PRODUCT CATALOGUE

# WELDING CONSUMABLES

2023

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SAF-FRO®

WELDING CONSUMABLES

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WELDING CONSUMABLES PRODUCT CATALOGUE

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TEST RESULTS

Test results for mechanical properties, deposit or electrode composition and diffusible hydrogen levels were obtained from a weld produced and tested according to prescribed standards, and should not be assumed to be the expected results in a particular application or weldment. Actual results will vary depending on many factors, including, but not limited to, weld procedure, plate chemistry and temperature, weldment design and fabrication methods. Users are cautioned to confirm by qualification testing, or other appropriate means, the suitability of any welding consumable and procedure before use in the intended application.

CUSTOMER ASSISTANCE POLICY

The business of Lincoln Electric is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or advice about their use of our products. Our employees respond to enquiries to the best of their ability based on information provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or advice. Moreover, the provision of such information or advice does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or advice, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose is specifically disclaimed.
Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing.
Please refer to www.lincolnelectriceurope.com for any updated information.

## IMPORTANT INFORMATION ON OUR WEBSITE

**Safety Data Sheets (SDS):**
https://www.lincolnelectric.com/en-GB/Safety-Document-Search/Safety-Data-Sheets

**Catalogues and Brochures**
https://www.lincolnelectric.com/en-GB/Support/Download-Brochures-and-Catalogues

**Consumable TÜV Certificates:**
https://www.lincolnelectric.com/en-GB/Certificate-Center/TUV-Certificates

## STICK ELECTRODES FOR MILD STEEL

| Product name | Type | Chemical composition (typical values) in % | | | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Mn | Si | S | P | Ni | Cr | Mo | Cu | V | | | | |
| FLEXAL 60 | CELLULOSIC | 0.1 | 0.6 | 0.2 | - | - | - | - | - | - | - | AWS A5.1 | E6010 | EN ISO 2560-A | E 38 3 C 21 |
| BLUCORD | RUTILE | 0.08 | 0.6 | 0.40 | 0.010 | 0.025 | - | - | - | - | - | AWS A5.1 | E6013 | EN ISO 2560-A | E 42 0 R 12 |
| SAFER G 38 | | 0.08 | 0.5 | 0.4 | ≤0.02 | ≤0.03 | - | - | - | - | - | AWS A5.1 | E6013 | EN ISO 2560-A | E 38 0 R 12 |
| SAFER G 47N | | 0.08 | 0.6 | 0.45 | - | - | - | - | - | - | - | AWS A5.1 | E6013 | EN ISO 2560-A | E 42 0 RR 12 |
| SAFER G 48N | | 0.07 | 0.6 | 0.4 | ≤0.03 | ≤0.03 | - | - | - | - | - | AWS A5.1 | E6013 | EN ISO 2560-A | E 38 0 RC 11 |
| SAFER GTI | | 0.08 | 0.6 | 0.4 | - | - | - | - | - | - | - | AWS A5.1 | E6013 | EN ISO 2560-A | E 42 0 RC 11 |
| SPEEDARC | | 0.08 | 0.5 | 0.4 | ≤0.02 | ≤0.03 | - | - | - | - | - | AWS A5.1 | E6013 | EN ISO 2560-A | E 42 0 R 12 |
| SUPERTIT FIN | | 0.08 | 0.5 | 0.4 | ≤0.02 | ≤0.03 | - | - | - | - | - | AWS A5.1 | E6013 | EN ISO 2560-A | E 42 0 R 12 |
| SAFER GF 130 | RUTILE, HIGH RECOVERY | 0.02 | 0.6 | 0.5 | ≤0.03 | ≤0.02 | - | - | - | - | - | AWS A5.1 | E7024 | EN ISO 2560-A | E 42 0 RR 53 |
| BASICORD A | BASIC | 0.06 | 1.5 | ≤0.5 | ≤0.010 | ≤0.020 | ≤0.05 | ≤0.05 | ≤0.01 | ≤0.05 | ≤0.02 | AWS A5.1 | E7018-1 H4 | EN ISO 2560-A | E 46 5 B 32 H5 |
| SAFER N 49 | | 0.06 | 0.9 | 0.7 | ≤0.015 | ≤0.020 | - | - | - | - | - | AWS A5.1 | E7016-H8 | EN ISO 2560-A | E 38 3 B 12 H10 |
| SAFER NF 510A | | 0.05 | 1.2 | 0.4 | ≤0.015 | ≤0.020 | - | - | - | - | - | AWS A5.1 | E7018 H4 | EN ISO 2560-A | E 42 4 B 32 H5 |
| SAFER NF 510P | | 0.07 | 1.1 | 0.4 | ≤0.02 | ≤0.02 | - | - | - | - | - | AWS A5.1 | E7018-1 H4 | EN ISO 2560-A | E 42 5 B 42 H5 |
| SAFER NF 510S | | 0.07 | 1.1 | 0.4 | ≤0.020 | ≤0.020 | - | - | - | - | - | AWS A5.1 | E7018-1 H4 | EN ISO 2560-A | E 42 5 B 42 H5 |
| SAFER NF 58 | | 0.07 | 1.4 | 0.3 | ≤0.02 | ≤0.025 | - | - | - | - | - | AWS A5.1 | E7018-1 H4 | EN ISO 2560-A | E 42 5 B 32 H5 |
| SANBAZ | | 0.070 | 1.2 | 0.4 | ≤0.010 | ≤0.020 | - | - | - | - | - | AWS A5.1 | E7018-1 H4R | EN ISO 2560-A | E 46 5 B 32 H5 |
| SUPERBAZ | | 0.08 | 1.1 | 0.45 | ≤0.015 | ≤0.025 | - | - | - | - | - | AWS A5.1 | E7018 H4 | EN ISO 2560-A | E 42 4 B 42 H5 |
| TENSILFRO 70 | | 0.06 | 1.3 | 0.35 | ≤0.03 | ≤0.03 | ≤0.08 | ≤0.08 | ≤0.06 | - | ≤0.06 | AWS A5.1 | E7018-1 H4R | EN ISO 2560-A | E 42 5 B 32 H5 |

