, P265 GH, P255NH, P235T1-P355T1, P235T2-P355T2, P235G1TH, P255G1TH, S235JRS1-S235J2S1, S235JRS2-S235J2S2

## Features and Applications

- Easily striking
- Suitability to spot welding
- Suitability for use in iron works

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100093 | 2.50 x 350 | 3/32 x 14” | 60 - 110 | 1910 |
| 3010100096 | 3.20 x 350 | 1/8 x 14” | 90 - 140 | 3160 |
| 3010100099 | 4.00 x 350 | 5/32 x 14” | 130 - 180 | 4700 |

**Approvals:** TSE, CE, SEPRO

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# GRANIT

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 38 2 RB 12 |
| EN ISO 2560-A | : E 38 2 RB 12 |
| AWS A5.1 | : ~ E 6013 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.08 | 0.2 | 0.5 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/-20°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 380 | 470-570 | min.47 J | min.24 |

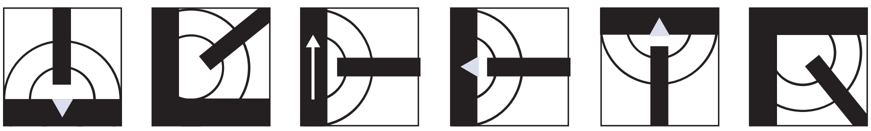
## Typical Base Material Grades

- S 235JR, S275JR, S235J2G3-S355J2G3, P235 GH, P265 GH, P255NH, P235T1-P355T1, P235T2-P355T2, P235G1TH, P255G1TH, L210-L360NB, S235JRS1-S235J2S1, S235JRS2-S235J2S2

## Features and Applications

- Electrode of rutile-basic character
- Electrode coating with high thickness
- Suitability for welding of pressure pipes
- Smooth welding bead without undercutting

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100102 | 2.50 x 350 | 3/32 x 14” | 60 - 110 | 1930 |
| 3010100105 | 3.20 x 350 | 1/8 x 14” | 90 - 140 | 3315 |
| 3010100108 | 4.00 x 350 | 5/32 x 14” | 110 - 200 | 4730 |

**Approvals:** TSE, CE, SEPRO

Rutile Electrode
# STEP

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 0 RC 11 |
| EN ISO 2560-A | : E 42 0 RC 11 |
| AWS A5.1 | : E 6012 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.06 | 0.35 | 0.45 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/0°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 510-610 | min.47 J | min.22 |

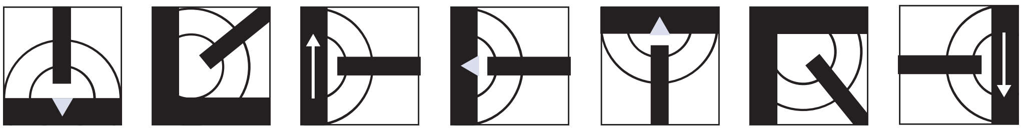
## Typical Base Material Grades

- S 235JR,S275JR, S235J2G3-S355J2G3, P235 GH, P265 GH, P255NH, P235T1 - P355T1, P235T2-P355T2, P235G1TH, P255G1TH, L210-L360NB, S235JRS1-S235J2S1, S235JRS2-S235J2S2

## Features and Applications

- Electrode coating with medium-thickness
- Electrode coating of flexible type, providing electrode bendability
- Usability in welding of materials at hardly-reachable places
- Suitability for welding at vertical down position

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100120 | 2.50 x 350 | 3/32 x 14” | 60 - 110 | 1730 |
| 3010100123 | 3.20 x 350 | 1/8 x 14” | 90 - 140 | 2900 |
| 3010100126 | 4.00 x 350 | 5/32 x 14” | 130 - 180 | 4275 |

**Approvals:** TSE, CE, SEPRO

Rutile Electrode

# INTER

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 38 0 RC 11 |
| EN ISO 2560-A | : E 38 0 RC 11 |
| AWS A5.1 | : E 6013 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.06 | 0.3 | 0.5 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/0°C) | **Elongation** $(L_0=5d_0)$ (%) |
|---|---|---|---|
| min.390 | 470-590 | min.47 J | min.22 |

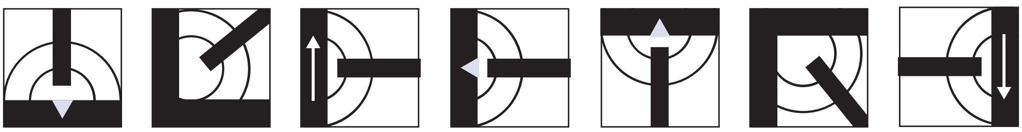
## Typical Base Material Grades

- S 235JR,S275JR, S235J2G3-S355J2G3, P235 GH, P265 GH, P255NH, P235T1-P355T1, P235T2-P355T2, P235G1TH, P255G1TH, L210-L360NB, S235JRS1-S235J2S1, S235JRS2-S235J2S2

## Features and Applications

- Electrode coating of flexible type, providing electrode bendability
- Suitability for welding at vertical-down position
- Deep penetration

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100129 | 2.50 x 350 | 3/32 x 14” | 60 - 110 | 1850 |
| 3010100132 | 3.20 x 350 | 1/8 x 14” | 90 - 140 | 2940 |
| 3010100138 | 4.00 x 350 | 5/32 x 14” | 110 - 180 | 4250 |
| 3010100141 | 4.00 x 450 | 5/32 x 18” | 110 - 200 | 5460 |

**Approvals:** TSE, CE, SEPRO

Rutile Electrode

# ELIT ARMCO

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 35 A RR 12 |
| EN ISO 2560-A | : E 35 A RR 12 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.05 | max. 0.2 | 0.3 |

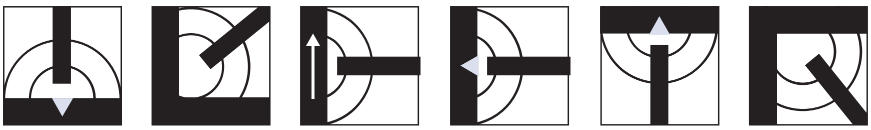
## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 355 | 440-560 | min. 47 J | min. 22 |

## Features and Applications

- Soft and stable welding
- Spatter formation in low amounts
- Formation of easily-removable slags
- Used for Armco Iron and very low carbon and silicon content steels, zinc bath containers used in galvanized coating

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100150 | 3.20 x 350 | 1/8 x 14” | 110 - 140 | 4090 |
| 3010100153 | 4.00 x 350 | 5/32 x 14” | 140 - 180 | 6120 |
| 3010100156 | 5.00 x 350 | 3/16 x 14” | 180 - 220 | 8160 |

**Approvals:** TSE, CE, SEPRO

# Rutile Electrode
# ELIT R 110

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 0 RR 33 |
| EN ISO 2560-A | : E 42 0 RR 33 |
| AWS A5.1 | : E 7014 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.07 | 0.4 | 0.6 |

## Mechanical Properties

| Yield Strength (N/mm²) | Tensile Strength (N/mm²) | Impact Strength (ISO-V/0°C) | Elongation $(L_0=5d_0)$ (%) |
|---|---|---|---|
| min. 420 | 520 - 600 | min. 47 J | min. 22 |

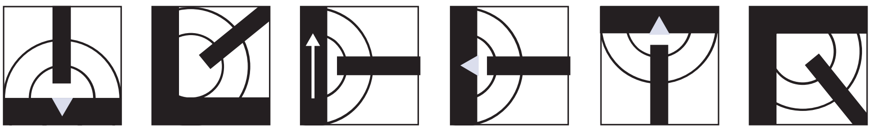
## Typical Base Material Grades

- S 235JR,S275JR, S235J2G3-S355J2G3, P235 GH, P265 GH, P255NH,S235JRS1-S235J2S1, S235JRS2-S235J2S2

## Features and Applications

- Usability in welding at all positions
- Resistance to high current
- Soft and stable welding
- Spatter formation in low amounts
- Welding efficiency of about 110%

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010102195 | 3.20 x 350 | 1/8 x 14” | 120 - 160 | 3558 |
| 3010102196 | 4.00 x 350 | 5/32 x 18” | 150 - 220 | 5910 |

**Approvals:** TSE, CE, SEPRO, RCB

## GeKa

Rutile Electrode

# CEM

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 0 RR 53 |
| EN ISO 2560-A | : E 42 0 RR 53 |
| AWS A5.1 | : E 7024 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.07 | 0.4 | 0.7 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/0°C) | Elongation $(L_0=5d_0)$ (%) |
|---|---|---|---|
| min. 420 | 510 - 610 | min. 47 J | min. 22 |

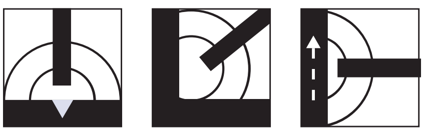
## Typical Base Material Grades

- S 235JR,S275JR, S235J2G3-S355J2G3, P235GH, P265GH, P295GH, S235JRS1-S235J2S1, S235JRS2- S235J2S2,

## Features and Applications

- Resistance to high current
- High welding efficiency (about 160%)
- Cost-saving in groove welding and in flat fillet welding

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100171 | 3.20 x 350 | 1/8 x 14” | 120 - 180 | 4710 |
| 3010100177 | 4.00 x 450 | 5/32 x 18” | 160 - 240 | 9830 |
| 3010100180 | 5.00 x 450 | 3/16 x 18” | 200 - 320 | 14950 |

**Approvals:** TSE, ABS, RS, RINA, NK, BV, CE, DNV-GL, SEPRO, CWB

# GeKa

Cellulosic Electrode

# LINK 6010

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 38 3 C 21 |
| EN ISO 2560-A | : E 38 3 C 21 |
| AWS A5.1 | : E 6010 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.12 | 0.2 | 0.6 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-30°C) | Elongation ($L_0=5d_0$) (%) |
|---|---|---|---|
| min.380 | 470-540 | min.47 J | min.22 |

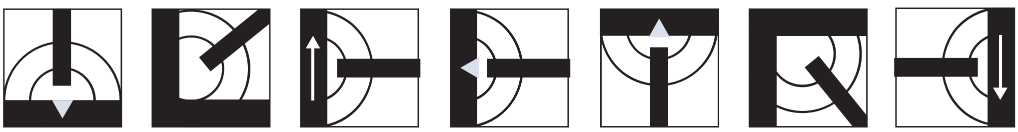
## Typical Base Material Grades

- S235JR, S275JR, S235J2G3, S275J2G3, S355J2G3, P235GH, P265GH,P235T1-P355T1, P235T2-P355T2, L210-L360NB, L290MB-L360MB, S235JRS1-S235J2S2, P235G1TH, P255G1TH, X42-X56, for root pass X60-X80.

## Features and Applications

- Suitability for use in welding large-diameter pipelines for crude oil, natural gas, and water as well as in root-pass welding or surfacing of ships, tanks, boilers, and steel constructions
- Usability in sour gas - involving applications (acc. HIC Test NACE TM-0284)
- Deep penetration obtained in welding at all positions
- Most suitability for welding at vertical down position

## Welding Positions



## Current Type

D.C.(+) / D.C. (-) for root pass

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100186 | 2.50 x 350 | 3/32 x 14” | 40 - 80 | 1670 |
| 3010100189 | 3.20 x 350 | 1/8 x 14” | 65 - 125 | 2720 |
| 3010100192 | 4.00 x 350 | 5/32 x 14” | 90 - 175 | 4110 |
| 3010100195 | 5.00 x 350 | 3/16 x 14” | 140-220 | 6210 |

**Approvals:** TSE, DNV-GL, TÜV, DB, CE, NACE, SEPRO, CWB

GeKa®

Cellulosic Electrode

# LINK 7010 - G

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 2 Mo C 21 |
| EN ISO 2560-A | : E 42 2 Mo C 21 |
| AWS A5.5 | : E 7010 - G |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo |
|---|---|---|---|
| 0.10 | 0.15 | 0.4 | 0.3 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/-20°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 510 - 590 | min. 47 J | min. 22 |

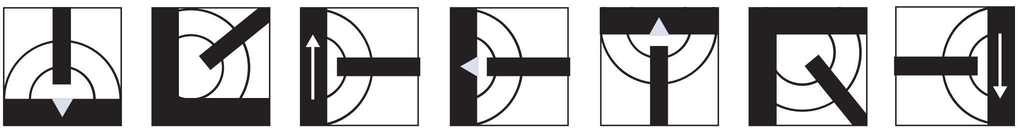
## Typical Base Material Grades

- S235JR, S275JR, S235J2G3, S275J2G3, S355J2G3, P235GH, P265GH,P355T1, P235T2-P355T2, L210-L415NB, L290MB-L415MB,S235JRS1-S235J4S2, P235G1TH, P255G1TH, X42-X65 for root pass applications is using up to X70(L485MB)

## Features and Applications

- It is used for root and filler passes in all welding positions of high strength steels, assembly pipelines, closed vessels and boilers, steel constructions
- Deep penetration, especially (obtained) at vertical-down position

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100234 | 2.50 x 350 | 3/32 x 14” | 40 - 80 | 1700 |
| 3010100237 | 3.20 x 350 | 1/8 x 14” | 65 -125 | 2735 |
| 3010100240 | 4.00 x 350 | 5/32 x 14” | 90 - 175 | 3990 |
| 3010100243 | 5.00 x 350 | 3/16 x 14” | 140 - 220 | 6135 |

**Approvals:** TSE, CE, SEPRO

Cellulosic Electrode

# LINK 7010 - P1

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 3 C 21 |
| EN ISO 2560-A | : E 42 3 C 21 |
| AWS A5.5 | : E 7010-P1 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.15 | 0.2 | 1.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-30°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 500-640 | min. 47 J | min. 22 |

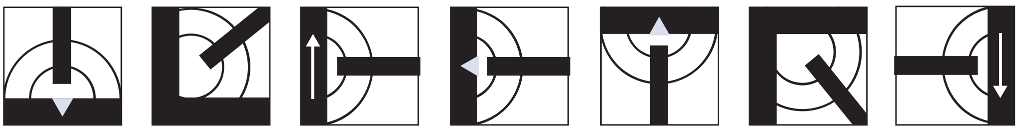
## Typical Base Material Grades

- S235JR, S275JR, S235J2G3, S275J2G3, S355J2G3, P235GH, P265GH,P355T1, P235T2-P355T2, L210-L415NB, L290MB-L415MB,S235JRS1-S235J4S, P235G1TH, P255G1TH, X42-X60

## Features and Applications

- Suitability for use in welding large-diameter high-strength steel pipelines and expecially use in hot, filler and cap passes.
- Deep penetration, especially (obtained) at vertical-down position.
- For root-pass welding, GeKa electrode LINK 6010 is recommended.

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100253 | 2.50 x 350 | 3/32 x 14” | 40 - 80 | 1700 |
| 3010100256 | 3.20 x 350 | 1/8 x 14” | 65 - 125 | 2735 |
| 3010100259 | 4.00 x 350 | 5/32 x 14” | 90 -175 | 3990 |
| 3010100262 | 5.00 x 350 | 3/16 x 14” | 140 - 220 | 6135 |

**Approvals:** TSE, CE, SEPRO

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# LINK 8010 - G

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E Z 46 3 Mo C 21 |
| EN ISO 2560-A | : E Z 46 3 Mo C 21 |
| AWS A5.5 | : E 8010 - G |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Mo |
|---|---|---|---|---|
| 0.14 | 0.2 | 0.9 | 0.2 | 0.15 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-30°C) | Elongation ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 460 | 550 - 650 | min. 47 J | min. 20 |

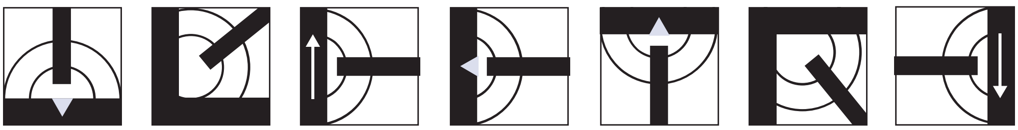
## Typical Base Material Grades

- L290NB-L415NB, L290MB-L415MB, -L485MB, S235JRS1-S235J4S, X42-X70

## Features and Applications

- Suitability for use in all-positions of welding high-strength low alloyed steel pipelines joining
- Suitability for  use in welding all positions, particularly vertical down position
- Usability in sour gas - involving applications (acc. HIC Test NACE TM-0284)
- For root-pass welding, GeKa LINK 6010 is recommended

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100273 | 2.50 x 350 | 3/32 x 14” | 40 - 80 | 1635 |
| 3010100276 | 3.20 x 350 | 1/8 x 14” | 65 - 125 | 2640 |
| 3010100279 | 4.00 x 350 | 5/32 x 14” | 90 - 175 | 4000 |
| 3010100282 | 5.00 x 350 | 3/16 x 14” | 140 - 220 | 6340 |

**Approvals:** TSE, CE, SEPRO

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# LINK 8010 - P1

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 46 3 1 Ni C 21 |
| EN ISO 2560-A | : E 46 3 1 Ni C 21 |
| AWS A5.5 | : E 8010-P1 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni |
|---|---|---|---|
| 0.14 | 0.2 | 0.9 | 0.6 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength (ISO-V/-30°C) | Elongation ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 460 | 550-650 | min. 47 J | min. 20 |

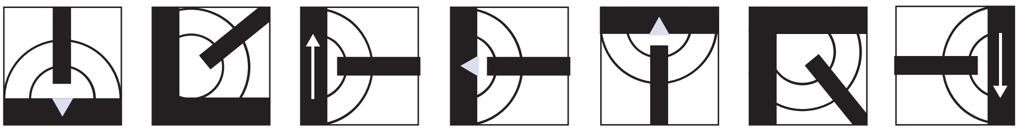
## Typical Base Material Grades

- L290NB-L415NB, L290MB-L415MB, -L485MB, S235JRS1-S235J4S, X42-X70

## Features and Applications

- Suitability for use in all-positions of welding high-strentgh low alloyed steel pipelines joining
- Suitability for use in welding all positions, particularly vertical down position
- Can be used in sour gas applications
- For root-pass welding, GeKa LINK 6010 is recommended

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100305 | 2.50 x 350 | 3/32 x 14” | 40 - 80 | 1635 |
| 3010100308 | 3.20 x 350 | 1/8 x 14” | 65 - 125 | 2640 |
| 3010100311 | 4.00 x 350 | 5/32 x 14” | 90 - 175 | 4000 |
| 3010100314 | 5.00 x 350 | 3/16 x 14” | 140 - 220 | 6340 |

**Approvals:** BV, DNV-GL, CE, TSE, SEPRO, NACE

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# LASER B 43

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 38 4 B 42 H5 |
| EN ISO 2560-A | : E 38 4 B 42 H5 |
| AWS A5.1 | : E 7016-1 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.06 | 0.5 | 0.7 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-50°C) | Elongation ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 400 | 490-600 | min. 47 J | min. 24 |

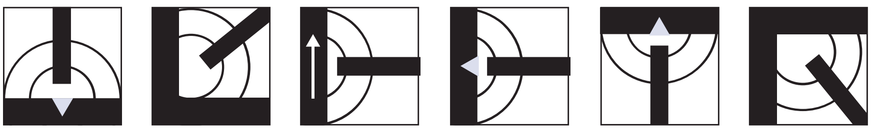
## Typical Base Material Grades

- S235JR-E295, S235J2G3-S355J2G3, C22, C35, P235T1-P355T1, P235T2,P355T2, L210 -L320, L290MB-L320MB, P235G1TH, P255G1TH, P235GH,P265GH, P295GH, S235JRS1-S235J4S, S315G1S-S355G3S, S255N-S355N, P255NH-P355NH, S255NL-S355NL, GE200 - GE240
- API 5L: A, B, X42, X46, X52, X56

## Features and Applications

- Suitability for use in welding at all positions except for vertical down position
- Weld metal recovery of about 110%
- Weld deposits with very low hydrogen content
- High-quality and ductile, crack-resistant weld metals, mostly forming rigid weldments with beads of large cross-sections
- D.C. (-) is recommended for the root pass
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C. (-) for root pass / D.C. (+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100336 | 2.50 x 350 | 3/32 x 14” | 80 -110 | 2270 |
| 3010100339 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3610 |
| 3010100342 | 4.00 x 450 | 5/32 x 18” | 130 -190 | 6760 |
| 3010100345 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10125 |

**Approvals:** TSE, CE, ABS SEPRO, DNV-GL

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# LASER B 47

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 4 B 42 H5 |
| EN ISO 2560-A | : E 42 4 B 42 H5 |
| AWS A5.1 | : E 7018 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.07 | 0.5 | 1.0 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/-40°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 510-600 | min. 47 J | min. 24 |

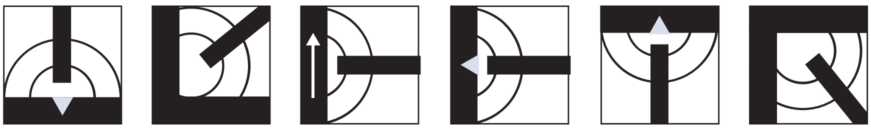
## Typical Base Material Grades

- S235JR-E295, E335, S235J2G3-S355J2G3, C22, C35, P235T1-P355T1, P235T2,P355T2, L210-L360, L290MB-L360MB, P235G1TH, P255G1TH, P235GH-P295GH, S235JRS1-S235J4S, S315G1S-S355G3S, S255N-S355N, P255NH-P355NH, S255NL-S355NL, GE200-GE300
- API 5L: A, B, X42, X46, X52, X56, X60

## Features and Applications

- Suitabilty for use in out-of-position welding except for welding at veretical down position
- Excellent strength and toughness
- Suitability for use in the fields of steel constructions, boiler, container, machine manufacturing and shipbuilding as well as for use in welding low-purity and high-carbon steels
- Suitability for the formation of welding buffer layers when buiding up high-carbon stees
- Weld deposits with very low hydrogen content
- Weld metal recovery of about 120%
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100351 | 2.50 x 350 | 3/32 x 14” | 80 -110 | 2410 |
| 3010100354 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3790 |
| 3010100363 | 4.00 x 450 | 5/32 x 18” | 130 -190 | 6850 |
| 3010100369 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10715 |

**Approvals:** BV, DNV-GL, TL, DB, ABS, LR, RS, RINA, NK, TSE, TÜV, SEPRO, CWB, HAKC, CE, CWB

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# LASER B 47-A

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 4 B 32 H5 |
| EN ISO 2560-A | : E 42 4 B 32 H5 |
| AWS A5.1 | : E 7016-1 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.07 | 0.6 | 1.0 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-46°C) | Elongation ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 500-610 | min. 47 J | min. 24 |

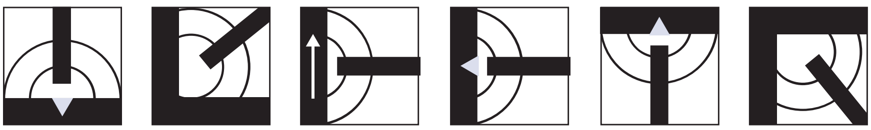
## Typical Base Material Grades

- S235JR-E295, E335, S235J2G3-S355J2G3, C22, C35, P235T1-P355T1, P235T2,P355T2, L210-L360, L290MB-L320MB, P235G1TH, P255G1TH, P235GH-P295GH, S235JRS1 S235J4S, S315G1S-S355G3S, S255N-S355N, GE200-GE300
- API 5L: A, B, X42, X46, X52, X56, X60

## Features and Applications

- Suitability for welding with AC power
- Suitability for use in out-of-position welding except for welding at vertical down position
- Excellent strength and toughness
- Suitability for use in the fields of steel constructions, boiler, container, machine manifacturing, and shipbuilding construction as well as for use in welding low-purity and high-carbon steels
- Suitability for the formation of welding buffer layers when building up high-carbon steels
- Weld deposits with very low hydrogen content
- Weld metal recovery of about 125%
- Requirement of re drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100372 | 2.50 x 350 | 3/32 x 14” | 80 -100 | 2320 |
| 3010100375 | 3.20 x 350 | 1/8 x 14” | 100-140 | 3720 |
| 3010100378 | 4.00 x 350 | 5/32 x 14” | 130 -190 | 5380 |
| 3010100381 | 4.00 x 450 | 5/32 x 18” | 130 -190 | 6820 |

**Approvals:** TSE, CE, ABS, SEPRO

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# LASER B 50

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 5 B 42 H5 |
| EN ISO 2560-A | : E 42 5 B 42 H5 |
| AWS A5.1 | : E 7018 - 1 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.08 | 0.5 | 1.1 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-50°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 510-630 | min. 47 J | min. 24 |

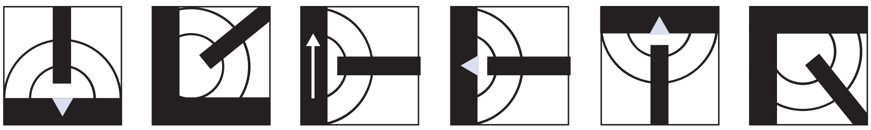
## Typical Base Material Grades

- S235JR-E295, E335, S235J2G3-S355J2G3, C22, C35, P235T1-P355T1, P235T2,P355T2, L210-L360, L290MB-L360MB, P235G1TH, P255G1TH, P235GH-P355GH, S235JRS1-S235J4S, S315G1S-S355G3S, S255N-S355N, P255NH-P355NH, S255NL-S355NL, GE200-GE300
- API 5L: A, B, X42, X46, X52, X56, X60

## Features and Applications

- Suitability for use in out-of-position welding except for welding at vertical down position
- Excellent strength and toughness
- Suitability for use in the fields of steel constructions, boiler, container, machine manufacturing and vertical construction as well as for use in welding low-purity and high-carbon steels
- Suitability for the formation of welding buffer layers when building up high-carbon steels
- Weld deposits with very low hydrogen content
- Weld metal recovery of about 110%
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100390 | 2.50 x 350 | 3/32 x 14” | 80 -100 | 2220 |
| 3010100393 | 3.20 x 350 | 1/8 x 14” | 100-140 | 3645 |
| 3010100402 | 4.00 x 450 | 5/32 x 18” | 130 -190 | 6700 |
| 3010100408 | 5.00 x 450 | 3/16 x 18” | 190/240 | 10500 |

**Product Code** TSE, ABS, CE, DNV-GL, SEPRO, CWB

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# LASER B 55

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 46 5 B 42 H5 |
| EN ISO 2560-A | : E 46 5 B 42 H5 |
| AWS A5.1 | : E 7018 - 1 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.08 | 0.4 | 1.4 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-50°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 460 | 530-650 | min. 47 J | min. 24 |

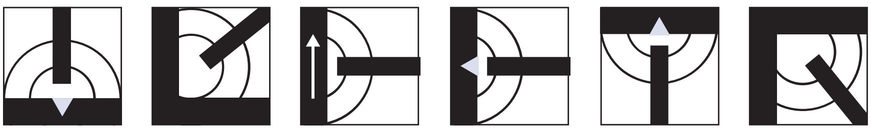
## Typical Base Material Grades

- S235JR-E295, E335, S235J2G3-S355J2G3, P235T1-P355T1, P235T2,P355T2, L210NB-L415NB, L290MB-L360MB, P235G1TH, P255G1TH, P235GH-P355GH, S235JRS1-S235J4S, S315G1 S-S355G3S, S255N-S380N, P255NH-P355NH, S255NL-S460NL1, GE200-GE300
- API 5L: X42, X46, X52, X56, X60, X65

## Features and Applications

- Suitability for use in out-of-position welding except for welding at vertical down position
- High ductility at low temperatures down to -50°C
- Suitability for use in welding low-purity and high-carbon steels
- Weld deposits with very low hydrogen content
- High-quality weld metals with higher strength values
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100411 | 2.50 x 350 | 3/32 X 14” | 80 - 100 | 2200 |
| 3010100414 | 3.20 x 350 | 1/8 X 14” | 100 - 140 | 3550 |
| 3010100417 | 4.00 x 450 | 5/32 X 18” | 130 -190 | 6570 |
| 3010100420 | 5.00 x 450 | 3/16 X 18” | 190 - 240 | 10220 |

**Approvals:** TSE, CE, ABS, SEPRO

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Low Hydrogen Electrode

# LASER B 55-S

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 46 6 B 42 H5 |
| EN ISO 2560-A | : E 46 6 B 42 H5 |
| AWS A5.1 | : E 7018 - 1 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.08 | 0.4 | 1.4 |

## Mechanical Properties*

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/-60°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 460 | 530-650 | min. 47 J | min. 24 |

* CTOD tested

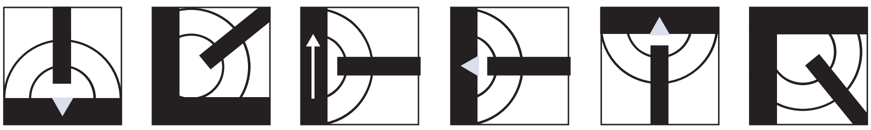
## Typical Base Material Grades

- S235JR-E295, E335, S235J2G3-S355J2G3, P235T1-P355T1, P235T2,P355T2, L210NB-L415NB, L290MB-L360MB, P235G1TH, P255G1TH, P235GH-P355GH, S235JRS1-S235J4S, S315G1S-S355G3S, S255N-S380N, P255NH-P355NH, S255NL-S460NL1, GE200-GE300
- API 5L: X42, X46, X52, X56, X60, X65

## Features and Applications

- Suitability for use in welding of high-strength, fine-grained steels
- High ductility at low temperatures down to -60°C
- It is used for joining thick materials safely
- Weld metal recovery of approx. 120%
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C
- CTOD tested.

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100423 | 2.50 x 350 | 3/32 x 14” | 80 - 100 | 2380 |
| 3010100426 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3740 |
| 3010100432 | 4.00 x 450 | 5/32 x 18” | 130 -190 | 7000 |

**Approvals:** TSE, BV, ABS, CE, SEPRO, CWB

Low Hydrogen Electrode

# LASER B 60

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 4 B 42 H5 |
| EN ISO 2560-A | : E 42 4 B 42 H5 |
| AWS A5.1 | : E 7018 - H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.08 | 0.6 | 1.2 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-40°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 520-630 | min. 47 J | min. 24 |

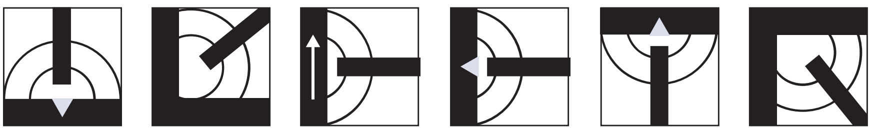
## Typical Base Material Grades

- S235JR-E295, E335, S235J2G3-S355J2G3, C22, C35, P235T1-P355T1, P235T2,P355T2, L210-L360, L290MB-L360MB, P235G1TH, P255G1TH, P235GH-P355GH, S235JRS1-S235J4S, S315G1S-S355G3S, S255N-S355N, P255NH-P355NH, S255NL-S355NL, GE200-GE300
- API 5L: A, B, X42, X46, X52, X56, X60

## Features and Applications

- Suitability for use in out-of-position welding except for welding at vertical down position
- Excellent strength and toughness
- Suitability for use in the fields of steel constructions, boiler, container, machine manifacturing and shipbuilding as well as for use in welding low purity and high-carbon steels
- The pressure vessels used in the production
- Suitability for the formation of welding buffer layers when building up high-carbon steels
- Weld deposits with very low hydrogen content
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100438 | 2.5 x 350 | 3/32 x 14” | 60 - 90 | 2300 |
| 3010100441 | 3.2 x 350 | 1/8 x 14” | 100 - 140 | 3700 |
| 3010100447 | 4.0 x 450 | 5/32 x 18” | 150 - 210 | 6800 |
| 3010100450 | 5.0 x 450 | 3/16 x 18” | 200 - 260 | 10200 |

**Approvals:** TSE, CE, SEPRO

GeKa

Low Alloyed High Strength Electrode

# TEMPO B 48

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 6 1 Ni B 32 H5 |
| EN ISO 2560-A | : E 42 6 1 Ni B 32 H5 |
| AWS A5.5 | : E 7018-G H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni |
|---|---|---|---|
| 0.06 | 0.5 | 1.0 | 0.8 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength (ISO-V/-60°C) | Elongation ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 460 | 530-640 | min. 47 J | min. 22 |

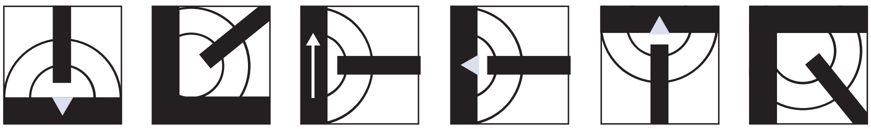
## Typical Base Material Grades

- EN 10205: S355J2G3, S355JR, S355J0, S355J2G4, S355K2G3, S355K2G4, ASTM A 572 Gr.50, A709Gr.50, A678Gr.50, A633Gr.D
- API 5L: A, B, X42, X46, X52, X56, X60

## Features and Applications

- This is AC/DC basic-coated electrode that has a weld metal recovery of 120% which can be used at all welding positions except for the vertical down position
- Usable with short arc in(-) pole for root pass welding with excellent penetration, especially at vertical-up position
- Weld deposit with high low temperature toughness
- Re-drying: 300-350°C / 2h

## Welding Positions



## Current Type

D.C.(+) / D.C.(-)

A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100462 | 2.50 x 350 | 3/32 x 14” | 60 - 100 | 2200 |
| 3010100465 | 3.20 x 350 | 1/8 x 14” | 80 - 130 | 3680 |
| 3010100471 | 4.00 x 350 | 5/32 x 14” | 120- 180 | 5370 |

**Approvals:** TSE, CE, ABS, SEPRO, BV

Low Alloyed High Strength Electrode

# TEMPO B 60

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 46 6 1Ni B 42 H5 |
| EN ISO 2560-A | : E 46 6 1Ni B 42 H5 |
| AWS A5.5 | : E 8018 - G H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni |
|---|---|---|---|
| 0.07 | 0.3 | 1.3 | 0.9 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-60°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 460 | 530-680 | min. 47 J | min. 20 |

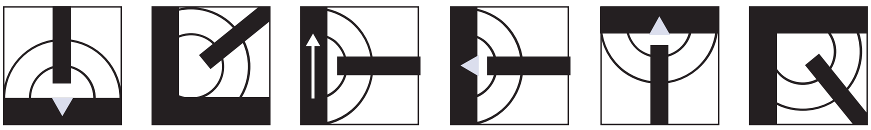
## Typical Base Material Grades

- E295, E335, S355J2G3, L210-L360NB, L210MB-L360MB,P310GH, P355GH, S380N-S460N, P380NH-P460NH, S380NL-S460NL, S255NL1-S420NL1, GE260-GE300
- API 5L: X42, X46, X52, X56, X60, X65

## Features and Applications

- Content with Mn-Ni alloy
- High toughness and high resistance to cracking
- Suitability for use in welding high strength, fine-grained structural steels
- Suitability for use in welding of materials with service temperatures between -60°C and +350°C
- Very high values of impact resistance after aging
- Convenience of welding at all positions except for vertical down position
- Weld deposits with very low contents of hydrogen
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100483 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2190 |
| 3010100486 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3570 |
| 3010100495 | 4.00 x 450 | 5/32 x18” | 130- 190 | 6660 |
| 3010100498 | 5.00 x 450 | 3/16 x 18” | 190-240 | 10550 |

**Approvals:** TSE, CE, DNV-GL, SEPRO

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Low Alloyed High Strength Electrode

# TEMPO B 63

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 50 3 B 42 H5 |
| EN ISO 2560-A | : E 50 3 B 42 H5 |
| AWS A5.5 | : E 8018-G H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.06 | 0.7 | 1.6 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-30°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 500 | 550-720 | min. 47 J | min. 19 |

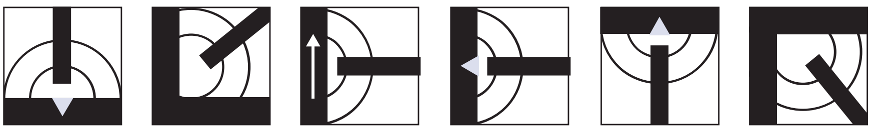
## Typical Base Material Grades

- S355J2G3,E295-E360, C35-C60, S315N-S500N, P315NH-P500NH, GE240-GE340
  Resistance of the rail steels up to 785 $N/mm^2$ are used.
- API 5L: X52, X56, X60, X65, X70

## Features and Applications

- Suitability for use in welding carbon and low-alloyed high-strength steels with carbon contents up to 0.6%
- Suitability for use in rail-joint welding
- Ductile and crack-resistant weld metals
- Recovery of weld metals about 115%
- Weldability at all positions except for vertical down positions
- Weld deposits with very low contents of hydrogen
- Requirement of re-drying for minimum 2 hours at the temperatures between 350°C and 400°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100501 | 2.50 x 350 | 3/32 x 14” | 80-110 | 2220 |
| 3010100504 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3590 |
| 3010100507 | 4.00 x 450 | 5/32 x 18” | 130-190 | 6820 |
| 3010100510 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10500 |

**Approvals:** TSE, CE, SEPRO

GeKa

Low Alloyed High Strength Electrode

# TEMPO B 65

## Standards

| | |
|---|---|
| TS EN ISO 18275-A | : E 55 6 1 NiMo B 42 H5 |
| EN ISO 18275-A | : E 55 6 1 NiMo B 42 H5 |
| AWS A5.5 | : E 8018 - G H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Mo |
|---|---|---|---|---|
| 0.06 | 0.3 | 1.2 | 0.8 | 0.35 |

## Mechanical Properties*

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-60°C) | Elongation ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 550 | 630-750 | min. 47 J | min. 19 |

* CTOD tested

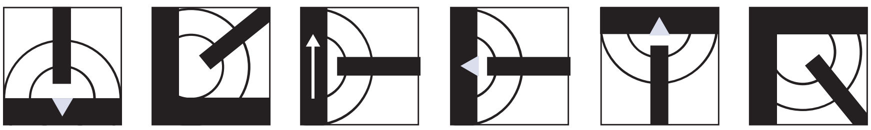
## Typical Base Material Grades

- E295-E360, 20MnMoNi5-5,22NiMoCr4-7, S380N-S500N, S380NH-S500NH,S380NL-S500NL, S380NL1- S500NL1, 15NiCuMoNb5S, 17MnMoV6-4,C35-C60, GS60,
- API 5L: X52, X56, X60, X65, X70

## Features and Applications

- Suitability for use in welding high-strength, fine-grained steels
- Consistent high ductility and crack-resistance at low working temperatures down to -60°C
- Resistance to aging
- Convenience of welding at all positions except for the vertical down position
- Possibility of applying same heat treatments temperatures at pre- and post- welding as well as at transition stages as those of base metal
- Very low contents of hydrogen
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+) / D.C. (-) for root pass

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100513 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2200 |
| 3010100516 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3640 |
| 3010100522 | 4.00 x 450 | 5/32 x 18” | 130 - 190 | 6800 |
| 3010100528 | 5.00 x 450 | 3/16 x 18” | 190-240 | 10500 |

**Approvals:** CE, ABS, SEPRO

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Low Alloyed High Strength Electrode

# TEMPO B 70 M

## Standards

| | |
|---|---|
| TS EN ISO 18275-A | : E 55 6 Z (1 NiMo) B 42 H5 |
| EN ISO 18275-A | : E 55 6 Z (1 NiMo) B 42 H5 |
| AWS A5.5 | : E 9018-M H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Mo |
|---|---|---|---|---|
| 0.05 | 0.3 | 1.1 | 1.4 | 0.3 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-60°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 550 | 620-780 | min. 47 J | min. 24 | AW |

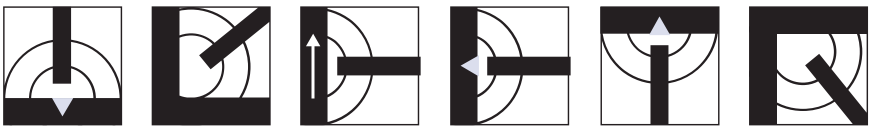
## Typical Base Material Grades

- S380N-S500N, S355NH-S460NH, S380NL-500NL
- Fine grained, high strength steels and steel castings
- API 5L: X52, X56, X60, X65, X70

## Features and Applications

- High resistance to cracking
- Low amounts of Hydrogen (4 ml / 100 g)
- Operability at temperatures between - 60°C and + 350°C
- Low content of moisture absorbed during long-term storage
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100546 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2250 |
| 3010100549 | 3.20 x 350 | 1/8 x 14” | 100- 140 | 3640 |
| 3010100552 | 4.00 x 450 | 5/32 x 18” | 130 - 190 | 6880 |
| 3010100555 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10130 |

**Approvals:** CE, SEPRO

Low Alloyed High Strength Electrode

# TEMPO B 70 S

## Standards

| | |
|---|---|
| TS EN ISO 18275-A | : E 55 6 2 NiMo BT 42 H5 |
| EN ISO 18275-A | : E 55 6 2 NiMo BT 42 H5 |
| AWS A5.5 | : E 9018 - G H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Mo |
|---|---|---|---|---|
| 0.07 | 0.2 | 0.6 | 2.4 | 0.4 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/-60°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 550 | 620-780 | min. 47 J | min. 18 | 560-600°C / 1 h / 300°C (air) |

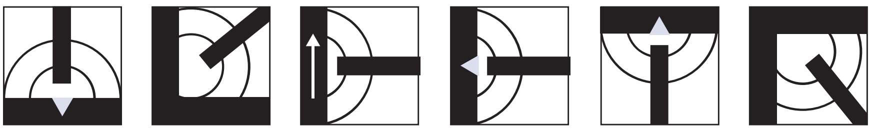
## Typical Base Material Grades

- S380N-S500N, S355NH-S460NH, S380NL-500NL
- Fine grained, high alloyed steels and steel castings
- API 5L: X52, X56, X60, X65, X70

## Features and Applications

- Suitability for use in welding of high-strength, fine-grained steels
- High ductility and high resistance to cracking obtained in welding fine-grained steels
- Suitability for use in welding of materials with service temperatures between -60°C and +350°C
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100570 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2320 |
| 3010100573 | 3.20 x 350 | 1/8 x 14” | 100- 140 | 3670 |
| 3010100576 | 4.00 x 450 | 5/32 x 18” | 130 - 190 | 6790 |
| 3010100579 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10130 |

**Approvals:** CE, ABS, SEPRO

Low Alloyed High Strength Electrode

# TEMPO B 70 Mo

## Standards

| | |
|---|---|
| TS EN ISO 18275-A | : E 55 5 MnMo B 42 H5 |
| EN ISO 18275-A | : E 55 5 MnMo B 42 H5 |
| AWS A5.5 | : ~ E 9018-D1 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo |
|---|---|---|---|
| 0.075 | 0.4 | 1.6 | 0.45 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/-50°C) | **Elongation** $(L_0=5d_0)$ (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 550 | 620-780 | min. 47 J | min. 18 | 560-600°C / 1h / 300°C (air) |

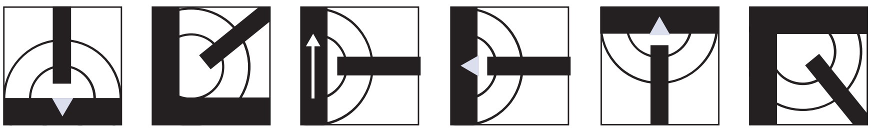
## Typical Base Material Grades

- E295-E360, P355GH, 17MnMoV6-4, 15NiCuMoNb5S,S380N-S500N, P380NH-S500NH, GE300-GE340,G22Mo4
- API 5L: X52, X56, X60, X65, X70

## Features and Applications

- Suitability for use in welding high-strength, fine-grained constructional steels and high-temperature steels
- Use in welding rail steels with strength values up to 785 N/mm²
- Content including MnMo alloy
- Resistance to cracking as well as to aging, high toughness
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100558 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2220 |
| 3010100561 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3670 |
| 3010100564 | 4.00 x 450 | 5/32 x 18” | 130 - 190 | 6790 |
| 3010100567 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10130 |

**Approvals:** CE, SEPRO

GeKa

Low Alloyed High Strength Electrode

# TEMPO B 75

## Standards

| | |
|---|---|
| TS EN ISO 18275-A | : E 62 6 Z 1NiMo B 4 2 H5 |
| EN ISO 18275-A | : E 62 6 Z 1NiMo B 4 2 H5 |
| AWS A5.5 | : E 10018 - G H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Cr | Mo | Ni |
|---|---|---|---|---|---|
| 0.05 | 0.5 | 1.3 | 0.3 | 0.5 | 1.3 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/-60°C) | **Elongation** ($L_0$=5$d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 620 | 690-890 | min. 47 J | min. 18 | 560-600°C / 1h / 300°C (air) |

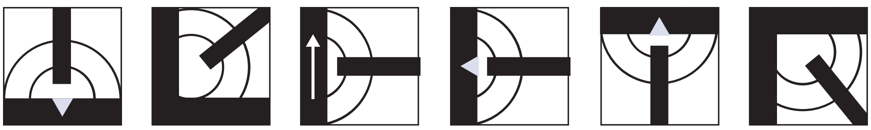
## Typical Base Material Grades

- The yield strength of 620 N/mm$^2$ up to the quenched and tempered fine grain steels
- The tensile strength of the 780 N/mm$^2$ heat treating steels.

## Features and Applications

- Content of Mn-Mo-Ni alloy
- High ductility and high resistance to cracking obtained in welding high-strength, quenched and tempered, fine-grained structural steels
- Suitability for use in welding of materials with service temperatures between -60°C and +400°C
- Very high values of impact resistance after aging
- Convenience of welding at all positions except for the vertical down position.
- Possibility of applying same heat treatment temperatures at pre- and post-welding as well as at transition stagesas those of base metal
- Weld deposits with very low contents of hydrogen
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100582 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2280 |
| 3010100585 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3580 |
| 3010100588 | 4.00 x 450 | 5/32 x 18” | 130 - 190 | 6680 |
| 3010100591 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10230 |

**Approvals:** CE, SEPRO

# Low Alloyed High Strength Electrode
# TEMPO B 85 M

## Standards

| | |
|---|---|
| TSENISO18275-A | : E 69 5 Mn2NiCrMo B 42 H5 |
| EN ISO 18275-A | : E 69 5 Mn2NiCrMo B 42 H5 |
| AWS A5.5 | : E11018-MH4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Cr | Mo | Ni |
|---|---|---|---|---|---|
| 0.05 | 0.2 | 1.6 | 0.35 | 0.45 | 2.2 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/-50°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 690 | 760-960 | min. 47 J | min. 20 |

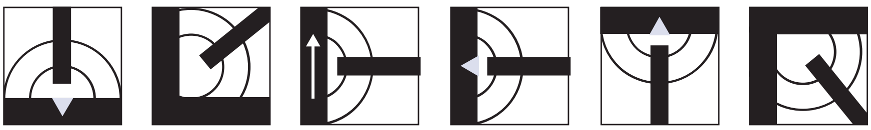
## Typical Base Material Grades

- S620QL-S690QL, S620QL 1, HY100
- API 5L: X60, X65, X70, X80

## Features and Applications

- Basic-type -coated and Ni-Cr-Mo -alloyed electrode character
- Applicability in welding of casting steels and high-strength fine-grained steels
- Weld metals with high resistance to cracking
- Low amounts of hydrogen (4 ml per 100 g of weld metal)
- Low amounts of moisture absorbed during long-term storage
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100609 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2250 |
| 3010100612 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3610 |
| 3010100618 | 4.00 x 450 | 5/32 x 18” | 130 - 190 | 6850 |
| 3010100624 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10520 |

**Approvals:** CE, ABS, SEPRO

GeKa

Low Alloyed High Strength Electrode

# TEMPO B 90

## Standards

| | |
|---|---|
| TS EN ISO 18275-A | : E 69 5 Z Mn2NiCrMo B 4 2 H5 |
| EN ISO 18275-A | : E 69 5 Z Mn2NiCrMo B 4 2 H5 |
| AWS A5.5 | : E 12018 - G H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Cr | Mo | Ni | Mn |
|---|---|---|---|---|---|
| 0.06 | 0.4 | 0.9 | 0.5 | 2.5 | 1.6 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-50°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 740 | 830-950 | min. 28 J | min. 17 | 560-600° C / 1h / 300° C (air) |

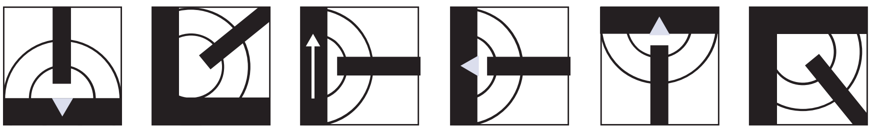
## Typical Base Material Grades

- HY 100, S690QL, S690QU, N-AXTRA 70
- API 5L: X60, X65, X70, X80

## Features and Applications

- Suitability for use in welding fine-grained steels, cementation steels, tempered steels, cast steels etc.
- Suitability for use of applications requiring a minimum tensile strength value of 830 $N/mm^2$
- Requirement of re-drying for minimum 2 hours at the temperatures between of 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100627 | 3.2 x 350 | 1/8 x 14” | 90 - 140 | 3670 |
| 3010100630 | 4.0 x 450 | 5/32 x 18” | 130 - 190 | 6740 |
| 3010100633 | 5.0 x 450 | 3/16 x 18” | 170 - 240 | 10530 |

**Approvals:** CE, SEPRO

Low Alloyed High Strength Electrode

# TEMPO Ni Cu

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 42 3 Z NiCrCu B 42 H5 |
| EN ISO 2560-A | : E 42 3 Z NiCrCu B 42 H5 |
| AWS A5.5 | : E7018-G/7018-W1(mod.)H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Cr | Ni | Cu | Mn |
|---|---|---|---|---|---|
| 0.06 | 0.5 | 0.3 | 0.4 | 0.4 | 1.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-30°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 510 - 630 | min. 47 J | min. 22 |

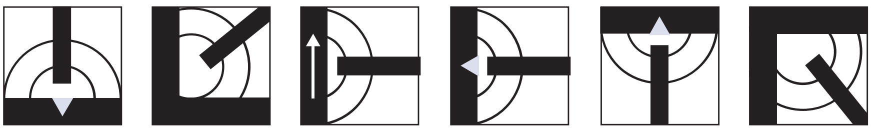
## Typical Base Material Grades

- S235JR, S235JRW, S325J2W, S355J2G1W, S355JRW, S355J2G 3 Cu, COR-TEN A

## Features and Applications

- Content of Ni-Cu-Cr alloy
- Suitability for use in welding structural steels exposed to weathering, such as COR-TEN.
- High mechanical properties with excellent crack resistance
- Convenience of welding at all positions except for vertical down position
- Weld deposits with very low contents of hydrogen
- Requirement of re-drying for minimum 2 hours at the temperatures between of 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100636 | 2.5 x 350 | 3/32 x 14” | 80-110 | 2240 |
| 3010100639 | 3.2 x 350 | 1/8 x 14” | 130-150 | 3520 |
| 3010100645 | 4.0 x 450 | 5/32 x 18” | 150-190 | 6580 |
| 3010100648 | 5.0 x 450 | 3/16 x 18” | 200-250 | 10100 |

**Approvals:** TSE, CE, SEPRO

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Low Alloyed High Strength Electrode

# TEMPO B W2

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 46 6 Z NiCrCu B 42 H5 |
| EN ISO 2560-A | : E 46 6 Z NiCrCu B 42 H5 |
| AWS A5.5 | : E 8018 -W2 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Cr | Ni | Cu | Mn |
|---|---|---|---|---|---|
| 0.06 | 0.45 | 0.5 | 0.5 | 0.4 | 0.7 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-60°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 460 | 550 - 680 | min. 47 J | min. 20 |

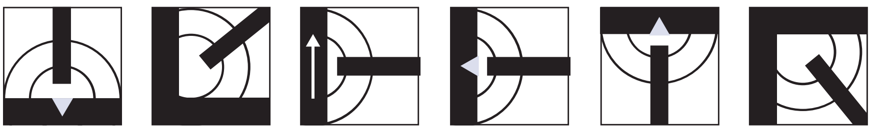
## Typical Base Material Grades

- S235JR, S235JRW, S325J2W, S355J2G1W, S355JRW, S355J2G 3 Cu, Patinax 37, 9CrNiCuP3-2-4 S255-S460, COR-TEN A,B,C

## Features and Applications

- Content of Ni-Cu-Cr alloy
- Suitability for use in welding structural steels exposed to weathering, especially for COR-TEN B type steels.
- High mechanical properties with excellent crack resistance
- Convenience of welding at all positions except for vertical down position
- Weld deposits with very low contents of hydrogen
- Requirement of re-drying for minimum 2 hours at the temperatures between of 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100651 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2200 |
| 3010100654 | 3.20 x 350 | 1/8 x 14” | 130 - 150 | 3550 |
| 3010100657 | 4.00 x 450 | 5/32 x 18” | 150 - 190 | 6700 |

**Approvals:** CE, SEPRO, TSE

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Low Alloyed High Strength Electrode

# TEMPO B 1

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 46 6 1 Ni B 42 H5 |
| EN ISO 2560-A | : E 46 6 1 Ni B 42 H5 |
| AWS A5.5 | : E 8018 -C3 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni |
|---|---|---|---|---|
| 0.07 | 0.3 | 1.0 | 0.15 | 1.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-60°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 470 | 550-680 | min. 47 J | min. 24 |

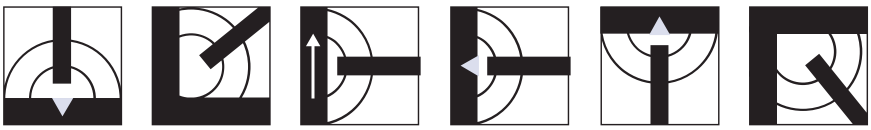
## Typical Base Material Grades

- 11 MnNi53, 13MnNi63, TTSt35N, TTSt35V, TTSt41, TTSt45, S255N-S500N,S255NL-S500NL

## Features and Applications

- Suitability for use in welding low-alloyed steels resistant to lower service temperatures
- Serviceability of weld metals at temperatures down to -60°C
- Weld metal recovery of approx. 120%
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100660 | 2.50 x 350 | 3/32 x 14” | 70 - 100 | 2190 |
| 3010100663 | 3.20 x 350 | 1/8 x 14” | 110 - 140 | 3440 |
| 3010100669 | 4.00 x 350 | 5/32 x 14” | 140 - 180 | 5130 |
| 3010100672 | 4.00 x 450 | 5/32 x 18” | 140 -190 | 6650 |
| 3010100678 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10500 |

**Approvals:** TSE, CE, SEPRO

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Low Alloyed High Strength Electrode

# TEMPO B 2

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 46 6 2 Ni B 42 H5 |
| EN ISO 2560-A | : E 46 6 2 Ni B 42 H5 |
| AWS A5.5 | : E8018-C1 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni |
|---|---|---|---|
| 0.05 | 0.3 | 0.8 | 2.4 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-80°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 460 | 550 - 690 | min. 47 J | min. 20 | 605°C / 2h / 300°C (air) |

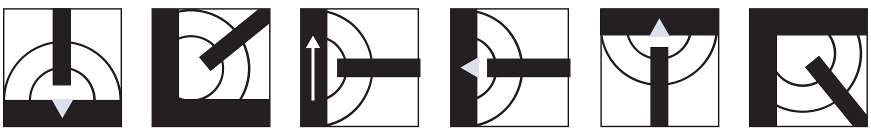
## Typical Base Material Grades

- 12Ni14, 14Ni6, 13MnNi6-3, G12Ni14, S255N-S460N, S255NH-S460NH, S255NL-S460NL, S255NL1-S460NL 1,TTSt35/N/V, TTSt45N/V

## Features and Applications

- Suitability for use in welding fine-grained, Ni-alloyed and carbon steels as well as cryogenic steels
- High ductility and crack resistance in weld deposits
- Serviceability of weld metals at temperatures down to -80°C
- Weld metal recovery of approx. 120%
- Convenience of welding at all positions except for vertical down position
- Possibility of applying same heat treatment temperatures at pre- and post-welding as well as at transition stages as those of base metal
- Weld deposits with very low contents of hydrogen
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100681 | 2.50 x 350 | 3/32 x 14” | 70 -100 | 2170 |
| 3010100684 | 3.20 x 350 | 1/8 x 14” | 110 - 140 | 3700 |
| 3010100687 | 4.00 x 450 | 5/32 x 18” | 140 - 180 | 6900 |
| 3010100690 | 5.00 x 450 | 3/16 x 18” | 190 - 230 | 10500 |

**Approvals:** TSE, CE, SEPRO

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# TEMPO B 3

## Standards

| | |
|---|---|
| TS EN ISO 2560-A | : E 46 6 3 Ni B 42 H5 |
| EN ISO 2560-A | : E 46 6 3 Ni B 42 H5 |
| AWS A5.5 | : E 8018-C2 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni |
|---|---|---|---|
| 0.05 | 0.3 | 0.7 | 3.2 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/-100°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 460 | 550 - 700 | min. 47 J | min. 24 | 605°C / 2h / 300°C (air) |

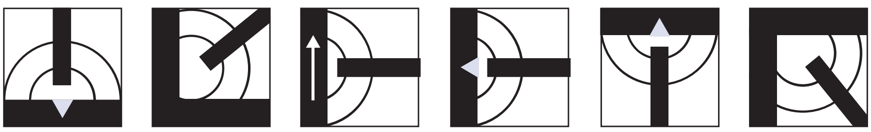
## Typical Base Material Grades

- Cold-tough steels: 10 Ni14, 16Ni16, S 255NL1-SS00NL1, S275NL2-P460NL2

## Features and Applications

- Suitability for use in welding Ni-alloyed construction steels for cryogenic applications
- High ductility and crack resistance in weld deposits
- Serviceability of weld metals at temperatures down to -110°C
- Weld metal recovery of approx. 120%
- Convenience of welding at all positions except for vertical down position
- Weld deposits with very low contents of hydrogen
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100693 | 2.50 x 350 | 3/32 x 14” | 70 - 110 | 2220 |
| 3010100696 | 3.20 x 350 | 1/8 x 14” | 110 - 140 | 3650 |
| 3010100702 | 4.00 x 450 | 5/32 x 18” | 140 - 180 | 6600 |
| 3010100705 | 5.00 x 450 | 3/16 x 18” | 190 - 230 | 10500 |

**Approvals:** TSE, CE, SEPRO

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Heat Resisting Electrode

# OPUS MOR

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E Mo R 12 |
| EN ISO 3580-A | : E Mo R 12 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo |
|---|---|---|---|
| 0.07 | 0.4 | 0.6 | 0.5 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20°C) | Elongation ($L_0=5d_0$) (%) | Heat Treatment |
|---|---|---|---|---|
| min. 355 | min. 510 | min. 47 J | min. 22 | 570-620°C / 1h / 300°C (air) |

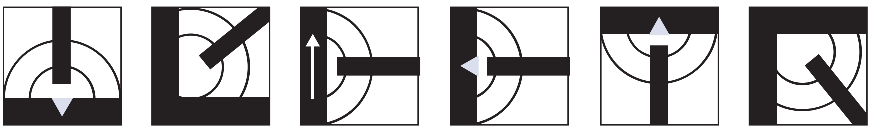
## Typical Base Material Grades

- S355J2G3, E295, P255G1TH, L320- L415NB, 16Mo3, L290MB-L415MB,16Mo3, S255N, P295GH, P355GH, P255-P355N, P255NH-P355NH

## Features and Applications

- Welding of heat-resistant Mo-alloyed, fine-grained or unalloyed steels used for construction of boilers and pipes
- Weld metal is resistant to working temperatures up to +550°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100708 | 2.50 x 350 | 3/32 x 14” | 80 - 100 | 2080 |
| 3010100711 | 3.20 x 350 | 1/8 x 14” | 110-140 | 3310 |
| 3010100714 | 4.00 x 350 | 5/32 x 14” | 140- 190 | 4900 |
| 3010100717 | 5.00 x 350 | 3/16 x 14” | 190 - 240 | 7540 |

**Approvals:** CE, SEPRO

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Heat Resisting Electrode

# OPUS MOB

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E Mo B 42 H5 |
| EN ISO 3580-A | : E Mo B 42 H5 |
| AWS A5.5 | : E 7018-A1 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo |
|---|---|---|---|
| 0.07 | 0.4 | 0.9 | 0.5 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-50°C) | Elongation ($L_0=5d_0$) (%) | Heat Treatment |
|---|---|---|---|---|
| min. 460 | 530 - 670 | min. 47 J | min. 22 | 620°C / 1h / 300°C (air) |

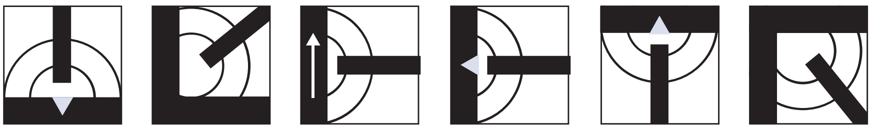
## Typical Base Material Grades

- S355J2G3, E295, E335, P255G1TH, 16Mo3, L320-L415NB, L290MB-L415MB,S255N-S460N, P295GH P355GH, 15NiCuMoNb5S, 20MnMoNi4-5, 17MnMoV6-4, S255NH-S460NH, S255NL-S460NL, GE240-GE300, GS22Mo4

## Features and Applications

- Basic-coated stick electrode
- Welding of heat-resisting, Mo-alloyed, thin-walled and unalloyed steels used for construction of boilers and pipes
- Weld metal is resistant to working temperatures from -50°C to +550°C
  Re-drying: 300-350°C min. 2h

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100720 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2200 |
| 3010100723 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3560 |
| 3010100729 | 4.00 x 450 | 5/32 x 18” | 140 - 190 | 6590 |
| 3010100735 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10160 |

**Approvals:** TÜV, DB, CE, SEPRO

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Heat Resisting Electrode

# OPUS C

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo1 R 12 |
| EN ISO 3580-A | : E CrMo1 R 12 |
| AWS A5.5 | : E 8013-G |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.06 | 0.4 | 0.6 | 0.5 | 1.1 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 460 | min. 550 | min. 47 J | min. 20 | 660-700°C / 1h / 300°C (air) |

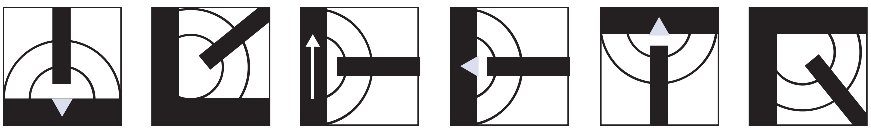
## Typical Base Material Grades

- 13CrMo4-5, 15CrMo5, 16CrMoV4, S355NH

## Features and Applications

- Welding of steam production plant equipments, steam pipes and similar kinds of heat-resistant joints, all of which are made of Cr-Mo alloy steels
- Electrode coating of rutile character
- Resistance of weld metal to operating temperatures of values up to 570°C

## Welding Positions



## Current Type

D.C. (-)
A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100738 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2150 |
| 3010100741 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3420 |
| 3010100744 | 4.00 x 350 | 5/32 x 14” | 140 - 190 | 4760 |

**Approvals:** CE, SEPRO

Heat Resisting Electrode

# OPUS CM

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo1 B 42 H5 |
| EN ISO 3580-A | : E CrMo1 B 42 H5 |
| AWS A5.5 | : E 8018-B2 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.07 | 0.5 | 0.8 | 0.5 | 1.1 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 460 | min. 550 | min. 47 J | min. 20 | 690°C / 1h / 300°C (air) |

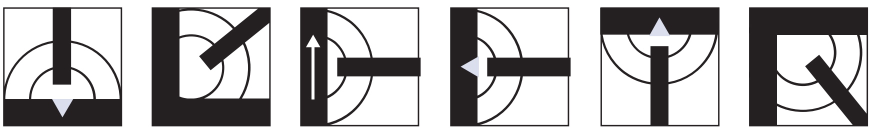
## Typical Base Material Grades

- 13CrMo4-5, 15CrMo5, 16CrMoV4, G17CrMo5-5, GS22Mo4, G22CrMo5-4, A193 Gr.B7, A335 Gr.P11

## Features and Applications

- Steam boilers and steam pipes made of Cr-Mo-alloyed heat-resistant steels
- Cementation steels, nitrided steels
- Electrode coating of basic character
- Requirement of re-drying for 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100747 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2190 |
| 3010100750 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3520 |
| 3010100756 | 4.00 x 450 | 5/32 x 18” | 140 - 190 | 6790 |
| 3010100759 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10020 |

**Approvals:** CE, SEPRO

Heat Resisting Electrode

# OPUS CM-15

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo1 B 42 H5 |
| EN ISO 3580-A | : E CrMo1 B 42 H5 |
| AWS A5.5 | : E 8015-B2 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.07 | 0.5 | 0.8 | 0.5 | 1.1 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 460 | 580 - 740 | min. 47 J | min. 20 | 690°C / 1h / 300°C (air) |

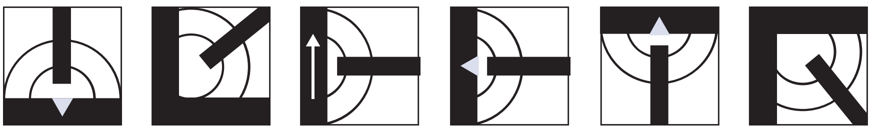
## Typical Base Material Grades

- 13CrMo4-5, 15CrMo5, 16CrMoV4, G17CrMo5-5, GS22Mo4, G22CrMo5-4, A193 Gr.B7, A335 Gr.P11,

## Features and Applications

- Welding of steam boilers and steam pipes made of Cr-Mo alloyed heat resistant steels, cementation steels, nitrided steels
- Resistance of weld metal to operating temperatures of values up to 570°C.
- Weld metal recovery of approx. 125%
- It can be used in position welding with lower heat input
- Usable with short arc in (-) pole for root pass welding with excellent penetration
- Requirement of re-drying for minimum 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C. (+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100762 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2190 |
| 3010100765 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3740 |
| 3010100771 | 4.00 x 450 | 5/32 x 18” | 140 - 190 | 6750 |
| 3010100774 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10020 |

**Approvals:** CE, SEPRO

GeKa

Heat Resisting Electrode

# OPUS CML

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo1L B 4 2 H5 |
| EN ISO 3580-A | : E CrMo1L B 4 2 H5 |
| AWS A5.5 | : E 7018-B2 L H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| <0.05 | 0.6 | 0.8 | 0.5 | 1.1 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 460 | min. 550 | min. 47 J | min. 20 |

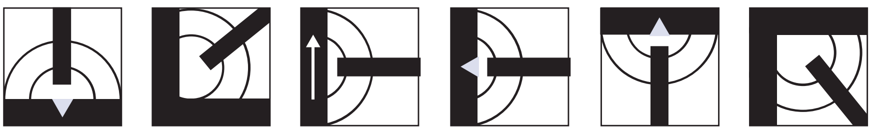
## Typical Base Material Grades

- 13CrMo4-5, 15CrMo5, 16CrMoV4, G17CrMo5-5, GS-22Mo4, GS-22 CrMo5-4, A 193 Gr B7, A335 Gr P11, P12

## Features and Applications

- Applicability in welding heat-resisting, low-alloyed steels
- Suitability to use against corrosion in sour crude, and against stress corrosion in petrochemical industry
- Requirement of re-drying for min. 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100777 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2220 |
| 3010100780 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3520 |
| 3010100783 | 4.00 x 450 | 5/32 x 18” | 140 - 190 | 6790 |
| 3010100786 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10020 |

**Approvals:** CE, SEPRO

GeKa®

Heat Resisting Electrode

# OPUS CMV

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E MoV B 42 H5 |
| EN ISO 3580-A | : E MoV B 42 H5 |
| AWS A5.5 | : E 9018-G H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr | V |
|---|---|---|---|---|---|
| 0.06 | 0.3 | 1.2 | 1.0 | 0.45 | 0.5 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 530 | min. 620 | min. 47 J | min. 18 | 710 ±20 °C / 1h / 300°C (air) |

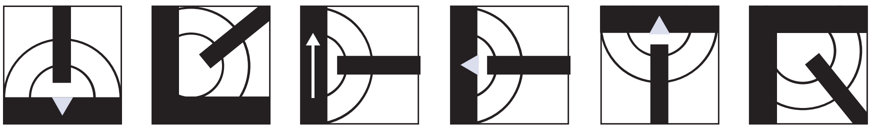
## Typical Base Material Grades

- 14MoV6-3, 24CrMoV5-5, 21CrMoV5-7, 21CrMoV5-11, G17CrMoV5-11

## Features and Applications

- V-alloyed steels such as 14MoV6-3
- Electrode coating of basic character
- Serviceability at temperatures up to 580°C
- Pre-heating and interpass temperatures: 200°C-300°C
- Requirement of re-drying for min. 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100789 | 2.50 x 350 | 3/12 x 14” | 65 - 90 | 2180 |
| 3010100792 | 3.20 x 350 | 1/8 x 14” | 90 - 130 | 3180 |
| 3010100795 | 4.00 x 350 | 5/32 x 14” | 140 - 180 | 5160 |

**Approvals:** CE, SEPRO

Heat Resisting Electrode

# OPUS 2 CM

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo2 B 42 H5 |
| EN ISO 3580-A | : E CrMo2 B 42 H5 |
| AWS A5.5 | : E 9018-B3 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.07 | 0.4 | 0.8 | 1.0 | 2.2 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20°C) | Elongation ($L_0=5d_0$) (%) | Heat Treatment |
|---|---|---|---|---|
| min. 530 | min. 620 | min. 47 J | min. 18 | 690-750°C / 1h / 300°C (air) |

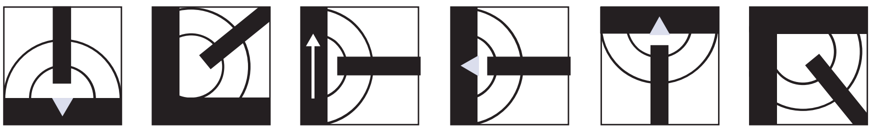
## Typical Base Material Grades

- 10CrMo9-10, 10CrSiMoV7, G-18CrMo9-10, A335 Gr. P22

## Features and Applications

- Welding of steam boilers, steam pipes made of Cr-Mo-alloyed steels, nitrided steels, not-heat treated cementation steels
- Resistance of weld metal to working temperatures up to 600°C
- Requirement of re-drying for min. 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100801 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2280 |
| 3010100804 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3490 |
| 3010100810 | 4.00 x 450 | 5/32 x 18” | 130 - 180 | 6860 |
| 3010100813 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10010 |

**Approvals:** CE, SEPRO

GeKa

Heat Resisting Electrode

# OPUS 2 CM-15

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo2 B 42 H5 |
| EN ISO 3580-A | : E CrMo2 B 42 H5 |
| AWS A5.5 | : E 9015-B3 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.07 | 0.5 | 0.8 | 1.0 | 2.2 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 530 | min. 620 | min. 47 J | min. 18 | 690-750°C / 1h / 300°C (air) |

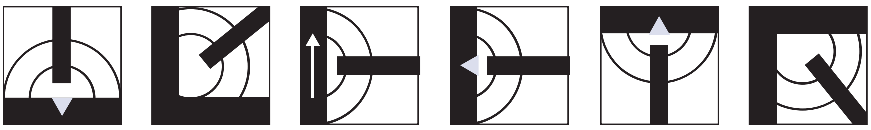
## Typical Base Material Grades

- 10CrMo9-10, 10CrMo5MoV7, G18CrMo9-6, A 335 Gr. P 22

## Features and Applications

- Welding of steam boilers, steam pipes made of Cr-Mo-alloyed steels, nitrided steels, not-heat treated cementation steels
- Resistance of weld metal to working temperatures up to 600°C
- Requirement of Re-drying for min 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100816 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2280 |
| 3010100819 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3810 |
| 3010100822 | 4.00 x 450 | 5/32 x 18” | 130 - 180 | 6920 |

**Approvals:** CE, SEPRO

GeKa®

Heat Resisting Electrode

# OPUS 2 CML

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo2L B 42 H5 |
| EN ISO 3580-A | : E CrMo2L B 42 H5 |
| AWS A5.5 | : E 8018-B3 L H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.04 | 0.6 | 0.6 | 1.1 | 2.2 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 530 | min. 620 | min. 47 J | min. 18 | 690-750 °C / 1h / 300°C (air) |

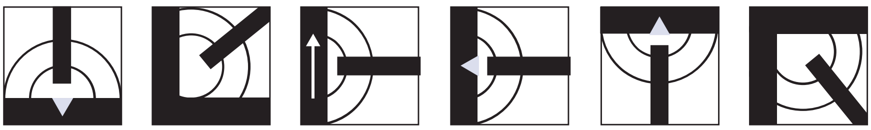
## Typical Base Material Grades

- 2% Cr - 1% Mo Steels, A335 Gr. P22

## Features and Applications

- Applicability in welding of heat-resisting steels containing 2% Cr - 1% Mn and similar alloys
- Electrode with basic-type coating
- Formation of more ductile and less hard weld metal due to low carbon content
- Serviceability at temperatures of values up to 600 °C
- Recommended pre-heating and post-heat treatment during welding processes
- Requirement of re-drying for min. 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100825 | 2.50 x 350 | 3/32 x 14" | 80 - 110 | 2100 |
| 3010100828 | 3.20 x 350 | 1/8 x 14" | 100 - 140 | 3480 |
| 3010100831 | 4.00 x 450 | 5/32 x 18 " | 130 - 180 | 6680 |

**Approvals:** CE, SEPRO

GeKa

Heat Resisting Electrode

# OPUS 5 CM

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo5 B 42 H5 |
| EN ISO 3580-A | : E CrMo5 B 42 H5 |
| AWS A5.5 (A5.4) | : E 8018-B6 (E 502-15) H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.06 | 0.4 | 0.8 | 0.5 | 5.2 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 460 | min. 590 | min. 47 J | min. 19 | 730-755°C / 1h / 300°C (air) |

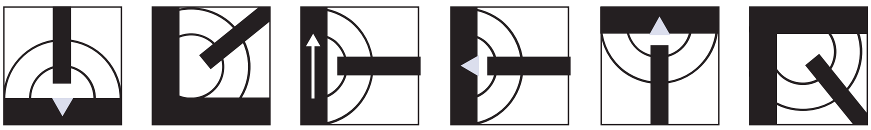
## Typical Base Material Grades

- X12CrMo5, GX12CrMo5

## Features and Applications

- High-heat-resistant steels
- In petro chemical industry and on pressured-hydrogen tanks
- Serviceability of weld metal at working temperature up to 650°C
- Requirement of re-drying for min. 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100834 | 2.50 x 350 | 3/32 x 14” | 65 - 90 | 2220 |
| 3010100837 | 3.20 x 350 | 1/8 x 14” | 110 - 130 | 3630 |
| 3010100843 | 4.00 x 450 | 5/32 x 18” | 140 - 180 | 6670 |
| 3010100846 | 5.00 x 450 | 3/16 x 18” | 190 - 240 | 10000 |

**Approvals:** CE, SEPRO

GeKa

Heat Resisting Electrode

# OPUS 9 CM

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo9 B 4 2 H5 |
| EN ISO 3580-A | : E CrMo9 B 4 2 H5 |
| AWS A5.5 | : E 8018-B8 H4 |
| AWS A5.4 | : E 505-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.07 | 0.4 | 0.7 | 1.0 | 9.0 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 460 | min. 590 | min. 34 J | min. 19 | 740-780°C / 2h / 300°C (air) |

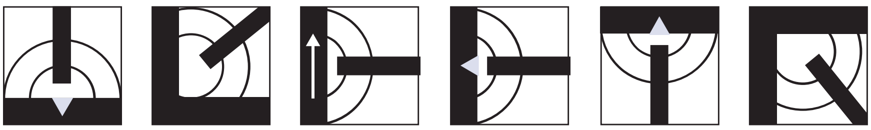
## Typical Base Material Grades

- X12CrMo9-1, X7CrMo9-1, GX12CrMo10.

## Features and Applications

- Welding of boilers, pressure vessel steels, pipe steels and cast steels
- Electrode coating of basic character
- Electrode content of wt% 9 Chromium wt% 1 Molybdenum
- Serviceability at temperatures of values up to 650°C
- Requirement of re-drying for min. 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100849 | 2.50 x 350 | 3/32 x 14” | 60 - 90 | 2330 |
| 3010100852 | 3.20 x 350 | 1/8 x 14” | 90 - 130 | 3810 |
| 3010100855 | 4.00 x 450 | 5/32 x 18” | 120 - 160 | 6680 |

**Approvals:** CE, SEPRO

GeKa

Heat Resisting Electrode

# OPUS 9 CM-15

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo9 B 42 H5 |
| EN ISO 3580-A | : E CrMo9 B 42 H5 |
| AWS A5.5 | : E 8015-B8 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.07 | 0.4 | 0.8 | 1.0 | 9.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 460 | min. 590 | min. 34 J | min. 19 | 740-780 °C / 2h / 300 °C (air) |

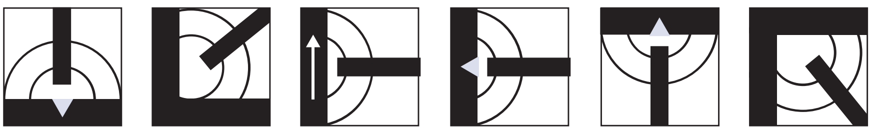
## Typical Base Material Grades

- X12CrMo9-1, X7CrMo9-1, A335 Gr. P9

## Features and Applications

- Heat resistance and low hydrogen electrode with basic-type coating
- Resistance of weld metal to working temperatures up to 650°C
- Welding of pressurized boiler steels, pipe steel and steel castings
- Requirement of re-drying for min. 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100858 | 3.20 x 350 | 1/8 x 14” | 90 - 130 | 3800 |
| 3010100861 | 4.00 x 350 | 5/32 x 14” | 120 - 160 | 5200 |

**Approvals:** CE, SEPRO

Heat Resisting Electrode
# OPUS 9 CMV

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo91 B 42 H5 |
| EN ISO 3580-A | : E CrMo91 B 42 H5 |
| AWS A5.5 | : E9018-B91 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Cr | Mo | Ni | V | Nb | N |
|---|---|---|---|---|---|---|---|---|
| 0.09 | 0.2 | 0.5 | 9.0 | 1.0 | 0.6 | 0.2 | 0.04 | + |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 530 | min. 620 | min. 47 J | 17 | 745-775°C / 2h / 300°C (air) |

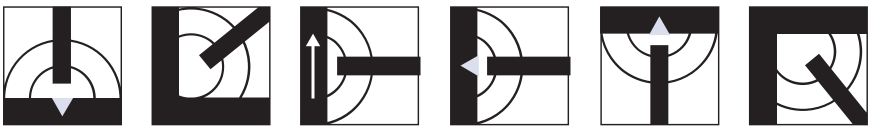
## Typical Base Material Grades

- X10CrMoVNb 9-1, A213 Gr. T91, A 335 Gr. P91 (T91), A 139Gr.T91, % 9-12 Cr type martensitic stainless steels.

## Features and Applications

- High- alloyed low-hydrogen electrode with basic-type coating
- Resistance to heat and creep, high resistance to creeping and high toughness values under long-term stress
- Weld metal’s resistance to high temperatures up to 620°C
- Pre-heating and inter-pass welding temperature: 200°C - 315°C
- Requirement of re-drying for min. 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+) / D.C.(-) for root pass

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100873 | 2.50 x 350 | 3/32 x 14” | 80 - 110 | 2220 |
| 3010100876 | 3.20 x 350 | 1 /8 x 14” | 110 -140 | 3560 |
| 3010100879 | 4.00 x 350 | 5/32 x 14 “ | 140 - 190 | 5250 |

**Approvals:** CE, SEPRO

GeKa®

Heat Resisting Electrode

# OPUS 9 CMV-15

## Standards

| | |
|---|---|
| TS EN ISO 3580-A | : E CrMo91 B 42 H5 |
| EN ISO 3580-A | : E CrMo91 B 42 H5 |
| AWS A5.5 | : E9015-B91 H4 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Cr | Mo | Ni | V | Nb | N |
|---|---|---|---|---|---|---|---|---|
| 0.09 | 0.2 | 0.5 | 9.0 | 1.0 | 1.0 | 0.2 | 0.04 | + |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20°C) | Elongation ($L_0=5d_0$) (%) | Heat Treatment |
|---|---|---|---|---|
| min. 530 | min. 620 | min. 47 J | min. 17 | 745-775°C / 2h / 300°C (air) |

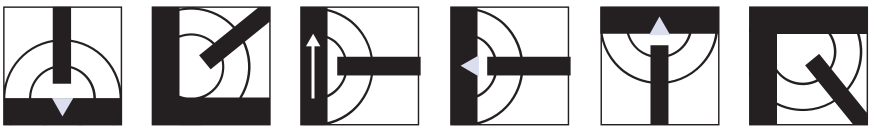
## Typical Base Material Grades

- X10CrMoVNb 9-1, A213 Gr. T91, A 335 Gr. P91 (T91), A 139Gr.T91, % 9-12 Cr type martensitic stainless steels.

## Features and Applications

- High- alloyed low-hydrogen electrode with basic-type coating
- Resistance to heat and creep, high resistance to creeping and high toughness values under long-term stress
- Weld metal's resistance to high temperatures up to 620°C
- Pre-heating and inter-pass welding temperature: 200°C - 315°C,
- Requirement of re-drying for min. 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+) / D.C.(-) for root pass

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100882 | 2.50 x 350 | 3/32 x 14" | 80 - 110 | 2300 |
| 3010100885 | 3.20 x 350 | 1/8 x 14" | 110 -140 | 3650 |
| 3010100888 | 4.00 x 350 | 5/32 x 14" | 140 - 190 | 5250 |

**Approvals:** CE, SEPRO

Heat Resisting Electrode

# OPUS P92

## Standards

| | |
|---|---|
| AWS A5.5 | : E 9018-B92 (mod.) |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Cr | Mo | Ni | V | W |
|---|---|---|---|---|---|---|---|
| 0.08 | 0.25 | 0.65 | 8.5 | 0.5 | 0.75 | 0.2 | 1.8 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 550 | min. 650 | min. 47 J | min. 19 | 745-775°C / 4h / 300°C (air) |

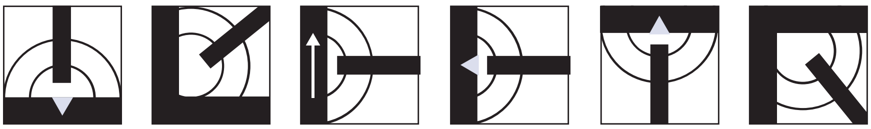
## Typical Base Material Grades

- T/P92, 9%Cr, 1.7%W, 0.5%Mo,, creep resisting martensitic steels: ASTM: A213 Gr T92, A 335 Gr P92, A387 Gr 92

## Features and Applications

- Recommended for welding of heat resistant steels T/P92 which are used for steam tubing, turbine casings and power generating casts
- Provides creep strength and toughness at elevated temperatures with additional alloying elements
- Weld metal is resistant to temperatures up to +650°C
- Bruscato factor of X<15
- Preheat and interpass temperature 200°C-315°C
- Requirement of re-drying for min. 2 hours at the temperatures between 300°C and 350°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010102273 | 3.20 x 350 | 1/8 x 14” | 110 - 140 | 3800 |

**Approvals:** SEPRO, CE

GeKa

Stainless Steel Electrode

# ELOX B 307

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 18 8 Mn B 22 |
| EN ISO 3581-A | : E 18 8 Mn B 22 |
| AWS A5.4 | : ~E 307-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.1 | 0.7 | 6.0 | 8.6 | 18.5 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 390 | 580-750 | min. 80 J | min. 35 |

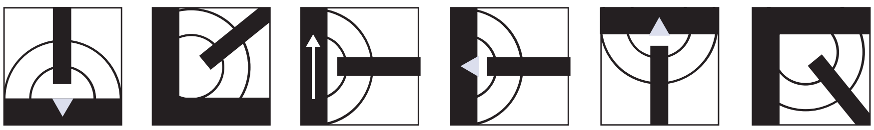
## Typical Base Material Grades

| | | | | |
|---|---|---|---|---|
| DIN: | X 6 Cr 13 | X 15 Cr 13 | AISI: | 405 |
| | X 6 Cr Al 13 | X 22 CrNi 17 | | 410 |
| | X 10 Cr 13 X | X 5 CrNi 13 4 | | 420 |
| | 8 Cr 17 | X 8 CrTi 17 | | 430 |
| | X 20 Cr 13 | G-X 20 Cr 14 | | 430 Ti |
| | X 10 Cr Al 13 | G-X 8 CrNi 13 | | 431 |
| | X 10 Cr Al 7 | G-X 30 CrSi 6 | | 440 |
| | | | | 502 |

## Features and Applications

- Highly resistant steels, alloyed / unalloyed steels, armour steels, hard manganese steels, nonmagnetic steels, steels with 14% Mn hard-to- weld steels
- Joint welding of different metals with each other
- Resistance of weld metal to corrosion, wear, thermal shocks and working temperatures between -100 °C and +500 °C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100893 | 2.50 x 250 | 3/32 x 10” | 60 - 80 | 1280 |
| 3010100898 | 3.20 x 350 | 1/8 x 14” | 80 - 100 | 3170 |
| 3010102108 | 4.00 x 350 | 5/32 x 14” | 110 - 140 | 4900 |

**Approvals:** TSE, CE, SEPRO

GeKa

Stainless Steel Electrode

# ELOX R 307

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 18 8 Mn R 32 |
| EN ISO 3581-A | : E 18 8 Mn R 32 |
| AWS A5.4 | : ~ E 307-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.11 | 1.0 | 4.5 | 8.5 | 19.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 390 | 600-770 | min. 47 J | min. 30 |

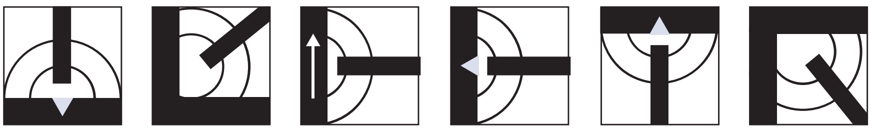
## Typical Base Material Grades

| | | | | |
|---|---|---|---|---|
| DIN: | X 7 Cr 13 | X 15 Cr 13 | AISI: | 405 |
| | X 7 Cr Al 13 | X 22 CrNi 17 | | 410 |
| | X 10 Cr 13 | X 5 CrNi 134 | | 420 |
| | X 8 Cr 17 | X 8 CrTi 17 | | 430 |
| | X 20 Cr 13 | G-X 20 Cr 14 | | 430 Ti |
| | X 10 Cr Al 7 | G-X 8 CrNi 13 | | 431 |
| | X 10 Cr A 13 | G-X 30 CrSi 6 | | 440 |
| | | | | 502 |

## Features and Applications

- High resistant steels, alloyed / unalloyed steels, heat-resistant steels, Cr-stainless steels, steels including 14%Mn, hard-to-weld steels
- Joint welding and filler welding of difference metal with each other
- Electrode coating of rutile character
- Austenitic weld metal with resistance to thermal shocks
- Maintenance of toughness at temperatures down to -100°C
- Requirement of re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100908 | 2.50 x 250 | 3/32 x 10” | 60 - 80 | 1350 |
| 3010100913 | 3.20 x 350 | 1/8 x 14” | 80 - 110 | 3320 |
| 3010100918 | 4.00 x 350 | 5/32 x 14” | 110 - 140 | 4810 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode

# ELOX B 307 L

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 18 9 MnMo B 22 |
| EN ISO 3581-A | : E 18 9 MnMo B 22 |
| AWS A5.4 | : E 307-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Mo | Cr |
|---|---|---|---|---|---|
| 0.08 | 0.6 | 4.0 | 9.5 | 1.0 | 19.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 390 | 590-740 | min. 78 J | min. 35 |

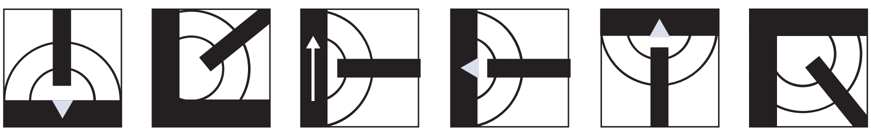
## Typical Base Material Grades

| | | | | |
|---|---|---|---|---|
| DIN: | X 20 Cr 13 | AISI: | 403 | 440 |
| | X 8 Cr 17 | | 405 | 501 |
| | X 22 CrNi 17 | | 410 | 502 |
| | X 5 CrNi 17 | | 420 | |
| | G-X 20 Cr 14 | | 430 | |

## Features and Applications

- Especially developed for the welding of armor steel
- Therefore this product using for hot work tool steels
- The welding of steels that are difficult to resource availability
- Stainless - Chromium, Chromium - Nickel steels and high strength steels welding

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100928 | 3.20 x 350 | 3/32 X 10” | 60 - 80 | 3130 |
| 3010100933 | 4.00 x 350 | 1/8 X 14” | 80 - 110 | 4800 |

**Approvals:** TSE, CE, SEPRO

GeKa

Stainless Steel Electrode

# ELOX RS 307

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E Z 18 9 MnMo R 53 |
| EN ISO 3581-A | : E Z 18 9 MnMo R 53 |
| AWS A5.4 | : ~E307-26 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Mo | Cr |
|---|---|---|---|---|---|
| 0.07 | 0.9 | 5.6 | 8.5 | 0.75 | 19.0 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength (ISO-V/+20°C) | Elongation ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 400 | 590-700 | min. 47 J | min. 35 |

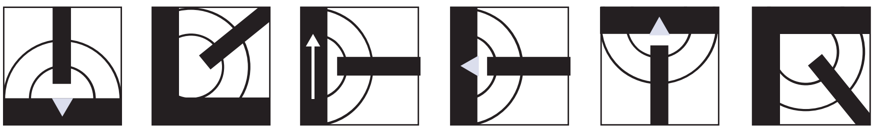
## Typical Base Material Grades

| | | | | |
|---|---|---|---|---|
| DIN: | X 6 Cr 13 | X 15 Cr 13 | AISI: | 405 |
| | X 6 Cr Al 13 | X 22 CrNi 17 | | 410 |
| | X 10 Cr 13 | X 5 CrNi 13 4 | | 420 |
| | X 8 Cr 17 | X 8 CrTi 17 | | 430 |
| | X 20 Cr 13 | G-X 20 Cr 14 | | 430Ti |
| | X 10 Cr Al 7 | G-X 8 CrNi 13 | | 431 |
| | X 10 Cr A 13 | G-X 30 CrSi 6 | | 440 |
| | | | | 502 |

## Features and Applications

- Welding of high resistant alloyed / unalloyed steels, heat-resistant steels / stainless steels, steels with 14% Mn, for welding problematic steels
- Joint and filler welding of different metals
- Rutile coated electrode, weld metal is austenitic, resistant to thermal shocks, keeps its toughness down to -100°C
- Requirement of re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100943 | 3.20 x 350 | 1/8 x 14” | 110 - 150 | 4900 |
| 3010100948 | 4.00 x 350 | 5/32 x 14” | 140 - 180 | 7830 |

**Approvals:** TSE, CE, SEPRO

GeKa®

Stainless Steel Electrode

# ELOX R 308 L

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 9 L R 32 |
| EN ISO 3581-A | : E 19 9 L R 32 |
| AWS A5.4 | : E 308 L- 16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.03 | 0.8 | 0.9 | 10.5 | 20.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 355 | 520 - 660 | min. 47 J | min. 35 |

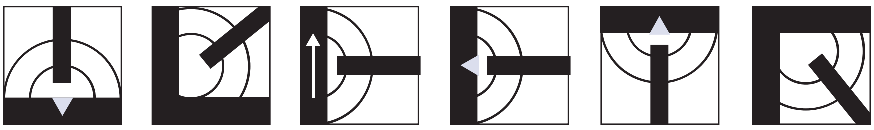
## Typical Base Material Grades

- X2CrNi 19 11, X5CrNi 18 10, X6CrNiTi 18 10, X6CrNib 18 10, X2CrNiN 18 10, X10CrNiNb 18 10, X12CrNi 18 8, 304 L, 304, 304 LN, 321, 347, 302

## Features and Applications

- Rutile-coated low-carbon electrode for use in chemical, petrochemical and food industries where similar steel types, including higher carbon grades as well as ferritic 13% -Cr steels are welded. Resistant to corrosion and cracks. Working temparatures up to +350°C
- Requirement of Re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100963 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1500 |
| 3010100968 | 3.20 x 300 | 1/8 x 12” | 80 - 120 | 2930 |
| 3010100973 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3510 |
| 3010100978 | 4.00 x 350 | 5/32 x 14“ | 110 -160 | 5100 |

**Approvals:** TSE, CE, BV, ABS, SEPRO

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# ELOX R 308 L-17

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 9 L R 32 |
| EN ISO 3581-A | : E 19 9 L R 32 |
| AWS A5.4 | : E 308 L- 17 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.03 | 0.8 | 0.9 | 10.5 | 20.0 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 355 | 520 - 660 | min. 47 J | min. 35 |

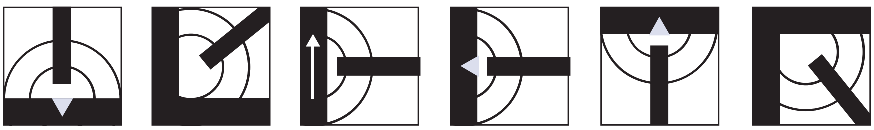
## Typical Base Material Grades

- X2CrNi 19 11, X5CrNi 18 10, X6CrNiTi 18 10, X6CrNiNb 18 10, X6CrNiNb 18 10, X10CrNiNb 18 10, X12CrNi 18 8, 304 L, 304, 304 LN, 321, 347, 302

## Features and Applications

- Rutile-coated low-carbon electrode for use in chemical, petrochemical and food industries where similar steel types, including higher carbon grades as well as ferritic 13% - Cr steels are welded.
- Resistant to corrosion and cracks.
- Working temperatures up to +350°C
- Requirement of Re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100993 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1510 |
| 3010100998 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3510 |
| 3010101003 | 4.00 x 350 | 5/32 x 14” | 110-160 | 4930 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode

# ELOX R 308 H

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 9 H R 32 |
| EN ISO 3581-A | : E 19 9 H R 32 |
| AWS A5.4 | : E 308 H- 16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.07 | 0.7 | 0.8 | 10.4 | 19.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 355 | 550 - 650 | min. 47 J | min. 35 |

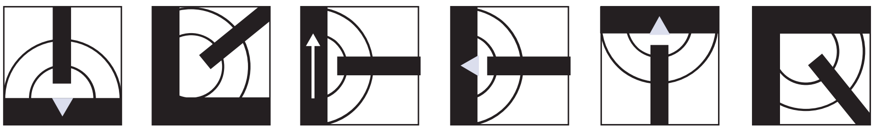
## Typical Base Material Grades

- DIN; X5CrNi18 -10, X6CrNiTi18-10, X6CrNiNb18-10, X8CrNiTi18-10, X7CrNi18-9
- AISI; 304, 304H, 321, 321H, 347, 347H

## Features and Applications

- Electrode with rutile coating on alloyed core-wire
- Applicability in welding Cr-Ni alloyed austenitic high - temperatures steel
- Usability in welding at all positions except for vertical downward position
- Applicability in joint-welding and surfacing of heat-resisting similar-type steels and steel casting
- Serviceability at temperatures of values up to 700°C
- Resistance to fractureand corrosion
- Creep resistance at high temperatures being higher than that of the electrode GeKa ELOX R 308 L

## Welding Positions



## Current Type

D.C.(+) / A.C

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101008 | 2.50 x 250 | 3/32 x 10” | 50 - 80 | 1490 |
| 3010101013 | 3.20 x 350 | 1/8 x 14” | 80 - 110 | 3430 |
| 3010101018 | 4.00 x 350 | 5/32 x 14” | 110-140 | 5060 |

**Approvals:** TSE, CE, SEPRO

GeKa®

Stainless Steel Electrode

# ELOX B 308 L

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 9 L B 22 |
| EN ISO 3581-A | : E 19 9 L B 22 |
| AWS A5.4 | : E 308 L-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.02 | 0.45 | 1.2 | 10.3 | 19.7 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 370 | 520 - 660 | 90 J | min. 40 |

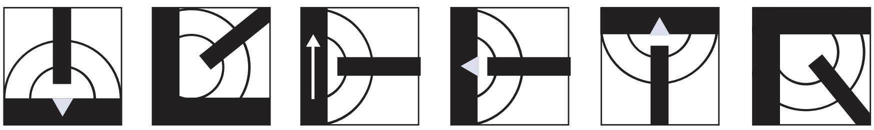
## Typical Base Material Grades

- X2CrNi 19 11, X5CrNi 18 10, X6CrNiTi 18 10, X6CrNiNb 18 10, X 10 CrNiNb 18 10, X2CrNiN 18 10, X12CrNi 18 8, 304L, 304, 304 LN, 321, 347, 302, 320 B 8 C & D

## Features and Applications

- Low carbon alloyed core wire austenitic electrode with basic coating far use in all industries where similar steel types,including higher carbon grades as well as ferritic 13% -Cr steels are welded.
- High ductility of the weld metal,therefore preferably used for welding heavy sections.
- Very good out-of-position weldability.
- Good low-temperature ductility down to -196°C.
- Resistant to intergranular corrosion up to 350°C.
- Weld metal does not require preheating or postweld heat treatement.

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101023 | 2.50 x 250 | 3/32 x 10” | 50-80 | 1510 |
| 3010101028 | 3.20 x 350 | 1/8 x 14” | 80-110 | 3330 |
| 3010101033 | 4.00 x 350 | 5/32 x 14” | 110-140 | 4760 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode
# ELOX B 308 H

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 9 H B 22 |
| EN ISO 3581-A | : E 19 9 H B 22 |
| AWS A5.4 | : E 308 H-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.05 | 0.6 | 1.4 | 10.5 | 19.0 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 350 | min. 550 | min. 47 J | min. 30 |

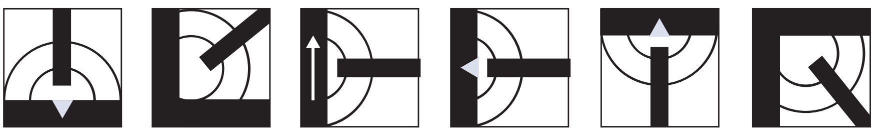
## Typical Base Material Grades

- 301,302,304, 304H, 305,321

## Features and Applications

- A basic coating electrodes are used for welding type 304H and similar applications where creep strength is required
- Electrodes are the same as E308, except for carbon content that has been restricted in the range of 0.04 to 0.08
- It provides higher tensile and creep strength has at elevated temperatures
- Weld metal ferrite content is normally targeted for 5 FN to minimize effect of sigma embrittlement in high temperature service

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101598 | 2.50 x 250 | 3/32 x 10" | 60 - 90 | 1500 |
| 3010101603 | 3.20 x 350 | 1/8 x 14" | 100 - 130 | 3300 |
| 3010101608 | 4.00 x 350 | 5/32 x 14" | 100 - 160 | 4750 |

**Approvals:** CE, SEPRO

GeKa®

Stainless Steel Electrode

# ELOX R 308L Mo

## Standards

| | |
|---|---|
| TS EN ISO 3581-B | : ES308LMo-16 |
| EN ISO 3581-B | : ES308LMo-16 |
| AWS A5.4 | : E308LMo-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mo | Ni | Cr |
|---|---|---|---|
| 0.03 | 2.5 | 9.5 | 18.0 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 450 | 540 - 700 | min. 47 J | min. 35 |

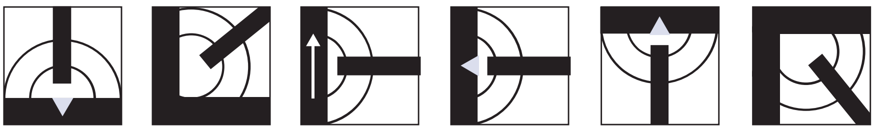
## Typical Base Material Grades

- ASTM A351-Gr. CF3M steel casting.

## Features and Applications

- A rutile electrode for welding of dissimilar steels
- The general purpose electrode for repair welding
- It has easy slag removal and smooth appearance in filled welding

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010100988 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3510 |

**Approvals:** CE, SEPRO

GeKa

Stainless Steel Electrode

# ELOX RS 308

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 9 R 53 |
| EN ISO 3581-A | : E 19 9 R 53 |
| AWS A5.4 | : E308-26 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.07 | 0.8 | 1.0 | 9.0 | 18.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 410 | 570 - 710 | min. 55 J | min. 30 |

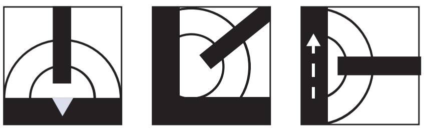
## Typical Base Material Grades

- X2CrNi 1911, X5CrNi 1911, X5CrNi 18 8, X12CrNi 17 7, X12CrNi 18 8,G-X10CrNi 18 8, G-X12CrNi 18 8,
  AISI: 304 L, 304, 302, 301, 308

## Features and Applications

- Applicability in joint- and surface-welding operations of 18/8 Cr-Ni steels, high-strength tempered steels, stainless steels and carbon steels
- Welding efficiency of approximately 150%
- Resistance to high current
- Requirement of re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101038 | 2.50 x 350 | 3/32 x 14” | 80 - 120 | 2820 |
| 3010101043 | 3.20 x 350 | 1/8 x 14” | 110 - 160 | 5700 |
| 3010101048 | 4.00 x 350 | 5/32 x 14” | 150 - 190 | 7680 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode

# ELOX R 309 L

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 23 12 L R 32 |
| EN ISO 3581-A | : E 23 12 L R 32 |
| AWS A5.4 | : E309L-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.03 | 0.8 | 0.8 | 12.6 | 23.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 440 | 540 - 720 | min.47 J | min. 30 |

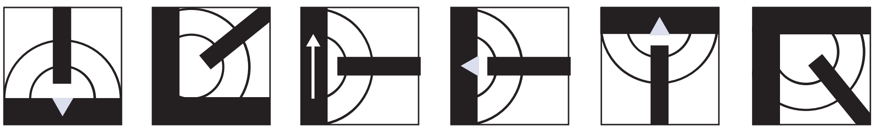
## Typical Base Material Grades

- High-strength unalloyed and heat-treatable steels, ferritic Cr and austenitic CrNi steels, austenitic Mn steels.
- Unalloyed tempered steels, tool steels, hard manganese steels, ferritic chromium steels, austenitic nickel chromium steels, hard-to- weld steels.

## Features and Applications

- Similar-type austenitic stainless steels, dissimilar metals, buffer layers on mild and low-alloy steels prior to build up or overlaying with any stainless electrodes, joining of corrosion resistant stainless steel with mild or low alloy steels, clad steels
- Good crack resistance with hard to weld steels
- The weld metal is content to high ferrite %
- Requirement of re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101058 | 2.00 x 250 | 5/64 x 10” | 50-85 | 950 |
| 3010101063 | 2.50 x 250 | 3/32 x 10” | 60-90 | 1570 |
| 3010101073 | 3.20 x 350 | 1/8 x 14” | 80-120 | 3610 |
| 3010101078 | 4.00 x 350 | 5/32 x 14” | 100-160 | 5050 |

**Approvals:** TSE, CE, BV, ABS, SEPRO, RCB, DNV-GL

# Stainless Steel Electrode
# ELOX R 309 H

## Standards

| | |
|---|---|
| TS EN ISO 3581-B | : ES309-16 |
| EN ISO 3581-B | : ES309-16 |
| AWS A5.4 | : E 309 H-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.06 | 0.8 | 0.8 | 12.0 | 23.0 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 440 | 550 - 720 | min.47 J | min. 30 |

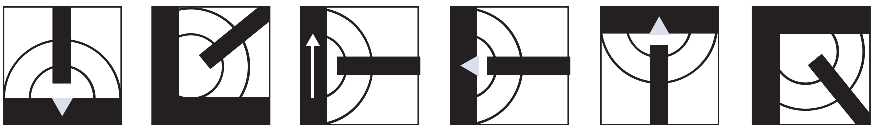
## Typical Base Material Grades

- Alloyed and unalloyed steels, AISI 309 Type Steel, Tool Steels, Austenitic Cr-Ni and Mn steels

## Features and Applications

- Electrode with rutile coating on alloyed core-wire
- Applicability in welding similar/dissimilartype austenitic stainless steels, high-strength unalloyed and heat treatable steels, ferritic Cr and austenitic CrNi steels, austenitic Mn steels
- It provides higher tensile and creep strength at elevated temperatures according to ELOX R 309 L
- Usability in welding at all positions except for vertical downward position

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010102197 | 2.50 x 250 | 3/32 x 10” | 50-85 | 1550 |
| 3010102198 | 3.20 x 350 | 1/8 x 14” | 80-120 | 3600 |

**Approvals:** SEPRO

GeKa

Stainless Steel Electrode

# ELOX R 309 L-17

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 23 12 L R 32 |
| EN ISO 3581-A | : E 23 12 L R 32 |
| AWS A5.4 | : E309L-17 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.03 | 0.8 | 0.8 | 12.6 | 23.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 440 | 540 - 720 | min.47 J | min. 30 |

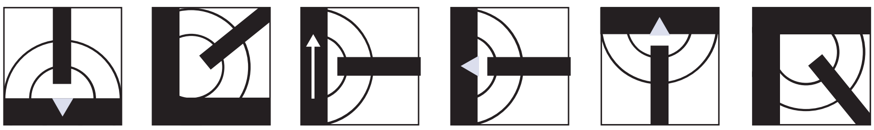
## Typical Base Material Grades

- High-strength unalloyed and heat-treatable steels, ferritic Cr and austenitic CrNi steels, austenitic Mn steels
- Unalloyed tempered steels, tool steels, hard manganese steels, hard-to-weld steels

## Features and Applications

- Rutile-coated low-carbon electrode for use in high-strength unalloyed and heat treatable steels, ferritic Cr and austenitic CrNi steels, austenitic Mn steels
- Similar-type austenitic stainless steels, dissimilar metals, buffer layers on mild and low-alloyed steels prior to build up or overlaying with any stainless electrodes, joining of corrosion resistant stainless steel with mild or low alloy steels, clad steels
- Good crack resistance wity hard-to-weld steels
- The weld metal is content to high ferrite %
- Requirement of re-drying for minimum 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101083 | 2.50 x 250 | 3/32 x 10” | 60-90 | 1550 |
| 3010101088 | 3.20 x 350 | 1/8 x 14” | 80-120 | 3640 |
| 3010101093 | 4.00 x 350 | 5/32 x 14” | 100-160 | 5320 |

**Approvals:** TSE, CE, SEPRO

# Stainless Steel Electrode
# ELOX R 309 MoL

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 23 12 2 L R 32 |
| EN ISO 3581-A | : E 23 12 2 L R 32 |
| AWS A5.4 | : E 309LMo-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|
| <0.03 | 0.7 | 0.8 | 2.8 | 13.0 | 23.0 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| 530 | 700 | min.55 J | 35 |

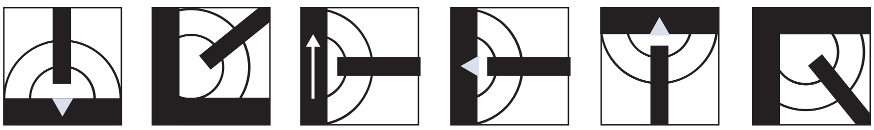
## Typical Base Material Grades

- High strength unalloyed and alloyed steels, heat resistant steels, ferritic and austenitic steels

## Features and Applications

- Welding of higher strength unalloyed and alloyed steels
- Welding of heat resistant steels
- Welding of high temperature pressure vessels, similar type of ferritic and austenitic steels
- Welding of corrosion and heat resistant steels, build-up or overlaying, buffer layers applications
- Weld metal contains higher amount of ferrite and has higher resistance to cracking
- Requirement of Re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101098 | 2.50 x 250 | 3/32 x 10” | 60-90 | 1570 |
| 3010101103 | 3.20 x 350 | 1/8 x 14” | 80-120 | 3640 |
| 3010101108 | 4.00 x 350 | 5/32 x 14” | 100-160 | 5050 |

**Approvals:** TSE, CE, SEPRO

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Stainless Steel Electrode

# ELOX R 309 MoL-17

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 23 12 2 L R 32 |
| EN ISO 3581-A | : E 23 12 2 L R 32 |
| AWS A5.4 | : E 309LMo-17 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|
| <0.03 | 0.7 | 0.8 | 2.8 | 13.0 | 23.0 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 490 | 620-750 | min.47 J | min. 30 |

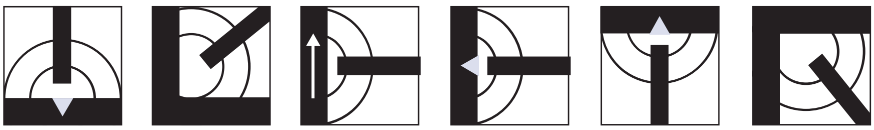
## Typical Base Material Grades

- Uses in high strength unalloyed and heat-treatable steels, ferritic / austenitic steels, austenitic Mn steels.

## Features and Applications

- Similar type austenitic stainless steels, dissimilar metals, buffer layers on mild and low-alloy steels prior to build up or overlaying with any stainless steels electrode
- Joining of corrosion-resistant stainless steel with mild or low- alloy steels, clad steels
- The weld metal is content to high ferrite %
- Good cracking resistance with problematic steels
- Requirement of Re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101113 | 2.50 x 250 | 3/32 x 10” | 60-90 | 1570 |
| 3010101118 | 3.20 x 350 | 1/8 x 14” | 80-120 | 3640 |
| 3010101123 | 4.00 x 350 | 5/32 x 14” | 100-160 | 5050 |

**Approvals:** TSE, CE, SEPRO

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Stainless Steel Electrode

# ELOX B 309

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 22 12 B 22 |
| EN ISO 3581-A | : E 22 12 B 22 |
| AWS A5.4 | : E 309 -15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.085 | 0.9 | 1.8 | 12.5 | 22.5 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 360 | 550-650 | min.47 J | min.25 |

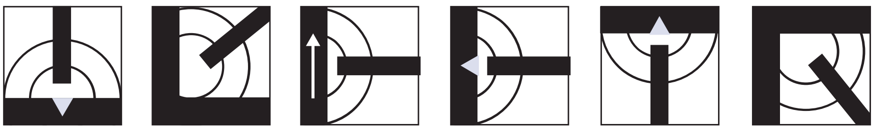
## Typical Base Material Grades

- X15CrNiSi20 12, X10CrAl7, X10CrAl13, X10CrAl18, G-X40CrNiSi22, 9G-X40CrSi17, G-X30CrSi6, AISI 305, ASTM; A297HF

## Features and Applications

- Basic-coated alloyed core wire electrode for welding analogous, heat resistant rolled, forged and cast steels as well as heat resistant ferritic CrSiAl steels
- For weld joints exposed to reducing, sulphurous gases, the final layer has to be deposited by means of this electrode
- In annealing plants, hardening plants, steam boiler construction, the crude oil industry and the ceramics industry
- Scaling resistant up to 1000°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101128 | 2.50 x 250 | 3/32 x 10” | 60 - 80 | 1500 |
| 3010101133 | 3.20 x 350 | 1/8 x 14” | 80 - 110 | 3250 |
| 3010101138 | 4.00 x 350 | 5/32 x 14” | 110-140 | 4730 |

**Approvals:** TSE, CE, SEPRO

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Stainless Steel Electrode

# ELOX R 310

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 25 20 R 32 |
| EN ISO 3581-A | : E 25 20 R 32 |
| AWS A5.4 | : ~E 310-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.12 | 0.9 | 2.5 | 20 | 26.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 355 | 560-690 | min.47 J | min. 25 |

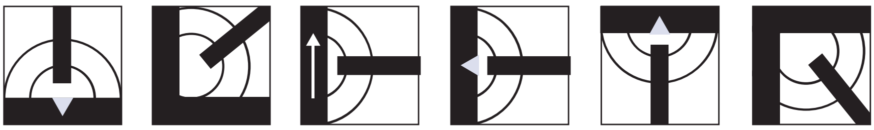
## Typical Base Material Grades

- Furnace, boilers, pipes made of Cr-Ni and Cr-Si-Al-alloyed steels.
- X15CrNiSi 25-20, X15CrNiSi 25-21, X15CrNrSi 20-12, G-X40CrNi25, GX40CrNiSi229, X10CrAl, X10CrAl24, GX40CrSi1, AISI 305, 310, 304

## Features and Applications

- Weld metal is resistant to working temperatures up to +1200°C
- Used with alternative current also
- Requirement of Re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101158 | 2.50 x 250 | 3/32 x 10” | 50 - 80 | 1410 |
| 3010101163 | 3.20 x 300 | 1/8 x 1 2” | 80 - 110 | 2930 |
| 3010101168 | 3.20 x 350 | 1/8 x 14” | 80 - 110 | 3460 |
| 3010101173 | 4.00 x 350 | 5/32 x 14” | 110 - 140 | 5300 |

**Approvals:** TSE, CE, SEPRO

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Stainless Steel Electrode

# ELOX R 310 Mo

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : ES 310 Mo-16 |
| EN ISO 3581-A | : ES 310 Mo-16 |
| AWS A5.4 | : E 310 Mo-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Cr | Ni | Mo |
|---|---|---|---|
| 0.08 | 25.0 | 21.0 | 2.8 |

## Mechanical Properties

| **Tensile Strength** ($N/mm^2$) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|
| min. 550 | min. 30 |

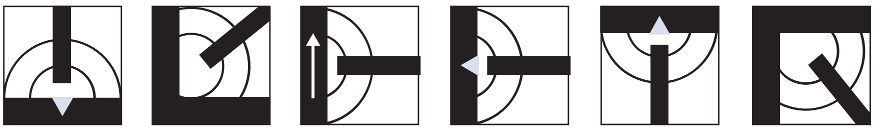
## Typical Base Material Grades

- For austenitic steels, Cr-Mo Steels, coated stainless steels and type AISI 316, 316L and 317 clad steels.

## Features and Applications

- Rutile-basic coated electrode
- The addition of Mo is improved high temperature creep properties
- The weld deposit is full austenitic and corrosion resistant

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101178 | 3.20 x 350 | 1/8 x 14” | 80 - 110 | 3510 |
| 3010101183 | 4.00 x 350 | 5/32 x 14” | 110 -140 | 5140 |

**Approvals:** SEPRO

Stainless Steel Electrode

# ELOX B 310

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 25 20 B 22 |
| EN ISO 3581-A | : E 25 20 B 22 |
| AWS A5.4 | : ~E 310-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.12 | 0.9 | 3.0 | 20.5 | 25.0 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0$=5$d_0$) (%)) |
|---|---|---|---|
| min. 355 | 560-690 | 100 J | min. 25 |

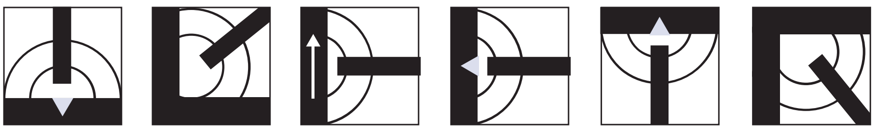
## Typical Base Material Grades

- X15CrNiSi 25 20, X12CrNi 25 21, X15CrNiSi 20 12, G-X 15CrNi 25 20, G-X 40CrNi 25 21, G-X40CrNiSi22 9, X10CrAl 18, X10CrAl 24, G-X40CrSi 17, AISI 305, 310, 314.

## Features and Applications

- Austenitic CrNi steels, ferritic CrNiAl alloyed steels, heat-resisting rolled, forged and cast steels used in ceramic, petrochemical industries and furnace, boilers, chimney applications
- Weld metal is resistant to working temperature - 196°C up to +1200°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101188 | 2.50 x 250 | 3/32 x 10” | 50 - 80 | 1440 |
| 3010101193 | 3.20 x 300 | 1/8 x 1 2” | 80 - 110 | 2710 |
| 3010101198 | 3.20 x 350 | 1/8 x 14” | 80 - 110 | 3120 |
| 3010101203 | 4.00 x 350 | 5/32 x 14” | 110 - 140 | 4750 |

**Approvals:** TSE, CE, SEPRO

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Stainless Steel Electrode

# ELOX R 312

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 29 9 R 12 |
| EN ISO 3581-A | : E 29 9 R 12 |
| AWS A5.4 | : ~E 312-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.12 | 1.0 | 0.8 | 10.5 | 30.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 490 | 700-830 | min. 24 J | min. 20 |

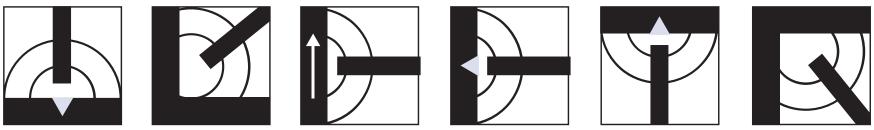
## Typical Base Material Grades

| | | | | |
|---|---|---|---|---|
| DIN: | X7Cr13 | G-X7Cr13 | AISI: | 403 |
| | X7CrAl13 | G-X20Cr14 | | 405 |
| | X10CrAl13 | G-X10CrMo13 | | 410 |
| | X8Cr17 | G-X8CrNi13 | | 420 |
| | X20Cr13 | | | 430 |
| | X15Cr13 | | | 430Ti |
| | X22CrNi 17 | | | 431 |
| | X15CrNi13 4 | | | 446 |
| | X8CrTi17 | | | |

## Features and Applications

- Alloyed-unalloyed high-resistant steels, Cr and Mn steels, joint welding of tool steels and different steels and repair welding of sprockets and wheelshaft
- Weld metal is resistant to corrosions, cracks and rust
- Requirement of re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101208 | 2.50 x 250 | 3/32 x 10” | 50 - 80 | 1260 |
| 3010101213 | 3.20 x 300 | 1/8 x 1 2” | 80 - 110 | 2470 |
| 3010101218 | 3.20 x 350 | 1/8 x 14” | 80 - 110 | 2890 |
| 3010101223 | 4.00 x 350 | 5/32 x 14” | 110 - 160 | 4470 |

**Approvals:** TSE, CE, ABS, BV, SEPRO

GeKa

Stainless Steel Electrode

# ELOX R 316 L

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 12 3 L R 32 |
| EN ISO 3581-A | : E 19 12 3 L R 32 |
| AWS A5.4 | : E316L-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|
| 0.03 | 0.8 | 0.9 | 2.6 | 11.5 | 19.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 355 | 540-670 | min. 47 J | min. 30 |

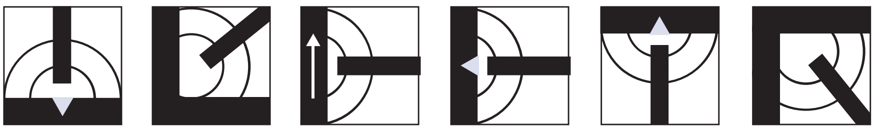
## Typical Base Material Grades

- EN: X10CrNiMoNb 18 12, X2CrNiMo 18 14 3, X5CrNiMo 17 13 3, X2CrNiMo 17 13 2, X2CrNiMoN 17 12 2, X5CrNiMo 17 12 2, X5CrNiMoTi 17 12 2, X6CrNiMoNb 17 12 2, X2CrNiMoN 17 13 3.
- AISI: 316Cb, 316, 316L, 316Ti

## Features and Applications

- Tanks, pipes and equipments made of Cr-Ni-Mo low-carbon steels which are used in food, textile, chemical and paint industries
- Weld metal is resistant to acid, corrosion
- Serviceability at temperatures up to 400°C
- Requirement of Re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101243 | 2.00 x 250 | 5/64 x 10” | 40-70 | 950 |
| 3010101248 | 2.50 x 250 | 3/32 x 10” | 50-90 | 1500 |
| 3010101258 | 3.20 x 350 | 1/8 x 14” | 80-120 | 3480 |
| 3010101263 | 4.00 x 350 | 5/32 x 14” | 110-160 | 5130 |

**Approvals:** TSE, BV, CE, ABS, SEPRO, DNV-GL

Stainless Steel Electrode

# ELOX R 316L-17

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 12 3 L R 32 |
| EN ISO 3581-A | : E 19 12 3 L R 32 |
| AWS A5.4 | : E316L-17 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|
| 0.03 | 0.8 | 0.9 | 2.6 | 11.5 | 19.0 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 355 | 540-670 | min. 47 J | min. 30 |

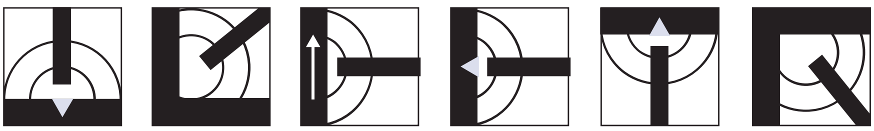
## Typical Base Material Grades

- EN: X10CrNiMoNb 18 12, X2CrNiMo 18 14 3, X5CrNiMo 17 13 3, X2CrNiMo 17 13 2, X2CrNiMoN 17 12 2, X5CrNiMo 17 12 2, X5CrNiMoTi 17 12 2, X6CrNiMoNb 17 12 2, X2CrNiMoN 17 13 3.
- AISI: 316Cb, 316, 316L, 316Ti

## Features and Applications

- Rutile-coated low-carbon electrode for use in tanks, pipes and equipments made of Cr-Ni-Mo low-carbon steels which are used in food, textile, chemical and paint industries
- Weld metal is resistant resistant to acid, corrosion
- Serviceability at temperatures up to 400°C
- Requirement of Re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101268 | 2.50 x 250 | 3/32 X 10” | 50-90 | 1480 |
| 3010101273 | 3.20 x 350 | 1/8 X 14” | 80-120 | 3470 |
| 3010101278 | 4.00 x 350 | 5/32 X 14” | 110-160 | 5030 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode

# ELOX B 316 L

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 12 3 L B 22 |
| EN ISO 3581-A | : E 19 12 3 L B 22 |
| AWS A5.4 | : E 316 L-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|
| 0.03 | 0.45 | 1.35 | 2.75 | 11.5 | 18.9 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 360 | 550-700 | min. 55 J | min. 35 |

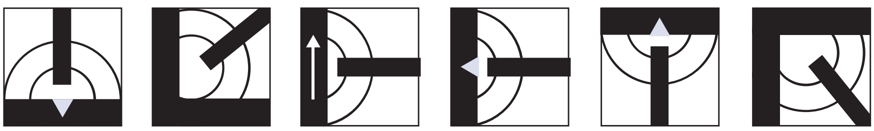
## Typical Base Material Grades

- EN: X10CrNiMoNb 18 12, X2CrNiMo 18 14 3, X5CrNiMo 17 13 3, X2CrNiMo 17 13 2, X2CrNiMoN 17 12 2, X5CrNiMo 17 12 2, X5CrNiMoTi 17 12 2, X6CrNiMoNb 17 12 2, X2CrNiMoN 17 13 3.
- AISI: 316Cb, 316, 316L, 316Ti

## Features and Applications

- Low-carbon alloyed-core wire austenitic electrode with basic coating for use in all industries where analogous steels, including higher carbon grades and ferritic 13% Cr types,are welded. High ductility of weld metal,therefore preferably used for welding of heavy sections.Very good out-of-position weldability. Good low-temperature ductility down to -196°C. Resistance to intergranular corrosion up to 400°C.
- No requirement of preheating ar postweld heat treatement of weld metal

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101283 | 2.50 x 250 | 3/32 x 10” | 60 - 80 | 1440 |
| 3010101288 | 3.20 x 350 | 1/8 x 14” | 80 - 110 | 3480 |
| 3010101293 | 4.00 x 350 | 5/32 x 14” | 110 - 140 | 5080 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode
# ELOX RS 316

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 12 2 R 53 |
| EN ISO 3581-A | : E 19 12 2 R 53 |
| AWS A5.4 | : E316-26 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|
| 0.07 | 0.9 | 1.0 | 2.7 | 11.0 | 18.5 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 410 | 640-740 | min. 55 J | min. 30 |

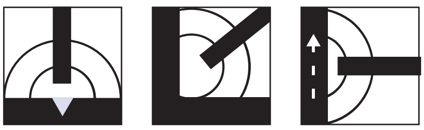
## Typical Base Material Grades

- EN: X5CrNiMo 17 13 3, X10CrNiMo 18 10, X6CrNiMoTi 17 12 2, X5CrNiMo 17 12 2, G-X10CrNiMo 18 10,
- AISI: 316, 316Ti, 317

## Features and Applications

- Used for welding of Cr-Ni-Mo alloyed steels, joint of stainless steel to carbon steels and used for surfacing of stainless steel on carbon steels
- The efficiency of weld metal is approx. 150%
- It is synthetic electrode and is resistant to high current
- Requirement of re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101298 | 2.50 x 350 | 3/32 x 14” | 90 - 120 | 3310 |
| 3010101303 | 3.20 x 350 | 1/8 x 14” | 110 -160 | 5480 |
| 3010101308 | 4.00 x 350 | 5/32 x 14” | 150 - 190 | 8080 |
| 3010101313 | 5.00 x 350 | 3/16 x 14” | 180 - 220 | 11400 |

**Approvals:** TSE, CE, SEPRO

GeKa

Stainless Steel Electrode

# ELOX R 317 L

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E Z 19 13 4 L R 12 |
| EN ISO 3581-A | : E Z 19 13 4 L R 12 |
| AWS A5.4 | : E317L-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|
| <0.04 | 0.8 | 0.9 | 3.2 | 12.5 | 18.7 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 400 | 570-700 | min. 47 J | min. 30 |

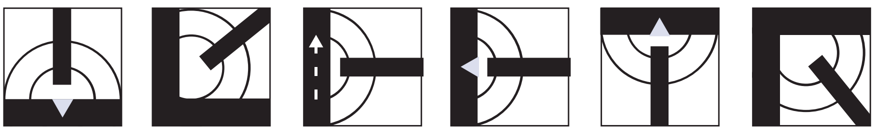
## Typical Base Material Grades

- EN: X2CrNiMoN 17 13 3, X2CrNiMoN 17 13 5, X2CrNiMoN 18 18 3, X2CrNiMoN 18 13, X4CrNiMoN 19 16 5, X4CrNiMoN 22 15, X2CrNiMo 18 14 3, X2CrNiMo 18 16 4, X10CrNiMoTi 18 12
- AISI & UNS: 316L, 316Cb, 317, S31726

## Features and Applications

- Reduces the possibility of intergranular carbide precipitation, providing increase in resistance to intergranular corrosion without use of stabilizers such as Niobium or Titanium
- Rutile-basic coated alloyed-core wire electrode for corrosion-resistant CrNi steels of increased Mo-contents
- Requirement of Re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101318 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1570 |
| 3010101323 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3470 |
| 3010101328 | 4.00 x 350 | 5/32 x 14” | 110 - 160 | 5100 |

**Approvals:** TSE, CE, SEPRO

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Stainless Steel Electrode

# ELOX R 318

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 12 3 Nb R 32 |
| EN ISO 3581-A | : E 19 12 3 Nb R 32 |
| AWS A5.4 | : ~E318-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr | Nb |
|---|---|---|---|---|---|---|
| 0.04 | 0.8 | 0.8 | 2.8 | 11.0 | 19.4 | + |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 390 | 580-750 | min. 47 J | min. 30 |

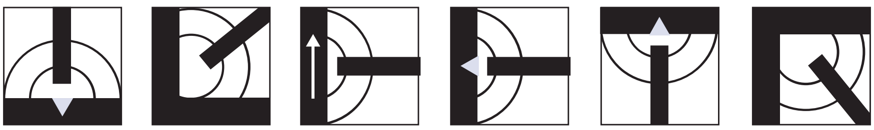
## Typical Base Material Grades

- EN: X6CrNiMoTi 17 12 2, X6CrNiMoNb 1 12 2, X5CrNiMo 17 13 2, G-XCrNiMo 18 10, X10CrNiMoNb 18 12, X5CrNiMo 17 13 3, G-X10CrNiMo 18 10, G-X10CrNiNb 18 10,
- AISI: 316Ti, 316Cb, 316L

## Features and Applications

- Used for the welding of tanks and pipes made of Cr-Ni-Mo-alloyed, stabilized steels which are used in food, chemical textile and paint industries
- The weld metal stabilized by Nb is resistant to temperatures up to +400°C
- Requirement of Re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101333 | 2.00 x 250 | 5/64 x 10” | 40 - 60 | 930 |
| 3010101338 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1540 |
| 3010101343 | 3.20 x 300 | 1/8 x 12 “ | 80 - 120 | 3030 |
| 3010101348 | 3.20 x 350 | 1/8 x 14 “ | 80 - 120 | 3530 |
| 3010101353 | 4.00 x 350 | 5/32 x 14” | 110 - 160 | 5150 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode

# ELOX B 318

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 12 3 Nb B 22 |
| EN ISO 3581-A | : E 19 12 3 Nb B 22 |
| AWS A5.4 | : E 318-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr | Nb |
|---|---|---|---|---|---|---|
| 0.04 | 0.45 | 1.45 | 2.75 | 11.5 | 20.0 | + |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20°C) | Elongation ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 390 | 590-730 | min. 55 J | min. 30 |

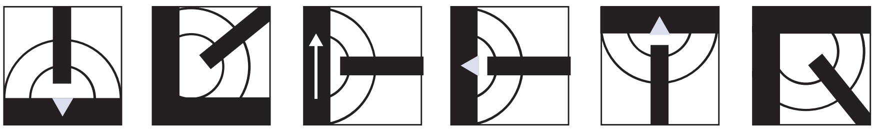
## Typical Base Material Grades

- EN: X6CrNiMoTi 17 12 2, X6CrNiMoNb 1 12 2, X5CrNiMo 17 13 2, G-XCrNiMo 18 10, X10CrNiMoNb 18 12, X5CrNiMo 17 13 3, G-X10CrNiMo 18 10, G-X10CrNiNb 18 10,
- AISI: 316Ti, 316Cb, 316L

## Features and Applications

- Stabilized alloyed-core wire austenitic electrode with basic coating.Intended for use in all industries where analogous steels,including ferritic 13% chromium steels,are welded.Weld metal has high ductility, therefore preferably used for heavy sections.Very good out-of-position weldability.Resistant to intergranular corrosion up to 400°C.The weld metal does not require preheating or postweld heat treatement

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101358 | 2.50 x 250 | 3/32 x 10” | 60 - 80 | 1450 |
| 3010101363 | 3.20 x 350 | 1/8 x 14” | 80 - 110 | 3500 |
| 3010101368 | 4.00 x 350 | 5/32 x 14” | 110 - 150 | 5300 |

**Approvals:** TSE, CE, SEPRO

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# ELOX B 327

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 25 4 B 22 |
| EN ISO 3581-A | : E 25 4 B 22 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr |
|---|---|---|---|---|
| 0.12 | 0.4 | 1.3 | 5.0 | 25.5 |

## Mechanical Properties

| Yield Strength (N/mm²) | Tensile Strength (N/mm²) | Impact Strength (ISO-V/+20°C) | Elongation ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 500 | 650-780 | min. 30 J | min. 15 |

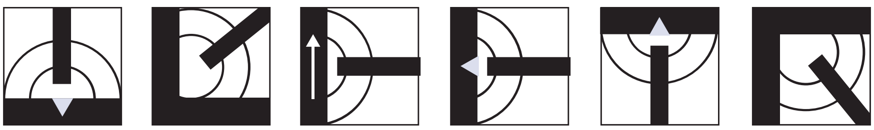
## Typical Base Material Grades

- EN: X20CrNiSi 25 4, G-X40CrNiSi 27 4, X10CrAl7, X10CrAl 13, X10CrAl 18, X10CrAl 24, G-X30CrSi 6, G-X40CrSi 17
- AISI: 327

## Features and Applications

- Used for the fabrication of furnace, boilers, etc. That made of heat resistant steels (CrNi and CrNiAl alloyed steels)
- Far furnace requiring elevated resistance to reducing and oxidizing sulphurous gases as well as for final passes of weld joints in heat-resistant CrSiAl-steels
- Scaling resistance up to 1100°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101373 | 2.50 x 250 | 3/32 x 10” | 50 - 80 | 1560 |
| 3010101378 | 3.20 x 350 | 1/8 x 14” | 80 - 105 | 3270 |
| 3010101383 | 4.00 x 350 | 5/32 x 14” | 100 - 130 | 4940 |

**Approvals:** TSE, CE, SEPRO

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# ELOX R 347

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 9 Nb R 32 |
| EN ISO 3581-A | : E 19 9 Nb R 32 |
| AWS A5.4 | : E 347-16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr | Nb |
|---|---|---|---|---|---|
| 0.04 | 0.8 | 0.9 | 10.0 | 19.8 | + |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 390 | 570-740 | min. 47 J | min. 35 |

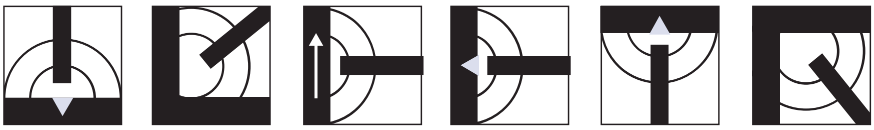
## Typical Base Material Grades

- EN: X6CrNiNb 18 10, X6CrNiTi 18 10, G-X5CrNiNb 18 9, X5CrNi 18 10, X12CrNiTi 18 9, G-X10CrNi 18 8, X10CrNiNb 18 10, X2CrNi 19 11
- AISI: 347, 321, 304, 304LN

## Features and Applications

- Used for the welding of tanks and pipes in which milk and beer is kept
- Also used for the welding of acid, gas, steam and water armatures
- Resistant to acid and corrosion, stabilized by Nb. Weld metal can resist to temperatures up to +400°C
- Requirement of Re-drying for min. 2 hours at the temperatures between 120°C and 200°C

## Welding Positions



## Current Type

D.C. (+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101388 | 2.00 x 250 | 5/64 x 10” | 40 - 60 | 940 |
| 3010101393 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1500 |
| 3010101398 | 3.20 x 300 | 1/8 x 12” | 80 - 120 | 2980 |
| 3010101403 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3470 |
| 3010101408 | 4.00 x 350 | 5/32 x 14” | 110 - 160 | 5150 |

**Approvals:** TSE, CE, SEPRO

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Stainless Steel Electrode

# ELOX B 347

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 19 9 Nb B 22 |
| EN ISO 3581-A | : E 19 9 Nb B 22 |
| AWS A5.4 | : E 347-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Ni | Cr | Nb |
|---|---|---|---|---|---|
| 0.04 | 0.45 | 1.4 | 10.2 | 19.8 | 0.4 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 400 | 600-740 | min. 55 J | min. 30 |

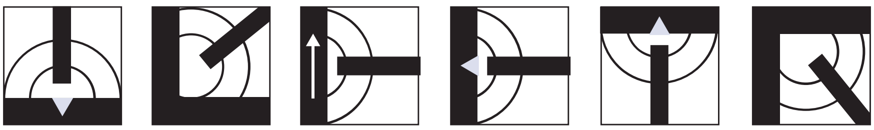
## Typical Base Material Grades

- EN & DIN: X6CrNiNb 18 10, X6CrNiTi 18 10, X5CrNi 18 10, X5CrNi 18 10, X2CrNiN 18 10, X2CrNi 19 11, G-X5CrNiNb 19 10, G-X10CrNi 18 8,
- AISI: 347, 321, 304, 304LN, 302, ASTM; A296 Gr.CF8C, A157 Gr C9, A320 Gr B 8C & D

## Features and Applications

- Stabilized alloyed-core wire austenitic electrode with basic coating for use in all industries where similar steel types as well as ferritic 13% chromium steels are welded
- High ductility of the weld metal, therefore preferable for welding heavy sections
- Very good out-of-position weldability Good low-temperature-ductility down to -196°C
- Resistant to intergranular corrosion up to 400°C
- Weld metal does not require preheating or postweld heat treatment

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101413 | 2.50 x 250 | 3/32 x 10” | 60-80 | 1460 |
| 3010101418 | 3.20 x 350 | 1/8 x 14” | 80-120 | 3250 |
| 3010101423 | 4.00 x 350 | 5/32 x 14” | 100-150 | 5100 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode

# ELOX R 385

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 20 25 5 Cu N L R 32 |
| EN ISO 3581-A | : E 20 25 5 Cu N L R 32 |
| AWS A5.4 | : E 385 -16 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr | Cu |
|---|---|---|---|---|---|---|
| <0.03 | 0.75 | 1.0 | 4.5 | 25.0 | 20.0 | 1.5 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 400 | 550-700 | min. 47 J | min. 30 |

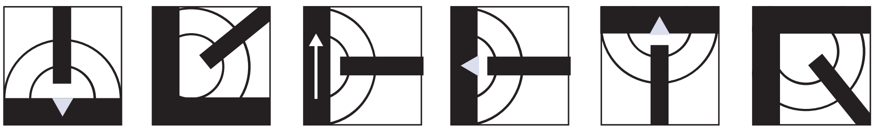
## Typical Base Material Grades

- EN & DIN: X5NiCrMoCuNb 20 18, X5NiCrMoCuTi 20 18, X2NiCrMoCu 25 20 5, X5NiCrMoCuNb 22 18, G-X7CrNiMoCuNb 18 18, G-X7NiCrMoCuNb 25 20
- AISI: 317L, 904L

## Features and Applications

- Resistant to intercıystalline corrosion / wet corrosion up to 350°C
- High corrosion resistance similar to that of matching steels / cast steel grades, above all in reducing environments
- For joining and surfacing work on matching austenitic CrNiMoCu steels/cast steel grades
- For joining these types of steels with unalloyed / low alloy steels / cast steel grades
- Re-drying: 120°C - 200°C / min. 2h

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101428 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1570 |
| 3010101433 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3470 |
| 3010101438 | 4.00 x 350 | 5/32 x 14” | 110 -160 | 5200 |

**Approvals:** TSE, CE, SEPRO

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# ELOX B 385

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | :E Z 20 25 5 Cu N L B 22 |
| EN ISO 3581-A | : E Z 20 25 5 Cu N L B 22 |
| AWS A5.4 | : E 385 -15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr | Cu | Nb |
|---|---|---|---|---|---|---|---|
| <0.025 | 0.40 | 2.2 | 3.5 | 25.0 | 22.0 | 2.2 | 0.35 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 380 | 600-700 | 80 J | min. 35 |

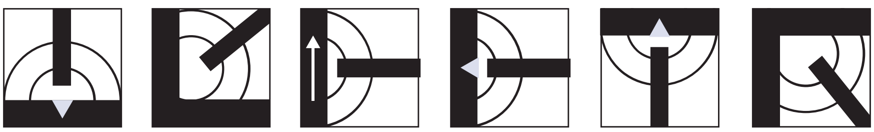
## Typical Base Material Grades

- EN & DIN: X5NiCrMoCuNb 20 18, X5NiCrMoCuTi 20 18, X2NiCrMoCu 25 20 5, X5NiCrMoCuNb 22 18, G-X7CrNiMoCuNb 18 18, G-X7NiCrMoCuNb 25 20
- AISI: 307, 307L, 904L

## Features and Applications

- Basic coated alloyed-core wire special electrode for corrosion - resistant high-Molybdenum CrNi steels
- Recomended for highly corrosive environments
- Apart from its markedly good chemical resistarıce to stress corrosion cracking and crevice corrosion,the weld metal leatures high resistance to pitting
- Particularly recomended for steels containing up to 5% molybdenum

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101443 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1573 |
| 3010101448 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3563 |
| 3010101453 | 4.00 x 350 | 5/32 x 14” | 110 -150 | 4570 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode
# ELOX B 410

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 13 B 22 |
| EN ISO 3581-A | : E 13 B 22 |
| AWS A5.4 | : E 410-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Cr |
|---|---|---|---|
| 0.07 | 0.7 | 0.8 | 13.5 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Hardness (HB)** | |
|---|---|---|---|---|
| | | | as welded | 750°C/2h/furnace |
| min. 450 | 650-800 | min. 15 J | ~350 | 200 |

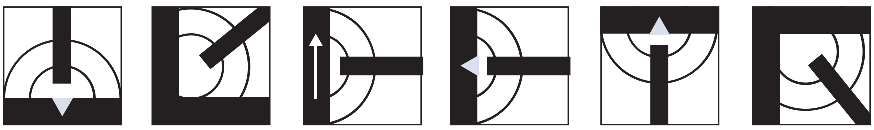
## Typical Base Material Grades

- X6Cr 13, X6CrAl 13, X15Cr 13, X10Cr 13, G-X10Cr 13

## Features and Applications

- 13% Cr used in the joining and surfacing welding of martensitic and martensitic-ferritic steels with 13% Cr and steel casts.( This electrode is also strong at filling in the surfaces of gas, water and steam armatures)
- Annealing at 750°C for 2 hours, cooling down to room temperature in the furnace
- Re-drying: 300°C - 350°C / min. 2h

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101458 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1500 |
| 3010101463 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3140 |
| 3010101468 | 4.00 x 350 | 5/32 x 14” | 110 -160 | 4690 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode

# ELOX B 410 Ni Mo

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 13 4 B 42 |
| EN ISO 3581-A | : E 13 4 B 42 |
| AWS A5.4 | : E 410 NiMo-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|
| 0.04 | 0.2 | 0.45 | 0.5 | 4.2 | 12.3 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength (ISO-V/+20°C) | Elongation ($L_0=5d_0$) (%)) | Hardness (HB) |
|---|---|---|---|---|
| min. 500 | min. 760 | min. 47 J | min. 15 | ~360 |

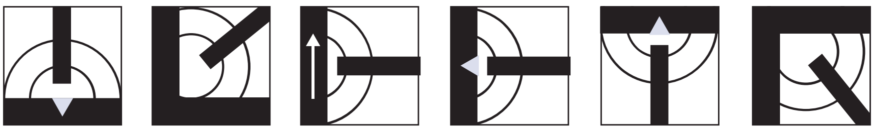
## Typical Base Material Grades

- X5CrNi 13 4, G-X5CrNi 13 4, X6Cr13, G-X5CrNi 13 6

## Features and Applications

- Electrode with rutile coating on alloyed core-wire
- Applicability in welding Cr-Ni -alloyed austenitic high-temperature steels
- Usability in welding at all positions except for vertical downward position
- Applicability in joint-welding and surfacing of heat-resisting similar-type steels and steel castings.
- Serviceability at temperatures of values up to 700 °C
- Resistance to fracture and corrosion
- Creep resistance at high temperatures being higher than that of the electrode ELOX R 308 L
- Re-drying: 300° - 350°C / min. 2 h

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101473 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1500 |
| 3010101478 | 3.20 x 350 | 1/8 x 14” | 90 - 110 | 3260 |
| 3010101483 | 4.00 x 350 | 5/32 x 14” | 110 - 160 | 4930 |

**Approvals:** TSE, CE, SEPRO

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# ELOX BS 410 Ni Mo

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 13 4 B 62 |
| EN ISO 3581-A | : E 13 4 B 62 |
| AWS A5.4 | : E 410NiMo-25 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|
| 0.05 | 0.3 | 0.5 | 0.5 | 4.5 | 11.5 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0$=5$d_0$) (%)) | **Hardness (HB)** |
|---|---|---|---|---|
| min. 600 | 800-980 | min. 47 J | min. 15 | ~270 |

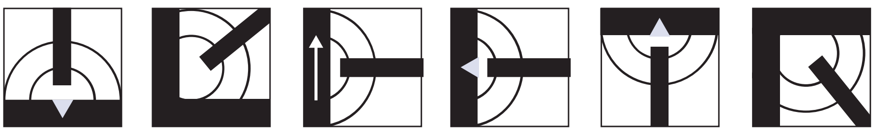
## Typical Base Material Grades

- X5CrNi 13 4, G-X5CrNi 13 4, X6Cr 13, G-X5CrNi 13 6

## Features and Applications

- Basic coated electrode for welding similar corrosion-resistant, martensitic and martensitic-ferritic rolled, forged and cast steels
- Used in the construction of hydroturbines, compressors and steam power plants
- Resistant to corrosion caused by water, steam and sea water atmosphere
- Excellent slag removability and smooth bead appearance
- Metal recovery approx. 130% Out-of-position weldability
- Preheating and interpass temperatures of thick-walled components 100°C-160°C
- Tempering temperature 580°C-620°C
- Re-drying: 300°C - 350°C / min. 2 h

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101488 | 2.50 x 350 | 3/32 x 14” | 70 - 110 | 1960 |
| 3010101493 | 3.20 x 350 | 1/8 x 14” | 110 - 150 | 3630 |
| 3010101498 | 4.00 x 350 | 5/32 x 14” | 150 - 190 | 5550 |

**Approvals:** TSE, CE, SEPRO

Stainless Steel Electrode

# ELOX B 430

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 17 B 22 |
| EN ISO 3581-A | : E 17 B 22 |
| AWS A5.4 | : E 430 - 15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Cr |
|---|---|---|---|
| 0.08 | 0.5 | 0.4 | 17.0 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ($L_0=5d_0$) (%)) | Hardness (HB) | |
|---|---|---|---|---|
| | | | as welded | 750°C/2h/furnace |
| min. 350 | 540-660 | min. 20 | ~270 | ~200 |

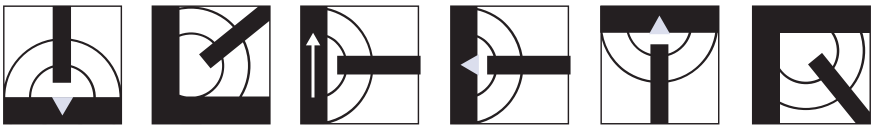
## Typical Base Material Grades

- X6CrTi 17, X20CrNi17-2, 431,430 Ti

## Features and Applications

- Mainly used for corrosion-resistant, wear-resistant surtacing applications
- Preferably for surfacing on sealing faces of gas, water and steam valves
- Scaling resistance up to 900°C
- Weld metal protector hardness up to 500°C

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101503 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1400 |
| 3010101508 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3000 |
| 3010101513 | 4.00 x 350 | 5/32 x 14” | 110 - 160 | 4600 |

**Approvals:** TSE, CE, SEPRO

GeKa

Stainless Steel Electrode

# ELOX B 430 Mo

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E Z 17 Mo B 22 |
| EN ISO 3581-A | : E Z 17 Mo B 22 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.2 | 0.5 | 0.5 | 1.2 | 17.0 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ($L_0=5d_0$) (%)) | Hardness (HB) | |
|---|---|---|---|---|
| | | | as welded | 750°C/2h/furnace |
| min. 490 | 650-750 | min. 15 | ~400 | ~250 |

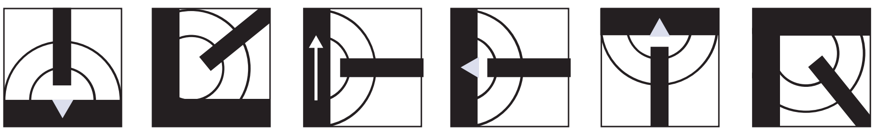
## Typical Base Material Grades

- GS-C 25, X22CrNi 17, 41Cr4

## Features and Applications

- Basic coated alloyed core wire electrode with good weldability in all positions except vertical-down
- Mainly used for hard surfacing, corrison resistant, wear resistant
- Preferably employed for sealing faces of gas, water and steam valves
- In the machined condition, at least a two-layer buildup should remain on the surface
- The weld metal features retention of hardness up to 500°C
- Sea water resistant, scalling resistant up to 900°C
- Preheating as required by the base metal, with temperatures between 100°C and 200°C being generally sufficient (for joining operations 250°- 400°C)
- Annealing at 650°C - 750°C may be carried out to improve the toughness values in the weld metal and in the transition zone

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101518 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1650 |
| 3010101523 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3030 |
| 3010101528 | 4.00 x 350 | 5/32 x 14” | 110 - 160 | 4630 |

**Approvals:** TSE, CE, SEPRO

# ELOX R 2209

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 22 9 3 N L R 32 |
| EN ISO 3581-A | : E 22 9 3 N L R 32 |
| AWS A5.4 | : E 2209 - 17 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr | N |
|---|---|---|---|---|---|---|
| 0.03 | 0.5 | 0.9 | 2.7 | 10.0 | 22.0 | 0.12 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 520 | 690-850 | min. 47 J | min. 20 |

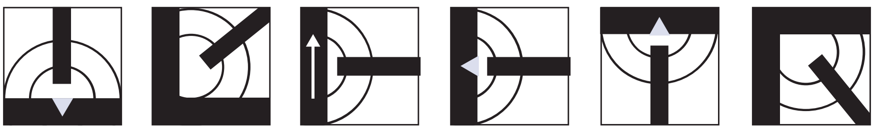
## Typical Base Material Grades

- X2CrNiMoN22-5-3, X2CrNiMoN23-4, X2CrNiMoN22-5-3 with X2CrNiMoNb18-12, X2CrNiMoN22-5-3 with P235GH/ P265GH, S255N, P295GH, S355N, 16Mo3

## Features and Applications

- Applicability in welding dublex steels
- Suitability to joint- and suriacing applications of similar-type austenitic steels and cast steels
- Electrode coating of rutile character
- Excellent weldability
- Very high resistance to stress corrosion cracking and to corrosion at particularly chlorious and sulphuruous media
- In the liquid conditions at chemical industry, serviceability at temperatures of values up to 280°C
- Re-drying: 250°C - 300°C / min. 2h

## Welding Positions



## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101533 | 2.50 x 250 | 3/32 x 10” | 50 - 90 | 1410 |
| 3010101538 | 3.20 x 350 | 1/8 x 14” | 80 - 120 | 3540 |
| 3010101543 | 4.00 x 350 | 5/32 x 14” | 110 - 160 | 5200 |

**Approvals:** TSE, CE, ABS, BV, Class NK, SEPRO, RINA

# Stainless Steel Electrode
# ELOX B 2209

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 22 9 3 N L B 22 |
| EN ISO 3581-A | : E 22 9 3 N L B 22 |
| AWS A5.4 | : E 2209-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr | N |
|---|---|---|---|---|---|---|
| 0.03 | 0.4 | 1.3 | 2.6 | 9.0 | 22.0 | 0.14 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20°C) | Impact Strength (ISO-V/-60°C) | Elongation ($L_0=5d_0$) (%)) |
|---|---|---|---|---|
| min. 520 | 690-850 | min. 80 J | min. 40 J | min. 30 |

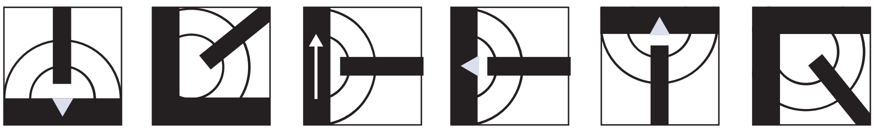
## Typical Base Material Grades

- X2CrNiMoN22-5-3, X2CrNiMoN23-4, X2CrNiMoN22-5-3 with X2CrNiMoNb18-1, X2CrNiMoN22-5-3 with P235GH/ P265GH, S255N, P295GH, S355N, 16Mo3

## Features and Applications

- Applicability in welding dublex steels
- Suitability to joint- and surfacing applications of similar-type austenitic steels and cast steels.
- Electrode coating of basic character
- Excellent weldability
- Very high resistance to stress corrosion cracking and to corrosion at particularly chlorious and sulphuruous media
- In the liquid conditions at chemical industry, serviceability at temperatures of values up to 280°C
- Re-drying: 250°C - 300°C / min. 2h

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101548 | 2.50 x 250 | 3/32 x 10” | 60-80 | 1550 |
| 3010101558 | 3.20 x 300 | 1/8 x 12” | 80-110 | 2850 |
| 3010101568 | 4.00 x 350 | 5/32 x 14” | 110-140 | 5140 |

**Approvals:** TSE, CE, SEPRO

GeKa

Stainless Steel Electrode

# ELOX B 2594

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E 25 9 4 N L B 42 |
| EN ISO 3581-A | : E 25 9 4 N L B 42 |
| AWS A5.4 | : E 2594 - 15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn | Mo | Ni | Cr | N |
|---|---|---|---|---|---|---|
| 0.035 | 0.35 | 1.45 | 3.8 | 8.6 | 24.0 | 0.25 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 550 | min. 760 | min. 47 J | min. 18 |

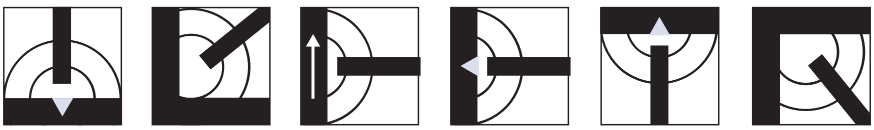
## Typical Base Material Grades

- 1.4410, X2CrNiMoN 25-7-4, 1.4501, X2CrNiMoCuWN 25-7-4, 1.4507, X2CrNiMoCuN 25-6-3
- UNS S32750, S32760, S32550

## Features and Applications

- Basic type electrode which used especially for the welding of duplex steels. It provides high yield and tensile strength and the weld metal is resistant to pitting corrosion
- Re-drying: 250°C - 300°C / min. 2h

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101573 | 2.50 x 250 | 3/32 x 10” | 60 - 80 | 1470 |
| 3010101578 | 3.20 x 300 | 1/8 x 12” | 80 - 120 | 2870 |

**Approvals:** CE, SEPRO

Stainless Steel Electrode

# ELOX B 16-8-2

## Standards

| | |
|---|---|
| TS EN ISO 3581-A | : E Z 16 8 2 B 22 |
| EN ISO 3581-A | : E Z 16 8 2 B 22 |
| AWS A5.4 | : E 16 8 2-15 |

## Chemical Composition of Weld Metal % (Typical)

| C | Cr | Ni | Mo |
|---|---|---|---|
| 0.05 | 16.0 | 8.5 | 1.3 |

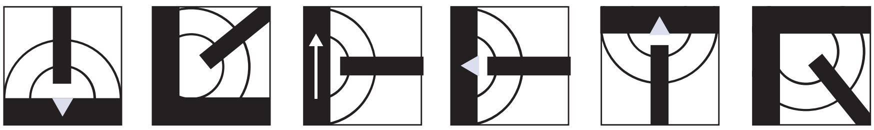
## Mechanical Properties

| Yield Strength (N/mm²) | Tensile Strength (N/mm²) | Impact Strength (ISO-V/+20°C) | Elongation ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 410 | min. 550 | min. 47 J | min. 35 |

## Features and Applications

- Basic coated electrode is used primarily for welding stainless steel, such as types 16-8-2, 316, and 347, for high pressure, high-temperature piping systems
- A controlled chemical composition and ferrite number (<5 FN) of weld metal gives good creep, oxidation and general corrosion resistance

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101618 | 3.20 x 350 | 1/8 x 14” | 100 - 130 | 3200 |

**Approvals:** CE, SEPRO

GeKa

Cast Iron Electrode

# ELNIKEL

## Standards

| | |
|---|---|
| TS 9463 EN ISO 1071 | : E C Ni-CI 1 |
| EN ISO 1071 | : E C Ni-CI 1 |
| AWS A5.15 | : E Ni-CI |

## Chemical Composition of Weld Metal % (Typical)

| C | Ni |
|---|---|
| 0.5 | rest |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** ($L_0=5d_0$) (%)) | **Hardness** (HB) |
|---|---|---|---|
| 200 | 250 | 3 | ~170 |

## Features and Applications

- Joint welding of grey cast iron, temper cast iron, nodular cast iron as well as joint welding of cast iron with steel, stainless steel and Monel metal
- Ni cored stick electrode
- Welding in short passes, and gently striking the bead of each pass with a hammer when the bead is hot are required

## Welding Positions

## Current Type

D.C.(-) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101623 | 2.50 x 300 | 3/32 x 12” | 60- 90 | 1860 |
| 3010101630 | 3.20 x 300 | 1/8 x 12” | 90-110 | 2880 |
| 3010101644 | 4.00 x 400 | 5/32 x 16” | 110-130 | 6070 |

**Approvals:** CE, SEPRO, TSE

# GeKa

Cast Iron Electrode

# ELNIKEL - HD

## Standards

| | |
|---|---|
| TS 9463 EN ISO 1071 | : E C Ni-CI 3 |
| EN ISO 1071 | : E C Ni-CI 3 |
| AWS A5.15 | : E Ni-CI |

## Chemical Composition of Weld Metal % (Typical)

| Fe | Ni |
|---|---|
| 7.0 | rest |

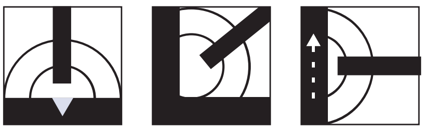
## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Elongation** ($L_0=5d_0$) (%)) | **Hardness** (HB) |
|---|---|---|---|
| 200 | 250 | 3 | ~170 |

## Features and Applications

- Ni cored stick electrode
- Welding in short passes, and gently, striking the bead of each pass with a hammer when the bead is hot
- Joint welding of grey cast iron, temper cast iron, nodular cast iron and joint welding of cast iron with steel
- Weld metal recovery of approx. 110%

## Welding Positions



## Current Type

D.C.(-) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101674 | 4.00 x 400 | 5/32 x 16” | 110 - 140 | 6820 |

**Approvals:** CE, SEPRO

Cast Iron Electrode

# ELNIKEL-NC

## Standards

| | |
|---|---|
| TS 9463 EN ISO 1071 | : E C Ni-CI 1 |
| EN ISO 1071 | : E C Ni-CI 1 |
| AWS A5.15 | : ENi-CI |

## Chemical Composition of Weld Metal % (Typical)

| C | Ni |
|---|---|
| 0.5 | min. 96 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Elongation ($L_0=5d_0$) (%)) | Hardness (HB) |
|---|---|---|---|
| 200 | 250 | 3 | ~170 |

## Features and Applications

- Non-conductive, basic-graphite-coated nickel stick electrode
- Repair welding of problematic cast iron parts of irregular shapes
- Joint welding of cast iron parts, and cast iron parts to steel parts
- Pre-heating to 200 °C is recommended for thick- walled components
- Welding in short runs, and peening are required

## Welding Positions

## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101651 | 2.50 x 300 | 3/32 x 12” | 70 - 100 | 1950 |
| 3010101658 | 3.20 x 300 | 1/8 x 12” | 90 - 110 | 2940 |
| 3010101665 | 4.00 x 400 | 5/32 x 16” | 110 - 130 | 5250 |

**Approvals:** CE, SEPRO, TSE

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Cast Iron Electrode

# ELNIFER

## Standards

| | |
|---|---|
| TS 9463 EN ISO 1071 | : E C NiFe Cl 1 |
| EN ISO 1071 | : E C NiFe Cl 1 |
| AWS A5.15 | : E NiFe-Cl |

## Chemical Composition of Weld Metal % (Typical)

| Fe | Ni |
|---|---|
| >40.0 | >45.0 |

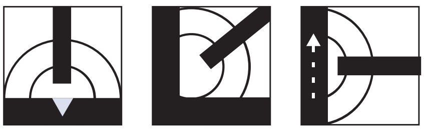
## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Elongation** ($L_0=5d_0$) (%)) | **Hardness** (HB) |
|---|---|---|---|
| 200 | 350 | 6 | ~190 |

## Features and Applications

- Welding of grey cast iron, temper cast iron
- Joint welding of cast iron with hard-to- weld steels or cast parts
- Ni-Fe cored stick electrode
- Welding in short passes, and hammering the bead of each pass through gentle strikes are required

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101683 | 2.50 x 300 | 3/32 x 12” | 60 - 90 | 1790 |
| 3010101690 | 3.20 x 300 | 1/8 x 12” | 80 - 120 | 2670 |
| 3010101697 | 4.00 x 400 | 5/32 x 16” | 110 - 150 | 5390 |

**Approvals:** CE, SEPRO, TSE

GeKa

Cast Iron Electrode

# ELMONEL

## Standards

| | |
|---|---|
| TS 9463 EN ISO 1071 | : E C NiCu-B1 |
| EN ISO 1071 | : E C NiCu-B1 |
| AWS A5.15 | : ~ E NiCu B |

## Chemical Composition of Weld Metal % (Typical)

| Ni | Cu |
|---|---|
| ~ 68.0 | ~30.0 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Elongation ($L_0=5d_0$) (%)) | Hardness (HB) |
|---|---|---|---|
| min. 190 | 300 | min. 15 | ~140 |

## Features and Applications

- Soft joint welding of grey cast iron
- Filler welding, repair welding and gently striking the bead of each pass with a hammer when the bead is hot are required
- Ni-Cu cored stick electrode

## Welding Positions

## Current Type

D.C.(-) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101704 | 2.50 x 300 | 3/32 x 12” | 60 - 90 | 1850 |
| 3010101711 | 3.20 x 300 | 1/8 x 12” | 90 - 110 | 2860 |
| 3010101718 | 4.00 x 400 | 5/32 x 16” | 110 - 130 | 5790 |

**Approvals:** CE, SEPRO, TSE

GeKa

Cast Iron Electrode

# ELFER

## Standards

| | |
|---|---|
| TS 9463 EN ISO 1071 | : E C Fe-2 |
| EN ISO 1071 | : E C Fe-2 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | V |
|---|---|---|---|
| 0.07 | 1.0 | 0.8 | 8.0 |

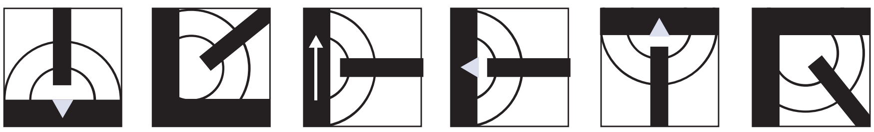
## Mechanical Properties

| **Weld Metal Hardness** (HB) |
|---|
| ~ 250 |

## Features and Applications

- Repair of welding defects,for facing of worn-out parts of mold of automobile body, shielding process of metal frictioning works
- Good results at joint welding of steel with cast iron
- Basic coated,Barium compound free,iron base,Vanadium alloyed cast iron electrode, which is used for repairing and mantanance of defective lameller and nodular cast iron equipment and machine parts. Also used for hard face welding of wear suspectible of cast iron parts Adventages of this Nickel free cast iron electrode is;
- The deposit metal is a cose color match to cast iron,
- The similaritiy of chemical composition of weld metal and cast iron assures similar that expansion and contraction charactheristics, as a result 1here is ne subject about thermal deformation
- When weding,electrode is not hot, as a result welding can be done unintenupted and more quickly

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101725 | 2.50 x 350 | 3/32 x 1 4” | 70 - 100 | 2270 |
| 3010101732 | 3.20 x 350 | 1/8 x 14” | 100 - 120 | 3650 |
| 3010101739 | 4.00 x 350 | 5/32 x 14” | 120 - 160 | 5260 |

**Approvals:** CE, SEPRO, TSE

Hardfacing Electrode

# ELHARD 250

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 1 |
| EN 14700 | : E Fe 1 |
| DIN 8555 | : E1-UM-250 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Cr |
|---|---|---|---|
| 0.15 | 1.0 | 0.8 | 1.0 |

## Mechanical Properties

| Weld Metal Hardness (HB) |
|---|
| 240 - 280 |

## Features and Applications

- For tough build-ups on rails, gearwheels, shafts, gear parts, and couplings
- For buffer layers on carbon steels and low-alloyed steels with concurrent extreme compressive stress on anti-wear surfaces
- Re-drying: 300°C / 2h

## Resistance Type and Level

| | |
|---|---|
| Friction | ■■□□ |
| High Temp. | ■□□□ |
| Corrosive | ■□□□ |
| Machining | ■■■■ |
| Impact | ■■■□ |
| Thermo Shock | ■□□□ |
| Crack Resistance | ■■■■ |

## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101744 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3670 |
| 3010101747 | 4.00 x 450 | 5/32 x 18” | 140 -180 | 6820 |
| 3010101750 | 5.00 x 450 | 3/16 x 18” | 180- 230 | 10570 |

**Approvals:** SEPRO

GeKa

Hardfacing Electrode

# ELHARD 300

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 1 |
| EN 14700 | : E Fe 1 |
| DIN 8555 | : E1-UM-300 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Cr |
|---|---|---|---|
| 0.15 | 1.3 | 0.5 | 1.5 |

## Mechanical Properties

| **Weld Metal Hardness** (HB) |
|---|
| 280 - 330 |

## Features and Applications

- Basic coated electrode for medium hardness value
- For tough build-ups, particularly on Mn-Mo-alloyed wing and junction rails with mechanical strength of minimum 880 N/mm$^2$
- Deposit offers ease of machining
- Pre-heating temperature 250°C-350°C.
- Re-drying: 300°C / 2h

## Resistance Type and Level

| | |
|---|---|
| Friction | 2/4 |
| High Temp. | 1/4 |
| Corrosive | 1/4 |
| Machining | 4/4 |
| Impact | 3/4 |
| Thermo Shock | 1/4 |
| Crack Resistance | 4/4 |

## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101753 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3571 |
| 3010101759 | 4.00 x 450 | 5/32 x 18” | 140 - 180 | 6775 |
| 3010101762 | 5.00 x 450 | 3/16 x 18” | 180 - 230 | 10500 |

**Approvals:** SEPRO

GeKa

Hardfacing Electrode

# ELHARD 300 R

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 1 |
| EN 14700 | : E Fe 1 |
| DIN 8555 | : E1-UM-300 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Cr |
|---|---|---|---|
| 0.14 | 0.5 | 0.5 | 1.8 |

## Mechanical Properties

| **Weld Metal Hardness** (HB) | **Weld Metal Hardness (HB)** 900°C/cooled on water/tempered |
|---|---|
| 300 - 330 | 450 - 470 |

## Features and Applications

- Basic coated electrode for medium hardness value
- For tough build-ups, particularly on Mn-Mo-alloyed wing and junction rails with mechanical strength of minimum 880 N/mm$^2$
- Deposit offers ease of machining
- It can use with alternating current
- Pre-heating temperature 250°C-350°C
- Re-drying: 300°C / 2h

## Resistance Type and Level

Friction

■■□□

High Temp.

■□□□

Corrosive

■□□□

Machining

■■■■

Impact

■■■□

Thermo Shock

■□□□

Crack Resistance

■■■■

## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101765 | 3.20 x 350 | 1/8x 14" | 90 - 135 | 3520 |
| 3010101768 | 4.00 x 450 | 5/32 x 18" | 135 - 180 | 6690 |

**Approvals:** SEPRO

GeKa

Hardfacing Electrode

# ELHARD 350

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 1 |
| EN 14700 | : E Fe 1 |
| DIN 8555 | : E1-UM-350 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Cr |
|---|---|---|---|
| 0.17 | 1.5 | 0.8 | 2.0 |

## Mechanical Properties

| Weld Metal Hardness (HB) |
|---|
| 330 - 380 |

## Features and Applications

- Basic-coated electrode
- Wear resistant surfacing on Mn-Cr-V alloyed frogs, track rollers, idlers, tracks, slideways and drive sprockets
- The deposits are machinable
- Re-drying: 300°C / 2h

## Resistance Type and Level

| | |
|---|---|
| Friction | 2 |
| High Temp. | 1 |
| Corrosive | 1 |
| Machining | 4 |
| Impact | 3 |
| Thermo Shock | 1 |
| Crack Resistance | 4 |

## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101774 | 3.20 x 350 | 1/8 x 14" | 100 - 140 | 3600 |
| 3010101777 | 4.00 x 450 | 5/32 x 18" | 140 - 180 | 6750 |
| 3010101780 | 5.00 x 450 | 3/16 x 18" | 180 - 230 | 10540 |

**Approvals:** SEPRO

GeKa

Hardfacing Electrode

# ELHARD 400

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 1 |
| EN 14700 | : E Fe 1 |
| DIN 8555 | : E1-UM-400 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Cr |
|---|---|---|---|
| 0.14 | 1.5 | 0.6 | 2.0 |

## Mechanical Properties

| **Weld Metal Hardness** (HB) |
|---|
| 400 - 430 |

## Features and Applications

- Used for dozer, excavator, mineral mining machine equipment like ladle, idler, idler roller and their repair welding
- Re-drying: 300°C / 2h

## Resistance Type and Level

Friction

High Temp.

Corrosive

Machining

Impact

Thermo Shock

Crack Resistance

## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101783 | 4.00 x 450 | 5/32 x 18” | 140-180 | 6820 |
| 3010101786 | 5.00 x 450 | 3/16 x 18” | 180-230 | 10900 |

**Approvals:** SEPRO

GeKa

Hardfacing Electrode

# ELHARD 500

## Standards

| | |
|---|---|
| TS EN 14700 | : E Z Fe 1 |
| EN 14700 | : E Z Fe 1 |
| DIN 8555 | : E1-UM-50 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Cr |
|---|---|---|---|
| 0.3 | 1.3 | 1.2 | ~5.5 |

## Mechanical Properties

| **Weld Metal Hardness** (HRC) |
|---|
| ~50 |

## Features and Applications

- Used in hardfacing applications of guide roller, rope pulleys, ladle lugs etc. for land, mineral and cool sector
- Weld metal has strength against friction and wear
- Pre-heating is generally 200°C according to base material
- Re-drying: 300°C / 2h

## Resistance Type and Level

Friction

High Temp.

Corrosive

Machining

Impact

Thermo Shock

Crack Resistance

## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101792 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3600 |
| 3010101798 | 4.00 x 450 | 5/32 x 18” | 140 - 180 | 7010 |
| 3010101804 | 5.00 x 450 | 3/16 x 18” | 180 - 230 | 10900 |

**Approvals:** SEPRO

GeKa

Hardfacing Electrode

# ELHARD 600

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 8 |
| EN 14700 | : E Fe 8 |
| DIN 8555 | : E6-UM-60 P |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Mo | V | Cr |
|---|---|---|---|---|---|
| 0.5 | 0.5 | 1.1 | 1.0 | 1.0 | 7.5 |

## Mechanical Properties

| **Weld Metal Hardness** (HRC) | **780- 820 °C Cooling in Furnace** | **Hardening 1000 - 1050°C in Oil** | **300 - 400°C Tempered** |
|---|---|---|---|
| 55-59 | ~ 25 HRC | ~60 HRC | 53 - 55 HRC |

## Features and Applications

- Final pass-welding of parts of earth-moving and mining equipment with high resistance to abraison, as well as of parts of hard manganese steels and frags
- Weld metal is resistant to abraison
- Re-drying: 300°C / 2h

## Resistance Type and Level

| | |
|---|---|
| Friction | 4/4 |
| High Temp. | 1/4 |
| Corrosive | 2/4 |
| Machining | 2/4 |
| Impact | 4/4 |
| Thermo Shock | 1/4 |
| Crack Resistance | 3/4 |

## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101810 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3660 |
| 3010101813 | 4.00 x 450 | 5/32 x 18” | 140 -180 | 6820 |
| 3010101816 | 5.00 x 450 | 5/16 x 18” | 180 - 230 | 10500 |

**Approvals:** SEPRO

GeKa

Hardfacing Electrode

# ELHARD 600 S

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 8 |
| EN 14700 | : E Fe 8 |
| DIN 8555 | : E6-UM-60 P |

## Chemical Composition of Weld Metal % (Typical)

| C | Cr | Si |
|---|---|---|
| 0.5 | 9.0 | 1.8 |

## Mechanical Properties

| **Weld Metal Hardness** (HRC) | **Slow Cooling in Furnace** | **Hardening 1000 - 1050°C in Oil** | **Tempered 300-400°C** |
|---|---|---|---|
| 54 - 58 | 780-820°C | ~60 HRC | 53 - 55 HRC |

## Features and Applications

- Applicability in final-layer hardfacing of parts of earth and mineral mining machines, impact drilling and crushing devices, guide springs, edges of cutting tools, hard manganese steels, bucket edges and teeth, all of which are made of alloyed or unalloyed steels, as well as in other materials required to have high resistance to wear
- Electrode of basic type with thick coating
- Inclusion of chromium-silicon alloy, very hard electrode
- Weld metal with ductile and cracking-resistant behaviors: Crack resistance to impact forcing due to its high ductility: Machinability of weld metal through grinding only: Requirement of re-drying at 300°C for 2 hours for moistened electrodes: Recommended pre-heating at 200-300°C for welding thick work pieces and materials tending to get hardened: Requirement of 2-3 layers hardfacing to obtain the highest resistance to wear
- Suitability of harder and/or higher-quality steels to buffer-layering with the GeKa electrodes LASER B 50, TEMPO B 63, or, in some cases, with the GeKa electrodes such as ELOX B307, ELOX R 312
- Re-drying: 300°C / 2h

## Resistance Type and Level

| Friction | High Temp. | Corrosive | Machining |
|---|---|---|---|
| ■■■■ | ■□□□ | ■■□□ | ■■□□ |
| Impact | Thermo Shock | Crack Resistance | |
| ■■■■ | ■□□□ | ■■■□ | |

## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101822 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3650 |
| 3010101825 | 4.00 x 450 | 5/32 x 18” | 140 - 180 | 6840 |
| 3010101828 | 5.00 x 450 | 3/16 x 18” | 180 - 230 | 10900 |

**Approvals:** SEPRO

GeKa®

Hardfacing Electrode

# ELHARD 600 R

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 8 |
| EN 14700 | : E Fe 8 |
| DIN 8555 | : E6-UM-60 P |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Mo | V | Cr |
|---|---|---|---|---|---|
| 0.5 | 0.3 | 1.1 | 1.0 | 1.0 | 7.0 |

## Mechanical Properties

| Weld Metal Hardness (HRC) |
|---|
| 55 - 59 |

## Features and Applications

- Electrode covering of rutile character
- Usability with a welding transformer (Weldability with AC)
- Weld metal with ductile and cracking-resistant behaviors
- Requirement of re-drying at the temperature range of 300°C-350°C for 2 hours
- Applicability in final layer welding of earth and mineral mining machines. Impact drilling and crushing devices, guide springs,edges of cutting tools, hard manganese steels, bucket edges and teeth

## Resistance Type and Level

Friction ■■■■

High Temp. ■□□□

Corrosive ■■□□

Machining ■■□□

Impact ■■■■

Thermo Shock ■□□□

Crack Resistance ■■■□

## Current Type

D.C.(+) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101831 | 3.20 x 350 | 1/8 x 14” | 90 - 135 | 4170 |
| 3010101834 | 4.00 x 450 | 5/32 x 18” | 135 - 180 | 7640 |
| 3010101837 | 5.00 x 450 | 3/16 x 18” | 180 - 230 | 11670 |

**Approvals:** SEPRO

GeKa®

Hardfacing Electrode

# ELHARD 650

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 6 |
| EN 14700 | : E Fe 6 |
| DIN 8555 | : E6-UM-60 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Mo | Nb | Cr |
|---|---|---|---|---|---|
| 0.55 | 1.35 | 0.75 | 1.2 | 0.6 | 6.8 |

## Mechanical Properties

| **Weld Metal Hardness** (HRC) |
|---|
| 56 - 59 |

## Features and Applications

- Used in hardfacing applications of earth-moving industry and wearing parts of grinders etc.
- Can be used directly. After three or more passes, buffer-layering must be done according to material grade. (ELHARD 63, ELHARD 250, ELOX R 307 and ELHARD 14 Mn)
- For hardenable steels, preheat temperature is 100-300°C
- Re-drying: 300°C / 2h

## Resistance Type and Level

| Friction | High Temp. | Corrosive | Machining |
|---|---|---|---|
| ■■■■ | ■■■□ | ■□□□ | ■■□□ |
| **Impact** | **Thermo Shock** | **Crack Resistance** | |
| ■■■■ | ■■■□ | ■■■□ | |

## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010100333 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3846 |
| 3010101846 | 4.00 x 450 | 5/32 x 18” | 140 - 180 | 6930 |
| 3010101849 | 5.00 x 450 | 3/16 x 18” | 180 - 230 | 10900 |

**Approvals:** SEPRO

Hardfacing Electrode

# ELHARD 650 Si

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe2 |
| EN 14700 | : E Fe2 |
| DIN 8555 | : E2-UM-60 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Cr |
|---|---|---|---|
| 0.7 | 0.5 | 3.5 | 3.5 |

## Mechanical Properties

| **Weld Metal Hardness** (HRC) |
|---|
| 57 - 62 |

## Features and Applications

- Resistance to abrasion and shocks
- Suitability for uses in hardfacing worn parts of crushing, drilling, excavating, grinding machines in mines/quarries/soil crushing plants
- Weld metal hardness can be exchange between 57 - 62 HRC according to welding current, number of passes, largeness of base metal and chemical compositon of base metal

## Resistance Type and Level

Friction ■■□□

High Temp. ■□□□

Corrosive ■□□□

Machining ■■□□

Impact ■■■□

Thermo Shock ■□□□

Crack Resistance ■■■□

## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101855 | 4.00 x 450 | 5/32 x 18” | 140 - 180 | 7020 |
| 3010101858 | 5.00 x 450 | 3/16 x 18” | 170 - 210 | 11200 |

**Approvals:** SEPRO

Hardfacing Electrode

# ELHARD 700

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 2 |
| EN 14700 | : E Fe 2 |
| DIN 8555 | : ~E6-UM-60 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Mo | V | Cr |
|---|---|---|---|---|---|
| 0.5 | 1.5 | 1.2 | 0.8 | 0.8 | 4.7 |

## Mechanical Properties

| **Weld Metal Hardness** (HRC) |
|---|
| 60 - 62 |

## Features and Applications

- Hardfacing of workpieces of steel, cast steel or hard Mn-steel exposed to a combination of impact, compression and abrasive wearing, such as cam shafts, gliding surfaces, gears, plough shares, rails, shunts, crosses, baffle plates, excavator parts, rope carrier wheels etc.
- Weld metal does not cracking
- Re-drying: 300°C-350°C / 2h

## Resistance Type and Level

| Type | Level (of 4) |
|---|---|
| Friction | 2 |
| High Temp. | 1 |
| Corrosive | 1 |
| Machining | 2 |
| Impact | 3 |
| Thermo Shock | 1 |
| Crack Resistance | 3 |

## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101861 | 3.20 x 350 | 1/8 x 14” | 100 - 150 | 3920 |
| 3010101867 | 4.00 x 450 | 5/32 x 18” | 140 - 180 | 7790 |
| 3010101870 | 5.00 x 450 | 3/16 x 18” | 170 - 210 | 10750 |

**Approvals:** SEPRO

# ELHARD 14 Mn

## Standards

| | |
|---|---|
| TS EN 14700 | : E Z Fe 9 |
| EN 14700 | : E Z Fe 9 |
| DIN 8555 | : E 7-UM-200K |
| AWS A5.13 | : E FeMn-A |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Ni |
|---|---|---|---|
| 0.6 | 13.5 | 0.1 | 3.0 |

## Mechanical Properties

| **Hardness** (HB) | **Hardness After Cold Deformation** (HB) |
|---|---|
| 180 - 220 | ~ 550 |

## Features and Applications

- Hardfacing of mining and rock-crushing machine parts as well as of hard manganese steels.
- Machinability of weld metal only if it is not hammered when it is cold, or, if it is not put into operation for a while
- Re-drying at condition 300°C / 2h is required

## Resistance Type and Level

| Friction | High Temp. | Corrosive | Machining |
|---|---|---|---|
| ■□□□ | ■□□□ | ■■■□ | ■■□□ |
| **Impact** | **Thermo Shock** | **Crack Resistance** | |
| ■■■■ | ■□□□ | ■■■■ | |

## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101876 | 3.20 x 350 | 1/8 x 14” | 110 - 140 | 3700 |
| 3010101882 | 4.00 x 450 | 5/32 x 18” | 150 - 180 | 6870 |
| 3010101885 | 5.00 x 450 | 3/16 x 18” | 180 - 210 | 10900 |

**Approvals:** SEPRO

GeKa

Hardfacing Electrode

# ELHARD 40 W

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 1 |
| EN 14700 | : E Fe 1 |
| DIN 8555 | : E 3-UM-400-GPTS |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Mo | V | Cr | W |
|---|---|---|---|---|---|---|
| 0.2 | 1.1 | 0.8 | 0.6 | 0.4 | 3.2 | 0.5 |

## Mechanical Properties

| **Hardness** (HB) |
|---|
| 380 - 440 |

## Features and Applications

- Used in surface coating applications and dies made from hot work tool steels.
- According to the base material pre-heat and slow cooling can be done
- Weld metal keep its hardness until $500^{0}$C
- Re-drying: $300^{0}$C - $350^{0}$C / 2h

## Resistance Type and Level

Friction

High Temp.

Corrosive

Machining

Impact

Thermo Shock

Crack Resistance

## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101906 | 3.20 x 350 | 1/8 x 14” | 100 - 140 | 3700 |
| 3010101909 | 4.00 x 350 | 5/32 x 14” | 140 -180 | 5390 |

**Approvals:** SEPRO

# ELHARD 58

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 4 |
| EN 14700 | : E Fe 4 |
| DIN 8555 | : ~E 4-UM-60 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Mo | Co | V | Cr |
|---|---|---|---|---|---|---|
| 0.7 | 1.0 | 1.0 | 7.0 | 2.0 | 1.7 | 4.0 |

## Mechanical Properties

| **Hardness** (HRC) |
|---|
| 56 - 60 |

## Features and Applications

- Used in repairing of machining and cutting tools, tool bits, press dies and supports, fillers against strong abraison of excavating and detaching attachments
- Weld deposit has high resistance to friction and wear
- Re-drying: 300°C-350°C / 2h

## Resistance Type and Level

| Friction | High Temp. | Corrosive | Machining |
|---|---|---|---|
| ■■■□ | ■■■■ | ■■□□ | ■■□□ |
| Impact | Thermo Shock | Crack Resistance | |
| ■■■□ | ■■■■ | ■■■□ | |

## Current Type

D.C.(+) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101933 | 3.20 x 350 | 1/8 x 14” | 80-110 | 4410 |
| 3010101936 | 4.00 x 350 | 5/32 x 14” | 110-140 | 5960 |

**Approvals:** SEPRO

Hardfacing Electrode

# ELHARD 60

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 14 |
| EN 14700 | : E Fe 14 |
| DIN 8555 | : E 10-UM-60 GRZ |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Cr |
|---|---|---|---|
| 3.2 | 0.5 | 1.0 | 29.0 |

## Mechanical Properties

| **Hardness** (HRC) |
|---|
| 58 - 62 |

## Features and Applications

- On parts primarily exposed to abraison combined with light impact, such as conveyor screws, mixer blades and mud pumps
- Requirement of re-drying for 2 hours at the temperatures between 300°C and 350°C

## Resistance Type and Level

Friction

High Temp.

Corrosive

Machining

Impact

Thermo Shock

Crack Resistance

## Current Type

D.C.(+) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101942 | 3.20 x 350 | 1/8 x 14” | 110 - 140 | 5080 |
| 3010101945 | 4.00 x 350 | 5/32 x 14” | 170 - 200 | 7960 |
| 3010101948 | 5.00 x 350 | 3/16 x 14” | 190 - 260 | 11400 |

**Approvals:** SEPRO

GeKa®

Hardfacing Electrode

# ELHARD 62

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 16 |
| EN 14700 | : E Fe 16 |
| DIN 8555 | : ~ E 10-UM-60 GRZ |

## Chemical Composition of Weld Metal % (Typical)

| C | Cr | Nb |
|---|---|---|
| 6.5 | 24.0 | 7.5 |

## Mechanical Properties

| **Hardness** (HRC) |
|---|
| ~ 62 |

## Features and Applications

- On parts primarily exposed to abraison combined with light impact, such as conveyor screws, mixer blades and sand pumps
- Weld metal has resistant to corrosion, friction and impact
- It is not recommended overlap passes
- Requirement of re-drying for minimum 2 hours at temperatures between 300°C and 350°C

## Resistance Type and Level

| Friction | High Temp. | Corrosive | Machining |
|---|---|---|---|
| ■■■■ | ■■■■ | ■■□□ | ■□□□ |
| **Impact** | **Thermo Shock** | **Crack Resistance** | |
| ■□□□ | ■□□□ | ■□□□ | |

## Current Type

D.C.(+) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101951 | 3.20 x 350 | 1/8 x 14” | 125 - 160 | 5040 |
| 3010101954 | 4.00 x 350 | 5/32 x 14” | 170 - 200 | 7710 |

**Approvals:** SEPRO

GeKa

Hardfacing Electrode

# ELHARD 63

## Standards

| | |
|---|---|
| TS EN 14700 | : E Z Fe 14 |
| EN 14700 | : E Z Fe 14 |
| DIN 8555 | : E 10-UM-60 GRZ |
| AWS A5.13 | : ~E FeCr-A8 |

## Chemical Composition of Weld Metal % (Typical)

| C | Cr | Si | Mn |
|---|---|---|---|
| 4.5 | 34.0 | 1.0 | 0.5 |

## Mechanical Properties

| **Hardness** (HRC) |
|---|
| 60 -64 |

## Features and Applications

- Special coating, high-chromium carbide electrode for hardfacing operations to provide maximum resistance to extreme mineral abrasion
- A typical application is stringer beads on earth-moving, cement mill and brick making equipment
- Weld metal efficiency is ~ % 220.
- Re-drying: 300°C-350°C / min. 2h

## Resistance Type and Level

| Resistance | Level (of 4) |
|---|---|
| Friction | 4 |
| High Temp. | 2 |
| Corrosive | 3 |
| Machining | 1 |
| Impact | 2 |
| Thermo Shock | 1 |
| Crack Resistance | 1 |

## Current Type

D.C.(+)(-) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101960 | 3.20 x 350 | 1/8 x 14” | 125 - 160 | 5030 |
| 3010101963 | 4.00 x 350 | 5/32 Xx 14” | 170 - 200 | 7420 |
| 3010101969 | 5.00 x 350 | 3/16 x14” | 190 - 260 | 12000 |

**Approvals:** SEPRO

GeKa

Hardfacing Electrode

# ELHARD 65

## Standards

| | |
|---|---|
| TS EN 14700 | : E Fe 16 |
| EN 14700 | : E Fe 16 |
| DIN 8555 | : E 10-UM-65 GRZ |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Mo | V | W | Cr | Nb |
|---|---|---|---|---|---|---|---|
| 4.5 | 0.3 | 1.0 | 5.0 | 1.7 | 2.5 | 23.5 | 4.0 |

## Mechanical Properties

| **Hardness** (HRC) |
|---|
| 63 - 67 |

## Features and Applications

- Super hardfacing electrode with very high content of carbide formers (Mo, V, W, Nb) for deposits subject to extreme sliding mineral abraison
- Used in blast furnace cover mechanism, breakers, mixers, gimlet, non-steel and cement industry, mining coal industries, weld metal efficiency is ~ % 230
- Re-drying: 300°C-350°C / min. 2h

## Resistance Type and Level

| Type | Level (of 4) |
|---|---|
| Friction | 4 |
| High Temp. | 4 |
| Corrosive | 2 |
| Machining | 1 |
| Impact | 1 |
| Thermo Shock | 1 |
| Crack Resistance | 1 |

## Current Type

D.C.(+) / A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Welding Current** (A) | **Weight** g / 100 pcs |
|---|---|---|---|---|
| 3010101975 | 3.20 x 350 | 1/8 x 14” | 110 -150 | 5500 |
| 3010101978 | 4.00 x 350 | 5/32 x 14” | 170 - 200 | 8200 |
| 3010101981 | 5.00 x 350 | 3/16 x 14” | 190 - 250 | 12500 |

**Approvals:** SEPRO

# GeKa

Nickel Based Electrode

# NIBAZ B 65

## Standards

| | |
|---|---|
| TS EN ISO 14172 | : E Ni 6625 (NiCr22Mo9Nb) |
| EN ISO 14172 | : E Ni 6625 (NiCr22Mo9Nb) |
| AWS A5.11 | : E NiCrMo-3 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Mo | Ni | Fe | Cr | Ti | Nb |
|---|---|---|---|---|---|---|---|---|
| 0.04 | 0.4 | 0.7 | 9.0 | rest | 5.0 | 21.0 | + | 3.5 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20°C) | Impact Strength (ISO-V/-196°C) | Elongation ($L_0=5d_0$) (%)) |
|---|---|---|---|---|
| min. 420 | min. 760 | min. 60 J | min. 35 J | min. 30 |

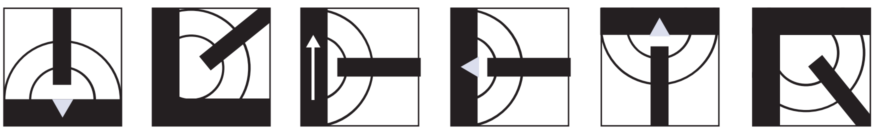
## Typical Base Material Grades

- 1.4529 X2 NiCrMoCu 25 20 6
- 1.4583 X10 NiCrMoNb 1812
- 1.4876 X10 NiCrAlTi 32 20 (incoloy800)
- 1.5662 X8 Ni 9 (ASTM 9Ni)
- 2.4816 NiCr 15 Fe (inconel 600)
- 2.4856 NiCr 22 Mo 9 Nb (inconel 625)
- 2.4858 NiCr 21 Mo (inconel 825)
- 2.4951 NiCr20Ti (ASTM 75)
- 2.4952 NiCr 20 TLN (ASTM 80A)
- ASTM 8443, 8444, 8446 (UNS N06625)

## Features and Applications

- High Molybdenum Nickel-base alloy electrode for creep-resistant steels,heat resisting steels, heat resisting and Cryogenic materials,dissimilar joints and high strength problem steels
- Especially designed for Inconel 625 and Incoloy 825
- Re-drying cond.: 250°C-300°C / 2h

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010101986 | 2.50 x 250 | 3/32 x 10” | 60 - 80 | 1600 |
| 3010101991 | 3.20 x 300 | 1/8 x 12” | 70 - 100 | 3220 |
| 3010101996 | 4.00 x 350 | 5/32 x 14” | 90 - 130 | 5460 |

**Approvals:** SEPRO

Nickel Based Electrode

# NIBAZ B 70

## Standards

| | |
|---|---|
| TS EN ISO 14172 | : E Ni 6082 (NiCr20Mn3Nb) |
| EN ISO 14172 | : E Ni 6082 (NiCr20Mn3Nb) |
| AWS A5.11 | : ~ E NiCrFe 3 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Mo | Ni | Fe | Cr | Ti | Nb |
|---|---|---|---|---|---|---|---|---|
| 0.05 | 4.5 | 0.4 | 1.5 | >65 | 3.0 | 20.0 | 0.25 | 1.8 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20°C) | Elongation ($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 390 | 630 - 710 | min. 60 J | min. 30 |

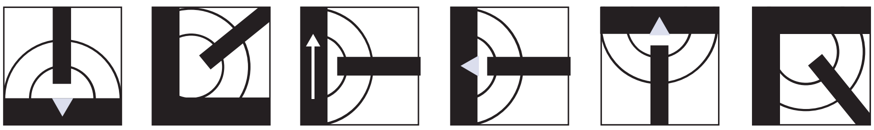
## Typical Base Material Grades

- Un-alloyed and alloyed, high temperature steels to X8Ni9, high alloyed Cr and CrNi Steels, particularly for mixed alloy joints. Nickel and nickel alloys and joints to steels.
- NiCr 15 Fe, LC-NiCr 15Fe, NiCr 60 15, INCONEL 600 / 600 L, INCOLOY 800

## Features and Applications

- Resisting to low and high temperature and creep, low and unalloyed steels contain up to % 9 Ni Ni and Ni Alloys and pressure vessels
- Weld metal has non-scalling structure at -196°C and 1200°C
- Weld metal is stainless, austenitic steels and resistance to thermal shock

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010102016 | 2.50 x 250 | 3/32 x 10” | 50-80 | 1750 |
| 3010102021 | 3.20 x 300 | 1/8 x 12” | 75-105 | 3350 |
| 3010102026 | 4.00 x 350 | 5/32 x 14” | 90-130 | 5490 |

**Approvals:** SEPRO, ABS

GeKa

Nickel Based Electrode

# NIBAZ B 71

## Standards

| | |
|---|---|
| TS EN ISO 14172 | : E Ni 6182 (NiCr15Fe6Mn) |
| EN ISO 14172 | : E Ni 6182(NiCr15Fe6Mn) |
| AWSA5.11 | : E NiCrFe3 |

## Chemical Composition of Weld Metal % (Typical)

| C | Mn | Si | Ni | Fe | Cr | Nb |
|---|---|---|---|---|---|---|
| 0.04 | 7.5 | 0.6 | rest | 7.5 | 16.7 | 2.2 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength | | Elongation |
|---|---|---|---|---|
| | | (ISO-V/+20°C) | (ISO-V/-196°C) | ($L_0$=5$d_0$) (%)) |
| min. 360 | min. 550 | min. 47 J | min. 32 J | min. 30 |

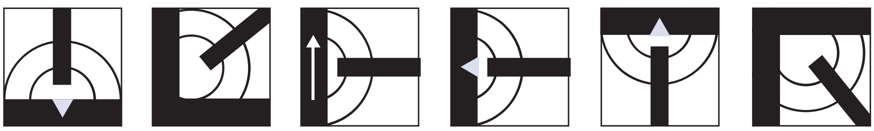
## Typical Base Material Grades

- NiCr 15 Fe, LC-NiCr 15 Fe, NiCr 60 15,INCONEL 600/600L, INCOLOY 800

## Features and Applications

- This electrode is a Nickel-based and basic-type electrode
- Applicability in weldinghigh-temperature steels and low-temperature alloyed or unalloyed steels, Nickel (Ni), and Ni-alloys
- High creep-resistance
- Serviceability at temperatures ranging between -196°C and 480°C
- Requirement of re-drying at 300°C-350°C for 2 hours

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010102031 | 2.50 x 250 | 3/32 x 10” | 50 - 80 | 1600 |
| 3010102036 | 3.20 x 300 | 1/8 x 12” | 75 - 105 | 3250 |
| 3010102041 | 4.00 x 350 | 5/32 x 14” | 90 - 130 | 5490 |

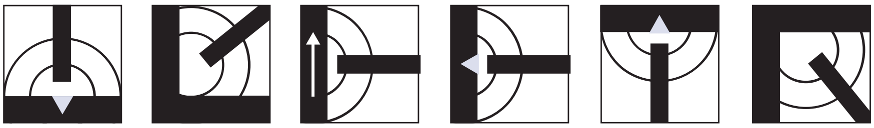
**Approvals:** SEPRO

GeKa®

Cutting Electrode
# ELIT CUT

## Typical Base Material Grades
- Non-alloyed and low alloyed steels, stainless steels, aluminium and aluminium alloys, copper and copper alloys, cast-iron and steel casts

## Features and Applications
- Usability in cutting, in making welding grooves, or in drilling all metals that cannot be oxygen-cut or -drilled
- Resistance against high values of current at welding.
- Requirement of holding the electrode in the direction perpendicular to work direction

## Welding Positions


## Current Type
D.C.(-) / A.C.

## Operating Data

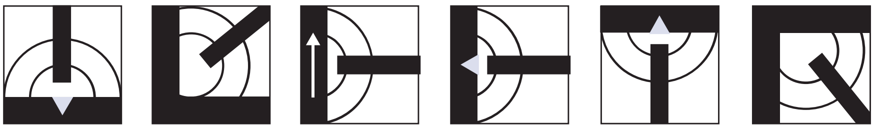
| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010102044 | 3.20 x 350 | 1/8 x 14” | 160 - 240 | 3680 |
| 3010102050 | 4.00 x 350 | 5/32 x 14” | 180 - 300 | 5430 |
| 3010102053 | 4.00 x 450 | 5/32 x 18” | 180 - 300 | 11000 |
| 3010102056 | 5.00 x 450 | 3/16 x 18” | 240 - 400 | 15000 |

GeKa®

Gouging Electrode
# ELIT NUT

## Typical Base Material Grades
- Non-alloyed and low alloyed steels, stainless steels, aluminium and aluminium alloys, copper and copper alloys, cast-iron and steel casts

## Features and Applications
- Usability in making welding grooves, or in removing defective weld beads in all metals that cannot be worked through oxygen
- Very easy usage
- Arc start by holding the electrode in a direction perpendicular to that of the work, and, by subsequently pushing it forward after approaching it at an angle of 15° to work direction
- Groove depth of halt of the electrodes coating thickness
- Deeper grooves obtained only by repeating the operation atter the work piece is cooled

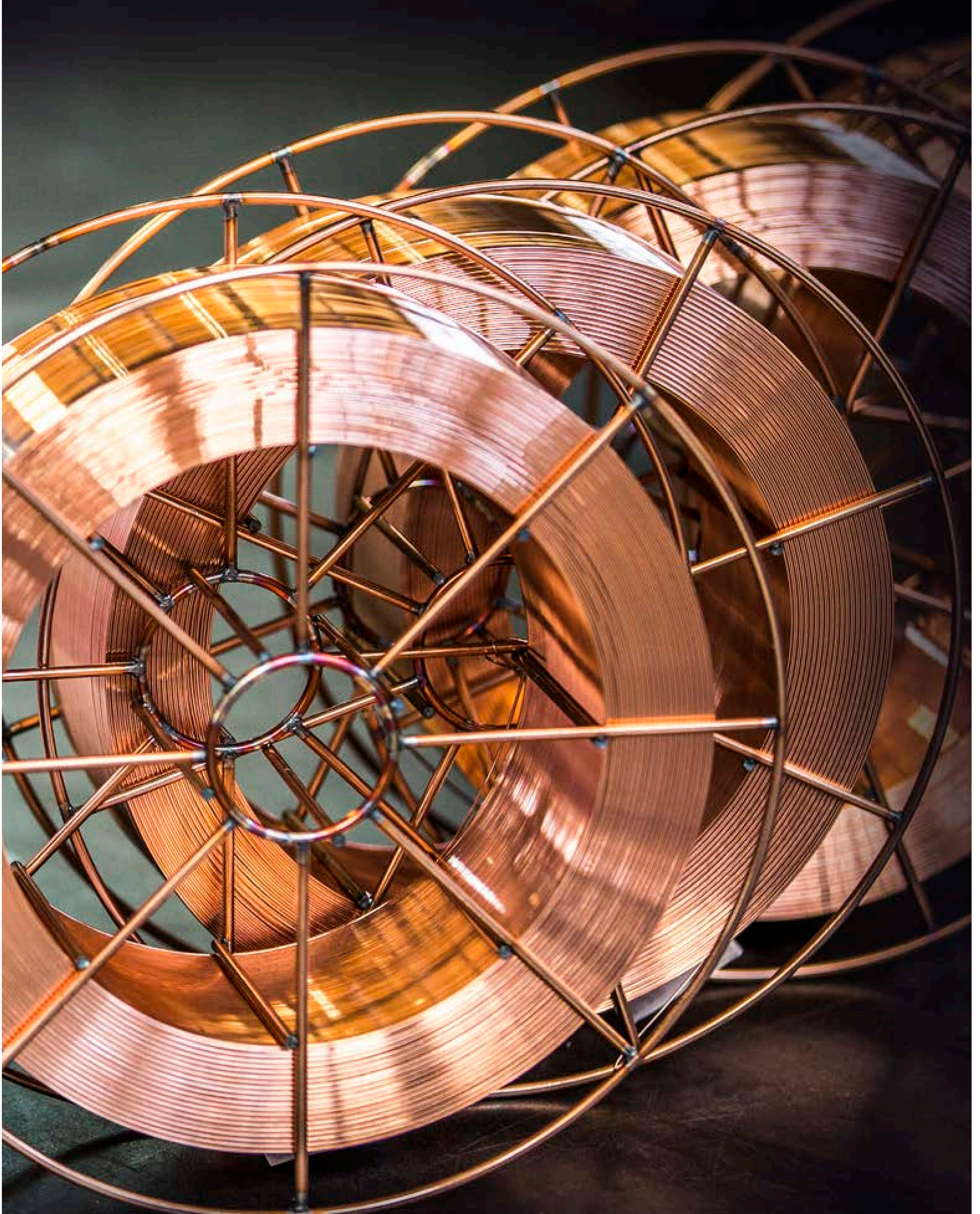
## Welding Positions


## Current Type
D.C.(+) / A.C.

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Welding Current (A) | Weight g / 100 pcs |
|---|---|---|---|---|
| 3010102059 | 3.20 x 350 | 1/8 x 14” | 180 - 240 | 3770 |
| 3010102062 | 4.00 x 350 | 5/32 x 14” | 250 - 320 | 5350 |
| 3010102065 | 5.00 x 350 | 3/16 x 14” | 360 - 500 | 8280 |

**Approvals (ELIT CUT / NUT):** SEPRO



# WELDING WIRES

# SG 1

## Standards

| | |
|---|---|
| TS EN ISO 14341-A | : G2Si |
| TS EN ISO 636-A | : W2Si |
| EN ISO 14341-A | : G2Si |
| EN ISO 636-A | : W2Si |
| AWS A5.18 | : ER 70 S-3 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.10 | 0.6 | 1.2 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-30°C) | Elongation (($L_o$=5$d_o$) (%) |
|---|---|---|---|
| min. 400 | 480 - 600 | min. 47 J | min. 22 |

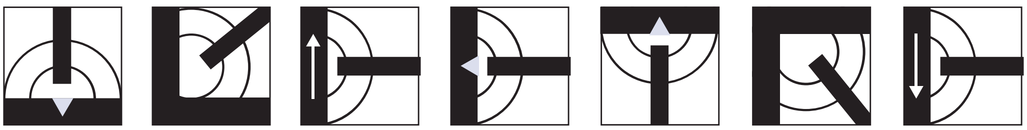
## Typical Base Material Grades

- S235J2G3-S355J2G3, P235T2-P355T2, L210NB - L290NB, L290MB-L360MB, P235G1TH, P255G1TH, P235GH P355GH, S235JRS1-S235J4S, S315G1S-S355G3S,P255NH-P355NH, GE200-GE300

## Features and Applications

- Welding of thin walled parts
- Root pass welding
- For making galvanized coating
- TIG welding of tubes and pipes
- Shielding gases: TIG: Ar / MAG: 20% $CO_2$, - 80% Ar or pure $CO_2$

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| Product Code | | Diameter x Length (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|---|
| **BS 300** | **D 300** | | | | BS/D/300 |
| 3010200009 | 3010200033 | 0.8 | 0.030” | 15 | D 200 |
| 3010200011 | 3010200035 | 1.0 | 0.040” | 15 | D 100 |
| 3010200013 | 3010200037 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010200014 | 3010200039 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300115 | | 1,60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300116 | | 2,00 x 1000 | 5/64 x 39” | 5 | |
| 3010300117 | | 2,40 x 1000 | 3/32 x 39” | 5 | |
| 3010300118 | | 3,20 x 1000 | 1/8 x 39” | 5 | |
| 3010300119 | | 4,00 x 1000 | 5/32 x 39” | 5 | |
| 3010300120 | | 5,00 x 1000 | 3/16 x 39” | 5 | |

**Approvals:** SG1/$CO_2$: TSE, CE, SEPRO, CWB SG1/TIG: CE, SEPRO, TSE, CWB

# SG 70 S-2

## Standards

| | |
|---|---|
| TS EN ISO 14341-A | : G2Ti |
| TS EN ISO 636-A | : W2Ti |
| EN ISO 14341-A | : G2Ti |
| EN ISO 636-A | : W2Ti |
| AWS A5.18 | : ER 70 S-2 |

## Chemical Composition of Welding Wire % (Typical)

| C | Mn | Si | Zr | Ti | Al |
|---|---|---|---|---|---|
| 0.05 | 1.1 | 0.55 | 0.07 | 0.12 | 0.11 |

## Mechanical Properties

| Yield Strength (N/mm²) | Tensile Strength (N/mm²) | Impact Strength (ISO-V/-30°C) | Elongation (($L_o=5d_o$) (%) |
|---|---|---|---|
| min. 400 | min. 480 | min. 47 J | min. 22 |

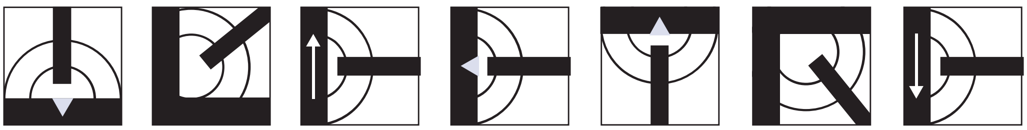
## Typical Base Material Grades

- S235J2G3-S355J2G3, P235T2-P355T2, L210NB-L290NB, L290MB-L360MB, P235G1TH, P255G1TH, P235GH P355GH, S235JRS1-S235J4S, S315G1S-S355G3S, P255NH-P355NH, S255N-S420N, GE200-GE300

## Features and Applications

- Wire for welding mild and low alloy steels as well as thin walled materials
- Being triple deoxidized with Aluminium, Titanium and Zirconium as well as Manganese and Silicon, the wire is capable of producing efficient welds when the steel to be welded is rusty, dirty, undercoat painted
- It is recommended for pipe welding and for root passes in heavy vessel construction
- Also for welding of steels of which surface will be coated (such as galvanized, etc.)
- Shielding gases: MAG; Ar + $CO_2$ mix gases, TIG; %100 Ar gas can be used

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| Product Code | | Diameter x Length (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|---|
| **BS 300** | **D 300** | | | | BS/D/300 |
| 3010202833 | 3010202856 | 0.8 | 0.030” | 15 | D 200 |
| 3010202835 | 3010202858 | 1.0 | 0.040” | 15 | D 100 |
| 3010202837 | 3010202860 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010202838 | 3010202862 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300222 | | 1,60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300223 | | 2,00 x 1000 | 5/64 x 39” | 5 | |
| 3010300224 | | 2,40 x 1000 | 3/32 x 39” | 5 | |
| 3010300225 | | 3,20 x 1000 | 1/8 x 39” | 5 | |
| 3010300226 | | 4,00 x 1000 | 5/32 x 39” | 5 | |
| 3010300227 | | 5,00 x 1000 | 3/16 x 39” | 5 | |

**Approvals:** SG 70 S2 · TSE, CE, SEPRO

# SG 2

## Standards

| | |
|---|---|
| TS EN ISO 14341-A | : G3Si 1 |
| TS EN ISO 636-A | : W3Si1 |
| EN ISO 14341-A | : G3Si 1 |
| EN ISO 636-A | : W3Si 1 |
| AWS A5.18 | : ER 70 S-6 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.08 | 0.85 | 1.45 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-30°C) | Elongation (($L_o=5d_o$) (%) |
|---|---|---|---|
| min. 420 | 500 - 640 | min. 47 J | min. 22 |

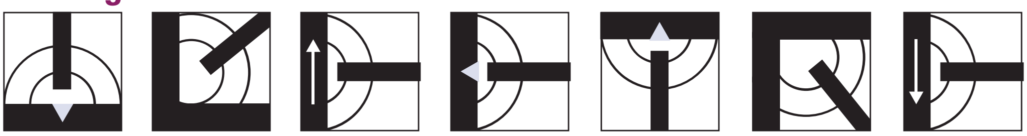
## Typical Base Material Grades

- E295, E335, S235J2G3-S355J2G3, P235T1-P355T1, P235T2,P355T2, L210NB-L415NB, L290MB-L360MB, P235G1TH, P255G1TH, P235GH-P355GH, S235JRS1-S235J4S, S315G1S-S355G3S, S255N-S380N,P255NH P355NH, GE200- GE260

## Features and Applications

- Steel construction and machinery production
- Welding of ships, boiler tanks, pipe parts
- Welding of thin walled steels
- Thin sheet welding in automotive industry
- Perfect smooth feedability, perfect welding characteristics
- Shielding gases: MAG; Ar+$CO_2$ mix gases, TIG ; % 100 Ar gas can be used
- It can be used at operating temperatures of 350°C-400°C.

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| Product Code | | Diameter x Length (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|---|
| BS 300 | D 300 | | | | BS/D 300 |
| 3010200449 | 3010200523 | 0.8 | 0.030”” | 15 | D 200 |
| 3010200451 | 3010200525 | 1.0 | 0.040” | 15 | D 100 |
| 3010200453 | 3010200527 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010200454 | 3010200529 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300156 | | 1,60 x 1000 | 1 / 16 x 39” | 5 | Carton Box |
| 3010300157 | | 2,00 x 1000 | 5/64 x 39” | 5 | |
| 3010300158 | | 2,40 x 1000 | 3/32 x 39” | 5 | |
| 3010300159 | | 3,20 x 1000 | 1/8 x 39” | 5 | |
| 3010300160 | | 4,00 x 1000 | 5/32 x 39” | 5 | |
| 3010300161 | | 5,00 x 1000 | 3/16 x 39 | 5 | |

**Approvals: SG2[M24]:** BV, DNV-GL, TL, DB, ABS, LR, RS, RINA, NK, SEPRO, TÜV
**SG2 [$CO_2$]:** TSE, CE, DB **SG2 [TIG]:** BV, ABS, CE, DB, DNV-GL

# SG 3

## Standards

| | |
|---|---|
| TS EN ISO 14341-A | : G4Si 1 |
| TS EN IS0 636-A | : W4Si1 |
| EN IS0 14341-A | : G4Si 1 |
| EN IS0 636-A | : W4Si1 |
| AWS A5.18 | : ER 70 S-6 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.10 | 1.0 | 1.70 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength (ISO-V/-40°C) | Elongation (($L_o=5d_o$) (%) |
|---|---|---|---|
| min. 460 | 540- 680 | min. 47 J | min. 22 |

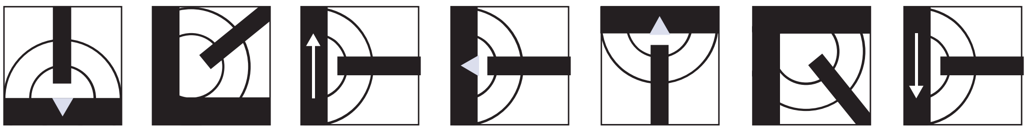
## Typical Base Material Grades

- E295,E360,S235J2G3-S355J2G3, P235T1-P355T1, P235T2,P355T2, L210NB-L415NB, L290MB-L415MB, P235G1TH, P255G1TH, P235GH-P355GH, S235JRS1-S235J4S, S315G1S-S355G3S, S255N-S420N, P255NH-P420NH, GE200-GE260

## Features and Applications

- Used for the same welding purposes as SG2
- Its strength is increased by Si-Mn
- Low spatter although used under $CO_2$ atmosphere
- Excellent wire feeding capability
- Shielding gases: MAG; Ar+$CO_2$ mix gases, TIG; %100 Ar gas can be used

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| Product Code | | Diameter x Length (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|---|
| **BS 300** | **D 300** | | | | BS/D300 |
| 3010201069 | 3010201107 | 0.8 | 0.030” | 15 | D 200 |
| 3010201071 | 3010201109 | 1.0 | 0.040” | 15 | D 100 |
| 3010201073 | 3010201111 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010201074 | 3010201113 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300203 | | 1.6 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300204 | | 2.0 x 1000 | 5/64 x 39” | 5 | |
| 3010300205 | | 2.4 x 1000 | 3/32 x 39” | 5 | |
| 3010300206 | | 3.2 x 1000 | 1/8 x 39” | 5 | |
| 3010300207 | | 4.0 x 1000 | 5/32 x 39” | 5 | |

**Approvals: SG3 [M24]:** TSE, CE, DNV-GL, SEPRO

GeKa®

Heat Resisting Arc Welding Wires & Rods

# SG Mo

## Standards

| | |
|---|---|
| TS EN ISO 21952-A | : G MoSi |
| EN ISO 21952-A | : G MoSi |
| TS EN ISO 21952-A | : W MoSi |
| EN ISO 21952-A | : W MoSi |
| AWS A5.28 | : ER 80 S-G (mod.) (ER 70 S-A1) |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mo | Mn |
|---|---|---|---|
| 0.10 | 0.6 | 0.5 | 1.1 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-20°C) | Elongation (($L_o=5d_o$) (%) |
|---|---|---|---|
| min. 460 | 550 - 670 | min. 47 J | min. 22 |

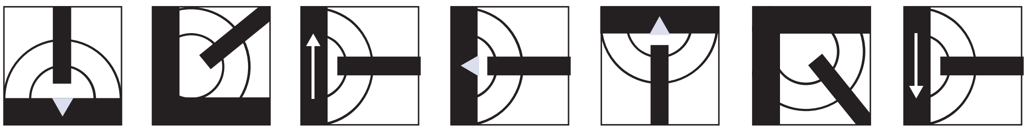
## Typical Base Material Grades

- S355J2G3, L320-L415NB, L320MB-L415MB, P255G1TH, P235GH-P355GH,P255NH, 16Mo3, 17MnMoV6-4, 20MnMoNi5-5, 20MnMoNi4-5, GE240-GE300, 22Mo4, S255N-S460N, P255NH-P460 NH

## Features and Applications

- Copper coated wire for GMAW and rod TIG welding in boiler pressure vessel, pipework and crane construction as well as in structural steel engineering
- High quality, very tough deposit of high crack resistance and non-aging
- Recommended for service in temperature range (-40°C) for TIG, or (-20°C) for GMAW to (+550°C)
- Good copper bonding with low total copper content. Very good welding and flow characteristics
- Preheating interpass and postweld heat treatment as required by base metal
- Shielding gases: MAG; Ar+$CO_2$, mix gases, TIG; %100 Ar

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| Product Code | | Diameter x Length (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|---|
| BS 300 | D 300 | | | | BS/D 300 |
| 3010201530 | 3010201557 | 0.8 | 0.030” | 15 | D 200 |
| 3010201532 | 3010201559 | 1.0 | 0.040” | 15 | D 100 |
| 3010201534 | 3010201561 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010201535 | 3010201563 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300421 | | 1,60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300422 | | 2,00 x 1000 | 5/64 x 69” | 5 | |
| 3010300423 | | 2,40 x 1000 | 3/32 x 39” | 5 | |
| 3010300424 | | 3,20 x 1000 | 1/8 x 39” | 5 | |
| 3010300425 | | 4,00 x 1000 | 5/32 x 39” | 5 | |

**Approvals:** SGMo: CE, SEPRO

# SG 80 S-D2

## Standards

| | |
|---|---|
| TS EN ISO 14341-A | : G 4Mo |
| EN ISO 14341-A | : G 4Mo |
| TS EN ISO 14341-A | : W 4Mo |
| EN ISO 14341-A | : W 4Mo |
| AWS A5.28 | : ER 80 S-D2 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mo | Mn |
|---|---|---|---|
| 0.10 | 0.65 | 0.5 | 1.8 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-30°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 470 | 550 - 680 | min. 47 J | min. 20 |

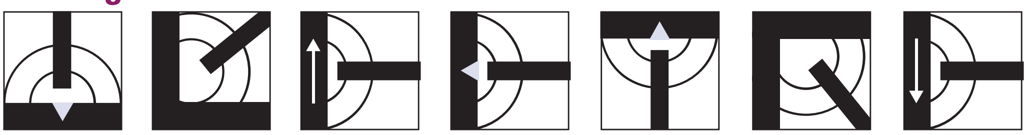
## Typical Base Material Grades

- S355J2G3, L320-L415NB, L320MB-L415MB, P255G1TH, P235GH-P355GH, 16Mo3, 17MnMoV6-4, 20MnMoNi5- 5, 20MnMoNi4-5, GE240-GE300, 22Mo4, S255N-S460N, P255NH-P460 NH

## Features and Applications

- Copper coated for GMAW and TIG welding in boiler pressure vessel, pipework and crane construction as well as in structural steel engineering
- High quality, very tough deposit of high crack resistance and non-aging
- Recommended for service in temperature range -45°C (TIG) or -40 °C (GMAW) to +550 °C.
- Good copper bonding with low total copper content
- Very good welding and flow characteristics
- Preheating interpass and postweld heat treatment as required by base metal
- Shielding gases: MAG; Ar+$CO_2$ mix gases, TIG; pure Ar gas can be used

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| **Product Code** | | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|---|
| **BS 300** | **D 300** | | | | BS/D/300 |
| 3010203050 | 3010203075 | 0.8 | 0.030” | 15 | D 200 |
| 3010203052 | 3010203077 | 1.0 | 0.040” | 15 | D 100 |
| 3010203054 | 3010203079 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010203055 | 3010203081 | 1.6 | 0.062” | 15 | BIG PACK |
| | | (0,6,0.9, 1.14,1.4) | | (1,5,15,18,50,250,400) | |
| 3010300281 | | 1,60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300282 | | 2,00 x 1000 | 5/64 x 39” | 5 | |
| 3010300283 | | 2,40 x 1000 | 3/32 x 39” | 5 | |
| 3010300284 | | 3,20 x 1000 | 1/8 x 39” | 5 | |
| 3010300285 | | 4,00 x 1000 | 5/32 x 39” | 5 | |
| 3010300286 | | 5,00 x 1000 | 3/16 x 39” | 5 | |

**Approvals:** SG80 S-D2: CE, SEPRO

# SG CrMo 1

## Standards

| | |
|---|---|
| TS EN ISO 21952-A | : G Z CrMo 1 Si |
| EN ISO 21952-A | : G Z CrMo 1 Si |
| TS EN ISO 21952-A | : W Z CrMo1 Si |
| EN ISO 21952-A | : W Z CrMo1 Si |
| AWS A5.28 | : ER 80 S-B2 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.10 | 0.6 | 0.5 | 0.5 | 1.2 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength (ISO-V/+20°C) | Elongation (($L_0=5d_0$) (%) | Heat Treatment |
|---|---|---|---|---|
| min. 470 | 550 - 670 | min. 47 J | min. 19 | 620°C/1hour-300°C air |

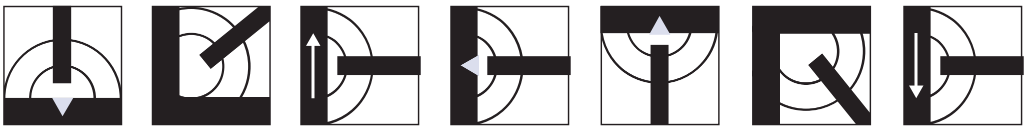
## Typical Base Material Grades

- 13CrMo4-5, 15CrMo5, 42CrMo4, 16CrMoV4, 25CrMo4, 24CrMo5, G22CrMo5-4, G17CrMo5-5, A 333Gr; P11

## Features and Applications

- Used for the welding of high heat resisting. Cr-Mo alloyed steels which are used for the production of boilers tubes and pipes and nitrided steels
- Weld metal is resistant to temperatures up to +570°C
- Shielding gases: MAG; Ar+$CO_2$ and Ar+ $O_2$ mix gases, TIG; pure Ar gas can be used

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| Product Code | | Diameter x Length (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|---|
| BS 300 | D 300 | | | | BS/D/300 |
| 3010201750 | 3010201776 | 0.8 | 0.030” | 15 | D 200 |
| 3010201752 | 3010201778 | 1.0 | 0.040” | 15 | D 100 |
| 3010201754 | 3010201780 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010201755 | 3010201782 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300326 | | 1,60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300327 | | 2,00 x 1000 | 5/64 x 39” | 5 | |
| 3010300328 | | 2,40 x 1000 | 3/32 x 39” | 5 | |
| 3010300329 | | 3,20 x 1000 | 1/8 x 39” | 5 | |
| 3010300330 | | 4,00 x 1000 | 5/32 x 39” | 5 | |

**Approvals:** CE, SEPRO

# SG CrMo 1 Si

## Standards

| | |
|---|---|
| TS EN ISO 21952-A | : G CrMo 1 Si |
| EN ISO 21952-A | : G CrMo 1 Si |
| TS EN ISO 21952-A | : W CrMo 1 Si |
| EN ISO 21952-A | : W CrMo 1 Si |
| AWSA5.28 | : ER 80 S-G |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.10 | 0.6 | 1.0 | 0.5 | 1.2 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 470 | 550 - 670 | min. 47 J | min. 20 | 680°C/1hour-300°C air |

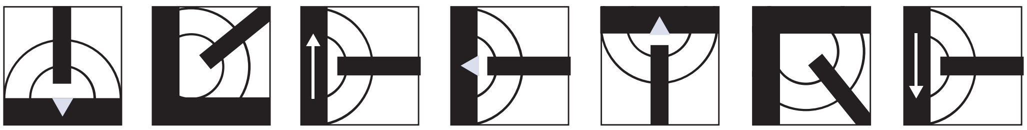
## Typical Base Material Grades

- 13CrMo4-5, 15CrMo5, 42CrMo4, 16CrMoV4, 25CrMo4, 24CrMo5, G22CrMo5-4, G17CrMo5-5

## Features and Applications

- Used for the welding of high heat resisting. Cr-Mo alloyed steels which are used for the production of boilers tubes and pipes and nitrided steels
- Weld metal is resistant to temperatures up to +570°C
- Shielding gases: MAG; Ar+$CO_2$ and Ar+$O_2$ mix gases, TIG; pure Ar gas can be used

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| **Product Code** | | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|---|
| **BS 300** | **D 300** | | | | BS/D/300 |
| 3010201969 | 3010201992 | 0.8 | 0.030” | 15 | D 200 |
| 3010201971 | 3010201994 | 1.0 | 0.040” | 15 | D 100 |
| 3010201973 | 3010201996 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010201974 | 3010201998 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300360 | | 1.6 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300361 | | 2.0 x 1000 | 5/64 x 39” | 5 | |
| 3010300362 | | 2.4 x 1000 | 3/32 x 39” | 5 | |
| 3010300363 | | 3.2 x 1000 | 1/8 x 39” | 5 | |
| 3010300364 | | 4.0 x 1000 | 5/32 x 39” | 5 | |

**Approvals:** CE, SEPRO

# SG CrMo 2

## Standards

| | |
|---|---|
| TS EN ISO 21952-A | : G Z CrMo 2 Si |
| EN ISO 21952-A | : G Z CrMo 2 Si |
| TS EN ISO 21952-A | : W Z CrMo 2 Si |
| EN ISO 21952-A | : W Z CrMo 2 Si |
| AWS A5.28 | : ER 90 S-B3 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.08 | 0.6 | 0.5 | 1.0 | 2.4 |

## Mechanical Properties

| Yield Strength (N/mm²) | Tensile Strength (N/mm²) | Impact Strength (ISO-V/+20°C) | Elongation (($L_o=5d_o$) (%) | Heat Treatment |
|---|---|---|---|---|
| min. 540 | 620 - 760 | min. 47 J | min. 20 | 690⁰C/1hour-300⁰C air |

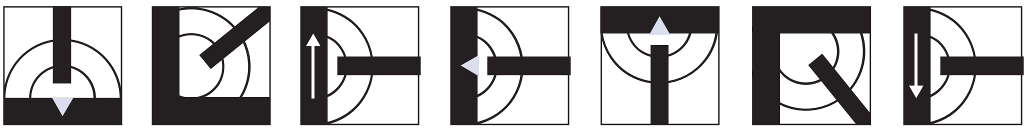
## Typical Base Material Grades

- 10 CrMo9-10, 10 CrSiMoV 7, 10 CrV 63, G-17 CrMo 9-10, A335 Gr. P22

## Features and Applications

- Used for the welding of high heat resisting
- XCr-Mo alloyed steels which are used for the production of boilers tubes, pipes and nitrided steels
- Weld metal is resistant to temperatures up to +600°C
- Shielding gases: MAG; Ar+$CO_2$ and Ar+$O_2$ mix gases, TIG; pure Ar gas can be used

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| Product Code | | Diameter x Length (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|---|
| BS 300 | D 300 | | | | BS/D/300 |
| 3010202185 | 3010202208 | 0.8 | 0.030” | 15 | D 200 |
| 3010202187 | 3010202210 | 1.0 | 0.040” | 15 | D 100 |
| 3010202189 | 3010202212 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010202190 | 3010202214 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300367 | | 1,60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300368 | | 2,00 x 1000 | 5/64 x 39” | 5 | |
| 3010300369 | | 2,40 x 1000 | 3/32 x 39” | 5 | |
| 3010300370 | | 3,20 x 1000 | 1/8 x 39” | 5 | |
| 3010300371 | | 4,00 x 1000 | 5/32 x 39” | 5 | |

**Approvals:** CE, SEPRO

# SG CrMo 2 Si

## Standards

| | |
|---|---|
| TS EN ISO 21952-A | : G CrMo 2 Si |
| EN ISO 21952-A | : G CrMo 2 Si |
| TS EN ISO 21952-A | : W CrMo 2 Si |
| EN ISO 21952-A | : W CrMo 2 Si |
| AWS A5.28 | : ER 90 S-G |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.08 | 0.6 | 1.0 | 1.0 | 2.4 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0$=5$d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 540 | 620 - 760 | min. 47 J | min. 20 | 720$^0$C/1hour-300$^0$C air |

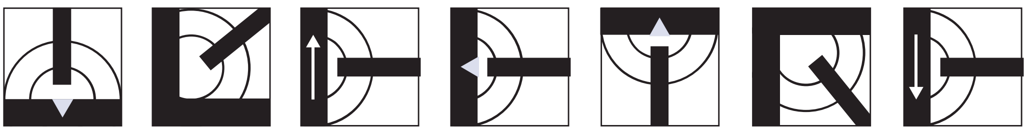
## Typical Base Material Grades

- 10 CrMo9-10, 10 CrSiMoV 7, 10 CrV 63, G-17 CrMo 9-10, A 335 Gr. P22

## Features and Applications

- Used for the welding of high heat resisting
- XCr-Mo alloyed steels which are used for the production of boilers tubes, pipes and nitrided steels
- Weld metal is resistant to temperatures up to +600°C
- Shielding gases: MAG; Ar+$CO_2$ and Ar+$O_2$ mix gases, TIG; pure Ar gas can be used

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| **Product Code** | | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|---|
| **BS 300** | **D 300** | | | | BS/D/300 |
| 3010202401 | 3010202424 | 0.8 | 0.030” | 15 | D 200 |
| 3010202403 | 3010202426 | 1.0 | 0.040” | 15 | D 100 |
| 3010202405 | 3010202428 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010202406 | 3010202430 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300400 | | 1.6 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300507 | | 2.0 x 1000 | 5/64 x 39” | 5 | |
| 3010300401 | | 2.4 x 1000 | 3/32 x 39” | 5 | |
| 3010300402 | | 3.2 x 1000 | 1/8 x 39” | 5 | |
| 3010300403 | | 4.0 x 1000 | 5/32 x 39” | 5 | |

**Approvals:** CE, SEPRO

GeKa®

Heat Resisting Arc Welding Wires & Rods

# SG CrMo 5

## Standards

| | |
|---|---|
| TS EN ISO 21952-A | : G / W CrMo 5 Si |
| EN ISO 21952-A | : G / W CrMo 5 Si |
| AWS A5.28/(A5.9) | : ER 80 S-B6 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.07 | 0.45 | 0.5 | 0.6 | 6.0 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20°C) | Elongation (($L_o$=5$d_o$) (%) | Heat Treatment |
|---|---|---|---|---|
| min. 470 | min. 590 | min. 70 J | min. 18 | 730-760⁰C/1h/300⁰C air |

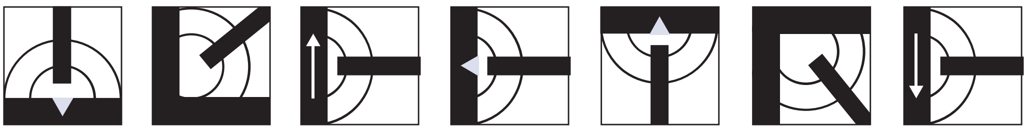
## Typical Base Material Grades

- X12CrMo5, GX12CrMo5

## Features and Applications

- Used for the welding of high heat resisting steels, hot hydrogen plants, working temperature is +600°C and also used for the welding of steels with 5 Cr 1/2 Mo
- Shielding gases: TIG: pure Ar gas can be used. MAG; Ar+$CO_2$, and Ar+$O_2$ mix gases can be used

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| Product Code | | Diameter x Length (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|---|
| **BS 300** | **D 300** | | | | BS/D/300 |
| 3010202617 | 3010202640 | 0.8 | 0.030” | 15 | D 200 |
| 3010202619 | 3010202642 | 1.0 | 0.040” | 15 | D 100 |
| 3010202621 | 3010202644 | 1.2 | 0.047” | 15 | EGO PACK |
| 3010202622 | 3010202646 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300404 | | 1.6 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300405 | | 2.0 x 1000 | 5/64 x 39” | 5 | |
| 3010300406 | | 2.4 x 1000 | 3/32 x 39” | 5 | |
| 3010300407 | | 3.2 x 1000 | 1/8 x 39” | 5 | |
| 3010300408 | | 4.0 x 1000 | 5/32 x 39” | 5 | |

**Approvals:** CE, SEPRO

# SG CrMo 9V

## Standards

| | |
|---|---|
| TS EN ISO 21952-A | : W CrMo 91 |
| EN ISO 21952-A | : W CrMo 91 |
| AWS A5.28/(A5.9) | : ER 90 S-B9 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Cr | V | Ni | Nb | N |
|---|---|---|---|---|---|---|---|---|
| 0.09 | 0.25 | 0.6 | 0.95 | 9.0 | 0.2 | 0.65 | 0.06 | 0.05 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| 650 | 740 | min. 60 J | min. 18 | 745-775°C/2h/300$^0$C air |

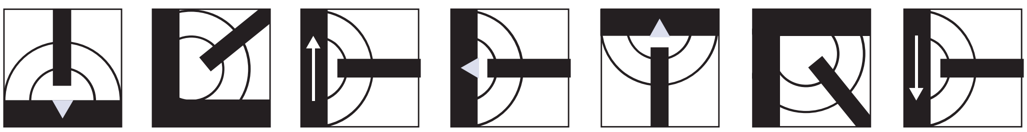
## Typical Base Material Grades

- X10CrMoVNb 9-1, A213 Gr. T91, A 335 Gr. P91 (T31), A 139 GR. T91, %9-12 Cr martensitic stainless steels.

## Features and Applications

- Used for TIG welding of high heat resistance steels such as P91 / T91
- Power plants, turbines, oil refineries, cool and gasification plants, boiler production, also used for the welding of steels with 9Cr 1Mo
- Weld metal is resistant to working temperature up to 600°C
- Shielding gas (TIG): Pure Ar

## Welding Positions



## Current Type

TIG D.C.(-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100368 | 2.00 x 1000 | 5/64 x 39” | 5 | Carton Box |
| 6011100369 | 2.40 x 1000 | 3/32 x 39” | 5 | |

**Approvals:** CE, SEPRO

GeKa

High Strength MAG Wire & TIG Rod

# SG Ni1

## Standards

| | |
|---|---|
| TS EN ISO 14341-A | : G3Ni 1 |
| TS EN ISO 636A | : W3Ni1 |
| EN ISO 14341-A | : G3Ni 1 |
| EN ISO 636A | : W3Ni1 |
| AWS A5.28 | : ER 80S-Ni1 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Ni |
|---|---|---|---|
| 0.08 | 0.65 | 1.10 | 1.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-45°C) | **Elongation** $((L_0=5d_0)$ (%) |
|---|---|---|---|
| min. 470 | min. 550 | min. 27 J | min. 24 |

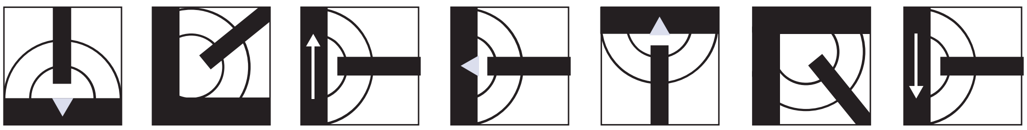
## Typical Base Material Grades

- A106; A515; A714; A131; A369; A210; L290; P235 T1 /T2; P275 T1;
- L360; L415; P275T2; P355N; API X-42; X46; X62; X60; P235GH; P355GH;
- A283; A285; A414; A372; A662; S275; S420; A516; A255; A333; A350; A612

## Features and Applications

- Building up of cranes, transport, industrial facilities, equipment in general, pipelines, shipbuilding, etc
- Working temperatures are between of -45°C and +400°C
- Shielding gas: Ar+$CO_2$ mix gases can be used for MAG
- Shielding gas: Ar gas can be used for TIG

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 3031100169 | 1.20 | 0.047” | 15 | BS 300 Spool |
| 6011100373 | 2.0 x 1.000 | 5/64 x 39” | 5 | Carton Box |
| 6011100380 | 2.4 x 1.000 | 3/32 x 39” | 5 | Carton Box |

**Approvals:** CE, SEPRO

GeKa

High Strength MAG Wire

# SG Ni2

## Standards

| | |
|---|---|
| TS EN ISO 14341-A | : G2Ni 2 |
| EN ISO 14341-A | : G2Ni 2 |
| AWS A5.28 | : ER80S-Ni2 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Ni |
|---|---|---|---|
| 0.08 | 0.55 | 1.10 | 2.30 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/-60°C) | **Elongation** (($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|---|
| min. 470 | min. 550 | min. 27 J | min. 24 | 620 ± 15°C / 1 hours |

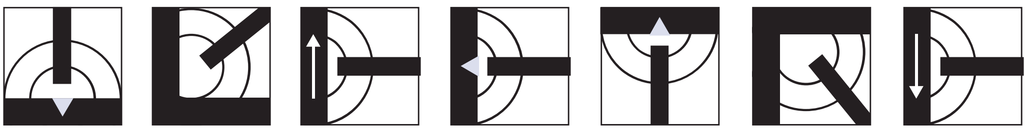
## Typical Base Material Grades

- S255NL2-S355NL2; 14Ni6; 12Ni14; X12Ni5; S255N, S380N, S255NL, S380NL; S255NL1-S355NL1; S380NL1;
- A333: Gr.1-3; A442; Gr55-60; A334: Gr.3;
- 10Ni14, 13MnNi63 ; TTSI E355; TTSI E 460; HY 80; TTSE 35 N

## Features and Applications

- Applications down to -60°C on mild steels, low-alloy steels and fine-grained steels, plates, storage tanks, pipelines and equipment for cryogenic use
- Shielding gas: Ar+$CO_2$ mix gases can be used

## Welding Positions



## Current Type

MAG D.C.(+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 3031100170 | 1.20 | 0.047” | 15 | BS 300 Spool |

**Approvals:** CE, SEPRO

# SG NiMo1

## Standards

| | |
|---|---|
| TS EN ISO 16834-A | : G 62 6 C1/M21 Mn3Ni1Mo |
| EN ISO 16834-A | : G 62 6 C1/M21 Mn3Ni1Mo |
| AWS A5.28 | : ER 100 S-G |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Ni | Mo |
|---|---|---|---|---|
| 0.09 | 0.65 | 1.70 | 1.15 | 0.40 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/-60°C) | **Elongation** (($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 620 | 700 - 890 | min. 47 J | min. 18 |

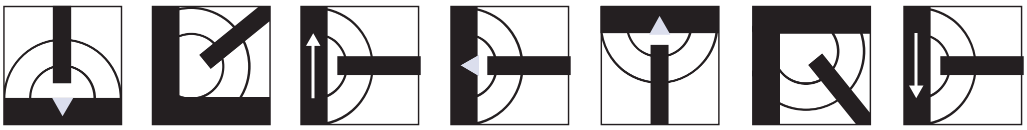
## Typical Base Material Grades

- P355NL1, P460NL1, StE460-590, USS-T.TTS, TE47-51, N-X-ATRA 70, WTSt37-2, WT37-3, WTSt52- 3
- WT St52-3A, Corten A, Patinax 37, Alcodur 50, Koralpin 52, S255, S550, A516, A350, A612, A255, A299, A333

## Features and Applications

- Fine-grained low alloy steels and also austempering steels for applications. Building up of cranes, transport, tanks, industrial facilities, equipment in general, pipelines, shipbuilding, etc
- If necessary, post-weld stress relief shall be heat treated at 560°C-600°C for 1 hour and left in the furnace for cooling down to 300°C
- Shielding gas: Ar+$CO_2$ mix gases can be used

## Welding Positions



## Current Type

MAG D.C.(+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6031100218 | 1.20 | 0.047” | 15 | BS 300 Spool |

**Approvals:** CE, SEPRO

# ER 100 SG

## Standards

| | |
|---|---|
| TS EN ISO 16834-A | : G/W Mn3Ni1CrMo |
| EN ISO 16834-A | : G/W Mn3Ni1CrMo |
| AWS A5.28 | : ER 100S-G |

## Chemical Composition of Welding Wire % (Typical)

| C | Mn | Mo | Cr | Ni | Si |
|---|---|---|---|---|---|
| 0.07 | 1.55 | 0.25 | 0.25 | 1.50 | 0.50 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-30°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 620 | min. 690 | min. 47 J | min. 18 |

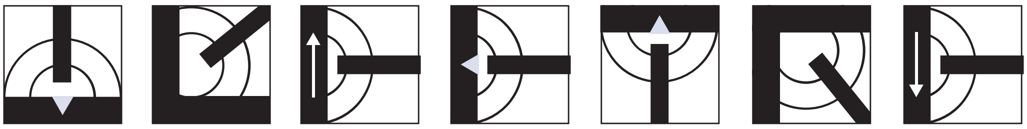
## Typical Base Material Grades

- S460N,S500N, S550NC, S500NL, N-A-XTRA 56-70,BHV 70, PAS700, HSM700, E 295-E 360

## Features and Applications

- ER 100 SG is low alloyed and high strength GMAW wire
- It is used for joining of the high strength low alloy steels and the fine grained constructional steels
- It has high yield strength and impact toughness at low temperatures
- Shielding gases MAG: (Ar+% 15-25 $CO_2$) / TIG: Ar

## Welding Positions



## Current Type

TIG D.C.(-) / MAG D.C.(+)

## Operating Data

| **Product Code** | | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|---|
| **BS 300** | **D 300** | | | | BS/D/300 |
| 3010203273 | 3010203296 | 0.8 | 0.030” | 15 | D 200 |
| 3010203275 | 3010203298 | 1.0 | 0.040” | 15 | D 100 |
| 3010203277 | 3010203300 | 1.2 | 0.047” | 15 | ECO PACK |
| 3010203278 | 3010203302 | 1.6 (0,6,0.9, 1.14,1.4) | 0.062” | 15 (1,5,15,18,50,250,400) | BIG PACK |
| 3010300450 | | 1,60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300451 | | 2,00 x 1000 | 5/64 x 39” | 5 | |
| 3010300452 | | 2,40 x 1000 | 3/32 x 39” | 5 | |
| 3010300453 | | 3,20 x 1000 | 1/8 x 39” | 5 | |

**Approvals:** CE, SEPRO

# GeKa

High Strength MAG Wire & TIG Rod
# ER 110 SG

## Standards

| | |
|---|---|
| TS EN ISO 16834-A | : G 69 4 M21 Mn3Ni1CrMo |
| EN ISO 16834-A | : G 69 4 M21 Mn3Ni1CrMo |
| AWS A5.28 | : ER 110S-G |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Ni | Cr | Cu |
|---|---|---|---|---|---|---|
| 0.09 | 0.75 | 1.70 | 0.50 | 2.0 | 0.30 | 0.20 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-30°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 690 | min. 760 | min. 47 J | 19 |

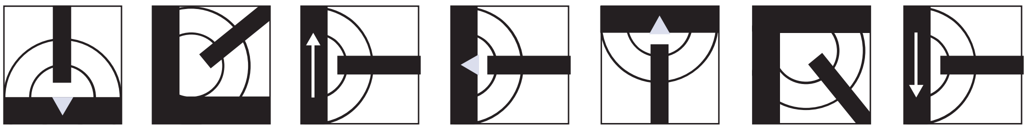
## Typical Base Material Grades

- High strength structural steels and fine grained steels
- S690Q, L690M, N-A-XTRA 70, USS-T1, BH 70 V, HY 100, ASTM A514 Gr.F

## Features and Applications

- ER 110 SG is low alloyed and high strength GMAW wire and GTAW rods
- It is used for joining of the high strength low alloy steels and the fine grained constructional steels with minimum yield strength of 690 $N/mm^2$, especially Hardox and Weldox sheets
- Boilers, pressure vessels, pipelines, structure steels are the other application areas
- Weld metal has high impact and toughness at low temperatures
- Pre-heat can be according to the base material
- Shielding gases - MAG: (Ar+% 15-25 $CO_2$) / TIG: (Ar)

## Welding Positions



## Current Type

MAG D.C.(+) / TIG D.C.(-)

## Operating Data

| **Product Code** | | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|---|
| **BS 300** | **D 300** | | | | BS/D/300 |
| 3010203706 | 3010203729 | 0.8 | 0.030” | 15 | D 200 |
| 3010203708 | 3010203731 | 1.0 | 0.040” | 15 | D 100 |
| 3010203710 | 3010203733 | 1.2 | 0.047” | 15 | EGO PACK |
| 3010203711 | 3010203735 | 1.6<br>(0,6,0.9, 1.14,1.4) | 0.062” | 15<br>(1,5,15,18,50,250,400) | BIG PACK |
| 3010300470 | | 1,60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300471 | | 2,00 x 1000 | 5/64 x 39” | 5 | |
| 3010300472 | | 2,40 x 1000 | 3/32 x 39” | 5 | |

**Approvals:** CE, SEPRO

# Weather Resistant MAG Wire
# SG NiCu

## Standards

| | |
|---|---|
| TS EN ISO 14341-A | : G504 M121 Z (3Ni1) |
| EN ISO 14341-A | : G504 M121 Z (3Ni1) |
| AWS A5.28 | : ER80S-G |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Ni | Cu | Cr |
|---|---|---|---|---|---|
| 0.08 | 0.80 | 1.30 | 0.80 | 0.40 | 0.20 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** | | **Elongation** (($L_0=5d_0$) (%)) |
|---|---|---|---|---|
| | | (ISO-V/-20°C) | (ISO-V/-40°C) | |
| 510 | 590 | 110 J | 60 J | 25 |

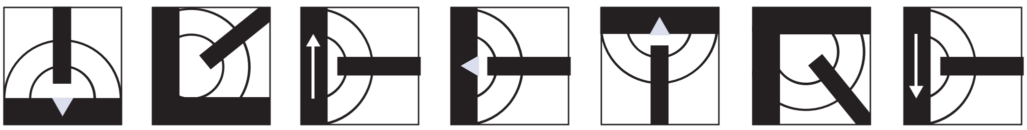
## Typical Base Material Grades

- S235JRW, S235J2G3, Patinax 37, Alcodur 50, Koralpin 52, S355J2G3Cu, 9CrNiCuP3-2-4, Corten A-B1, Itacor, WTSt37, WTST52.3, S355K2W

## Features and Applications

- Excellent resistance to atmospheric events due to the presence of Cu, Cr, Ni
- Suitable for bridges, cranes, ground moving machines, boilers, building structures, petrochemical sector, fans gas pipes, fume section, etc
- Shielding gas: Ar+$CO_2$ mix gases can be used
- Depending on the thickness of the main material to be used, a pre-heating application can be applied to the main material before starting the welding.

## Welding Positions



## Current Type

MAG D.C.(+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6031100122 | 1.20 | 0.047” | 15 | BS 300 Spool |

**Approvals:** CE, SEPRO

Stainless Steel Gas Shielded Welding Wire & Rod

# ELOX SG 307

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : G 18 8 Mn |
| EN ISO 14343-A | : G 18 8 Mn |
| TS EN ISO 14343-A | : W 18 8 Mn |
| EN ISO 14343-A | : W 18 8 Mn |
| AWS A5.9 | : ~ER 307 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.08 | 0.9 | 7.0 | 19.2 | 9.0 |

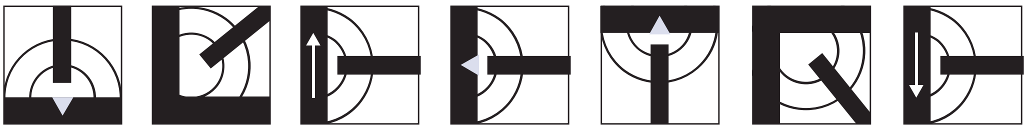
## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 370 | 580 - 750 | min. 63 J | min. 30 |

## Features and Applications

- Filler welding of high-strength low-alloyed and alloyed heat-treatable steels, armor steels, steels including 14 % Mn, ferritic chromium steels, heat-resistant steels, non-magnetic steels etc.
- Joint welding of different types of steels with each other
- Filler welding of abrasion-resistant steels for valves and turbines
- As shielding gas, Argon is used at TIG welding, where as Ar+ % 2.5 $O_2$ or Ar+ % 2.5 $CO_2$ mixed gas is used at MIG welding

## Welding Positions



## Current Type

MIG DC(+) / TIG DC(-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100313 | 0,8 | 0.030” | 12.5 | BS 300 |
| 6011100381 | 1 | 0.040” | 15 | BS 300 |
| 6011100314 | 1,2 | 0.047” | 15 | BS 300 |
| 6011100312 | 1,6 | 0.062” | 15 | BS 300 |
| 6011100315 | 2,00 x 1000 | 5/64 x 39” | 5 | Plastic Box |
| 6011100316 | 2,40 x 1000 | 3/32 x 39” | 5 | Plastic Box |
| 6011100317 | 3,20 x 1000 | 1/8 x 39” | 5 | Plastic Box |

**Approvals:** SEPRO, DB

# ELOX SG 308-H

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : W 19 9 H |
| EN ISO 14343-A | : W 19 9 H |
| AWS A5.9 | : ER 308 H |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.06 | 0.5 | 1.7 | 20.1 | 9.8 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/0°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 350 | min. 550 | min. 63 J | min. 25 |

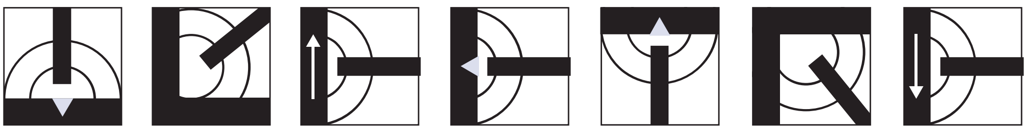
## Typical Base Material Grades

- X2 CrNi 19 11, X5 CrNi 19 11, X 5 CrNi 18 8, X 12 CrNi 17 7, X 12 CrNi 18 8, G-X 10 CrNi 18 8, G-X 12 CrNi 18 8
- AISI: 304 L, 301,302,304,308

## Features and Applications

- Applicability in welding tempered high-strength steels as well as stainless steels, carbon steels, and 18/8, Cr-Ni -alloy steels
- Requirement of use of Ar as "shielding gas for TIG welding"

## Welding Positions



## Current Type

TIG D.C.(-), MIG D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100318 | 2.0 x 1000 | 5/64 x 39" | 5 | Plastic Box |
| 6011100319 | 2.4 x 1000 | 3/32 x 39" | 5 | Plastic Box |
| 6011100320 | 3.2 x 1000 | 1/8 x 39" | 5 | Plastic Box |

**Approvals:** SEPRO, CE

# ELOX SG 308 L

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : W 19 9 L |
| EN ISO 14343-A | : W 19 9 L |
| AWS A5.9 | : ER 308 L |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.02 | 0.5 | 1.7 | 20.1 | 9.8 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 390 | 540 - 660 | min. 63 J | min. 35 |

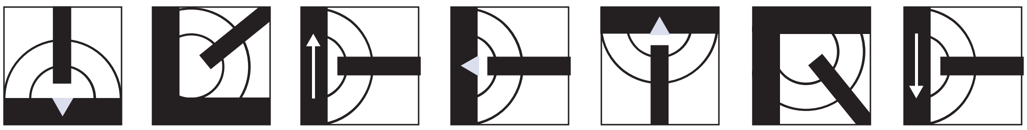
## Typical Base Material Grades

- X2CrNi 19 11, X5CrNi 18 10, X6CrNiTi 18 10, X6CrNiNb 18 10, X2CrNiN 18 10, X10CrNiNb 18 10
- AISI & ASTM: 304, 304L, 304LN, 347, 321, A320Gr.B8C, A320Gr.B8D

## Features and Applications

- TIG welding of 13% Cr ferritic stainless steels, high-carbon steels of type 304, or stabilized steels of type 347, or steels of similar qualities, all of which used in drug, cellulose, paper and food (production) industries
- The shielding gas is Argon (Ar).
- Maintenance of ductile behavior at temperature values down to -196°C
- Maintenance of resistance against intergranular corrosion at temperatures up to 400°C

## Welding Positions



## Current Type

TIG D.C.(-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100424 | 1.00 x 1000 | 0.040” x 39” | 5 | Plastic Box |
| 6011100321 | 1.20 x 1000 | 0.047” x 39” | 5 | Plastic Box |
| 6011100326 | 1.6 x 1000 | 1/16 x 39” | 5 | Plastic Box |
| 6011100327 | 2.0 x 1000 | 5/64 x 39” | 5 | Plastic Box |
| 6011100328 | 2.4 x 1000 | 3/32 x 39” | 5 | Plastic Box |
| 6011100329 | 3.2 x 1000 | 1/8 x 39” | 5 | Plastic Box |

**Approvals:** CE, SEPRO

GeKa

Stainless Steel Gas Shielded Welding Wire

# ELOX SG 308 L Si

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : G 19 9 L Si |
| EN ISO 14343-A | : G 19 9 L Si |
| AWS A5.9 | : ER 308 LSi |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.02 | 0.8 | 1.7 | 20.4 | 10.2 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 350 | 520 - 660 | min. 63 J | min. 35 |

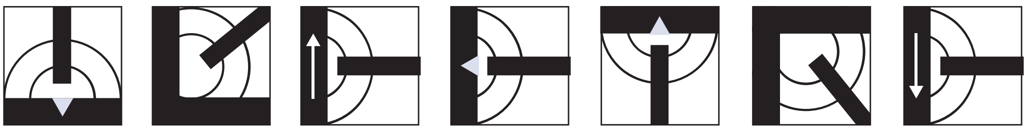
## Typical Base Material Grades

- X2 CrNi 19 11, X5CrNi 18 10, X6 CrNiTi 18 10, X6 CrNiNb 18 10, X2 CrNiN 18 10, X10 CrNiNb 18 10
- AISI & ASTM: 304, 304L, 304LN, 321, 347, A320Gr.B8C, A320Gr.B8D

## Features and Applications

- MIG welding of 13% Cr ferritic stainless steels, high-carbon steels of type 304 or stabilized steels of type 347, or steels of similar types, used in industries of drug, cellulose, paper, and food (production)
- Ar+%2.5$O_2$ or Ar+%2.5$CO_2$ mixed gas is used as shielding gas
- Maintenance of ductile behavoir at temperature valuesdown to -196°C.
- Maintenance of resistance to intergranular corrosion at temperatures up to 350°C

## Welding Positions



## Current Type

MIG D.C.(+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100323 | 0.8 | 0.030” | 12.5 | BS 300 |
| 6011100324 | 1.0 | 0.040” | 15 | BS 300 |
| 6011100382 | 1.2 | 0.047” | 15 | BS 300 |
| 6011100322 | 1.6 | 0.062” | 15 | BS 300 |

**Approvals:** CE, SEPRO

Stainless Steel Gas Shielded Welding Rod

# ELOX SG 309 L

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : W 23 12 L |
| EN ISO 14343-A | : W 23 12 L |
| AWS A5.9 | : ER 309 L |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.03 | 0.45 | 1.80 | 23.5 | 13.0 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 320 | min. 520 | min. 47 J | min. 30 |

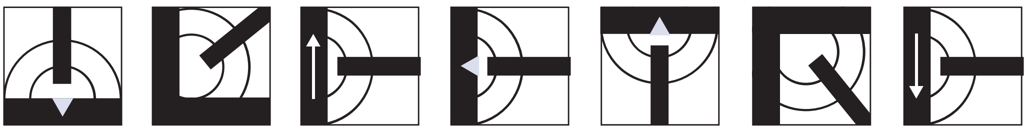
## Typical Base Material Grades

- Ferritic Cr and austenitic CrNi steels, austenitic manganese steels, unalloyed high strength steels, high temperature steels

## Features and Applications

- Applicability on ferritic Cr or austenitic CrNi steels, austenitic manganese steels, unalloyed high-strength steels, heat-treated steels
- Usability in welding austenitic stainless steels, in joint-welding of different kinds of metals, in buffer layers, in joint-welding of corrosion-resistant stainless steels to each other or to low-alloyed steels, and in welding coated steels
- Requirement of use of Ar as shielding gas

## Welding Positions



## Current Type

TIG D.C.(-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100333 | 1.6 x 1000 | 1/16 x 39” | 5 | Plastic Box |
| 6011100334 | 2.0 x 1000 | 5/64 x 39” | 5 | Plastic Box |
| 6011100335 | 2.4 x 1000 | 3/32 x 39” | 5 | Plastic Box |
| 6011100396 | 3.2 x 1000 | 1/8 x 39” | 5 | Plastic Box |

**Approvals:** CE, SEPRO, NK, RINA, DNV-GL, TL

GeKa

Stainless Steel Gas Shielded Welding Wire

# ELOX SG 309 L Si

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : G 23 12 L Si |
| EN ISO 14343-A | : G 23 12 L Si |
| AWS A5.9 | : ER 309 L Si |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.03 | 0.80 | 1.80 | 23.5 | 13.0 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20 °C) | Elongation (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 320 | min. 520 | min. 47 J | min. 30 |

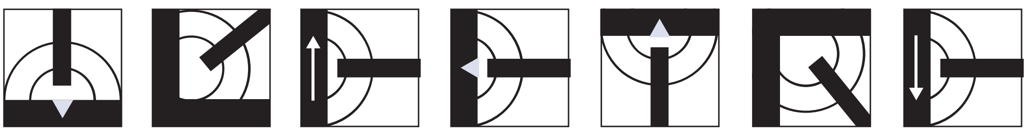
## Typical Base Material Grades

- Ferritic Cr and austenitic CrNi steels, austenitic manganese steels, unalloyed high strength steels, high temperature steels.

## Features and Applications

- Applicability on ferritic Cr or austenitic CrNi steels, austenitic manganese steels, unalloyed high-strength steels, heat-treated steels
- Usability in welding austenitic stainless steels, in joint- welding of different kinds of metals, in buffer layers, in joint-welding of corrosion-resistant stainless steels to each other or to low-alloyed steels, and in welding coated steels
- Ar+ %2.5 $O_2$ or (Ar+%2.5 $CO_2$) gas is used as shielding gas

## Welding Positions



## Current Type

MIG D.C.(+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 6011100383 | 0.8 | 0.030” | 12.5 | BS 300 |
| 6011100331 | 1.0 | 0.040” | 15 | BS 300 |
| 6011100332 | 1.2 | 0.047” | 15 | BS 300 |

**Approvals:** CE, SEPRO

GeKa

Stainless Steel Gas Shielded Welding Wire & Rod

# ELOX SG 310

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : G 25 20 |
| EN ISO 14343-A | : G 25 20 |
| TS EN ISO 14343-A | : W 25 20 |
| EN ISO 14343-A | : W 25 20 |
| AWS A5.9 | : ER 310 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.12 | 0.5 | 1.6 | 25.0 | 20.5 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 350 | 550 - 720 | min. 63 J | min. 30 |

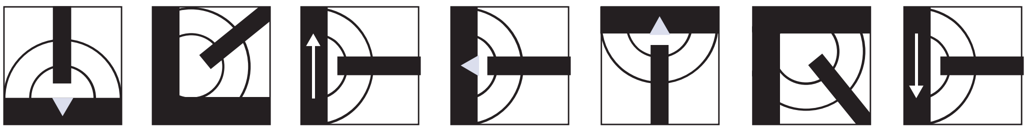
## Typical Base Material Grades

- X15CrNiSi 25 20, X12CrNi 25 21, X15CrNi 20 12, G-X15CrNi 25 20, G-X40 CrNi 25 21, X10CrAl 7, X10CrAl 18, X10CrAl 24, 305, 310, 314, A297 HF, A297 HJ

## Features and Applications

- Applicability in cement and ceramic industries, in manufacturing processes of industrial furnaces, oil refineries, in welding of steel and steel castings used in steam boiler manufacturing
- Suitability of weld metal for use at temperatures between -196°C and 1200°C
- Suitability for both TIG and MIG welding
- Requirement of use of Ar as shielding gas in TIG welding, and of Ar+ %2.5 $O_2$ or Ar+ %2.5 $CO_2$ mixed gas as shielding in MIG welding

## Welding Positions



## Current Type

TIG D.C.(-) / MIG D.C.(+)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) | (inch) | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100402 | 0,8 | 0.030” | 12.5 | BS 300 |
| 6011100338 | 1 | 0.040” | 15 | BS 300 |
| 6011100374 | 1,2 | 0.047” | 15 | BS 300 |
| 6011100339 | 1,60 x 1000 | 1/16 x 39” | 5 | Plastic Box |
| 6011100340 | 2,00 x 1000 | 5/64 x 39” | 5 | Plastic Box |
| 6011100341 | 2,40 x 1000 | 3/32 x 39” | 5 | Plastic Box |
| 6011100342 | 3,20 x 1000 | 1/8 x 39” | 5 | Plastic Box |

**Approvals:** CE, SEPRO

# ELOX SG 312

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : G 29 9 |
| EN ISO 14343-A | : G 29 9 |
| TS EN ISO 14343-A | : W 29 9 |
| EN ISO 14343-A | : W 29 9 |
| AWS A5.9 | : ER 312 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.12 | 0.40 | 1.80 | 30.0 | 9.0 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength (ISO-V/+20°C) | Elongation (($L_0$=5$d_0$) (%) |
|---|---|---|---|
| min. 450 | min. 660 | 47 J | min. 20 |

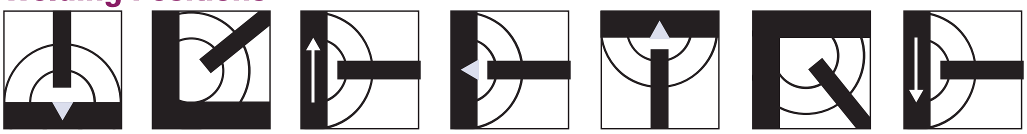
## Typical Base Material Grades

| | | | | |
|---|---|---|---|---|
| DIN: | X7Cr13 | G-X 7 Cr 13 | AISI: | 403 |
| | X7CrAl13 | G-X 20 Cr 14 | | 405 |
| | X10CrAl13 | G-X 10 Cr Mo 13 | | 410 |
| | X 8 Cr17 | G-X 8 Cr Ni 13 | | 420 |
| | X20Cr13 | | | 430 |
| | X 15Cr 13 | | | 430 Ti |
| | X22CrNi17 | | | 431 |
| | X15CrNi134 | | | 446 |
| | X 8 Cr Ti 17 | | | |

## Features and Applications

- Applicability in joint- welding of unalloyed and alloyed high-strength steels, Cr and Mn steels, tool steels, and of different metals
- Resistance to wearing, cracking and corrosion
- Requirement of use of Ar as shielding gas in TIG welding, and Ar+ %2.5 $O_2$ or Ar+ %2.5 $CO_2$ mix as shield gas in MIG welding

## Welding Positions



## Current Type

TIG D.C.(-) / MIG D.C.(+)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 6011100153 | 0,8 | 0.030” | 15 | BS 300 |
| 6011100343 | 1 | 0.040” | 15 | BS 300 |
| 6011100156 | 1,2 | 0.047” | 15 | BS 300 |
| 6011100157 | 1,60 x 1000 | 1/16 x 39” | 5 | Plastic Box |
| 6011100344 | 2,00 x 1000 | 5/64 x 39” | 5 | Plastic Box |
| 6011100345 | 2,40 x 1000 | 3/32 x 39” | 5 | Plastic Box |

**Approvals:** CE, SEPRO

# ELOX SG 316 L

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : W Z 19 12 3 L |
| EN ISO 14343-A | : W Z 19 12 3 L |
| AWS A5.9 | : ER 316 L |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Cr | Ni |
|---|---|---|---|---|---|
| 0.02 | 0.5 | 1.6 | 2.2 | 18.5 | 11.5 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 420 | 570 - 700 | min. 63 J | min. 30 |

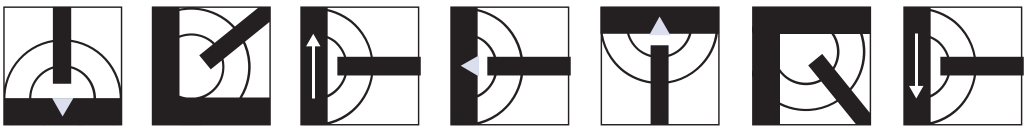
## Typical Base Material Grades

- X2 CrNiMo 1814 3, XS CrNiMo 1713 3, X2 CrNiMo 1713 2, XS CrNiMoTi 1712 2, X6 CrNiMoTi 1712 2, X6 CrNiMoNb 1712 2, X2 CrNiMoN 1713 3, X2 CrNiMoN 1712 2
- AISI: 316, 316L, 316Cb, 316Ti

## Features and Applications

- TIG welding of 13% Cr ferritic stainless steels, high-carbon or stabilized steels of type 316, low-carbon stainless steels of type 316 L, all of which are used in machinery and equipment parts at production plants for food, chemical, drug textile and similar kinds of industries
- As shielding gas, Argon (Ar) is used
- Maintenance of resistance to intergranular corrosion at temperature valves up to 400°C.
- Resistance to low temperatures varying at values down to -196°C

## Welding Positions



## Current Type

TIG D.C.(-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100169 | 1,00 x 1000 | 0.040” x 39” | 5 | Plastic Box |
| 6011100399 | 1,20 x 1000 | 0.047” x 39” | 5 | Plastic Box |
| 6011100351 | 1,60 x 1000 | 1/16 x 39” | 5 | Plastic Box |
| 6011100400 | 2,00 x 1000 | 5/64 x 39” | 5 | Plastic Box |
| 6011100352 | 2,40 x 1000 | 3/32 x 39” | 5 | Plastic Box |

**Approvals:** CE, SEPRO, TL, DNV-GL, NK, RINA

Stainless Steel Gas Shielded Welding Wire

# ELOX SG 316 L Si

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : G Z 19 12 3 L Si |
| EN ISO 14343-A | : G Z 19 12 3 L Si |
| AWS A5.9 | : ER 316 LSi |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni | Mo |
|---|---|---|---|---|---|
| 0.02 | 0.80 | 1.6 | 18.5 | 11.5 | 2.2 |

## Mechanical Properties

| **Yield Strength** (N/$mm^2$) | **Tensile Strength** (N/$mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 400 | 550 - 700 | min. 63 J | min. 30 |

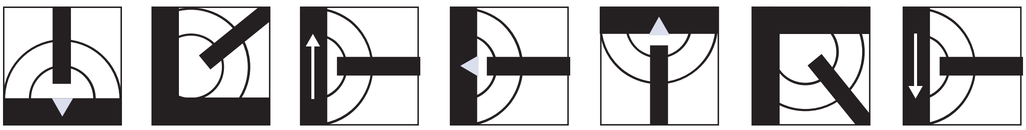
## Typical Base Material Grades

- X2 CrNiMo 1814 3, X5 CrNiMo 17 13 3, X2 CrNiMo 1713 2,, X5 CrNiMo 1712 2, X6 CrNiMoTi 17 12 2, X6 CrNiMoNb 17 12 2, X2 CrNiMoN 1713 3, X2 CrNiMoN 1712 2
- AISI: 316, 316Cb, 316L, 316Ti

## Features and Applications

- MIG welding of 13% ferritic stainless steels, high-carbon or stabilized stainless steels of type 316 and low carbon stainless steels of type 316 L, used in machinery and equipment parts of production plants for food, chemical, drug, textile and similar kinds of industries
- As shielding gas, Ar+ %2.5 $O_2$ or Ar+ %2.5 $CO_2$ mixed gas is used
- Maintenance of resistance to intergranular corrosion at temperature values up to 400°C.
- Resistance to low temperatures varying at values down to -196°C

## Welding Positions



## Current Type

MIG D.C.(+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100348 | 0,8 | 0.030” | 12.5 | BS 300 |
| 6011100398 | 1 | 0.040” | 15 | BS 300 |
| 6011100349 | 1,2 | 0.047” | 15 | BS 300 |
| 6011100350 | 1,6 | 0.062” | 15 | BS 300 |

**Approvals:** CE, SEPRO

GeKa®

Stainless Steel Gas Shielded Welding Rod

# ELOX SG 318

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : W 19 12 3 Nb |
| EN ISO 14343-A | : W 19 12 3 Nb |
| AWSA5.9 | : ER 318 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni | Mo | Nb |
|---|---|---|---|---|---|---|
| 0.035 | 0.50 | 1.7 | 19.6 | 11.4 | 2.7 | + |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0$=5$d_0$) (%) |
|---|---|---|---|
| min. 440 | 640 - 780 | min. 63 J | min. 30 |

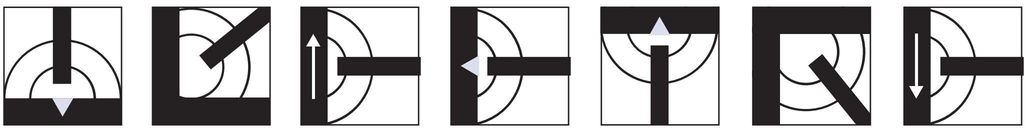
## Typical Base Material Grades

- X6 CrNiMoTi 1712 2, X6 CrNiMoNb 1712 2, X5 CrNiMo 1712 2, G-X5 CrNiMoNb 18 10, X10 CrNiMoNb 18 12
- AISI: 316, 316Cb, 316L, 316Ti

## Features and Applications

- TIG welding of 13% ferritic stainless steels as well as of stainless steels of similar chemical compositions as those of welding wires used in chemical, textile, paint, food and synthetic resin production
- As the shielding gas, argon(Ar) is used
- Maintenance of resistance to intergranular corrosion at temperature values up to 400 °C

## Welding Positions



## Current Type

TIG D.C.(-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100401 | 1.6 x 1000 | 1/16 x 39” | 5 | Plastic Box |
| 6011100356 | 2.0 x 1000 | 5/64 x 39” | 5 | Plastic Box |
| 6011100180 | 2.4 x 1000 | 3/32 x 39” | 5 | Plastic Box |

**Approvals:** CE, SEPRO

# ELOX SG 318 Si

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : G 19 12 3 Nb Si |
| EN ISO 14343-A | : G 19 12 3 Nb Si |
| AWS A5.9 | : ~ER 318 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni | Mo | Nb |
|---|---|---|---|---|---|---|
| 0.035 | 0.8 | 1.4 | 19.9 | 11.5 | 2.8 | + |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 390 | 600 - 780 | min. 63 J | min. 30 |

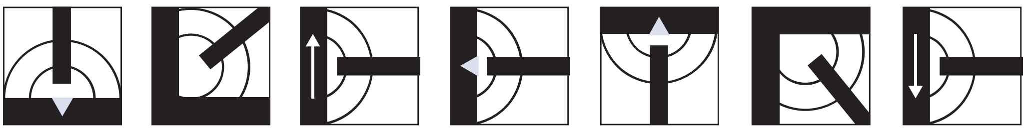
## Typical Base Material Grades

- X6 CrNiMoTi 1712 2, X6 CrNiMoNb 1712 2, X5 CrNiMo 1712 2, G-X5 CrNiMoNb 1810, G-X10 CrNiMo 18 10, X10 CrNiNb 1810, X10 CrNiMoNb 1812
- AISI: 316, 316Cb, 316L, 316Ti

## Features and Applications

- Used for the welding of 13% ferritic stainless steels or stainless steels which have the similar chemical analysis to welding wires that are used in the chemical, textile, paint and food industries
- Weld metal is resistant to corrosion up to +400°C and chlorine
- Suitable for MIG welding
- Ar+ %2.5 $O_2$ or Ar+ %2.5 $CO_2$ mixed gases are the shielding gases.

## Welding Positions



## Current Type

MIG D.C.(+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100357 | 1.0 | 0.040” | 15 | BS 300 |
| 6011100406 | 1.2 | 0.047” | 15 | BS 300 |

**Approvals:** CE, SEPRO

# ELOX SG 347

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : W 19 9 Nb |
| EN ISO 14343-A | : W 19 9 Nb |
| AWS A5.9 | : ER 347 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni | Nb |
|---|---|---|---|---|---|
| 0.035 | 0.5 | 1.4 | 19.4 | 9.5 | + |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** ($(L_0=5d_0)$ (%) |
|---|---|---|---|
| min. 430 | 600 - 740 | min. 63 J | min. 30 |

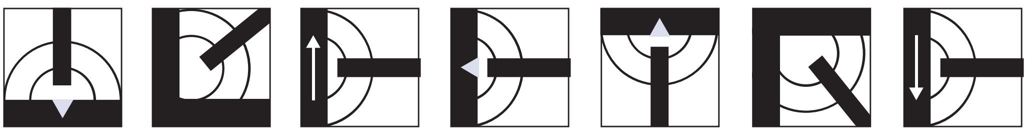
## Typical Base Material Grades

- X6 CrNiNb 18 10, X6 CrNiTi 18 10, G-X5 CrNiNb 18 9, X-5 CrNi 18 10, G-X10 CrNi 18 8, X12 CrNiTi 18 9, X10 CrNiNb 1810
- AISI & ASTM: 304, 321, 347, A157Gr.C9, A296Gr.CF8C, A320Gr.B8C, A320Gr.B8D

## Features and Applications

- Used for the welding of 13% Cr steels which are used in the textile, paper, paint and food industries
- Resistant to corrosion up to +400°C, suitable for TIG welding
- Argon is the shielding gas and it is also used for the welding of materials which have the similar chemical composition to welding wire

## Welding Positions



## Current Type

TIG D.C.(-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100360 | 1.6 x 1000 | 1/16 x 39” | 5 | Plastic Box |
| 6011100361 | 2.0 x 1000 | 5/64 x 39” | 5 | Plastic Box |
| 6011100362 | 2.4 x 1000 | 3/32 x 39” | 5 | Plastic Box |
| 6011100363 | 3.2 x 1000 | 1/8 x 39 “ | 5 | Plastic Box |

**Approvals:** CE, SEPRO

# ELOX SG 347 Si

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : G 19 9 Nb Si |
| EN ISO 14343-A | : G 19 9 Nb Si |
| AWS A5.9 | : ER 347 Si |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni | Nb |
|---|---|---|---|---|---|
| 0.035 | 0.9 | 1.2 | 19.4 | 9.7 | + |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| min. 400 | 570- 710 | min. 63 J | min. 30 |

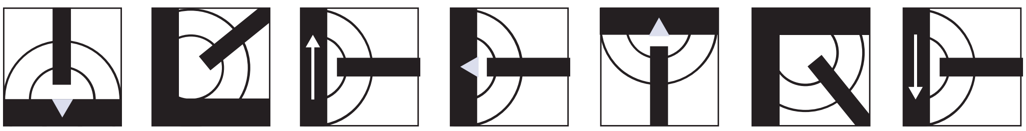
## Typical Base Material Grades

- X6 CrNiNb 18 10, X6 CrNiTi 18 10, G-X5 CrNiNb 18 9, X5 CrNi 18 10, G-X 10 CrNi 18 8, X12 CrNiTi 18 9, X10 CrNiNb 18 10
- AISI & ASTM: 304, 321, 347, A157Gr.C9, A296Gr.CF8C, A320Gr.B8C, A320Gr.B8D

## Features and Applications

- Used for the welding of 13% Cr steels which are used in the textile, paper, paint and food industries
- Resistant to corrosion up to +400°C, suitable for MIG welding
- Ar+ %2.5 $O_2$ or Ar+ %2.5 $CO_2$ mixed gases are used for shielding, also used for the welding of materials which have the similar chemical composition to welding wire

## Welding Positions



## Current Type

MIG D.C.(+)

## Operating Data

| **Product Code** | **Diamete** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100359 | 1.0 | 0.040” | 15 | BS 300 |
| 6011100231 | 1.2 | 0.047” | 15 | BS 300 |

**Approvals:** CE, SEPRO

GeKa®

Stainless Steel Gas Shielded Welding Wire

# ELOX SG 409 CB

## Standards

| | |
|---|---|
| AWS A5.9 | : ER 409 Nb |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni | Mo |
|---|---|---|---|---|---|
| 0.07 | 1.0 | 0.8 | 12.0 | 0.6 | 0.5 |

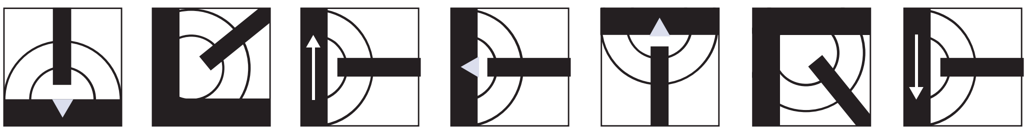
## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Elongation** (($L_o$=5$d_o$) (%) |
|---|---|---|
| min. 355 | min. 450 | min. 20 |

## Features and Applications

- It used for the welding of ferritic stainless steel 409Gb and 409Ti which are commonly used for exhaust parts in automotive industry
- High resistant to thermal fatigue
- With help of Nb addition, Chromium carbide formation is prevented
- Ar+ %2.5 $O_2$ or Ar+ %2.5 $CO_2$ mixed gases are used as shielding gas

## Welding Positions



## Current Type

MIG D.C.(+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100364 | 1.20 | 0.047” | 15 | D 300 |

**Approvals:** CE, SEPRO

Stainless Steel Gas Shielded Welding Wire & Rod

# ELOX SG 410

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : G/W 13 |
| EN ISO 14343-A | : G/W 13 |
| AWS A5.9 | : ER 410 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr |
|---|---|---|---|
| 0.10 | 0.35 | 0.50 | 13.0 |

## Mechanical Properties (MIG)

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** (($L_0$=5$d_0$) (%) | **Heat Treatment** |
|---|---|---|---|
| min. 250 | min. 520 | min. 20 | 840 °C - 870 °C/2h |

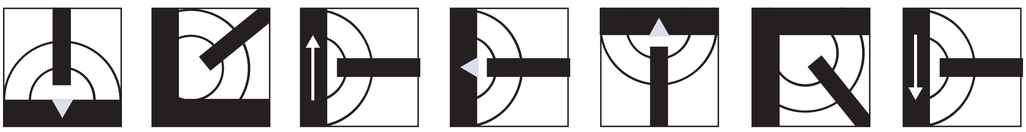
## Typical Base Material Grades

- X 6 CrTi 17, X 20 CrNi 17 2, 431, 430 Ti
- AISI: 431, 430Ti

## Features and Applications

- Preferred use in formation of surfaces resistant to corrosion, wear, and heat.
- Maintained hardness at temperatures of up to 500°C
- Resistance to formation of oxide layers at temperatures up to 900°C
- Reqiured use of Ar+ %2.5 $O_2$ or Ar+ %2.5 $CO_2$ mixed gas as shielding gas
- For TIG; Ar gas as shielding

## Welding Positions



## Current Type

MIG D.C. (+) / TIG D.C. (-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100365 | 1.0 | 0.040” | 15 | BS 300 |
| 6011100375 | 1.2 | 0.047” | 15 | BS 300 |
| 6011100196 | 2.40 x 1000 | 3/32 x 39” | 5 | Plastic Box |

**Approvals:** CE, SEPRO

GeKa

Stainless Steel Gas Shielded Welding Wire & Rod

# ELOX SG 430

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : G/W 17 |
| EN ISO 14343-A | : G/W 17 |
| AWS AS.9 | : ER 430 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr |
|---|---|---|---|
| 0.05 | 0.40 | 0.40 | 17.0 |

## Mechanical Properties (MIG)

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** (($L_0=5d_0$) (%) | **Heat Treatment** |
|---|---|---|---|
| min. 300 | min. 450 | min. 20 | 760 - 790°C /2h |

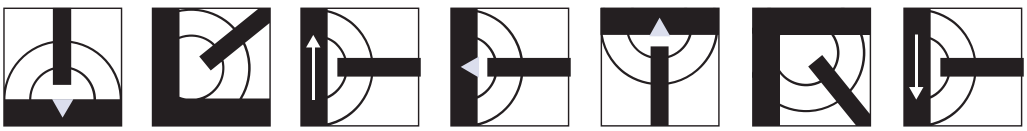
## Typical Base Material Grades

- X 6 CrTi 17, X 20 CrNi 17 2
- AISI: 431, 430Ti

## Features and Applications

- Applicability in surfacing to provide resistance to corrosion, wearing, and heat
- Requirement of use of for MIG: Ar+ %2.5 $O_2$ or Ar+ %2.5 $CO_2$ mix gas as shielding
- For TIG: Ar gas as shielding

## Welding Positions



## Current Type

MIG D.C.(+) / TIG D.C. (-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100403 | 1.0 | 0.040” | 15 | BS 300 |
| 6011100366 | 1.2 | 0.047” | 15 | BS 300 |
| 6011100376 | 1.6 | 0.062” | 15 | BS 300 |
| 6011100367 | 2.40 x 1000 | 3/32 x 39” | 5 | Plastic Box |

**Approvals:** CE, SEPRO

# ELOX SG 2209

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : W 22 9 3 N L |
| EN ISO 14343-A | : W 22 9 3 N L |
| AWS A5.9 | : ER 2209 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni | Mo | N |
|---|---|---|---|---|---|---|
| 0.02 | 0.40 | 1.70 | 22.80 | 7.80 | 2.90 | 0.15 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Elongation** (($L_0=5d_0$) (%) | **Impact Strength** (ISO-V/-46°C) |
|---|---|---|---|
| 550 | 700 | 28 | 100 J |

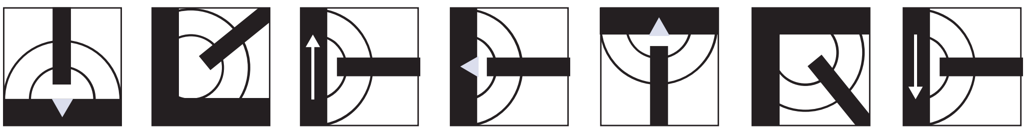
## Typical Base Material Grades

- SAE 2209, SAE 2205, EN14462, X2CrNiMoN22-5-3, X2CrNiN23-4, X2CrNiMoN22-5-3 with X10CrNiMoNb18- 12 and X2CrNiMoN22-5-3 with P235GH/ P265GH, S255N, P295GH, S355N and 16Mo3 combinations, UNS S31803, S32205.

## Features and Applications

- GeKa ELOX SG 2209 is duplex stainless steel TIG Welding rod contains low Carbon and approximate %22Cr, %9Ni and %3Mo
- Microstructure is Austenite + Ferritic
- The weld metal has an excellent resistance to stress corrosion, cracking and pitting
- The use of this welding rod, pipe and general manufacturing industries, offshore applications, oil, gas, chemical and petrochemical industry
- Shielding gas: TIG; pure Ar or Ar+%1-2$N_2$ mix gases can be used

## Welding Positions



## Current Type

MIG D.C. (+) / TIG D.C. (-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100308 | 1,2 | 0.047" | 15 | BS 300 |
| 6011100309 | 2.00 x 1000 | 5/64 x 39" | 5 | Plastic Box |
| 6011100310 | 2.40 x 1000 | 3/32 x 39" | 5 | Plastic Box |

**Approvals:** CE, SEPRO, NK, RINA

# ELOX SG 2594

## Standards

| | |
|---|---|
| TS EN ISO 14343-A | : W 25 9 4 N L |
| EN ISO 14343-A | : W 25 9 4 N L |
| AWS A5.9 | : ER2594 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cr | Ni | Mo |
|---|---|---|---|---|---|
| 0.02 | 0.35 | 0.70 | 25.0 | 9.00 | 3.80 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Elongation** $((L_0=5d_0)$ (%) | **Impact Strength** (ISO-V/+20°C) |
|---|---|---|---|
| min. 550 | min. 760 | min. 18 | min. 47 J |

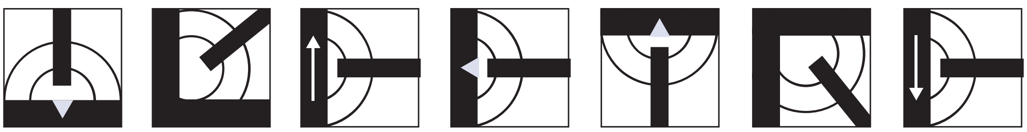
## Typical Base Material Grades

- (1.4501)X2CrNiMoCuWN25-7-4, (1.4515)GX3CrNiMoCuN26-6-3, (1.4517)GX3CrNiMoCuN25-6-3-3, UNS S 32750, S 32760 ZERON 100, SAF 25/07, FALC100

## Features and Applications

- GeKa ELOX SG 2594 is a super duplex welding wire.
- Used for the welding Austenitic-Ferritic stainless alloys of %25 Cr, %9 Ni, %3.5 Mo and low C types
- It has high resistance to intergranular corrosion and pitting
- GeKa ELOX SG 2594 is intended for welding super duplex alloys such as 2507, ASTM S32760, S32550 and A31260
- As the shielding gas, Argon (Ar) is used

## Welding Positions



## Current Type

TIG D.C. (-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 6011100225 | 1.60 x 1000 | 1/16 x 39” | 5 | Plastic Box |
| 6011100226 | 2.00 x 1000 | 5/64 x 39” | 5 | Plastic Box |
| 6011100227 | 2.40 x 1000 | 3/32 x 39” | 5 | Plastic Box |

**Approvals:** CE, SEPRO

GeKa

# Aluminium Alloyed MIG Welding Wire
# AlSi 5

## Standards

| | |
|---|---|
| TS EN ISO 18273 | : S Al 4043 (AlSi5) |
| EN ISO 18273 | : S Al 4043 (AlSi5) |
| AWS A5.10 | : ER 4043 |

## Chemical Composition of Welding Wire % (Typical)

| Si | Mn | Al | Fe |
|---|---|---|---|
| 5.0 | 0.03 | rest | 0.5 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** (($L_0$=5$d_0$) (%) | **Working Temperature** (°C) |
|---|---|---|---|
| 110 | 150 | 15 | 575 - 633 |

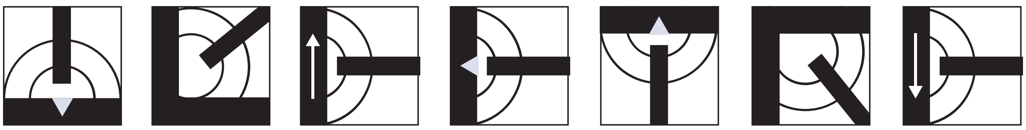
## Typical Base Material Grades

- AlMgSi 0.5, AlMg1SiCu, AlMgSi 1, AlZn4.5Mg 1, Al 99.5, Al 99, AlCuMg 1, AlMgSi 0.7, AlMgSi 0.8, AlMgSiCu, AlMn 1, G-AlSi 6 Cu 4

## Features and Applications

- It is Al-Si welding MIG wire
- Application range is joining of cast aluminum parts and aluminum profiles, motor blocks.
- Material range is AlMgSi 0.5, AlMgSiCu, Al99.5 etc
- It is recommended that preheating to 105°C before welding of plates thicker than 10 mm
- Required use of Ar, He or Ar+He gas as shielding gas

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Package Weight** (Kg) |
|---|---|---|---|
| 6011100292 | 0.8 | 0.030” | 5 |
| 6011100293 | 1.0 | 0.040” | 7 |
| 6011100294 | 1.2 | 0.047” | 7 |
| 6011100295 | 1.6 | 0.062” | 7 |

**Approvals:** SEPRO, CE

GeKa

# Aluminium Alloyed MIG Welding Wire
# Al 99.5

## Standards

| | |
|---|---|
| TS EN ISO 18273 | : ~S Al 1100 (Al 99.0 Cu) |
| EN ISO 18273 | : ~S Al 1100 (Al 99.0 Cu) |
| AWS A5.10 | : ~ER1100 |

## Chemical Composition of Welding Wire % (Typical)

| Al | Cu | Fe | Si |
|---|---|---|---|
| 99.5 | 0.10 | <0.40 | <0.30 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Elongation** (($L_0$=5$d_0$) (%) | **Working Temperature** (°C) |
|---|---|---|---|
| 50 | 85 | 25 | 647 - 658 |

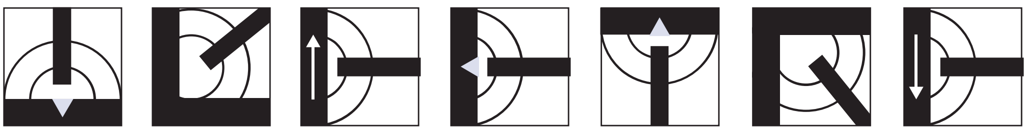
## Typical Base Material Grades

- Al 99.5, Al 99.7, Al 99.8, E Al 99.9, Al 99, E-Al MgSi

## Features and Applications

- It is aluminum MIG welding wire
- Application field is truck chassis and body, tanks, buses and containers, railway trucks, marine applications, pipes, flanges, panels, ship ports, barriers, ship boards etc
- It is recommended that preheating to 150°C before welding of plates thicker than 10mm

## Welding Positions



## Current Type

MIG D.C.(+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Package Weight** (Kg) |
|---|---|---|---|
| 6011100268 | 0.80 | 0.030” | 5 |
| 6011100032 | 1.00 | 0.040” | 7 |
| 6011100033 | 1.20 | 0.047” | 7 |
| 6011100269 | 1.60 | 0.062” | 7 |

**Approvals:** SEPRO, CE

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Aluminium Alloyed MIG Welding Wire

# AlMg 3

## Standards

| | |
|---|---|
| TS EN ISO 18273 | : S Al 5754 (AlMg3) |
| EN ISO 18273 | : S Al 5754 (AlMg3) |
| AWS A5.10 | : ER 5754 |

## Chemical Composition of Welding Wire % (Typical)

| Mg | Mn | Si | Fe | Al |
|---|---|---|---|---|
| 3.0 | <0.5 | <0.40 | <0.40 | rest |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** (($L_0=5d_0$) (%) | **Working Temperature** (°C) |
|---|---|---|---|
| 100 | 200 | 20 | 610 - 642 |

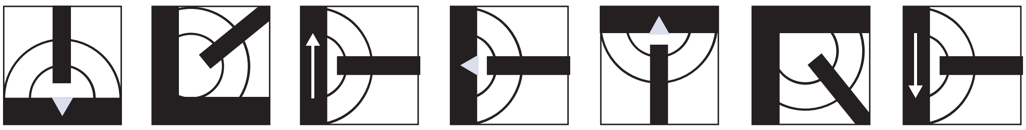
## Typical Base Material Grades

- AlMg 1, AlMg 2.5, AlMg 3, AlMg 2.7 Mn, AlMg Si 0.5, AlMg 2, AlMg2 Mn 0.8, AlMgSi 0.7, AlMgSi 0.8, G-AlMg 3, G-AlMg3 (Cu), G-AlMg 3 Si.

## Features and Applications

- It is used for joining aluminum alloys includes up to 3 % Mg. Resistance to sea water. Parent metals AlMg 1, AlMg 2.5, and AlMg 2 Mn 0.8 etc
- Required use of Ar, He or Ar+He gas as shielding gas
- It is recommended that preheating to 150°C before welding of plates thicker than 10mm

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Package Weight** (Kg) |
|---|---|---|---|
| 6011100271 | 1.20 | 0.047" | 7 |
| 6011100272 | 1.60 | 0.062" | 7 |

**Approvals:** SEPRO, CE

# AlMg 5

## Standards

| | |
|---|---|
| TS EN ISO 18273 | : S Al 5356 (AlMg5Cr(A)) |
| EN ISO 18273 | : S Al 5356 (AlMg5Cr(A)) |
| AWS A5.10 | : ER 5356 |

## Chemical Composition of Welding Wire % (Typical)

| Mg | Mn | Si | Fe | Al |
|---|---|---|---|---|
| 5.0 | 0.3 | <0.25 | <0.40 | rest |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Elongation** (($L_0=5d_0$) (%) | **Working Temperature** (°C) |
|---|---|---|---|
| 180 | 260 | 20 | 575 - 633 |

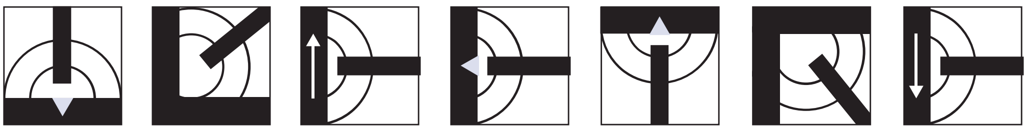
## Typical Base Material Grades

- AlMg 5, AlMg 4.5, G-AlMg 5, G-AlMg 10, AlMgSi 1, G-AlMg 3(Cu), AlMg 2.5Mn, AlMg 2 Mn 0.8, AlMg 3, AlMg 3 Si, G-Almg 3, AlMg 4.5 Mn, G-AlMg 3 Si, AlMg Si 0.5, AlMgSi 0.7, AlMgSi 0.8, AlMgSi 0.8, AlMgSi 1 Cu, AlZn 4.5 Mg 1.

## Features and Applications

- It is used for joining aluminum alloys includes over 3 % Mg. Resistance to sea water
- Application field is cup and boilers, columns, marine applications
- Required use of Ar, He or Ar+He gas as shielding gas
- It is recommended that preheating to 150°C before welding of plates thicker than 10mm

## Welding Positions



## Current Type

MIG D.C.(+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Package Weight** (Kg) |
|---|---|---|---|
| 6011100277 | 0.80 | 0.030” | 5 |
| 6011100278 | 1.00 | 0.040” | 7 |
| 6011100279 | 1.20 | 0.047” | 7 |
| 6011100058 | 1.60 | 0.062” | 7 |

**Approvals:** SEPRO, CE

Aluminium Alloyed MIG Welding Wire

# AlMg 4.5 Mn

## Standards

| | |
|---|---|
| TS EN ISO 18273 | : S Al 5183(AlMg4.5Mn0.7A) |
| EN ISO 18273 | : S Al 5183(AlMg4.5Mn0.7A) |
| AWS A5.10 | : ER 5183 |

## Chemical Composition of Welding Wire % (Typical)

| Mg | Mn | Si | Fe | Al | Cr |
|---|---|---|---|---|---|
| 5.0 | 0.8 | <0.40 | <0.40 | rest | 0.20 |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Elongation** (($L_0=5d_0$) (%) | **Working Temperature** (°C) |
|---|---|---|---|
| 170 | 250 | 20 | 574 - 638 |

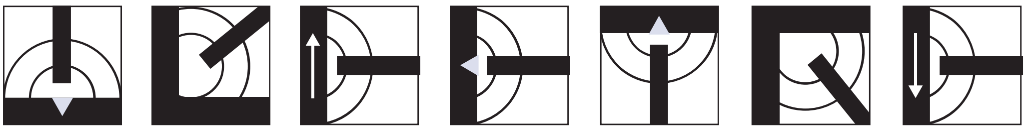
## Typical Base Material Grades

- AlMg 2.7 Mn, AlMg 3, AlMg 4.5 Mn, AlMg 4 Mn, AlMg 5, AlMgSi 0.5, AlMgSi, 0.7, AlMgSi 0.8, AlMgSi 1, AlMgSi 1 Cu, AlZn 4.5 Mg 1, AlZMgCu 1.5, AlZnMgCu 0.5, G-AlMg 5 Si, G-AlMg 3, G-AlMg 5.

## Features and Applications

- It is used in welding exposed to sea water aluminum parts, high strength aluminum alloys work in low temperatures (-196°C)

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Package Weight** (Kg) |
|---|---|---|---|
| 6011100275 | 1.00 | 0.040” | 7 |
| 6011100276 | 1.20 | 0.047” | 7 |

**Approvals:** SEPRO, CE

GeKa

Aluminium TIG & Gas Welding Rod

# AlSi 5 TIG

## Standards

| | |
|---|---|
| TS EN ISO 18273 | : S Al 4043 (AlSi5)) |
| EN ISO 18273 | : S Al 4043 (AlSi5) |
| TS EN ISO 17672 | : Al 105 |
| EN ISO 17672 | : Al 105 |
| AWS A5.10 | : ER 4043 |

## Chemical Composition of Welding Wire % (Typical)

| Al | Si | Mn | Fe |
|---|---|---|---|
| rest | 5.0 | 0.03 | 0.5 |

## Mechanical Properties

| **Density** (kg/$dm^3$) | **Yield Strength** (N/$mm^2$) | **Tensile Strength** (N/$mm^2$) | **Elongation** (($L_0=5d_0$) (%) | **Melting Range** (N/$mm^2$) |
|---|---|---|---|---|
| 2.7 | 100 | 160 | 15 | 573-625 |

## Features and Applications

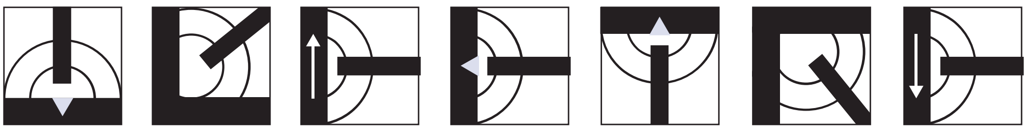
- AlSi5 is aluminum TIG rod with high content of silicon
- It is used for joining and filling of aluminum silicon cast alloys including up to 7% silicon
- It is recommended that preheating to 150°C before welding of plates thicker than 15 mm
- For gas welding, GeKaTec F-LH1 is recommended

## Welding Method

TIG Welding - Gas Welding

| Current Type | MIG Wire | Electrode |
|---|---|---|
| TIG A.C. | GeKa AlSi5 / GeKaTec 4043 MIG | GeKaTec Aluweld Si |

## Welding Positions



## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Package Weight (Kg) |
|---|---|---|---|
| 6011100296 | 1.6 x 1000 | 1/16 x 39” | 5 |
| 6011100249 | 2.0 x 1000 | 5/64 x 39” | 5 |
| 6011100250 | 2.4 x 1000 | 3/32 x 39” | 5 |
| 6011100251 | 3.2 x 1000 | 1/8 x 39” | 5 |
| 6011100297 | 4.0 x 1000 | 5/32 x 39” | 5 |

**Approvals:** SEPRO, CE

# AlSi 12 TIG

## Standards

| | |
|---|---|
| TS EN ISO 18273 | : S Al 4047 (AlSi 12) |
| EN ISO 18273 | : S Al 4047 (AlSi 12) |
| TS EN ISO 17672 | : Al 112 |
| EN ISO 17672 | : Al 112 |
| AWS A5.10 | : ER 4047 |

## Chemical Composition of Welding Wire % (Typical)

| Al | Si | Fe | Mn |
|---|---|---|---|
| rest | 12.0 | <0.5 | <0.3 |

## Mechanical Properties

| **Density** (kg/dm$^3$) | **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** (($L_0$=5$d_0$) (%) | **Melting Range** (°C) | **Hardness** (HB) |
|---|---|---|---|---|---|
| 2.6 | 80 | 170 | 8 | 575 - 585 | 45 |

## Features and Applications

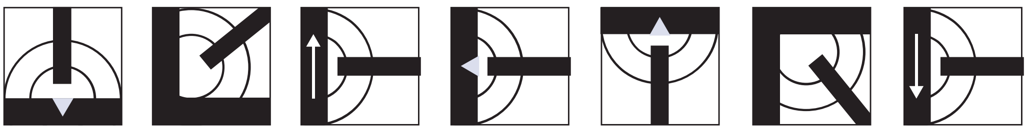
- AlSi 12 is aluminum TIG rod with high content of Silicon
- It is used for joining and filling of aluminum silicon cast alloys including more than 7% silicon
- It has a good fluidity. Oxyacetylene welding and brazing is possible with GeKaTec F-LH1
- It is recommended that preheating to 150°C before weldingof plates thicker than 15mm
- Shielding gas: Ar

## Welding Method

TIG Welding - Gas Welding

| Current Type | Electrode |
|---|---|
| TIG A.C. | GeKaTec Aluweld 12 Si |

## Welding Positions



## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Package Weight (Kg) |
|---|---|---|---|
| 6011100288 | 2,00 x 1000 | 5/64 x 39” | 5 |
| 6011100289 | 2,40 x 1000 | 3/32 x 39” | 5 |
| 6011100290 | 3,20 x 1000 | 1/8 x 39” | 5 |

**Approvals:** SEPRO, CE

GeKa®

Aluminium TIG & Gas Welding Rod

# Al 99.5 TIG

## Standards

| | |
|---|---|
| TS EN ISO 18273 | : ~S Al 1100 (Al 99.0 Cu) |
| EN ISO 18273 | : ~S Al 1100 (Al 99.0 Cu) |
| AWS A5.10 | : ~ER1100 |

## Chemical Composition of Welding Wire % (Typical)

| Al |
|---|
| min. 99 |

## Mechanical Properties

| **Density** (kg/dm³) | **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Elongation** (($L_0=5d_0$) (%) | **Melting Range** (°C) | **Electrical Conductivity** (Sm/mm²) |
|---|---|---|---|---|---|
| 2.7 | min. 40 | min. 70 | 30 | 658 - 674 | 35 |

## Features and Applications

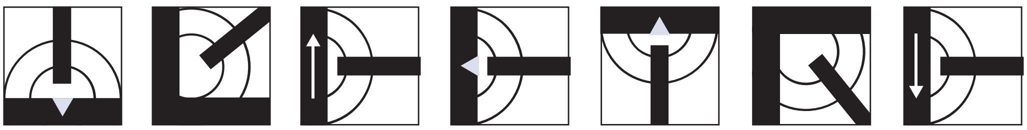
- Al99.5 TIG is pure aluminum weldingTIG rod
- It is used for joining of aluminum alloys required high electrical conductivity
- It is recommended that preheating to 200°C before welding of plates thicker than 15mm
- For gas welding, GeKaTec F-LH1 is recommended
- Shielding gas: Ar

## Welding Method

TIG Welding - Gas Welding

| Current Type | MIG Wire | Electrode |
|---|---|---|
| TIG A.C. | GeKa Al99.5 | GeKaTec Aluweld 99Al |

## Welding Positions



## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Package Weight (Kg) |
|---|---|---|---|
| 6011100036 | 2.0 x 1000 | 5/64 x 39” | 5 |
| 6011100392 | 2.4 x 1000 | 3/32 x 39” | 5 |
| 6011100038 | 3.2 x 1000 | 1/8 x 39” | 5 |
| 6011100039 | 4.0 x 1000 | 5/32 X 39” | 5 |

**Approvals:** SEPRO

GeKa

Aluminium TIG & Gas Welding Rod

# AlMg 5 TIG

## Standards

| | |
|---|---|
| TS EN ISO 18273 | : S Al 5356 (AlMg5Cr(A)) |
| EN ISO 18273 | : S Al 5356 (AlMg5Cr(A)) |
| DIN 1732 | : SG-AlMg5 |
| AWS A5.10 | : ER 5356 |

## Chemical Composition of Welding Wire % (Typical)

| Al | Mg | Si | Mn |
|---|---|---|---|
| rest | 5.0 | 0.5 | 0.5 |

## Mechanical Properties

| **Densitt** (kg/dm$^2$) | **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** (($L_0$=5$d_0$) (%) | **Melting Range** (°C) | **Hardness** (HB) |
|---|---|---|---|---|---|
| 2.6 | 120 | 250 | 25 | 560 - 630 | 70 |

## Features and Applications

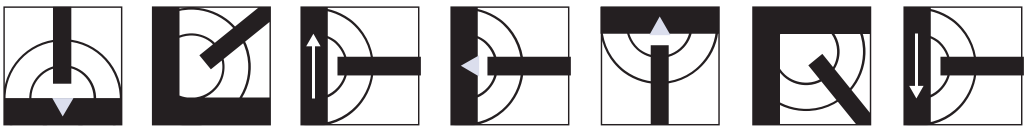
- AlMg5 is magnesium alloyed aluminum TIG rod
- It is used for joining of aluminum alloys required high mechanical properties
- The weld deposit has a good resistance to atmospheric influences and sea water
- And the weld metal is proper for surface treatment such as anodizing and polishing
- it is recommended that preheating to 150°C before welding of plates thicker than 15mm
- For gas welding, GeKaTec F-LH1 is recommended
- Shielding gas: Ar

## Welding Method

TIG Welding - Gas Welding

| Current Type | MIG Wire |
|---|---|
| TIG A.C. | GeKa AlMg 5 |

## Welding Positions



## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Package Weight (Kg) |
|---|---|---|---|
| 6011100062 | 1,60 x 1000 | 1/16 x 39” | 5 |
| 6011100281 | 2,00 x 1000 | 5/64 x 39” | 5 |
| 6011100282 | 2,40 x 1000 | 3/32 x 39” | 5 |

**Approvals:** SEPRO

Aluminium TIG & Gas Welding Rod

# AlMg 4.5 Mn TIG

## Standards

| | |
|---|---|
| TS EN ISO 18273 | : SAl 5183(AlMg4.5Mn0.7A) |
| EN ISO18273 | : SAl 5183(AlMg4.5Mn0.7A) |
| AWS A5.10 | : ER 5183 |

## Chemical Composition of Welding Wire % (Typical)

| Al | Si | Fe | Mn | Mg | Cr |
|---|---|---|---|---|---|
| rest | <0.4 | <0.4 | 0.8 | 5.0 | 0.2 |

## Mechanical Properties

| **Densitt** (kg/dm$^2$) | **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** (($L_0$=5$d_0$) (%)) | **Melting Range** (°C) | **Hardness** (HB) |
|---|---|---|---|---|---|
| 2.6 | 170 | 250 | 20 | 575 - 585 | 45 |

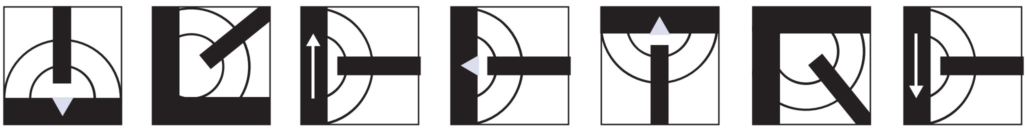
## Features and Applications

- AlMg4.5Mn is Magnesium alloyed Aluminum TIG rod
- It is used for joining of Aluminum alloys including more than 3% Mg
- The weld deposit has a good resistance to atmospheric influences and sea water
- It is recommended that preheating to 150 °C before welding of plates thicker than 15mm
- For gas welding, GeKaTec F-LH1 is recommended
- Shielding gas: Ar

## Welding Method

TIG Welding - Gas Welding

## Welding Positions



## Current Type

TIG A.C.

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Package Weight** (Kg) |
|---|---|---|---|
| 6011100284 | 2.0 x 1000 | 5/64 x 39" | 5 |
| 6011100393 | 2.4 x 1000 | 3/32 x 39" | 5 |
| 6011100285 | 3.2 x 1000 | 1/8 x 39" | 5 |

**Approvals:** SEPRO, CE

GeKa

# Copper Alloyed MIG Welding Wire R1

## Standards

| | |
|---|---|
| TS EN ISO 24373 | : S Cu 6560 (CuSi3Mn1) |
| EN ISO 24373 | : S Cu 6560 (CuSi3Mn1) |
| AWS A5.7 | : ER CuSiA |

## Chemical Composition of Welding Wire % (Typical)

| Si | Mn | Fe | Sn | Cu |
|---|---|---|---|---|
| 3.0 | 1.0 | <0.20 | 0.10 | rest |

## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Elongation** (($L_0=5d_0$) (%) | **Hardness** (HB) |
|---|---|---|---|
| 130 | 220 | 30 | 55 |

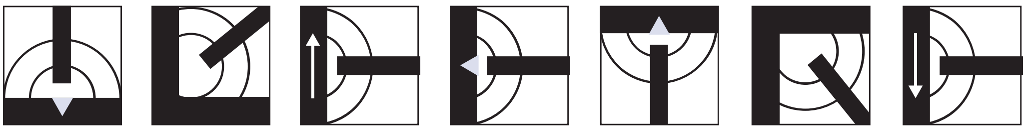
## Typical Base Material Grades

- CuSi 2 Mn,CuSi 3 Mn,CuMn 5,CuMn 2, Galvanized steels and Cu-Zn (brass) alloyed, Cu-Mn alloyed

## Features and Applications

- It is Copper-Silicon alloyed MIG welding wire and used in welding of galvanized steels
- Shielding Gas: Ar

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) |
|---|---|---|---|
| 6031100261 | 0.8 | 0.030” | 15 |
| 6031100262 | 1.0 | 0.040” | 15 |
| 6031100263 | 1.2 | 0.047” | 15 |

**Approvals:** SEPRO

# R1 L

## Standards

| | |
|---|---|
| TS EN ISO 24373 | : ~S Cu1898 (CuSn1) |
| EN ISO 24373 | : ~S Cu1898 (CuSn1) |
| AWS A5.7 | : ER Cu |

## Chemical Composition of Welding Wire % (Typical)

| Si | Mn | Sn | Cu |
|---|---|---|---|
| 0.3 | 0.3 | 0.8 | rest |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Elongation** (($L_0=5d_0$) (%) | **Hardness** (HB) |
|---|---|---|---|
| 115 | 200 | 35 | 60 |

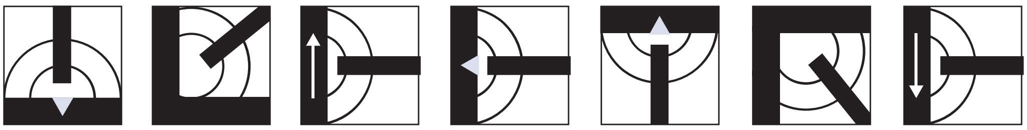
## Typical Base Material Grades

- OF-Cu, SE-Cu, SW-Cu, SF-Cu, Cu Fe 2P, CuSP, CuTeP, E-Cu C, F-Cu, D-Cu, SD Cu, SB-Cu, SA-Cu.

## Features and Applications

- It is Cu-Sn alloy welding wire
- It is used in welding of pure copper and copper based low alloy, tank and boilers, graphite electrode holders, slag baths, oxygen tubes, electrical equipment
- Shielding Gas: Ar, He, Ar+He

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) |
|---|---|---|---|
| 6031100266 | 1.0 | 0.040” | 15 |
| 6031100386 | 1.2 | 0.047” | 15 |
| 6031100267 | 1.6 | 0.062” | 15 |

**Approvals:** SEPRO

GeKa

# Copper Alloyed MIG Welding Wire
# R1 AG

## Standards

| | |
|---|---|
| TS EN ISO 24373 | : S Cu1897 (CuAg1) |
| EN ISO 24373 | : S Cu1897 (CuAg1) |

## Chemical Composition of Welding Wire % (Typical)

| Ag | P | Mn | Cu |
|---|---|---|---|
| 0.8-1.2 | 0.01 | 0.1 | rest |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Elongation** (($L_0=5d_0$) (%) | **Hardness** (HB) |
|---|---|---|---|
| 80 | 200 | 20 | ~ 50 |

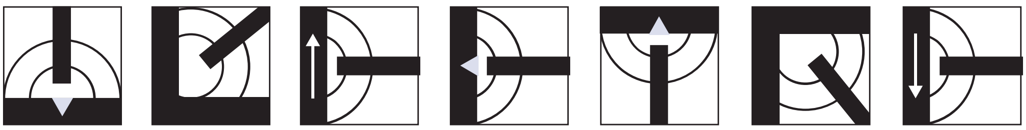
## Typical Base Material Grades

- 2.0076, 2.0090, 2.0040

## Features and Applications

- Applicability in arc welding of copper materials with high electric conductivity, of copper- silver alloys containing low amounts of phosphor as well as of pure copper
- Additional applicability in gas welding of deoxidized copper
- High electric conductivity (30-45 $S.m/mm^2$)
- Use of Ar (I1) as shielding gas

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) |
|---|---|---|---|
| 6031100264 | 1.2 | 0.047” | 15 |

**Approvals:** SEPRO

GeKa

# Copper Alloyed MIG Welding Wire
# R4

## Standards

| | |
|---|---|
| TS EN ISO 24373 | : Cu5410 (CuSn12 P) |
| EN IS024373 | : Cu5410  (CuS212P) |

## Chemical Composition of Welding Wire % (Typical)

| Sn | P | Fe | Cu |
|---|---|---|---|
| 12.0 | 0.20 | <0.10 | rest |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Elongation** (($L_0=5d_0$) (%) | **Hardness** (HB) |
|---|---|---|---|
| 260 | 380 | 10 | 130 |

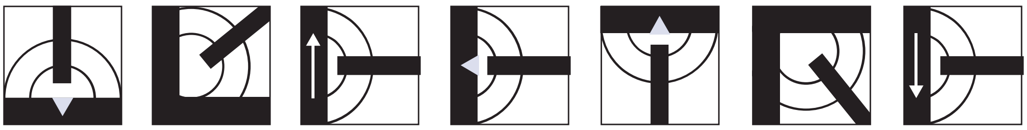
## Typical Base Material Grades

- Cu Sn 8, Cu Sn 12

## Features and Applications

- It is Cu-Sn alloy welding wire
- It is used in welding of pure copper and copper based low alloy, tank and boilers, graphite electrode holders, slag baths, oxygen tubes, electrical equipment
- Shielding Gas: Ar, Ar+He

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) |
|---|---|---|---|
| 6011100407 | 1.0 | 0.040” | 15 |
| 6011100408 | 1.2 | 0.047” | 15 |
| 6011100409 | 1.6 | 0.062” | 15 |

**Approvals:** SEPRO

GeKa

Copper Alloyed MIG Welding Wire

# R4 L

## Standards

| | |
|---|---|
| TS EN ISO 24373 | : CuSn6 P - CF452K |
| EN ISO 24373 | : CuSn6 P - CF452K |
| AWS A 5.7 | : ~ER CuSn -A |

## Chemical Composition of Welding Wire % (Typical)

| Sn | P | Fe | Cu | Pb |
|---|---|---|---|---|
| 6.0 | 0.20 | <0.10 | rest | <0.02 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** (($L_0=5d_0$) (%) | **Hardness** (HB) |
|---|---|---|---|
| 270 | 410 | 30 | 100 |

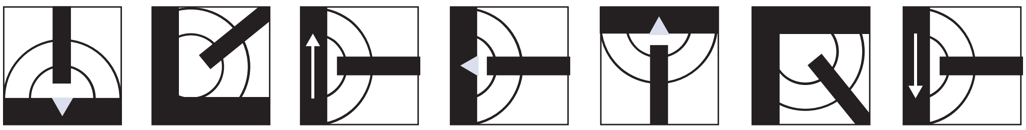
## Typical Base Material Grades

- CuSn 2, CuSn 4, CuSn 6, CuSn 8, CuSn 6 Zn, G-CuSn 2 ZnPb, G-CuSn 5 ZnPb, G-CuSn 6 ZnNi.

## Features and Applications

- It is Cu-Sn alloy welding wire
- Joining and surfacing of tin bronzes, cast tin bronzes, such as CuSn 2, CuSn 6, CuSn 8 and CuSn 6 Zn
- Shielding Gas: Ar, Ar+He

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) |
|---|---|---|---|
| 6031100272 | 1.0 | 0.040” | 15 |
| 6031100273 | 1.2 | 0.047” | 15 |
| 6031100052 | 1.6 | 0.062” | 15 |

**Approvals:** SEPRO

# R4 A

## Standards

| | |
|---|---|
| TS EN ISO 24373 | : Cu6180 (CuAl10Fe) |
| EN ISO 24373 | : Cu6180 (CuAl10Fe) |
| AWS A 5.7 | : ER CuAl-A2 |

## Chemical Composition of Welding Wire % (Typical)

| Al | Si | Fe | Cu |
|---|---|---|---|
| 9.0 | <0.10 | <1.50 | rest |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** (($L_0$=5$d_0$) (%) | **Hardness** (HB) |
|---|---|---|---|
| 410 | 590 | 45 | 145 |

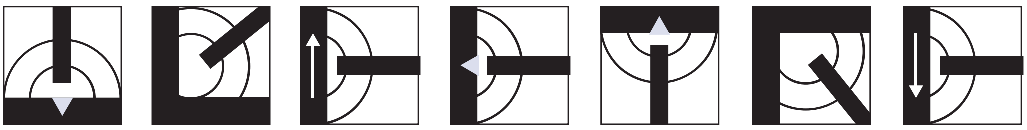
## Typical Base Material Grades

- CuAl 5, CuAl 8, G-CuAl 8 Mn

## Features and Applications

- It is Cu- Al MIG welding wire
- It is used for welding of sea water vaporizers, door accessories, rolling equipment, CuAl 5, CuAl 8, G-CuAl 8 Mn

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) |
|---|---|---|---|
| 6031100042 | 1.0 | 0.040” | 15 |
| 6031100043 | 1.2 | 0.047” | 15 |
| 6031100044 | 1.6 | 0.062” | 15 |

**Approvals:** SEPRO

# Copper Alloyed MIG Welding Wire
# R4 AL

## Standards

| | |
|---|---|
| TS EN ISO 24373 | : S Cu 6100 (CuAl8) |
| EN ISO 24373 | : S Cu 6100 (CuAl8) |
| AWS A5.7 | : CuAl-A1 |

## Chemical Composition of Welding Wire % (Typical)

| Al | Si | Zn | Cu | Mn |
|---|---|---|---|---|
| 8.0 | <0.10 | <0.20 | rest | <0.50 |

## Mechanical Properties

| **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Elongation** (($L_0$=5$d_0$) (%) | **Hardness** (HB) |
|---|---|---|---|
| 200 | 430 | 40 | 100 |

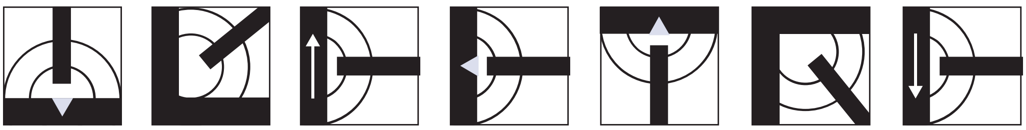
## Typical Base Material Grades

- CuAl 5, CuAl 8, G-CuAl 8 Mn, CuAl 5 As, CuZn 20 Al 2

## Features and Applications

- It is Cu-Al MIG welding wire
- It is used for surfacing of steel and cast steels
- It is used for joining and surfacing of Aluminum Bronzes, e.g. (CuAl5), (CuAl8), G-CuAl 8 Mn, Cu Al 5 As, C Zn 20 Al 2, surfacing of Copper, Brass, non alloyed and low alloyed steels
- Shielding Gas: Ar, He+Ar, He
- Metal to metal wear, sea water and is used in parts exposed to corrosive liquids such as acids

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Package Weight** (Kg) |
|---|---|---|---|
| 6031100268 | 1.0 | 0.040” | 15 |
| 6031100270 | 1.2 | 0.047” | 15 |
| 6031100271 | 1.6 | 0.062” | 15 |
| 6031100269 | 1.0 | 0.040” | 200 (Big Pack) |

**Approvals:** SEPRO

Copper Alloyed MIG Welding Wire

# R4 M

## Standards

| | |
|---|---|
| AWS A5.7 | : ER CuMnNiAl |

## Chemical Composition of Welding Wire % (Typical)

| Al | Fe | Ni | Cu | Mn |
|---|---|---|---|---|
| 7.5 | 2.5 | 2.0 | rest | 13.0 |

## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation (($L_0=5d_0$) (%) | Hardness (HB) |
|---|---|---|---|
| 470 | 650 | 20 | 205 |

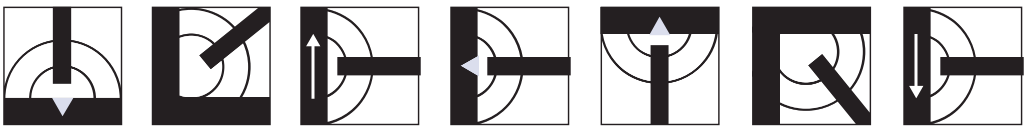
## Typical Base Material Grades

- Ductile cast iron steels, ductile cast Iron-Manganse steels.

## Features and Applications

- Mn-Ni, Aluminum bronze MIG welding wire
- Used for welding of screw, clutch pulley and compression plates
- Shielding gas: Ar

## Welding Positions



## Current Type

MIG D.C. (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) |
|---|---|---|---|
| 6031100274 | 1.2 | 0.047” | 15 |

**Approvals:** SEPRO

GeKa®

# Copper Alloyed TIG Welding Rod
# CuNi SG

## Standards

| | |
|---|---|
| TS EN ISO 24373 | : S Cu 7158 (CuNi30) |
| EN ISO 24373 | : S Cu 7158 (CuNi30) |
| AWS A5.7 | : ER CuNi |

## Chemical Composition of Welding Wire % (Typical)

| Mn | Ti | Fe | Ni | S | Cu |
|---|---|---|---|---|---|
| 0.9 | 0.4 | 0.5 | 30.0 | <0.01 | rest |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|
| 250 | 400 | 100 J | 30 |

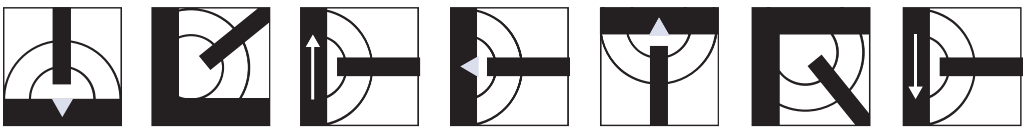
## Typical Base Material Grades

- CuNi 10 Fe 1 Mn (2.0872) - CuNi 20 Fe (2.0878) - CuNi 30 Fe (2.0882)

## Features and Applications

- It is used of Copper alloys includes up to 30% Nickel, joining and surfacing of steel alloys.
- Joining of stainless steel to copper alloys is possible
- Because of excellent resistance to sea water corrosion, it is used marine off-shore applications, sea water exchangers and food & chemical industries
- Shielding Gas: Ar

## Welding Positions



## Current Type

TIG D.C.(-)

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) |
|---|---|---|---|
| 6031100255 | 1.6 x 1000 | 1/16 x 39” | 5 |
| 6031100256 | 2.0 x 1000 | 5/64 x 39” | 5 |
| 6031100257 | 2.4 x 1000 | 3/32 x 39” | 5 |

**Approvals:** SEPRO

# Copper Alloyed TIG Welding Rod
# CuNiFe SG

## Standards

| | |
|---|---|
| TS EN ISO 24373 | : S Cu 7061(CuNi10) |
| EN ISO 24373 | : S Cu 7061(CuNi10) |
| DIN 1733 | : SG CuNi10 Fe |

## Chemical Composition of Welding Wire % (Typical)

| Cu | Fe | Mn | Ti | Ni |
|---|---|---|---|---|
| rest | 1.8 | 1.0 | 0.17 | 10.0 |

## Mechanical Properties

| Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Elongation (($L_0=5d_0$) (%) | Hardness (HB) |
|---|---|---|---|
| 150 | 350 | 30 | 200 |

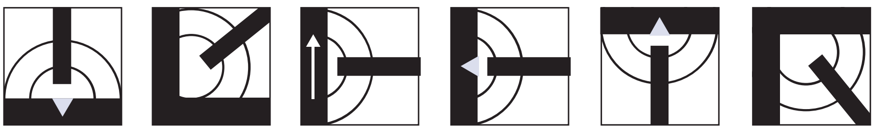
## Typical Base Material Grades

- CUNIFER 30, CUNIFER 40, Cu90-Ni10 and lo w Ni Alloys Cu-Ni alloys
- 2.0862 CuNi5Fe, 2.0872 CuNi10Fe

## Features and Applications

- It is used for copper nickel alloys with 10% nickel such as CuNi5Fe, CuNi10Fe.
- Weld deposit is highly corrosion resistant
- It is used for joining and surfacing copper-nickel alloys and CuNiFe pipes which pertorm in corrosive areas such as seawater
- Shielding Gas: Ar

## Welding Positions



## Current Type

TIG D.C.(-)

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Weight (Kg) |
|---|---|---|---|
| 6031100258 | 1,60 x 1000 | 1/16 x 39” | 5 |
| 6031100259 | 2,00 x 1000 | 5 /64 x 39” | 5 |
| 6031100385 | 2,40 x 1000 | 3/32 x 39” | 5 |
| 6031100260 | 3,20 x 1000 | 1/8 x 39” | 5 |

**Approvals:** SEPRO

# ELCOR R 71

## Standards

| | |
|---|---|
| TS EN ISO 17632-A | : T 42 4 P C 1 H5 |
| EN ISO 17632-A | : T 42 4 P C 1 H5 |
| AWS A5.20 | : E 71T-1C-J |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | P | S |
|---|---|---|---|---|
| 0.06 | 0.5 | 1.3 | 0.015 | 0.015 |

## Mechanical Properties

| Heat Treatment | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-40°C) | Elongation (($L_0=5d_0$) (%) |
|---|---|---|---|---|
| AW | min. 420 | 500- 640 | min. 50 J | min. 22 |

**AW:** as welded

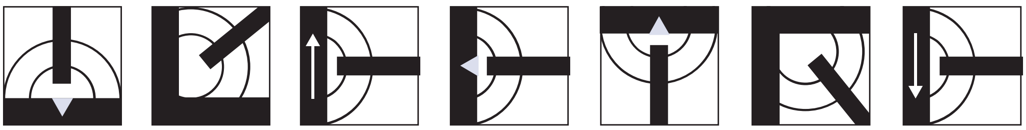
## Typical Base Material Grades

- S235JR, S275JR, S235J2G3-S355J2G3, P 235T1-P355T1, P235T2-P355T2, L210NB-L360NB, L290MB L360MB, P235G1TH, P255G1TH, P235GH-P355GH, P295GH, S235JRS1-S235J4S, S315G1S-S355G3S, S255N-S380N, S255NL-S355NL,GE200-GE260

## Features and Applications

- Rutile type flux-cored wire which is used for the production welding of machine and welding applications on ship, industry vehicle building and steel constructions in all positions
- Provides high mechanical properties, proper, smooth, X-ray safety seams
- It is economical as it has high melting ability and can work under high current in all positions
- Shielding gas: %100 $CO_2$

## Welding Positions



## Current Type

FCAW / D.C. (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010500008 | 1.20 | 0.047” | 4.5 | D 200 |
| 3010500018 | 1.20 | 0.047” | 15 | D 300 |
| 3010500023 | 1.20 | 0.047” | 15 | BS 300 |
| 3010500020 | 1.60 | 0.062” | 15 | BS 300 |
| 3010500035 | 1.60 | 0.047” | 200 | BIG PACK |

**Approvals:** ELCOR R71 (CO2): TL, DNV-GL, BV, ABS, LR, RS, DB NK, RINA, CE, TÜV, SEPRO, CWB

GeKa

Rutil Type Flux Cored Wire

# ELCOR R 71 CM

## Standards

| | |
|---|---|
| TS EN ISO 17632-A | : T 46 2 P M 1 |
| EN ISO 17632-A | : T 46 2 P M 1 |
| AWS A5.20 | : E71 T-1M |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn |
|---|---|---|
| 0.06 | 0.5 | 1.3 |

## Mechanical Properties

| Heat Treatment | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-20°C) | Elongation (($L_0$=5$d_0$) (%)) |
|---|---|---|---|---|
| AW | min. 460 | 530- 600 | min. 50 J | min. 22 |

**AW:** as welded

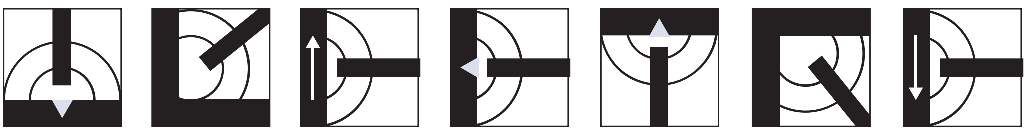
## Typical Base Material Grades

- S235JR, S275JR, S235J2G3- S355J2G3, P 235T1-P355T1, P235T2-P355T2, L210NB-L360NB, L290MB-L360MB, P235G1TH, P255G1TH, P235GH-P355GH, P295GH, S235JRS1-S235J4S, S315G1S-S355G3S, S255N-S380N, S255NL-S355NL, GE200-GE260

## Features and Applications

- Rutile type flux cored wire which is used for the production welding of machine and welding applications on ship, and steel constructions in all positions. Provides high mechanical proper ties, proper, smooth, X-ray safety seams
- It is economical as it has high melting ability and can work with high current in all positions. Shielding Gas: M21 ($CO_2$)

## Welding Positions



## Current Type

FCAW / D.C. (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010500112 | 1.20 | 0.047” | 15 | BS 300 |

**Approvals:** CE, SEPRO

GeKa

Rutile Type Flux Cored Wire

# ELCOR MR 70

## Standards

| | |
|---|---|
| TS EN ISO 17632-A | : T 42 4 R C3 H10 |
| EN ISO 17632-A | : T 42 4 R C3 H10 |
| AWS A5.20 | : E 70 T-9 C J H 8 |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn |
|---|---|---|
| 0.04 | 0.70 | 1.40 |

## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-40°C) | **Elongation** ($(L_0=5d_0)$) (%) |
|---|---|---|---|
| min. 420 | 500- 640 | min. 47 J | min. 22 |

## Features and Applications

- Metal-Rutile type flux cored welding wire
- High fill rate and deep penantrant
- Suitability flat and horizontal fillet weld
- Excellent notch toughness value at low temperatures.
- Shielding Gas: $CO_2$

## Welding Positions

## Current Type

FCAW / D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 3010500122 | 1.20 | 0.047” | 15 | BS 300 |

**Approvals:** CE, SEPRO

# ELCOR B 70

## Standards

| | |
|---|---|
| TS EN ISO 17632-A | : T 42 4 B M 3 H5 |
| EN ISO 17632-A | : T 42 4 B M 3 H5 |
| AWS A5.20 | : E70T-5M J |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn |
|---|---|---|
| 0.05 | 0.55 | 1.35 |

## Mechanical Properties

| Heat Treatment | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength | | Elongation (($L_0=5d_0$) (%) |
|---|---|---|---|---|---|
| | | | (ISO-V/-30°C) | (ISO-V/-40°C) | |
| AW or A | min. 420 | 520 - 670 | 120 J | min. 47 J | min. 22 |

**AW:** as welded **A:** aging

## Typical Base Material Grades

- EN: S185, S235-S355, P 235 GH, P 265 GH, P 295 GH, P 235 T1/T2-P355N, I2 10-L485, S 255-S460, X42-X70 ASTM: A 131, A106/A515/A 714, A283/A285/A414/A662/A372, A369/A210/A106, A516/A255/A 333/ A350/

## Features and Applications

- Used for semi-automatic or fully automatic welding of alloyed or unalloyed construction steels, thin-walled steels
- it has soft arc, deep penetration, good bead features
- Impact strength values are higher than those of E71 T-1 in at low temperatures
- M21 gas is used for shielding

## Welding Positions

## Current Type

FCAW / D.C. (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010500141 | 1.20 | 0.047” | 15 | BS 300 |
| 3010500143 | 1.60 | 0.062” | 15 | BS 300 |

**Approvals:** CE, SEPRO

# ELCOR B 70 - ARM

## Standards

| | |
|---|---|
| TS EN ISO 17632-A | : T 42 A Z B M 3 |
| EN ISO 17632-A | : T 42 A Z B M 3 |
| AWS A5.20 | : E 70 T-5M |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn |
|---|---|---|
| 0.03 | 0.10 | 0.35 |

## Mechanical Properties

| **Heat Treatment** | **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/-30°C) | **Elongation** (($L_0$=5$d_0$) (%) |
|---|---|---|---|---|
| AW | min. 420 | 500- 640 | min. 47 J | min. 22 |

**AW:** as welded

## Typical Base Material Grades

- Armco Iron and mild steels.

## Features and Applications

- Suitable for use in welding of Armco Iron and mild steels. Applicability in welding of galvanized tanks made of Armco Iron
- Suitable for automation
- Shielding gas: M21

## Welding Positions

## Current Type

FCAW / D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 3010500226 | 1.20 | 0.062” | 15 | BS 300 |

**Approvals:** CE, SEPRO

# ELCOR M 70

## Standards

| | |
|---|---|
| TS EN ISO 17632-A | : T 46 4 M M 3 |
| EN ISO 17632-A | : T 46 4 M M 3 |
| AWS A5.18 | : E 70 C-6 M |

## Chemical Composition of Weld Metal % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.05 | 0.65 | 1.60 |

## Mechanical Properties

| **Heat Treatment** | **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/-40°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|---|
| AW | min. 460 | 530- 650 | min. 47 J | min. 22 |

**AW:** as welded

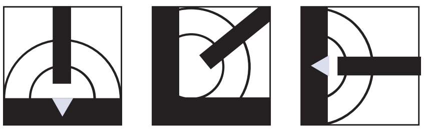
## Typical Base Material Grades

- S235JR, S275JR, S235J2G3-S355J2G3, P 235T1-P355T1, P235T2-P355T2, L210NB-L415NB, L290MB-L415MB, P235G1TH, P255G1TH, P235GH-P355GH, P295GH, S235JRS1-S235J4S, S315G1S-S355G3S, S255N-S420N, S255NL-S355NL, GE200-GE260, X42-X60

## Features and Applications

- Suitable for butt and fillet welding. Better arc stability and wider optimum current range for spray transfer arc with less spattering than solid wire
- Shielding gas M21

## Welding Positions



## Current Type

FCAW / D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 3010500249 | 1.20 | 0.047” | 15 | BS 300 |
| 3010500251 | 1.60 | 0.062” | 15 | BS 300 |

**Approvals:** ELCOR M 70 (M21): BV, ABS, CE, SEPRO

# ELCOR M 80 Ni

## Standards

| | |
|---|---|
| TS EN ISO 17632-A | : T 50 4 M M 3 |
| EN ISO 17632-A | : T 50 4 M M 3 |
| AWS A5.28 | : E 80 C Ni 1 |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Ni |
|---|---|---|---|
| 0.05 | 0.50 | 1.20 | 1.00 |

## Mechanical Properties

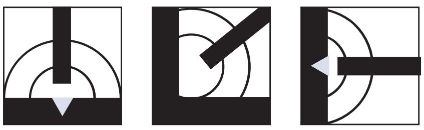
| **Heat Treatment** | **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/-45°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|---|
| AW | min. 500 | 560 - 720 | min. 47 J | min. 24 |

**AW:** as welded

## Features and Applications

- Suitable for automation welding applications
- It is metal cored wire
- It has soft arc, deep penetration, good bead features
- Suitable for butt and fillet welding
- Shielding gases: M21 (Ar+%5-25$CO_2$)

## Welding Positions



## Current Type

FCAW / D.C. (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 3010500331 | 1.20 | 0.047” | 15 | BS 300 |
| 3010500332 | 1.40 | 0.055” | 15 | BS 300 |
| 3010500335 | 1.40 | 0.055” | 200 | BIG PACK |

**Approvals:** CE, SEPRO

Rutile Type Flux Cored Wire
# ELCOR R 81 Ni

## Standards

| | |
|---|---|
| TS EN ISO 17632-A | : T 46 4 1Ni P C 1 |
| EN ISO 17632-A | : T 46 4 1Ni P C 1 |
| AWS A5.29 | : E81 T1-Ni1 C |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Ni |
|---|---|---|---|
| 0.05 | 0.5 | 1.30 | 0.90 |

## Mechanical Properties - (Typical): (With $CO_2$ gas)

| Heat Treatment | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength | | Elongation (($L_0$=5$d_0$) (%) |
|---|---|---|---|---|---|
| | | | (ISO-V/-40°C) | (ISO-V/-30°C) | |
| AW | min. 460 | 560 - 690 | 50 J | 80 J | min. 24 |

**AW:** as welded

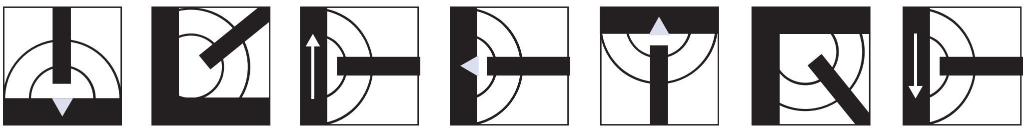
## Typical Base Material Grades

- EN: S 185, S235-S355, P 235 GH, P 265 GH, P 295 GH, P 235 T1/T1-P 355 N, L210-L485, S255-S500 (NL1,2), X 42-X80
  ASTM: A 131, A 106/A515/A714, A 283/A285/A414/A662/A372, A369/A210/A106/A516/A573/A707, A516/A255/ A299/ A333/ A350/ A612

## Features and Applications

- Rutile type flux cored welding wire with good toughness in mild and 490-550 MPa high tensile steels at low service temperatures
- Suitable for butt and fillet welding in all positions
- You can get smooth arc, and low spatter, good weldability
- Shielding Gas: $CO_2$

## Welding Positions



## Current Type

FCAW / D.C.(+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010500337 | 1.20 | 0.047” | 15 | BS 300 |

**Approvals:** ABS, CE, SEPRO, TL

GeKa

Rutile Type Flux Cored Wire

# ELCOR R 91

## Standards

| | |
|---|---|
| TS EN ISO 18276-A | : T 62 4 Mn 1.5 Ni PC 1 |
| EN ISO 18276-A | : T 62 4 Mn 1.5 Ni PC 1 |
| AWS A5.29 | : E91T1 - K2CJ |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Ni |
|---|---|---|---|
| 0.08 | 0.5 | 1.20 | 1.70 |

## Mechanical Properties - (Typical): (With $CO_2$ gas)

| Heat Treatment | Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength (ISO-V/-20°C) | Impact Strength (ISO-V/-40°C) | Elongation (($L_0=5d_0$) (%) |
|---|---|---|---|---|---|
| AW | min. 620 | 690 - 890 | min. 62 J | min. 47 J | min. 18 |

**AW:** as welded

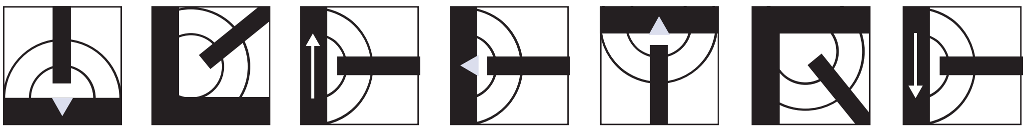
## Typical Base Material Grades

- S380N-S500N, S355NH-S460NH, S380NL-500NL

## Features and Applications

- Rutile type flux cored wire for 550-620 N/mm$^2$ high tensile strength steel for low temperature service
- Suitable for butt and fillet welding all positions
- Excellent impact value at low temperatures down to -40°C
- Shielding gas: $CO_2$

## Welding Positions



## Current Type

FCAW / D.C.(+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010500348 | 1.20 | 0.047" | 15 | D 300 |

**Approvals:** ABS, SEPRO, CE

GeKa®

Rutile Type Flux Cored Wire

# ELCOR R 110

## Standards

| | |
|---|---|
| TS EN ISO 18276-A | : T 69 4 Mn2.5Ni P C 1 |
| EN ISO 18276-A | : T 69 4 Mn2.5Ni P C 1 |
| AWS A5.29 | : E 111 T1 - GC |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Ni | Mo |
|---|---|---|---|---|
| 0.08 | 0.5 | 1.70 | 2.10 | 0.20 |

## Mechanical Properties - (Typical): (With $CO_2$ gas)

| Heat Treatment | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-40°C) | Elongation (($L_o=5d_o$) (%) |
|---|---|---|---|---|
| AW | min. 690 | 770 - 940 | min. 47 J | min. 17 |

**AW:** as welded

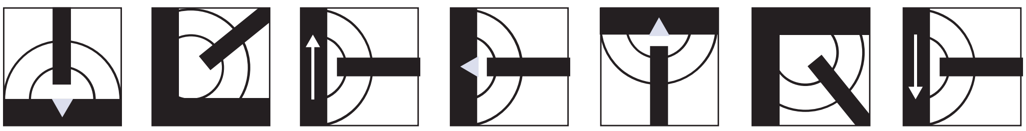
## Typical Base Material Grades

- S690Q, L690M, N-A-XTRA, USS-T1, BH 70V, HY100,
- ASTM A514Gr.F
- High alloyed structural steels, fine grained steels.

## Features and Applications

- Rutile type flux cored wire which provides an exceptionally smooth and stable arc, low spatter.
- Applications of single and multipass welding of high strengthlow alloy steels such as HY-80 and HY-100
- Shielding gas: $CO_2$

## Welding Positions



## Current Type

FCAW / D.C.(+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010500354 | 1.20 | 0.047” | 15 | BS 300 |

**Approvals:** ABS, SEPRO, TL, CE

GeKa

Rutile Type Flux Cored Wire

# ELCOR R 81 NiCu

## Standards

| | |
|---|---|
| TS EN ISO 17632-B | : T 55 3 T1-1CA-NCC1 |
| EN ISO 17632-B | : T 55 3 T1-1CA-NCC1 |
| AWS A5.29 | : E 81 T1-W2 C |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Ni | Cr | Cu |
|---|---|---|---|---|---|
| 0.05 | 0.5 | 1.3 | 0.5 | 0.55 | 0.50 |

## Mechanical Properties - (Typical)

| Heat Treatment | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-30°C) | Elongation (($L_0=5d_0$) (%) |
|---|---|---|---|---|
| AW | min. 470 | 550 - 690 | min. 47 J | min. 19 |

**AW:** as welded

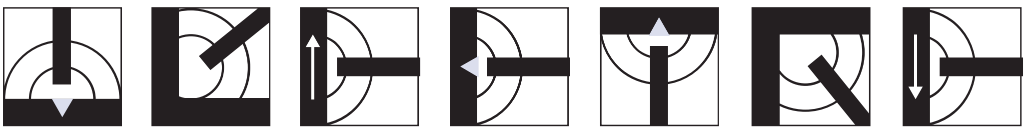
## Typical Base Material Grades

- DIN: COR-TEN A-B-C
- EN: S235JRW-S355JRW, 9CrNiCuP3-2-4, S255-S460,
- ASTM: A 242/A441, A423/ A 588, A516/ A 255/ A 333/ A 350 / A612

## Features and Applications

- Rutile flux-cored wire
- Typical application is weathering grades of steels
- Excellent weld puddle maniplation, superior all-position welding
- Particularly suited for mechanized MAG welding and all-position welding on ceramic backing
- Low spatter with easy slag removal
- Shielding Gas: $CO_2$

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010500364 | 1.20 | 0.047" | 15 | BS 300 |

**Approvals:** CE, SEPRO

GeKa

Rutile Type Flux Cored Wire

# ELCOR R Mo

## Standards

| | |
|---|---|
| TS EN ISO 17632-A | : T 46 2 Mo R C 2 |
| EN ISO 17632-A | : T 46 2 Mo R C 2 |
| AWS A5.29 | : E 81 T1-A1C |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Mo |
|---|---|---|---|
| 0.05 | 0.50 | 1.25 | 0.50 |

## Mechanical Properties - % (Typical)

| **Heat Treatment** | **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (RT) | (ISO-V/-20°C) | **Elongation** (($L_o$=5$d_o$) (%) |
|---|---|---|---|---|---|
| AW | min.470 | 550 - 650 | min.70 J | min.47 J | min.22 |
| SR (620°C / 1h, air cooled at 300°C) | min.470 | 550 - 680 | min.70 J | min.47 J | min.21 |

**AW:** as welded **SR:** stress relieved **RT:** room temperature

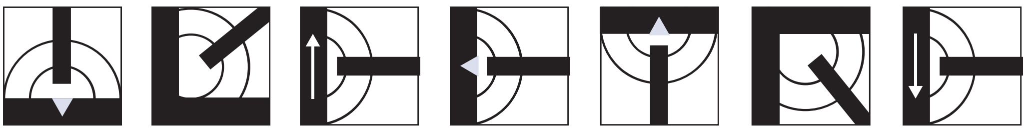
## Typical Base Material Grades

- DIN: HI, HII, 17Mn4, 19Mn5, 15Mo3, 16 Mo 3
- EN: P 235 GH, P 265 GH, P 295 GH, 16 Mo 3, P 235 T1fT2-P355 N, L210-L485, S255-L485
- ASTM: A283, A285, A414, A662, A372, A204, A 369, A210, A106, A 516, A 255, A 333, A 350, A 612

## Features and Applications

- Rutile type flux-cored wire
- Typical applications are vessel and steel construction, mechanical engineering and pipe work.
- Good arc restriking even with cold wire tip, suitable for robot applications
- Multi-pass welding without in-between cleaning
- Ideal for use in the field short arc and spray arc
- Excellent gap bridging for root welding
- High-effeciency type for economic production environments
- Shielding Gas: $CO_2$

## Welding Positions



## Current Type

D.C.(+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 3010500367 | 1.20 | 0.047” | 15 | BS 300 |

**Approvals:** CE, SEPRO

# ELCOR M Mo

## Standards

| | |
|---|---|
| TS EN ISO 17632-A | : T 46 2 Mo M M 3 |
| EN ISO 17632-A | : T 46 2 Mo M M 3 |
| EN ISO 17634-A | : T MoL M M 3 |
| AWS A5.29 | : E80T1 – A1 M |

## Chemical Composition of Weld Metal (Typical)

| Si | C | Mn | Mo |
|---|---|---|---|
| 0.06 | 0.03 | 1.20 | 0.50 |

## Mechanical Properties - (Typical)

| Heat Treatment | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-20°C) | Impact Strength (ISO-V/0°C) | Impact Strength (ISO-V/+20°C) | Elongation (($L_0=5d_0$) (%) |
|---|---|---|---|---|---|---|
| SR | min. 470 | 550 - 680 | min. 47 | 147 | 162 | min. 20 |
| AW | min. 470 | 550 - 680 | min. 47 | 102 | 158 | min. 20 |

SR: Stress Relieved (620 °C/1h furnace down to 300 °C / air), AW: As welded

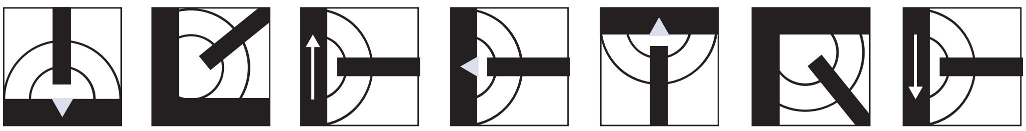
## Typical Base Material Grades

- DIN: HI, HII, 17Mn4, 19Mn5, 15Mo3, 16Mo3,
- EN: P 235 GH, P 265 GH, P 295 GH, 16 Mo 3, P 235 T1/T2-P355 N, L210-L485, S255-L460
- ASTM: A 161, A 204, A 302, Gr A plate, A335-P1 pipe

## Features and Applications

- Metal type flux-cored wire which provides a smooth arc, low spatter and good weldability.
- This type of electrode is commonly used in the fabrication and erection of boilers and pressure vessels.
- Typical applications include the welding of C-Mo steel base metals such as ASTM.
- High efficiency type for economic production environments and Mo-steels up to 500 $^0$C.
- Metal cored wire without slag primarily used with Argon/Carbon Dioxide shielding gas mixtures in the flat and horizontal-vertical positions, however, welds in other positions are also possible using the short-circuiting or pulsed arc modes of transfer.
- Fast freezing characteristics facilitate butt and fillet welding.
- Shielding gas: M21

## Welding Positions



## Current Type

FCAW D.C (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010500386 | Ø1.2 | Ø3/64 | 15 | D 320 |

**Approvals:** SEPRO, CE

# GeKa

## Heat Resisting Flux Cored TIG Welding Rod
# FC TIG-B2

### Standards

| | |
|---|---|
| TS EN ISO 21952-A | : W Z Cr Mo1Si |
| EN ISO 21952-A | : W Z Cr Mo1Si |
| AWS A5.28 | : E80C-B2(mod.) |

### Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Mo | Cr |
|---|---|---|---|---|
| 0.06 | 0.55 | 0.90 | 0.50 | 1.0 |

### Mechanical Properties - (Typical)

| **Heat Treatment** | **Yield Strength** (N/mm$^2$) | **Tensile Strength** (N/mm$^2$) | **Impact Strength** (ISO-V/-40°C) | **Elongation** (($L_0=5d_0$) (%) |
|---|---|---|---|---|
| 680°C / 2h | min. 355 | min. 550 | min. 47 J | min. 20 |

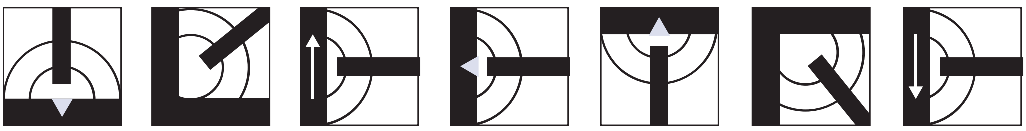
### Typical Base Material Grades

- 13CrMo4-5, 15CrMo5, 42CrMo4, 16CrMoV4, 25CrMo4, 24CrMo5, G22CrMo5-4, G17CrMo5-5

### Features and Applications

- Recommended for welding of Cr-Mo alloyed steels which are used for the production of boilers, tubes, pipes and nitride steels
- Weld metal is resistant to temperatures up to +570°C
- Suitable for step-cooling applications
- Shielding Gas: 100% Argon

### Welding Positions



### Current Type

TIG D.C (-)

### Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Weight** (Kg) |
|---|---|---|---|
| 3010600001 | 2.40x1000 | 3/32x39” | 5 |

**Approvals:** CE, SEPRO

GeKa

Rutile Type Flux Cored Wire

# ELCOR R CrMo1

## Standards

| | |
|---|---|
| TS EN ISO 17634-A | : T CrMo1 R C 2 |
| EN ISO 17634-A | : T CrMo1 R C 2 |
| AWS A5.29 | : E81 T1-B2C |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Cr | Mo |
|---|---|---|---|---|
| 0.06 | 0.50 | 1.20 | 1.20 | 0.50 |

## Mechanical Properties - (Typical): (With M21 gas)

| Heat Treatment | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (RT) | Elongation (($L_0=5d_0$) (%) |
|---|---|---|---|---|
| 680°C / 1h | min. 460 | 550 - 690 | min. 80 J | min. 19 |
| 920°C / 30 min. | min. 320 | 450 - 550 | min. 100 J | min. 26 |

**RT:** room temperature

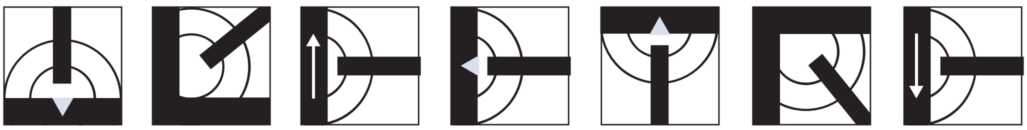
## Typical Base Material Grades

- DIN: 13 CrMo 44, 24 CrMo 5
- Cast Steels: GS 17CrMo55, GS 22CrMo54, G17CrMo5-5, G22CrMo5-4
- EN: 13 CrMo 4-5, G 17 CrMo 5-5, G 22 CrMo 5-4
- ASTM: A 182, A 387, A217, A 387 Gr. 11-12

## Features and Applications

- Rutile type flux-cored wire
- Typical applicatins are vessel and steel construction, mechanical engineering and pipe work
- Good arc restriking even with cold wire tip, suitable for robot applications
- Multi-pass welding without in-between cleaning
- Ideal for use in the field short arc and spray arc
- Excellent gap bridging for root welding
- High-effeciency type for economic production environments
- Shielding gas: $CO_2$

## Welding Positions



## Current Type

D.C (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010500121 | 1.20 | 0.047” | 15 | BS 300 |

**Approvals:** CE, SEPRO

# ELCOR R CrMo 2

## Standards

| | |
|---|---|
| TS EN ISO 17634-A | : T CrMo2 R C 1 /T CrMo2 R M 1 |
| EN ISO 17634-A | : T CrMo2 R C 1 /T CrMo2 R M 1 |
| AWS A5.29 | : E 91T1 - B3C/B3M |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Cr | Mo |
|---|---|---|---|---|
| 0.05 | 0.45 | 1.00 | 2.40 | 1.00 |

## Mechanical Properties - (Typical)

| Heat Treatment | Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Impact Strength (ISO-V/+20°C) | Elongation ($(L_o=5d_o)$) (%) |
|---|---|---|---|---|
| 690°C / 1h | min. 540 | 620 - 760 | min. 47 J | min. 18 |

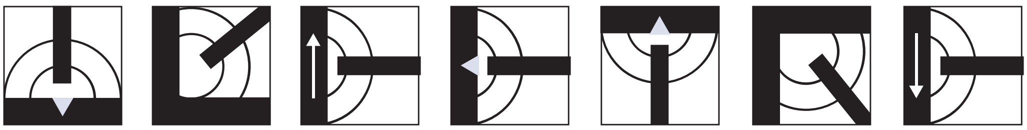
## Typical Base Material Grades

- 2.25% Cr - 1% Mo steels such as ASTM A387 or P21/P22 pipes.

## Features and Applications

- Rutile type flux cored wire for all position welding
- Excellent weldability for vertical up position (PG) and overhead fillet (PD) position
- Good arc stability and weldability
- Shielding gas: 100% $CO_2$ or Ar+$CO_2$ mix

## Welding Positions



## Current Type

FCAW D.C (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010500387 | 1.20 | 0.047” | 15 | BS 300 |

**Approvals:** SEPRO, CE

GeKa®

Stainless Steel Flux Cored Wire

# ELOXCOR S 307

## Standards

| | |
|---|---|
| TS EN ISO 17633-A | : T 18 8 Mn P M21/C1 1 |
| EN ISO 17633-A | : T 18 8 Mn P M21/C1 1 |
| AWS A5.22 | : E307T1-1/-4 (mod.) |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.10 | 0.70 | 6.00 | 19.0 | 9.0 |

## Mechanical Properties - (Typical): (With M21 gas)

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20°C) | Elongation (($L_0=5d_0$) (%) |
|---|---|---|---|
| 480 | 630 | 50 J | 40 |

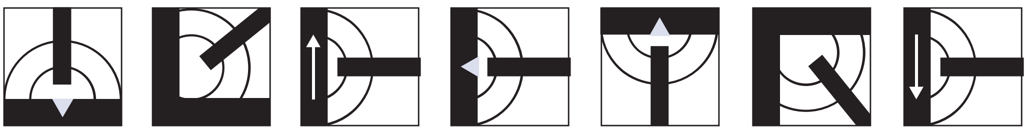
## Typical Base Material Grades

- High-strength low alloyed and alloyed heat-treatable steels, armor steels, steels including 14 % Mn, ferritic chromium steels, heat-resistaant steels, non-magnetic steels, dissimalar joints and repair welding.

## Features and Applications

- ELOXCOR S 307 is rutile fast freezing type flux cored wire
- Work-hardening austenitic deposit in CrNiMn steel modified type 307
- Dissimilar joint, welding of steels of unknown types, armouring steels, buffering joining of 14 %Mn austenitic steels
- Service temperatures from -120°C to +300°C
- Shielding Gas: $CO_2$ or M21

## Welding Positions



## Current Type

D.C (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 6011100006 | 1.20 | 0.047” | 15 | D 300 |

**Approvals:** CE, SEPRO

# Stainless Steel Flux Cored Wire
# ELOXCOR S 308 L

## Standards

| | |
|---|---|
| TS EN ISO 17633-A | : T 19 9 L P M21/C1 1 |
| EN ISO 17633-A | : T 19 9 L P M21/C1 1 |
| AWS A5.22 | : E 308 L T1-1/-4 |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.03 | 0.70 | 1.40 | 20.0 | 10.5 |

## Mechanical Properties - (Typical): (With M21 gas)

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-196°C) | Elongation (($L_o=5d_o$) (%) |
|---|---|---|---|
| 460 | 620 | 34 J | 36 |

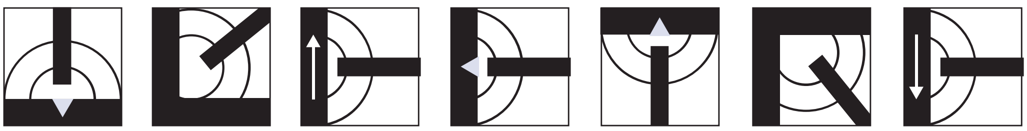
## Typical Base Material Grades

- (1.4306) X2CrNi19-11, (1.4301) X5CrNi18-10, (1.4311) X2 CrNiN 18-10, (1.4312) GX10CrNi18-8)
- AISI 304-304L-304LN, 302, 321-347, ASTM: A 157, Gr C9, A 320 Gr B8C or D

## Features and Applications

- Rutile type, rapid hardening flux cored wire
- Weld metal structure is austenitic (CrNi alloyed, 308 type)
- Used in pharmaceutical, paper and food industry
- Ferritic stainless steel, high carbon 304 and stabilized 347 grades can be welded this wire
- Weld metal has resisting between -196°C and 400°C service temperature
- Shielding Gas: $CO_2$ or M21

## Welding Positions



## Current Type

FCAW / D.C (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 6011100255 | 1.20 | 0.047” | 15 | D 300 |

**Approvals:** ELOXCOR S 308 L ($CO_2$): DNV-GL, CE, SEPRO

# ELOXCOR S 309 L

## Standards

| | |
|---|---|
| TS EN ISO 17633-A | : T 23 12 L P M21/C1 1 |
| EN ISO 17633-A | : T 23 12 L P M21/C1 1 |
| AWS A5.22 | : E309L T1-1/-4 |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Cr | Ni |
|---|---|---|---|---|
| 0.03 | 0.70 | 1.40 | 23.5 | 13.0 |

## Mechanical Properties - (Typical): (With M21 gas)

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-60°C) | Elongation (($L_o=5d_o$) (%) |
|---|---|---|---|
| 460 | 580 | 40 J | 35 |

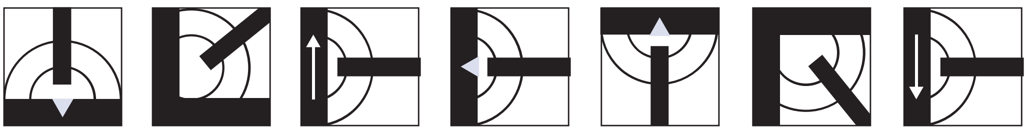
## Typical Base Material Grades

- High-strength unalloyed and heat-treatable steels, ferritic Cr and austenitic CrNi steels, austenitic Mn steels, unalloyed tempered steels, tool steels, hard mangenese steels, ferritic chromium steels, austenitic nickel-chromium steels, hard-to-weld steels, similar-type austenititic steels, dissimilar metals, joining of corrosion resistant stainless steel with mild or low alloy steels, clad steels.

## Features and Applications

- ELOXCOR S 309L is rutile fast freezing type flux cored wire
- Austenitic-ferritic deposit in over-alloyed CrNi steel type 309L, with optimised ferrite content for joining dissimilar metals
- Joining of steels with similar compositions and joining carbon steels to Stainless steels
- Buffering before cladding. Service temperatures from - 60°C to + 350°C
- Shielding Gas: $CO_2$ or M21

## Welding Positions



## Current Type

D.C (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 6011100256 | 1.20 | 0.047” | 15 | D 300 |

**Approvals:** ELOXCOR S 309 L ($CO_2$): DNV-GL, SEPRO, CE

# ELOXCOR S 316 L

## Standards

| | |
|---|---|
| TS EN ISO17633-A | : T Z 19 12 3 L P M21/C1 1 |
| EN ISO 17633-A | : T Z 19 12 3 L P M21/C1 1 |
| AWSAS.22 | : E316LT1-1/-4 |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Cr | Ni | Mo |
|---|---|---|---|---|---|
| 0.03 | 0.80 | 1.40 | 19.0 | 12.0 | 2.10 |

## Mechanical Properties - (Typical): (With M21 gas)

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-110°C) | Elongation (($L_0=5d_0$) (%) |
|---|---|---|---|
| 490 | 600 | 35 J | 32 |

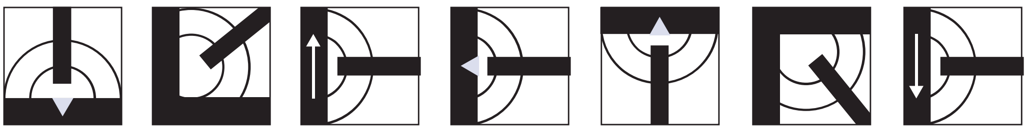
## Typical Base Material Grades

- (1.4401) X5CrNiMo 17-12-2, (1.4404) X2CrNiMo 17-12-2, (1.4435) X2CrNiMo 18-14-3, (1.4436) X3 CrNiMo 17- 13-3, (1.4571) X6 CrNiMoTi 17-12-2, (1.4580) X6 CrNiMoNb 17-12-2, (1.4583) X10 CrNiMoNb 18-12, (1.4409) GX2 CrNiMo 19-11-2
- AISI 316 L, 316 Ti, 316 Cb

## Features and Applications

- Rutile type, rapid hardening flux cored wire
- Weld metal microstructure is austenite (CrNiMo alloyed, 316 type)
- Used in welding of high carbon and stabilized 316 grade steels, low carbon 316 L grade stainless steels, food, pharmaceutral, chemical dye and machinery and equipment industries
- Weld metal has resisting between -110°C and 400°C service temperature
- Shielding Gas: $CO_2$ or M21

## Welding Positions



## Current Type

FCAW / D.C (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 6011100257 | 1.20 | 0.047" | 15 | D 300 |

**Approvals:** ELOXCOR S 316 L ($CO_2$): DNV-GL, SEPRO, CE

GeKa®

Stainless Steel Flux Cored Wire

# ELOXCOR S 2209

## Standards

| | |
|---|---|
| TS EN ISO 17633-A | : T 22 9 3 N L P M21/C 1 1 |
| EN ISO 17633-A | : T 22 9 3 N L P M21/C 1 1 |
| AWS A5.22 | : E 2209 T1-1/-4 |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Cr | Ni | Mo | N |
|---|---|---|---|---|---|---|
| 0.03 | 0.80 | 1.40 | 23.0 | 9.0 | 3.20 | 0.14 |

## Mechanical Properties - (Typical): (With M21 gas)

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/-60°C) | Elongation (($L_0=5d_0$) (%) |
|---|---|---|---|
| 630 | 780 | 32 J | 28 |

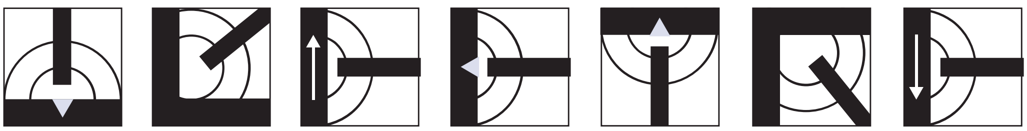
## Typical Base Material Grades

- (1.4462) X2CrNiMoN 22-5-3, (1.4362) X2 CrNiN 23-4, UNS S31803, S32205, J92295, S31500, S32304, S32404

## Features and Applications

- Rutile type and rapid hardening flux cored wire
- Weld metal microstructure is austenite - ferritic
- The weld metal has an excellent resistance to stress corrosion, cracking and pitting
- Used in duplex stainless steel and similar materials
- Shielding Gas: $CO_2$ or M21

## Welding Positions



## Current Type

FCAW / D.C (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 6011100254 | 1.20 | 0.047” | 15 | D 300 |

**Approvals:** ELOXCOR S 2209: CDNV-GL, NK, RINA, SEPRO, CE

Submerged Arc Welding Wire for Hardfacing

# SUBCOR 41 NiMo - LH

## Standards

| |
|---|
| AWS A5.23 : ~ EC 410 NiMo |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Cr | Ni | Mo | V |
|---|---|---|---|---|---|---|
| 0.07 | 0.35 | 1.50 | 12.5 | 2.2 | 1.0 | 0.2 |

## Mechanical Properties

| Hardness (HV) | |
|---|---|
| Single Pass | 3 Pass |
| 350 | 400 |

## Typical Base Material Grades

- Applicability in welding of martensitic and martensitic-ferritic materials used in toolsof rolling forging and steel casting operations. Continuous casting rollers particularly or iron-steel productions plants, relays, rolls, valves, used in gas/water/steam environments, flanges, compressons.

## Features and Applications

- A tubular wire for submerged arc welding of martensitic stainless steels
- Good resistance to corrosion and thermal fatigue
- It used with GeKa ELIFLUX BSS-F flux for surfacing continuous casting, rollers
- Weld metals of martensitic micro-structure
- It is used in combination with GeKa ELIFLUX BSS-F

## Resistance Type and Level

| Friction | High Temp. | Corrosive | Machining |
|---|---|---|---|
| ■■■□ | ■■■■ | ■■■■ | ■■■■ |
| Impact | Thermo Shock | Crack Resistance | |
| ■■■□ | ■■■■ | ■■■■ | |

## Current Type

D.C (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Package Weight (Kg) |
|---|---|---|---|
| 3010700005 | 2.40 | 3/32 | 25 |
| 3010700006 | 2.80 | 7/64 | 200 |

**Approvals:** SEPRO

Submerged Arc Welding Wire for Hardfacing

# SUBCOR 41 NiMo - MH

## Standards

| |
|---|
| AWS A5.23 : ~ EC 410 NiMo |

## Chemical Composition of Weld Metal (Typical)

| C | Si | Mn | Cr | Ni | Mo | V | Nb |
|---|---|---|---|---|---|---|---|
| 0.13 | 1.00 | 2.00 | 12.5 | 2.5 | 1.0 | 0.2 | 0.15 |

## Mechanical Properties

| Hardness (HRC) | |
|---|---|
| Single Pass | 3 Pass |
| 40 | 45 |

## Typical Base Material Grades

- Applicability in welding of martensitic and martensitic-ferritic materials used in toolsof rolling forging and steel casting operations. Continuous casting rollers particularly or iron-steel productions plants, relays, rolls, valves, used in gas/water/steam environments, flanges, compressons

## Features and Applications

- A tubular wire for submerged arc welding of martensitic stainless steels
- Good resistance to corrosion and thermal fatigue
- It used with GeKa ELIFLUX BSS-F flux for surfacing continuous casting, rollers
- Weld metals of martensitic micro-structure
- It is used in combination with GeKa ELIFLUX BSS-F

## Resistance Type and Level

| Friction | High Temp. | Corrosive | Machining |
|---|---|---|---|
| ■■■□ | ■■■■ | ■■■■ | ■■■■ |
| **Impact** | **Thermo Shock** | **Crack Resistance** | |
| ■■■□ | ■■■■ | ■■■■ | |

## Current Type

D.C (+)

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Package Weight (Kg) |
|---|---|---|---|
| 3010700007 | 2.40 | 3/32 | 200 |

**Approvals:** SEPRO

GeKa®

# Submerged Arc Welding Wire for Hardfacing
# SUBCOR 430

## Standards

| | |
|---|---|
| TS EN 14700 | : T Fe 7 |
| EN 14700 | : T Fe 7 |

## Chemical Composition of Weld Metal (Typical)

| C | Cr | Mn | Si |
|---|---|---|---|
| 0.05 | 17.0 | 2.0 | 0.7 |

## Mechanical Properties

| **Hardness (HV)** 3 Pass |
|---|
| 200 |

## Features and Applications

- %17 Chromium ferritic stainless steel deposit
- It is used for buffer layers before hardfacing of SUBCOR 41 NiMo LH and MH
- High resistant to combination of high temperature, corrosion and adhesive / friction wear
- Application; rolls, contionous casting rolls, shafts.It is using with submerged arc flux of Geka ELIFLUX BSS-F
- It is used in combination with GeKa ELIFLUX BSS-F

## Resistance Type and Level

Friction

High Temp.

Corrosive

Machining

Impact

Thermo Shock

Crack Resistance

## Current Type

D.C (+)

## Operating Data

| **Product Code** | **Diameter** (mm) / (inch) | | **Package Weight** (Kg) |
|---|---|---|---|
| 3010700001 | 2.40 | 3/32 | 25 |
| 3010700002 | 2.40 | 3/32 | 200 |

**Approvals:** SEPRO

## Standards

| | |
|---|---|
| TS EN ISO 14171-A | : S1 |
| EN ISO 14171-A | : S1 |
| AWS A5.17 | : EL 12 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cu |
|---|---|---|---|
| 0.08 | 0.10 | 0.50 | <0.30[1] |

1:copper-plated

## Mechanical Properties

| Submerged Arc Flux | AWS A5.17 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C | -30°C |
| ELIFLUX BAR | F6 AZ-EL 12 | 360 | 460 | 26 | 47 | --- | --- |
| ELIFLUX BFB | F6 A2-EL 12 | 380 | 480 | 28 | --- | 55 | 47 |
| ELIFLUX BMS | F6 AZ-EL 12 | 395 | 475 | 24 | 38 | --- | --- |
| ELIFLUX BBR-AG | F6 A0-EL 12 | 370 | 480 | 30 | 60 | 50 | --- |

## Chemical Compositon of Weld Metal - % ( Typical)

| Submerged Arc Flux | C | Si | Mn |
|---|---|---|---|
| ELIFLUX BAR | 0.07 | 0.50 | 1.10 |
| ELIFLUX BFB | 0.06 | 0.25 | 1.20 |
| ELIFLUX BMS | 0.05 | 0.80 | 1.10 |
| ELIFLUX BBR-AG | 0.06 | 0.30 | 0.90 |

## Typical Base Material Grades

- Structural Steels: S185-S235JR
- Pipe Steels: S275N
- Boiler Steels: P235GH
- Ship-Construction Steels: A, B, D
- Fine-grained Steels: P275N, S355N

## Features and Applications

- Copper-coated wire.
- Applicability in welding of steel constructions, pipes and tanks as well as in submerged arc welding of unalloyed structural steels and plates.

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400000 | 1.6 | 1/16 | 25 | K 435<br>*BIG PACK<br><br>* Packaging alternatives according to the order; 30 - 350 - 550 - 1000 Kg |
| 3010400001 | 2.0 | 5/64 | 25 | |
| 3010400002 | 2.4 | 3/32 | 25 | |
| 3010400003 | 3.2 | 1/8 | 25 | |
| 3010400004 | 4.0 | 5/32 | 25 | |
| 3010400005 | 5.0 | 3/16 | 25 | |

**Approvals:** S1 x ELIFLUX BAR · BV, DNV-GL, TL, ABS, LR, CE, SEPRO S1: TSE, CE SEPRO

1) Copper Coated

## Standards

| | |
|---|---|
| TS EN ISO 14171-A | : S2 |
| EN ISO 14171-A | : S2 |
| AWS A5.17 | : EM 12 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cu |
|---|---|---|---|
| 0.12 | 0.10 | 1.0 | <0.30[1] |

1:copper-plated

## Mechanical Properties

| Submerged Arc Flux | AWS A5.17 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C | -30°C | -40°C |
| ELIFLUX BAR | F6 AZ-EM 12<br>F6 PZ-EM 12 | 400 | 500 | 30 | 60 | --- | --- | --- |
| ELIFLUX BFB | F7 A4-EM 12 | 460 | 525 | 30 | --- | 70 | 55 | 50 |
| ELIFLUX BFF | F7 A4-EM 12 | 410 | 520 | 24 | --- | --- | 70 | 60 |
| ELIFLUX BBR-AG | F7 A2 EM12 | 410 | 490 | 32 | 50 | 50 | 50 | --- |
| ELIFLUX BMS | F6 A0-EM 12 | 390 | 485 | 30 | --- | 69 | --- | --- |
| ELIFLUX PIPE | F7 A4-EM 12 | 460 | 550 | 26 | --- | 75 | --- | 50 |
| ELIFLUX BAB-S | F7 A4-EM 12 | 430 | 525 | 29 | --- | --- | --- | 60 J |

## Chemical Compositon of Weld Metal - % (Typical)

| Submerged Arc Flux | C | Si | Mn |
|---|---|---|---|
| ELIFLUX BAR | 0.07 | 0.60 | 1.35 |
| ELIFLUX BFB | 0.07 | 0.35 | 1.50 |
| ELIFLUX BFF | 0.05 | 0.20 | 1.00 |
| ELIFLUX BBR-AG | 0.10 | 0.35 | 1.20 |
| ELIFLUX BMS | 0.04 | 0.45 | 1.27 |
| ELIFLUX PIPE | 0.07 | 0.40 | 1.35 |

## Typical Base Material Grades

- Structural Steels: S355JR
- Pipe Steels: L360
- Boiler Steels: P295GH, P 355 GH
- Ship-Construction Steels: A, B, D, E
- Fine-grained steels: P355N, S355N

## Features and Applications

- Applicability in welding of steel construction, pipe manufacturing, pressure vessels, structural steels and ship plates, general structural steels with tensile strength up to 500 $N/mm^2$ and unalloyed or medium strength stee

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400033 | 1.6 | 1/16 | 25 | K 435<br>*BIG PACK |
| 3010400034 | 2.0 | 5/64 | 25 | |
| 3010400035 | 2.4 | 3/32 | 25 | |
| 3010400036 | 3.2 | 1/8 | 25 | |
| 3010400037 | 4.0 | 5/32 | 25 | |
| 3010400038 | 5.0 | 3/16 | 25 | * Packaging alternatives according to the order; 30 - 350 - 550 - 1000 Kg |

**Approvals: S2:** CE, TSE, DB, SEPRO • **S2 x ELIFLUX BAR:** BV, ABS, CE, DB, SEPRO• **S2 x ELIFLUX BAB-S:** ABS, CE, SEPRO
**S2 x ELIFLUX BFB:** TL, DNV-GL, BV, ABS, LR, RS, NK, RINA, TÜV, CE, DB, SEPRO
**S2 x ELIFLUX BMS:** BV, ABS, CE

# S2Si

## Standards

| | |
|---|---|
| TS EN ISO 14171-A | : S2 Si |
| EN ISO 14171-A | : S2 Si |
| AWS A5.17 | : EM 12 K |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cu |
|---|---|---|---|
| 0.10 | 0.25 | 1.0 | <0.30[1] |

1:copper-plated

## Mechanical Properties

| Submerged Arc Flux | AWS A5.17 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | -20°C | -30°C | -40°C |
| ELIFLUX BFB | F7A2-EM12K<br>F7P2-EM12K | 430 | 530 | 28 | 80 | 70 | --- |
| ELIFLUX BFF | F7A4-EM12K<br>F7P4-EM12K | 450 | 540 | 23 | --- | --- | 65 |
| ELIFLUX BAB-S | F7A4-EM12K | 440 | 550 | 28 | 100 | --- | 65 |
| ELIFLUX BBR-AG | F7A0-EM12K | 420 | 510 | 29 | 50 | --- | --- |

## Chemical Compositon of Weld Metal - % ( Typical)

| Submerged Arc Flux | C | Si | Mn |
|---|---|---|---|
| ELIFLUX BFB | 0.05 | 0.40 | 1.70 |
| ELIFLUX BFF | 0.06 | 0.30 | 1.10 |
| ELIFLUX BAB-S | 0.07 | 0.45 | 1.60 |
| ELIFLUX BBR-AG | 0.07 | 0.40 | 1.30 |

## Typical Base Material Grades

- Structural Steels: S355JR
- Pipe Steels: L360
- Boiler Steels: P295GH, P 355 GH
- Ship-Construction Steels: A, B, D, E

## Features and Applications

- Applicability in submerged arc welding of steel materials with medium or high levels of tensile strength
- Usability in manufacture processes of pressure vessels, boilers, pipes, ship and other steel construction purposes
- Decreased affinity to Oxygen due to high content of Silicon
- Increased electric conductivity, and increased resistance to corrosion due to copper coating

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400071 | 2.0 | 5/64 | 25 | K 435<br>*BIG PACK<br><br>* Packaging alternatives according to the order; 30 - 350 - 550 - 1000 Kg |
| 3010400072 | 2.4 | 3/32 | 25 | |
| 3010400073 | 3.2 | 1/8 | 25 | |
| 3010400074 | 4.0 | 5/32 | 25 | |
| 3010400075 | 5.0 | 3/16 | 25 | |

**Approvals:** **S2Si:** TSE, CE, SEPRO, DB • **S2Si x ELIFLUX BFF:** BV, ABS, CE
**S2Si x ELIFLUX BFB:** ABS, LR, BV, CE

GeKa

Submerged Arc Welding Wire

# S2Mo

## Standards

| | |
|---|---|
| TS EN ISO 14171-A | : S2 Mo |
| EN ISO 14171-A | : S2 Mo |
| AWS A5.23 | : EA2 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Cu |
|---|---|---|---|---|
| 0.12 | 0.10 | 1.0 | 0.5 | <0.30[1] |

1:copper-plated

## Mechanical Properties

| Submerged Arc Flux | AWS A5.23 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | |
|---|---|---|---|---|---|---|
| | | | | | -20°C | -40°C |
| ELIFLUX BFB | F8A4-EA2-A2 | 490 | 600 | 26 | 90 | 60 |
| ELIFLUX BFF | F8A4-EA2-A2<br>F8P5-EA2-A2 | 480 | 570 | 27 | --- | 70 |
| ELIFLUX BAB-S | F8A4-EA2-A3 | 500 | 600 | 26 | --- | 60 |
| ELIFLUX PIPE | F7 A4-EA2-A4 | 510 | 640 | 25 | --- | 60 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Submerged Arc Flux | C | Si | Mn | Mo |
|---|---|---|---|---|
| ELIFLUX BFB | 0.06 | 0.40 | 1.40 | 0.50 |
| ELIFLUX BFF | 0.07 | 0.25 | 1.15 | 0.45 |
| ELIFLUX BAB-S | 0.07 | 0.55 | 1.70 | 0.50 |
| ELIFLUX PIPE | 0.06 | 0.40 | 1.40 | 0.50 |

## Typical Base Material Grades

- Pipe Steels: L485MB(X70)
- Boiler Steels: 16Mo3, P355 GH
- Fine-grained Steels: S460N, P460N

## Features and Applications

- Specific applicability in welding high-strength low-alloyed steels and creep-resisting steels
- Weld metal of 1/2 Mo-alloy with resistance to creep at high-temperature applications
- Serviceability at temperatures of values up to 500°C

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400140 | 2.0 | 5/64 | 25 | K 435<br>*BIG PACK<br>* Packaging alternatives according to the order; 30 - 350 - 550 - 1000 Kg |
| 3010400141 | 2.4 | 3/32 | 25 | |
| 3010400142 | 3.2 | 1/8 | 25 | |
| 3010400143 | 4.0 | 5/32 | 25 | |
| 3010400144 | 5.0 | 3/16 | 25 | |

**Approvals: S2Mo x ELIFLUX BFB:** BV, ABS, CE • **S2Mo:** TSE, CE, DB, SEPRO
**S2Mo x ELIFLUX BFF:** DNV-GL, BV, ABS, CE • **S2Mo x ELIFLUX BAB-S:** ABS, CE

# S2Mo TiB

## Standards

| | |
|---|---|
| TS EN ISO 26304 | : S Z |
| EN ISO 26304 | : S Z |
| AWS A5.23 | : EA2TiB |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | B | Ti |
|---|---|---|---|---|---|
| 0.08 | 0.15 | 1.10 | 0.55 | 0.015 | 0.15 |

## Mechanical Properties

| Submerged Arc Flux | AWS A5.23 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C | -30°C |
| ELIFLUX BFF | F8A0-EG-G | 550 | 650 | 21 | 60 | 45 | --- |
| ELIFLUX BFB | F9A2-EG-G | 580 | 660 | 28 | --- | --- | 60 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Submerged Arc Flux | C | Si | Mn | Mo | Ti |
|---|---|---|---|---|---|
| ELIFLUX BFF | 0.06 | 0.65 | 1.85 | 0.50 | 0.06 |
| ELIFLUX BFB | 0.06 | 0.50 | 1.70 | 0.50 | 0.06 |

## Typical Base Material Grades

- Pipe steels: L485MB(X70)
- Boiler steels: 16Mo3
- Fine-grained steels: S460N, P460N

## Features and Applications

- Specific applicability in welding high-strength low-alloyed steels and creep-resisting steels
- Serviceability at temperatures of values up to 500°C

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400236 | 2.4 | 3/32 | 25 | K 435 *BIG PACK |
| 3010400237 | 3.2 | 1/8 | 25 | |
| 3010400238 | 4.0 | 5/32 | 25 | |

* Packaging alternatives according to the order; 30 - 350 - 550 - 1000 Kg

**Approvals:** S2 Mo TiB: CE, SEPRO

GeKa

# Submerged Arc Welding Wire
# S3Si

## Standards

| | |
|---|---|
| TS EN ISO 14171-A | : S3 Si |
| EN ISO 14171-A | : S3 Si |
| AWS A5.17 | : EH 12 K |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Cu |
|---|---|---|---|
| 0.10 | 0.30 | 1.70 - 1.80 | <0.30[1] |

1:copper-plated

## Mechanical Properties

| Submerged Arc Flux | AWS A5.17 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | |
|---|---|---|---|---|---|---|
| | | | | | 0°C | -40°C |
| ELIFLUX BFF | F7A4-EH 12K | 490 | 580 | 26 | 100 | 70 |
| ELIFLUX BFB | F7A4-EH 12K | 460 | 550 | 27 | --- | 60 |
| ELIFLUX BAB-S | F7A4-EH 12K | 545 | 645 | 26 | --- | 60 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Submerged Arc Flux | C | Si | Mn |
|---|---|---|---|
| ELIFLUX BFF | 0.10 | 0.35 | 1.65 |
| ELIFLUX BFB | 0.07 | 0.40 | 1.80 |
| ELIFLUX BAB-S | 0.07 | 0.60 | 1.70 |

## Typical Base Material Grades

- Fine-grained Steels: S460N, P460N

## Features and Applications

- Inclusion of high contents of Mn-Si alloy
- Applicability in submerged arc welding processes of medium- and high-strength structural steels and of steels in offshore structures

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400110 | 2.0 | 5/64 | 25 | K 435<br>*BIG PACK<br>* Packaging alternatives according to the order; 30 - 350 - 550 - 1000 Kg |
| 3010400111 | 2.4 | 3/32 | 25 | |
| 3010400112 | 3.2 | 1/8 | 25 | |
| 3010400113 | 4.0 | 5/32 | 25 | |
| 3010400114 | 5.0 | 3/16 | 25 | |

**Approvals:** **S3 Si x ELIFLUX BFF:** BV, ABS, CE • **S3 Si:** CE, TSE, SEPRO •**S3 Si x ELIFLUX BAB-S:** ABS, CE

# Submerged Arc Welding Wire
# S3Mo

## Standards

| | |
|---|---|
| TS EN ISO 14171-A | : S3 Mo |
| EN ISO 14171-A | : S3 Mo |
| AWS A5.23 | : EA4 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Cu |
|---|---|---|---|---|
| 0.10 | 0.15 | 1.50 | 0.50 | <0.30[1] |

1:copper-plated

## Mechanical Properties

| Submerged Arc Flux | AWSA5.23 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | |
|---|---|---|---|---|---|---|
| | | | | | 0°C | -40°C |
| ELIFLUX BFF | F8 A4-EA4-A4 | 540 | 630 | 27 | 110 | 65 |
| ELIFLUX PIPE | F8 A4-EA4-A4 | 530 | 620 | 25 | 100 | 50 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Submerged Arc Flux | C | Si | Mn | Mo |
|---|---|---|---|---|
| ELIFLUX BFF | 0.07 | 0.50 | 1.75 | 0.50 |
| ELIFLUX PIPE | 0.06 | 0.40 | 1.60 | 0.45 |

## Typical Base Material Grades

- Fine-grained Steels: S460N, P460N

## Features and Applications

- Suitability to high-quality welding of Mo-alloyed steels, boiler sheet steels, and fine-grained steels

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400176 | 2.4 | 3/32 | 25 | K 435 |
| 3010400178 | 4.0 | 5/32 | 25 | *BIG PACK |

* Packaging alternatives according to the order; 30 - 350 - 550 - 1000 Kg

**Approvals:** S3 Mo: TSE, CE, SEPRO

# S3 TiB

## Standards

| | |
|---|---|
| TS EN ISO 26304-A | : S Z |
| EN ISO 26304-A | : S Z |
| AWS A5.23 | : E-G |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Ti | B |
|---|---|---|---|---|
| 0.08 | 0.25 | 1.40 | 0.14 | 0.011 |

## Mechanical Properties

| Submerged Arc Flux | AWS A5.23 | Yield Strength (N/mm²) | Tensile Strength (N/mm²) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | |
|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C |
| ELIFLUX PIPE | F8A0-EG-G | 520 | 630 | 24 | 80 | 50 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Submerged Arc Flux | C | Si | Mn |
|---|---|---|---|
| ELIFLUX PIPE | 0.06 | 0.50 | 1.30 |

## Typical Base Material Grades

- Pipe Steels: X52, X56, X60, X65, X70, X80,
  L360MB, L385M, L415MB, L450MB, L485MB, L555MB

## Features and Applications

- Used in submerged arc welding of pipe steels
- It is suitable to use for multi and two run technique and applications with high toughness requirements

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400206 | 1.6 | 1/16 | 25 | K 435 *DRUM |
| 3010400207 | 2.0 | 5/64 | 25 | |
| 3010400208 | 2.4 | 3/32 | 25 | |
| 3010400209 | 3.2 | 1/8 | 25 | |
| 3010400210 | 4.0 | 5/32 | 25 | |
| 3010400211 | 5.0 | 3/16 | 25 | * Packaging alternatives according to the order; 400 - 600 Kg |

**Approvals:** S3 Mo: CE, SEPRO

# S3Mo TiB

## Standards

| | |
|---|---|
| TS EN ISO 26304-A | : S Z |
| EN ISO 26304-A | : S Z |
| AWS A5.23 | : E A 2 TiB (mod.) |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Ti | B |
|---|---|---|---|---|---|
| 0.08 | 0.25 | 1.20 | 0.52 | 0.14 | 0.011 |

## Mechanical Properties

| Submerged Arc Flux | AWS A5.23 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | |
|---|---|---|---|---|---|---|
| | | | | | 20°C | -20°C |
| ELIFLUX PIPE | F8A0-EA2TiB (mod.)-G | 545 | 680 | 26 | 100 | 60 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Submerged Arc Flux | C | Si | Mn | Mo |
|---|---|---|---|---|
| ELIFLUX PIPE | 0.06 | 0.60 | 1.50 | 0.40 |

## Typical Base Material Grades

- Pipe Steels: X52, X56, X60, X65, X70, X80,
  L360MB, L385M, L415MB, L450MB, L485MB, L555MB

## Features and Applications

- Wire for submerged arc welding of pipeline steels
- Optimized for multi-arc welding using two-runtechnique
- For applications with high toughness requirements

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400255 | 2.4 | 3/32 | 25 | K 435 *BIG PACK |
| 3010400256 | 3.2 | 1/8 | 25 | |
| 3010400257 | 4.0 | 5/32 | 25 | |

* Packaging alternatives according to the order; 30 - 350 - 550 - 1000 Kg

**Approvals:** CE, SEPRO

# Submerged Arc Welding Wire
# S3 NiMo1

## Standards

| | |
|---|---|
| TS EN ISO 26304-A | : S3 Ni1Mo |
| EN ISO 26304-A | : S3 Ni1Mo |
| AWS A5.23 | : EF3 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Ni |
|---|---|---|---|---|
| 0.12 | 0.20 | 1.75 | 0.55 | 0.90 |

## Mechanical Properties

| Submerged Arc Flux | AWS A5.23 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | |
|---|---|---|---|---|---|---|
| | | | | | -20°C | -40°C |
| ELIFLUX BFF | F9 A4-EF3-F3 | 580 | 650 | 21 | 100 | 60 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Submerged Arc Flux | C | Si | Mn | Mo | Ni |
|---|---|---|---|---|---|
| ELIFLUX BFF | 0.09 | 0.25 | 1.65 | 0.55 | 0.90 |

## Typical Base Material Grades

- Pipe Steels: X52, X56, X60, X65, X70, X80,
  L360MB, L385M, L415MB, L450MB, L485MB, L555MB
- Fine-grained Steels: S550QL1 S380N, S500N, S380NL, S500NL
- Pressure Steels: 20 MnMoNi5-5

## Features and Applications

- S3NiMo1 is a Nickel-Molybdenum-Alloyed, copper-coated wire designed for submerged arc welding of structural steels and higher tensile steels

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400273 | 2.4 | 3/32 | 25 | K 435 *BIG PACK |
| 3010400274 | 3.2 | 1/8 | 25 | |
| 3010400275 | 4.0 | 5/32 | 25 | |

* Packaging alternatives according to the order; 30 - 350 - 550 - 1000 Kg

**Approvals:** CE, SEPRO

# S3 NiCrMo 2.5

## Standards

| | |
|---|---|
| TS EN ISO 26304-A | : S 3 Ni2.5CrMo |
| EN ISO 26304-A | : S 3 Ni2.5CrMo |
| AWS A5.23 | : EM4 (mod.) |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|
| 0.11 | 0.17 | 1.40 | 0.55 | 2.40 | 0.70 |

## Mechanical Properties

| Submerged Arc Flux | AWS A5.23 | Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | -20°C | -40°C | -60°C |
| ELIFLUX BFF | F11A8-EM4 (mod.)-M4 | 740 | 850 | 20 | 90 | 85 | min.27 |
| ELIFLUX BAB-S | F11A4-EM4(mod.)-M4 | 735 | 855 | 18 | 70 | 60 | --- |

## Chemical Compositon of Weld Metal - % ( Typical)

| Submerged Arc Flux | C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|---|
| ELIFLUX BFF | 0.06 | 0.30 | 1.50 | 0.50 | 2.20 | 0.50 |
| ELIFLUX BAB-S | 0.05 | 0.65 | 1.80 | 0.48 | 2.05 | 0.35 |

## Typical Base Material Grades

- Fine-grained steels: S550QL1, S690QL1

## Features and Applications

- S3NiCrMo 2.5 is a CrNiMo alloyed, Copper-coated wire designed for submerged arc welding of high strength quenched, tempered structural steels and extra high tensile steels

## Operating Data

| Product Code | Diameter (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010400291 | 2.4 | 3/32 | 25 | K 435<br>*DRUM<br>* Packaging alternatives according to the order; 400 - 600 Kg |
| 3010400292 | 3.2 | 1/8 | 25 | |
| 3010400293 | 4.0 | 5/32 | 25 | |

**Approvals:** S3NiCrMo2.5: CE, SEPRO

## Mechanical Properties

| Submerded Arc Welding Wire | Submerded Arc Welding Wire Flux | Standards (AWS A5.9) | Tensile Strength (N/mm$^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | 0°C | -110°C | -196°C |
| ELOX UP 307 | ELIFLUX BSS-A | ER 307 | 620 | --- | --- | 37 | --- |
| ELOX UP 308L | ELIFLUX BSS-A | ER 308L | 555 | 42 | 72 | 48 | 41 |
| ELOX UP 309L | ELIFLUX BSS-A | ER 309L | 545 | 36 | --- | --- | --- |
| ELOX UP 316L | ELIFLUX BSS-A | ER 316L | 570 | 39 | 63 | 52 | 40 |
| ELOX UP 2209 | ELIFLUX BSS-D | ER 2209 | 830 | 32 | --- | --- | --- |
| ELOX UP 410 | ELIFLUX BSS-F | ER 410 | 530 | 25 | --- | --- | --- |
| ELOX UP 430 | ELIFLUX BSS-F | ER 430 | 460 | 20 | --- | --- | --- |

## Chemical Compositon of Weld Metal - % ( Typical)

| Product | Submerded Arc Welding Wire Flux | C | Si | Mn | Mo | Cr | Ni | P | S |
|---|---|---|---|---|---|---|---|---|---|
| ELOX UP 308L | ELIFLUX BSS-A | 0.030 | 0.53 | 1.55 | --- | 19.25 | 9.36 | 0.015 | 0.008 |
| ELOX UP 309L | ELIFLUX BSS-A | 0.028 | 0.42 | 1.65 | 0.55 | 24.25 | 13.16 | 0.014 | 0.009 |
| ELOX UP 316L | ELIFLUX BSS-A | 0.030 | 0.40 | 1.75 | 2.15 | 19.10 | 11.30 | 0.018 | 0.010 |
| ELOX UP 2209 | ELIFLUX BSS-D | 0.030 | 0.90 | 1.85 | 3.15 | 21.85 | 8.50 | 0.018 | 0.008 |
| ELOX UP 410 | ELIFLUX BSS-F | 0.110 | 0.31 | 0.39 | 0.13 | 13.20 | 0.37 | 0.028 | 0.010 |
| ELOX UP 430 | ELIFLUX BSS-F | 0.040 | 0.40 | 0.50 | 0.20 | 16.50 | 0.18 | 0.020 | 0.010 |

## Package Type

| Product | Product Code | Diameter (mm) | Weight (Kg) |
|---|---|---|---|
| ELOX UP 307 | 6011100384 | 2.4 | 25 |
| ELOX UP 308L | 6011100299 | 2.4 | 25 |
| | 6011100091 | 3.2 | 25 |
| ELOX UP 309L | 6011100300 | 2.4 | 25 |
| | 6011100301 | 3.2 | 25 |
| | 6011100302 | 4.0 | 25 |
| ELOX UP 316L | 6011100303 | 2.4 | 25 |
| | 6011100096 | 3.2 | 25 |
| ELOX UP 2209 | 6011100306 | 2.4 | 25 |
| | 6011100307 | 3.2 | 25 |
| ELOX UP 410 | 6011100304 | 4.0 | 25 |
| ELOX UP 430 | 6011100098 | 3.2 | 25 |
| | 6011100305 | 4.0 | 25 |

**Approvals:** CE, SEPRO
GeKa ELOX UP 2209 x ELIFLUX BSS-D: CE, NK

# ELIFLUX BAR

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA AR 1 77 AC |
| EN ISO 14174 | : SA AR 1 77 AC |
| AWS A5.17 | : F6AZ-EL12 / F7AZ-EM12 |

| Basicity |
|---|
| 0.7 |

## Mechanical Properties

| SAW Wire | AWS A5.17 | Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) |
|---|---|---|---|---|---|
| | | | | | 0°C |
| S1 | F6AZ-EL 12 | 360 | 460 | 26 | 47 |
| S2 | F7AZ-EM 12 | 400 | 500 | 30 | 60 |

## Chemical Compositon of Weld Metal - % ( Typical)

| SAW Wire | C | Si | Mn |
|---|---|---|---|
| S1 | 0.07 | 0.50 | 1.10 |
| S2 | 0.07 | 0.60 | 1.35 |

## Features and Applications

- A type of SAW rutile flux structured from agglomerated aluminate
- Applicability in single-pass joint welding and fillet welding of particularly spiral welded pipes, LPG cylinders, general-purpose construction steels, boiler sheet, and shipbuilding steels
- Low consumption of flux. Basicity: 0.7
- Straight and nonporous welding beads
- Formation of very easily-removed slag
- Requirement of re-drying at 250-350°C for 2 hours

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 3010800006 | 25 | Kraft Bag |

**Approvals:** **S1 x ELIFLUX BAR:** BV, DNV-GL, TL, ABS, LR, CE • **S2 x ELIFLUX BAR:** BV, ABS, CE, DB
**ELIFLUX BAR:** CE, SEPRO

# ELIFLUX BAS

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA AB 1 67 AC |
| EN ISO 14174 | : SA AB 1 67 AC |
| AWS A5.17 | : F7 A5-EM12 / F7A5-EM12K |

| Basicity |
|---|
| 1.60 |

## Mechanical Properties

| SAW Wire | AWS A5.17 | Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Elongation ((Lo=do) (%) | Impact Strength ISO-V(J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | 0°C | -40°C | -45°C |
| S2 | F7A5-EM 12 | 430 | 520 | 30 | 110 | 75 | min.47 |
| S2Si | F7A5-EM 12K | 465 | 570 | 30 | 100 | 85 | min.47 |

## Chemical Compositon of Weld Metal - % ( Typical)

| SAW Wire | C | Si | Mn |
|---|---|---|---|
| S2 | 0.05 | 0.30 | 1.40 |
| S2 Si | 0.06 | 0.40 | 1.40 |

## Features and Applications

- SAW flux type composed of agglomerated aluminate-basic
- Basicity: 1.6 (According to Boniszewski formula)
- Applicability in single and multi-pass welding of general-purpose construction steels
- Formation of easily-removed slag
- Requirement of re-drying at 300 - 350°C for 2 hours

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 3010800035 | 25 | Kraft Bag |

**Approvals:** CE, SEPRO

GeKa

Submerged Arc Welding Flux

# ELIFLUX BBR-AG

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA AB 1 67 AC H5 |
| EN ISO 14174 | : SA AB 1 67 AC H5 |
| AWS A5.17 | : F6AZ-EL12 / F7A0-EM12 |
| | F7A0-EM12K |

| Basicity |
|---|
| 1.1 |

## Mechanical Properties

| SAW Wire | AWS A5.17 | Yield Strength (N/mm²) | Tensile Strength (N/mm²) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | |
|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C |
| S1 | F6AZ-EL12 | 370 | 480 | 30 | 55 | --- |
| S2 | F7A0-EM12 | 410 | 490 | 32 | --- | 50 |
| S2Si | F7A0-EM12K | 420 | 510 | 29 | --- | 50 |

## Chemical Compositon of Weld Metal - % ( Typical)

| SAW Wire | C | Si | Mn |
|---|---|---|---|
| S1 | 0.06 | 0.30 | 0.90 |
| S2 | 0.10 | 0.35 | 1.20 |
| S2Si | 0.07 | 0.40 | 1.30 |

## Features and Applications

- Agglomerated aluminate-basic type welding flux.
- Especially suitable for singlepass joining and fillet welding of LPG cylinders, welded spiral pipes (with S2 combination up to X52 pipe), general constructions, steels, boiler plates and ship plates.
- The weld bead looks more like a rutile type weld bead.
- Easy removable slag.
- Before using: The welding flux should be dried 2h between 300°C - 350°C.

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 3010800026 | 25 | Kraft Bag |

**Approvals:** CE, SEPRO

# ELIFLUX BFB

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA AB 1 68 AC H5 |
| EN ISO 14174 | : SA AB 1 68 AC H5 |
| AWS A5.17 | : F6A2-EL12 / F7A4-EM12 / F7A2-EM12K / F7A4-EH12K |
| AWS A5.23 | : F8A4-EA2-A2 |

| Basicity |
|---|
| 1.4 |

## Mechanical Properties

| SAW Wire | AWS A5.17 / AWS A5.23 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | -20°C | -30°C | -40°C |
| S1 | F6A2-EL12 | 380 | 480 | 28 | 55 | 47 | --- |
| S2 | F7A4-EM 12 | 460 | 525 | 30 | 70 | 55 | 50 |
| S2 Si | F7A2-EM12K | 430 | 530 | 28 | 80 | 70 | --- |
| S3 Si | F7A4-EH12K | 460 | 550 | 27 | --- | --- | 60 |
| S2 Mo | F8A4-EA2-A2 | 490 | 600 | 26 | 90 | --- | 60 |

## Chemical Compositon of Weld Metal - % ( Typical)

| SAW Wire | C | Si | Mn | Mo |
|---|---|---|---|---|
| S1 | 0.06 | 0.25 | 1.20 | --- |
| S2 | 0.07 | 0.35 | 1.50 | --- |
| S2 Si | 0.05 | 0.40 | 1.70 | --- |
| S3 Si | 0.07 | 0.40 | 1.80 | --- |
| S2 Mo | 0.06 | 0.40 | 1.40 | 0.50 |

## Features and Applications

- A type of submerged welding (SAW) basic flux structured from agglomerated aluminate.
- Applicability in single-and multi-pass (butt-) joint welding and fillet welding of general-purpose construction steels, shipbuilding stell, boiler sheet, heat-resisting steels, and fine-grained steels.
- Low consumption of flux.
- Basicity: 1.4
- High toughness of weld metal at low temperatures.
- Formation of easily-removed slag.
- Requirement of re-drying at 300°C - 350°C for 2 hours.

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 3010800002 | 25 | Kraft Bag |

**Approvals:** **ELIFLUX BFB:** CE, SEPRO • **S2Si x ELIFLUX BFB:** ABS, LR, CE
**S2 x ELIFLUX BFB:** TL, DNV-GL, BV, ABS, LR, RS, NK, RINA, DB • **S2Mo x ELIFLUX BFB:** BV, ABS, CE

# ELIFLUX PIPE

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA AB 1 78 AC H5 |
| EN ISO 14174 | : SA AB 1 78AC H5 |
| AWS A5.17 | : F7A4-EM12 |
| AWSA5.23 | : F7A4-EA2-A2 / F8A4-EA4-A4 |

| Basicity |
|---|
| 1.7 |

## Mechanical Properties

| SAW Wire | AWS A5.17/ AWS A5.23 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C | -40°C |
| S2 | F7A4-EM 12 | 460 | 550 | 26 | --- | 75 | 50 |
| S2 Mo | F7A4 EA2-A4 | 510 | 640 | 25 | --- | --- | 60 |
| S3 Mo | F8A4-EA4-A4 | 530 | 620 | 25 | 100 | --- | 50 |

## Chemical Compositon of Weld Metal - % ( Typical)

| SAW Wire | C | Si | Mn | Mo |
|---|---|---|---|---|
| S2 | 0.05 | 0.40 | 1.35 | --- |
| S2 Mo | 0.06 | 0.40 | 1.40 | 0.50 |
| S3 Mo | 0.06 | 0.40 | 1.60 | 0.45 |

## Features and Applications

- SAW flux type composed of agglomerated aluminate Basic.
- Basicity of the flux According to Boniszewski Formula is 1.7
- Excellent removal of slags of weld beads formed at high temperatures
- Suitability for use in both bilateral and tandem (AC/DC) welding operations.
- Sufficiently high tougness of weld metals obtained particularly by 2-pass welding operations.
- Suitability for use in welding of high-strength steels.
- Process requirement of re-drying at 300°C - 350°C for 2 hours.

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 3010800019 | 25 | Kraft Bag |

**Approvals:** CE, SEPRO

# ELIFLUX BAB-S

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA AB 1 68 AC H5 |
| EN ISO 14174 | : SA AB 1 68 AC H5 |
| AWS A5.17 | : F7A4-EH12K/ F7A4-EM12<br>F7A4-EM12K |
| AWS A5.23 | : F8A4-EA2-A3 /<br>F11A4-EM4(mod)-M4 |

| Basicity |
|---|
| 2.1 |

## Mechanical Properties

| SAW Wire | AWS A5.17 AWS A5.23 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | -20°C | -30°C | -40°C |
| S2 | F7A4-EM12 | 430 | 525 | 29 | --- | --- | 60 |
| S2Si | F7A4-EM12K | 440 | 550 | 28 | 100 | --- | 65 |
| S2 Mo | F8A4-EA2-A3 | 500 | 600 | 26 | --- | --- | 60 |
| S3Si | F7A4-EH12K | 545 | 645 | 26 | --- | --- | 60 |
| S3NiCrMo2.5 | F11A4-EM4(mod)-M4 | 735 | 855 | 18 | --- | 70 | 60 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Saw Wire | C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|---|
| S2 | 0.08 | 0.40 | 1.50 | --- | --- | --- |
| S2 Si | 0.07 | 0.45 | 1.60 | --- | --- | --- |
| S2 Mo | 0.07 | 0.55 | 1.70 | 0.50 | --- | --- |
| S3 Si | 0.07 | 0.60 | 1.70 | --- | --- | --- |
| S3 NiCrMo 2.5 | 0.05 | 0.65 | 1.80 | 0.48 | 2.05 | 0.35 |

## Features and Applications

- SAW Flux type is composed of agglomerated Aluminate Basic.
- Weld beads of excellent surface appearance.
- Slag can be removed easily.
- This product has high current carrying capacity.
- GeKa ELIFLUX BAB-S is suitable for multipass and tandem welding especialy for manufacturing of spiral pipe.
- It has suitable of high working speed.
- Suitable for the use of welding of high strength steels.
- Process requirement of re-drying at 300°C - 350°C for 2 hours.

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 3010800022 | 25 | Kraft Bag |

**Approvals:** **ELIFLUX BAB-S:** CE, SEPRO • **S2 x ELIFLUX BAB-S:** CE, ABS • **S3Si x ELIFLUX BAB-S:** ABS
**S2Mo x ELIFLUX BAB-S:** ABS • **S3NiCrMo2.5 x ELIFLUX BAB-S:** ABS,

# ELIFLUX BFPP

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA AB 1 66 AC H5 |
| EN ISO 14174 | : SA AB 1 66 AC H5 |
| AWS A5.17 | : F7A2-EM12/F7A2-EM12K |
| AWS A5.23 | : F8A4-EA2-A2 |

| Basicity |
|---|
| 1.6 |

## Mechanical Properties

| SAW Wire | AWSA5.17 AWSA5.23 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | |
|---|---|---|---|---|---|---|
| | | | | | -30°C | -40°C |
| S2 | F7A2-EM 12 | 430 | 520 | 29 | 60 | --- |
| S2 Si | F7A2 EM12K | 440 | 515 | 30 | 65 | --- |
| S2 Mo | F8A4-EA2-A2 | 490 | 595 | 26 | --- | 60 |

## Chemical Compositon of Weld Metal - % ( Typical)

| SAW Wire | C | Si | Mn | Mo |
|---|---|---|---|---|
| S2 | 0.06 | 0.35 | 1.20 | --- |
| S2Si | 0.07 | 0.40 | 1.25 | --- |
| S2 Mo | 0.07 | 0.40 | 1.30 | 0.50 |

## Features and Applications

- GeKa ELIFLUX BFPP, is agglomerated aluminate basic flux for submerged arc welding
- It features high impact toughness and low hydrogen content
- It is suitable for double wire welding and narrow gap welding of thick steel plates and spiral welded pipes
- With suitable wires, also can be used for welding of pressure vessels
- Flux should be re-dried before use for 2 hours at 300°C - 350°C

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 6010800015 | 25 | Kraft Bag |

**Approvals:** SEPRO, CE

# ELIFLUX BFPV

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA FB 1 66 AC H5 |
| EN ISO 14174 | : SA FB 1 66 AC H5 |
| AWS A5.17 | : F7A2-EM12/F7A2-EM12K |
| AWS A5.23 | : F8A4-EA2-A2/F8A5-EA4-A3/ F11A8-EM4(mod)-M4 |

| Basicity |
|---|
| 2.8 |

## Mechanical Properties

| SAW Wire | AWS A5.17 AWS A5.23 | Yield Strength (N/mm²) | Tensile Strength (N/mm²) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | -30°C | -40°C | -50°C | -60°C |
| S2 | F7A2-EM12 | 430 | 520 | 29 | 60 | --- | --- | --- |
| S2 Si | F7A2-EM12K | 440 | 515 | 30 | 65 | --- | --- | --- |
| S2 Mo | F8A4-EA2-A2 | 490 | 595 | 26 | --- | 60 | --- | --- |
| S3Si | F8A5-EA4-A3 | 500 | 588 | 27 | --- | 100 | 80 | --- |
| S3NiCrMo2.5 | F11A8-EM4(mod.)-M4 | 700 | 775 | 23 | --- | 55 | 45 | min.27 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Saw Wire | C | Si | Mn | Mo | Cr | Ni |
|---|---|---|---|---|---|---|
| S2 | 0.06 | 0.35 | 1.20 | --- | --- | --- |
| S2 Si | 0.07 | 0.40 | 1.25 | --- | --- | --- |
| S2 Mo | 0.07 | 0.40 | 1.30 | 0.50 | --- | --- |
| S3 Mo | 0.05 | 0.30 | 1.75 | 0.50 | --- | --- |
| S3 NiCrMo 2.5 | 0.06 | 0.40 | 1.75 | 0.50 | 0.40 | 2.10 |

## Features and Applications

- GeKa ELIFLUX BFPV, high basic, is agglomerated fluoride basic flux for submerged arc welding.
- It features high impact toughness and low hydrogen content
- It is suitable for double wire welding and narrow gap welding of thick steel plates, pressure vessels
- Flux should be re-dried before use for 2 hours at 300°C - 350°C

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 6010800016 | 25 | Kraft Bag |

**Approvals:** SEPRO, CE

# ELIFLUX BFF

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA FB 1 65 DC H5 |
| EN ISO14174 | : SA FB 1 65 DC H5 |
| AWS A5.17 | : F7A4-EM12/F7A4-EM12K/ F7A4-EH12K |
| AWS A5.23 | : F8A4-EA2-A2/ F9A4-EF3(mod)-F3 / F11A8-EM4(mod)-M4 |

| Basicity |
|---|
| 3.0 |

## Mechanical Properties

| SAW Wire | AWS A5.17 AWS A5.23 | Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | -20°C | -30°C | -40°C | -60°C |
| S2 | F7A4-EM12 | 410 | 520 | 24 | --- | 70 | 60 | --- |
| S2 Si | F7A4-EM12K | 450 | 540 | 23 | --- | --- | 65 | --- |
| S2 Mo | F8A4-EA2-A2 | 480 | 570 | 27 | --- | --- | 70 | --- |
| S3 Si | F7A4-EH12K | 490 | 580 | 26 | --- | --- | 60 | --- |
| S3 NiMo1 | F9A4-EF3(mod)-F3 | 580 | 650 | 21 | 100 | --- | 60 | --- |
| S3NiCrMo2.5 | F11A8-EM4(mod.)-M4 | 740 | 850 | 20 | 90 | --- | 85 | min.27 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Saw Wire | C | Si | Mn | Mo | Ni | Cr |
|---|---|---|---|---|---|---|
| S2 | 0.05 | 0.20 | 1.00 | --- | --- | --- |
| S2 Si | 0.06 | 0.30 | 1.10 | --- | --- | --- |
| S2 Mo | 0.07 | 0.25 | 1.15 | 0.45 | --- | --- |
| S3 Si | 0.10 | 0.60 | 1.70 | --- | --- | --- |
| S3 NiMo 1 | 0.09 | 0.25 | 1.65 | 0.55 | 0.90 | --- |
| S3 NiCrMo 2.5 | 0.06 | 0.30 | 1.50 | 0.50 | 2.20 | 0.50 |

## Features and Applications

- This is fluoride-basic agglomerated flux
- This flux is suitable for welding high strength low alloy steels
- Prefable to use with wire electrodes having higher manganese level
- Recommended for multi-pass welding, in particular when there are high toughness requirement
- Process requirement of re-drying at 300°C - 350°C for 2 hours

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 3010800012 | 25 | Kraft Bag |

**Approvals: ELIFLUX BFF:** CE, SEPRO • **S2Si x ELIFLUX BFF:** BV, ABS, CE
**S3Si x ELIFLUX BFF:** BV,ABS, CE • **S2Mo x ELIFLUX BFF:** DNV-GL, BV, ABS, CE
**S3NiCrMo2.5 x ELIFLUX BFF:** ABS, CE

# ELIFLUX BMS

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA CS/MS 1 68 AC |
| EN IS014174 | : SA CS/MS 1 68 AC |
| AWS A5.17 | : F6A0-EM12 / F6AZ-EL12 |

| Basicity |
|---|
| 1.0 |

## Mechanical Properties

| SAW Wire | AWSA5.17 | Yield Strength (N/mm$^2$) | Tensile Strength (N/mm$^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | |
|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C |
| S1 | F6AZ-EL12 | 395 | 475 | 24 | 38 | --- |
| S2 | F6A0-EM12 | 390 | 485 | 30 | --- | 69 |

## Chemical Compositon of Weld Metal - % ( Typical)

| SAW Wire | C | Si | Mn |
|---|---|---|---|
| S1 | 0.05 | 0.80 | 1.10 |
| S2 | 0.04 | 0.45 | 1.27 |

## Features and Applications

- A type of SAW flux structured from agglomerated manganese silicate and calcium silicate
- Basicity of the flux according to Boniszewski formula is 1,0
- Weld beads of excellent surface appearance and with easily removed slags
- High resistance to porosity caused by oil and rust
- High capacity of current flow
- Suitability for use in 2-pass welding operations on thick materials (best choice for base metals in thicknesses of 10-40 mm)
- Requirement of re-drying at 250-350°C for 2 hours

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 3010800009 | 25 | Kraft Bag |

**Approvals:** S2 / ELIFLUX BMS: BV, ABS, CE    ELIFLUX BMS: CE, SEPRO

# ELIFLUX BSS-A

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA FB 2 65 DC |
| EN ISO 14174 | : SA FB 2 65 DC |

| Basicity |
|---|
| 2.45 |

## Mechanical Properties

| SAW Wire | Standards | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) | Impact Strength ISO-V(J) | | |
|---|---|---|---|---|---|---|
| | | | | 0°C | -110°C | -196°C |
| ELOX UP 307 | ER 307 | --- | --- | --- | --- | --- |
| ELOX UP 308L | ER 308 L | 550 | 41 | 70 | 50 | 40 |
| ELOX UP 309L | ER 309 L | 540 | 35 | --- | --- | --- |
| ELOX UP 316 L | ER 316 L | 570 | 39 | 60 | 50 | 40 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Saw Wire | C | Si | Mn | Mo | Cr | Ni | P | S |
|---|---|---|---|---|---|---|---|---|
| ELOX UP 307 | --- | --- | --- | --- | --- | --- | --- | --- |
| ELOX UP 308 L | 0.03 | 0.54 | 1.57 | | 19.20 | 9.30 | 0.018 | 0.009 |
| ELOX UP 309 L | 0.03 | 0.40 | 1.63 | 0.03 | 24.20 | 13.10 | 0.017 | 0.008 |
| ELOX UP 316 L | 0.03 | 0.40 | 1.73 | 2.13 | 19.00 | 11.20 | 0.025 | 0.008 |

## Features and Applications

- A type of fluoride basic flux for SAW
- General use in submerged welding of stainless steel materials
- Very high corrosion resistance
- Very good mechanical properties
- Formation of easily-removable slags
- Requirement of re-drying at 300-350°C for 2 hours

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 6010800014 | 25 | Kraft Bag |

**Approvals:** CE, SEPRO

GeKa

Submerged Arc Welding Flux

# ELIFLUX BSS-D

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA FB 2 65 DC |
| EN ISO 14174 | : SA FB 2 65 DC |

| Basicity |
|---|
| 2.45 |

## Mechanical Properties

| SAW Wire | AWS A5.9 | Tensile Strength ($N/mm^2$) | Elongation ((Lo=5do) (%) |
|---|---|---|---|
| ELOX UP 2209 | ER 2209 | 830 | 32 |

## Chemical Compositon of Weld Metal - % ( Typical)

| Saw Wire | C | Si | Mn | Mo | Cr | Ni |
|---|---|---|---|---|---|---|
| ELOX UP 2209 | 0.03 | 0.90 | 1.85 | 3.15 | 21.15 | 8.50 |

## Features and Applications

- A type of fluoride basic flux for SAW. General use in submerged welding of stainless steel materials
- The corrosion resistance and mechanical properties are good
- Formation of easily-removable slags
- Requirement of re-drying at 250°C - 350°C for 2 hours

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 6010800007 | 25 | Kraft Bag |

**Approvals:** GeKa ELIFLUX BSS-D; CE, SEPRO
GeKa ELOX UP 2209 x ELIFLUX BSS-D; CE, CLASS NK

# ELIFLUX BSS-F

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA FB 1 / SA FB 2 77 AC |
| EN ISO 14174 | : SA FB 1 / SA FB 2 77 AC |

| SAW Wire | Standards | Hardness (HRC)* (as welded) |
|---|---|---|
| SUBCOR 41 NiMo - MH | AWS A5.22: ~ EC 410 NiMo | 44 |

* Weld Thickness: 5 mm

## Chemical Compositon of Weld Metal - % ( Typical)

| Saw Wire | C | Si | Mn | Mo | Cr | Ni |
|---|---|---|---|---|---|---|
| SUBCOR 41 NiMo-MH | 0.13 | 1.00 | 2.00 | 1.00 | 12.50 | 2.50 |

## Features and Applications

- Non-alloyed, fluoride - basic agglomerated flux
- Used in hardfacing cladding for ferritic stainless steel withSUBCOR 41 NiMo-MH. Also suitable for joint welding
- All the properties of the wire is transferred to weld pool. Hardness will very depending on it
- Suitable for overlay welding with oscillation and single/multi-pass welding
- Formation of easily removable slag
- Re-drying at 300°C - 350°C/2h

## Operating Data

| Product Code | Package Weight (Kg) | Package Type |
|---|---|---|
| 3010800015 | 25 | Kraft Bag |

**Approvals:** CE, SEPRO

GeKa®

Submerged Arc Welding Flux

# ELIFLUX 350

## Standards

| | |
|---|---|
| TS EN ISO 14174 | : SA FB 2 C Cr H5 |
| EN ISO 14174 | : SA FB 2 C Cr H5 |

## Mechanical Properties

| SAW Wire | Hardness (HB) |
|---|---|
| S1 | 300 |

* It is recommended to contact the manufacturer regarding the application.

## Chemical Compositon of Weld Metal - % ( Typical)

| SAW - Wire | C | Si | Mn | Cr | Fe |
|---|---|---|---|---|---|
| S1 | 0.10-0.30 | 0.50-1.00 | 1.00-1.80 | 1.60-3.00 | Rest |

## Features and Applications

- A type of SAW flux structured from agglomerated calcium silicate
- This submerged arc welding powder and wire specification is used for hardfacing of steels
- Requirement of re-drying at 250°C - 350°C for 2 hours

## Operating Data

| Product Code | Package Weight (Kg) | Packaging |
|---|---|---|
| 6010800012 | 25 | Kraft Bag |

**Approvals:** ELIFLUX 350: CE, SEPRO

GeKa

Gas Welding Wire

# ELIGAS 1

## Standards

| | |
|---|---|
| TS 3623 EN 12536 | : 0 I |
| EN 12536 | : 0 I |
| AWS A5.2 | : R 45 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.07 | 0.1 | 0.5 |

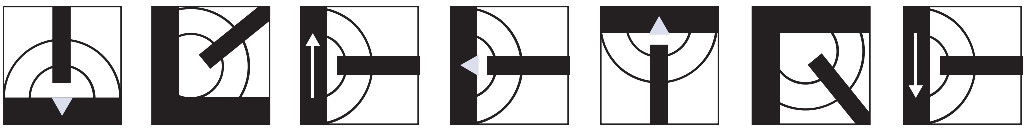
## Mechanical Properties

| **Yield Strength** (N/mm²) | **Tensile Strength** (N/mm²) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 245 | 340 - 440 | min. 35 J | min. 14 |

## Features and Applications

- Oxy-acetylene / gas welding rod to be used for flame welding of all types of machinery parts made of unalloyed steels
- Body, exhaust, thin sheet pipe welding
- Neutral flame should be used

## Welding Positions



## Flame Adjustment

Neutral Flame

## Operating Data

| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 3010300000 | 1.60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300001 | 2.00 x 1000 | 5/64 x 39” | 5 | |
| 3010300002 | 2.40 x 1000 | 3/32 x 39” | 5 | |
| 3010300003 | 3.20 x 1000 | 1/8 x 39” | 5 | |
| 3010300004 | 4.00 x 1000 | 5/32 x 39” | 5 | |
| 3010300005 | 5,00 x 1000 | 3/16 x 39” | 5 | |

**Approvals:** CE, SEPRO

# ELIGAS 2

## Standards

| | |
|---|---|
| TS 3623 EN 12536 | : 0 Z |
| EN 12536 | : 0 Z |
| AWS A5.2 | : R 60 |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mn |
|---|---|---|
| 0.07 | 0.15 | 1.0 |

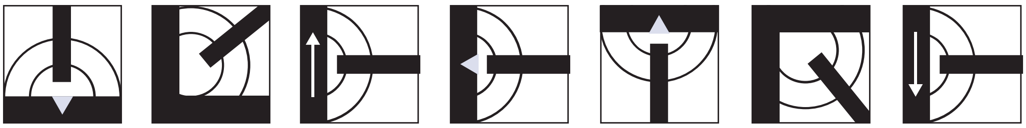
## Mechanical Properties

| Yield Strength ($N/mm^2$) | Tensile Strength ($N/mm^2$) | Impact Strength (ISO-V/+20°C) | Elongation (($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 295 | 440 - 540 | min. 39 J | min. 22 |

## Features and Applications

- High quality welding of unalloyed or Mo-alloyed steels used in the production of boilers, pipe lines and constructions
- Mo-alloyed oxy-acetylene / gas welding with flame welding technique
- Excellent yield and welding properties
- Ideal welding rod for plumbers
- Neutral flame should be used

## Welding Positions



## Flame Adjustment

Neutral Flame

## Operating Data

| Product Code | Diameter x Length (mm) / (inch) | | Weight (Kg) | Package Type |
|---|---|---|---|---|
| 3010300040 | 1.60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300041 | 2.00 x 1000 | 5/64 x 39” | 5 | |
| 3010300042 | 2.40 x 1000 | 3/32 x 39” | 5 | |
| 3010300043 | 3.20 x 1000 | 1/8 x 39” | 5 | |
| 3010300044 | 4.00 x 1000 | 5/32 x 39” | 5 | |
| 3010300045 | 5.00 x 1000 | 3/16 x 39” | 5 | |

**Approvals:** CE, SEPRO

# ELIGAS 4

## Standards

| | |
|---|---|
| TS 3623 EN 12536 | : 0 IV |
| EN 12536 | : 0 IV |
| AWS A5.2 | : R 60-G |

## Chemical Composition of Welding Wire % (Typical)

| C | Si | Mo | Mn |
|---|---|---|---|
| 0.07 | 0.15 | 0.5 | 1.0 |

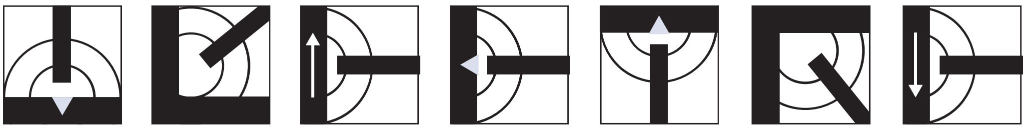
## Mechanical Properties

| **Yield Strength** ($N/mm^2$) | **Tensile Strength** ($N/mm^2$) | **Impact Strength** (ISO-V/+20°C) | **Elongation** (($L_0=5d_0$) (%)) |
|---|---|---|---|
| min. 295 | 440 - 540 | min. 39 J | min. 22 |

## Features and Applications

- High quality welding of unalloyed or Mo-alloyed steels used in the production of boilers, pipe lines and constructions
- Mo-alloyed oxy-acetylene / gas welding with flame welding technique
- Excellent yield and welding properties
- Ideal welding rod for plumbers
- Neutral flame should be used

## Welding Positions



## Flame Adjustment

Neutral Flame

## Operating Data

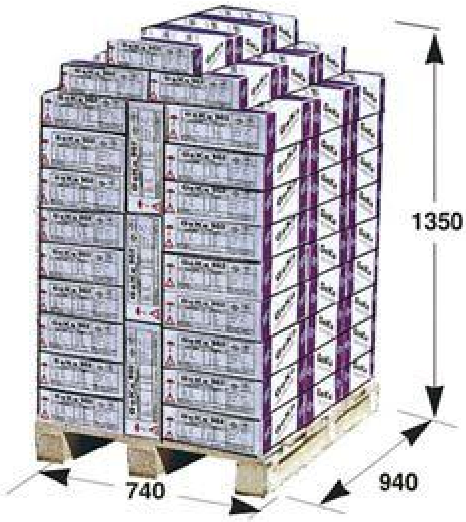
| **Product Code** | **Diameter x Length** (mm) / (inch) | | **Weight** (Kg) | **Package Type** |
|---|---|---|---|---|
| 3010300078 | 1.60 x 1000 | 1/16 x 39” | 5 | Carton Box |
| 3010300079 | 2.00 x 1000 | 5/64 x 39” | 5 | |
| 3010300080 | 2.40 x 1000 | 3/32 x 39” | 5 | |
| 3010300081 | 3.20 x 1000 | 1/8 x 39” | 5 | |
| 3010300082 | 4.00 x 1000 | 5/32 x 39” | 5 | |
| 3010300083 | 5.00 x 1000 | 3/16 x 39” | 5 | |

**Approvals:** CE, SEPRO


# PACKAGING INFORMATION

# PACKAGING OF WELDING WIRES


**1 Pallet**
72 Spools-1080 kg.




**1 Pallet**
72 Spools-1080 kg.

**1 Container**
18 Pallet-19.440 kg


**1 Pallet**
56 Spools-840 kg.
56 Spools-1.850 lb

72 Spools-1080 kg.
72 Spools-2319 lb

**1 Container**
22 Pallet-18.480 kg
22 Pallet-40.405 lb

22 Pallet-23.760 kg
22 Pallet-52.335 lb

# PACKAGING OF WELDING WIRES

## BIG PACK

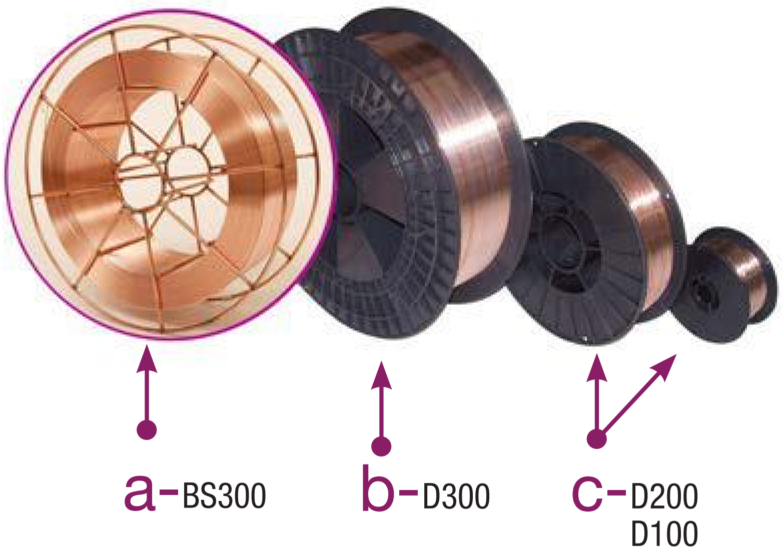


**For Gas Shielded Arc Welding Wires**
250 kg. / 550 lb.
400 kg. / 900 lb.

**For Submerged Arc Welding Wires**
400 kg./ 900 lb.
600 kg. / 1322 lb.
1000 kg./ 2203 lb.

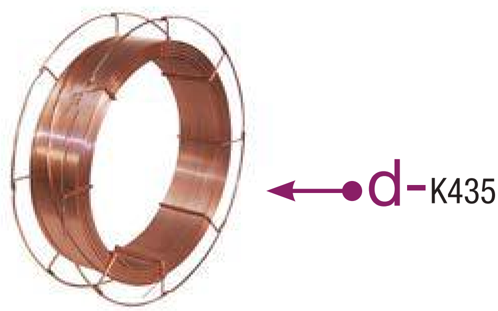
# PACKAGING OF WELDING WIRES


## PLASTIC & BASKET SPOOLS




**For Gas Shielded Arc Welding Wires**
*a - Centered Basket Spool - 15 kg.
*b - Plastic Spool - 15 or 20 kg. / 33 or 44 lb.
*c - Mini Plastic Spool - 5 or 1 kg. / 11 or 2 lb.

**For Submerged Arc Welding Wires**
*d - Basket Spool - 25 kg / 30 kg / 100 kg.



# PACKAGING OF WELDING ELECTRODES

## TIN BOXES & CARTON BOXES


## VACUUM PACKS

# Table of the Electrodes for Manual Arc Welding of Non-alloy and Fine Grain Steels according to TS EN ISO 2560 -A

| E | 46 | 3 | 1Ni | B | 6 | 4 | H5 |
|---|---|---|---|---|---|---|---|

| Production / Product | |
|---|---|
| G | Wire Electrodes |
| O | Oxy-acetylene |
| E | Electric arc welding |
| S | Submerged arc welding wires |
| T | Flux-cored wires |
| W | TIG Rods |
| F | Submerged arc welding fluxes |

| Alloy Symbol | Chemical Composition % 1) 2) 3) | | |
|---|---|---|---|
| | Mn | Mo | Ni |
| | 2,00 | - | - |
| Mo | 1,40 | 0,3 - 0,6 | - |
| MnMo | > 1,4 - 2,0 | 0,3 - 0,6 | - |
| 1 Ni | | - | 0,6 - 1,2 |
| 2 Ni | 1,40 | - | 1,8 - 2,6 |
| 3 Ni | 1,40 | - | > 2,6 - 3,8 |
| Mn 1Ni | > 1,4 - 2,0 | - | 0,6 - 1,2 |
| 1 NiMo | 1,40 | 0,3 - 0,6 | 0,6 - 1,2 |
| Z | Any other agreed composition | | |

1)If not specified Mo<0,3; Ni<0,3; Cr<0,2; V<0,05; Nb<0,05; Cu<0,3
2)Single values shown in the table mean maximum values
3)The results shall be rounded to the same number of significant figures as in the specified value using the rules according to ISO 31-0, annex B rule A

| Yield Strength, Tensile Strength and Elongation | | | |
|---|---|---|---|
| Symbol | ReL ($N/mm^2$) | Rm ($N/mm^2$) | A (%) |
| 35 | 355 | 440-570 | 22 |
| 38 | 380 | 470-600 | 20 |
| 42 | 420 | 500-640 | 20 |
| 46 | 460 | 530-680 | 20 |
| 50 | 500 | 560-720 | 18 |

| Symbol for impact properties of all-weld metal (Min. 47J) | |
|---|---|
| Symbol | Temperature °C |
| Z | No Requirements |
| A | (+20) |
| 0 | 0 |
| 2 | -20 |
| 3 | -30 |
| 4 | -40 |
| 5 | -50 |
| 6 | -60 |

| Electrode covering | |
|---|---|
| A | Acid covering |
| C | Cellulosic covering |
| R | Rutile covering |
| RR | Thick Rutile covering |
| RC | Rutile-Cellulosic covering |
| RA | Rutile-Acid cov. |
| RB | Rutile-Basic cov. |
| B | Basic covering |

| Symbol for weld metal recovery and type of current (%) | | |
|---|---|---|
| 1 | ≤ 105 | ≈/= |
| 2 | ≤ 105 | = |
| 3 | > 105 ≤ 125 | ≈/= |
| 4 | > 105 ≤ 125 | = |
| 5 | > 125 ≤ 160 | ≈/= |
| 6 | > 125 < 160 | |
| 7 | > 160 | ≈/= |
| 8 | > 160 | = |

| Symbols for welding positions | |
|---|---|
| 1 | PA; PB; PC; PD; PE; PF; PG |
| 2 | PA; PB; PC; PD; PE; PF; |
| 3 | PA; PB |
| 4 | PA |
| 5 | PA; PB; PG |

| Symbols for hydrogen content of the all-weld metal | |
|---|---|
| Symbol | ml/100g |
| H 5 | 5 |
| H 10 | 10 |
| H 15 | 15 |

# Table of the Electrodes tor Welding of Non-alloy Steels according to AWS A5.1/A5.1M

| E | 6 0 | 1 | 3 |
|---|---|---|---|

E: Covered Electrode

60: Tensile / Yield Strength

| Symbol | Tensile Strength min. | | Yield Strength min. | |
|---|---|---|---|---|
| | A5.1 (ksi) | A5.1 M ($N/mm^2$) | A5.1 (ksi) | A5.1 M ($N/mm^2$) |
| 60 | 60 | 430 | 48 | 330 |
| 70 | 70 | 490 | 58 | 400 |

1: Welding Positions

| Symbol | Welding Positions |
|---|---|
| 1 | all welding positions |
| 2 | horizontal and flat welding positions |
| 4 | all welding positions including vertical down position |

13: Type of Cover

| Symbol | Type of Cover | Welding Position | Current Type | Elongation %min. |
|---|---|---|---|---|
| 10 | Cellulosic-Sodium silicate | F, V, OH, H-fillet | DC (+) | 22 |
| 11 | Cellulosic-Potassium silicate | F, V, OH, H-fillet | AC - DC (+) | 22 |
| 12 | Rutile-Sodium silicate | F, V, OH, H-fillet | AC - DC (-) | 17 |
| 13 | Rutile-Potassium silicate | F, V, OH, H-fillet | AC - DC (-) (+) | 17 |
| 14 | Rutile-Iron powder | F, V, OH, H-fillet | AC - DC (-) (+) | 17 |
| 15 | Basic-Sodium silicate | F, V, OH, H-fillet | DC (+) | 22 |
| 16 | Basic-Potassium silicate | F, V, OH, H-fillet | AC - DC (+) | 22 |
| 18 | Basic, Iron powder-Potassium silicate | F, V, OH, H-fillet | AC - DC (+) | 22 |
| 19 | Rutile, Iron oxide-Potassium silicate | F, V, OH, H-fillet | AC - DC (-) (+) | 22 |
| 20 | Iron oxide | F, H-fillet | AC - DC (-) (+) | 22 |
| 22 | Iron oxide | only for one-run welding | AC - DC (-) | — |
| 24 | Rutile-Iron powder | F, H-fillet | AC - DC (-) (+) | 17 |
| 27 | Iron oxide - Iron powder | F, H-fillet | AC - DC (-) (+) | 22 |
| 28 | Basic, Iron powder - Potassium Silicate | F, H-fillet | AC - DC (+) | 22 |
| 48 | Basic, Iron powder - Potassium Silicate | F, OH, H, V-Down | AC - DC (+) | 22 |

F=Flat V=Vertical OH=Overhead H=Horizontal
H-Fillets= Horizontal fillets V-Down= Vertical with downward progression

# Table of High Strenght Electrodes According to TS EN ISO 18275-A

| E | 69 | 6 | Mn2NiCrMo | B | 3 | 4 | H5 |
|---|---|---|---|---|---|---|---|

| Production / Product | |
|---|---|
| G | Wire Electrodes |
| O | Oxy-acetylene |
| E | Electric arc welding |
| S | Submerged arc welding wires |
| T | Flux-cored wires |
| W | TIG Rods |
| F | Submerged arc welding fluxes |

| Yield Strength,Tensile Strength&Elongation | | | |
|---|---|---|---|
| symbol | ReL (N/mm²) | Rm (N/mm²) | A(%) |
| 55 | 550 | 610-780 | 18 |
| 62 | 620 | 690-890 | 18 |
| 69 | 690 | 760-960 | 17 |
| 79 | 790 | 880-1080 | 16 |
| 89 | 890 | 980-1180 | 15 |

| Symbol for impact properties of all-weld metal min. 47J | |
|---|---|
| Symbol | Temperature °C |
| Z | No Requirements |
| A | (+20) |
| 0 | 0 |
| 2 | -20 |
| 3 | -30 |
| 4 | -40 |
| 5 | -50 |
| 6 | -60 |
| 7 | -70 |
| 8 | -80 |

| Symbol for weld metal recovery and type of current (%) | | |
|---|---|---|
| 1 | 105 | ≈/= |
| 2 | 105 | = |
| 3 | > 105 ≤ 125 | ≈/= |
| 4 | > 105 ≤ 125 | = |
| 5 | > 125 ≤ 160 | ≈/= |
| 6 | > 125 ≤ 160 | = |
| 7 | > 160 | ≈/= |
| 8 | > 160 | = |

| Alloy Symbol | Chemical Composition % 1) 2) 3) % Mass | | | |
|---|---|---|---|---|
| | Mn | Ni | Cr | Mo |
| MnMo | 1,4-2,0 | | — | 0,3-0,6 |
| Mn1Ni1 | 1,4-2,0 | 0,6-1,2 | — | — |
| 1NiMo | 1,4 | 0,6-1,20 | — | 0,3-0,6 |
| 1,5 NiMo | 1,4 | 1,2-1,8 | — | 0,3-0,6 |
| 2 NiMo | 1,4 | 1,8-2,6 | — | 0,3-0,6 |
| Mn1NiMo | 1,4-2,0 | 0,6-1,2 | — | 0,3-0,6 |
| Mn2NiMo | 1,4-2,0 | 1,8-2,6 | — | 0,3-0,6 |
| Mn2NiCrMo | 1,4-2,0 | 1,8-2,6 | 0,3-0,6 | 0,3-0,6 |
| Mn2Ni1CrMo | 1,4-2,0 | 1,8-2,6 | 0,6-1,0 | 0,3-0,6 |
| Z | Any other agreed composition | | | |

1) If not specified C 0,03%-0,10% , Ni <0,3%, Cr <0,2%, Mo <0,2%, V <0,05% , Nb <0,05% , Cu <0,3%, P <0,025%, S <0,020%

2) Single values shown in the table mean maximum values

3) The results shall be rounded to the same number of significant figures as in the specified value using the rules according to ISO 31-0, annex B rule A

| Electrode covering | |
|---|---|
| A | Acid covering |
| C | Cellulosic covering |
| R | Rutile covering |
| RR | Thick Rutile covering |
| RC | Rutile-Cellulosic covering |
| RA | Rutile-Acid cov. |
| RB | Rutile-Basic cov. |
| B | Basic covering |

| Symbols for Welding Positions | |
|---|---|
| 1 | PA; PB; PC; PD; PE; PF; PG |
| 2 | PA; PB; PC; PD; PE; PF; |
| 3 | PA; PB, PC |
| 4 | PA, PB |
| 5 | PA; PB; PG |

| Symbols for hydrogen content of the all-weld metal | |
|---|---|
| Symbol | ml/100g |
| H 5 | 5 |
| H 10 | 10 |

# Table for Creep - Resisting (Heat - Resisting) Electrodes According to TS EN ISO 3580-A

| E | CrMo1 | B | 4 | 3 | H5 |
|---|---|---|---|---|---|

| Alloy Symbol | Chemical Composition % 1) 2) 3) % Mass | | | | | | | | | Yield Strength | Tensile Strength | Elongation | Impact Strength | Post Weld Heat Treatment | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | P | S | Cr | Mo | V | other | ReL (N/mm²) | Rm (N/mm²) | A(%) | J | °C | Time / min. |
| Mo | 0,10 | 0,80 | 0,40-0,504) | 0,03 | 0,025 | — | 0,40-0,70 | — | — | 355 | 510 | 22 | 47 | 570-620 | 60 |
| MoV | 0,03-0,12 | 0,80 | 0,40-1,50 | 0,03 | 0,025 | 0,30-0,60 | 0,80-1,20 | 0,25-0,60 | — | 355 | 510 | 18 | 47 | 690-730 | 60 |
| CrMo0,5 | 0,05-0,12 | 0,80 | 0,40-1,50 | 0,03 | 0,025 | 0,40-0,65 | 0,40-0,65 | — | — | 355 | 510 | 22 | 47 | 600-650 | 60 |
| CrMo1 | 0,05-0,12 | 0,80 | 0,40-1,504) | 0,03 | 0,025 | 0,90-1,40 | 0,45-0,70 | — | — | 355 | 510 | 20 | 47 | 660-700 | 60 |
| CrMo1L | 0,05 | 0,80 | 0,40-1,504) | 0,03 | 0,025 | 0,90-1,40 | 0,45-0,70 | — | — | 355 | 510 | 20 | 47 | 660-700 | 60 |
| CrMoV1 | 0,05-0,15 | 0,80 | 0,40-1,50 | 0,03 | 0,025 | 0,90-1,30 | 0,90-1,30 | 0,10-0,35 | — | 435 | 590 | 15 | 47 | 680-730 | 60 |
| CrMo2 | 0,05-0,12 | 0,80 | 0,40-1,30 | 0,03 | 0,025 | 2,0-2,6 | 0,90-1,30 | — | — | 400 | 500 | 18 | 47 | 690-750 | 60 |
| CrMo2L | 0,05 | 0,80 | 0,40-1,30 | 0,025 | 0,025 | 2,0-2,6 | 0,90-1,30 | — | — | 400 | 500 | 18 | 47 | 690-750 | 60 |
| CrMo5 | 0,03-0,12 | 0,80 | 0,40-1,50 | 0,025 | 0,025 | 4,0-6,0 | 0,40-0,70 | — | — | 400 | 590 | 17 | 47 | 730-760 | 60 |
| CrMo9 | 0,03-0,12 | 0,80 | 0,40-1,30 | 0,025 | 0,025 | 8,0-10,0 | 0,90-1,2 | 0,15 | Ni 1,0 | 435 | 590 | 18 | 34 | 740-780 | 60 |
| CrMo91 | 0,06-0,12 | 0,60 | 0,40-1,50 | 0,025 | 0,025 | 8,0-10.5 | 0,80-1,20 | 0,15-0,30 | Ni 0,40-1,00<br>Nb 0,03-0,10<br>N 0,02-0,07 | 415 | 585 | 17 | 47 | 750-770 | 120-180 |
| CrMoWV12 | 0,15-0,22 | 0,80 | 0,40-1,30 | 0,025 | 0,025 | 10,0-12,0 | 0,80-1,20 | 0,20-0,40 | Ni 0,8<br>W 0,40-0,60 | 550 | 690 | 15 | 34 | 740-780 | 60 |
| Z | Any other agreed composition | | | | | | | | | | | | | | |

1) If not specified Ni <%0,3 , Cu <% 0,3 , V <%0,03 , Nb <% 0,01 , Cr <%0,2.
2) Single values shown in the table mean maximum values
3) The results shall be rounded to the same number of significant figures as in the specified value using the rules according to ISO 31-0, annex B rule A

| Electrode covering | |
|---|---|
| A | Acid covering |
| C | Cellulosic covering |
| R | Rutile covering |
| RR | Thick Rutile covering |
| RC | Rutile-Cellulosic covering |
| RA | Rutile-Acid cov. |
| RB | Rutile-Basic cov. |
| B | Basic covering |

| Symbols for welding positions | |
|---|---|
| 1 | PA; PB; PC; PD; PE; PF; PG |
| 2 | PA; PB; PC; PD; PE; PF; |
| 3 | PA; PB, PC |
| 4 | PA, PB |
| 5 | PA; PB; PG |

| Production / Product | |
|---|---|
| G | Wire Electrodes |
| O | Oxy-acetylene |
| E | Electric arc welding |
| S | Submerged arc welding wires |
| T | Flux-cored wires |
| W | TIG Rods |
| F | Submerged arc welding fluxes |

| Symbol for weld metal recovery and type of current (%) | |
|---|---|
| 1 | 105 |
| 2 | 105 |
| 3 | > 105 < 125 |
| 4 | > 105 ≤ 125 |

In order to demonstrate operability on a.c., tests shall be carried out with no voltage no higher than 65V.

| Symbols for hydrogen content of the all-weld metal | |
|---|---|
| Symbol | ml/100g |
| H 5 | 5 |
| H 10 | 10 |

# Table of the Low-Alloy Electrodes According to AWS A5.5

| E | 8 0 | 1 | 8 | – | B2 |
|---|---|---|---|---|---|

**Covered Electrode**

| Symbol | Tensile Strength | | Yield Strength | |
|---|---|---|---|---|
| | (ksi) | N/mm²) | (ksi) | (N/mm²) |
| 70 | 70 | 480 | 60 | 415 |
| 80 | 80 | 550 | 67 | 460 |
| 90 | 90 | 620 | 77 | 530 |
| 100 | 100 | 690 | 87 | 600 |
| 110 | 110 | 760 | 97 | 670 |
| 120 | 120 | 830 | 107 | 8 |

| | |
|---|---|
| 1 | All Welding Positions |
| 2 | Horizontal and flat welding positions |

| Symbol | Type of Cover | Welding Position | Type of Current |
|---|---|---|---|
| 10 | Cellulosic Sodium Silicate | F, V, OH, H-fillet | DC (+) |
| 11 | Cellulosic Potassium Silicate | F, V, OH, H-fillet | AC DC (+) |
| 13 | Rutile Potassium Silicate | F, V, OH, H-fillet | AC DC (-) (+) |
| 15 | Basic Sodium Silicate | F, V, OH, H-fillet | DC (+) |
| 16 | Basic Potassium Silicate | F, V, OH, H-fillet | AC DC (+) |
| 18 | Basic Iron Powder Potassium Silicate | F, V, OH, H-fillet | AC DC (+) |
| 20 | Iron Oxide | F, H-fillet | AC DC (-) (+) |
| 27 | Iron Oxide Iron Powder | F, H-fillet | AC DC (-) (+) |

F=Flat V=Vertical OH=Overhead
H=Horizontal H-Fillets= Horizontal fillets
V-Down= Vertical with downward progression

| Symbol | | Elongation % min. |
|---|---|---|
| E 7010 | P1/A1/G | 22/22/22 |
| E 7011 | A1/G | 22/22 |
| E 7015 | X/B2L/G | 25/19/25 |
| E 7016 | X/B2L/G | 25/19/25 |
| E 7018 | X/B2L/C3L/W1/G | 25/19/25/25/25 |
| E 7020 | A1/G | 25/25 |
| E 7027 | A1/G | 22/25 |
| E 8010 | P1/G | 19/19 |
| E 8011 | G | 19 |
| E 8013 | G | 16 |
| E 8015 | X/B3L/G | 19/17/19 |
| E 8016 | X/C3/C4/G | 19/24/19/19 |
| E 8018 | X/B3L/C3/C4/NM1/W2/G | 19/17/24/19/19/19/19 |
| E 9010 | G | 17 |
| E 9011 | G | 17 |
| E 9013 | G | 14 |
| E 9015 | X/G | 17/17 |
| E 9016 | X/G | 17/17 |
| E 9018 | M/X/G | 24/17/17 |
| E 10010 | G | 16 |
| E 10011 | G | 16 |
| E 10013 | G | 13 |
| E 10015 | X/G | 16/16 |
| E 10016 | X/G | 16/16 |
| E 10018 | M/X/G | 20/16/16 |
| E 11010 | G | 15 |
| E 11011 | G | 15 |
| E 11013 | G | 13 |
| E 11015 | G | 15 |
| E 11016 | G | 15 |
| E 11018 | M | 20 |
| E 12010 | G | 14 |
| E 12011 | G | 14 |
| E 12013 | G | 11 |
| E 12015 | G | 14 |
| E 12016 | G | 14 |
| E 12018 | G/M/M1 | 14/18/18 |

'X' : B1, B2, B3, B4L, B5, B6, B6L, B7, B7L, B8,B8L, B9, C1, C1L, C2, C2L, C5L, D1, D2, D3, P1

| Symbol | Types of Electrodes | Chemical Composition of the Weld Metals % | | | | |
|---|---|---|---|---|---|---|
| | | C | Mn | Ni | Cr | Mo |
| EXXXX-A1 | Carbon Molybdenum alloyed | 0,12 | 0,60 | — | — | 0,40-0,65 |
| EXXXX-B1 | Chromium molybdenum alloyed | 0,05-0,12 | 0,90 | — | 0,40-0,65 | 0,40-0,65 |
| EXXXX-B2 | | 0,05-0,12 | 0,90 | — | 1,00-1,50 | 0,40-0,65 |
| EXXXX-B3 | | 0,05-0,12 | 0,90 | — | 2,00-2,50 | 0,90-1,20 |
| EXXXX-B4L | | 0,05 | 0,90 | — | 1,75-2,25 | 0,40-0,65 |
| EXXXX-B5 | | 0,07-0,15 | 0,40-0,70 | — | 0,40-0,60 | 1,00-1,25 |
| EXXXX-B6 | | 0,05-0,10 | 1,00 | 0,40 | 4,00-6,00 | 0,45-0,65 |
| EXXXX-B7 | | 0,05-0,10 | 1,00 | 0,40 | 6,00-8,00 | 0,45-0,65 |
| EXXXX-B8 | | 0,05-0,10 | 1,00 | 0,40 | 8,00-10,5 | 0,85-1,20 |
| EXXXX-B9 | | 0,08-0,13 | 1,25 | 1,00 | 8,00-10,5 | 0,85-1,20 |
| EXXXX-C1 | Nickel alloyed | 0,12 | 1,25 | 2,00-2,75 | — | — |
| EXXXX-C2 | | 0,12 | 1,25 | 3,00-3,75 | — | — |
| EXXXX-C3 | | 0,12 | 0,40-1,25 | 0,80-1,10 | 0,15 | 0,35 |
| EXXXX-C4 | | 0,10 | 1,25 | 1,10-2,00 | — | — |
| EXXXX-C5 | | 0,05 | 0,40-1,00 | 6,00-7,25 | — | — |
| EXXXX-NM1 | Nickel molybdenum alloyed | 0,10 | 0,80-1,25 | 0,80-1,10 | 0,10 | 0,40-0,65 |
| EXXXX-D1 | Manganese molybdenum alloyed | 0,12 | 1,00-1,75 | 0,90 | — | 0,25-0,45 |
| EXXXX-D2 | | 0,15 | 1,65-2,00 | 0,90 | — | 0,25-0,45 |
| EXXXX-D3 | | 0,12 | 1,00-1,80 | 0,90 | — | 0,40-0,65 |
| XXXX-G | Low alloy electrode | Mn: 1,00 - Si: 0,80 - Ni: 0,50 - Cr: 0,30 Mo: 0,20 V: 0,10 When at least one of these elements exceeds the limit, designated with "G". | | | | |
| EXXXX-M | Military similar electrode | 0,10 | 0,60-1,25 | 1,40-1,80 | 0,15 | 0,35 |
| EXXXX-P1 | Pipeline electrodes | 0,20 | 1,20 | 1,00 | 0,30 | 0,50 |
| EXXXX-W1 | Weathering steel electrodes | 0,12 | 0,40-0,70 | 0,20-0,40 | 0,15-0,30 | Cu: 0.3-0.6 |
| EXXXX-W2 | | 0,12 | 0,50-1,30 | 0,40-0,80 | 0,45-0,70 | Cu: 0.3-0.75 |

The symbol L is added to the low-carbon electrodes.

# Table of Covered Electrodes for Manual Arc Welding of Heat-Resisting and Stainless Steels According to TS EN ISO 3581-A

| E | 19 12 3 Nb | R | 5 | 4 |
|---|---|---|---|---|

| Symbol of alloy | Chemical Composition % 1) 2) C | Si | Mn | P | S | Cr | Ni | Mo | Other Elements | Mechanical Properties Yield Strength | Tensile Strength | Elongation % | Post weld Heat Treatment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Martensitic / Ferritic** | | | | | | | | | | | | | |
| 13 | 0,12 | 1,00 | 1,50 | 0,03 | 0,025 | 11,0 - 14,0 | < 0,60 | < 0,75 | - | 250 | 450 | 15 | 840-870°C/2 h/600°C/air |
| 13 4 | 0,06 | 1,00 | 1,50 | 0,03 | 0,025 | 11,0 - 14,5 | 3,0 - 5,0 | 0,4 - 1,0 | - | 500 | 750 | 15 | 580-620 °C/2 h /air |
| 17 | 0,12 | 1,00 | 1,50 | 0,03 | 0,025 | 16,0 - 18,0 | < 0,60 | < 0,75 | - | 300 | 450 | 15 | 760-790°C/2 h/600°C/air |
| **Austenitic** | | | | | | | | | | | | | |
| 19 9 | 0,08 | 1,20 | 2,00 | 0,03 | 0,025 | 18,0 - 21,0 | 9,0 - 11,0 | < 0,75 | - | 350 | 550 | 30 | none |
| 19 9 L | 0,04 | 1,20 | 2,00 | 0,03 | 0,025 | 18,0 - 21,0 | 9,0 - 11,0 | < 0,75 | - | 320 | 510 | 30 | none |
| 19 9 Nb | 0,08 | 1,20 | 2,00 | 0,03 | 0,025 | 18,0 - 21,0 | 9,0 - 11,0 | < 0,75 | Nb min. 8 x % C, max. % 1,1 | 350 | 550 | 25 | none |
| 19 12 2 | 0,08 | 1,20 | 2,00 | 0,03 | 0,025 | 17,0 - 20,0 | 10,0 - 13,0 | 2,0 - 3,0 | - | 350 | 550 | 25 | none |
| 19 12 3 L | 0,04 | 1,20 | 2,00 | 0,03 | 0,025 | 17,0 - 20,0 | 10,0 - 13,0 | 2,5 - 3,0 | - | 320 | 510 | 25 | none |
| 19 12 3 Nb | 0,08 | 1,20 | 2,00 | 0,03 | 0,025 | 17,0 - 20,0 | 10,0 - 13,0 | 2,5 - 3,0 | Nb min. 8 x % C, max. % 1,1 | 350 | 550 | 25 | none |
| 19 13 4 N L | 0,04 | 1,20 | 1,0 - 5,0 | 0,03 | 0,025 | 17,0 - 20,0 | 12,0 - 15,0 | 3,0 - 4,5 | N 0,20 | 350 | 550 | 25 | none |
| **Austenitic- Ferritic High corrosion resistance** | | | | | | | | | | | | | |
| 22 9 3 N L | 0,04 | 1,20 | 2,50 | 0,03 | 0,025 | 21,0 - 24,0 | 7,5 - 10,5 | 2,5 - 4,0 | N 0,08 - 0,20 | 450 | 550 | 20 | none |
| 25 7 2 N L | 0,04 | 1,20 | 2,00 | 0,035 | 0,025 | 24,0 - 28,0 | 6,0 - 8,0 | 1,0 - 3,0 | N 0,20 | 500 | 700 | 15 | none |
| 25 9 3 Cu N L | 0,04 | 1,20 | 2,50 | 0,03 | 0,025 | 24,0 - 27,0 | 7,5 - 10,5 | 2,5 - 4,0 | N 0,10 - 0,25; Cu 1,5 - 3,5 | 550 | 620 | 18 | none |
| 25 9 4 N L | 0,04 | 1,20 | 2,50 | 0,03 | 0,025 | 24,0 - 27,0 | 8,0 - 10,5 | 2,5 - 4,5 | N 0,20 - 0,30; Cu 1,5; W 1,0 | 550 | 620 | 18 | none |
| **Austenitic- Ferritic High corrosion resistance** | | | | | | | | | | | | | |
| 18 15 3 L | 0,04 | 1,20 | 1,0 - 4,0 | 0,03 | 0,025 | 16,5 - 19,5 | 14,0 - 17,0 | 2,5 - 3,5 | - | 300 | 480 | 25 | none |
| 18 16 5 N L | 0,04 | 1,20 | 1,0 - 4,0 | 0,035 | 0,025 | 17,0 - 20,0 | 15,5 - 19,0 | 3,5 - 5,0 | N 0,20 | 300 | 480 | 25 | none |
| 20 25 5 Cu N L | 0,04 | 1,20 | 1,0 - 4,0 | 0,03 | 0,025 | 19,0 - 22,0 | 24,0 - 27,0 | 4,0 - 7,0 | Cu 1,0 - 2,0; N 0,25 | 320 | 510 | 25 | none |
| 20 16 3 Mn N L | 0,04 | 1,20 | 5,0 - 8,0 | 0,035 | 0,025 | 18,0 - 21,0 | 15,0 - 18,0 | 2,5 - 3,5 | N 0,20 | 320 | 510 | 25 | none |
| 25 22 2 N L | 0,04 | 1,20 | 1,0 - 5,0 | 0,03 | 0,025 | 24,0 - 27,0 | 20,0 - 23,0 | 2,0 - 3,0 | N 0,20 | 320 | 510 | 25 | none |
| 27 31 4 Cu L | 0,04 | 1,20 | 2,50 | 0,03 | 0,025 | 26,0 - 29,0 | 30,0 - 33,0 | 3,0 - 4,5 | Cu 0,6 - 1,5 | 240 | 500 | 25 | none |
| **Special Types** | | | | | | | | | | | | | |
| 18 8 Mn | 0,20 | 1,20 | 4,5 - 7,5 | 0,035 | 0,025 | 17,0 - 20,0 | 7,0 - 10,0 | - | - | 350 | 500 | 25 | none |
| 18 9 Mn Mo | 0,04 - 0,14 | 1,20 | 3,0 - 5,0 | 0,035 | 0,025 | 18,0 - 21,5 | 9,0 - 11,0 | 0,5 - 1,5 | - | 350 | 500 | 25 | none |
| 20 10 3 | 0,10 | 1,20 | 2,50 | 0,03 | 0,025 | 18,0 - 21,0 | 9,0 - 12,0 | 1,5 - 3,5 | - | 400 | 620 | 20 | none |
| 23 12 L | 0,04 | 1,20 | 2,50 | 0,03 | 0,025 | 22,0 - 25,0 | 11,0 - 14,0 | < 0,75 | - | 320 | 510 | 25 | none |
| 23 12 Nb | 0,10 | 1,20 | 2,50 | 0,03 | 0,025 | 22,0 - 25,0 | 11,0 - 14,0 | < 0,75 | Nb min. 8 x % C, max. % 1,1 | 350 | 550 | 25 | none |
| 23 12 2 L | 0,04 | 1,20 | 2,50 | 0,03 | 0,025 | 22,0 - 25,0 | 11,0 - 14,0 | 2,0 - 3,0 | - | 350 | 550 | 25 | none |
| 29 9 | 0,15 | 1,20 | 2,50 | 0,035 | 0,025 | 27,0 - 31,0 | 8,0 - 12,0 | < 0,75 | - | 450 | 650 | 15 | none |
| **Heat Resisting Types** | | | | | | | | | | | | | |
| 16 8 2 | 0,08 | 1,00 | 2,50 | 0,03 | 0,025 | 14,5 - 16,5 | 7,5 - 9,5 | 1,5 - 2,5 | - | 320 | 510 | 25 | none |
| 19 9 H | 0,04 - 0,08 | 1,20 | 2,00 | 0,03 | 0,025 | 18,0 - 21,0 | 9,0 - 11,0 | < 0,75 | - | 350 | 550 | 30 | none |
| 25 4 | 0,15 | 1,20 | 2,50 | 0,03 | 0,025 | 24,0 27,0 | 4,0 - 6,0 | < 0,75 | - | 400 | 600 | 15 | none |
| 22 12 | 0,15 | 1,20 | 2,50 | 0,03 | 0,025 | 20,0 - 23,0 | 10,0 - 13,0 | < 0,75 | - | 350 | 550 | 25 | none |
| 25 20 | 0,06 - 0,20 | 1,20 | 1,0 - 5,0 | 0,03 | 0,025 | 23,0 - 27,0 | 18,0 - 22,0 | < 0,75 | - | 350 | 550 | 20 | none |
| 25 20 H | 0,35 - 0,45 | 1,20 | 2,50 | 0,03 | 0,025 | 23,0 - 27,0 | 18,0 - 22,0 | < 0,75 | - | 350 | 550 | 10 | none |
| 18 36 | 0,25 | 1,20 | 2,50 | 0,03 | 0,025 | 14,0 - 18,0 | 33,0 - 37,0 | < 0,75 | - | 350 | 550 | 10 | none |

| Symbol for welding position | |
|---|---|
| 1 | PA; PB; PC; PD; PE; PF; PG |
| 2 | PA; PB; PC; PD; PE; PF; |
| 3 | PA; PB |
| 4 | PA |
| 5 | PA; PB; PG |

| Symbol for weld metal recovery and type of current (%) | | |
|---|---|---|
| 1 | ≤ 105 | ≈/= |
| 2 | ≤ 105 | = |
| 3 | > 105 ≤ 125 | ≈/= |
| 4 | > 105 ≤ 125 | = |
| 5 | > 125 ≤ 160 | ≈/= |
| 6 | > 125 ≤ 160 | = |
| 7 | > 160 | ≈/= |
| 8 | > 160 | = |

| Electrode Covering |
|---|
| R - Rutile Cov. |
| B - Basic Cov. |

| Production / Product | |
|---|---|
| G | Wire Electrodes |
| O | Oxy-acetylene |
| E | Electric arc welding |
| S | Submerged arc welding wires |
| T | Flux-cored wires |
| W | TIG Rods |
| F | Submerged arc welding fluxes |

# Table of Stainless Steel Electrodes According to AWS A5.4

| E | 308 L | 16 |
|---|---|---|

Coated Electrodes

| Symbol | Current Type | Welding Position |
|---|---|---|
| 15 | DC (+) | All Welding Position |
| 16 | AC,DC (+) | |
| 17 | AC,DC (+) | |
| 25 | DC (+) | Horizontal, flat and horizontal vertical |
| 26 | AC,DC (+) | |

| Symbol | Chemical Composition of Weld Metal % | | | | | | Mechanical Properties | |
|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | Cr | Ni | Mo | Tensile Strength | Elongation min. % |
| E 209 [1] | 0.06 | 0.90 | 4.0 - 7.0 | 20.5 - 24.0 | 9.5 - 12.0 | 1.5 - 3.0 | 690 | 15 |
| E 219 [1] | 0.06 | 1.00 | 8.0 - 10.0 | 19.0 - 21.5 | 5.5 - 7.0 | 0.75 | 620 | 15 |
| E 240 [1] | 0.06 | 1.00 | 10.5 - 13.5 | 17.0 - 19.0 | 4.0 - 6.0 | 0.75 | 690 | 15 |
| E 307 | 0.04 - 0.14 | 0.90 | 3.30 - 4.75 | 18.0 - 21.5 | 9.0 - 10.7 | 0.5 - 1.5 | 590 | 30 |
| E 308 | 0.08 | 0.90 | 0.5 - 2.5 | 18.0 - 21.0 | 9.0 - 11.0 | 0.75 | 550 | 35 |
| E 308 H | 0.04 - 0.08 | 0.90 | 0.5 - 2.5 | 18.0 - 21.0 | 9.0 - 11.0 | 0.75 | 550 | 35 |
| E 308 L | 0.04 | 0.90 | 0.5 - 2.5 | 18.0 - 21.0 | 9.0 - 11.0 | 0.75 | 520 | 35 |
| E 308 Mo | 0.08 | 0.90 | 0.5 - 2.5 | 18.0 - 21.0 | 9.0 - 12.0 | 2.0 - 3.0 | 550 | 35 |
| E 308 MoL | 0.04 | 0.90 | 0.5 - 2.5 | 18.0 - 21.0 | 9.0 - 12.0 | 2.0 - 3.0 | 520 | 35 |
| E 309 | 0.15 | 0.90 | 0.5 - 2.5 | 22.0 - 25.0 | 12.0 - 14.0 | 0.75 | 550 | 30 |
| E 309 L | 0.04 | 0.90 | 0.5 - 2.5 | 22.0 - 25.0 | 12.0 - 14.0 | 0.75 | 520 | 30 |
| E 309 Cb [3] | 0.12 | 0.90 | 0.5 - 2.5 | 22.0 - 25.0 | 12.0 - 14.0 | 0.75 | 550 | 30 |
| E 309 Mo | 0.12 | 0.90 | 0.5 - 2.5 | 22.0 - 25.0 | 12.0 - 14.0 | 2.0 - 3.0 | 550 | 30 |
| E 309 MoL | 0.04 | 0.90 | 0.5 - 2.5 | 22.0 - 25.0 | 12.0 - 14.0 | 2.0 - 3.0 | 520 | 30 |
| E 310 | 0.08 - 0.20 | 0.75 | 1.0 - 2.5 | 25.0 - 28.0 | 20.0 - 22.5 | 0.75 | 550 | 30 |
| E 310 H | 0.35 - 0.45 | 0.75 | 1.0 - 2.5 | 25.0 - 28.0 | 20.0 - 22.5 | 0.75 | 620 | 10 |
| E 310 Cb [3] | 0.12 | 0.75 | 1.0 - 2.5 | 25.0 - 28.0 | 20.0 - 22.0 | 0.75 | 550 | 25 |
| E 310 Mo | 0.12 | 0.75 | 1.0 - 2.5 | 25.0 - 28.0 | 20.0 - 22.0 | 2.0 - 3.0 | 550 | 30 |
| E 312 | 0.15 | 0.90 | 0.5 - 2.5 | 28.0 - 32.0 | 8.0 - 10.5 | 0.75 | 660 | 22 |
| E 316 | 0.08 | 0.90 | 0.5 - 2.5 | 17.0 - 20.0 | 11.0 - 14.0 | 2.0 - 3.0 | 520 | 30 |
| E 316 H | 0.04 - 0.08 | 0.90 | 0.5 - 2.5 | 17.0 - 20.0 | 11.0 - 14.0 | 2.0 - 3.0 | 520 | 30 |
| E 316 L | 0.04 | 0.90 | 0.5 - 2.5 | 17.0 - 20.0 | 11.0 - 14.0 | 2.0 - 3.0 | 490 | 30 |
| E 317 | 0.08 | 0.90 | 0.5 - 2.5 | 18.0 - 21.0 | 12.0 - 14.0 | 3.0 - 4.0 | 550 | 30 |
| E 317 L | 0.04 | 0.90 | 0.5 - 2.5 | 18.0 - 21.0 | 12.0 - 14.0 | 3.0 - 4.0 | 520 | 30 |
| E 318 [3] | 0.08 | 0.90 | 0.5 - 2.5 | 17.0 - 20.0 | 11.0 - 14.0 | 2.0 - 3.0 | 550 | 25 |
| E 320 [2,3] | 0.07 | 0.60 | 0.5 - 2.5 | 19.0 - 21.0 | 32.0 - 36.0 | 2.0 - 3.0 | 550 | 30 |
| E 320 LR [2,3] | 0.03 | 0.30 | 1.50 - 2.5 | 19.0 - 21.0 | 32.0 - 36.0 | 2.0 - 3.0 | 520 | 30 |
| E 330 | 0.18 - 0.25 | 0.90 | 1.0 - 2.5 | 14.0 - 17.0 | 33.0 - 37.0 | 0.75 | 520 | 25 |
| E 330 H | 0.35 - 0.45 | 0.90 | 1.0 - 2.5 | 14.0 - 17.0 | 33.0 - 37.0 | 0.75 | 620 | 10 |
| E 347 | 0.08 | 0.90 | 0.5 - 2.5 | 18.0 - 21.0 | 9.0 - 11.0 | 0.75 | 520 | 30 |
| E 349 | 0.13 | 0.90 | 0.5 - 2.5 | 18.0 - 21.0 | 8.0 - 10.0 | 0.35 - 0.65 | 690 | 25 |
| E 383 | 0.03 | 0.90 | 0.5 - 2.5 | 26.5 - 29.0 | 30.0 - 33.0 | 3.2 - 4.2 | 520 | 30 |
| E 385 | 0.03 | 0.75 | 1.0 - 2.5 | 19.5 - 21.5 | 24.0 - 26.0 | 4.2 - 5.2 | 520 | 30 |
| E 410 | 0.12 | 0.90 | 1.0 | 11.0 - 13.5 | 0.7 | 0.75 | 450 | 20 |
| E 410 NiMo | 0.06 | 0.90 | 1.0 | 11.0 - 12.5 | 4.0 - 5.0 | 0.40 - 0.70 | 760 | 15 |
| E 430 | 0.10 | 0.90 | 1.0 | 15.0 - 18.0 | 0.6 | 0.75 | 450 | 20 |
| E 502 | 0.10 | 0.90 | 1.0 | 4.0 - 6.0 | 0.4 | 0.45 - 0.65 | 420 | 20 |
| E 505 | 0.10 | 0.90 | 1.0 | 8.0 - 10.5 | 0.4 | 0.85 - 1.20 | 420 | 20 |
| E 630 [2,3] | 0.05 | 0.75 | 0.25 - 0.75 | 16.00 - 16.75 | 4.5 - 5.0 | 0.75 | 930 | 7 |
| E 16-8-2 | 0.10 | 0.60 | 0.5 - 2.5 | 14.5 - 16.5 | 7.5 - 9.5 | 1.0 - 2.0 | 550 | 35 |
| E 7 Cr | 0.10 | 0.90 | 1.0 | 6.0 - 8.0 | 0.4 | 0.45 - 0.65 | 420 | 20 |
| E 2209 [1] | 0.04 | 0.90 | 0.5 - 2.0 | 21.5 - 23.5 | 8.5 - 10.5 | 2.5 - 3.5 | 690 | 20 |
| E 2553 [1,2] | 0.06 | 1.0 | 0.5 - 1.5 | 24.0 - 27.0 | 6.5 - 8.5 | 2.9 - 3.9 | 760 | 15 |

1)Weld metal includes N.
2) Weld metal includes cu.
3) Weld metal includes Cb (Nb)+Ta.

# Table of Cast Iron Electrodes According to TS EN ISO 1071

| E | NiFe - CI |
|---|---|
| Coated Electrodes | |

| Symbol | Product Structure | Composition of the weld metal % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Si | Mn | P | S | Fe | Ni | Cu | Not | Other elements |
| Coated Electrodes | | | | | | | | | | | |
| Fe-1 | E, S, T | 2,0 | 1,5 | 0,5-1,5 | 0,04 | 0,04 | rest | - | - | - | 1,0 |
| St | E, S, T | 0,15 | 1,0 | 0,8 | 0,04 | 0,04 | rest | - | 0,35 | - | 0,4 |
| Fe-2 | E, T | 0,2 | 1,5 | 0,3-1,5 | 0,04 | 0,04 | rest | - | - | Nb+V: 5,0-10,0 | 1,0 |
| Ni-CI | E | 2,0 | 4,0 | 2,5 | - | 0,03 | 8,0 | min.85 | 2,5 | Al: 1,0 | 2,0 |
| | S | 1,0 | 0,75 | 2,5 | - | 0,03 | 4,0 | min.90 | 4,0 | - | 1,0 |
| Ni-CI-A | E | 2,0 | 4,0 | 2,5 | - | 0,03 | 8,0 | min.85 | 2,5 | Al: 1,0-3,0 | 1,0 |
| NiFe-1 | E, S, T | 2,0 | 4,0 | 2,5 | 0,03 | 0,03 | rest | 45-70 | 4,0 | Al: 1,0 | 1,0 |
| NiFe-2 | E, S, T | 2,0 | 4,0 | 1,0-5,0 | 0,03 | 0,03 | rest | 45-60 | 2,5 | elements that produce carbide 3,0 | 1,0 |
| NiFe-CI | E | 2,0 | 4,0 | 2,5 | - | 0,04 | rest | 40-60 | 2,5 | Al: 1,0 | 1,0 |
| NiFeT3-CI | T | 2,0 | 1,0 | 3,0-5,0 | - | 0,03 | rest | 45-60 | 2,5 | Al: 1,0 | 1,0 |
| NiFeCI-A | E | 2,0 | 4,0 | 2,5 | - | 0,03 | rest | 45-60 | 2,5 | Al: 1,0-3,0 | 1,0 |
| NiFeMn-CI | E | 2,0 | 1,0 | 10,1 | - | 0,03 | rest | 35-45 | 2,5 | Al: 1,0 | 1,0 |
| | S | 0,5 | 1,0 | 10 - 14 | | 0,03 | rest | 35-45 | 2,5 | Al: 1,0 | 1,0 |
| NiCu | E, S, T | 1,7 | 1,0 | 2,5 | - | 0,04 | 5,0 | 50-75 | rest | - | 1,0 |
| NiCu-A | E, S | 0,35-0,55 | 0,75 | 2,3 | - | 0,025 | 3,0-6,0 | 50-60 | 35-45 | - | 1,0 |
| NiCu-B | E, S | 0,35-0,55 | 0,75 | 2,3 | - | 0,025 | 3,0-6,0 | 60-70 | 25-35 | - | 1,0 |
| Z | R, E, T | Any agreed composition | | | | | | | | | |
| Single values shown in the table mean maximum values unless noted otherwise. | | | | | | | | | | | |

| Symbol | Abbreviation of the consumable | Tensile Strength | Yield Strength | Elongation |
|---|---|---|---|---|
| | | MPa | MPa | % |
| Fe-1 | E C Fe - 1 | No values, only for surface coating (intermediate transverse layers) | | |
| St | E C St | | | |
| Fe-2 | E C Fe-2<br>T C Fe-2 | 320 | 440 | 8 |
| Ni-CI | E C Ni-CI | 200 | 250 | 3 |
| | S C Ni-CI | 200 | 250 | 3 |
| Ni-CI-A | E C NiCI-A | 200 | 250 | 3 |
| NiFe-1 | E/S/T C NiFe1 | 290 | 420 | 6 |
| NiFe-2 | E/S/T C NiFe2 | 290 | 420 | 6 |
| NiFe-CI | | 250 | 350 | 6 |
| NiFeT3-CI | T C NiFeT3-CI | 250 | 350 | 12 |
| 350 NiFe-CI-A | E C NiFeCI-A | 250 | 350 | 4 |
| NiFeMn-CI | E S NiFeMn-CI | 350 | 450 | 10 |
| | S C NiFeMn-CI | 350 | 450 | 15 |
| NiCu | E C NiCu | 190 | 300 | 15 |

| Symbol | Weld metal recovery rate (%) | Current Type |
|---|---|---|
| 1 | ≤ 105 | AC - DC |
| 2 | ≤ 105 | DC |
| 3 | > 105≤125 | AC - DC |
| 4 | >105≤125 | DC |
| 5 | >105≤125 | AC - DC |
| 6 | >105≤125 | DC |
| 7 | >160 | AC - DC |
| 8 | >160 | DC |

# Table of Cast Iron Electrodes according to AWS A5.15

E | NiFe - CI

Coated Electrodes

| Symbol | Composition of the weld metal | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | Fe | Ni | Mo | Cu | Mg | Al | Ce | Other elements |
| **Coated Electrodes** | | | | | | | | | | | | | |
| ENi-CI | 2,00 | 2,50 | 4,00 | — | 0,03 | 8,00 | min. 85 | — | 2,50 | — | 1,00 | — | 1,00 |
| ENi-CI-A | 2,00 | 2,50 | 4,00 | — | 0,03 | 8,00 | min. 85 | — | 2,50 | — | 1,0-3,0 | — | 1,00 |
| ENiFe-CI | 2,00 | 2,50 | 4,00 | — | 0,03 | Rest | 45-60 | — | 2,50 | — | 1,00 | — | 1,00 |
| ENiFe-CI-A | 2,00 | 2,50 | 4,00 | — | 0,03 | Rest | 45-60 | — | 2,50 | — | 1,0-3,0 | — | 1,00 |
| ENiFeMn-CI | 2,00 | 10,0-14,0 | 1,00 | — | 0,03 | Rest | 35-45 | — | 2,50 | — | 1,00 | — | 1,00 |
| ENiCu-A | 0,35-0,55 | 2,30 | 0,75 | — | 0,025 | 3,0-6,0 | 50-60 | — | 35-45 | — | — | — | 1,00 |
| ENiCu-B | 0,35-0,55 | 2,30 | 0,75 | — | 0,025 | 3,0-6,0 | 60-70 | — | 25-35 | — | — | — | 1,00 |
| **Flux-cored Wires** | | | | | | | | | | | | | |
| ENiFeT3-CI | 2,00 | 3,0-5,0 | 1,00 | — | 0,03 | Rest | 45-60 | — | 2,50 | — | 1,00 | — | 1,00 |
| **Core Wire** | | | | | | | | | | | | | |
| E St | 0,15 | 0,60 | 0,15 | 0,04 | 0,04 | Rest | — | — | — | — | — | — | — |
| **Cast Iron Welding Rods for Oxy-acetylene Welding** | | | | | | | | | | | | | |
| RCI | 3,2-3,5 | 0,60-0,75 | 2,7-3,0 | 0,50-0,75 | 0,10 | Rest | eser | eser | — | — | — | — | — |
| RCI-A | 3,2-3,5 | 0,50-0,70 | 2,0-2,5 | 0,20-0,40 | 0,10 | Rest | 1,2-1,6 | 0,25-0,45 | — | — | — | — | — |
| RCI-B | 3,2-4,0 | 0,10-0,40 | 3,2-3,8 | 0,05 | 0,015 | Rest | 0,50 | — | — | 0,04-0,10 | — | 0,20 | — |
| **TIG Rods** | | | | | | | | | | | | | |
| ERNi-CI | 1,00 | 2,50 | 0,75 | | 0,03 | 4,00 | min. 90 | | 4,00 | | | | 1,00 |
| ERNiFeMn-CI | 0,50 | 10,0-14,0 | 1,00 | | 0,03 | Rest | 35-45 | | 2,50 | | 1,00 | | 1,00 |

| Symbol | Tensile Strength min. | | Yield Strength min. | | Elongation | Hardness |
|---|---|---|---|---|---|---|
| | (ksi) | (N/mm²) | (ksi) | (N/mm²) | % | BHN |
| RCI | 20-25 | 138-172 | — | — | — | 150-210 |
| RCI-A | 35-40 | 241-276 | — | — | — | 225-290 |
| RCI-B (kaynaklı) | 80-90 | 552-621 | 70-75 | 483-517 | 3,0-5,0 | 220-310 |
| RCI-B (tavlı) | 50-60 | 345 | 40-45 | 276-310 | 5,0-15,0 | 150-200 |
| E St | — | — | — | — | — | 250-400 |
| ENi-CI | 40-65 | 276-448 | 38-60 | 262-414 | 3,0-6,0 | 135-218 |
| ENi-CI-A | 40-65 | 276-448 | 38-60 | 262-414 | 3,0-6,0 | 135-218 |
| ENiFe-CI | 58-84 | 400-579 | 43-63 | 296-434 | 6,0-18,0 | 165-218 |
| ENiFe-CI-A | 58-84 | 400-579 | 43-63 | 296-434 | 4,0-12,0 | 165-218 |
| ENiFeMn-CI | 75-95 | 517-655 | 60-70 | 414-483 | 10,0-18,0 | 165-210 |
| ENiFeT3-CI | 65-80 | 448-552 | 40-55 | 276-379 | 12,0-20,0 | 150-165 |
| ERNiFeMn-CI | 75-100 | 517-689 | 65-80 | 448-552 | 15-35 | 165-210 |

# Table of Electrodes for Hardfacing according to TS EN 14700

| E | Fe12 |
|---|---|

| Symbol | Production Form |
|---|---|
| E | Coated Electrodes |
| S | Wires or Rods |
| T | Flux-cored Wires of Flux-cored Rods |
| R | Cast Iron Welding Rods |
| B | Strips |
| C | Sintered rods, strips or flux-cored-strips |
| P | Metal Powder |

| Alloy Symbol | Acceptance | Chemical Composition % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Cr | Ni | Mn | Mo | W | V | Nb | other | rest |
| Fe1 | p | ≤ 0,4 | ≤ 3,5 | --- | 0,5 – 3 | ≤ 1 | ≤ 1 | ≤ 1 | --- | --- | Fe |
| Fe2 | p | 0,4 – 1,2 | ≤ 7 | ≤ 1 | 0,5 – 3 | ≤ 1 | ≤ 1 | ≤ 1 | --- | --- | Fe |
| Fe3 | st | 0,2 – 0,5 | 1 – 8 | ≤ 5 | ≤ 3 | ≤ 4,5 | ≤ 10 | ≤ 1,5 | --- | Co, Si | Fe |
| Fe4 | st (p) | 0,2 – 1,5 | 2 – 6 | ≤ 4 | ≤ 3 | ≤ 10 | ≤ 19 | ≤ 4 | --- | Co, Si | Fe |
| Fe5 | c p s t w | ≤ 0,5 | ≤ 0,1 | 17 – 22 | ≤ 1 | 3 – 5 | --- | --- | --- | Co, Ti | Fe |
| Fe6 | g p s | ≤ 2,5 | ≤ 10 | --- | ≤ 3 | ≤ 3 | --- | --- | ≤ 10 | Ti | Fe |
| Fe7 | c p t | ≤ 0,2 | 4 – 30 | ≤ 6 | ≤ 3 | ≤ 2 | --- | ≤ 1 | ≤ 1 | Si | Fe |
| Fe8 | g p t | ≤ 0,2 – 2 | 5 – 18 | --- | 0,3 – 3 | ≤ 4,5 | ≤ 2 | ≤ 2 | ≤ 10 | Si, Ti | Fe |
| Fe9 | k (n) p | 0,3 – 1,2 | ≤ 19 | ≤ 3 | 11 – 18 | ≤ 2 | --- | ≤ 1 | --- | Ti | Fe |
| Fe10 | c k (n) p z | ≤ 0,25 | 17 – 22 | 7 – 11 | 3 – 8 | ≤ 1,5 | --- | --- | ≤ 1,5 | Si | Fe |
| Fe11 | c n z | ≤ 0,3 | 18 – 31 | 8 – 20 | ≤ 3 | ≤ 4 | --- | --- | ≤ 1,5 | Cu | Fe |
| Fe12 | c (n) z | ≤ 0,08 | 17 – 26 | 9 – 26 | 0,5 – 3 | ≤ 4 | --- | --- | ≤ 1,5 | --- | Fe |
| Fe13 | G | ≤ 1,5 | ≤ 6,5 | ≤ 4 | 0,5 – 3 | ≤ 4 | --- | --- | ---- | B, Ti | Fe |
| Fe14 | g (c) | 1,5 – 4,5 | 25 – 40 | ≤ 4 | 0,5 – 3 | ≤ 4 | --- | --- | --- | --- | Fe |
| Fe15 | g | 4,5 – 5,5 | 20 – 40 | ≤ 4 | 0,5 – 3 | ≤ 2 | --- | --- | ≤ 10 | B | Fe |
| Fe16 | g z | 4,0 – 7,5 | 10 – 40 | --- | ≤ 3 | ≤ 9 | ≤ 8 | ≤ 10 | ≤ 10 | B, Co | Fe |
| Fe20 | c g t z | hardfacing mat. | --- | --- | --- | --- | --- | --- | --- | --- | Fe |
| Ni1 | c p t | ≤ 1 | 15 – 30 | rest | 0,3 – 1 | ≤ 6 | ≤ 2 | ≤ 1 | ---- | Si, Fe, B | Ni |
| Ni2 | c k p t z | ≤ 0,1 | 15 – 30 | rest | ≤ 1,5 | ≤ 28 | ≤ 8 | ≤ 1 | ≤ 4 | Co, Si, Ti | Ni |
| Ni3 | c p t | ≤ 1 | 1 – 15 | rest | 0,3 – 1 | ≤ 6 | ≤ 2 | ≤ 1 | --- | Si, Fe, B | Ni |
| Ni4 | c k p t z | ≤ 0,1 | 1 – 15 | rest | ≤ 1,5 | ≤28 | ≤ 8 | ≤ 1 | ≤ 4 | Co, Si, Ti | Ni |
| Ni20 | c g t z | hardfacing mat. | --- | --- | --- | --- | --- | --- | --- | --- | Ni |
| Co1 | c k t z | ≤ 0,6 | ≤ 0,6 | 20 – 30 | ≤ 10 | ≤ 10 | ≤ 15 | --- | --- | Fe | Co |
| Co2 | t z (c s) | 0,6 – 3 | 20 – 35 | ≤ 4 | 0,1 – 2 | --- | 6 – 14 | --- | --- | Fe | Co |
| Co3 | t z (c s) | 1 – 3 | 20 – 35 | ≤ 4 | ≤ 2 | ≤ 1 | 6 – 14 | --- | --- | Fe | Co |
| Cu1 | c (n) | --- | --- | ≤ 6 | ≤ 15 | --- | --- | --- | --- | Al, Fe, Sn | Cu |
| Al1 | c n | --- | --- | --- | 10 – 35 | ≤ 0,5 | --- | --- | --- | Cu, Si | Al |
| Cr1 | c g | 1 – 5 | rest | --- | ≤ 1 | --- | --- | 15 – 30 | --- | Fe, B, Si, Zr | Cr |

Acceptance: c: corrosion resistance n: non-magnetized t: heat resisting
g: abrasion resisting p: impact resisting z: oxidation resisting
k: working hardening s: shearing ability w: precipitation hardening

a)Analyses that do not fit this table is signified with z.

# Table of Surfacing Electrodes according to AWS A5.13

**E FeMn-A**

| Symbol | UNS Number | Chemical Composition % | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Mn | Si | Cr | Ni | Mo | V | W | Other | Fe | Other elements total |
| IRON BASE SURFACING ELECTRODES a) | | | | | | | | | | | | |
| EFe1 | W74001 | 0,04-0,20 | 0,5-2,0 | 1,0 | 0,5-3,5 | --- | 1,5 | --- | --- | --- | rest | 1,0 |
| EFe2 | W74002 | 0,10-0,30 | 0,0-2,0 | 1,0 | 1,8-3,8 | 1,0 | 1,0 | 0,35 | --- | --- | rest | 1,0 |
| EFe3 | W74003 | 0,50-0,80 | 0,5-1,5 | 1,0 | 4,0-8,0 | --- | 1,0 | --- | --- | --- | rest | 1,0 |
| EFe4 | W74004 | 1,0-2,0 | 0,5-2,0 | 1,0 | 3,0-5,0 | --- | --- | --- | --- | --- | rest | 1,0 |
| EFe5 | W75110 | 0,30-0,80 | 1,5-2,5 | 0,90 | 1,5-3,0 | --- | 7,0-9,5 | 0,5-1,5 | 0,5-1,5 | --- | rest | 1,0 |
| EFe6 | W77510 | 0,6-1,0 | 0,4-1,0 | 1,0 | 3,0-5,0 | --- | 7,0-9,5 | 0,5-1,5 | 0,5-1,5 | --- | rest | 1,0 |
| EFe7 | W77610 | 1,5-3,0 | 0,5-2,0 | 1,5 | 4,0-8,0 | --- | 1,0 | --- | --- | --- | rest | 1,0 |
| EFeMn-A | W79110 | 0,5-1,0 | 12-16 | 1,3 | --- | 2,5-5,0 | --- | --- | --- | --- | rest | 1,0 |
| EFeMn-B | W79310 | 0,5-1,0 | 12-16 | 1,3 | --- | ---- | 0,5-1,5 | --- | --- | --- | rest | 1,0 |
| EFeMn-C | W79210 | 0,5-1,0 | 12-16 | 1,3 | 2,5-5,0 | 2,85-5,0 | --- | --- | --- | --- | rest | 1,0 |
| EFeMn-D | W79410 | 0,5-1,0 | 15-20 | 1,3 | 4,5-7,5 | --- | --- | 0,4-1,2 | --- | --- | rest | 1,0 |
| EFeMn-E | W79510 | 0,5-1,0 | 15-20 | 1,3 | 3,0-6,0 | 1,0 | --- | --- | --- | --- | rest | 1,0 |
| EFeMn-F | W79610 | 0,8-1,2 | 17-21 | 1,3 | 3,0-6,0 | 1,0 | --- | --- | --- | --- | rest | 1,0 |
| EFeMnCr | W79710 | 0,25-0,75 | 12-18 | 1,3 | 13-17 | 0,5-2,0 | 2,0 | 1,0 | --- | --- | rest | 1,0 |
| EFeCr-A1-A | W74011 | 3,5-4,5 | 4,0-6,0 | 0,5-2,0 | 20-25 | --- | 0,5 | --- | --- | --- | rest | 1,0 |
| EFeCr-A2 | W74012 | 2,5-3,5 | 0,5-1,5 | 0,5-1,5 | 7,5-9,0 | --- | --- | --- | --- | Ti 1,2-1,8 | rest | 1,0 |
| EFeCr-A3 | W74013 | 2,5-4,5 | 0,5-2,0 | 1,0-2,5 | 14-20 | --- | 1,5 | --- | --- | --- | rest | 1,0 |
| EFeCr-A4 | W74014 | 3,5-4,5 | 1,5-3,5 | 1,5 | 23-29 | --- | 1,0-3,0 | --- | --- | --- | rest | 1,0 |
| EFeCr-A5 | W74015 | 1,5-2,5 | 0,5-1,5 | 2,0 | 24-32 | 4,0 | 4,0 | --- | --- | --- | rest | 1,0 |
| EFeCr-A6 | W74016 | 2,5-3,5 | 0,5-1,5 | 1,0-2,5 | 24-30 | --- | 0,5-2,0 | --- | --- | --- | rest | 1,0 |
| EFeCr-A7 | W74017 | 3,5-5,0 | 0,5-1,5 | 0,5-2,5 | 23-30 | --- | 2,0-4,5 | --- | --- | --- | rest | 1,0 |
| EFeCr-A8 | W74018 | 2,5-4,5 | 0,5-1,5 | 1,5 | 30-40 | --- | 2,0 | --- | --- | --- | rest | 1,0 |
| EFeCr-E1 | W74211 | 5,0-6,5 | 2,0-3,0 | 0,8-1,5 | 12-16 | --- | --- | --- | --- | Ti 4,0-7,0 | rest | 1,0 |
| EFeCr-E2 | W74212 | 4,0-6,0 | 0,5-1,5 | 1,5 | 14-20 | --- | 5,0-7,0 | 1,5 | --- | --- | rest | 1,0 |
| EFeCr-E3 | W74213 | 5,0-7,0 | 0,5-2,0 | 0,5-2,0 | 18-28 | --- | 5,0-7,0 | --- | 3,0-5,0 | --- | rest | 1,0 |
| EFeCr-E4 | W74214 | 4,0-6,0 | 0,5-1,5 | 1,0 | 20-30 | --- | 5,0-7,0 | 0,5-1,5 | 2,0 | Nb 4,0-7,0 | rest | 1,0 |

a)Sulfur and phosphorus contents each shall not exceed 0.035%.

| Symbol | UNS Number | C | Mn | Si | Cr | Ni | Mo | Fe | W | other | Co | Other elements total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nickel and Cobalt Base Surfacing Electrodes | | | | | | | | | | | | |
| ECoCr-A | W73006 | 0,7-1,4 | 2,0 | 2,0 | 25-32 | 3,0 | 1,0 | 5,0 | 3,0-6,0 | --- | rest | 1,0 |
| ECoCr-B | W73012 | 1,0-1,7 | 2,0 | 2,0 | 25-32 | 3,0 | 1,0 | 5,0 | 7,0-9,5 | --- | rest | 1,0 |
| ECoCr-C | W73001 | 1,7-3,0 | 2,0 | 2,0 | 25-33 | 3,0 | 1,0 | 5,0 | 11-14 | --- | rest | 1,0 |
| ECoCr-E | W73021 | 0,15-0,4 | 1,5 | 2,0 | 24-29 | 2,0-4,0 | 4,5-6,5 | 5,0 | 0,50 | --- | rest | 1,0 |
| ENiCr-C | W89606 | 0,5-1,0 | --- | 3,5-5,5 | 12-18 | rest | --- | 3,5-5,5 | --- | B 2,5-4,5 | 1,0 | 1,0 |
| ENiCrMo-5A | W80002 | 0,12 | 1,0 | 1,0 | 14-18 | rest | 14-18 | 4,0-7,0 | 3,0-5,0 | V 0,40 | --- | 1,0 |
| ENiCrFeCo | W83002 | 2,2-3,0 | 1,0 | 0,6-1,5 | 25-30 | 10-33 | 7,0-10 | 20-25 | 2,0-4,0 | --- | 10-15 | 1,0 |

b)Sulfur and phosphorus contents each shall not exceed 0.03%.

# Table of Wire Electrodes and Deposits for Gas-shielded Arc Welding of Non-alloy and Fine-grain Steels according to TS EN ISO 14341-A

| G | 42 | 3 | M | G3Si1 |
|---|---|---|---|---|

| Alloy Symbol | Chemical Composition %[1) 2) 3)] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | P | S | Ni | Mo | Al | Ti+Zr |
| GO | 0,06-0,14 | | | | | | | | |
| G2Si | 0,06-0,14 | 0,50-0,80 | 0,90-1,30 | 0,025 | 0,025 | 0,15 | 0,15 | 0,02 | 0,15 |
| G3Si1 | 0,06-0,14 | 0,70-1,00 | 1,30-1,60 | 0,025 | 0,025 | 0,15 | 0,15 | 0,02 | 0,15 |
| G4Si1 | 0,06-0,14 | 0,80-1,20 | 1,60-1,90 | 0,025 | 0,025 | 0,15 | 0,15 | 0,02 | 0,15 |
| G3Si2 | 0,06-0,14 | 1,00-1,30 | 1,30-1,60 | 0,025 | 0,025 | 0,15 | 0,15 | 0,02 | 0,15 |
| G2Ti | 0,04-0,14 | 0,40-0,80 | 0,90-1,40 | 0,025 | 0,025 | 0,15 | 0,15 | 0,05-0,20 | 0,05-0,25 |
| G3Ni1 | 0,06-0,14 | 0,50-0,90 | 1,00-1,60 | 0,025 | 0,025 | 0,80-0,15 | 0,15 | 0,02 | 0,15 |
| G2Ni2 | 0,06-0,14 | 0,40-0,80 | 0,80-1,40 | 0,025 | 0,025 | 2,10-2,70 | 0,15 | 0,02 | 0,15 |
| G2Mo | 0,08-0,14 | 0,30-0,70 | 0,90-1,30 | 0,025 | 0,025 | 0,15 | 0,40-0,60 | 0,02 | 0,15 |
| G4Mo | 0,08-0,14 | 0,50-0,80 | 1,70-2,10 | 0,025 | 0,025 | 0,15 | 0,40-0,60 | 0,02 | 0,15 |
| G2A1 | 0,08-0,14 | 0,30-0,50 | 0,90-1,30 | 0,025 | 0,025 | 0,15 | 0,15 | 0,35-0,75 | 0,15 |

1)Single values shown in the table mean maximum values.
2)If not specified, Cr<%0,15, Cu %0,35 and V %0,03.

| Production / Product | |
|---|---|
| G | Wire Electrodes |
| O | Oxy-acetylene |
| E | Electric arc welding |
| S | Submerged arc welding wires |
| T | Flux-cored wires |
| W | TIG Rods |
| F | Submerged arc welding fluxes |

Symbol for impact properties of all-weld metal

| Symbol | Temperature °C |
|---|---|
| Z | No Requirements |
| A | (+20) |
| 0 | 0 |
| 2 | -20 |
| 3 | -30 |
| 4 | -40 |
| 5 | -50 |
| 6 | -60 |
| 7 | -70 |
| 8 | -80 |

Yield Strength, Tensile Strength and Elongation

| Symbol | ReL ($N/mm^2$) | Rm ($N/mm^2$) | A (%) |
|---|---|---|---|
| 35 | 355 | 440-570 | 22 |
| 38 | 380 | 470-600 | 20 |
| 42 | 420 | 500-640 | 20 |
| 46 | 460 | 530-680 | 20 |
| 50 | 500 | 560-720 | 18 |
| 55 | 550 | 610-780 | 18 |
| 62 | 620 | 690-890 | 18 |
| 69 | 690 | 760-960 | 17 |
| 79 | 790 | 880-1080 | 16 |
| 89 | 890 | 980-1180 | 15 |

Shielding Gas EN 439

| M | Composition |
|---|---|
| C | $CO_2$ |
| N | No Gas |

# Table of Carbon Steel Electrodes and Rods tor Gas Shielded Arc Welding (TIG, MIG) of Non- Alloy Steels according to AWS A5.18

| Chemical Compositions for Solid and Stick Electrodes (%) (a) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A 5.18M | UNS Number | C | Mn | Si | P | S | Ni | | Mo | | Cu | Ti | Zr | Al |
| ER 70S-2 | ER 48S-2 | K10726 | 0,07 | 0,90-1,40 | 0,40-0,70 | 0,025 | 0,035 | 0,15 | 0,15 | 0,15 | 0,03 | 0,50 | 0,05-0,15 | 0,02-0,12 | 0,05-0,15 |
| ER 70S-3 | ER 48S-3 | K11022 | 0,06-0,15 | 0,90-1,40 | 0,45-0,75 | 0,025 | 0,035 | 0,15 | 0,15 | 0,15 | 0,03 | 0,50 | - | - | - |
| ER 70S-4 | ER 48S-4 | K11132 | 0,06-0,15 | 1,00-1,50 | 0,65-0,85 | 0,025 | 0,035 | 0,15 | 0,15 | 0,15 | 0,03 | 0,50 | - | - | - |
| ER 70S-6 | ER 48S-6 | K11140 | 0,06-0,15 | 1,40-1,85 | 0,80-1,15 | | | 0,15 | 0,15 | 0,15 | 0,03 | 0,50 | - | - | - |
| ER 70S-7 | ER 48S-7 | K11125 | 0,07-0,15 | 1,50-2,00 | 0,50-0,80 | 0,025 | 0,035 | 0,15 | 0,15 | 0,15 | 0,03 | 0,50 | - | - | - |
| ER 70S-G | ER 48S-G | - | Not Specified | | | | | | | | | | | | |

a) Single values shown in the table mean maximum values.

Min. Impact Strength of all-weld metal

| ER | 70 | S | - | 6 | H8 |
|---|---|---|---|---|---|

ER: Wire electrodes
E: Stick Electrodes

S: Solid wires
C: Composite wires

| Symbols for hydrogen content of the all-weld metal | |
|---|---|
| Symbol | mL/100g |
| H16 | 16 |
| H8 | 8 |
| H4 | 4 |

| Tensile Test | | | | | | Impact Test |
|---|---|---|---|---|---|---|
| Symbol A5.18 | A5.18M | Shielding Gas | Tensile Strength (Mpa) | Yield Strength (Mpa) | Elongation (%) | Average Impact Strength (Min.) A5.18M |
| ER70S-2 | ER48S-2 | | | | | 27J at -30C |
| ER70S-3 | ER48S-3 | | | | | 27J at -20C |
| ER70S-4 | ER48S-4 | | | | | Not required |
| ER70S-6 | ER48S-6 | $CO_2$ | 480 | 400 | 22 | 27J at -30C |
| ER70S-7 | ER48S-7 | | | | | 27J at -30C |
| ER70S-G | ER48S-G | | 480 | 400 | 22 | a |
| E70C-3X | E48C-3X | 75-80 %Ar/Rem. $CO_2$ or $CO_2$ | 480 | 400 | 22 | 27J at -20C |
| E70C-6X | E48C-6X | | | | | 27J at -30C |
| E70C-G(X) | E48C-G(X) | | 480 | 400 | 22 | a |
| E70C-GS(X) | E48C-GS(X) | | 480 | Not Specified | | Not Required |

a) Specified according to the agreement between the producer and the customer.

# Table of Wire Electrodes, Wires and Rods for Arc Welding of Creep-Resisting Steels according to TS EN ISO 21952-A

| W/G | Cr | Mo | 1 Si |
|---|---|---|---|

| Alloy Symbols | Chemical Composition | | | | | | | | | Mechanical Properties | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | P | S | Cr | Mo | V | Other Elements | Yield Strength (Min.) N/mm² | Tensile Strength (Min.) N/mm² | Elongation (Min.) % | Impact Energy (+20ºC) (Min.) J | Pre-heating and Interpass Temperature ºC | Post Weld Heat Treatment Temperature ºC a) | Duration (minutes) |
| Mo | 0,08-0,15 | 0,05-0,25 | 0,80-1,20 | 0,025 | 0,025 | - | 0,45-0,65 | - | - | 355 | 510 | 22 | 47 | <200 | None | - |
| MoSi | 0,08-0,15 | 0,50-0,80 | 0,70-1,30 | 0,02 | 0,02 | - | 0,40-0,60 | - | - | | | | | | | |
| MnMo | 0,08-0,15 | 0,05-0,25 | 1,30-1,70 | 0,025 | 0,025 | - | 0,45-0,65 | - | - | 355 | 510 | 22 | 47 | <200 | None | - |
| MoV | 0,08-0,15 | 0,10-0,30 | 0,60-1,00 | 0,02 | 0,02 | 0,30-0,60 | 0,50-1,00 | 0,25-0,45 | - | 355 | 510 | 18 | 47 | 200-300 | 690-730 | 60 |
| MoVSi | 0,06-0,15 | 0,40-0,70 | 0,70-1,10 | 0,02 | 0,02 | 0,30-0,60 | 0,50-1,00 | 0,20-0,40 | - | | | | | | | |
| CrMo1 | 0,08-0,15 | 0,05-0,25 | 0,60-1,00 | 0,02 | 0,02 | 0,90-1,30 | 0,40-0,65 | - | - | 355 | 510 | 20 | 47 | 150-250 | 660-700 | 60 |
| CrMo1Si | 0,08-0,15 | 0,50-0,80 | 0,80-1,20 | 0,02 | 0,02 | 0,90-1,30 | 0,40-0,65 | - | - | | | | | | | |
| CrMoV1 | 0,08-0,15 | 0,05-0,25 | 0,80-1,20 | 0,02 | 0,02 | 0,90-1,30 | 0,90-1,30 | 0,10-0,35 | - | 435 | 590 | 15 | 24 | 200-300 | 680-730 | 60 |
| CrMoV1Si | 0,06-0,15 | 0,50-0,80 | 0,80-1,20 | 0,02 | 0,02 | 0,90-1,30 | 0,90-1,30 | 0,10-0,35 | - | | | | | | | |
| CrMo2 | 0,08-0,15 | 0,05-0,25 | 0,30-0,70 | 0,02 | 0,02 | 2,20-2,80 | 0,90-1,15 | - | - | 400 | 500 | 18 | 47 | 200-300 | 690-750 | 60 |
| CrMo2Si | 0,04-0,12 | 0,50-0,80 | 0,80-1,20 | 0,02 | 0,02 | 2,30-3,00 | 0,90-1,20 | - | - | | | | | | | |
| CrMo2Mn2) | 0,1 | 0,5 | 0,50-1,20 | 0,02 | 0,015 | 2,00-2,50 | 0,90-1,20 | - | - | | | | | | | |
| CrMo2L | 0,05 | 0,05-0,25 | 0,30-0,70 | 0,02 | 0,02 | 2,20-2,80 | 0,90-1,15 | - | - | 400 | 500 | 18 | 47 | 200-300 | 690-750 | 60 |
| CrMo2LSi | 0,05 | 0,50-0,80 | 0,80-1,20 | 0,02 | 0,02 | 2,30-3,00 | 0,90-1,20 | - | - | | | | | | | |
| CrMo5 | 0,03-0,10 | 0,20-0,50 | 0,40-0,75 | 0,02 | 0,02 | 5,50-6,50 | 0,50-0,80 | - | - | 400 | 590 | 17 | 47 | 200-300 | 730-760 | 60 |
| CrMo5Si | 0,03-0,10 | 0,30-0,60 | 0,30-0,70 | 0,02 | 0,02 | 5,50-6,50 | 0,50-0,80 | - | - | | | | | | | |
| CrMo9 | 0,06-0,10 | 0,30-0,60 | 0,30-0,70 | 0,025 | 0,025 | 8,50-10,0 | 0,80-1,20 | 0,15 | Ni:1,0 | 435 | 590 | 18 | 34 | 200-300 | 740-780 | 120 |
| CrMo9Si | 0,03-0,10 | 0,40-0,80 | 0,40-0,80 | 0,02 | 0,02 | 8,50-10,0 | 0,80-1,20 | - | - | | | | | | | |
| CrMo91 | 0,07-0,15 | 0,6 | 0,40-1,50 | 0,02 | 0,02 | 8,0-10,5 | 0,80-1,20 | 0,15-0,30 | Ni: 0,4-1,0 Nb: 0,03-0,10 N: 0,02-0,07 Cu: 0,25 | 415 | 585 | 17 | 47 | 250-350 | 750-760 | 180 |
| CrMoWV12 | 0,22-0,30 | 0,05-0,40 | 0,40-1,20 | 0,025 | 0,02 | 10,5-12,5 | 0,80-1,20 | 0,20-0,40 | Ni: 0,8 W: 0,35-0,60 | 550 | 690 | 15 | 34 | 250-350 b) or 400-500 b) | 740-780 | 120 |
| CrMoWV12Si | 0,17-0,24 | 0,20-0,60 | 0,40-1,00 | 0,025 | 0,02 | 10,5-12,0 | 0,80-1,20 | 0,20-0,40 | Ni: 0,8 W: 0,35-0,60 | | | | | | | |
| Z | Any other agreed composition | | | | | | | | | | | | | | | |

1) Unless noted otherwise, Ni<0,3 Cu<0,3 V<0,03 Nb<0,01 Cr<0,2

2) Better if Mn/Si>2

a) Test specimen should be cooled to 300C in an oven not faster than 200 C/hour

b) The test specimen should be cooled to 120-100C right after the welding and it should stay at that temperature at least an hour

# Table of Low-Alloy Steel Electrodes and Rods according to AWS A5.28

ER 80S - B6

| Chemical Composition for Solid Electrodes and Wires | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | C | Mn | Si | P | S | Ni | Cr | Mo | V | Ti | Zr | Al | Cu | Other |
| Carbon-Molybdenum Steel Electrodes and Rods | | | | | | | | | | | | | | |
| ER70S-A1 | 0,12 | 1,30 | 0,3-0,7 | 0,025 | 0,025 | 0,20 | - | 0,4-0,65 | - | - | - | - | 0,35 | 0,50 |
| Chromium-Molybdenum Steel Electrodes and Rods | | | | | | | | | | | | | | |
| ER80SB-2 | 0,07-0,12 | 0,4-0,7 | 0,4-0,7 | 0,025 | 0,025 | 0,20 | 1,2-1,5 | 0,40-0,65 | - | - | - | - | 0,35 | 0,50 |
| ER70SB-2L | 0,05 | 0,4-0,7 | 0,4-0,7 | 0,025 | 0,025 | 0,20 | 1,2-1,5 | 0,40-0,65 | - | - | - | - | 0,35 | 0,50 |
| ER90S-B3 | 0,07-0,12 | 0,4-0,7 | 0,4-0,7 | 0,025 | 0,025 | 0,20 | 2,3-2,7 | 0,9-1,2 | - | - | - | - | 0,35 | 0,50 |
| ER80S-B3L | 0,05 | 0,4-0,7 | 0,4-0,7 | 0,025 | 0,025 | 0,20 | 2,3-2,7 | 0,9-1,2 | - | - | - | - | 0,35 | 0,50 |
| ER80S-B6 | 0,10 | 0,4-0,7 | 0,50 | 0,025 | 0,025 | 0,60 | 4,5-6,0 | 0,45-0,65 | - | - | - | - | 0,35 | 0,50 |
| ER80S-B8 | 0,10 | 0,4-0,7 | 0,50 | 0,025 | 0,025 | 0,50 | 8,0-10,5 | 0,8-1,2 | - | - | - | - | 0,35 | 0,50 |
| ER90S-B9 | 0,07-0,13 | 1,25 | 0,15-0,30 | 0,010 | 0,010 | 1,00 | 8,0-9,5 | 0,8-1,1 | 0,15-0,25 | - | - | 0,04 | 0,20 | 0,50 |
| Nickel Steel Electrodes and Rods | | | | | | | | | | | | | | |
| ER80S-Ni-1 | 0,12 | 1,25 | 0,40-0,80 | 0,025 | 0,025 | 0,8-1,1 | 0,15 | 0,35 | 0,05 | - | - | - | 0,35 | 0,50 |
| ER80S-Ni-2 | 0,12 | 1,25 | 0,40-0,80 | 0,025 | 0,025 | 2,00-2,75 | - | - | - | - | - | - | 0,35 | 0,50 |
| ER80S-Ni-3 | 0,12 | 1,25 | 0,40-0,80 | 0,025 | 0,025 | 3,00-3,75 | - | - | - | - | - | - | 0,35 | 0,50 |
| Manganese-Molybdenum Steel Electrodes and Rods | | | | | | | | | | | | | | |
| ER80S-D2<br>ER90S-D2 | 0,07-0,12 | 1,6-2,1 | 0,5-0,8 | 0,025 | 0,025 | 0,15 | - | 0,4-0,6 | - | - | - | - | 0,5 | 0,5 |
| Other Low-Alloy Steel Electrodes and Rods | | | | | | | | | | | | | | |
| ER100S-1 | 0,08 | 1,25-1,8 | 0,20-0,55 | 0,010 | 0,010 | 1,4-2,1 | 0,30 | 0,25-0,55 | 0,05 | 0,10 | 0,10 | 0,10 | 0,25 | 0,50 |
| ER110S-1 | 0,09 | 1,4-1,8 | 0,20-0,55 | 0,010 | 0,010 | 1,9-2,6 | 0,50 | 0,25-0,55 | 0,04 | 0,10 | 0,10 | 0,10 | 0,25 | 0,50 |
| ER120S-1 | 0,10 | 1,4-1,8 | 0,25-0,60 | 0,010 | 0,010 | 2,0-2,8 | 0,60 | 0,30-0,65 | 0,03 | 0,10 | 0,10 | 0,10 | 0,25 | 0,50 |
| ERXXS-G | Not Specified | | | | | | | | | | | | | |

| Chemical Composition for Composite Electrode Weld Metal | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | C | Mn | Si | P | S | Ni | Cr | Mo | V | Ti | Zr | Al | Cu | Other |
| Manganese-Molybdenum Weld Metal | | | | | | | | | | | | | | |
| E90C-D2 | 0,12 | 1,0-1,9 | 0,90 | 0,025 | 0,030 | - | - | 0,4-0,6 | - | - | - | - | 0,35 | 0,50 |
| Chromium-Molybdenum Weld Metal | | | | | | | | | | | | | | |
| E70C-B2L | 0,05 | 0,4-1,0 | 0,25-0,60 | 0,025 | 0,030 | 0,20 | 1,0-1,5 | 0,40-0,65 | - | - | - | - | 0,35 | 0,50 |
| E80C-B2 | 0,05-0,12 | 0,4-1,0 | 0,25-0,60 | 0,025 | 0,030 | 0,20 | 1,0-1,5 | 0,40-0,65 | - | - | - | - | 0,35 | 0,50 |
| E80C-B3L | 0,05 | 0,4-1,0 | 0,25-0,60 | 0,025 | 0,030 | 0,20 | 2,0-2,5 | 0,90-1,20 | - | - | - | - | 0,35 | 0,50 |
| E90C-B3 | 0,05-0,12 | 0,4-1,0 | 0,25-0,60 | 0,025 | 0,030 | 0,20 | 2,0-2,5 | 0,90-1,20 | - | - | - | - | 0,35 | 0,50 |
| Nickel Weld Metal | | | | | | | | | | | | | | |
| E80C-Ni-1 | 0,12 | 1,50 | 0,90 | 0,025 | 0,030 | 0,8-1,1 | - | 0,30 | - | - | - | - | 0,35 | 0,50 |
| E70C-Ni2 | 0,08 | 1,25 | 0,90 | 0,025 | 0,030 | 1,75-2,75 | - | - | - | - | - | - | 0,35 | 0,50 |
| E80C-Ni2 | 0,12 | 1,50 | 0,90 | 0,025 | 0,030 | 1,75-2,75 | - | - | - | - | - | - | 0,35 | 0,50 |
| E80c-Ni3 | 0,12 | 1,50 | 0,90 | 0,025 | 0,030 | 2,75-3,75 | - | - | - | - | - | - | 0,35 | 0,50 |
| Other Low-Alloy Weld Metal | | | | | | | | | | | | | | |
| EXXC-G | Not Specified | | | | | | | | | | | | | |

| Symbol | Shielding Gas | Tensile Strength (N/mm²) Min. | Yield Strength (N/mm²) Min. | Elongation | Heat Treatment: PWHT (ºC) | Heat Treatment: Interpass Temperature (ºC) | Impact Energy (J) Min. |
|---|---|---|---|---|---|---|---|
| ER70S-B2L | Argon/1-5%$O_2$ | 515 | 400 | 19 | 620±15 | 135 - 165 | Not Required |
| E70C-B2L | | | | | | | Not Required |
| ER70S-A1 | | | | | | | Not Required |
| ER80S-B2 | | 550 | 470 | 19 | | | Not Required |
| E80C-B2 | | | | | | | Not Required |
| ER80S-B3L | | 550 | 470 | 17 | 690±15 | 185 - 215 | Not Required |
| E80C-B3L | | | | | | | Not Required |
| ER90S-B3 | | 620 | 540 | 17 | | | Not Required |
| E90C-B3 | | | | | | | Not Required |
| ER80S-B6 | | 550 | 470 | 17 | 745±15 | 177 - 232 | Not Required |
| ER80S-B8 | | | | | 745±15 | 205 - 260 | Not Required |
| ER90S-B9 | Argon/5%$O_2$ | 620 | 410 | 16 | 745±15 | 150 - 260 | Not Required |
| E70C-Ni-2 | Argon/1-5%$O_2$ | 480 | 400 | 24 | 620±15 | 135 - 165 | - 62 °C 27 J |
| ER80S-Ni1 | | 550 | 470 | 24 | - | 135 - 165 | - 46 °C 27 J |
| E80C-Ni1 | | | | | - | 135 - 165 | - 46 °C 27 J |
| ER80S-Ni2 | | 550 | 470 | 24 | 620±15 | 135 - 165 | - 62 °C 27 J |
| E80C-Ni2 | | | | | 620±15 | 135 - 165 | - 62 °C 27 J |
| ER80S-Ni3 | | | | | 620±15 | 135 - 165 | - 73 °C 27 J |
| E80C-Ni3 | | | | | 620±15 | 135 - 165 | - 73 °C 27 J |
| ER80S-D2 | $CO_2$ | 550 | 470 | 17 | - | 135 - 165 | - 29 °C 27 J |
| ER90S-D2 | Argon/1-5%$O_2$ | 620 | 540 | 17 | - | 135 - 165 | - 29 °C 27 J |
| E90C-D2 | | | | | - | 135 - 165 | - 29 °C 27 J |
| ER100S-1 | Argon/2%$O_2$ | 690 | 610 | 16 | - | 135 - 165 | - 51 °C 68 J |
| ER110S-1 | | 760 | 660 | 15 | - | 135 - 165 | - 51 °C 68 J |
| ER120S-1 | | 830 | 730 | 14 | | 135 - 165 | - 51 °C 68 J |
| ER70S-G<br>E70C-G | Not Specified (Specified according to the producer and the customer) | 480 | Not Specified (Specified according to the producer and the customer) | Not Specified (Specified according to the producer and the customer) | Not Specified (Specified according to the producer and the customer) | Not Specified (Specified according to the producer and the customer) | Not Specified (Specified according to the producer and the customer) |
| ER80S-G<br>E80C-G | | 550 | | | | | |
| ER90S-G<br>E90C-G | | 620 | | | | | |
| ER100S-G<br>E100C-G | | 690 | | | | | |
| ER110S-G<br>E110C-G | | 760 | | | | | |
| ER120S-G<br>E120C-G | | 830 | | | | | |

# Table of Wire Electrodes of Arc Welding of Stainless and Heat-Resisting Steels According to TS EN ISO 14343-A

G | 19 12 3 Nb

| Production/Product | |
|---|---|
| G: | MIG Wires |
| W: | TIG Rods |
| S: | Submerged Arc Welding Wires |
| P: | Plasma |

| Alloy Symbol | Chemical Composition%1)2) | | | | | | | | | Mechanical Properties | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | P[5] | S[5] | Cr | Ni | Mo | Other Elements | Tensile Strength ($N/mm^2$) Min. | Yield Strength ($N/mm^2$ Min. | Elongation (%) Min. | Post Weld Heat Treatment |
| **Martensitic / Ferritic** | | | | | | | | | | | | | |
| 13 | 0,15 | 1,0 | 1,0 | 0,03 | 0,02 | 12,0-15,0 | - | 0,3 | Cu<%0,3 and Ni<%0,3 | 250 | 450 | 15 | 840-870 C for 2h |
| 13 L | 0,05 | 1,0 | 1,0 | 0,03 | 0,02 | 12,0-15,0 | - | 0,3 | Cu<%0,3 and Ni<%0,3 | 250 | 450 | 15 | 840-870 C for 2h |
| 13 4 | 0,05 | 1,0 | 1,0 | 0,03 | 0,02 | 11,0-14,0 | 3,0-5,0 | 0,4-1,0 | Cu<%0,3 and Ni<%0,3 | 500 | 750 | 15 | 580-620 C for 2h |
| 17 | 0,12 | 1,0 | 1,0 | 0,03 | 0,02 | 16,0-19,0 | - | - | Cu<%0,3 and Ni<%0,3 | 300 | 450 | 15 | 760-790 C for 2h |
| **Austenitic** | | | | | | | | | | | | | |
| 19 9 L | 0,03 | 0,65 | 1,0-2,5 | 0,03 | 0,02 | 19,0-21,0 | 9,0-11,0 | 0,3 | Cu<%0,3 and Ni<%0,3 | 320 | 510 | 30 | None |
| 19 9 Nb | 0,08 | 0,65 | 1,0-2,5 | 0,03 | 0,02 | 19,0-21,0 | 9,0-11,0 | 0,3 | Cu<%0,3 and Ni<%0,3 Nb min 10 x % C, max % 1,0 | 350 | 550 | 25 | None |
| 19 12 3 L | 0,03 | 0,65 | 1,0-2,5 | 0,03 | 0,02 | 18,0-20,0 | 11,0-14,0 | 2,5-3,0 | Cu<%0,3 and Ni<%0,3 | 320 | 510 | 25 | None |
| 19 12 3 Nb | 0,08 | 0,65 | 1,0-2,5 | 0,03 | 0,02 | 18,0-20,0 | 11,0-20,0 | 2,5-3,0 | Nb min 10 x % C, max % 1,0 | 350 | 550 | 25 | None |
| **Austenitic- Ferritic High corrosion resistance** | | | | | | | | | | | | | |
| 22 9 3 N L | 0,03 | 1,0 | 2,5 | 0,03 | 0,02 | 21,0-24,0 | 7,0-10,0 | 2,5-4,0 | Cu<%0,3 and Ni<%0,3 N 0,10-0,20 | 450 | 550 | 20 | None |
| 25 7 2 L | 0,03 | 1,0 | 2,5 | 0,03 | 0,02 | 24,0-27,0 | 6,0-8,0 | 1,5-2,5 | Cu<%0,3 and Ni<%0,3 | 500 | 700 | 15 | None |
| 25 9 3 Cu N L | 0,03 | 1,0 | 2,5 | 0,03 | 0,02 | 24,0-27,0 | 8,0-11,0 | 2,5-4,0 | Cu 1,5-2,5; N 0,10-0,20 | 550 | 620 | 18 | None |
| 25 9 4 N L | 0,08 | 0,65 | 1,0-2,5 | 0,03 | 0,02 | 24,0-27,0 | 8,0-10,5 | 2,5-4,5 | N 0,20-0,30; Cu 1,5; W 1,0 | 550 | 620 | 18 | None |
| **Full Austenitic High corrosion resistance** | | | | | | | | | | | | | |
| 18 15 3 L | 0,03 | 1,0 | 1,0-4,0 | 0,03 | 0,02 | 17,0-20,0 | 13,0-16,0 | 2,5-4,0 | Cu<%0,3 and Ni<%0,3 | 300 | 480 | 25 | None |
| 18 16 5 N L | 0,03 | 1,0 | 1,0-4,0 | 0,03 | 0,02 | 17,0-20,0 | 16,0-19,0 | 3,5-5,0 | Cu<%0,3 and Ni<%0,3 N 0,10-0,20 | 300 | 480 | 25 | None |
| 19 13 4 L | 0,03 | 1,0 | 1,0-5,0 | 0,03 | 0,02 | 17,0-20,0 | 12,0-15,0 | 3,0-4,5 | Cu<%0,3 and Ni<%0,3 | 350 | 550 | 25 | None |
| 20 25 5 Cu L | 0,03 | 1,0 | 1,0-5,0 | 0,03 | 0,02 | 19,0-20,0 | 24,0-27,0 | 4,0-6,0 | Cu 1,0-2,0; Ni < % 0,3 | 320 | 510 | 25 | None |
| 20 16 3 Mn L | 0,03 | 1,0 | 5,0-9,0 | 0,03 | 0,02 | 19,0-20,0 | 15,0-18,0 | 2,5-4,5 | Cu<%0,3 and Ni<%0,3 | 320 | 510 | 25 | None |
| 25 22 2 N L | 0,03 | 1,0 | 3,5-6,5 | 0,03 | 0,02 | 24,0-27,0 | 21,0-24,0 | 1,5-3,0 | Cu<%0,3 and Ni<%0,3 N 0,10-0,20 | 320 | 510 | 25 | None |
| 27 31 4 Cu L | 0,03 | 1,0 | 1,0-3,0 | 0,03 | 0,02 | 26,0-29,0 | 30,0-33,0 | 3,0-4,5 | Cu 0,7-1,5; Ni < % 0,3 | 240 | 500 | 25 | None |
| **Special Types** | | | | | | | | | | | | | |
| 18 8 Mn | 0,20 | 1,2 | 5,0-8,0 | 0,03 | 0,03 | 17,0-20,0 | 7,0-10,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 350 | 500 | 25 | None |
| 20 10 3 | 0,12 | 1,0 | 1,0-2,5 | 0,03 | 0,02 | 18,0-21,0 | 8,0-12,0 | 1,5-3,5 | Cu < 0.30 ; Ni < % 0,3 | 400 | 620 | 20 | None |
| 23 12 L | 0,03 | 0,65 | 1,0-2,5 | 0,03 | 0,02 | 22,0-25,0 | 11,0-14,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 320 | 510 | 25 | None |
| 23 12 Nb | 0,08 | 1,0 | 1,0-2,5 | 0,03 | 0,02 | 22,0-25,0 | 11,0-14,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 350 | 550 | 25 | None |
| 23 12 2 L | 0,03 | 1,0 | 1,0-2,5 | 0,03 | 0,02 | 21,0-25,0 | 11,0-15,5 | 2,0-3,5 | Cu < 0.30 ; Ni < % 0,3 | 350 | 550 | 25 | None |
| 29 9 | 0,15 | 1,0 | 1,0-2,5 | 0,03 | 0,02 | 28,0-32,0 | 8,0-12,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 450 | 650 | 15 | None |
| **Heat-Resisting Types** | | | | | | | | | | | | | |
| 16 8 2 | 0,10 | 1,0 | 1,0-2,5 | 0,03 | 0,02 | 14,5-16,5 | 7,5-9,5 | 1,0-2,5 | Cu < 0.30 ; Ni < % 0,3 | 320 | 510 | 25 | None |
| 19 9 H | 0,04-0,08 | 1,0 | 1,0-2,5 | 0,03 | 0,02 | 18,0-21,0 | 9,0-11,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 350 | 550 | 30 | None |
| 19 12 3 H | 0,04-0,08 | 1,0 | 1,0-2,5 | 0,03 | 0,02 | 18,0-20,0 | 11,0-14,0 | -2,0-3,0 | Cu < 0.30 ; Ni < % 0,3 | 350 | 550 | 25 | None |
| 22 12 H | 0,04-0,15 | 2,0 | 1,0-2,5 | 0,03 | 0,02 | 21,0-24,0 | 11,0-14,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 350 | 550 | 25 | None |
| 25 4 | 0,15 | 2,0 | 1,0-2,5 | 0,03 | 0,02 | 24,0-27,0 | 4,0-6,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 450 | 650 | 15 | None |
| 25 20 | 0,08-0,15 | 2,0 | 1,0-2,5 | 0,03 | 0,02 | 24,0-27,0 | 18,0-22,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 350 | 550 | 20 | None |
| 25 20 Mn | 0,08-0,15 | 2,0 | 2,5-5,0 | 0,03 | 0,02 | 24,0-27,0 | 18,0-22,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 350 | 550 | 20 | None |
| 25 20 H | 0,35-0,45 | 2,0 | 1,0-2,5 | 0,03 | 0,02 | 24,0-27,0 | 18,0-22,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 350 | 550 | 10[5] | None |
| 18 36 H | 0,18-0,25 | 0,40-2,0 | 1,0-2,5 | 0,03 | 0,02 | 15,0-19,0 | 33,0-37,0 | 0,3 | Cu < 0.30 ; Ni < % 0,3 | 350 | 550 | 10[5] | None |

1) Single values shown in the table mean maximum values.
2)Si shall be added to the alloy symbol in case Si>0,65 - %1,2.

1) Gauge length is equal to five times the test specimen diameter.

GeKa®

# Table of Wire Electrodes for Arc Welding of Stainless Steels According to AWS A5.9

| ER | 316L Si |
|---|---|

**ER: Wire electrodes**

| Chemical Composition (%) | | | | | | | | Mechanical Values | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | C | Cr | Ni | Mo | Mn | Si | Other Elements | Tensile Strength (MPa) | Elongation (%) | Heat Treatment °C |
| ER209 | 0,05 | 20,5-24,0 | 9,5-12,0 | 1,5-3,0 | 4,0-7,0 | 0,90 | N,V:0,10-0,30 Cu:0,75 | 690 | 15 | None |
| ER218 | 0,10 | 16,0-18,0 | 8,0-9,0 | 0,75 | 7,0-9,0 | 3,5-4,5 | N:0,08-0,18 Cu:0,75 | - | - | - |
| ER219 | 0,05 | 19,0-21,5 | 5,5-7,0 | 0,75 | 8,0-10,0 | 1,00 | N:0,10-0,30 Cu:0,75 | 620 | 15 | None |
| ER240 | 0,05 | 17,0-19,0 | 4,0-6,0 | 0,75 | 10,5-13,5 | 1,00 | N:0,10-0,30 Cu:0,75 | 690 | 15 | None |
| ER307 | 0,04-0,14 | 19,5-22,0 | 8,0-10,7 | 0,5-1,5 | 3,3-4,75 | 0,30-0,65 | Cu:0,75 | 590 | 30 | None |
| ER308 | 0,08 | 19,5-22,0 | 9,0-11,0 | 0,75 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 550 | 35 | None |
| ER308H | 0,04-0,08 | 19,5-22,0 | 9,0-11,0 | 0,50 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 550 | 35 | None |
| ER308L | 0,03 | 19,5-22,0 | 9,0-11,0 | 0,75 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 520 | 35 | None |
| ER308Mo | 0,08 | 18,0-21,0 | 9,0-12,0 | 2,0-3,0 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 550 | 35 | None |
| ER308LMo | 0,04 | 18,0-21,0 | 9,0-12,0 | 2,0-3,0 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 520 | 35 | None |
| ER308Si | 0,08 | 19,5-22,0 | 9,0-11,0 | 0,75 | 1,0-2,5 | 0,65-1,00 | Cu:0,75 | - | - | - |
| ER308LSi | 0,03 | 19,5-22,0 | 9,0-11,0 | 0,75 | 1,0-2,5 | 0,65-1,00 | Cu:0,75 | - | - | - |
| ER309 | 0,12 | 23,0-25,0 | 12,0-14,0 | 0,75 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 550 | 30 | None |
| ER309L | 0,03 | 23,0-25,0 | 12,0-14,0 | 0,75 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 520 | 30 | None |
| ER309Mo | 0,12 | 23,0-25,0 | 12,0-14,0 | 2,0-3,0 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 550 | 30 | None |
| ER309LMo | 0,03 | 23,0-25,0 | 12,0-14,0 | 2,0-3,0 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 520 | 30 | None |
| ER309Si | 0,12 | 23,0-25,0 | 12,0-14,0 | 0,75 | 1,0-2,5 | 0,65-1,00 | Cu:0,75 | - | - | - |
| ER309LSi | 0,03 | 23,0-25,0 | 12,0-14,0 | 0,75 | 1,0-2,5 | 0,65-1,00 | Cu:0,75 | - | - | - |
| ER310 | 0,08-0,15 | 25,0-28,0 | 20,0-22,5 | 0,75 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 550 | 30 | None |
| ER312 | 0,15 | 28,0-32,0 | 8,0-10,5 | 0,75 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 660 | 22 | None |
| ER316 | 0,08 | 18,0-20,0 | 11,0-14,0 | 2,0-3,0 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 520 | 30 | None |
| ER316H | 0,04-0,08 | 18,0-20,0 | 11,0-14,0 | 2,0-3,0 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 520 | 30 | None |
| ER316L | 0,03 | 18,0-20,0 | 11,0-14,0 | 2,0-3,0 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 490 | 30 | None |
| ER316Si | 0,08 | 18,0-20,0 | 11,0-14,0 | 2,0-3,0 | 1,0-2,5 | 0,65-1,00 | Cu:0,75 | - | - | - |
| ER316LSi | 0,03 | 18,0-20,0 | 11,0-14,0 | 2,0-3,0 | 1,0-2,5 | 0,65-1,00 | Cu:0,75 | - | - | - |
| ER317 | 0,08 | 18,5-20,5 | 13,0-15,0 | 2,0-3,0 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 550 | 30 | None |
| ER317L | 0,03 | 18,5-20,5 | 13,0-15,0 | 2,0-3,0 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 520 | 30 | None |
| ER318 | 0,08 | 18,0-20,0 | 11,0-14,0 | 2,0-3,0 | 1,0-2,5 | 0,30-0,65 | Cb:8*Cmin/1,0max Cu:0,75 | 550 | 25 | None |
| ER320 | 0,07 | 19,0-21,0 | 32,0-36,0 | 2,0-3,0 | 2,50 | 0,60 | Cb:8*Cmin/1,0max Cu:3,0-4,0 | 550 | 30 | None |
| ER320LR | 0,025 | 19,0-21,0 | 32,0-36,0 | 2,0-3,0 | 1,5-2,5 | 0,15 | Cb:8*Cmin/1,0max Cu:3,0-4,0 | 520 | 30 | None |
| ER321 | 0,08 | 18,5-20,5 | 9,0-10,5 | 0,75 | 1,0-2,5 | 0,30-0,65 | Ti:9*Cmin/1,0max Cu:0,75 | - | - | - |
| ER330 | 0,18-0,25 | 15,0-17,0 | 34,0-37,0 | 0,75 | 1,0-2,5 | 0,30-0,65 | Cu:0,75 | 520 | 25 | None |
| ER347 | 0,08 | 19,0-21,5 | 9,0-11,0 | 0,75 | 1,0-2,5 | 0,30-0,65 | Cb:10*Cmin/1,0max Cu:0,75 | 520 | 30 | None |
| ER347Si | 0,08 | 19,0-21,5 | 9,0-11,0 | 0,75 | 1,0-2,5 | 0,65-1,00 | Cb:10*Cmin/1,0max Cu:0,75 | - | - | - |
| ER383 | 0,025 | 26,5-28,5 | 30,0-33,0 | 3,2-4,2 | 1,0-2,5 | 0,50 | Cu:0,70-1,50 | 520 | 30 | None |
| ER385 | 0,025 | 19,5-21,5 | 24,0-26,0 | 4,2-5,2 | 1,0-2,5 | 0,50 | Cu:1,20-2,00 | 520 | 30 | None |
| ER409 | 0,08 | 10,5-13,5 | 0,60 | 0,50 | 0,80 | 0,50 | Ti:10*Cmin/1,0max Cu:0,75 | - | - | - |
| ER409Cb | 0,08 | 10,5-13,5 | 0,60 | 0,50 | 0,80 | 1,00 | Cb:10*Cmin/1,0max Cu:0,75 | - | - | - |
| ER410 | 0,12 | 11,5-13,5 | 0,60 | 0,75 | 0,60 | 0,50 | Cu:0,75 | 450 | 20 | 730-760 |
| ER410NiMo | 0,06 | 11,0-12,5 | 4,0-5,0 | 0,4-0,7 | 0,60 | 0,50 | Cu:0,75 | 760 | 15 | 595-620 |
| ER420 | 0,25-0,40 | 12,0-14,0 | 0,60 | 0,75 | 0,60 | 0,50 | Cu:0,75 | - | - | - |
| ER430 | 0,10 | 15,5-17,0 | 0,60 | 0,75 | 0,60 | 0,50 | Cu:0,75 | 450 | 20 | 760-790 |
| ER446LMo | 0,015 | 25,0-27,5 | a | 0,75-1,50 | 0,40 | 0,40 | N:0,015 | - | - | - |
| ER502 | 0,10 | 4,6-6,0 | 0,60 | 0,45-0,65 | 0,60 | 0,50 | Cu:0,75 | 420 | 20 | 840-870 |
| ER505 | 0,10 | 8,0-10,5 | 0,50 | 0,8-1,2 | 0,60 | 0,50 | Cu:0,75 | 420 | 20 | 840-870 |
| ER630 | 0,05 | 16,0-16,75 | 4,5-5,0 | 0,75 | 0,25-0,75 | 0,75 | Cb:0,15-0,30 Cu:3,25-4,00 | 930 | 7 | 1025-1050 |
| ER19-10H | 0,04-0,08 | 18,5-20,0 | 9,0-11,0 | 0,25 | 1,0-2,0 | 0,30-0,65 | Ti:0,05 Cb:0,05 Cu:0,75 | - | - | - |
| ER16-8-2 | 0,10 | 14,5-16,5 | 7,5-9,5 | 1,0-2,0 | 1,0-2,0 | 0,30-0,65 | Cu:0,75 | 550 | 35 | None |
| ER2209 | 0,03 | 21,5-23,5 | 7,5-9,5 | 0,50-2,0 | 0,50-2,0 | 0,90 | N:0,08-0,20 Cu:0,75 | 690 | 20 | None |
| ER2553 | 0,04 | 24,0-27,0 | 4,5-6,5 | 1,50 | 1,50 | 1,00 | N:0,10-0,25 Cu:1,5-2,5 | 760 | 15 | None |
| ER3556 | 0,05-0,15 | 21,0-23,0 | 19,0-22,5 | 0,50-2,00 | 0,50-2,0 | 0,20-0,80 | Co:16,0-21,0 | - | - | - |
| | (N:0,10-0,30 W:2,0-3,5 Cb:0,30 Ta:0,30-1,25 Al:0,10-0,50 Zr:0,001-0,10 La:0.005-0,10 B:0,02) | | | | | | | | | |

a) Nickel+Copper total is max. %0,5

# Table of Covered Electrodes for Manual Metal Arc Welding of Nickel and Nickel Alloys According to TS EN ISO 14172

**E – Ni 6625 (NiCr22Mo9Nb)**

| Symbol | Production Form |
|---|---|
| E: | Coated Electrodes |
| S: | Wires or Rods |
| T: | Flux-cored Wires of Flux-cored Rods |
| R: | Cast Iron Welding Rods |
| B: | Strips |
| C: | Sintered rods, strips or flux-cored-strips |
| P: | Metal Powder |

| Alloy Symbol | | Chemical Composition % a) | | | | | | | | | | | | | | | Mechanical Values d) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Numerical | Chemical | C | Mn | Fe | Si | Cu | Ni | Co | Al | Ti | Cr | Nb | Mo | V | W | Notes b) c) | Yield Strength N/mm² | Tensile Strength N/mm² | Elongation Min. A % |
| **Nickel** | | | | | | | | | | | | | | | | | | | |
| Ni 2061 | NiTi3 | 0,10 | 0,7 | 0,7 | 1,2 | 0,2 | 0,2 | - | 1,0 | 1,0-4,0 | - | - | - | - | - | | 200 | 410 | 18 |
| **Nickel-Copper** | | | | | | | | | | | | | | | | | | | |
| Ni 4060 | NiCu30Mn3Ti | 0,15 | 4,0 | 2,5 | 1,5 | 27,0-34,0 | min. 62,0 | - | 1,0 | 1,0 | - | - | - | - | - | | 200 | 480 | 27 |
| Ni4061 | NiCu27Mn3NbTi | 0,15 | 4,0 | 2,5 | 1,3 | 24,0-31,0 | min. 63,0 | - | 1,0 | 1,5 | - | 3,0 | - | - | - | | 200 | 480 | 27 |
| **Nickel-Chromium** | | | | | | | | | | | | | | | | | | | |
| Ni 6082 | NiCr20Mn3Nb | 0,10 | 2,0-6,0 | 4,0 | 0,8 | 0,5 | min. 63,0 | - | - | 0,5 | 18,0-22,0 | 1,5-3,0 | 2,0 | - | - | | 360 | 600 | 22 |
| Ni 6231 | NiCr22W14Mo | 0,05-0,10 | 0,3-1,0 | 3,0 | 0,3-0,7 | 0,5 | min. 45,0 | 5,0 | 0,5 | 0,1 | 20,0-24,0 | - | 1,0-3,0 | - | 13,0-15,0 | | 350 | 620 | 18 |
| **Nickel-Chromium-Iron** | | | | | | | | | | | | | | | | | | | |
| Ni 6025 | NiCr25Fe10AlY | 0,10-0,25 | 0,5 | 8,0-11,0 | 0,8 | - | min. 55,0 | - | 1,5-2,2 | 0,3 | 24,0-26,0 | - | - | - | - | 0,15Y | 400 | 690 | 12 |
| Ni 6062 | NiCr15Fe8Nb | 0,08 | 3,5 | 11,0 | 0,8 | 0,5 | min. 62,0 | - | - | - | 13,0-17,0 | 0,5-4,0 | - | - | - | | 360 | 550 | 27 |
| Ni 6092 | NiCr16Fe12NbMo | 0,10 | 1,0-3,5 | 12,0 | 0,8 | 0,5 | min. 62,0 | - | - | - | 13,0-17,0 | 0,5-3,0 | 0,5-2,5 | - | - | | 360 | 550 | 27 |
| Ni 6093 | NiCr16Fe8NbMo | 0,20 | 1,0-5,0 | 12,0 | 1,0 | 0,5 | min. 60,0 | - | - | - | 13,0-17,0 | 1,0-3,5 | 1,0-3,5 | - | - | | 360 | 650 | 18 |
| Ni 6094 | NiCr14Fe4NbMo | 0,15 | 1,0-4,5 | 12,0 | 0,8 | 0,5 | min. 55,0 | - | - | - | 12,0-17,0 | 0,5-3,0 | 2,5-5,5 | - | 1,5 | | 360 | 650 | 18 |
| Ni 6095 | NiCr15Fe8NbMoW | 0,20 | 1,0-3,5 | 12,0 | 0,8 | 0,5 | min. 55,0 | - | - | - | 13,0-17,0 | 1,0-3,50 | 1,0-3,5 | - | 1,5-3,5 | | 360 | 650 | 18 |
| Ni 6152 | NiCr30Fe9Nb | 0,05 | 5,0 | 7,0-12,0 | 0,8 | 0,5 | min. 50,0 | - | 0,5 | 0,5 | 28,0-31,5 | 1,0-2,5 | 0,5 | - | - | | 360 | 550 | 27 |
| Ni 6182 | NiCr15Fe6Mn | 0,10 | 5,0-10,0 | 1,0 | 0,5 | min. 60,0 | - | - | 1,0 | 13,0-17,0 | 1,0-3,5 | W: - V: - Mo: - Nb: - 0,3 max. Ta where specified | | | | | 360 | 550 | 27 |
| Ni 6333 | NiCr25Fe16CoMbW | 0,10 | 1,2-2,0 | min. 16,0 | 0,8-1,2 | 0,5 | 44,0-47,0 | 2,5-3,5 | - | - | 24,0-26,0 | - | 2,5-3,5 | - | 2,5-3,5 | - | 360 | 550 | 18 |
| Ni6701 | NiCr36Fe7Nb | 0,35-0,50 | 0,5-2,0 | 7,0 | 0,5-2,0 | - | 42,0-48,0 | - | - | - | 33,0-39,0 | 0,8-1,8 | - | - | - | - | 450 | 650 | 8 |
| Ni6702 | NiCr28Fe6W | 0,35-0,50 | 0,5-1,5 | 6,0 | 0,5-2,0 | - | 47,0-50,0 | - | - | - | 27,0-30,0 | - | - | - | 4,0-5,5 | - | 450 | 650 | 8 |
| Ni 6704 | NiCr25Fe10Al3YC | 0,15-0,30 | 0,5 | 8,0-11,0 | 0,8 | - | min. 55,0 | - | 1,8-2,8 | 0,3 | 24,0-26,0 | - | - | - | - | 0,15Y | 400 | 690 | 12 |
| Ni 8025 | NiCr29 Fe30Mo | 0,06 | 1,0-3,0 | 30,0 | 0,7 | 1,5-3,0 | 35,0-40,0 | - | 0,1 | 1,0* | 27,0-31,0 | 1,0 | 2,5-4,5 | - | - | * or Nb | 240 | 550 | 22 |
| Ni 8165 | NiCr25 Fe30Mo | 0,03 | 1,0-3,0 | 30,0 | 0,7 | 1,5-3,0 | 37,0-42,0 | - | 0,1 | 1,0 | 23,0-27,0 | - | 3,5-7,5 | - | - | - | 240 | 550 | 22 |

# Table of Covered Electrodes for Manual Metal Arc Welding of Nickel and Nickel Alloys according to TS EN ISO 14172

Table 1 Continued

| Alloy Symbol | | Chemical Composition % a) | | | | | | | | | | | | | | | Mechanical Values d) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Numerical | Chemical | C | Mn | Fe | Si | Cu | Ni | Co | Al | Ti | Cr | Nb | Mo | V | W | Notes b) c) | Yield Strength N/mm² | Tensile Strength N/mm² | Elongation Min. A % |
| **Nickel-Molybdenum** | | | | | | | | | | | | | | | | | | | |
| Ni 1001 | NiMo28Fe5 | 0,07 | 1,0 | 4,0-7,0 | 1,0 | 0,5 | min. 55,0 | 2,5 | - | - | 1,0 | - | 26,0-30,0 | 0,6 | 1,0 | - | 400 | 690 | 22 |
| Ni 1004 | NiMo25Cr5Fe5 | 0,12 | 1,0 | 4,0-7,0 | 1,0 | 0,5 | min. 60,0 | - | - | - | 2,5-5,5 | - | 23,0-27,0 | 0,6 | 1,0 | - | 400 | 690 | 22 |
| Ni 1008 | NiMo19WCr | 0,10 | 1,5 | 10,0 | 0,8 | 0,5 | min. 60,0 | - | - | - | 0,5-3,5 | - | 17,0-20,0 | - | 2,0-4,0 | - | 360 | 650 | 22 |
| Ni 1009 | NiMo20WCu | 0,10 | 1,5 | 7,0 | 0,8 | 0,3-1,3 | min. 62,0 | - | - | - | - | - | 18,0-22,0 | - | 2,0-4,0 | - | 360 | 650 | 22 |
| Ni 1062 | NiMo24Cr8Fe6 | 0,02 | 1,0 | 4,0-7,0 | 0,7 | - | min. 60,0 | - | - | - | 6,0-9,0 | - | 22,0-26,0 | - | - | - | 360 | 550 | 18 |
| Ni 1066 | NiMo28 | 0,02 | 2,0 | 2,2 | 0,2 | 0,5 | min. 64,5 | - | - | - | 1,0 | - | 26,0-30,0 | - | 1,0 | - | 400 | 690 | 22 |
| Ni 1067 | NiMo30Cr | 0,02 | 2,0 | 1,0-3,0 | 0,2 | 0,5 | min. 62,0 | 3,0 | - | - | 1,0-3,0 | - | 27,0-32,0 | - | 3,0 | - | 350 | 690 | 22 |
| Ni 1069 | NiMo28Fe4Cr | 0,02 | 1,0 | 2,0-5,0 | 0,7 | - | min. 65,0 | 1,0 | 0,5 | - | 0,5-1,5 | - | 26,0-30,0 | - | - | - | 360 | 550 | 20 |
| **Nickel-Chromium-Molybdenum** | | | | | | | | | | | | | | | | | | | |
| Ni 6002 | NiCr22Fe18Mo | 0,05-0,15 | 1,0 | 17,0-20,0 | 1,0 | 0,5 | min. 45,0 | 0,5-2,5 | - | - | 20,0-23,0 | - | 8,0-10,0 | - | 0,2-1,0 | - | 380 | 650 | 18 |
| Ni 6012 | NiCr22Mo9 | 0,03 | 1,0 | 3,5 | 0,7 | 0,5 | min. 58,0 | - | 0,4 | 0,4 | 20,0-23,0 | 1,5 | 8,5-10,5 | - | - | - | 410 | 650 | 22 |
| Ni 6022 | NiCr21Mo13W3 | 0,02 | 1,0 | 2,0-6,0 | 0,2 | 0,5 | min. 49,0 | 2,5 | - | - | 20,0-22,5 | - | 12,5-14,5 | 0,4 | 2,5-3,5 | - | 350 | 690 | 22 |
| Ni 6024 | NiCr26Mo14 | 0,02 | 0,5 | 1,5 | 0,2 | 0,5 | min. 55,0 | - | - | - | 25,0-27,0 | - | 13,5-15,0 | - | - | - | 350 | 690 | 22 |
| Ni 6030 | NiCr29Mo5Fe15W2 | 0,03 | 1,5 | 13,0-17,0 | 1,0 | 1,0-2,4 | min. 36,0 | 5,0 | - | - | 28,0-31,5 | 0,3-1,5 | 4,0-6,0 | - | 1,5-4,0 | - | 350 | 585 | 22 |
| Ni 6059 | NiCr23Mo16 | 0,02 | 1,0 | 1,5 | 0,2 | - | min. 56,0 | - | - | - | 22,0-24,0 | - | 22,0-24,0 | - | - | - | 350 | 690 | 22 |
| Ni 6200 | NiCr23Mo16Cu2 | 0,02 | 1,0 | 3,0 | 0,2 | 1,3-1,9 | min. 45,0 | 2,0 | - | - | 20,0-24,0 | - | 15,0-17,0 | - | - | - | 400 | 690 | 22 |
| Ni 6205 | NiCr25Mo16 | 0,02 | 0,5 | 5,0 | 0,2 | 2,0 | min. 50,0 | - | 0,4 | - | 22,0-27,0 | - | 13,5-16,5 | - | - | - | 400 | 690 | 22 |
| Ni 6275 | NiCr15Mo16Fe5W3 | 0,10 | 1,0 | 4,0-7,0 | 1,0 | 0,5 | min. 50,0 | 2,5 | - | - | 14,5-16,5 | - | 15,0-18,0 | 0,4 | 3,0-4,5 | - | 400 | 690 | 22 |
| Ni 6276 | NiCr15Mo15Fe6W4 | 0,02 | 1,0 | 4,0-7,0 | 0,2 | 0,5 | min. 50,0 | 2,5 | - | - | 14,5-16,5 | - | 15,0-17,0 | 0,4 | 3,0-4,5 | - | 350 | 690 | 22 |
| Ni 6452 | NiCr19Mo15 | 0,025 | 2,0 | 1,5 | 0,4 | 0,5 | min. 56,0 | - | - | - | 18,0-20,0 | 0,4 | 14,0-16,0 | 0,4 | - | - | 350 | 690 | 22 |
| Ni 6455 | NiCr16Mo15Ti | 0,02 | 1,5 | 3,0 | 0,2 | 0,5 | min. 56,0 | 2,0 | - | 0,7 | 14,0-18,0 | - | 14,0-17,0 | - | 0,5 | - | 300 | 690 | 22 |
| Ni 6620 | NiCr14Mo7Fe | 0,10 | 2,0-4,0 | 10,0 | 1,0 | 0,5 | min. 55,0 | - | - | - | 12,0-17,0 | 0,5-2,0 | 5,0-9,0 | - | 1,0-2,0 | - | 350 | 620 | 32 |
| Ni 6625 | NiCr22Mo9Nb | 0,10 | 2,0 | 7,0 | 0,8 | 0,5 | min. 55,0 | - | - | - | 20,0-23,0 | 3,0-4,2 | 8,0-10,0 | - | - | - | 420 | 760 | 27 |
| Ni 6627 | NiCr21MoFeNb | 0,03 | 2,2 | 5,0 | 0,7 | 0,5 | min. 57,0 | - | - | - | 20,5-22,5 | 1,0-2,8 | 8,8-10,0 | - | 0,5 | - | 400 | 650 | 32 |
| Ni 6650 | NiCr20Fe14Mo11WN | 0,03 | 0,7 | 12,0-15,0 | 0,6 | 0,5 | min. 44,0 | 1,0 | 0,5 | - | 19,0-22,0 | 0,3 | 10,0-13,0 | - | 1,0-2,0 | 0,15N 0,02S | 420 | 660 | 30 |
| Ni 6686 | NiCr21Mo16W4 | 0,02 | 1,0 | 5,0 | 0,3 | 0,5 | min. 49,0 | - | - | 0,3 | 19,0-23,0 | - | 15,0-17,0 | - | 3,0-4,4 | - | 350 | 690 | 27 |
| Ni 6985 | NiCr22Mo7Fe19 | 0,02 | 1,0 | 18,0-21,0 | 1,0 | 1,5-2,5 | min. 45,0 | 5,0 | - | - | 21,0-23,5 | 1,0 | 6,0-8,0 | - | 1,5 | - | 350 | 620 | 22 |
| **Nickel-Chromium-Cobalt-Molybdenum** | | | | | | | | | | | | | | | | | | | |
| Ni6617 | NiCr22Co12Mo | 0,05-0,15 | 3,0 | 5,0 | 1,0 | 0,5 | min. 45,0 | 9,0-15,0 | 1,5 | 0,6 | 20,0-26,0 | 1,0 | 8,0-10,0 | - | - | - | 400 | 620 | 22 |

a) Single values for all elements except Ni are maxima.
b) The total of unspecified elements shall not exceed 0,5 %.
c) Phosphorus 0,020 max., sulfur 0,015 max.
d) Mechanical values are min. values.

# Table of Flux-cored Electrodes for Gas-Shielded Arc Welding of Non-alloy and Fine-grain Steels according to TS EN ISO 17632-A

| T | 46 | 3 | 1Ni | B | M | 4 | H5 |
|---|---|---|---|---|---|---|---|

| Production/product | |
|---|---|
| G | Wire Electrodes |
| O | Oxy-acetylene |
| E | Electric arc welding |
| S | Submerged arc welding wires |
| T | Flux-cored wires |
| W | TIG Rods |
| F | Submerged arc welding fluxes |

| Alloy Symbol | Chemical Composition % 1) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Mn | Ni | Mo | Cr | V | Nb | Cu |
| No symbol | 2,0 | 0,5 | 0,2 | 0,2 | 0,08 | 0,05 | 0,3 |
| Mo | 1,4 | 0,5 | 0,3-0,6 | 0,2 | 0,08 | 0,05 | 0,3 |
| MnMo | > 1,4-2,0 | 0,5 | 0,3-0,6 | 0,2 | 0,08 | 0,05 | 0,3 |
| 1 Ni | 1,4 | 0,6-1,2 | 0,2 | 0,2 | 0,08 | 0,05 | 0,3 |
| 1,5 Ni | 1,6 | 1,2-1,8 | 0,2 | 0,2 | 0,08 | 0,05 | 0,3 |
| 2Ni | 1,4 | 1,8-2,6 | 0,2 | 0,2 | 0,08 | 0,05 | 0,3 |
| 3Ni | 1,4 | 2,6-3,8 | 0,2 | 0,2 | 0,08 | 0,05 | 0,3 |
| Mn1Ni1 | >1,4-2,0 | 0,6-1,2 | 0,2 | 0,2 | 0,08 | 0,05 | 0,3 |
| 1 NiMo | 1,4 | 0,6-1,2 | 0,3-0,6 | 0,2 | 0,08 | 0,05 | 0,3 |
| Z | Any other agreed composition | | | | | | |

1)Single values shown in the table mean maximum values.

| Symbols for welding position | |
|---|---|
| 1 | PA; PB; PC; PD; PE; PF; PG |
| 2 | PA; PB; PC; PD; PE; PF; |
| 3 | PA; PB |
| 4 | PA |
| 5 | PA; PB; PG |

| Symbols for hydrogen content of the all-weld metal | |
|---|---|
| Symbol | ml/100g |
| H 5 | 5 |
| H 10 | 10 |
| H 15 | 15 |

| Shielding Gas EN 439 | |
|---|---|
| M | Composition |
| C | $CO_2$ |
| N | No gas |

| Yield Strength, Tensile Strength and Elongation | | | |
|---|---|---|---|
| Symbol | ReL ($N/mm^2$) | Rm ($N/mm^2$) | A (%) |
| 35 | 355 | 440-570 | 22 |
| 38 | 380 | 470-600 | 20 |
| 42 | 420 | 500-640 | 20 |
| 46 | 460 | 530-680 | 20 |
| 50 | 500 | 560-720 | 18 |
| 55 | 550 | 610-780 | 18 |
| 62 | 620 | 690-890 | 18 |
| 69 | 690 | 760-960 | 17 |
| 79 | 790 | 880-1080 | 16 |
| 89 | 890 | 980-1180 | 15 |

| Symbol for impact properties of all-weld metal | |
|---|---|
| Symbol | Temperature C |
| Z | no requirements |
| A | (+20) |
| 0 | 0 |
| 2 | -20 |
| 3 | -30 |
| 4 | -40 |
| 5 | -50 |
| 6 | -60 |
| 7 | -70 |
| 8 | -80 |

| Symbol for Type of Electrode Core | | |
|---|---|---|
| Symbol-Characteristics | Types of Weld | Shielding Gas |
| R Rutile, slow freezing slag | Single and Multiple pass | Required |
| P Rutile, fast freezing slag | Single and Multiple pass | Required |
| B Basic | Single and Multiple pass | Required |
| M Metal Powder | Single and Multiple pass | Required |
| V Rutile or Basic/fluoride | Single Pass | Not Required |
| W Basic/fluoride, slow freezing slag | Single and Multiple pass | Not Required |
| Y Basic/fluoride, fast freezing slag | Single and Multiple pass | Not Required |
| Z Other Types | | |

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# Table of Flux-Cored Wires according to AWS A5.20

| E | 7 | 1 | T | - | 1 | M | J | | H4 |
|---|---|---|---|---|---|---|---|---|---|

E: Electrode

| | |
|---|---|
| 0 | Flat and Horizontal Position |
| 1 | All Welding Positions |

T: Flux-cored Wires

| Yield Strength, Tensile Strength and Elongation % | | | | Symbol for impact properties of all-weld metal |
|---|---|---|---|---|
| Symbol | ReL | Rm | A | |
| E7XT-1, -1M | 400 | 480 | 22 | 27J at 18ºC |
| E7XT-2, -2M | --- | 480 | --- | --- |
| E7XT-3 | --- | 480 | --- | --- |
| E7XT-4 | 400 | 480 | 22 | --- |
| E7XT-5,-5M | 400 | 480 | 22 | 27J at -29ºC |
| E7XT-6 | 400 | 480 | 22 | 27J at -29ºC |
| E7XT-7 | 400 | 480 | 22 | --- |
| E7XT-8 | 400 | 480 | 22 | 27J at -29ºC |
| E7XT-9-9M | 400 | 480 | 22 | 27J at -29ºC |
| E7XT-10 | --- | 480 | --- | --- |
| E7XT-11 | 400 | 480 | 20 | --- |
| EXXT-12, -12M | 400 | 480-620 | 22 | 27J at -29ºC |
| E6XT-13 | --- | 415 | --- | --- |
| E7XT-13 | --- | 480 | --- | --- |
| E6XT-14 | --- | 480 | --- | --- |
| E6XT-G | 330 | 415 | 22 | --- |
| E7XT-G | 400 | 480 | 22 | --- |
| E6XT-GS | --- | 415 | --- | --- |
| E7XT-GS | --- | 480 | --- | --- |

a) Single values are minimum values.

| Alloy Symbol | | Chemical Composition % | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | UNS Number | C | Mn | Si | S | P | Cr | Ni | Mo | V | Al | Cu |
| E7XT-1 | W07601 | | | | | | | | | | | |
| E7XT-1M | | | | | | | | | | | | |
| E7XT5 | W07605 | 0,18 | 1,75 | 0,90 | 0,03 | 0,03 | 0,20 | 0,50 | 0,30 | 0,08 | --- | 0,35 |
| E7XT-5M | | | | | | | | | | | | |
| E7XT-9 | W07609 | | | | | | | | | | | |
| E7XT-9M | | | | | | | | | | | | |
| E7XT-4 | W07604 | | | | | | | | | | | |
| E7XT-6 | W07606 | | | | | | | | | | | |
| E7XT-7 | W07607 | (f) | 1,75 | 0,60 | 0,03 | 0,03 | 0,20 | 0,50 | 0,30 | 0,08 | 1,8 | 0,35 |
| E7XT-8 | W07608 | | | | | | | | | | | |
| E7XT-11 | W07611 | | | | | | | | | | | |
| EXXT-G | --- | (f) | 1,75 | 0,90 | 0,03 | 0,03 | 0,20 | 0,50 | 0,30 | 0,08 | 1,8 | 0,35 |
| E7XT-12 | W07312 | 0,15 | 1,60 | 0,90 | 0,03 | 0,03 | 0,20 | 0,50 | 0,30 | 0,08 | --- | 0,35 |
| E7XT-12M | | | | | | | | | | | | |
| E6XT-13 | W06613 | | | | | | | | | | | |
| E7XT-2 | W07602 | | | | | | | | | | | |
| E7XT-2M | | | | | | | | | | | | |
| E7XT-3 | W07613 | Not Specified | | | | | | | | | | |
| E7XT-10 | W07610 | | | | | | | | | | | |
| E7XT-13 | W07613 | | | | | | | | | | | |
| E7XT-14 | W07614 | | | | | | | | | | | |
| EXXT-GS | --- | | | | | | | | | | | |

f) Limits of this element was not specified. Look at AWS A6.5 for it.

M: 75-80 % Argon - $CO_2$

If no M Symbol, products E70T-3, E70T-4, E70T-6, E70T-7, E70T-8, E70T-10, E70T-11, E71T-11, E61T-13, E71T-13, E71T-14 are used without gas, the rest is used with $CO_2$.

"J" is used if 27J is provided at -40ºC.

| Symbols for hydrogen content of the all-weld metal | |
|---|---|
| Symbol | ml/100g |
| H4 | 16,0 |
| H 8 | 8,0 |

# Table of Electrodes for Submerged Arc Welding of Non-alloy and Fine-grain Steels according to TS EN ISO 14171-A

| S | 38 | 3 | AB | S2 |
|---|---|---|---|---|

| Alloy Symbol | Chemical Composition % 1) 2) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | P | S | Mo | Ni | Cr |
| SO | | | | | | | | |
| S1 | 0,05-0,15 | 0,15 | 0,35-0,60 | 0,025 | 0,025 | 0,15 | 0,15 | 0,15 |
| S2 | 0,07-0,15 | 0,15 | 0,80-1,30 | 0,025 | 0,025 | 0,15 | 0,15 | 0,15 |
| S3 | 0,07-0,15 | 0,15 | > 1,30-1,75 | 0,025 | 0,025 | 0,15 | 0,15 | 0,15 |
| S4 | 0,07-0,15 | 0,15 | > 1,75-2,25 | 0,025 | 0,025 | 0,15 | 0,15 | 0,15 |
| S1Si | 0,07-0,15 | 0,15-0,40 | 0,35-0,60 | 0,025 | 0,025 | 0,15 | 0,15 | 0,15 |
| S2Si | 0,07-0,15 | 0,15-0,40 | 0,80-1,30 | 0,025 | 0,025 | 0,15 | 0,15 | 0,15 |
| S2Si2 | 0,07-0,15 | 0,40-0,60 | 0,80-1,30 | 0,025 | 0,025 | 0,15 | 0,15 | 0,15 |
| S3Si | 0,07-0,15 | 0,15-0,40 | > 1,30-1,85 | 0,025 | 0,025 | 0,15 | 0,15 | 0,15 |
| S4Si | 0,07-0,15 | 0,15-0,40 | > 1,85-2,25 | 0,025 | 0,025 | 0,15 | 0,15 | 0,15 |
| S1Mo | 0,05-0,15 | 0,05-0,25 | 0,35-0,60 | 0,025 | 0,025 | 0,45-0,65 | 0,15 | 0,15 |
| S2Mo | 0,07-0,15 | 0,05-0,25 | 0,80-1,30 | 0,025 | 0,025 | 0,45-0,65 | 0,15 | 0,15 |
| S3Mo | 0,07-0,15 | 0,05-0,25 | > 1,30-1,75 | 0,025 | 0,025 | 0,45-0,65 | 0,15 | 0,15 |
| S4Mo | 0,07-0,15 | 0,05-0,25 | > 1,75-2,25 | 0,025 | 0,025 | 0,45-0,65 | 0,15 | 0,15 |
| S2Ni1 | 0,07-0,15 | 0,05-0,25 | 0,80-1,30 | 0,020 | 0,025 | 0,15 | 0,80-1,20 | 0,15 |
| S2Nil1,5 | 0,07-0,15 | 0,05-0,25 | 0,80-1,30 | 0,020 | 0,020 | 0,15 | > 1,20-1,80 | 0,15 |
| S2Ni2 | 0,07-0,15 | 0,05-0,25 | 0,80-1,30 | 0,020 | 0,020 | 0,15 | > 1,80-2,40 | 0,15 |
| S2Ni3 | 0,07-0,15 | 0,05-0,25 | 0,80-1,30 | 0,020 | 0,020 | 0,15 | > 2,80-3,70 | 0,15 |
| S2Ni1Mo | 0,07-0,15 | 0,05-0,25 | 0,80-1,30 | 0,020 | 0,020 | 0,45-0,65 | 0,80-1,20 | 0,20 |
| S3Ni1,5 | 0,07-0,15 | 0,05-0,25 | > 1,30-1,70 | 0,020 | 0,020 | 0,15 | > 1,20-1,80 | 0,20 |
| S3Ni1Mo | 0,07-0,15 | 0,05-0,25 | > 1,30-1,80 | 0,020 | 0,020 | 0,45-0,65 | 0,80-1,20 | 0,20 |
| S3Ni1,5Mo | 0,07-0,15 | 0,05-0,25 | 1,20-1,80 | 0,020 | 0,020 | 0,30-0,50 | 1,20-1,80 | 0,20 |

1) Including the Cu of the covering, in the chemical composition of end product; Cu?%0,30; Al?%0,030.
2) Single values shown in the table mean maximum values.

| Yield Strength, Tensile Strength and Elongation | | | |
|---|---|---|---|
| Symbol | ReL ($N/mm^2$) | Rm ($N/mm^2$) | A (%) |
| 35 | 355 | 440-570 | 22 |
| 38 | 380 | 470-600 | 20 |
| 42 | 420 | 500-640 | 20 |
| 46 | 460 | 530-680 | 20 |
| 50 | 500 | 560-720 | 18 |
| 55 | 550 | 610-780 | 18 |
| 62 | 620 | 690-890 | 18 |
| 69 | 690 | 760-960 | 17 |
| 79 | 790 | 880-1080 | 16 |
| 89 | 890 | 980-1180 | 15 |

| Symbol for impact properties of all-weld metal | |
|---|---|
| Symbol | Temperature C |
| Z | no requirements |
| A | (+20) |
| 0 | 0 |
| 2 | -20 |
| 3 | -30 |
| 4 | -40 |
| 5 | -50 |
| 6 | -60 |
| 7 | -70 |
| 8 | -80 |

| Production/product | |
|---|---|
| G | Wire Electrodes |
| O | Oxy-acetylene |
| E | Electric arc welding |
| S | Submerged arc welding wires |
| T | Flux-cored wires |
| W | TIG Rods |
| F | Submerged arc welding fluxes |

| Type of Submerged Welding Powder | Symbol |
|---|---|
| Manganese-silicate | MS |
| Calcium-silicate | CS |
| Zirconium-silicate | ZS |
| Rutile-silicate | RS |
| Aluminate-rutile | AR |
| Aluminate-basic | AB |
| Aluminate-silicate | AS |
| Aluminate-flouride-basic | AF |
| Flouride-basic | FB |
| Other types | ZS |

# Specitication tor Wires and Fluxes for Submerged Arc Welding According to AWS A5.17

**Tensile Test**

| Wire-Flux Combination | Tensile Strength psi | Yield Strength psi | Elongation % |
|---|---|---|---|
| F6XX-EXXX | 60000-80000 | 48000 | 22 |
| F7XX-EXXX | 70000-95000 | 58000 | 22 |

**Impact Test**

| Symbol | Max. Test Temperature ºF | Min. Average Energy |
|---|---|---|
| 0 | 0 | 20 ft ·lbf |
| 2 | -20 | |
| 4 | -40 | |
| 5 | -50 | |
| 6 | -60 | |
| 8 | -80 | |
| Z | Not noted | |

F: Submerged Arc Welding Flux

A: Without Heat Treatment
P: PWHT

| F | 7 | A | 2 | - | EM12 |
|---|---|---|---|---|---|

**Tensile Test**

| Wire-Flux Combination | Tensile Strength MPa | Yield Strength MPa | Elongation % |
|---|---|---|---|
| F43XX-EXXX | 430-560 | 330 | 22 |
| F48XX-EXXX | 480-660 | 400 | 22 |

**Impact Test**

| Symbol | Max. Test Temperature ºF | Min. Average Energy |
|---|---|---|
| 0 | 0 | 27 Joule |
| 2 | -20 | |
| 3 | -30 | |
| 4 | -40 | |
| 5 | -50 | |
| 6 | -60 | |
| Z | Not noted | |

F: Submerged Arc Welding Flux

A: Without Heat Treatment
P: PWHT

| F | 43 | A | 3 | - | EM12 |
|---|---|---|---|---|---|

**Chemical Composition for Submerged Arc Welding Wires (%)**

| Symbo | UNS Number | C | Mn | Si | S | P | Cu | Ti |
|---|---|---|---|---|---|---|---|---|
| **Low-Manganese Electrodes** | | | | | | | | |
| EL 8 | K01008 | 0,10 | 0,25/0,60 | 0,07 | 0,03 | 0,03 | 0,35 | - |
| EL 8K | K01009 | 0,10 | 0,25/0,60 | 0,10/0,25 | 0,03 | 0,03 | 0,35 | - |
| EL12 | K01012 | 0,04/0,14 | 0,25/0,60 | 0,10 | 0,03 | 0,03 | 0,35 | - |
| **Medium-Manganese Electrodes** | | | | | | | | |
| EM11K | K01111 | 0,07/0,15 | 1,00/1,50 | 0,65/0,85 | 0,03 | 0,025 | 0,35 | - |
| EM12 | KO1112 | 0,06/0,15 | 0,80/1,25 | 0,10 | 0,03 | 0,03 | 0,35 | |
| EM12K | K01113 | 0,05/0,15 | 0,80/1,25 | 0,10/0,35 | 0,03 | 0,03 | 0,35 | - |
| EM13K | K01313 | 0,06/0,16 | 0,90/1,40 | 0,35/0,75 | 0,03 | 0,03 | 0,35 | - |
| EM14K | K01314 | 0,06/0,19 | 0,90/1,40 | 0,35/0,75 | 0,025 | 0,025 | 0,35 | 0,03/0,17 |
| EM15K | K01515 | 0,10/0,20 | 0,80/1,25 | 0,10/0,35 | 0,03 | 0,03 | 0,35 | - |
| **High-Manganese Electrodes** | | | | | | | | |
| EH10K | K01210 | 0,07/0,15 | 1,30/1,70 | 0,05/0,25 | 0,025 | 0,025 | 0,35 | - |
| EH11K | K11140 | 0,07/0,15 | 1,40/1,85 | 0,80/1,15 | 0,03 | 0,03 | 0,35 | - |
| EH12K | K01213 | 0,06/0,15 | 1,50/2,00 | 0,25/0,65 | 0,025 | 0,025 | 0,35 | - |
| EH14 | K11585 | 0,10/0,20 | 1,70/2,20 | 0,10 | 0,03 | 0,03 | 0,35 | - |
| EG | Not Specified | | | | | | | |

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# Welding of Mild Steels

The most commonly used metallic materials of our era are iron based alloys. Steel has a very important role in them. The property that makes steels this mportant is their ability to make various types of alloys and their ability to gain various types of properties with the help of heat treatments. As known, while quenched, steel can be used as a tool that can easily process steel that has the same composition with the former one. 4000 types of steel that have different compositions and properties are developed since the industrial revolut on. When different properties from the same steel are considered, there occurs a really wide spectrum.

The most important issue for welding is the hardening that is caused by rapid cooling from very high temperatures, which happens in some steels. The resulting hard material, which can go up to 64 HRC depending on the composition of the steel and the cooling rate, is called "martensite". Martensite is quite hard and brittle. The hardest steels are the ones that contain 0,7-0,8% C. The other s gn ficant factor in martensite formation aside from carbon is the cooling rate. While steels that include more than 0,3% carbon only harden when they are cooled in the water from a high temperature, hard and brittle martensitic structure occurs with a much slower cooling when steel includes alloying element.

In arc welding methods, metal is first heated to a temperature higher than its melting point; and then cooled down. Experiments and measurements show that the cooling rate of the welded zone on an iron bar is equivalent to the cooling rate of a piece that is heated up to a high temperature and cooled down by being quenched. Hence, it is obvious that this kind of a hard and brittle structure will be proced at the weld zones of the steels that contain carbon and alloying elements of higher amount than a certain value for each.

Welding electrode producers adjust the composition of the filler metal in such a way that even il it mixes a little with the base metal being melted, no hardening occurs at the molten metal after cooling. However, hardening on the base metal that is interconnected to the welded zone can occur since this part that is warmed up to a high temperature and then cooled down. Carbon and manganese are two elements that especially affect the hardening capability of the unalloyed steel. There are various opinions on the required maximum carbon content of the unalloyed steels for them to be welded without taking any precautions. For example, while the maximum carbon content for non-degassed steels are is 0,25% and the maximum carbon content for non-degassed steels are 0,22% in Sweden, it is allowed for this value to go up to 0,30% in the USA.

Alloying elements such as chromium, molybdenum, vanadium, nickel and copper, when they are contained in low-alloyed steels, cause hardening of the heat-affected zone (HAZ) although carbon content is lower. In add ton to crack formation right after the welding in this hard and brittle material, that is caused by heat, brittle fractures occur when any deformation process is performed on this structure material in case during use of welded joints, any smallest deformation stress causes such structures to undergo brittle fracture ; and, this results in significant damages.

The Weldability Commission of International Institute of Welding advises that the hardness of the heat-affected zone should not be higher than 350 HVC.

The only solution for decreasing the hardness of HAZ is to decelerate the cooling process after welding. The safest way for doing this is preheating the piece and welding it at this temperature. Various theoretical and applied researches have been made in order to find a constant that gives the hardening tendency of the steel and hence to obtain a formula which gives the preheating temperature that should be appled.

A solution that easily shows results is developed as a result of all these studies. In this solution, which is named Carbon Equivalent, the amounts of the alloying elements which exist in the chemical composition of the steel consist are put into a formula; and, a constant is calculated, depending on whose value a preheating temperature is can be chosen determined according to this constant.

Although there are various formulas for the calculation of carbon equivalent in literature, all of them are empirical relations that give close and satisfactory results in practice. The Carbon Equivalent Formula which the International Institute of Welding (IIW) requires proposes for low-alloyed carbon steels is as follows:

$C_{eq}$= C+ Mn/6 + Cr/5 + Mo/5 + V/5 + Ni/15 + Cu/15

The alloying elements limits in order for the above-given formula to be valid is are as follows:

C<0,5%; Mn<1%; Cr<1%; Nk 3,5%; Mo<0,6%

The preheating temperature that should be applied according to Ceq is as follows:

| Ceq(%) | Preheating Temperature (ºC) |
|---|---|
| less than 0,45 | not required at normal conditions |
| between 0,45 and 0,60 | 100-200 |
| more than 0,60 | 200-350 (can be increased up to 600 at special conditions) |

If the carbon equivalent, which is just an approach, is used; maximum preheating temperatures should be chosen as to be the upper limits of the value ranges that are valid for the conditions applied in the circumstances that are specified below, and in some special conditions, they should be exceeded, in order to eliminate any risks.

- If the base metal is Thomas steel or hot-cast steel,
- If the steel has a coarse-grained microstructure,
- If the base metal piece (the workpiece) is big large and unorderly structure complex- shaped,
- If the workpiece is very thick,
- If low levels of energy should be applied during welding,
- If the filler metal is not firm sufficiently tough
- If the temperature of the welding environment is too low,

As seen, carbon equivalent only includes the chemical composition of the steel. However it does not involve factors that primarily affect the cooling rate such as welding heat input, form of the weld groove, the geometry and thickness of the workpiece. Although there are some empirical formulas in the literature, the appropriate preheating temperatures according to electrode diameter (heat input), piece thickness, groove form according to $C_{eq}$ is shown in the table.

The points below should be considered during the welding of the steels that have tendency to harden and have a $C_{eq}$ value that is more than 0,45% for a safe welding .

- An appropriately chosen preheating temperature should be applied to all the whole pieces.
- The temperature should be kept at the same level during the welding process.
- A pre-dried basic-coated electrode should be used.
- If a piece will be annealed for stress relieving, it should be put into the furnace as soon as the welding process is finished before the piece cools down (it should stay in the furnace at the temperatures of 600-650 ºC temperature for 2 hours for each 2 mm.). It should be taken out after it cooled down to 300 ºC in the furnace, and should be left for air-cooling in a stable environment.

## Recommended Pre-annealing Temperatures according to Carbon Equivalent, Electrode Diameter, Particle Thickness and Groove Type

| $C_{eq}$ | Electrode Diameter (mm) | Pre-annealing Temperature °C | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Particle Thickness/Butt Seam | | | | Particle Thickness/ Inside Corner Seam | | | |
| | | 6 mm | 12 mm | 25 mm | 50 mm | 6 mm | 12 mm | 25 mm | 50 mm |
| 0.35 | 3.20 | • | • | • | • | • | • | • | 100 |
| 0.35 | 4 | • | • | • | • | • | • | • | • |
| 0.35 | 5 | • | • | • | • | • | • | • | • |
| 0.35 | 6 | • | • | • | • | • | • | • | • |
| 0.40 | 3.20 | • | • | • | 150 | • | • | 100 | 200 |
| 0.40 | 4 | • | • | • | • | • | • | • | 150 |
| 0.40 | 5 | • | • | • | • | • | • | • | 100 |
| 0.40 | 6 | • | • | • | • | • | • | • | 100 |
| 0.45 | 3.20 | • | • | 150 | 250 | • | 100 | 250 | 300 |
| 0.45 | 4 | • | • | 100 | 200 | • | • | 200 | 250 |
| 0.45 | 5 | • | • | • | 150 | • | • | 100 | 200 |
| 0.45 | 6 | • | • | • | 100 | • | • | • | 150 |
| 0.50 | 3.20 | • | • | 250 | 350 | • | 150 | 350 | (450) |
| 0.50 | 4 | • | • | 150 | 300 | • | 100 | 250 | 400 |
| 0.50 | 5 | • | • | 100 | 200 | • | • | 200 | 350 |
| 0.50 | 6 | • | • | • | 100 | • | • | 150 | 300 |
| 0.55 | 3.20 | • | 150 | 400 | (550) | 100 | 300 | (550) | x |
| 0.55 | 4 | • | • | 300 | (450) | • | 200 | (450) | x |
| 0.55 | 5 | • | • | 150 | 350 | • | 100 | 350 | (600) |
| 0.55 | 6 | • | • | 150 | 300 | • | • | 300 | (600) |
| 0.60 | 3.20 | 150 | 400 | x | x | 350 | x | x | x |
| 0.60 | 4 | 100 | 250 | x | x | 250 | (600) | x | x |
| 0.60 | 5 | • | 100 | (500) | (600) | 150 | 300 | (600) | x |
| 0.60 | 6 | • | • | 350 | 500 | • | 150 | 500 | x |
| 0.65 | 3.20 | 300 | x | x | x | x | x | x | x |
| 0.65 | 4 | 200 | 350 | x | x | x | x | x | x |
| 0.65 | 5 | • | 150 | (600) | x | 200 | (600) | x | x |
| 0.65 | 6 | • | • | (500) | x | 100 | 300 | x | x |
| 0.70 | 3.20 | 400 | x | x | x | x | x | x | x |
| 0.70 | 4 | 300 | 500 | x | x | x | x | x | x |
| 0.70 | 5 | 200 | 400 | x | x | 400 | (600) | x | x |
| 0.70 | 6 | • | 200 | (600) | x | 200 | 400 | x | x |
| 0.75 | 3.20 | 600 | x | x | x | x | x | x | x |
| 0.75 | 4 | 500 | x | x | x | x | x | x | x |
| 0.75 | 5 | 400 | 500 | x | x | (600) | x | x | x |
| 0.75 | 6 | 200 | 400 | x | x | (450) | (600) | x | x |

• = Pre-Annealing is not recommended
x = It is not used in practice since required pre-annealing temperature is too high

In production plants, damaged parts must be repaired immediately operations. The damaged part should be repaired by welding, and put into its place. The composition of the material of the piece is not generally known. The welding shop cannot be expected to analyze and determine the chemical composition of the piece before welding. in such conditions, the first thing that has to be done is to perform spark and file tests on the material. A file that is grinded to the surface of the material makes it easy to determine it hardening process is applied to the piece before. In the spark test, the piece is touched against the spinning surface of a grinding wheel. It is touched to the wheel in such a way that the length of the sparks is 30 cm. An experienced person who looks at the sparks in a dim light can estimate the elements that are in the composite and the proportions of these elements. Even an inexperienced person can identify carbon steel from alloyed steel and the low-middle and high-carbon steels from each other after a few hours work unless they are dischromated. Another good way of analysing is to compare the piece with specimens from metals whose chemical compositions are known.

Magnetic-particle test is generally used in distinguishing ferritic steels that can harden after heat treatment from austenitic steels that cannot harden (despite their high carbon equivalent). Austenitic steels are not pulled by magnets since they are antimagnetic. The point that should be bewared is not to put the magnet to the zones that are mechanically worked or to the zones that hardened as a result of transformation because these zones can locally be magnetic as a result of transformation.

- Use the largest-diameter electrode to which that is suitable for both the weld groove’s shape and the part’s dimensions allow.
- Choose the max. value of welding ampacity that the electrode producer requested since the cool-down rate decreases when the energy applied to the weld zone increases.
- Use basic austenitic coated electrodes. This may prevent the cracks in the weld bead because austenitic steels are more tough.
- Welded joint should never be done through one pass. The welding with as many passes as it can have should be chosen because new pass has a tempering effect on the HAZ of the earlier pass and hence the brittleness and hardness of this zone decreases. Various researchers advise that a tempering pass should be applied to the weld bead without touching the base metal after the welding.

# Welding of Fine-Grained High-Strength Structural Steels

Fine-grained high-strength structural steels were developed in order to meet the increasing needs for light steel containers and high-strength containers and reactors in the industry. Carbides, nitrides and carbonitrides that are scattered around in a very tine structure especially in grain boundaries in the internal microstructure of fine-grained structural steels, and are transmitted to the solution only at the temperatures higher than 1100 ºC; prevent grain growth even at the heat temperatures at the austenite zone. High-strength and firm tough steels group occurs are obtained as a result of this . In a second group of fine-grained structural steels, the yield and tensile strength and the firmness toughness of the steel are increased without causing the steel that will form a low-carbon martensite in the inner structure lose its weldabilty. Since the Martensite start temperature is 400 ºC in this quenched fine-grained structural steels group, the martensite that is formed is automatically tempered when it is slowly cooled down at a temperature lower than this. Therefore fine grained scattered around carbide precipitates that increase the strength of the inner structure form. Carbon content should not exceed 0,20 for their weldability in fine-grained structural steels. Steels that have the desired qualities are obtained by low or limited hardening by putting alloying elements as little as possible, fine-grain formation, decomposition of nitride particles that prevent grain growth and optimization between heat treatments.

Fine-grained structural steels have a very good weldability because of the limitations to their carbon and alloying element contents. Classical structural steels are preheated and welded with high energy input in order to slow down the cooling down rate. On the other hand, slow down of the cooling down rate in fine-grained structural steels causes them to turn into a ferrite and high-carbon martensite or bulk martensite or bulk bainite areas at the inner structure in meld line of the base metal. This causes the firmness toughness to decrease and the strength quality to deteriorate. This shows itself especially on the HAZ of the joints that are preheated at a very high temperature and welded with a single pass. If the welding process is multi-passed, quality of the weld zone gets better than the weld zone of the single pass welding since each pass tempers the weld zone of the former one. An appropriate preheating for thick and highly stressed constructions is an effective precaution for the cracks that can be caused by various reasons.

Specific-energy input E (k/cm) that is calculated by taking the ratio of the multiplication of welding current strength and arc voltage and relative thermal activity coefficient of welding method to the welding speed; preheating temperature and piece thickness are the three significant factors that affect the cooling down rate of the weld zone.

These three factors should be considered together to be able to control the qualities of the weld zone of the fine-grained structural steels. Cooling down rate $t_{8/5}$ at 800-500 ºC is very important for affecting the qualities of the weld zone of the steels. The decrease in time causes the hardness and the strength to increase but the tendency to crack to increase.

Steel producers state the appropr ate $t_{8/5}$ value for the fine-grained structural steels that they produce in the certificate of the steel. There are mathematical formulas, computer programs that calculate the specific energy that is applied to the weld, piece thickness, preheating temperature and $t_{8/5}$ and nomograms on this issue. 1kj/cm for each mm of plate thickness as specific energy input is averagely chosen in practice. For example, E=25kj/cm specific energy for a 25mm thick plate. A preheating process that is between 80 ºC and 200 ºC is applied to the joint for the processes that are under +5 ºC in weld of the fine-grained structural steels. For the processes higher than this temperature, yield limit and piece thickness are criteria for the decision whether preheating process is applied or not.

## GeKa Electrodes for Welding of Fine-Grain/Non-Alloy and Low Alloy Steels

| GeKa Electrodes | | ELİT | PANTERA | LOTUS | EGE | GRANİT | TARGA | STEP | İNTER | ELİT R 110 | CEM | ELİT R 180 | LİNK 6010 | LİNK 6011 | LİNK 7010-G | LİNK 7010 A | LİNK 8010-G | LASER B 43 | LASER B 47 | LASER B 50 | LASER B 47-A | LASER B 60 | LASER B 55 | LASER B 160 | TEMPO B 60 | TEMPO B 63 | TEMPO B 65 | TEMPO B 70 | TEMPO B 75 | TEMPO B 85 | TEMPO NiCu | TEMPO B 2 | TEMPO B 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIN | EN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| St 37.2 | S 235 JR | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | | | | | | | * | | |
| WTSt 37.2-37.3 | S 235 JRW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | | |
| St 44.2 | S 275 JR | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | | | | | | | | | |
| St 50.2 | E 295 | | | | | | | | | | | | | | | | | * | * | * | * | * | | * | * | * | * | | | | | | |
| St 60-2 | E 335 | | | | | | | | | | | | | | | | | | * | * | | * | | | * | * | * | | | | | | |
| St 70-2 | E 360 | | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | | | |
| St 37.3 | S 235 J2G3 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | | | | | | | | | |
| St 44.3 | S 275 J2G3 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | | | | | | | | | |
| St 52.3 | S 355 J2G3 | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | * | * | | | | | | | |
| St 52 Cu 3 | S 355 J2G3 Cu | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | | |
| WTSt 52.3-52.3A | S 355 JRW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | | |
| HI | P 235 GH | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | | | | | | | | | |
| HII | P 265 GH | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | | * | * | * | * | * | * | * | | | | | | | | | |
| 17 Mn 4 | P 295 GH | | | | | | | | | | * | * | | | | | | * | * | * | * | * | * | * | | | | | | | | | |
| 19 Mn 5 | P 310 GH | | | | | | | | | | | | | | | | | | | | | | | | * | | | | | | | | |
| 19 Mn 6 | P 355 GH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WStE 255 | P 255 NH | * | * | * | * | * | * | * | * | * | | | | * | | | | * | * | * | * | * | * | * | | | | | | | | * | |
| WStE 355 | P 355 NH | | | | | | | | | | | | | | | | | * | * | * | * | * | * | * | * | * | * | | | | | * | |
| WStE 380 | P 380 NH | | | | | | | | | | | | | | | | | | | | | | | | * | * | * | | | | | * | |
| WStE 420 | P 420 NH | | | | | | | | | | | | | | | | | | | | | | | | * | * | * | | | | | * | |
| WStE 460 | P 460 NH | | | | | | | | | | | | | | | | | | | | | | | | * | * | * | | | | | * | |
| WStE 500 | P 500 NH | | | | | | | | | | | | | | | | | | | | | | | | | * | | | * | | | | |
| St 37.0 | P 235 T1 | * | * | * | * | * | * | * | * | * | | | | * | | | | * | * | * | * | * | * | | | | | | | | | | |
| St 44.0 | P 275 T1 | * | * | * | * | * | * | * | * | * | | | | * | | | | * | * | * | * | * | * | | | | | | | | | | |
| St 52.0 | P 355 T1 | * | * | * | * | * | * | * | * | * | | | * | * | * | * | | | * | * | * | * | * | | | | | | | | | | |
| St 37.4 | P 235 T2 | * | * | * | * | * | * | * | * | * | | | * | * | * | * | | * | * | * | * | * | * | | | | | | | | | | |
| St 44.4 | P 275 T2 | * | * | * | * | * | * | * | * | * | | | * | * | * | * | | * | * | * | * | * | * | | | | | | | | | | |
| St 52.4 | P 355 T2 | * | * | * | * | * | * | * | * | * | | | * | * | * | * | | | * | * | * | * | * | | | | | | | | | | |
| St 35.8 | P 235 G1TH | * | * | * | * | * | * | * | * | * | | | * | * | * | * | | * | * | * | * | * | * | | | | | | | | | | |
| St 45.8 | P 255 G1TH | * | * | * | * | * | * | * | * | * | | | * | * | * | * | | * | * | * | * | * | * | | | | | | | | | | |
| StE 210.7 | L 210 A | * | * | * | * | * | * | * | * | * | | | * | * | * | * | | * | * | * | * | * | * | | * | | | | | | | | |

# GeKa Electrodes tor Welding of Fine-Grain/Non-Alloy and Low Alloy Steels

| GeKa Electrodes DIN | EN | | ELİT | PANTERA | LOTUS | EGE | GRANİT | TARGA | STEP | İNTER | ELİT R 110 | CEM | ELİT R 180 | LİNK 6010 | LİNK 6011 | LİNK 7010-G | LİNK 7010 A | LİNK 8010-G | LASER B 43 | LASER B 47 | LASER B 50 | LASER B 47-A | LASER B 60 | LASER B 55 | LASER B 160 | TEMPO B 60 | TEMPO B 63 | TEMPO B 65 | TEMPO B 70 | TEMPO B 75 | TEMPO B 85 | TEMPO NiCu | TEMPO B 2 | TEMPO B 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| StE 240.7 | L 245 NB | B | * | * | * | * | * | * | * | * | * | | | * | * | * | * | | * | * | * | * | * | * | | * | | | | | | | | |
| StE 290.7 | L 290 NB | | * | * | * | * | * | * | * | * | * | | | * | * | * | * | | * | * | * | * | * | * | | * | | | | | | | | |
| StE 320.7 | L 320 | | * | * | * | * | * | * | * | * | * | | | * | | * | * | | * | * | * | * | * | * | | * | | | | | | | | |
| StE 360.7 | L 360 NB | | * | * | * | * | * | * | * | * | * | | | * | | * | * | | | * | * | * | * | * | | * | | | | | | | | |
| StE 415.7 | L 415 NB | | | | | | | | | | | | | * | | * | * | * | | | | | | * | | * | | | | | | | | |
| StE 480.7 | L 485 NB | | | | | | | | | | | | | | | | | * | | | | | | | | | | | | | | | | |
| StE 290.7 TM | L 290 MB | **X42** | * | * | * | * | * | * | * | * | * | | | * | * | * | * | | * | * | * | * | * | * | | * | | | | | | | | |
| StE 320.7 TM | L 320 MB | **X46** | | | | | * | | | | | | | * | * | * | * | | * | * | * | * | * | * | | * | | | | | | | | |
| StE 360.7 TM | L 360 MB | **X52** | | | | | * | | | | | | | * | * | * | * | | * | * | * | * | * | * | | * | | | | | | | | |
| StE 385.7 TM | L 385 M | **X56** | | | | | | | | | | | | * | | * | * | | | * | * | * | * | * | | * | | | | | | | | |
| StE 415.7 TM | L 415 MB | **X60** | | | | | | | | | | | | * | | * | * | * | | | | | | * | | * | | | | | | | | |
| StE 445.7 TM | L 450 MB | **X65** | | | | | | | | | | | | | | | | * | | | | | | | | * | | | | | | | | |
| StE 480.7 TM | L 485 MB | **X70** | | | | | | | | | | | | | | | | * | | | | | | | | | | | | | | | | |
| StE 255 | S 255 N | | | | | | | | | | | * | * | | | | | | * | * | * | * | * | * | * | | | | | | | | * | |
| StE 355 | S 355 N | | | | | | | | | | | | | | | | | | * | * | * | * | * | * | * | | * | | | | | | * | |
| StE 380 / 420 | S 380 N / 420 N | | | | | | | | | | | | | | | | | | | | | | | * | * | * | * | * | * | | | | * | |
| StE 460 | S 460N / 460NH | | | | | | | | | | | | | | | | | | | | | | | * | | * | * | * | * | | | | * | |
| StE 500 | S 500 N | | | | | | | | | | | | | | | | | | | | | | | | | | * | * | * | * | | | | |
| TStE 255 | S 255 NL | | | | | | | | | | | | | | | | | | * | * | * | | * | * | * | | | | | | | | * | * |
| TStE 355 | S/P 355 NL (1) | | | | | | | | | | | | | | | | | | * | * | * | | * | * | * | | | * | | | | | * | * |
| TStE 380 | S 380 NL | | | | | | | | | | | | | | | | | | | | | | | * | | * | | * | * | | | | * | * |
| TStE 420 | S 420 NL1 | | | | | | | | | | | | | | | | | | | | | | | * | | * | | * | * | | | | * | * |
| TStE 460 | S 460 NL1 | | | | | | | | | | | | | | | | | | | | | | | | | * | | * | * | * | | | * | * |
| TStE 500 | S 500 NL1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | | | | | * |
| EStE 255 / 315 | S 255/315 NL1 | | | | | | | | | | | | | | | | | | | | | | | * | | | | | | | | | * | * |
| EStE 285 / 355 | P 275/355 NL 2 | | | | | | | | | | | | | | | | | | | | | | | | | * | | * | | | | | * | * |
| EStE 380 / 420 | S 380/420 NL 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | * | * |
| EStE 460 | P 460 NL 2 | | | | | | | | | | | | | | | | | | | | | | | | | * | | * | * | | | | * | * |
| EStE 500 | S 500 NL1 | | | | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | | |
| EStE 620 V | S 620 QL/QL1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | | | |
| EStE 690 V | S 690 QL/QL1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | | | |

# GeKa Electrodes for Welding of Fine-Grain/Non-Alloy and Low Alloy Steels

| GeKa Electrodes | | ELİT | PANTERA | LOTUS | EGE | GRANİT | TARGA | STEP | İNTER | ELİT R 110 | CEM | ELİT R 180 | LİNK 6010 | LİNK 6011 | LİNK 7010-G | LİNK 7010 A | LİNK 8010-G | LASER B 43 | LASER B 47 | LASER B 50 | LASER B 47-A | LASER B 60 | LASER B 55 | LASER B 160 | TEMPO B 60 | TEMPO B 63 | TEMPO B 65 | TEMPO B 70 | TEMPO B 75 | TEMPO B 85 | TEMPO NiCu | TEMPO B 2 | TEMPO B 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIN | EN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GL-A | S 235 JRS1/S2 | * | * | * | * | * | * | * | * | * | * | * | | * | * | | | * | * | * | * | * | * | * | | | | | | | | | |
| GL-D | S 235 J2S1/S2 | * | * | * | * | * | * | * | * | * | * | * | | * | * | | | * | * | * | * | * | * | * | | | | | | | | | |
| GL-E | S 235 J4S | | | | | | | | | | | | | | | | | * | * | * | * | * | * | * | | | | | | | | | |
| GL-A32 | S 315 G1S | | | | | | | | | | | | | | | | | | * | * | * | * | * | * | | | | | | | | | |
| GL-D32 | S 315 G2S | | | | | | | | | | | | | | | | | | * | * | * | * | * | * | | | | | | | | | |
| GL-E32 | S 315 G3S | | | | | | | | | | | | | | | | | | * | * | * | * | * | * | | | | | | | | | |
| GL-A36 | S 355 G1S | | | | | | | | | | | | | | | | | * | * | * | * | * | * | * | | | | | | | | | |
| GL-D36 | S 355 G2S | | | | | | | | | | | | | | | | | | * | * | * | * | * | * | | | | | | | | | |
| GL-E36 | S 355 G3S | | | | | | | | | | | | | | | | | * | * | * | * | * | * | * | | | | | | | | | |
| C 22 / C 35 | C 22 / C 35 | | | | | | | | | | | | | | | | | * | * | * | * | * | | | * | * | | | | | | | |
| C 45 / C 60 | C 45 / C 60 | | | | | | | | | | | | | | | | | | | | | | | | * | * | | | | | | | |
| GS 38 | GE 200 | | | | | | | | | | | | | | | | | * | * | * | * | * | * | * | * | * | | | | | | | |
| GS 45 | GE 240 | | | | | | | | | | | | | | | | | * | * | * | * | * | * | * | * | * | | | | | | | |
| GS 52 | GE 260 | | | | | | | | | | | | | | | | | | * | * | * | * | * | * | * | * | | | | | | | |
| GS 60 | GE 300 | | | | | | | | | | | | | | | | | | * | * | | * | * | | * | * | | | | | | | |
| GS 70 | GE 340 | | | | | | | | | | | | | | | | | | | | | | | | | * | | | | | | | |
| StSlch 800 | R 0800 | | | | | | | | | | | | | | | | | | | | | | | | | * | | | | | | | |
| 20 MnMoNi 55 | 20 MnMoNi 5-5 | | | | | | | | | | | | | | | | | | | | | | | | | | * | | | | | | |
| 22 NiMoCr 37 | 22 NiMoCr 4-7 | | | | | | | | | | | | | | | | | | | | | | | | | | * | | | | | | |
| 15 NiCuMoNb 5 | 15NiCuMoNb5S | | | | | | | | | | | | | | | | | | | | | | | | | | * | | | | | | |
| 17 MnMoV 64 | 17 MnMoV 6-4 | | | | | | | | | | | | | | | | | | | | | | | | | | * | | | | | | |
| N-A-XTRA 56-70 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | | | |
| TTSt 35 N / 45 N | S 225 NL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | |
| TTSt 35 V / 45 V | S 225 NL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | |
| 10-16 Ni 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | * |
| 14 Ni 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | |
| 13 MnNi 63 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | * | |

# Welding of Heat and Creep Resisting Steels

Steel has to be heat-resisting in the fields of application such as power plants, high pressure steam boilers, refineries and steam turbines. Hence the weld metal should be as heat resisting as the base metal.

The yield and tensile strengths of the unalloyed structural steels decrease significantly at high temperatures. When alloying elements such as Cr, Mo, W or V to the steel, heat resistance values gel much betler. One has to consider only the yield and tensile strengths of the steel at the high temperature applications. Creep gets intensified for the materials as a result of the combined effect of temperature and mechanical stress. The creep characteristics of all high temperature steels are determined and put into the material standards and specifications in the last 20 years. in addition to these studies, similar tests are applied to the test rods that are provided from the weld metal that is produced with creep resisting electrodes. It is found out that the results have the same values as the test results from the heat and creep resisting steels, and the results for the stabilized austenitic weld metal have even much higher values than those.

These steels are classified depending on their compositions and hence their operative temperature. Cr, Mo, W, Co, Nb, Ta, Ti and Al affect both the matrix composition of the steel and carbide formation and develop its heat and creep resistance qualities. A little amount of Mo, V and Cr addition to the composition of the steel is enough for the temperatures up to 500 ºC . Mo is especially efficient in increasing heat resistance quality. Material should be resistant to oxidation for the temperatures more than 550 ºC. The best solution for this is to choose steels that include 12%Cr and Mo, V and Nb/Ta. Steels transform and start loose their creep resisting quality after 600 ºC . Hence chromium-nickel austenitic steels are preferred for these temperatures. This product is steel that includes 16%Cr and 13%Ni, and of which basic type's creep resisting qualities are developed by adding Mo, V and Nb/Ta. (X8CrNiNb 16 13, X8CrNiMoVNb 16 13). Only alloys that are Cr-, Ni-, Co-based including Mo, V and Nb/Ta show the appropriate creep resistance for the temperatures that are higher than 700 ºC.

All 12% Cr and heat- and creep -resisting low-alloyed steels are generally welded after they are quenched and tempered. The heat-affected zone of these steels with hardening tendencies hardens if there are no precautions. Internal stresses that occur during welding process and the adjustment processes after the welding cause the risk of cracking at this zone. in order to prevent the danger of this, an appropriate groove should be chosen, a welding plan should be made, preheating and cooling should be carried out under control; and, stress-relief heating should be applied when it is necessary.

Stabilized austenitic steels show betler qualities at high temperatures when that are welded after solution heat treatment is performed on them. Because of the tendency to crack in high temperatures of this type of materials, heat input should be low during the welding process. Since the low thermal conductivity of this type of materials can cause regional heat rises, the weld heat should not be allowed to accumulate at the welded zone. For these cases, short arc and electrodes that have diameters no longer than 4 mm should be applied at an 80-90 ºC angle, and weld beads that are as narrow as possible should be produced with oscillations no higher than three times of the wire diameter. Welding is generally performed without preheating. However, preheating to 100-200 ºC should be applied to the pieces that are thicker than 25 mm; but, the temperature of the welding zone should not exceed 300-350 ºC in those cases.

Co-based, creep-resisting materials such as X40 Cr Ni Co Nb, should be preheated up to 200- 400 ºC because of their high content of carbon.

# GeKa Electrodes for welding of Heath Resisting Steels

| STEELS | | | | | ELECTRODES | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Steel Type | Norms of Steel | | | Max. Operating Temp. °C | OPUS MOB | OPUS MOR | TEMPO B 65 | OPUS CM | OPUS C | OPUS 2 CM | OPUS 5 CM |
| | Material No. | EN | ASTM / AISI UNS | | | | | | | | |
| Boiler Plates, Heat Resisting Steels EN 10028-2 | 1.0405 | P255G1TH | | 500 | • | • | | | | | |
| | 1.0461 | S255N | | 400 | • | • | | | | | |
| | 1.0481 | P295GH | | 500 | • | • | | | | | |
| | 1.0482 | P310GH | | 500 | • | • | • | | | | |
| | 1.5415 | 16Mo3 | A 335. Gr P1 | 530 | • | • | | | | | |
| | 1.7335 | 13CrMo4-5 | A 335, Gr P11 P12 | 560 | | | | • | • | | |
| | 1.7380 | 10CrMo9-10 | | 590 | | | | | | • | |
| Heat Resisting Steel Castings EN 10213-2 | 1.0619 | GP240GH | | 450 | • | | | | | | |
| | 1.5419 | G20Mo5 | A 217, Gr.WC1 | 500 | • | | | | | | |
| | 1.7357 | G17CrMo5-5 | A 217, Gr.WC6 | 550 | | | | • | | | |
| | 1.7379 | G17CrMo9-10 | | 600 | | | | | | • | |
| Steels for High Pressure Hydrogenation Plates EN 10028-2 EN 10083-1 | 1.7218 | 25CrMo4 | | 300 | | | | • | | | |
| | 1.7273 | 24CrMo10 | | 400 | | | | | | • | |
| | 1.7362 | 12CrMo19 5 | A 335. Gr P5 | 600 | | | | | | | • |
| Heat Resisting Special Steels EN 10028-2 EN 10250-3 | 1.6368 | 15NiCuMoNb5-6-4 | | 500 | • | | • | | | | |
| | 1.6311 | 20MnMoNi4-5 | A 508 Cl 3 | 550 | • | | • | | | | |
| | 1.7375 | 12CrMo9-10 | | 590 | | | | | | • | |
| Special Nuclear Reactor Steels SEW 028 | 1.6369 | 15NiCuMoNb55 | | 375 | | | • | | | | |
| | 1.6310 | 20MnMoNi5-5 | A 533 Gr B Cl 1 | 375 | | | • | | | | |
| Caustic Resisting Steels EN 10277-2 | 1.0407 | C-16 | | --- | • | | | • | | | |
| | 1.0569 | S355J2G3C | | --- | • | | | • | | | |

# Welding of Cryogenic Steels

Especially the production of the welding vessels that are used in sforage and transportation of liquefied gases requires material that does not lose its qualities at very low temperatures and weld joints that are appropriate for it. As it is known, the tensile strength of steels increases but the ductility and firmness toughness of them decrease as the temperature decreases. For these reasons, the most important quality of the material for applications under the temperature of 0 ºC is for it to protect its firmness toughness that is determined by impact test at the desired level. Various surveillance organizations estimate that these types of steels give the result of minimum 27J at ISO-V impact test at the lowest operation temperatures. The impact test is thought to be inadequate recently, and this type of steels is assessed by various fracture mechanics tests. Steels that are used depending on the ambient temperature they are in, and the appropriate GeKa Electrodes for their welding is shown in the table.

- The thin sheet metals that are used in this production branch are not generally preheated before welding. A preheating process between 80 and 150 ºC is necessary as the cut view gets thicker and the carbon content exceeds 20 %.
- Low hydrogen, well dried, basic coated electrodes are used in welding .
- Weld metal is chosen in such a way that it provides both the desired strength qualities and the necessary firmness toughness at the operation temperature.
- The most important point for these steels is to keep the heat input at the lowest level in order for HAZ not to have grain growth. Even it a preheating process is performed before the welding, the interpass temperature should not exceed 150 ºC.
- Stress relief heating should be applied on some conditions in order to develop the qualities of the steel depending on the type of the steel and the specifications. The temperature degree and duration that the steel producer proposed should in no way exceeded .
- Welding should be performed in a flat position as horizontal as possible by using positioners. The reason is that both controlling the heat input and providing a faultless welding is only possible in this position. These types of steels should never be welded in overhead, horizontal vertical and vertical up positions. If vertical welding position is necessary, they should only be welded in vertical down position.

Weld bead is done straight without oscillating the electrode in order to limit the heat input during welding process. In case of vertical welding, vertical down welding position is preferred in order to decrease the heat input. Electrical arc welding with coated electrodes is still the most preferred welding method for welding of these types of steels. Submerged arc welding applications with TIG, MIG and special powders are also done recently.

GeKa®

## Welding of Stainless Steels

The most important qual ty of stainless steels is that they do not rust, and that they are resistant to oxidation and corrosion. This quality is acquired by adding more than 12% chromium to the content of the steel. As the amount of chromium increases, the oxidation resistance at hi gh temperatures also increases. Existence of the steel causes corrosion resistance especially in acidic environments. Besides nickel, molybdenum addition also protects steel from some types of corrosion. However, steels that contain more than 6.5% molybdenum cannot be produced economically.

Chromium causes steel to keep its mechanical qualities at very high temperatures. Hence chromium stainless steels are also used as creep resisting steels at high temperatures.

Stainless steels that have more than 170 types are widely used in industry for various purposes. The most commonly-used ones of the stainless steel types that are used in industry are generally divided into three main groups:

- Martensitic Chromium Stainless Steels.
- Ferritic Chromium Stainless Steels.
- Austenitic Chromium-Nickel Stainless Steels.

In constructions in which the stainless steels are used, modern welding methods such as electron beam welding and laser beam welding are also used besides arc welding with coated electrodes, gas metal arc welding methods (TIG, MIG), submerged arc welding and plasma welding.
Physical qualities of the stainless steels of different types are also different from each other. This plays an important role in welding processes.

Heat conductivity facfor of chromium stainless is halt of the unalloyed steels. This value is 50% more in austenitic chromium-nickel steels than the value in low-carbon alloy steels. This is of particular concern to construcfor as well as the welder.

Low-carbon alloy steels have low resistance to electrical conductivity. This value is 4-7 times higher in stainless steels. Thus stainless steel electrodes redden more quickly, are produced shorter, and are loaded with 25% less strength of current than the normal electrodes.

## Welding of Martensitic Chromium Stainless Steels

Stainless steels in this group contain Cr amount between 11.5% and 18%. Carbon amount in their composition is between 0.1% and 1.2%.

Main effective element in welding of martensitic stainless steels is carbon. Amount of carbon affects the hardness of HAZ, and can be controlled by welding method to an extent. If the hardness of HAZ increases, and, firmness toughness decreases.

Martensitic is relatively less hard in low-carbon martensitic stainless steels. Hence their tendency to crack is less. These steels are normally preheated at 200-400 ºC temperature before welding. Soon after the welding a stress-relieiving process can be performed before the joint cools down by heating it 800-820 ºC for four hours and cooling it slowly in the furnace.

Flux-coated electrodes and TIG welding wires of GeKa are safely used in welding of martensitic chromium stainless steels. Especially ELOX B 410 and GeKaTec 410 HD are coated electrodes that are appropriate for welding of low-carbon martensitic stainless steels. in addition to these, austenitic chromium-nickel stainless coated GeKa electrodes such as GeKa ELOX R 307, ELOX B 307, ELOX R 309 L, ELOX R 312, ELOX B 347, ELOX R 347 provide quality weld joints in conditions such that the strength of the weld bead is not required to be too strong and the joint does not operate in a sulfuric environment. The fact that the yield point of austenitic welding metal is low prevents the danger of cracking which is caused by tensile stress that will happen after the welding. If the joint operates in sulfuric environments, weld beads in which the base metal composition is the same is provided with GeKa stainless chromium special products. The application tables that are given can be used while choosing these products. You can easily solve the problems you experienced with the help of the experts of our company.

## Welding of Ferritic Chromium Stainless Steels

This type of steels contains 16-30 % Cr and 0.5-0.25 % C. Its internal composition microstructure is normally made up of ferrite and carbide.

The most significant qualities of these steels are that they are not hardened by quenching since phase transformation is not seen when they are solid, and their corrosion and oxidation resistance is high at high temperatures. They are magnetic. They can be rolled hot or cold. They show their best mechanical qualities when they are normalized. Their resistance to the stress corrosion cracking caused by the chlorinated environments is high.

Weldability of ferritic chromium stainless steels is better than the weldability of martensitic stainless steels. However, one of the significant problems that occur in the welding of ferritic stainless steels is the tendency to grain growth at HAZ. This cannot be removed by a post-weld heating. Furthermore, carbide precipitation at the ferritic grain boundaries also causes vulnerability at weld joints. Thus the mechanic qualities decrease. Use of austenitic chromium-nickel electrodes at the arc welding of this type of steels with coated electrodes prevents the brittleness that is caused by the grain growth at the molten zone. GeKa ELOX R 308 L and ELOX R 347 that contain 20%Cr and 10%Ni is recommended since they have great result at welding of low-carbon ferritic stainless steels. For the ferritic stainless steels that contain more than 0.1% carbon, GeKa Flux-coated Electrodes that contain more Cr and Ni can be easily used (ELOX R 309 L).

Use of the austenitic weld metal creates weld beads that have very good mechanical qualities, and absorbs most of the welding stress. However, the color of the weld beads would be different than the base metal. GeKa ELOX B 430 coated electrode that contains 18% Cr should be used when weld beads are desired to be the same color as the base metal since filler metal that has the same characteristics as the base metal should be used.

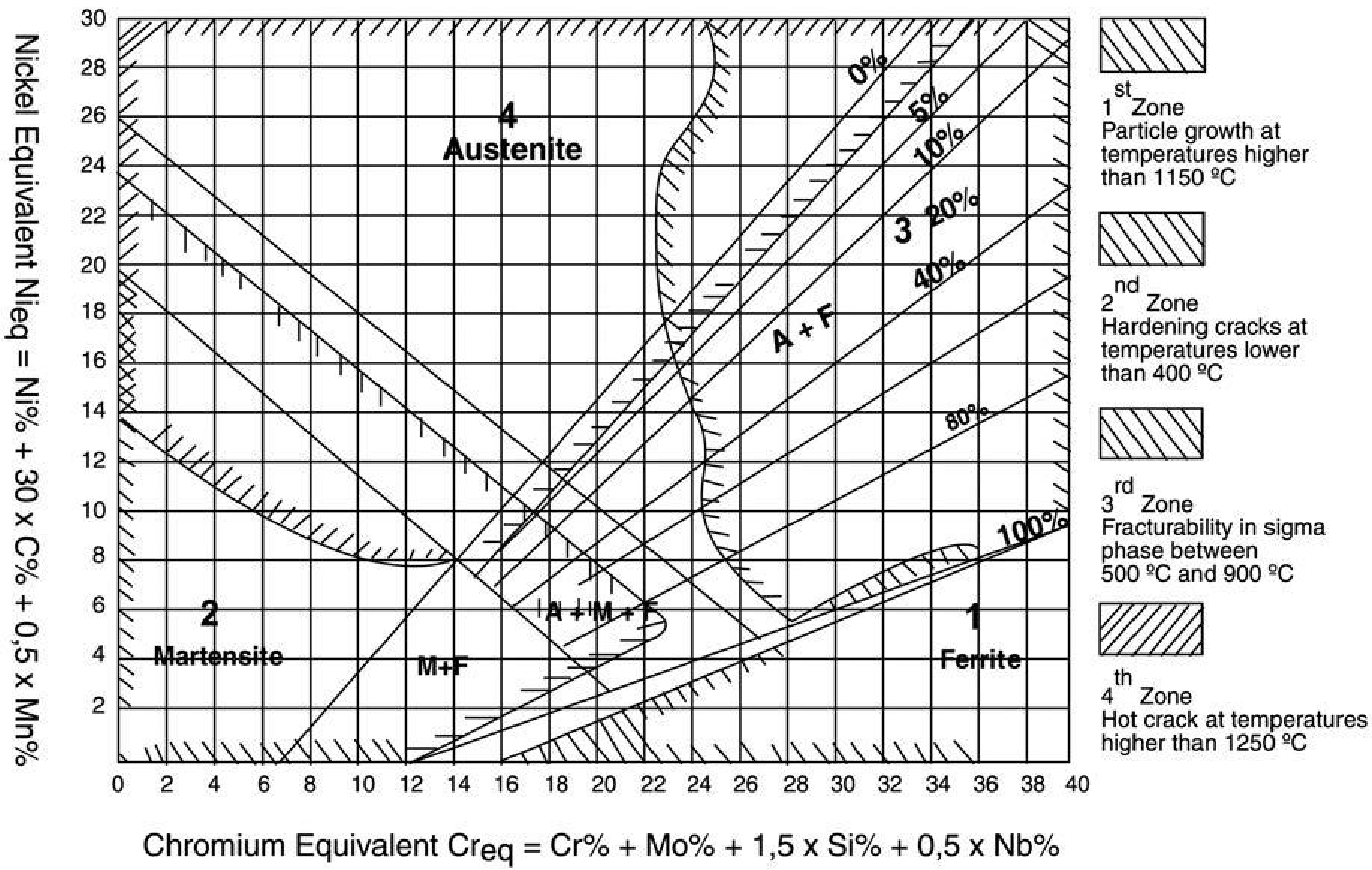
Preheating process in the welding of stainless steels prevents the danger of cracking in HAZ and minimizes the stress that is caused by the welding. 150-300 ºC preheating temperature is recommended normally. Interpass temperature can be a little higher than the preheating temperature. To keep the heat input at low temperatures, the electrode with the smallest diameter possible should be chosen, the welding speed should be high and the electrode should not oscillate.

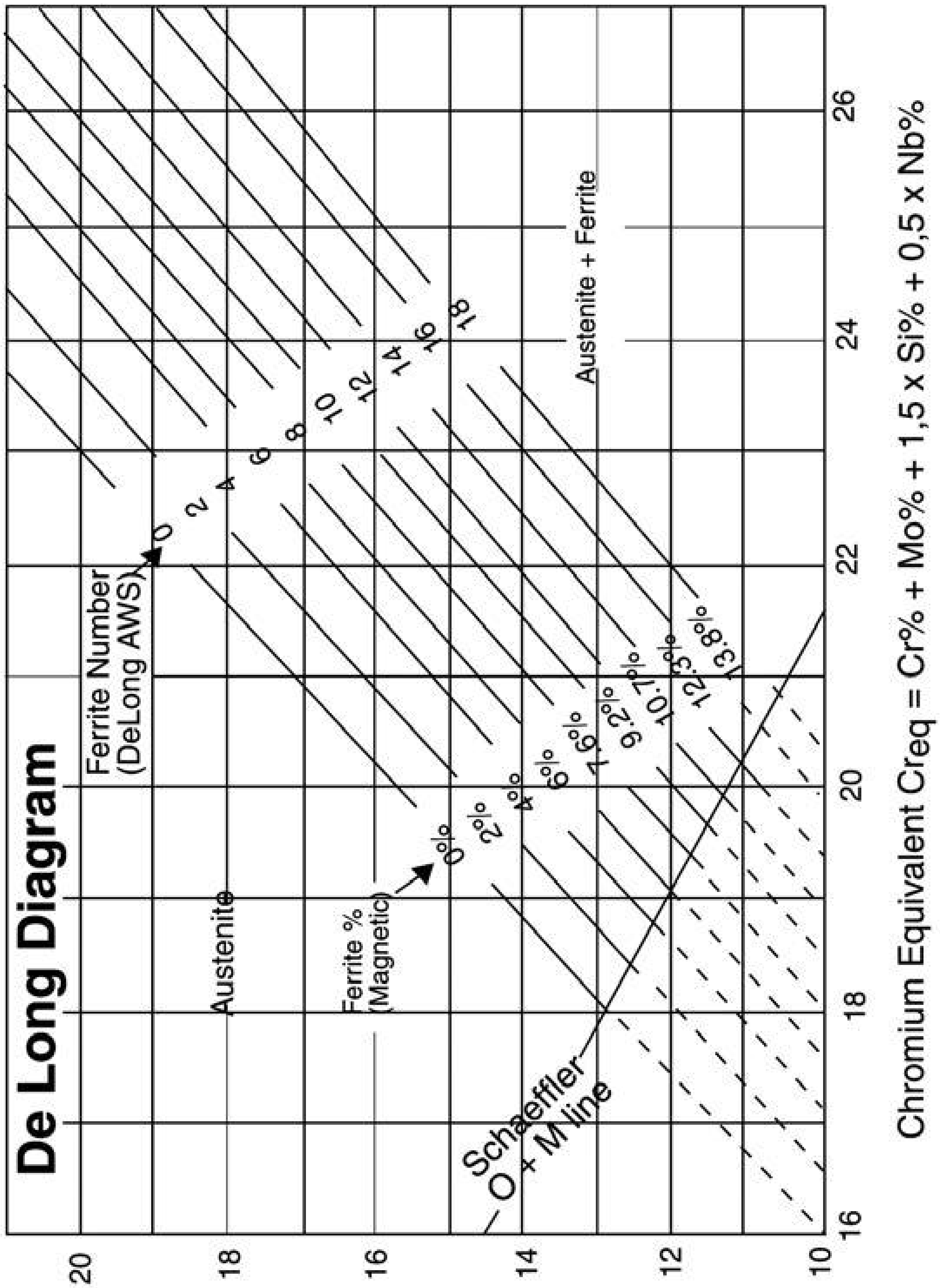
Rapid cooling after 750-800 ºC post weld heating helps the and the intergranular corrosion resistance of the HAZ to increase for this type of steels.

Cold formation of the welded joints should be done after a heating process at 300-400 ºC because the deformation capability of those steels significantly increases at this temperature.

## For determination of the microstructure of the stainless steel weld metal

## Shaeffler Diagram



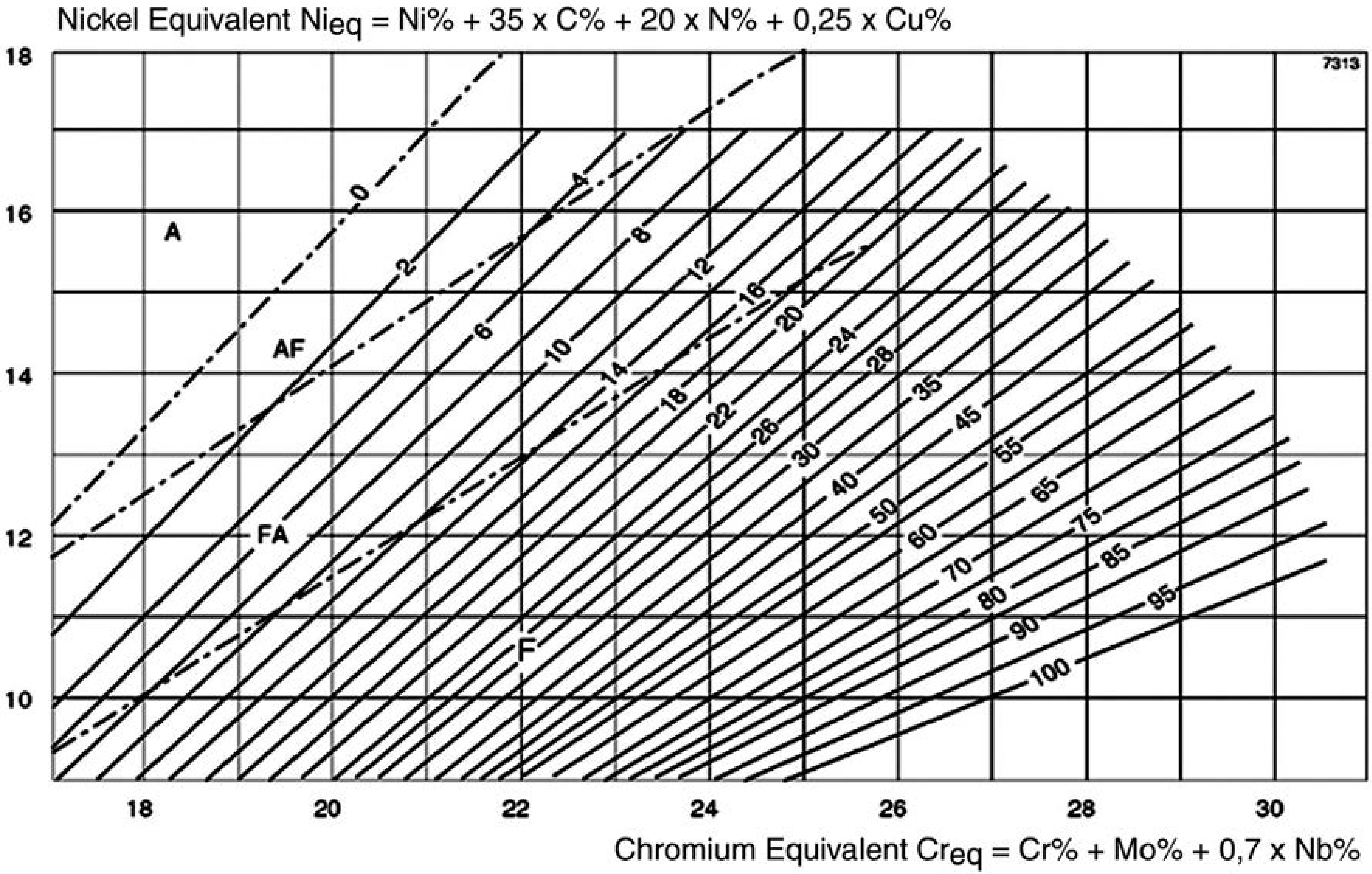



Notes: Effective Nitrogen amount shall be considered. If this amount is not known, the values below can be considered depending on the methods:

a)MIG/TIG weld metal 0,08% (except flux-cored wires without shielding gas 0,12%)

b)All other welding methods 0,06%

# WRC Diagram



Nickel Equivalent $Ni_{eq}$ = Ni% + 35 x C% + 20 x N% + 0,25 x Cu%
Chromium Equivalent $Cr_{eq}$ = Cr% + Mo% + 0,7 x Nb%
7313
A
AF
FA
F
18
16
14
12
10
18
20
22
24
26
28
30
0
2
4
6
8
10
12
14
16
18
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22
24
26
28
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100

GeKa®

# Welding of Austenitic Chromium-Nickel Stainless Steels

The composition of austenitic chromium-nickel stainless steels contains 12-25% Cr and 8-25% Ni. Various alloy elements are added to these steels, which are antimagnetic, to increase their corrosion resistance. These stainless steels have very good weldability. However, the physical qualities they have that are mentioned before should be taken into consideration during welding. in welding of these steels, more tension is seen than the welding of low-alloy carbon steels. The possibility of hot cracks at the two-sided inside corner fillet seam of these steels is very high at the welding of these stainless steels.

SCHAEFFLER diagram and DE LONG diagram that is the advanced version of it is used while calculating the amount of ferrite in the weld metal at welding of these stainless steels. Ferrite making elements Cr, Mo, Si, and Nb are put to the horizontal axis as chromium equivalent to detect the amount of delta ferrite that will be in the composition of the weld metal with the help of these diagrams. “Ferrite numbers” and hence the ferrite percentage can be read from the De Long diagram. With the help of these diagrams, the problems that can occur in the weld metal in cases of arc welding with flux-coated electrodes are known beforehand, and the required precautions can be taken.

Another metallurgical problem in welding of austenitic chromium-nickel stainless steels is the chromium-carbide precipitation that is caused in HAZ when this zone is heated for a long time at 500-900 ºC. Chromium-carbides precipitate at grain boundaries and make the steel vulnerable to intergranular corrosion. Hence, the carbon content of the austenitic chromium-nickel stainless steels that will be welded should be maximum 0.06% and, optimally, 0.03%. For this reason, it is advised that the amount of carbon of the products is decreased and the corrosion resistance is increased.

Another method to prevent the chromium-carbide precipitation is to add stabilization elements such as Ti, Nb and to to the composition of the steel. Niobium is preferred in electrodes because of its deprivation in titanium arc.

GeKa product range developed has been enriched with rutile and basic-coated electrodes to be used in the arc welding of austenitic chromium-nickel stainless steels. They contain stabilization elements in their coating-fluxes. The points that are considered in case of using of basic-coated electrodes for welding of mild steels should also be considered in both arc start and welding with basic-coated electrodes in this case, too.

The lowest-diameter electrode possible should be chosen and the lowest strength amount of current should be chosen when austenitic chromium-nickel steels are arc-welded with flux-coated electrodes. The electrodes should not be oscillated. in case of multi-pass welding, the joint should be cooled down to room temperature after each pass, which should be followed by the second pass following pass should be done after that, and, then, by the application of rapid cooling should be performed. The crater that formed in the end of the weld should be filled and enclosed.

GEDiK WELDING produces flux-coated various stainless steel electrodes for welding of austenitic stainless steels. Some of them are the GeKa electrodes ELOX R 308 L, ELOX R 316 L, ELOX R 318, ELOX R 347 and ELOX R 310. in addition to these, gas-shielded (TIG or MIG) or submerged arc welding wires of GEDİK WELDING meet all your requirements. Expert staff of GEDİK WELDING is at your service in case of a problem.

# GeKa GeKaTec Electrodes for Welding of Ferritic Chromium Steels

| W-No | Material Definition | ASTM AISI UNS | ELOX B 410 | ELOX B 410 NiMo / ELOX BS 410 NiMo | ELOX B 430 | ELOX B 430 Mo | ELOX R 307 / ELOX B 307 / ELOX RS 307 | ELOX B 307 L | ELOX R 308 L / ELOX B 308 L / ELOX RS 308 | ELOX R 308 H | ELOX B 309 / ELOX R 309 L | ELOX R 309 Mo L | ELOX R 312 / ELOX R 312 A | ELOX R 316 L / ELOX B 316 L / ELOX RS 316 | ELOX B 347 / ELOX R 347 | ELOX R 318 / ELOX B 318 | NİBAZ B 70 | GEKATEK 410 HD | GK UNIBASE 660 HD | GK 309 MoL | GEKATEK 309 Mo | GK 299 HD / GK 299 SUPER | GK 308 L | GK 316 L | GK ANTİ-CRACK 7015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.4000 | X6Cr13 | 403 | ● | ● | ● | | ○ | ○ | ○ | ○ | ○ | | ○ | | ○ | | | ● | ○ | | | ○ | ○ | | |
| 1.4001 | X7Cr14 | 429 | ● | | ● | | ○ | ○ | ○ | ○ | ○ | | ○ | | ○ | | | ● | ○ | | | ○ | ○ | | |
| 1.4001 | G-X7Cr14 | | ● | | ● | | ○ | ○ | | | | | | | | | ○ | ● | ○ | | | | | | ○ |
| 1.4002 | X6CrAl13 | 405 | ● | | ● | | ○ | ○ | ○ | ○ | | | | | ○ | | | ● | ○ | | | | ○ | | |
| 1.4003 | X2CrNi12 | | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | | ○ | | | | ○ | | | ○ | ○ | | |
| 1.4006 | X12Cr13 | 410 | ● | | ● | | ○ | ○ | ○ | ○ | ○ | | ○ | | ○ | | | ● | ○ | | | ○ | ○ | | |
| 1.4008 | GX8CrNi13 | CA 15 | ● | | ● | | ○ | ○ | ○ | ○ | ○ | | ○ | | ○ | | | ● | ○ | | | ○ | ○ | | |
| 1.4016 | X6Cr17 | 430 | ● | | ● | | ○ | ○ | ○ | ○ | ○ | | ○ | | ○ | | | ● | ○ | | | ○ | ○ | | |
| 1.4021 | X20Cr13 | 420 | ● | | ● | | ○ | ○ | ○ | ○ | ○ | | ○ | | ○ | | | ● | ○ | | | ○ | ○ | | |
| 1.4024 | X15Cr13 | 410 | ● | | ● | | ○ | ○ | ○ | ○ | ○ | | ○ | | ○ | | | ● | ○ | | | ○ | ○ | | |
| 1.4027 | GX20Cr14 | A 217 | | | | | ○ | ○ | | | ○ | | ○ | | | | ○ | | ○ | | | ○ | | | ○ |
| 1.4034 | X46Cr13 | | | | | | ○ | ○ | | | ○ | | ○ | | | | ○ | | ○ | | | ○ | | | ○ |
| 1.4034 | G-X46Cr13 | 420 | | | | | ○ | ○ | | | ○ | | ○ | | | | | | ○ | | | ○ | | | |
| 1.4057 | X17CrNi16-2 | 431 | | | ○ | ● | ○ | ○ | ○ | ○ | ○ | | ○ | | ○ | ○ | | | ○ | | | ○ | ○ | | |
| 1.4059 | GX22CrNi17 | A 743 | | | ○ | ● | ○ | ○ | ○ | ○ | ○ | | ○ | | ○ | ○ | | | ○ | | | ○ | ○ | | |
| 1.4113 | X6CrMo17-1 | 434 | | | | ● | | | | | | ○ | | ○ | | ○ | | | | ○ | ○ | | | ○ | |
| 1.4120 | X20CrMo13 | | | | | ● | | | | | | ○ | | ○ | | ○ | | | | ○ | ○ | | | ○ | |
| 1.4120 | GX20CrMo13 | | | | | ● | | | | | | ○ | | ○ | | ○ | | | | ○ | ○ | | | ○ | |
| 1.4122 | X39CrMo17-1 | | | | | ○ | | | | | | ○ | | ○ | | ○ | | | | ○ | ○ | | | ○ | |
| 1.4122 | GX35CrMo17-1 | | | | | ○ | | | | | | ○ | | ○ | | ○ | | | | ○ | ○ | | | ○ | |

Prod. Groups: GEKA; GEKATEK

Explanations:
● Substance and the additional metal have the same properties
○ Additional metals have higher alloys than the substance

GeKa

# GeKa GeKaTec TIG-MIG Wires and Submerged Wire-Powder Combination for Welding of Ferritic Chromium Steels

| W-No | Material Definition | ASTM AISI UNS | ELOX SG 307 (TIG-MIG) | GEKA ELOX SG 308 L (TIG) GEKA ELOX SG 308 L Si (MIG) | GEKA ELOX SG 309 L (TIG-MIG) | GEKA ELOX SG 312 (TIG-MIG) | GEKA ELOX SG 316 L Si (MIG) GEKA ELOX SG 316 L (TIG) | ELOX SG 347 (TIG) ELOX SG 347 Si (MIG) | ELOX SG 318 (TIG) ELOX SG 318 Si (MIG) | GEKA ELOX SG 430 (MIG) | GEKATEK 430 (MIG) | GEKATEK 430 LNB SG | GEKATEK 308 L Si (MIG) GEKATEK 308 L (TIG) | GEKATEK 316 L Si (MIG) GEKATEK 316 L (TIG) | GEKATEK 7015 SG | GEKA ELOX UP 308 L / ELIFLUX BSS | GEKA ELOX UP 316 L / ELIFLUX BSS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.4000 | X6Cr13 | 403 | ○ | ○ | ○ | ○ | | ○ | | ● | ● | | ○ | | | ○ | |
| 1.4001 | X7Cr14 | 429 | ○ | ○ | ○ | ○ | | ○ | | ● | ● | | ○ | | | ○ | |
| 1.4001 | G-X7Cr14 | | ○ | | | | | | | ● | ● | | | | ○ | | |
| 1.4002 | X6CrAl13 | 405 | ○ | | | | | ○ | | ● | ● | | | | | | |
| 1.4003 | X2CrNi12 | | ○ | ○ | ○ | ○ | | ○ | | | | | ○ | | | ○ | |
| 1.4006 | X12Cr13 | 410 | ○ | ○ | ○ | ○ | | ○ | | ● | ● | | ○ | | | ○ | |
| 1.4008 | GX8CrNi13 | CA 15 | ○ | ○ | ○ | ○ | | ○ | | ● | ● | | ○ | | | ○ | |
| 1.4016 | X6Cr17 | 430 | ○ | ○ | ○ | ○ | | ○ | | ● | ● | ● | ○ | | | ○ | |
| 1.4021 | X20Cr13 | 420 | ○ | ○ | ○ | ○ | | ○ | | ● | ● | | ○ | | | ○ | |
| 1.4024 | X15Cr13 | 410 | ○ | ○ | ○ | ○ | | ○ | | ● | ● | | ○ | | | ○ | |
| 1.4027 | GX20Cr14 | A 217 | ○ | ○ | ○ | ○ | | | | | | | ○ | | ○ | ○ | |
| 1.4034 | X46Cr13 | | ○ | ○ | ○ | ○ | | | | | | | ○ | | ○ | ○ | |
| 1.4034 | G-X46Cr13 | 420 | ○ | ○ | ○ | ○ | | | | | | ● | ○ | | | ○ | |
| 1.4057 | X17CrNi16-2 | 431 | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | ● | ○ | | | ○ | |
| 1.4059 | GX22CrNi17 | A 743 | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | ● | ○ | | | ○ | |
| 1.4113 | X6CrMo17-1 | 434 | | | | | ○ | | ○ | ○ | ○ | ● | | ○ | | | ○ |
| 1.4120 | X20CrMo13 | | | | | | ○ | | ○ | | | ● | | ○ | | | ○ |
| 1.4120 | GX20CrMo13 | | | | | | ○ | | ○ | | | ● | | ○ | | | ○ |
| 1.4122 | X39CrMo17-1 | | | | | | ○ | | ○ | | | ○ | | ○ | | | ○ |
| 1.4122 | GX35CrMo17-1 | | | | | | ○ | | ○ | | | ○ | | ○ | | | ○ |

Prod. Groups: GEKA TIG-MIG WIRE | GEKATEK TIG-MIG WIRE | GeKa Submerged Wire-Powder Combination

Explanations: ● Substance and the additional metal have the same properties | ○ Additional metals have higher alloys than the substance

# GeKa GeKaTec Electrodes for Welding of Chemical Resistant Steels

| W-No | Material Definition | ASTM AISI UNS | ELOX R 317 L | ELOX B 410 NiMo | ELOX B 410 | ELOX BS 410 NiMo | ELOX B 385 / ELOX R 385 | ELOX B 2209 / ELOX R 2209 | ELOX B 308 L / ELOX R 308 L | ELOX R 316 L / ELOX B 316 L | ELOX B 347 / ELOX R 347 | ELOXR 318 / ELOX B 318 | ELOX B 430 | NİBAZ B 65 | GK 410 HD | GK 308 L | GK 316 L | GK ANTİ-CRACK 70 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.3952 | X2CrNiMoN18-14-3 | | | | | | ○ | | | | | | | | | | | |
| 1.3964 | X2CrNiMnMoNNb21-16-5-3 | S20910 | | | | | ○ | | | | | | | | | | | |
| 1.4301 | X5CrNi18-10 | 304 | | | | | | | ● | | ○ | | | | | ● | | |
| 1.4303 | X4CrNi18-12 | 305 | | | | | | | ● | | ○ | | | | | ● | | |
| 1.4306 | X2CrNi19-11 | 304L | | | | | | | ● | | ○ | | | | | ● | | |
| 1.4308 | GX5CrNi19-10 | | | | | | | | ● | | ○ | | | | | ● | | |
| 1.4311 | X2CrNiN18-10 | 304LN | | | | | | | ● | | ○ | | | | | ● | | |
| 1.4312 | GX10CrNi18-8 | | | | | | | | ● | | ○ | | | | | ● | | |
| 1.4313 | X3CrNiMo13-4 | S41500 | | ○ | | ○ | | | | | | | | | ● | | | |
| 1.4317 | G-X 4CrNi 13-4 | | | ○ | | ○ | | | | | | | | | ● | | | |
| 1.4361 | X1CrNiSi18-15-4 | | | | | | | | | | | | | | | | | |
| 1.4401 | X5CrNiMo17-12-2 | 316 | | | | | | | | ● | | ○ | | | | | ● | |
| 1.4404 | X2CrNiMo17-12-2 | 316 L | | | | | | | | ● | | ○ | | | | | ● | |
| 1.4406 | X2CrNiMoN17-11-2 | 316 L | ○ | | | | | | | ● | | ○ | | | | | ● | |
| 1.4407 | G-X5CrNiMo13-4 | CAGNM | | ● | | ● | | | | | | | | | ● | | | |
| 1.4408 | G-X5CrNiMo19-11-2 | | | | | | | | | ● | | ○ | | | | | ● | |
| 1.4409 | GX2CrNiMo19-11-2 | | | | | | | | | ● | | ○ | | | | | ● | |
| 1.4429 | X2CrNiMoN17-13-3 | 315LN | ○ | | | | | | | ● | | ○ | | | | | ● | |
| 1.4435 | X2CrNiMo18-14-13 | 317L | ○ | | | | | | | ● | | ○ | | | | | ● | |
| 1.4436 | X3CrNiMo17-13-3 | S31600 | ○ | | | | | | | ● | | ○ | | | | | ● | |
| 1.4437 | GX6CrNiMo18-12 | S31600 | ○ | | | | | | | ● | | ○ | | | | | ● | |
| 1.4438 | X2CrNiMo18-15-4 | S31703 | ○ | | | | ○ | | | | | | | | | | | |
| 1.4439 | X2CrNiMoN17-13-5 | S31726 | ○ | | | | ○ | | | | | | | | | | | |
| 1.4446 | GX2CrNiMoN17-13-4 | | ○ | | | | ○ | | | | | | | | | | | |
| 1.4448 | GX6CrNiMo17-3 | | ○ | | | | ○ | | | | | | | | | | | |
| 1.4462 | X2CrNiMoN22-5-3 | S31803 | | | | | | ● | | | | | | | | | | |
| 1.4500 | GX7NiCrMoCuNb25-20 | | | | | | ● | | | | | | | | | | | |
| 1.4505 | X4NiCrMoCuNb20-18-2 | | | | | | ○ | | | | | | | | | | | |
| 1.4506 | X5CrNiMoCuTi20-18 | | | | | | ○ | | | | | | | | | | | |
| 1.4510 | X3CrTi17 | 430 Ti | | | | | | | | | | | ● | | | | | |
| 1.4511 | X3CrNb17 | 430 Cb | | | | | | | | | ○ | | ● | | | | | |
| 14512 | X2CrTi12 | S40900 | | | | | | | ○ | | | | ○ | | | ○ | | |
| 1.4529 | X1NiCrMoCuN25-20-7 | N08925 | | | | | | | | | | | | ● | | | | ○ |
| 1.4531 | GX2NiCrMoCuN20-18 | | | | | | ○ | | | | | | | | | | | |
| 1.4536 | GX2NiCrMoCuN25-20 | | | | | | ● | | | | | | | ○ | | | | ○ |
| 1.4539 | X1NiCrMoCu25-20-5 | N08904 | | | | | ● | | | | | | | ○ | | | | ○ |
| 1.4541 | X6CrNiTi18-10 | 321 | | | | | | | ○ | | ● | | | | | ○ | | |
| 1.4550 | X6CrNiNb18-10 | 347 | | | | | | | ○ | | ● | | | | | ○ | | |
| 1.4552 | GX5CrNiNb19-11 | CF8C | | | | | | | ○ | | ● | | | | | ○ | | |
| 1.4558 | X2NiCrAlTi32-20 | B407 | | | | | | | | | | | | ○ | | | | ○ |
| 1.4571 | X6CrNiMoTi17-12-2 | 316 Ti | | | | | | | | ○ | | ● | | | | | ○ | |
| 1.4577 | X3CrNiMoTi25-25 | S31640 | | | | | ○ | | | | | | | | | | | |
| 1.4580 | X6CrNiMoNb17-12-2 | 316 Cb | | | | | | | | ○ | | ● | | | | | ○ | |
| 1.4581 | GX5CrNiMoNb19-11-2 | | | | | | | | | ○ | | ● | | | | | ○ | |
| 1.4583 | X10CrNiMoNb18-12 | 316 Cb | | | | | | | | | | ● | | | | | | |
| 1.4585 | GX7CrNiMoCuNb18-18 | | | | | | ○ | | | | | | | | | | | |
| 1.4586 | X5NiCrMoCuNb22-18 | | | | | | ○ | | | | | | | | | | | |
| 2.4856 | NiCr22Mo6Nb | N06625 | | | | | | | | | | | | ○ | | | | ○ |
| 2.4858 | NiCr21Mo | N08825 | | | | | | | | | | | | ○ | | | | ○ |

Product Groups: GEKA | GEKATEK

Explanations: ● Substance and the additional metal have the same properties; ○ Additional metals have higher alloys than the substance

# GeKa GeKaTec TIG-MIG Wires and Submerged Wire-Powder Combination for Welding of Chemical Resistant Steels

| W-No | Material Definition | ASTM AISI UNS | GEKA ELOX SG 308 L Si (MIG) / GEKA ELOX SG 308 L (MIG) | ELOX SG 347 (TIG) / ELOX SG 347 Si (MIG) | GEKA ELOX SG 316 L Si (MIG) / GEKA ELOX SG 316 L (MIG) | ELOX SG 318 (TIG) / ELOX SG 318 Si (MIG) | ELOX SG 430 (MIG) | GEKATEK 308 L Si (MIG) / GEKATEK 308 L (MIG) | GEKATEK 316 L Si (MIG) / GEKATEK 316 L (MIG) | GEKATEK 7015 SG | GEKA ELOX UP 308 L / ELIFLUX BSS | GEKA ELOX UP 316 L / ELIFLUX BSS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.4301 | X5CrNi18-10 | 304 | ● | ○ | | | | ● | | | ● | |
| 1.4303 | X4CrNi18-12 | 305 | ● | ○ | | | | ● | | | ● | |
| 1.4306 | X2CrNi19-11 | 304L | ● | ○ | | | | ● | | | ● | |
| 1.4308 | GX5CrNi19-10 | | ● | ○ | | | | ● | | | ● | |
| 1.4311 | X2CrNiN18-10 | 304LN | ● | ○ | | | | ● | | | ● | |
| 1.4312 | GX10CrNi18-8 | | ● | ○ | | | | ● | | | ● | |
| 1.4401 | X5CrNiMo17-12-2 | 316 | | | ● | ○ | | | ● | | | ● |
| 1.4404 | X2CrNiMo17-12-2 | 316 L | | | ● | ○ | | | ● | | | ● |
| 1.4406 | X2CrNiMoN17-11-2 | 316 L | | | ● | ○ | | | ● | | | ● |
| 1.4407 | G-X5CrNiMo13-4 | CA6NM | | | | | | | | | | |
| 1.4408 | G-X5CrNiMo19-11-2 | | | | ● | ○ | | | ● | | | ● |
| 1.4409 | GX2CrNiMo19-11-2 | | | | ● | ○ | | | ● | | | ● |
| 1.4429 | X2CrNiMoN17-13-3 | 315LN | | | ● | ○ | | | ● | | | ● |
| 1.4435 | X2CrNiMo18-14-13 | 317L | | | ● | ○ | | | ● | | | ● |
| 1.4436 | X3CrNiMo17-13-3 | S31600 | | | ● | ○ | | | ● | | | ● |
| 1.4437 | GX6CrNiMo18-12 | S31600 | | | ● | ○ | | | ● | | | ● |
| 1.4510 | X3CrTi17 | 430 Ti | | ○ | | | ● | | | | | |
| 1.4511 | X3CrNb17 | 430 Cb | ○ | ○ | | | ● | ○ | | | ○ | |
| 14512 | X2CrTi12 | S40900 | | | | | ○ | | | | | |
| 1.4529 | X1NiCrMoCuN25-20-7 | N08925 | | | | | | | | ● | | |
| 1.4536 | GX2NiCrMoCuN25-20 | | | | | | | | | ○ | | |
| 1.4539 | X1NiCrMoCu25-20-5 | N08904 | | | | | | | | ○ | | |
| 1.4541 | X6CrNiTi18-10 | 321 | ○ | ● | | ● | | ○ | | | ○ | |
| 1.4550 | X6CrNiNb18-10 | 347 | ○ | ● | | ● | | ○ | | | ○ | |
| 1.4552 | GX5CrNiNb19-11 | CF8C | ○ | ● | | ● | | ○ | | | ○ | |
| 1.4558 | X2NiCrAlTi32-20 | B407 | | | | | | | | ○ | | |
| 1.4571 | X6CrNiMoTi17-12-2 | 316 Ti | | | ○ | | ● | | ○ | | | ○ |
| 1.4577 | X3CrNiMoTi25-25 | S31640 | | | | | | | | | | |
| 1.4580 | X6CrNiMoNb17-12-2 | 316 Cb | | | ○ | | ● | | ○ | | | ○ |
| 1.4581 | GX5CrNiMoNb19-11-2 | | | | ○ | | ● | | ○ | | | ○ |
| 1.4583 | X10CrNiMoNb18-12 | 316 Cb | | | ○ | | ● | | ○ | | | ○ |
| 2.4856 | NiCr22Mo6Nb | N06625 | | | | | | | | ● | | |
| 2.4858 | NiCr21Mo | N08825 | | | | | | | | ● | | |

Product Groups: GeKa TIG MIG Wire | GeKaTeK TIG MIG Wire | GeKa Submerged Wire-Powder Combination

Explanations: ● Substance and the additional metal have the same properties | ○ Additional metals have higher alloys than the substance

# GeKa GeKaTec Branded Electrodes and TIG-MIG Wires for Welding of Heat Resisting Steels

| Material Definition | W-No | ASTM AISI UNS | Service Temperature °C | ELOX B 327 | ELOX B 309 | ELOX R 310 ELOX B 310 | ELOX R 347 ELOX B 347 | ELOX R 307 ELOX B 307 | NİBAS B 70 | GEKATEK 309 Mo | GK 310 | GK UNIBASE 660 HD | GK ANTİCRACK 7015 | Service Temperature °C | ELOX SG 310 (TIG-MIG) | ELOX SG 307 (TIG-MIG) | GEKA ELOX SG 309 L (TIG-MIG) | GEKATEK 309 L (TIG) GEKATEK 309 L Si (MIG) | GEKATEK 7015 SG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Heath resisting steels | 1.4710 | | 850 | ○ | ○ | | | ○ | | ○ | | ○ | | 850 | | | ○ | ○ | |
| | 1.4712 | | 850 | ○ | ○ | | | ○ | | ○ | | ○ | | 850 | | | ○ | ○ | |
| | 1.4713 | | 800 | ○ | ○ | | | ○ | | ○ | | ○ | | 800 | | | ○ | ○ | |
| | 1.4724 | 405 | 850 | ○ | ○ | | | ○ | | ○ | | ○ | | 850 | | | ○ | ○ | |
| | 1.4729 | | 900 | ○ | ○ | | | | ○ | ○ | | | ○ | 900 | | | ○ | ○ | ○ |
| | 1.4740 | | 950 | ○ | ○ | | | | ○ | ○ | | | ○ | 950 | | | ○ | ○ | ○ |
| | 1.4742 | 430 | 1050 | ○ | ○ | | | | | ○ | | | | 1050 | | | ○ | ○ | |
| | 1.4745 | | 1050 | ○ | | ○ | | | ○ | | ○ | | ○ | 1050 | ○ | | | | ○ |
| | 1.4762 | 446 | 1200 | ● | | ○ | | | | | ○ | | | 1200 | ○ | | | | |
| | 1.4821 | 327 | 1100 | ● | | ○ | | | | | ○ | | | 1100 | ○ | | | | |
| | 1.4822 | | 1100 | ● | | ○ | | | | | ○ | | | 1100 | ○ | | | | |
| | 1.4825 | A 297, Gr. CF20 | 800 | | ○ | | ○ | ○ | | ○ | | ○ | | 800 | | ○ | ○ | ○ | |
| | 1.4826 | A 297, Gr. HF | 950 | | ● | ○ | | | | ● | ○ | | | 950 | ○ | | ● | ● | |
| | 1.4828 | 309 | 1050 | | ● | ○ | | | | ● | ○ | | | 1050 | ○ | | ● | ● | |
| | 1.4832 | | 1000 | | ● | ○ | | | ○ | ● | ○ | | ○ | 1000 | ○ | | ● | ● | ○ |
| | 1.4837 | A 297, Gr. HH | 1150 | | | ● | | | ○ | | ● | | ○ | 1150 | ● | | | | ○ |
| | 1.4841 | 314, 310 | 1150 | | | ● | | | | | ● | | | 1150 | ● | | | | |
| | 1.4845 | 310 | 1050 | | | ● | | | | | ● | | | 1050 | ● | | | | |
| | 1.4861 | | 1200 | | | | | | ○ | | | | ○ | 1200 | | | | | ○ |
| | 1.4864 | 330 | 1100 | | | | | | ○ | | | | ○ | 1100 | | | | | ○ |
| | 1.4865 | 330 | 1120 | | | | | | ○ | | | | ○ | 1120 | | | | | ○ |
| | 1.4876 | B163 | 1150 | | | | | | ○ | | | | ○ | 1150 | | | | | ○ |
| | 1.4878 | 321 | 800 | | | | ○ | ○ | | | | | | 800 | | ○ | | | |
| | 1.0569 | | | ● | | | | | | | | | | | | | | | |

Product Groups: GEKA | GEKATEK

Explanations: ● Substance and the additional metal have the same properties | ○ Additional metals have higher alloys than the substance

# Welding of High-Manganese Austenitic Hard Steels

High-manganese austenitic steels that are named as Haldfield steel in Anglo-Saxon literature, and are widely used in contemporary technology are tough, ductile, durable, abrasion resisting, antimagnetic materials that have high strain hardening, and contain 11-14% Mn and 0.7-1.4 % C. Cr, Mo, V, Cu, Ti and Ba is added as the alloy element to these steels in order to acquire some additional qualities.

These steels are used in the production of the joints that take impact and are worn out of the heavy construction equipments such as excavator buckets, baggers, grader and dozer blades, crusher jaws.

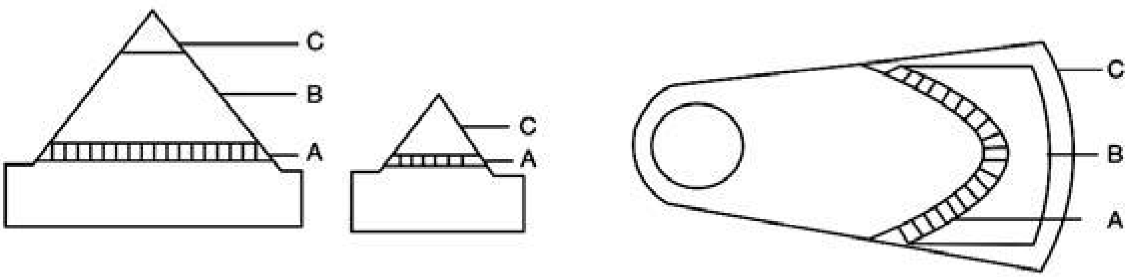
High-manganese austenitic hard steels can easily be welded because of their austenitic structure although their thermal conductivity is very low and their thermal expansion is high. They become brittle because of carbide formation when they stay at 400-800 ºC temperature for a long time, and their tendency to crack increases. Thus, these steels are welded only with electrical arc welding by applying as little heat input as possible. Each pass is cooled down by spraying water or wiping with a wet cloth after welding.Big pieces are welded by putting them into a water bath in such a way that only the weld zone is out of water.

Distortions and deformations in welding of the manganese austenitic hard steels are severer than the welding of carbon steels because of their high thermal expansion and low thermal conductivity. Even though cooling process decreases the severity of this problem, hammering the weld bead after cooling is very useful both for reducing the internal stress and for increasing the abrasion resistance as a result of deformation hardening.

Build-Up

Making worn out machine parts usable with build-up is very economical. As the types of electrodes increased, it is no lenger necessary to use an electrode that is made up of the same material as the material of the joint that will be repaired. There is a possibility of applying filler welding with a material that is much more durable.

Before the filler welding ofa worn out joint, surfaces that will be filled should be processed until all the abrasion cracks are removed with grinding or machining. If base metal and electrode are made up of different materials, using ELOX B 307 electrode that is ductile, that can remove the post welding internal stresses by changing its shape, and, that can prevent the fusion zone that can have undesired characteristics as the buffer layer is recommended. Filling processed is applied with ELHARD 14 Mn electrode by cooling and hammering each pass on the buffer layer made up




A- Buffer Welding with ELOX B 307
B- Build-Up with ELHARD 14 Mn
C- Hardfacing with ELHARD 600

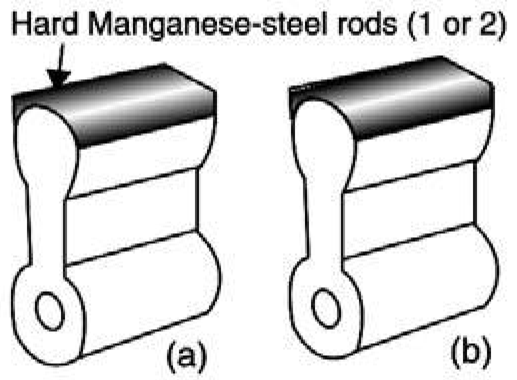
It would be safer if the last three passes are built up with ELHARD 600 in order for build-up layer to be more abrasion and impact resisting.

If the joints are small and lightly abraded, ELHARD 600 can be directly used on top of the buffer layer that is made with ELOX B 307. To have a more effective outcome in breaker and crusher jaws, the pass that is made with ELHARD 600 should be hot hammered. Although cooling the hot weld bead by putting it in water is also recommended to increase hardness, this process can only be applied to small joints that have a small filling zone.

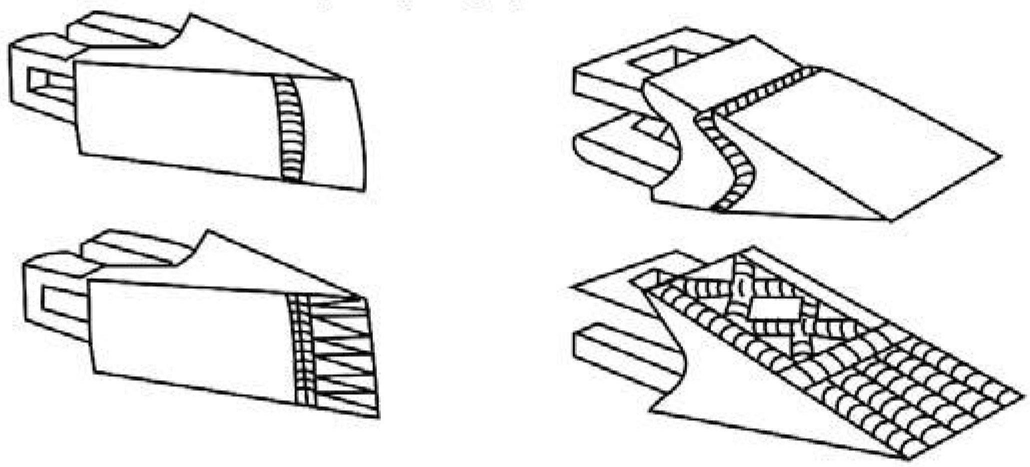
If the top layer has to be very hard, ELHARD 60/63/65 can be used instead of ELHARD 600. However, this type of electrodes should not be applied in more than two passes in filling processes, and cooling and hammering processes should not be applied to them.

## Joint Welding

Manganese austenitic hard steels can be welded with the same steels or with low-alloy steels. Chromium-nickel-manganese alloyed ELOX B 307 should be preferred instead of a high-manganese electrode that fits the composition of the base metal for this process. This electrode has an excellent abrasion resistance and removes tensions by changing its shape with its high ductility. Welding process should be made by applying as little heat input as possible and a cooling process. Short passes should be applied by changing directions, and each pass should be hammered after it cooled down.




A crusher of which worn out part is filled with hardfacing
a) by using steel rod
b) completely by electrode



Hardfacing application in repair and maintenance of bucket teeth that are made up of manganese austenitic hard steel.

## Welding of Cast Irons

Cast irons are iron alloys that generally contain 1.7-4% C, 3.5% Si, Mn, S, and P the facts that cast irons can flow well when they are liquid, their melting point is low, they are not affected by carbon catching during melting made them unique cast material. Cast irons contain carbon in unbound form, in carbide and a little in ferrite. The type and the characteristics of cast irons are determined by the form of the carbon. The significant types of cast irons for welding that are highly used in industry are gray cast iron and nodular cast iron.

## Welding of Gray Cast Irons

Gray cast iron has an internalstructure that is composed of unbound graphite that is scattered in the form of platelets in a matrix that resembles low-alloy unbound-carbon steels. The reason for the gray cast iron not to have transformation capability, to have low strength and to be brittle is the graphite platelets in its internalstructure.

Two significant points affect the weldability of gray cast iron;

1- Since the melted zone rapidly cools down because of its high carbon content, weld bead is very hard, brittle and rich in cementite.

2- Deformation caused by regional heating and cooling during welding causes the cast iron joint that is very brittle to crack from the weakest point.

There are two solutions for the welding of cast iron.

- It is possible to prevent both the hard structure that is caused by rapid cooling and the danger of cracking caused by welding stress by applying preheating at a very high temperature (600-700 ºC). Electric arc welding and oxi-acetylene welding with a metal that has the suitable composition to the base metal can be applied in this process, which can be named as hot welding.
- The bases of the welding process of gray casting irons that is named as cold welding is to apply heat low enough to prevent the formation of high amounts of cementite and martensite and formation of the stress that can cause fracture in the course of heating, and, to use a weld metal that does mot cause martensite and cementite formation. Pure Nickel, Copper-Nickel, Iron-Nickel alloy coated electrodes are used in this method.

V, X and U grooves in 80-90º angle is applied to joint that will be welded. Cast spunk along the grooves is cleaned. it is necessary to obey the following conditions in this welding method during welding to prevent the danger of heat stress cracking, to narrow transition zene and to decrease the hardening in this zone.

Heat input should be decreased by using the thinnest electrode and the lowest strength of current possible.

Weld bead length should be limited to 25mm in order for the base metal not to warm too much.

Each pass should be hammered with a round head hammer before it cools down to decrease the stress the weld metal causes by shrinking.

Welding should be paused after each weld bead until the joint cools down to a temperature at which one can touch it by hand.

Electrode should be started on the prior seam when welder starts a new seam.

Arc should always be directed to the piled metal during welding and welder should go back a little while they put out the arc. They should retract the electrode slowly.

In order to decrease the stresses in the multi pass welding of thick joints, welding should be applied in width and length.

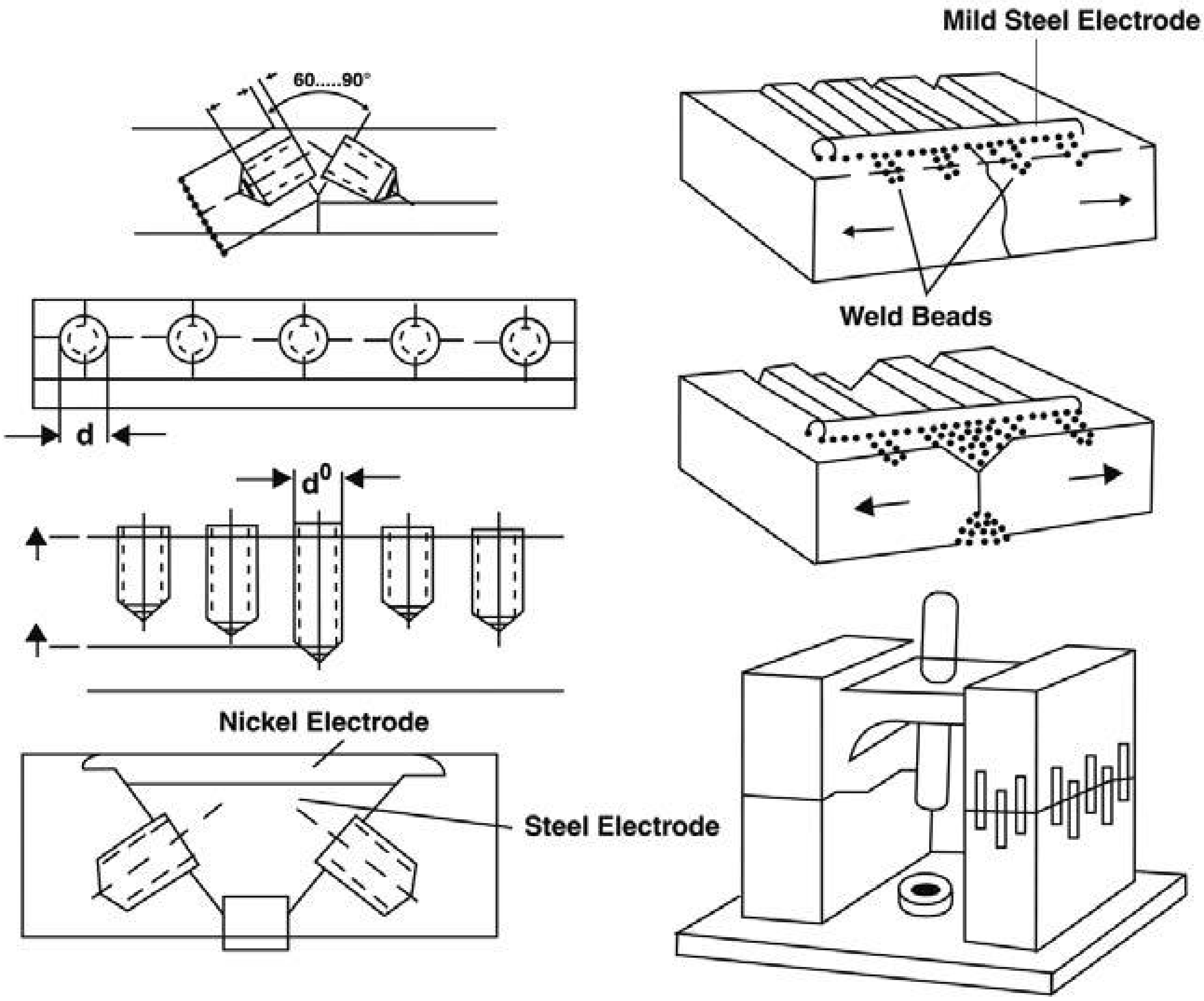
Geka developed pure nickel ELNIKEL, copper-nickel ELMONEL and ferronickel ELNIFER electrodes for the cold welding of cast irons.

It is possible to apply the weld joint quicker, with less risk and with longer seams using electrodes above and a preheating at 150-250 ‘ C in the cases where the size, shape and the type of the cast iron joint are appropriate. in the method that is called half-hot welding, the hardness of the HAZ does not exceed 200 Vickers.

In the cases where the weld zone does not have to be processed, an experienced welder can get a satisfactory result with LASER B 50 or ELFER basic electrodes if they obey the conditions above. However, hard zones that can exceed 450 Vickers can be seen in the HAZ in these conditions.

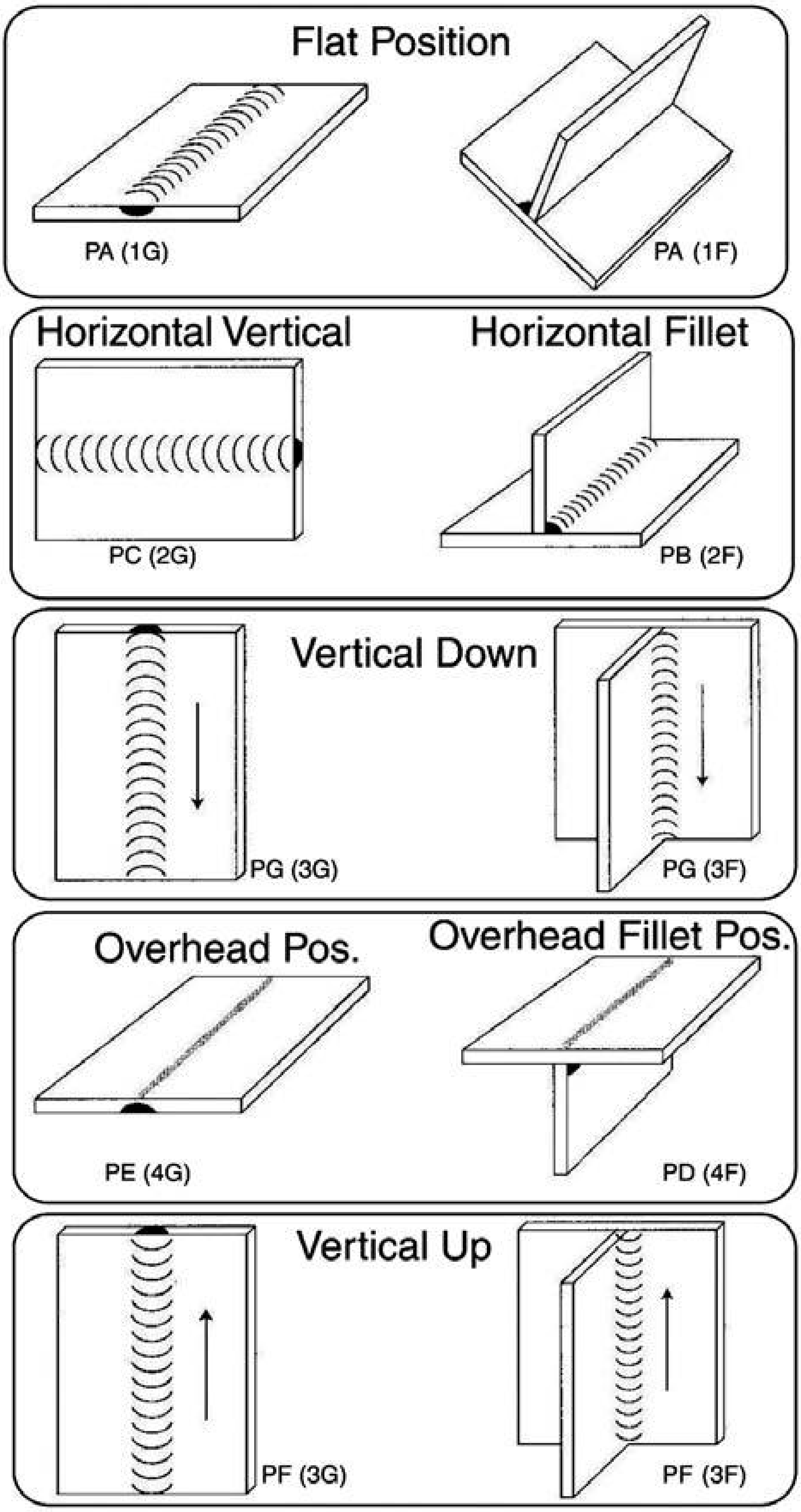
### Welding of Nodular Cast Irons

Long studies showed that ferronickel based electrode ELNIFER is the most appropriate electrode for the welding of nodular cast iron. Although nodular cast irons can be welded with low heat input, the most appropriate results are gotten in the applications




Examples of reinforced stud welding of cast iron joints

# Welding Positions according to EN and AWS Standards

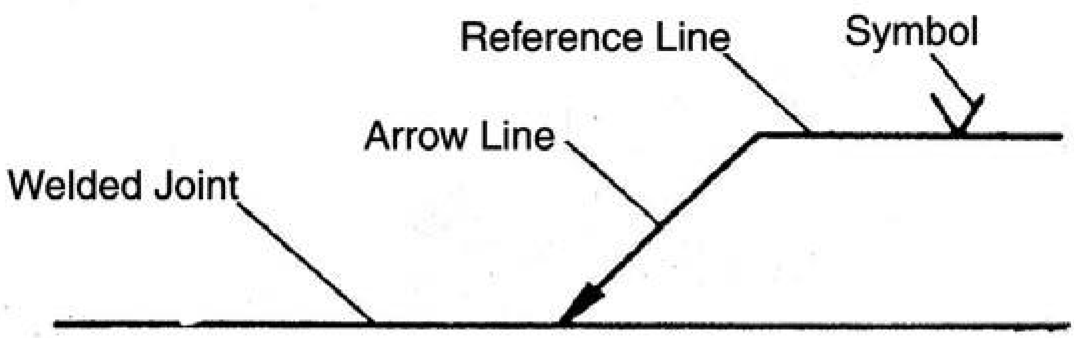


# Symbols for the Designation of Weld Beads in Projects

Usage of welding symbols and supporting elements adopted and standardized to make graphing and reapplication of welded constructions easier. TS 3004 is published on this issue in Turkey. However, conductors do not completely obey this standard. Thus, our craftsmen should be knowledgeable.

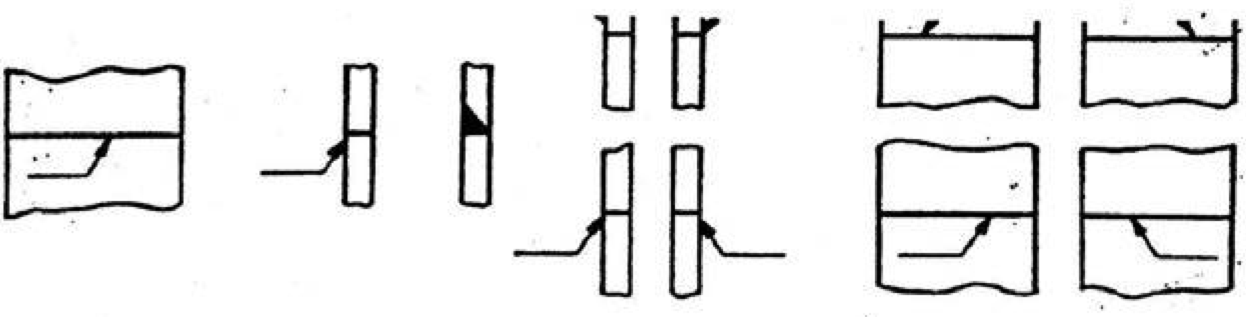
Illustrations that are the most important part of the welding plan should reflect all properties of weld beads.

There are an elementary symbol, an arrow line that has an arrow that shows the joint at the end of it, and a reference line in illustrations




*Designation that is used in weld joints*

The side of the joint where the arrow put is called "arrow side of the joint", the other side is called "other side of the joint".



Various designations

The position of the arrow line with respect to the weld is generally of no special significance. However, the arrow line should point towards the plate which is prepared for welding.

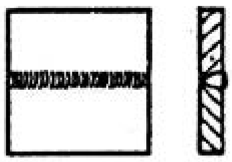
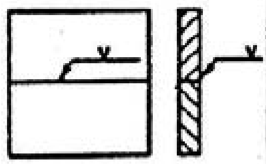
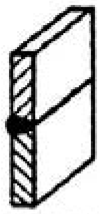
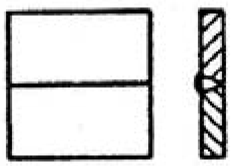
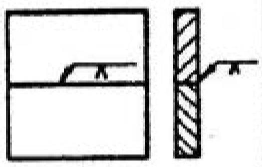
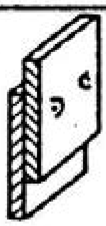
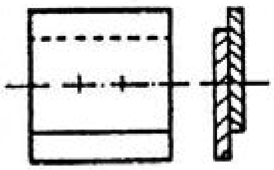
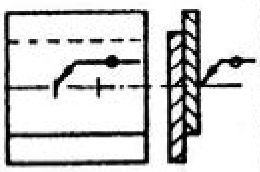
The reference line should be drawn parallel to the bottom edge of the drawing,

Positions of the symbols in relation to the reference line are defined according to E (first angle) and A (third angle) methods.

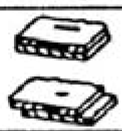
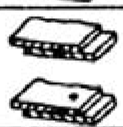
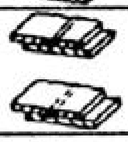
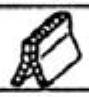
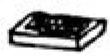
One should look into TS 3004 if they have to graph or read welding construction illustrations that are graphed using A method.

Although the symbols that are used in the illustrations of welded constructions have some differences depending on the symbols of the countries, they can show the information that determine the construction such as groove and seam surface from easily, clearly and in a simple way.

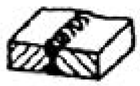
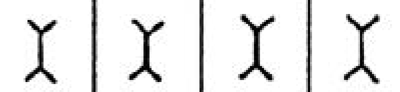
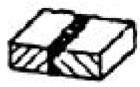
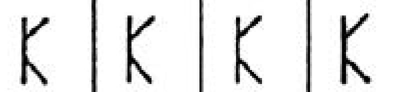
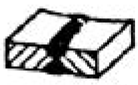
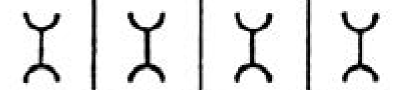
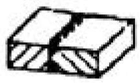
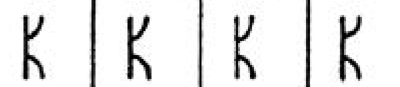
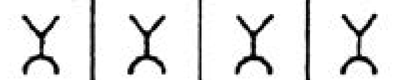
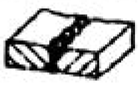
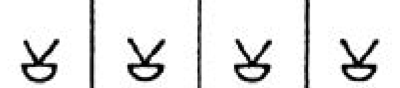
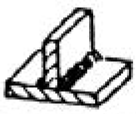
## Position of the symbols according to E Method

| Illustration | Figure | Figure Position of the symbols | Definition of Position of the symbols |
|---|---|---|---|
|  |  |  | The symbol is placed above the reference line if the weld face is on the arrow side of the joint |
|  |  |  | If the exterior surface of the weld is on the other side of the joint, below the reference line |
|  |  |  | If welding is not made in the junction plane, on the reference line |
| Note: In the case of spot welds made by projection welding, the projection surface is to be considered as the external surface of the weld. | | | |

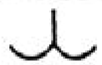
# Notation of Elementary Symbols in Standards

| Designation | illustration | Symbol TS | Symbol DIN | Symbol AWS | Symbol BS |
|---|---|---|---|---|---|
| Butt weld between plates with raised edges |  | | | | |
| Butt weld between plates with raised edge |  | | | | |
| Square butt weld |  | \|\| | \|\| | \|\| | \|\| |
| Single-V butt weld |  | V | V | V | V |
| Convoluted Single-V butt weld |  | | | | |
| Single-bevel butt weld |  | | | | |
| Single-V butt weld with broad root face |  | Y | Y | Y | Y |
| Single-bevel butt weld with broad root face |  | | | | |
| Single-U butt weld |  | | | | |
| Single-J butt weld |  | | | | |
| Backing weld |  | | | | |
| Fillet weld |  | | | | |
| Plug weld |  | | | | |
| Spot weld |  | O | O | O | O |
| Seam weld |  | | | | |
| Steep-flanked single-V butt weld |  | | | | |
| Steep-flanked single-bevel butt weld |  | | | | |
| Edge weld |  | | \|\|\| | | |
| Surfacing |  | | | | |

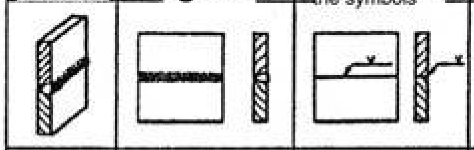
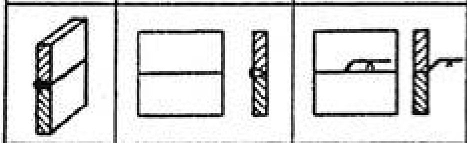
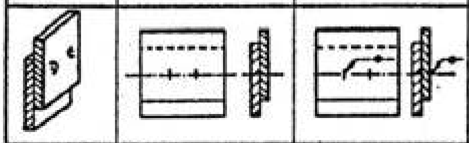
## Examples of Elementary Symbols in a Combined Way

| Designation | illustration | Symbol TS | Symbol DIN | Symbol AWS | Symbol BS |
|---|---|---|---|---|---|
| Double-V butt weld (X weld) |  | X | X | X | X |
| Double-bevel butt weld |  | K | K | K | K |
| Double-V butt weld with broad root face |  |  | | | |
| Double-bevel butt weld with broad root face |  |  | | | |
| Double-U butt weld |  |  | | | |
| Double-J butt weld |  |  | | | |
| V-U Butt weld |  |  | | | |
| Single-V butt weld with broad root face and backing run |  |  | | | |
| Double- Fillet weld |  |  | | | |

### Supplementary symbols

| Shape of the welded surface | Symbol |
|---|---|
| Flat | — |
| Convex |  |
| Concave |  |
| Toes shall be blended smoothly |  |

# Position of the symbols according to E Method

| illustration / figure / Position of the symbols | Definition of Position of the symbols |
|---|---|
|  | If the exterior surface of the weld is on the arrow side of the joint, above the reference line |
|  | If the exterior surface of the weld is on the other side of the joint, below the reference line |
|  | If welding is not made in the junction plane, on the reference line |
| Note: In the case of spot welds made by projection welding, the projection surface is to be considered as the external surface of the weld. | |

Weld symbols are generally examined under three groups:

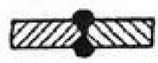
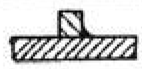
a) Elementary Symbols
b) Combined Symbols
c) Supplementary symbols

We can look at the notation of these in various country symbols.

**a) Elementary Symbols**
Examples for the usage of elementary symbols to show the welding type are also given in the table. These symbols are generally similar to the shape of the weld seam. Hence they can be easily remembered.

**b) Combined Symbols**
These symbols are shown in the table for the examples of elementary symbols in a combined way.

**c) Supplementary Symbols**
Elementary symbols can be completed with the supplementary symbols that show the shape of surface of the weld seam.Welded surfaces are generally made flat. Since there is no need to show the welding surface completely, it is normal that supplementary symbols are not used.

| Designation | illustration | Symbol |
|---|---|---|
| Flat single-V butt weld |  |  |
| Convex double-V weld |  |  |
| Concave fillet weld |  |  |
| Flat single-V butt weld with flat backing run |  |  |

*Examples of application of supplementary symbols*

Certain dimensions can be shown next to each welding symbol.

The main dimension of the cross section should be written on the left side of the symbol. Lengthwise dimensions ((Length of the weld bead) should be written on the right side of it.

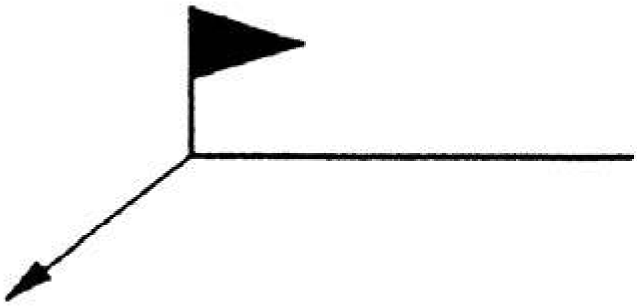
The principles for these dimensions are shown in the table. More significant dimensions can be shown when necessary.

In case of flat weld joints, it is understood that welding is made without opening a root along the joint.

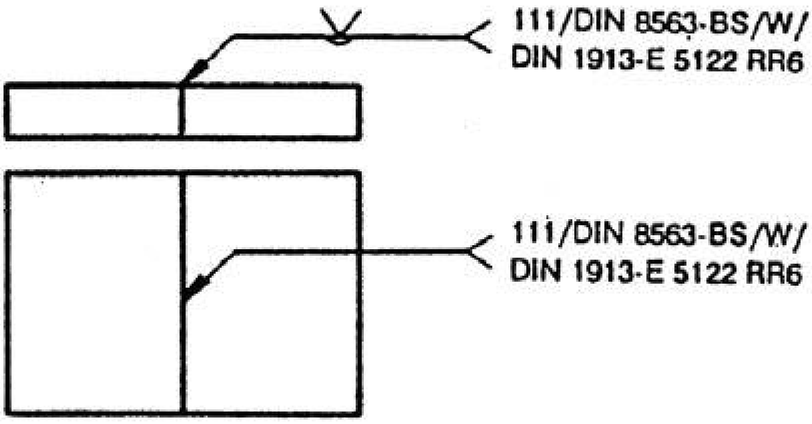
## Basic Dimensions

| No | Welding Method |
|---|---|
| 1 | Arc welding |
| 11 | Metal-arc welding without gas protection |
| 111 | Metal-arc welding with coated electrode |
| 12 | Submerged arc welding |
| 13 | Gas-shielded metal-arc welding |
| 131 | MIG welding |
| 135 | MAG welding |
| 141 | TIG welding |
| 15 | Plasma arc welding |
| 2 | Resistance welding |
| 21 | Spot welding |
| 22 | Seam welding |
| 23 | Projection welding |
| 24 | Flash welding |
| 3 | Gaswelding |
| 311 | Oxy-acetylene welding |
| 4 | Pressure welding |
| 41 | Ultrasonic welding |
| 42 | Friction welding |
| 441 | Explosive welding |
| 45 | Diffusion welding |
| 71 | Thermic welding |
| 72 | Electro-slag welding |
| 73 | Electro-gas welding |
| 751 | Laser beam welding |
| 76 | Electron beam welding |
| 9 | Brazing, soldering and braze welding |

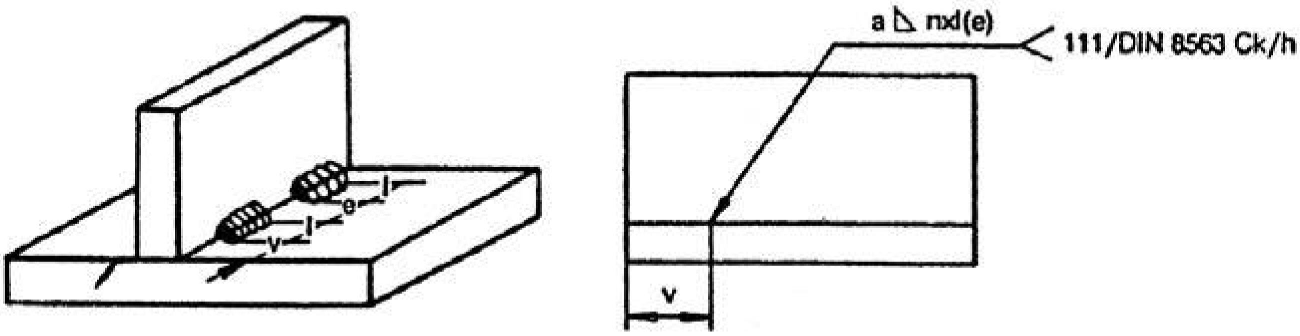
**According to DiN 1912, assessment group of the welding is shown right after the welding method in between slashes.**



Flag symbol that is used to indicate the field or site weld




Welding position and the designation of the electrode that is used




An example of an intermittent fillet weld

# ELECTRODE CONSUMPTION CALCULATION

In order to calculate the welding cost, the amount of electrodes that will be used should be calculated since it is the most important input. Although there are computer programs for this purpose, this can also be approximately calculated with the eight tables that are given below. in the first seven of these tables, the diameters of the electrodes that are recommended are also given considering the plate thickness and the weight of 1 meter welding seam and the welding position in !fillet welds. The number of electrodes that are needed is calculated for root and filler passes from table 8 in relation to the electrode diameter and length with the help of 1 meter seam weight that is calculated from those tables. The discarded stem length is considered to be 30mm and the loss that is caused by spattering and burning is considered to be 10% in this table. This value changes between 87% and 93% in practice depending on the type of electrode and the strength of current.

Since the efficiency of electrodes that have iron powder is higher the number of electrodes that are used in practice is lower than the number that is determined according to the table. Hence the number that is calculated with the help of the table is multiplied with 0.8 for 100-120 % efficiency electrodes and 0.6 for 160% efficiency electrodes.

**Example 1:** Calculation of the required number of electrodes for 1 meter welding seam when a 6mm plate is welded with a V groove in a horizontal position.

The weight of 1 meter welding seam is calculated as 0.10kg when 350mm long electrode that has 3.25mm long diameter is used for root pass according to table 1.

The weight of 1 meter welding seam is calculated as 0.12kg when 350mm long electrode that has 4mm long diameter is used for filler pass.

The number of electrodes according to table 8. 0.10kg= 5.3 (Ø3.25x350mm electrodes)

0.12kg= 0.10+0.02kg= 3.5+0.7= 4.2 (Ø4.00x350mm electrodes)

**Example 2:** Calculation of the required number of electrodes when a 16mm plate is welded with a V groove and its root is also welded from underside in a horizontal position.

The weight of 1 meter welding seam is calculated as 0.12kg when 450mm long electrode that has 4mm long diameter is used for root pass according to table 1.

In case of a root pass underside, 1 meter welding seam is calculated as 0.12kg for 450mm long electrode that has 4mm long diameter.

The weight of 1 meter welding seam is calculated as 1.3kg when 450mm long electrode that has 5mm long diameter is used for filler pass.

The number of electrodes according to table 8.

**Root pass:** 0.12= 0.10+0.02= 2.7+0.5= 3.2 (Ø4.00x450mm electrodes)

**Underside Root Pass:** 0.12= 0.10+0.02= 2.7+0.5= 3.2 (Ø4.00x450mm electrodes)

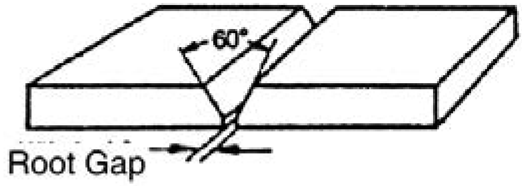
**Filler Pass:** 1.3= 1+0.3= 17.2+5.2= 22.4 (Ø5.00x450mm electrodes)

**Note:** These calculations are for normal electrodes. For example, if the same welding processed is made with a 160% efficient iron powder coated electrode, the number should be multiplied with 0.6. in case of basic electrodes, it should be multiplied with 0.8.

# Weld Bead Weight in V groove in horizontal and flat positions

## V-Groove

Horizontal and flat position
Groove angle: 60°




| Plate Thickness (mm) | Root Gap (mm) | Electrode Diameter (mm) | Approximate Seam Cross-Section (mm) | Seam Weight (kg/m) |
|---|---|---|---|---|
| 3 | 1 | 2,5 | 8,5 | 0,07 |
| 4 | 1 | 2,5 or 3,25 | 13,5 | 0,11 |
| 5 | 1 | 3,25 | 19,5 | 0,16 |
| 6 | 1 | W 3,25<br>D 4 | 27 | 0,10<br>0,12 |
| 7 | 1,5 | W 3,25<br>D 4 | 39 | 0,10<br>0,21 |
| 8 | 1,5 | W 3,25<br>D 4 or 5 | 49 | 0,10<br>0,29 |
| 9 | 1,5 | W 3,25<br>D 4 or 5 | 60,5 | 0,10<br>0,38 |
| 10 | 2 | W 3,25<br>D 4 or 5 | 77,5 | 0,10<br>0,51 |
| 11 | 2 | W 3,25<br>D 4 or 5 | 92 | 0,10<br>0,62 |
| 12 | 2 | W 3,25<br>D 4 or 5 | 108 | 0,10<br>0,75 |
| 13 | 2 | W 3,25<br>D 4 or 5 | 123 | 0,10<br>0,87 |
| 14 | 2 | W 3,25<br>D 4 or 5 | 142 | 0,10<br>1,02 |
| 15 | 2 | W 4<br>D 5 or 6 | 161 | 0,12<br>1,14 |
| 16 | 2 | W 4<br>D 5 or 6 | 180 | 0,12<br>1,30 |
| 17 | 2 | W 4<br>D 5 or 6 | 201 | 0,12<br>1,46 |
| 18 | 2 | W 4<br>D 5 or 6 | 223 | 0,12<br>1,72 |
| 19 | 2 | W 4<br>D 5 or 6 | 246 | 0,12<br>1,81 |
| 20 | 2 | W 4<br>D 5 or 6 | 271 | 0,12<br>2,01 |

**W: RootPass** **D: Filler Pass**

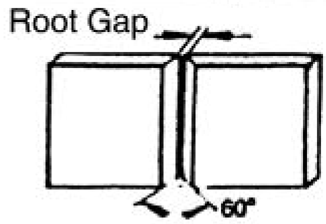
Half of the seam weight is added in the case of welding of plates that are up to 5mm for root welding from underside. At least the weight of the root pass should be added for the plaıes that are thicker than 5mm.

Hail of the plate thickness is taken in case of welding seam weight for double-V groove. Double of the required V-groove is taken and opposing welding of the root side is added to this.

# Weld Bead Weight in V butt welding in vertical position

## V-Groove

Horizontal and flat position
Groove angle: 60°




| Plate Thickness (mm) | Root Gap (mm) | Electrode Diameter (mm) | Approximate Seam Cross-Section (mm) | Seam Weight (kg/m) |
|---|---|---|---|---|
| 3 | 1 | 2,5 or 3,25 | 8,5 | 0,09 |
| 4 | 1 | 3,25 | 13,5 | 0,14 |
| 5 | 1 | 3,25 | 19,5 | 0,20 |
| 6 | 1 | 3,25 | 27 | 0,26 |
| 7 | 1,5 | 3,25 | 39 | 0,36 |
| 8 | 1,5 | 3,25 | 49 | 0,45 |
| 9 | 1,5 | W 3,25<br>D 4 | 60,5 | 0,20<br>0,34 |
| 10 | 2 | W 3,25<br>D 4 | 77,5 | 0,20<br>0,47 |
| 11 | 2 | W 3,25<br>D 4 | 92 | 0,20<br>0,59 |
| 12 | 2 | W 3,25<br>D 4 | 108 | 0,20<br>0,73 |
| 13 | 2 | W 3,25<br>D 4 | 123 | 0,20<br>0,85 |
| 14 | 2 | W 3,25<br>D 4 | 142 | 0,20<br>1,00 |
| 15 | 2 | W 3,25<br>D 4 | 161 | 0,20<br>1,14 |
| 16 | 2 | W 3,25<br>D 4 | 180 | 0,20<br>1,30 |
| 17 | 2 | W 3,25<br>D 4 | 201 | 0,20<br>1,47 |
| 18 | 2 | W 3,25<br>D 4 | 223 | 0,20<br>1,73 |
| 19 | 2 | W 3,25<br>D 4 | 246 | 0,20<br>1,83 |
| 20 | 2 | W 3,25<br>D 4 | 271 | 0,20<br>2,01 |

**W: RootPass** **D: Filler Pass**

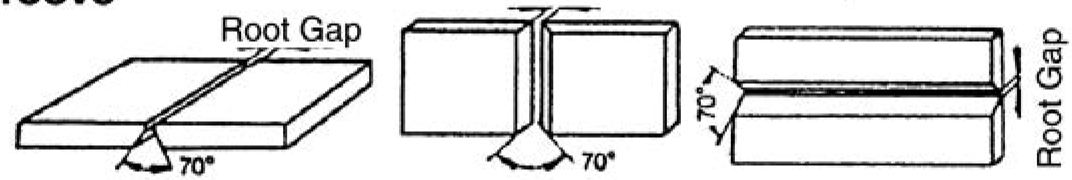
Half of the seam weight is added in the case of welding of plates that are up to 8mm for root welding from underside. At least the weight of the root pass should be added for the plates that are thicker than 8mm.

Hali of the plate thickness is taken in case of welding seam weight for double-V groove. Double of the required V-groove is laken and opposing welding of the root side is added to this.

# Weld Bead in V butt welding in overhead, vertical and horizontal vertical positions

**V-Groove**

Overhead, vertical and horizontal vertical positions Groove angle: 70°




| Plate Thickness (mm) | Root Gap (mm) | Electrode Diameter (mm) | Approximate Seam Cross-Section (mm) | Seam Weight (kg/m) |
|---|---|---|---|---|
| 3 | 1 | 2,5 | 9,5 | 0,10 |
| 4 | 1 | 2,5 or 3,25 | 16 | 0,16 |
| 5 | 1 | 3,25 | 22,5 | 0,22 |
| 6 | 1 | 3,25 | 31 | 0,29 |
| 7 | 1,5 | 3,25 | 45 | 0,41 |
| 8 | 1,5 | 3,25 | 57 | 0,51 |
| 9 | 1,5 | W 3,25<br>D 4 | 70,5 | 0,20<br>0,42 |
| 10 | 2 | W 3,25<br>D 4 | 90,5 | 0,20<br>0,57 |
| 11 | 2 | W 3,25<br>D 4 | 107 | 0,20<br>0,71 |
| 12 | 2 | W 3,25<br>D 4 | 125,5 | 0,20<br>0,87 |
| 13 | 2 | W 3,25<br>D 4 | 138 | 0,20<br>0,97 |
| 14 | 2 | W 3,25<br>D 4 | 165 | 0,20<br>1,18 |
| 15 | 2 | W 3,25<br>D 4 | 188 | 0,20<br>1,36 |
| 16 | 2 | W 3,25<br>D 4 | 211 | 0,20<br>1,54 |
| 17 | 2 | W 3,25<br>D 4 | 236 | 0,20<br>1,74 |
| 18 | 2 | W 3,25<br>D 4 | 263 | 0,20<br>1,95 |
| 19 | 2 | W 3,25<br>D 4 | 291 | 0,20<br>2,18 |
| 20 | 2 | W 3,25<br>D 4 | 320 | 0,20<br>2,41 |

**W: RootPass** **D: Filler Pass**

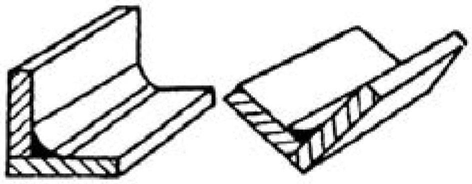
Half of the seam weight is added in the case of welding of plates that are up to 8mm for root welding from underside. At least the weight of the root pass should be added for the plates that are thicker than 8mm.

Halt of the plate thickness is taken in case of welding seam weight for double-V groove. Ooubl e of the required V-groove is laken and opposing welding of the root side is added to this.

# Weld Bead Weight in fillet welding in horizontal and flat positions

**Fillet Welding**

Horizontal and flat position



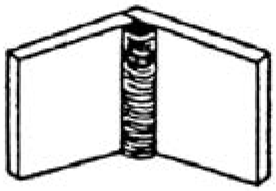
| Plate Thickness (mm) | Electrode Diameter (mm) | Approximate Seam Cross-Section (mm) | Seam Weight (kg/m) |
|---|---|---|---|
| 2 | 2,5 | 4 | 0,038 |
| 2,5 | 2,5 or 3,25 | 6,5 | 0,058 |
| 3 | 3,25 or 4 | 9 | 0,082 |
| 3,5 | 3,25 or 4 | 12,5 | 0,115 |
| 4 | 3,25 or 4 | 16 | 0,15 |
| 4,5 | 3,25 or 4 | 20,5 | 0,18 |
| 5 | 3,25 or 4 | 25 | 0,23 |
| 5,5 | 3,25 or 4 | 30,5 | 0,28 |
| 6 | 3,25 or 4 | 36 | 0,33 |
| 6,5 | 3,25 or 4 | 42,5 | 0,39 |
| 7 | 3,25 or 4 | 49 | 0,45 |
| 7,5 | 3,25 or 4 | 56,5 | 0,52 |
| 8 | W 4<br>D 5 | 64 | 0,18<br>0,41 |
| 8,5 | W 4<br>D 5 | 72,5 | 0,18<br>0,48 |
| 9 | W 4<br>D 5 | 81 | 0,18<br>0,56 |
| 9,5 | W 4<br>D 5 | 90,5 | 0,18<br>0,65 |
| 10 | W 4<br>D 5 or 6 | 100 | 0,18<br>0,73 |
| 11 | W 4<br>D 5 or 6 | 121 | 0,18<br>0,92 |
| 12 | W 4<br>D 5 or 6 | 144 | 0,18<br>1,14 |
| 13 | W 4<br>D 5 or 6 | 169 | 0,18<br>1,37 |
| 14 | W 4<br>D 5 or 6 | 196 | 0,18<br>1,60 |
| 15 | W 4<br>D 5 or 6 | 225 | 0,18<br>1,89 |
| 16 | W 4<br>D 5 or 6 | 256 | 0,18<br>2,14 |

**W: RootPass** **D: Filler Pass**

# Weld Bead Weight in fillet welding in vertical position

**Fillet Welding**

Vertical position



| Plate Thickness (mm) | Electrode Diameter (mm) | Approximate Seam Cross-Section (mm) | Seam Weight (kg/m) |
|---|---|---|---|
| 2 | 2 or 2,5 | 4 | 0,040 |
| 2,5 | 2 or 2,5 | 6,5 | 0,061 |
| 3 | 2,5 or 3,25 | 9 | 0,086 |
| 3,5 | 3,25 | 12,5 | 0,12 |
| 4 | 3,25 | 16 | 0,16 |
| 4,5 | 3,25 | 20,5 | 0,19 |
| 5 | W 3,25<br>D 4 | 25 | 0,10<br>0,14 |
| 5,5 | W 3,25<br>D 4 | 30,5 | 0,10<br>0,19 |
| 6 | W 3,25<br>D 4 | 36 | 0,10<br>0,25 |
| 6,5 | W 3,25<br>D 4 | 42,5 | 0,10<br>0,31 |
| 7 | W 3,25<br>D 4 | 49 | 0,10<br>0,37 |
| 7,5 | 4 | 56,5 | 0,55 |
| 8 | 4 | 64 | 0,62 |
| 8,5 | 4 | 72,5 | 0,69 |
| 9 | 4 | 81 | 0,78 |
| 9,5 | 4 | 90,5 | 0,87 |
| 10 | 4 | 100 | 0,96 |
| 11 | 4 | 121 | 1,16 |
| 12 | 4 | 144 | 1,39 |
| 13 | 4 | 169 | 1,63 |
| 14 | 4 | 196 | 1,87 |
| 15 | 4 | 225 | 2,17 |
| 16 | 4 | 256 | 2,44 |

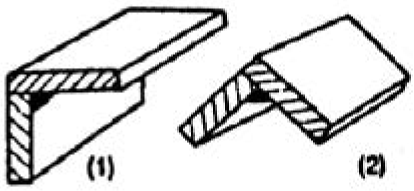
**W: RootPass** **D: Filler Pass**

# Weld Bead Weight in fillet welding in overhead position

## Fillet Welding

### Overhead position

Generally, electrodes with 3,25 Ø are used for static circumstances in overhead position similar to the situation (1).




| Plate Thickness (mm) | Electrode Diameter (mm) | Approximate Seam Cross-Section (mm) | Seam Weight (kg/m) |
|---|---|---|---|
| 2 | 2,5 | 4 | 0,040 |
| 2,5 | 2,5 | 6,5 | 0,061 |
| 3 | 2,5 | 9 | 0,086 |
| 3,5 | 2,5 | 12,5 | 0,12 |
| 4 | 2,5 | 16 | 0,16 |
| 4,5 | 2,5 | 20,5 | 0,19 |
| 5 | 3,25 | 25 | 0,24 |
| 5,5 | 3,25 | 30,5 | 0,29 |
| 6 | 3,25 | 36 | 0,35 |
| 6,5 | 3,25 | 42,5 | 0,41 |
| 7 | 3,25 | 49 | 0,47 |
| 7,5 | 3,25 | 56,5 | 0,55 |
| 8 | W 3,25<br>D 4 | 64 | 0,10<br>0,52 |
| 8,5 | W 3,25<br>D 4 | 72,5 | 0,10<br>0,59 |
| 9 | W 3,25<br>D 4 | 81 | 0,10<br>0,68 |
| 9,5 | W 3,25<br>D 4 | 90,5 | 0,10<br>0,77 |
| 10 | W 3,25<br>D 4 | 100 | 0,10<br>0,86 |
| 11 | W 3,25<br>D 4 | 121 | 0,10<br>1,06 |
| 12 | W 3,25<br>D 4 | 144 | 0,10<br>1,29 |
| 13 | W 3,25<br>D 4 | 169 | 0,10<br>1,53 |
| 14 | W 3,25<br>D 4 | 196 | 0,10<br>1,77 |
| 15 | W 3,25<br>D 4 | 225 | 0,10<br>2,07 |
| 16 | W 3,25<br>D 4 | 256 | 0,10<br>2,34 |

**W: RootPass** **D: Filler Pass**

# Weld Bead Weight in 1-butt wel ng of thin plates in horizontal position

| I-Groove of Thin Plates | | | |
|---|---|---|---|
| Plate Thickness (mm) | Root Gap (mm) | Electrode Diameter (mm) | Seam Weight of Convex Seams (kg/m) |
| 1,5 | 0,5 | 2 | 0,015 |
| 2 | 1 | 2 | 0,030 |
| 2,5 | 1,2 | 2,5 | 0,060 |
| 3 | 1,5 | 2,5 (3,25) | 0,075 |
| 3,5 | 1,5 | 3,25 | 0,090 |

## Labor Costs

Labor is not only the wage of the welder. It is one-hour labor cost that is calculated by adding wages of everybody that contributes to the application of that welding seam in a certain rate. This labor cost is divided to the one meter long welding seam.
The following formula is used in calculation.

$$\text{Labor Costs/meter welding} = \frac{I_G \ . \ KMA}{EG \ . \ \eta_i} \ \text{(TL/meter welding)}$$

$I_G$ : One hour cost (TL)
KMA : Weight of the one meter long welding metal (Kg)
EG : Melting power of electrodes (Kg/h)
$\eta_i$ : Operation factor

GeKa

## Number of electrodes for each Kg/m bead weight

(Efficiency is considered to be 90% and discarded stem length is considered to be 30mm)

| Seam Weight (kg/m) | Electrode diameters and lengths | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1,5 250 | 2 250 | 2,5 250 | 2,5 350 | 3,25 350 | 3,25 450 | 4 350 | 4 450 | 5 450 | 6 450 |
| 0,01 | 3,6 | 2,0 | 1,3 | 0,9 | 0,5 | 0,4 | 0,4 | 0,3 | 0,2 | 0,1 |
| 0,02 | 7,3 | 4,1 | 2,6 | 1,8 | 1,1 | 0,8 | 0,7 | 0,5 | 0,3 | 0,2 |
| 0,03 | 10,9 | 6,1 | 3,9 | 2,7 | 1,6 | 1,2 | 1,1 | 0,8 | 0,5 | 0,4 |
| 0,04 | 14,5 | 8,2 | 5,3 | 3,6 | 2,1 | 1,6 | 1,4 | 1,1 | 0,7 | 0,5 |
| 0,05 | 18.2 | 10,2 | 6,5 | 4,5 | 2,7 | 2,0 | 1,8 | 1,3 | 0,9 | 0,6 |
| 0,06 | 21,8 | 12,3 | 7,9 | 5,4 | 3,2 | 2,4 | 2,1 | 1,6 | 1,0 | 0,7 |
| 0,07 | 25,4 | 14,3 | 9,2 | 6,3 | 3,7 | 2,9 | 2,5 | 1,9 | 1,2 | 0,9 |
| 0,08 | 29,1 | 16,4 | 10,5 | 7,2 | 4,3 | 3,3 | 2,8 | 2,2 | 1,4 | 1,0 |
| 0,09 | 32,7 | 18,4 | 11,8 | 8,1 | 4,8 | 3,7 | 3,2 | 2,4 | 1,5 | 1,1 |
| 0,10 | 36,4 | 20,4 | 13,1 | 9,0 | 5,3 | 4,1 | 3,5 | 2,7 | 1,7 | 1,2 |
| 0,15 | 54,5 | 30,7 | 19,7 | 13,5 | 8,0 | 6,1 | 5,3 | 4,0 | 2,6 | 1,8 |
| 0,20 | 72,8 | 40,9 | 26,2 | 18,1 | 10,7 | 8,1 | 7,0 | 5,4 | 3,4 | 2,4 |
| 0,25 | 91,0 | 51,1 | 32,8 | 22,6 | 13,3 | 10,2 | 8,8 | 6,7 | 4,3 | 3,0 |
| 0,30 | 109 | 61,3 | 39,4 | 27,1 | 16,0 | 12,2 | 10,6 | 8,1 | 5,2 | 3,6 |
| 0,35 | 127 | 71,5 | 46,0 | 31,6 | 18,7 | 14,2 | 12,3 | 9,4 | 6,0 | 4,2 |
| 0,40 | 145 | 81,8 | 52,5 | 36,2 | 21,4 | 16,3 | 14,1 | 10,8 | 6,9 | 4,8 |
| 0,45 | 164 | 92,0 | 59,1 | 40,7 | 24,0 | 18,3 | 15,8 | 12,1 | 7,7 | 5,4 |
| 0,50 | 182 | 102 | 65,6 | 45,2 | 26,7 | 20,3 | 17,6 | 13,4 | 8,6 | 6,0 |
| 0,55 | 200 | 113 | 72,2 | 49,7 | 29,4 | 22,4 | 19,4 | 14,8 | 9,4 | 6,6 |
| 0,60 | 218 | 123 | 78,8 | 54,3 | 32,0 | 24,4 | 21,1 | 16,1 | 10,3 | 7,2 |
| 0,65 | 236 | 133 | 85,4 | 58,8 | 34,7 | 26,4 | 22,9 | 17,5 | 11,1 | 7,7 |
| 0,70 | 254 | 143 | 92,0 | 63,3 | 37,4 | 28,5 | 24,6 | 18,8 | 12,0 | 8,3 |
| 0,75 | 273 | 153 | 98,5 | 67,8 | 40,0 | 30,5 | 26,4 | 20,2 | 12,9 | 8,9 |
| 0,80 | 291 | 164 | 105 | 72,2 | 42,7 | 32,5 | 28,2 | 21,5 | 13,7 | 9,5 |
| 0,85 | 309 | 174 | 112 | 76,9 | 45,4 | 34,6 | 30,0 | 22,8 | 14,6 | 10,1 |
| 0,90 | 327 | 184 | 118 | 81,4 | 48,0 | 36,6 | 31,7 | 24,2 | 15,4 | 10,7 |
| 0,95 | 346 | 194 | 125 | 85,9 | 50,7 | 38,6 | 33,5 | 25,6 | 16,3 | 11,3 |
| 1,00 | 364 | 204 | 131 | 90,4 | 53,4 | 40,7 | 35,2 | 26,9 | 17,2 | 11,9 |
| 2,00 | 728 | 409 | 262 | 181 | 107 | 81,3 | 70,4 | 53,8 | 34,3 | 23,8 |
| 3,00 | 1090 | 613 | 394 | 271 | 160 | 122 | 106 | 80,7 | 51,5 | 35,7 |
| 4,00 | 1450 | 818 | 460 | 362 | 214 | 162 | 141 | 108 | 68,6 | 47,6 |
| 5,00 | 1820 | 1020 | 525 | 452 | 267 | 203 | 176 | 134 | 85,7 | 59,5 |
| 6,00 | 2180 | 1230 | 788 | 543 | 320 | 244 | 211 | 161 | 103 | 71,5 |
| 7,00 | 2540 | 1430 | 920 | 633 | 374 | 285 | 246 | 188 | 120 | 83,4 |
| 8,00 | 2910 | 1640 | 1050 | 723 | 427 | 325 | 288 | 215 | 137 | 95,3 |
| 9,00 | 3270 | 1840 | 1180 | 814 | 480 | 366 | 317 | 242 | 154 | 107 |
| 10,00 | 3640 | 2040 | 1310 | 904 | 534 | 407 | 352 | 269 | 172 | 119 |

**W: RootPass** **D: Filler Pass**

# BRINELL, ROCKWELL, VICKERS HARDNESS COMPARISION TABLE

| Impact Strength | Vickers Hardness | Brinell Hardness | Rockwell Hardness | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | HRB | HRF | HRC | HRA | HRD | HR 15 N | HR 30 N | HR 45 N |
| 255 | 80 | 76.0 | - | - | - | - | - | - | - | - |
| 270 | 85 | 80.7 | 41.0 | - | - | - | - | - | - | - |
| 285 | 90 | 85.5 | 48.0 | 82.6 | - | - | - | - | - | - |
| 305 | 95 | 90.2 | 52.0 | - | - | - | - | - | - | - |
| 320 | 100 | 95.0 | 56.2 | 87.0 | - | - | - | - | - | - |
| 335 | 105 | 99.8 | - | - | - | - | - | - | - | - |
| 350 | 110 | 105 | 62.3 | 90.5 | - | - | - | - | - | - |
| 370 | 115 | 109 | - | - | - | - | - | - | - | - |
| 385 | 120 | 114 | 66.7 | 93.6 | - | - | - | - | - | - |
| 400 | 125 | 119 | - | - | - | - | - | - | - | - |
| 415 | 130 | 124 | 71.2 | 96.4 | - | - | - | - | - | - |
| 430 | 135 | 128 | - | - | - | - | - | - | - | - |
| 450 | 140 | 133 | 75.0 | 99.0 | - | - | - | - | - | - |
| 465 | 145 | 138 | - | - | - | - | - | - | - | - |
| 480 | 150 | 143 | 78.7 | 101.4 | - | - | - | - | - | - |
| 495 | 155 | 147 | - | - | - | - | - | - | - | - |
| 510 | 160 | 152 | 81.7 | 103.6 | - | - | - | - | - | - |
| 530 | 165 | 156 | - | - | - | - | - | - | - | - |
| 545 | 170 | 162 | 85.0 | 105.5 | - | - | - | - | - | - |
| 560 | 175 | 166 | - | - | - | - | - | - | - | - |
| 575 | 180 | 171 | 87.1 | 107.2 | - | - | - | - | - | - |
| 595 | 185 | 176 | - | - | - | - | - | - | - | - |
| 610 | 190 | 181 | 89.5 | 105.5 | - | - | - | - | - | - |
| 625 | 195 | 185 | - | - | - | - | - | - | - | - |
| 640 | 200 | 190 | 91.5 | 110.1 | - | - | - | - | - | - |
| 660 | 205 | 195 | 92.5 | - | - | - | - | - | - | - |
| 675 | 210 | 199 | 93.5 | 111.3 | - | - | - | - | - | - |
| 690 | 215 | 204 | 94.0 | - | - | - | - | - | - | - |
| 705 | 220 | 209 | 95.0 | 112.4 | - | - | - | - | - | - |
| 720 | 225 | 214 | 96.0 | - | - | - | - | - | - | - |
| 740 | 230 | 219 | 96.7 | 113.4 | - | - | - | - | - | - |
| 755 | 235 | 223 | - | - | - | - | - | - | - | - |
| 770 | 240 | 228 | 98.1 | 114.3 | 20.3 | 60.7 | 40.3 | 69.6 | 41.7 | 19.9 |
| 785 | 245 | 233 | - | - | 21.3 | 61.2 | 41.1 | 70.1 | 42.5 | 21.1 |
| 800 | 250 | 238 | 99.5 | 115.1 | 22.2 | 61.6 | 41.7 | 70.6 | 43.4 | 22.2 |
| 820 | 255 | 242 | - | - | 23.1 | 62.0 | 42.2 | 71.1 | 44.2 | 23.2 |
| 835 | 260 | 247 | (101) | - | 24.0 | 62.4 | 43.1 | 71.6 | 45.0 | 24.3 |
| 850 | 265 | 252 | - | - | 24.8 | 62.7 | 43.7 | 72.1 | 45.7 | 25.2 |
| 865 | 270 | 257 | (102) | - | 25.6 | 63.1 | 44.3 | 72.6 | 46.4 | 26.2 |
| 880 | 275 | 261 | - | - | 26.4 | 63.5 | 44.9 | 73.0 | 47.2 | 27.1 |
| 900 | 280 | 266 | (104) | - | 27.1 | 63.8 | 45.3 | 73.4 | 47.8 | 27.9 |
| 915 | 285 | 271 | - | - | 27.8 | 64.2 | 46.0 | 73.8 | 48.4 | 28.7 |
| 930 | 290 | 276 | (105) | - | 28.5 | 64.5 | 46.5 | 74.2 | 49.0 | 29.5 |
| 950 | 295 | 280 | - | - | 29.2 | 64.8 | 47.1 | 74.6 | 49.7 | 30.4 |
| 965 | 300 | 285 | - | - | 29.8 | 65.2 | 47.5 | 74.9 | 50.2 | 31.1 |
| 995 | 305 | 295 | - | - | 31.0 | 65.8 | 48.4 | 75.6 | 51.3 | 32.5 |
| 1030 | 310 | 304 | - | - | 32.2 | 66.4 | 49.4 | 76.2 | 52.3 | 33.9 |
| 1060 | 315 | 314 | - | - | 33.3 | 67.0 | 50.2 | 76.8 | 53.6 | 35.2 |
| 1095 | 320 | 323 | - | - | 34.4 | 67.6 | 51.1 | 77.4 | 54.4 | 36.5 |
| 1125 | 325 | 333 | - | - | 35.5 | 68.1 | 51.9 | 78.0 | 55.4 | 37.8 |

# BRINELL, ROCKWELL, VICKERS HARDNESS COMPARISION TABLE

| Impact Strength | Vickers Hardness | Brinell Hardness | Rockwell Hardness | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | HRB | HRF | HRC | HRA | HRD | HR 15 N | HR 30 N | HR 45 N |
| 1155 | 360 | 342 | - | - | 36.6 | 68.7 | 52.8 | 78.6 | 56.4 | 39.1 |
| 1190 | 370 | 352 | - | - | 37.7 | 69.2 | 53.6 | 79.2 | 57.4 | 40.4 |
| 1220 | 380 | 361 | - | - | 38.8 | 69.8 | 54.4 | 79.8 | 58.4 | 41.7 |
| 1255 | 390 | 371 | - | - | 39.8 | 70.3 | 55.3 | 80.3 | 59.3 | 42.9 |
| 1290 | 400 | 380 | - | - | 40.8 | 70.8 | 56.0 | 80.8 | 60.2 | 44.1 |
| 1320 | 410 | 390 | - | - | 41.8 | 71.4 | 56.8 | 81.4 | 61.1 | 45.3 |
| 1350 | 420 | 399 | - | - | 42.7 | 71.8 | 57.5 | 81.8 | 91.9 | 46.4 |
| 1385 | 430 | 409 | - | - | 43.6 | 72.3 | 58.2 | 82.3 | 62.7 | 47.4 |
| 1420 | 440 | 418 | - | - | 44.5 | 72.8 | 58.8 | 82.8 | 63.5 | 48.4 |
| 1455 | 450 | 428 | - | - | 45.3 | 73.3 | 59.4 | 83.2 | 64.3 | 49.4 |
| 1485 | 460 | 437 | - | - | 46.1 | 73.6 | 60.1 | 83.6 | 64.9 | 50.4 |
| 1520 | 470 | 447 | - | - | 46.9 | 74.1 | 60.7 | 83.9 | 65.7 | 51.3 |
| 1555 | 480 | (456) | - | - | 47.7 | 74.5 | 61.3 | 84.3 | 66.4 | 52.2 |
| 1595 | 490 | (466) | - | - | 48.4 | 74.9 | 61.6 | 84.7 | 67.1 | 53.1 |
| 1630 | 500 | (475) | - | - | 49.1 | 75.3 | 62.2 | 85.0 | 67.7 | 53.9 |
| 1665 | 510 | (485) | - | - | 49.8 | 75.7 | 62.9 | 85.4 | 63.8 | 58.6 |
| 1700 | 520 | (494) | - | - | 50.5 | 76.1 | 63.5 | 85.7 | 69.0 | 55.6 |
| 1740 | 530 | (504) | - | - | 51.1 | 76.4 | 63.9 | 86.0 | 69.5 | 56.2 |
| 1775 | 540 | (513) | - | - | 51.7 | 76.7 | 64.4 | 86.3 | 70.0 | 57.0 |
| 1810 | 550 | (523) | - | - | 52.3 | 77.0 | 64.8 | 86.6 | 70.5 | 57.8 |
| 1845 | 560 | (532) | - | - | 53.0 | 77.4 | 65.4 | 86.9 | 71.2 | 58.6 |
| 1880 | 570 | (542) | - | - | 53.6 | 77.8 | 65.8 | 87.2 | 71.7 | 59.3 |
| 1920 | 580 | (551) | - | - | 54.1 | 78.0 | 66.2 | 87.5 | 72.1 | 59.9 |
| 1955 | 590 | (561) | - | - | 54.7 | 78.4 | 66.7 | 87.8 | 72.7 | 60.5 |
| 1995 | 600 | (570) | - | - | 55.2 | 78.6 | 67.0 | 88.0 | 73.2 | 61.2 |
| 2030 | 610 | (580) | - | - | 55.7 | 78.9 | 67.5 | 88.2 | 73.7 | 61.7 |
| 2070 | 620 | (589) | - | - | 56.3 | 79.2 | 67.9 | 88.5 | 74.2 | 62.4 |
| 2105 | 630 | (599) | - | - | 56.8 | 79.5 | 68.3 | 88.8 | 74.6 | 63.0 |
| 2145 | 640 | (608) | - | - | 57.3 | 79.8 | 68.7 | 89.0 | 75.1 | 63.5 |
| 2180 | 650 | (618) | - | - | 57.8 | 80.0 | 69.0 | 89.2 | 75.5 | 64.1 |
| - | 660 | - | - | - | 58.3 | 80.3 | 69.4 | 89.5 | 75.9 | 64.7 |
| - | 670 | - | - | - | 58.8 | 80.6 | 69.8 | 89.7 | 76.4 | 65.3 |
| - | 680 | - | - | - | 59.2 | 80.8 | 70.1 | 89.8 | 76.8 | 65.7 |
| - | 690 | - | - | - | 59.7 | 81.1 | 70.5 | 90.1 | 77.2 | 66.2 |
| - | 700 | - | - | - | 60.1 | 81.3 | 70.8 | 90.3 | 77.6 | 66.7 |
| - | 720 | - | - | - | 61.0 | 81.8 | 71.5 | 90.7 | 78.4 | 67.7 |
| - | 740 | - | - | - | 61.8 | 82.2 | 72.1 | 91.0 | 79.1 | 68.6 |
| - | 760 | - | - | - | 62.5 | 82.6 | 72.6 | 91.2 | 79.7 | 69.4 |
| - | 780 | - | - | - | 63.3 | 83.0 | 73.3 | 91.5 | 80.4 | 70.2 |
| - | 800 | - | - | - | 64.0 | 83.4 | 73.8 | 91.8 | 81.1 | 71.0 |
| - | 820 | - | - | - | 64.7 | 93.8 | 74.3 | 92.1 | 81.7 | 71.8 |
| - | 840 | - | - | - | 65.3 | 84.1 | 74.8 | 92.3 | 82.2 | 72.2 |
| - | 860 | - | - | - | 65.9 | 84.4 | 75.3 | 92.5 | 82.7 | 73.1 |
| - | 880 | - | - | - | 66.4 | 84.7 | 75.7 | 92.7 | 83.1 | 73.6 |
| - | 900 | - | - | - | 67.0 | 85.0 | 76.1 | 92.9 | 83.6 | 74.2 |
| - | 920 | - | - | - | 67.5 | 85.3 | 76.5 | 93.0 | 84.0 | 74.8 |
| - | 940 | - | - | - | 68.0 | 85.6 | 76.9 | 93.2 | 84.4 | 75.4 |

# DRYING TEMPERATURES AND DURATIONS OF GEKA ELECTRODES

| Standard | Material to which the electrode is applied | Coating Type | Drying Process (1-2) | Drying Temperature (2) ºC | Drying Duration (3) (hour) |
|---|---|---|---|---|---|
| EN 499 DIN 1913 AWS 5.1 | Unalloyed and low-alloy steels | A, AR, C R (C), R, RR RR (B) | not required | - | - |
| | | B (R), B | required | 300 - 350 | 2 - 10 |
| EN 757 DIN 8529 AWS 5.5 | High-strength fine-grained structural steels | B | required | 300 - 350 | 2 - 10 |
| EN 1599 DIN 8575 AWS 5.5 | Heat resisting steels | R | not required | - | - |
| | | B | required | 300 - 350 | 2 - 10 |
| EN 1600 DIN 8556 AWS 5.4 | Stainless Heat resisting steels | R | recommended | 100 - 200 | 2 - 10 |
| | | B (R), B | not required | - | - |
| | Mild Martensitic Steels | B | required | 300 - 350 | 2 - 10 |
| | Double phase Steels | (R) B | required | 250 - 350 | 2 - 10 |
| EN 14700 DIN 8555 AWS 5.13 | hardfacing | R | not required | - | - |
| | | B (R), B | required | 300 - 350 | 2 - 10 |
| | | special | on producer's recommandation | | |
| TS EN 14700 DIN1736 AWS 5.11 | nickel based alloys | all types | when necessary | 120 - 300 | 2 - 10 |

1) Electrodes in special can packages can be used without a drying process in 8 hours after the can is opened. in establishments that are more than 70% humid, electrodes should be put into special hot boxes at 100-200 ºC after the package is opened.
2) Please follow the recommendations of the producer tor special circumstances.
3) The maximum value is the sum of the durations of drying processes when electrode is dried multiple times (in different dates)

# CALCULATION OF WELDING CABLE CROSS-SECTION

In calculation of the welding cable cross-sections, the following empirical formula is used:

$$K = \frac{2 \times L \times 1}{a \times U}$$

K: Cross-section of the appropriate cable (mm²).
L: Length of the bar (electrode) or the earth wire (m).
I: Strength of welding current (A).
U: Permitted voltage loss in the welding circuit (V).
(This value should not exceed 2V.)
a: parameter in relation to the material of the cable

For copper: a=60
For aluminum a=30
For zinc a=15
For iron a=8

Example: what should be the cross-section of the appropriate copper cable if the length of the cable is 15m in a welding process that is performed with 160A?

$$K = \frac{2 \times 15 \times 160}{60 \times 2} = 40 \text{ mm}^2$$

**Copper cable cross-sections depending on welding cable length and welding current**

| Welding Current (A) | Welding Current Length (m) | | | | |
|---|---|---|---|---|---|
| | 10 | 15 | 20 | 25 | 30 |
| 50 | 25 | 25 | 35 | 35 | 35 |
| 100 | 25 | 35 | 35 | 50 | 50 |
| 150 | 35 | 35 | 50 | 70 | 95 |
| 200 | 35 | 50 | 70 | 95 | 120 |
| 250 | 50 | 70 | 95 | 120 | 150 |
| 300 | 70 | 95 | 120 | 150 | 150 |

# ELECTRODE DRYING OVENS

## GKF-T Hand Over Thermos - No Electric Only Carrying


Stable temperature with its flask capacity to store the humidity of electrodes if there is no power connection at the welding processing point.

**General Data**

| | |
|---|---|
| Capacity | 75rods |
| Height (y) | 50cm |
| External Diameter (g) | 10cm |
| Weight | 2.5kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700004 | This Order Code Relates to All Equipment |

## GKF-1 Drying Oven (1 Package) Basic Electrode


Used for handling of electrodes at the application point and keeping them at a specific temperature.

**General Data**

| | |
|---|---|
| Capacity | 100rods |
| Height (y) | 50cm |
| External Diameter (g) | 15cm |
| Internal Diameter | 10cm |
| Internal Depth | 47cm |
| Max Heating Temperature | 130°C |
| Heat Control | Fixed |
| Operating Capacity | 200W |
| Operating Voltage | 220-240V |
| Operating Current | 1A |
| Weight | 5kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700002 | This Order Code Relates to All Equipment |

## GKF-1A Oven with Thermostat (1 Package) All Electrodes


Its main function is to keep electrodes at the desired temperature level between 60°C and 200°C at the points of application. It can easily be used with all types of electrodes.

**General Data**

| | |
|---|---|
| Capacity | 100rods |
| Height (y) | 65cm |
| External Diameter (g) | 10cm |
| Max Heating Temperature | 60-200°C |
| Operating Capacity | 20 W |
| Operating Voltage | 220-240V |
| Operating Current | 1A |
| Weight | 5kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700005 | This Order Code Relates to All Equipment |

## GKF-R Oven With Thermostat (1 Package) All Electrodes


Portable thermal electrode carrying and drying oven, suitable for welding electrodes that can be stored between 130°C and 100-150°C. It is most commonly used for basic electrodes.

| General Data | 110 Volt | 220 Volt |
|---|---|---|
| Capacity | 100rods | 100rods |
| Height (y) | 50cm | 50cm |
| External Diameter | 12,5cm | 12,5cm |
| Heating | 130°C | 130°C |
| Operating Capacity | 200W | 200W |
| Operating Voltage | 110-13 V 1ph 50/60Hz | 230V 1ph 50/60Hz |
| Operating Current | 2A | 1A |
| Weight | 2,5kg | 2,5kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700025 / 110 V<br>6051700024 / 220 V | This Order Code Relates to All Equipment |

## GKF-2Y Oven With Thermostat (2 Packages) All Electrodes

Its main function is to carry in a casing up to the point of application help keeping electrodes manually at the desired temperature level between 60 and 200°C at the points of application when a power connection is available.


**General Data**

| | |
|---|---|
| Capacity | 200rods |
| Height (y) | 50cm |
| External Diameter (g) | 21cm |
| Internal Diameter | 15cm |
| Internal Depth | 49cm |
| Max Heating Temperature | 60-200°C |
| Heat Control | Adjustable Thermostat |
| Operating Capacity | 400W |
| Operating Voltage | 220-240V |
| Operating Current | 2A |
| Heat Insulation | Available |
| Weight | 8kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700000 | This Order Code Relates to All Related Equipment |

## GKF-4Y Oven With Thermostat (4 Packages) All Electrodes


Its main function is to help keep electrodes manually at the desired temperature level between 60 and 200°C at the points of application. It can easily be used with all types of electrodes.

**General Data**

| | |
|---|---|
| Capacity | 400rods |
| Height (y) | 50cm |
| External Diameter (g) | 27cm |
| Internal Diameter | 15cm |
| Internal Depth | 49cm |
| Max Heating Temperature | 60-300°C |
| Heat Control | Adjustable Thermostat |
| Operating Capacity | 600W |
| Operating Voltage | 220-240V |
| Operating Current | 3A |
| Heat Insulation | Available |
| Weight | 20kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700001 | This Order Code Relates to All Equipment |

## GKF-10 Oven With Digital Thermostat (10 Packages)


- Electrodes are subjected to shocks after being kept at 300°C for 2 hours. The thermostat is then lowered to 130°C, and the electrodes are subjected to no further treatment.
- It is used for subjecting to a shock after keeping them at a high temperature and preserving their heat at a low temperature for drying process.

### General Data

| | |
|---|---|
| Capacity | 1000rods |
| Height (y) | 102-72cm |
| External Diameter (g) | 45x67cm |
| Internal Diameter | 30x50x49cm |
| Tray Dimensions and Quantity | 22x47x7 / 2 trays |
| Max Heating Temperature | 0-400°C |
| Heat Control | Digitally Controlled |
| Operating Capacity | 3000W |
| Operating Voltage | 380-400V |
| Operating Current | 14A |
| Heat Insulation | Available |
| Weight | 75kg |

### Standard and Optional Equipment

| | |
|---|---|
| 6051700003 | This Order Code Relates to All Equipment |

## GKF-20 Oven With Digital Thermostat (20 Packages)


- Electrodes are subjected to shocks after being kept at 300°C for 2 hours. The thermostat is then lowered to 130°C, and electrodes are not subjected to any further treatment.
- It is used for subjecting to a shock after keeping them at a high temperature and preserving their heat at a low temperature for drying process.

### General Data

| | |
|---|---|
| Capacity | 2000rods |
| Height (y) | 134-102cm |
| External Diameter (g) | 46x67cm |
| Internal Diameter | 30x50x80cm |
| Tray Dimensions and Quantity | 22x47x7cm / 4 |
| Max Heating Temperature | 400°C |
| Heat Control | Digitally Controlled |
| Operating Capacity | 4500W |
| Operating Voltage | 380-400V |
| Operating Current | 21A |
| Heat Insulation | Available |
| Weight | 85kg |

### Standard and Optional Equipment

| | |
|---|---|
| 6051700006 | This Order Code Relates to All Equipment |

## GKF-30 Oven With Digital Thermostat (30 Packages)

- Electrodes are subjected to shocks after being kept at 300°C for 2 hours. The then the electrodes is kept in thermostat lowered to 130°C
- It is used for subjecting to a shock after keeping them at a high temperature and preserving their heat at a low temperature for drying process


### General Data

| | |
|---|---|
| Capacity | 3000rods |
| Height (y) | 113-80cm |
| External Diameter (g) | 64x67cm |
| Internal Diameter | 30x50x66cm |
| Tray Dimensions and Quantity | 38x47x7cm / 3 trays |
| Max Heating Temperature | 0-400°C |
| Heat Control | Digitally Controlled |
| Operating Capacity | 4500W |
| Operating Voltage | 380-400V |
| Operating Current | 21A |
| Heat Insulation | Available |
| Weight | 110kg |

### Standard and Optional Equipment

| | |
|---|---|
| 6051700007 | This Order Code Relates to All Equipment |

## GKF-30 Oven With Digital Thermostat (50 Packages)

- Electrodes are subjected to shocks after being kept at 300°C for 2 hours. The thermostat is then lowered to 130°C, and electrodes are not subjected to any further treatment.
- It is used for subjecting to a shock after keeping them at a high temperature and preserving their heat at a low temperature for drying process.


### General Data

| | |
|---|---|
| Capacity | 5000rods |
| Height (y) | 150x115cm |
| External Diameter (g) | 67x77cm |
| Internal Diameter | 23x50x96cm |
| Tray Dimensions and Quantity | 22x45x7cm / 10 trays |
| Max Heating Temperature | 0-400°C |
| Heat Control | Digitally Controlled |
| Operating Capacity | 4500W |
| Operating Voltage | 380-400V |
| Operating Current | 21A |
| Heat Insulation | Available |
| Weight | 160kg |

### Standard and Optional Equipment

| | |
|---|---|
| 6051700008 | This Order Code Relates to All Equipment |

## GKŞD 20 Shock And Conditioning Oven


- Before finalizing the shocking process is complete in standard ovens, new electrodes shall not be placed, the resting process shall be applied to the shocked electrodes and when the electrodes are finished all, new product can be taken into process. In this sense, the main operating principle is to carry out both of these 2 processes, in one section carrying out the shocking process while carrying out the resting process on the other section.
- After the electrodes at factory output are put to shocking process in shocking ovens at 300$^{O}$C they are to be taken to 130$^{O}$C temperature level and they shall be taken to resting process thus they shall be taken into welding process. This process is not frequently carried out in busy workshops with standard oven. In this product, there are two seperate sections with two independent digital thermostat thus allowing shocking process in one section while carrying out the resting process in the other which provides a special application for busy workshops.

**General Data**

| | |
|---|---|
| Capacity | 100+100kg/4000rods |
| Height | 140-165cm |
| Outer Diameter | 60x75cm |
| Inner Diameter | 44x50x45 |
| Trays Dimensions/Pcs | 32x47x7/6 |
| Max Heather | 0-400C |
| Temperature Controller | Double Temp. Controller |
| Power | 3000+3000 Watt |
| Voltage | 380 V 3ph |
| Curren | 28 Amper |
| Thermal Insulation | Present |
| Weight | 175k |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700009 | This Order Code Relates to All Equipment |

## GKŞD 30 Shock And Conditioning Oven


- Before finalizing the shocking process is complete in standard ovens, new electrodes shall not be placed, the resting process shall be applied to the shocked electrodes and when the electrodes are finished all, new product can be taken into process. In this sense, the main operating principle is to carry out both of these 2 processes, in one section carrying out the shocking process while carrying out the resting process on the other section.
- After the electrodes at factory output are put to shocking process in shocking ovens at 300$^{O}$C they are to be taken to 130$^{O}$C temperature level and they shall be taken to resting process thus they shall be taken into welding process. This process is not frequently carried out in busy workshops with standard oven. In this product, there are two seperate sections with two independent digital thermostat thus allowing shocking process in one section while carrying out the resting process in the other which provides a special application for busy workshops.

**General Data**

| | |
|---|---|
| Capacity | 150+150kg / 6000rods |
| Height | 150-180cm |
| Outer Diameter | 66x70 |
| Inner Diameter | 44x50x45 |
| Trays Dimensions / pcs | 32x47x7/6 |
| Max Heather | 0-400C |
| Temperature Controller | Double Temp. Controller |
| Power | 3000+3000Watt |
| Voltage | 380V 3ph |
| Curren | 28 Amper |
| Thermal Insulation | Present |
| Weight | 225kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700010 | This Order Code Relates to All Equipment |

# SUBMERGED ARC WELDING FLUX DRYING OVENS

## Submerged Arc Welding Flux Drying Ovens

- After leaving the factory, at the first use, submerged welding flux goes through a shock process by being kept at a temperature range of 300°C min. - 350° max. for 2 hours.
- In the second phase, the temperature in the oven is lowered to 130°C and the flux is kept in the oven until it is transferred to the application area.
- Then the submerged welding flux is poured into buckets through the bottom dispenser and can be carried to the point of application quickly in the amounts needed per use.

---

## GKT-50

Submerged Arc Welding Flux Drying Oven


**General Data**

| | |
|---|---|
| Capacity | 50 kg |
| Height | 50 - 109 cm |
| Outer Diameter | 60 x 74 cm |
| Internal Diameter | 48x34x43 cm |
| Number of Partitions | 1 |
| Maximum Heating Temperature | 0 - 400°C |
| Temperature Control | Digitally Controlled |
| Motor Power | 3000w |
| Operating Voltage | 380V3ph |
| Operating Current | 14 A |
| Heat Insulation | Available |
| Weight | 115 kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700014 | This Order Code Relates to All Equipment |

---

## GKT-125

Submerged Arc Welding Flux Drying Oven


**General Data**

| | |
|---|---|
| Capacity | 125 kg |
| Height | 130 cm |
| Width - Depth | 90-110x75 cm |
| Maximum Heating Temperature | 0 - 400°C |
| Motor Power | 4500w |
| Operating Voltage | 380V |
| Operating Current | 11.5 A |
| Weight | 190 kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700011 | This Order Code Relates to All Equipment |

## Submerged Arc Welding Flux Drying Oven

- After leaving the factory, at the first use, submerged arc welding flux goes through a shock process by being kept at a temperature range of 300°C min. – 350° max. for 2 hours.
- In the second phase, the temperature in the oven is lowered to 130°C and the flux is kept in the oven until it is transferred to the application area.
- Then the submerged welding flux is poured into buckets through the bottom dispenser and can be carried to the point of application quickly in the amounts needed per use.

## GKT-250
Submerged Arc Welding Flux Drying Oven


**General Data**

| | |
|---|---|
| Capacity | 250 kg |
| Height | 138 cm |
| Width - Depth | 120-140x75 cm |
| Maximum Heating Temperature | 0 - 400°C |
| Motor Power | 6000w |
| Operating Voltage | 380V |
| Operating Current | 15 A |
| Weight | 230 kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700012 | This Order Code Relates to All Equipment |

## GKT-350
Submerged Arc Welding Flux Drying Oven


**General Data**

| | |
|---|---|
| Capacity | 350 kg |
| Height | 156 cm |
| Width - Depth | 150x78 cm |
| Maximum Heating Temperature | 0 - 400°C |
| Motor Power | 7500w |
| Operating Voltage | 380V |
| Operating Current | 19 A |
| Weight | 390 kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700013 | This Order Code Relates to All Equipment |

## Submerged ARC Welding Flux Shocking and Conditioning Ovens

- By using standalone thermostats in 2 separate compartments, welding flux is kept at high temperatures for shocking process and relatively kept in lower temperatures for drying and for resting process until they are taken to the application site.
- After its first use, submerged welding flux is kept at a temperature range of 300°C min. - 350° max. for two hours before being subjected to shock.
- In the second phase, the temperature in the oven is lowered to 130°C and the flux is kept in the oven until it is transferred to the application area.

## GKTSD - 50 kg + 50 kg Double Digital
Shocking and Conditioning Oven with Thermostat


**General Data**

| | |
|---|---|
| Capacity | 50+50kg / 100kg |
| Height (y) | 120cm |
| External Diameter (g) | 110 x 65cm |
| Max Heating Temperature | 0 - 400°C |
| Heat Control | With Double Digital Control |
| Operating Capacity | 3000+3000W / 6000W |
| Operating Voltage | 380-400V |
| Operating Current | 28A |
| Heat Insulation | Available |
| Weight | 150kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700018 | This Order Code Relates to All Equipment |

## GKTSD - 125kg + 125kg Double Digital
Shocking and Conditioning Oven with Thermostat


**General Data**

| | |
|---|---|
| Capacity | 125+125kg / 250kg |
| Height (y) | 140cm |
| External Diameter (g) | 130x70cm |
| Max Heating Temperature | 0 - 400°C |
| Heat Control | With Double Digital Control |
| Operating Capacity | 3000+3000W / 6000W |
| Operating Voltage | 380-40 V |
| Operating Current | 28A |
| Heat Insulation | Available |
| Weight | 200kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700015 | This Order Code Relates to All Equipment |

## Submerged ARC Welding Flux Shocking and Conditioning Ovens

- By using standalone thermostats in 2 separate compartments, welding flux is kept at high temperatures for shocking process and relatively kept in lower temperatures for drying and for resting process until they are taken to the application site.
- After its first use, submerged welding flux is kept at a temperature range of 300°C min. - 350° max. for two hours before being subjected to shock.
- In the second phase, the temperature in the oven is lowered to 130°C and the flux is kept in the oven until it is transferred to the application area.

## GKTSD - 250kg + 250kg Double Digital
Shocking and Conditioning Oven with Thermostat


**General Data**

| | |
|---|---|
| Capacity | 50+50kg / 100kg |
| Height (y) | 120cm |
| External Diameter (g) | 110x65cm |
| Max Heating Temperature | 0 - 400°C |
| Heat Control | With Double Digital Control |
| Operating Capacity | 3000+3000W / 6000W |
| Operating Voltage | 380-400V |
| Operating Current | 28A |
| Heat Insulation | Available |
| Weight | 150kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700016 | This Order Code Relates to All Equipment |

## GKTSD - 350kg + 350kg Double Digital
Shocking and Conditioning Oven with Thermostat


**General Data**

| | |
|---|---|
| Capacity | 350+350kg / 700kg |
| Height (y) | 170cm |
| External Diameter (g) | 220x90cm |
| Max Heating Temperature | 0 - 400°C |
| Heat Control | With Double Digital Control |
| Operating Capacity | 4500+4500W / 9000W |
| Operating Voltage | 380-400V |
| Operating Current | 41A |
| Heat Insulation | Available |
| Weight | 390kg |

**Standard and Optional Equipment**

| | |
|---|---|
| 6051700017 | This Order Code Relates to All Equipment |

# HARDFACING PRODUCT CATALOG

GeKa®

| Product | Standart | Hardness | Applications | Resistance Type and Level | |
|---|---|---|---|---|---|
| **GeKa ELHARD 300** | EN 14700 : E Fe 1<br>DIN 8555 : E 1-UM-300 | 280-330 (HB) | It is used in the applications of buffer-layer welding and hardfacing of parts such as buckets and pallets belonging to graders and excavators. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■■<br>Machining ■■■■ |
| **GeKa ELHARD 350** | EN 14700 : E Fe 1<br>DIN 8555 : E1-UM-350 | 330-380 (HB) | It is used for welding repair of buckets, pallets, wheels directional, carrying rollers and rails, punches, dies and sets impact of ground and mine machinery such as bulldozers, graders, excavators. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■■<br>Machining ■■■■ |
| **GeKa ELHARD 400** | EN 14700 : E Fe 1<br>DIN 8555 : E1-UM-400 | 400-430 (HB) | It is used for repair welding of buckets, pallets, idlers, rollers carriers and rails, punches, dies and tools impact of ground and operating machines mining such as bulldozers, graders, excavators. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■■<br>Machining ■■■■ |
| **GeKa ELHARD 500** | EN 14700 : E Z Fe 1<br>DIN 8555 : E1-UM-50 | ~50 (HRC) | It is used for hardfacing bucket teeth, chain links (pallet), propulsion rollers, cable pulleys, cold cutting tools low alloy, punches and matrices of machines working in the ground, coal, mining and similar works. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■■<br>Machining ■■■■ |
| **GeKa ELHARD 600** | EN 14700 : E Fe 8<br>DIN 8555 : E6-UM-60 P | 55-59 (HRC) | It is used in the applications of hardfacing of earth-moving and mining equipment where a high resistance to abrasion is required, drilling tools and percussion break and snails delivery. Weld metal is ductile and resistant to cracking. | Friction ■■■■<br>Impact ■■■■<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■■■□<br>Machining ■■□□ |
| **GeKa ELHARD 600 S** | EN 14700 : E Fe 8<br>DIN 8555 : E6-UM-60 P | 54-58 (HRC) | It is used for welding parts of earthmoving and mining machinery mining in alloyed and unalloyed steels, tools percussion drilling and breaking, propeller snails, bucket nails and other work requiring high resistance to abrasion. Elhard 600 S is thick-coated type, chromium-silicon alloyed electrode. Due to its high ductility, it does not crack not even on parts subject to impact stresses. | Friction ■■■■<br>Impact ■■■■<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■■■□<br>Machining ■■□□ |

**INDUSTRY /** MINING & EARTHMOVING

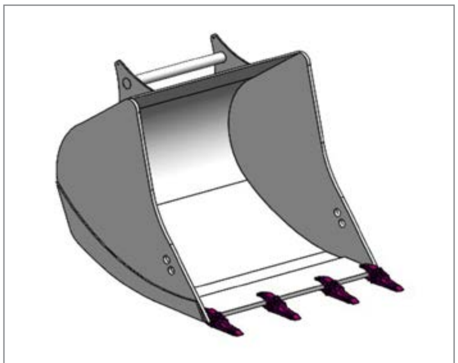
**TYPE OF PRODUCT /** ELECTRODE

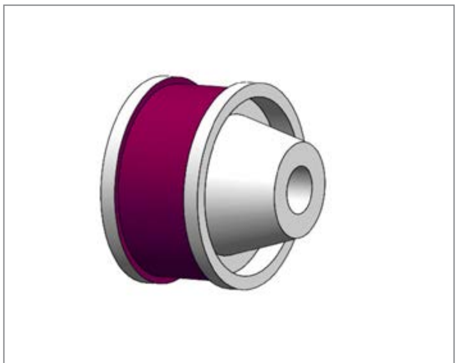
| Product | Standart | Hardness | Applications | Resistance Type and Level | |
|---|---|---|---|---|---|
| **GeKa ELHARD 600 R** | EN 14700 : E Fe 8<br>DIN 8555 : E6-UM-60 P | 55-59 (HRC) | It is used in the applications of hardfacing machine parts earthmoving and mining tools, impact drilling and breaking, snails of propulsion, bucket mouths and nails where high abrasion resistance is required. ELHARD 600 R is a coated electrode rutile type that can be used with a alternating current welding machine (workstation transformer). Weld metal is ductile and resistant to cracking. | Friction ■■■■<br>Impact ■■■■<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■■■□<br>Machining ■■□□ |
| **GeKa ELHARD 650** | EN 14700 : E Fe 6<br>DIN 8555 : E6-UM-60 | 56-59 (HRC) | It is used for recharging wear parts of crushing machines, drilling, scraping, chipping and grinding in the ground, mines and quarries. Resistant to abrasive wear and impact. | Friction ■■■■<br>Impact ■■■■<br>High Temp. ■■■□<br>Thermo Shock ■■■□ | Corrosive ■□□□<br>Crack Resistance ■■■□<br>Machining ■■□□ |
| **GeKa ELHARD 650 Si** | EN 14700 : E Fe2<br>DIN 8555 : E2-UM-60 | 57-62 (HRC) | It is used in case of abrasive wear by impact.<br>The main areas of application are tillage, mining, coal industry ; parts bucket teeth crusher, excavator parts are used in grinding hammers, the mixing arms, the jaws of crusher. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■□<br>Machining ■■□□ |
| **GeKa ELHARD 700** | EN 14700 : E Fe 2<br>DIN 8555 : ~E6-UM-60 | 60-62 (HRC) | It is used in the applications of abrasion resistant hardfacing parts used in the mineral (ore) preparation industry. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■□<br>Machining ■■□□ |
| **GeKa ELHARD 14 Mn** | EN 14700 : E Z Fe 9<br>DIN 8555 : E 7-UM-200K<br>AWS A5.13 : E FeMn-A | 180-220 (HB) | It is used in mines and stone crushing machines, lifting and digging machines, nails made of hard manganese steel, the jaws ladle, hammer and crusher and other strong hardfacing applications to wear and shock. | Friction ■□□□<br>Impact ■■■■<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■■■□<br>Crack Resistance ■■■■<br>Machining ■■□□ |
| **GeKa ELHARD 60** | EN 14700 : E Fe 14<br>DIN 8555 : E 10-UM-60 GRZ | 58-62 (HRC) | It is used in hardfacing resistant to abrasion and shocks such as drills, buckets and nails from construction machinery, crusher jaws, rollers and hammers, delivery snails. | Friction ■■■■<br>Impact ■■□□<br>High Temp. ■■□□<br>Thermo Shock ■□□□ | Corrosive ■■■□<br>Crack Resistance ■□□□<br>Machining ■□□□ |

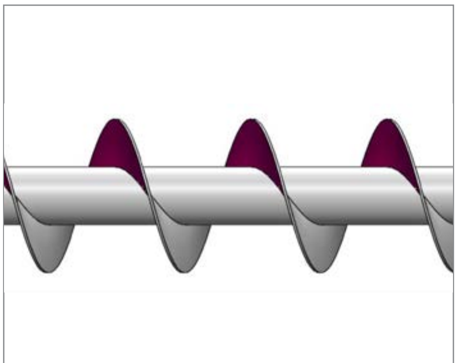
## **INDUSTRY /** MINING & EARTHMOVING

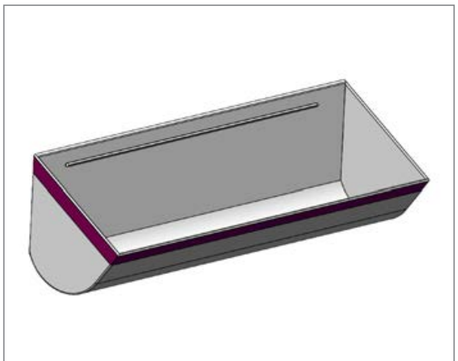
## **TYPE OF PRODUCT /** ELECTRODE

| Product | Standart | Hardness | Applications | Resistance Type and Level | |
|---|---|---|---|---|---|
| **GeKa ELHARD 62** | EN 14700 : E Fe 16<br>DIN 8555 : ~ E 10-UM-60 GRZ | ~ 62 (HRC) | It is used in welding wear resistant hardfacing such as buckets, hammers crushers, mixing blades earth-moving machinery. | Friction ■■■■<br>Impact ■□□□<br>High Temp. ■■■■<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■□□□<br>Machining ■□□□ |
| **GeKa ELHARD 63** | EN 14700 : E Z Fe 14<br>DIN 8555 : E 10-UM-60 GRZ<br>AWS A5.13 : ~E FeCr-A8 | 60-64 (HRC) | It is used in buckets and heavy construction machinery nails, conveyor buckets, crushing hammers, jaws and rollers, excavation machines, drills, all strong hardfacing applications to wear in mines, quarries and coal mines. | Friction ■■■■<br>Impact ■■□□<br>High Temp. ■■□□<br>Thermo Shock ■□□□ | Corrosive ■■■□<br>Crack Resistance ■□□□<br>Machining ■□□□ |
| **GeKa ELHARD 65** | EN 14700 : E Fe 16<br>DIN 8555 : E 10-UM-65 GRZ | 63-67 (HRC) | It is used in welding wear-resistant parts in earth-moving industry, mining, quarries and coal mines, such as mixers, heavy excavation machinery, drills. | Friction ■■■■<br>Impact ■□□□<br>High Temp. ■■■■<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■□□□<br>Machining ■□□□ |


**Excavator buckets and teeth**


**Idlers, cable sheaves**


**Augers**


**Buckets**


**Drilling parts**

# CEMENT

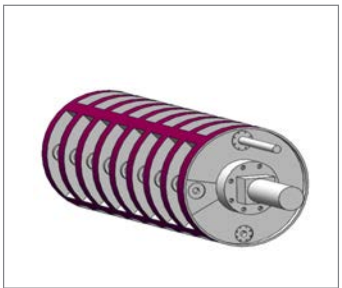
**INDUSTRY** / CEMENT **TYPE OF PRODUCT /** ELECTRODE

| Product | Standart | Hardness | Applications | Resistance Type and Level | |
|---|---|---|---|---|---|
| **GEKA ELHARD 300** | EN 14700 : E Fe 1<br>DIN 8555 : E1-UM-300 | 280-330 (HB) | Used as buffer layer for hardfacing applications in crusher rotors. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■■<br>Machining ■■■■ |
| **GEKA ELHARD 14 Mn** | EN 14700 : E Z Fe 9<br>DIN 8555 : E 7-UM-200K<br>AWS A5.13 : E FeMn-A | 180-220 (HB) | Used to refill the welds of wear materials and impact resistant materials with condenser jaws. | Friction ■□□□<br>Impact ■■■■<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■■■□<br>Crack Resistance ■■■■<br>Machining ■■□□ |
| **GEKA ELHARD 60** | EN 14700 : E Fe 14<br>DIN 8555 : E 10-UM-60 GRZ | 58-62 (HRC) | Used for hardfacing of materials resistant to abrasion, shocks and corrosion in the jaws of the crushers. | Friction ■■■■<br>Impact ■■□□<br>High Temp. ■■□□<br>Thermo Shock ■□□□ | Corrosive ■■■□<br>Crack Resistance ■□□□<br>Machining ■□□□ |
| **GEKA ELHARD 62** | EN 14700 : E Fe 16<br>DIN 8555 : ~ E 10-UM-60 GRZ | ~ 62 (HRC) | Used in crusher hammers, jaws and rollers, hardfacing of all wear resistant materials in the cement industry. | Friction ■■■■<br>Impact ■□□□<br>High Temp. ■■■■<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■□□□<br>Machining ■□□□ |
| **GEKA ELHARD 63** | EN 14700 : E Z Fe 14<br>DIN 8555 : E 10-UM-60 GRZ<br>AWS A5.13 : ~E FeCr-A8 | 60 -64 (HRC) | Used in crusher hammers, jaws and rollers,hardfacing of all materials wear resistant in the cement industry. | Friction ■■■■<br>Impact ■■□□<br>High Temp. ■■□□<br>Thermo Shock ■□□□ | Corrosive ■■■□<br>Crack Resistance ■□□□<br>Machining ■□□□ |

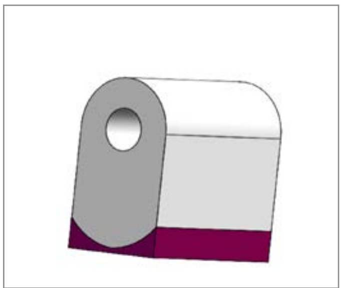
## **INDUSTRY** / CEMENT

## **TYPE OF PRODUCT /** ELECTRODE

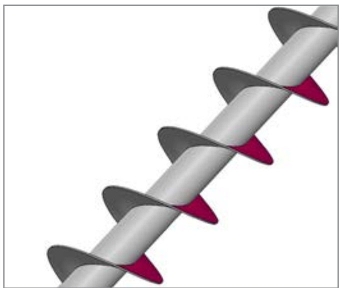
| Product | Standart | Hardness | Applications | Resistance Type and Level | |
|---|---|---|---|---|---|
| **GEKA ELHARD 65** | EN 14700 : E Fe 16<br>DIN 8555 : E 10-UM-65 GRZ | 63-67 (HRC) | Used in wear resistant welding parts in crushers, mixers, cement industry. | Friction<br>Impact<br>High Temp.<br>Thermo Shock | Corrosive<br>Crack Resistance<br>Machining |



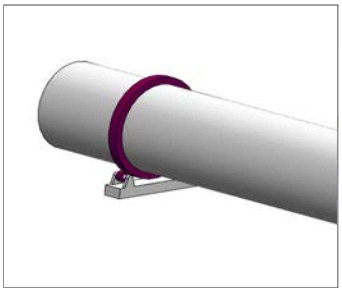
Crushers



Crusher hammers



Cement spiral



Rotary kilns

Roller press

Seperator-inner cone

Cement mixers

# STEEL MAKING

GeKa®

**INDUSTRY** / STEEL MAKING　　**TYPE OF PRODUCT** / ELECTRODE

| Product | Standart | Hardness | Applications | Resistance Type and Level |
|---|---|---|---|---|
| **GeKa ELOX B 410 Ni Mo** | EN ISO 3581-A : E 13 4 B 42<br>AWS A5.4 : E 410 NiMo-15 | ~360 | Recommended for rollers and traction relays where temperature and metal-to-metal friction occur. | |
| **GeKa ELOX BS 410 Ni Mo** | EN ISO 3581-A : E 13 4 B 62<br>AWS A5.4 : E 410NiMo-25 | ~270 | Preferred for rollers and traction relays where temperature and metal-to-metal friction occur. | |
| **GeKa ELHARD 65** | EN 14700 : E Fe 16<br>DIN 8555 : E 10-UM-65 GRZ | 63-67 (HRC) | Used for hardfacing wear resistant parts in the steel industry, such as hot slag crushers, cover mechanisms and blast furnace fans. | Friction ■■■■<br>Impact ■□□□<br>High Temp. ■■■■<br>Thermo Shock ■□□□<br>Corrosive ■■□□<br>Crack Resistance ■□□□<br>Machining ■■□□ |

**INDUSTRY /** STEEL MAKING

**TYPE OF PRODUCT /** SUBMERGED ARC WELDING WIRE

| Product | Standart | Hardness | Applications | Resistance Type and Level | |
|---|---|---|---|---|---|
| **GeKa SUBCOR 41 NiMo-LH** | AWS A5.23: ~ EC 410 NiMo | Single Pass 350 (HV) 3 Pass: 400 (HV) | Used in hardfacing of continuous casting rolls and for welding of martensitic and martensitic-ferritic steel castings, tool steels for rolling and forging.It is used with GeKa ELIFLUX BSS-F submerged arc powder. | Friction ■■■□<br>Impact ■■■□<br>High Temp. ■■■■<br>Thermo Shock ■■■■ | Corrosive ■■■■<br>Crack Resistance ■■■■<br>Machining ■■■■ |
| **GeKa SUBCOR 41 NiMo-MH** | AWS A5.23: ~ EC 410 NiMo | 1 Pass 40 (HV) 3 Pass 45 (HV) | Used in hardfacing of continuous casting rolls and for welding of martensitic and martensitic-ferritic steel castings, tool steels for rolling and forging.It is used with GeKa ELIFLUX BSS-F submerged arc powder. | Friction ■■■□<br>Impact ■■■□<br>High Temp. ■■■■<br>Thermo Shock ■■■■ | Corrosive ■■■■<br>Crack Resistance ■■■■<br>Machining ■■■■ |
| **GeKa SUBCOR 430** | EN 14700 : T Fe 7 | 3 Pass 200 (HV) | It is used in particular as a buffer layer before hardfacing with the SUBCOR 41 NiMo LH and MH wires in the steel industry. It is used with GeKa ELIFLUX BSS-F submerged arc powder. | Friction ■■■□<br>Impact ■■■□<br>High Temp. ■■■■<br>Thermo Shock ■■■■ | Corrosive ■■■■<br>Crack Resistance ■■■■<br>Machining ■■■■ |

# SUGAR

**INDUSTRY** / SUGAR **TYPE OF PRODUCT /** ELECTRODE

| Product | Standart | Hardness | Applications | Resistance Type and Level | |
|---|---|---|---|---|---|
| **GeKa ELHARD 60** | EN 14700 : E Fe 14<br>DIN 8555 : E 10-UM-60 GRZ | 58-62 (HRC) | Used for reloading roller presses, cutter discs, cane loaders, chipping discs, fan blades, crusher hammers, mill cylinders. | Friction ■■■■<br>Impact ■■□□<br>High Temp. ■■□□<br>Thermo Shock ■□□□ | Corrosive ■■■□<br>Crack Resistance ■□□□<br>Machining ■□□□ |
| **GeKa ELHARD 62** | EN 14700 : E Fe 16<br>DIN 8555 : ~ E 10-UM-60 GRZ | ~ 62 (HRC) | Used for reloading roller presses, cutter discs, cane loaders, chipping discs, fan blades, crusher hammers, mill cylinders. | Friction ■■■■<br>Impact ■□□□<br>High Temp. ■■■■<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■□□□<br>Machining ■■□□ |
| **GeKa ELHARD 63** | EN 14700 : E Z Fe 14<br>DIN 8555 : E 10-UM-60 GRZ<br>AWS A5.13 : ~E FeCr-A8 | 60 -64 (HRC) | Used for reloading roller presses, cutter discs, cane loaders, chipping discs, fan blades, crusher hammers, mill cylinders. | Friction ■■■■<br>Impact ■■□□<br>High Temp. ■■□□<br>Thermo Shock ■□□□ | Corrosive ■■■□<br>Crack Resistance ■□□□<br>Machining ■□□□ |
| **GeKa ELHARD 600** | EN 14700 : E Fe 8<br>DIN 8555 : E6-UM-60 P | 55-59 (HRC) | Used in applications of hardfacing grab buckets. | Friction ■■■■<br>Impact ■■■■<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■■■□<br>Machining ■■□□ |
| **GeKa ELHARD 600 S** | EN 14700 : E Fe 8<br>DIN 8555 : E6-UM-60 P | 54-58 (HRC) | Used in applications of hardfacing grab buckets. | Friction ■■■■<br>Impact ■■■■<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■■■□<br>Machining ■■□□ |

# AGRICULTURE

**INDUSTRY** / AGRICULTURE **TYPE OF PRODUCT /** ELECTRODE

| Product | Standart | Hardness | Applications | Resistance Type and Level | |
|---|---|---|---|---|---|
| **GeKa ELHARD 600** | EN 14700 : E Fe 8<br>DIN 8555 : E6-UM-60 P | 55-59 (HRC) | Used in hardfacing applications of grain mill hammers, augers and ploughshares. | Friction ■■■■<br>Impact ■■■■<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■■■□<br>Machining ■■□□ |
| **GeKa ELHARD 600 R** | EN 14700 : E Fe 8<br>DIN 8555 : E6-UM-60 P | 55-59 (HRC) | Used in hardfacing applications of grain mill hammers, augers and ploughshares. | Friction ■■■■<br>Impact ■■■■<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■■□□<br>Crack Resistance ■■■□<br>Machining ■■□□ |
| **GeKa ELHARD 63** | EN 14700 : E Z Fe 14<br>DIN 8555 : E 10-UM-60 GRZ<br>AWS A5.13 : ~E FeCr-A8 | 60 -64 (HRC) | Used in ploughshares and augers hardfacing applications. | Friction ■■■■<br>Impact ■■□□<br>High Temp. ■■□□<br>Thermo Shock ■□□□ | Corrosive ■■■□<br>Crack Resistance ■□□□<br>Machining ■□□□ |

**INDUSTRY /** INDUSTRY RAILWAYS **TYPE OF PRODUCT /** ELECTRODE

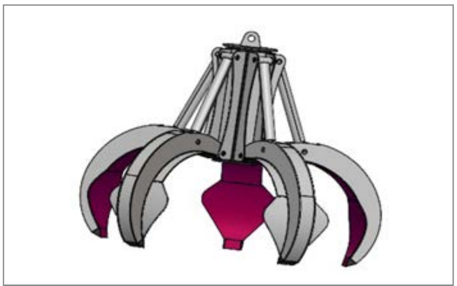
| Product | Standart | Hardness | Applications | Resistance Type and Level | |
|---|---|---|---|---|---|
| **GeKa ELHARD 250** | EN 14700 : E Fe 1<br>DIN 8555 : E 1-UM-250 | 240-280 (HB) | Used for hardfacing of rails, railroad frogs, running wheels, carrier rollers, shafts, gearboxes and couplings. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■■<br>Machining ■■■■ |
| **GeKa ELHARD 300** | EN 14700 : E Fe 1<br>DIN 8555 : E1-UM-300 | 280-330 (HB) | Used for welding joints in rails, railroad frogs, wheel tyres, carrier rollers, medium-hard hardfacing of shafts and rails. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■■<br>Machining ■■■■ |
| **GeKa ELHARD 300 R** | EN 14700 : E Fe 1<br>DIN 8555 : E1-UM-300 | Weld metal hardness 300-330 (HB) 900 °C / Cooled on water / Tempered 450-470 (HB) | Used for welding joints in rails, railroad frogs wheel tyres, carrier rollers, medium-hard hardfacing of shafts and rails. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■■<br>Machining ■■■■ |

# RECYCLING

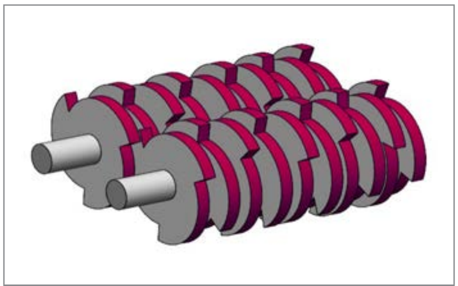
**INDUSTRY** / RECYCLING

**TYPE OF PRODUCT /** ELECTRODE

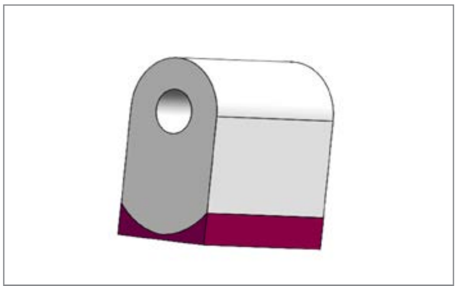
| Product | Standart | Hardness | Applications | Resistance Type and Level | |
|---|---|---|---|---|---|
| **GeKa ELHARD 300** | EN 14700 : E Fe 1<br>DIN 8555 : E1-UM-300 | 280-330 (HB) | Prefer in abrasions caused by scrap metal at the ends of polyp grapples. | Friction ■■□□<br>Impact ■■■□<br>High Temp. ■□□□<br>Thermo Shock ■□□□ | Corrosive ■□□□<br>Crack Resistance ■■■■<br>Machining ■■■■ |



Polyp grapples



Crusher components



Crusher hammers



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