## STICK ELECTRODES FOR LOW ALLOY STEEL

| Product | Type | Chemical composition (typical values) in % | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Mn | Si | S | P | Ni | Cr | Mo | | | | |
| FLEXAL 70 | CELLULOSIC | 0.1 | 0.7 | 0.2 | - | - | - | - | 0.5 | AWS A5.5 | E7010-P1 | EN ISO 2560-A | E 42 3 Mo C 21 |
| FLEXAL 80 | | 0.1 | 0.8 | 0.2 | - | - | 0.7 | - | 0.5 | AWS A5.5 | E8010-G | EN ISO 2560-A | E 46 3 1NiMo C 21 |
| SAFER MD 56 | HIGH STRENGTH | 0.06 | max 1.4 | 0.35 | ≤0.015 | ≤0.020 | 0.6-1.2 | - | 0.3-0.6 | AWS A5.5 | E8018-G H4 | EN ISO 18275-A | E 55 5 1NiMo B 32 H5 |
| SAFER ND 80 | | 0.065 | 1.85 | 0.35 | ≤0.012 | ≤0.02 | 2.6 | <0.2 | 0.4 | AWS A5.5 | E11018-G H4 | EN ISO 18275-A | E 69 6 Mn2NiMo B 42 H5 |
| SAFER NF 59 | | 0.06 | 1.6 | 0.3 | ≤0.015 | ≤0.020 | 0.75 | - | - | AWS A5.5 | E8018-G H4 | EN ISO 2560-A | E 50 6 Mn1Ni B 42 H5 |
| NIBAZ 65 | LOW TEMPERATURE | 0.055 | 1.2 | 0.5 | ≤0.015 | ≤0.020 | 1.0 | - | - | AWS A5.5 | E8018-G H4 | EN ISO 2560-A | E 50 6 Mn1Ni B 42 H5 |
| SUPERBAZ 65 | | 0.055 | 1.2 | 0.5 | ≤0.015 | ≤0.020 | 1.0 | - | - | AWS A5.5 | E8018-G H4 | EN ISO 2560-A | E 50 6 Mn1Ni B 42 H5 |
| MOLIBAZ | | ≤0.06 | 0.8 | 0.4 | ≤0.015 | ≤0.020 | - | - | 0.55 | AWS A5.5 | E7018-A1 H4 | EN ISO 3580-A | E Mo B 42 H5 |
| CROMOBAZ | | 0.065 | 0.9 | 0.45 | ≤0.010 | ≤0.015 | - | 1.30 | 0.50 | AWS A5.5 | E8018-B2 H4 | EN ISO 3580-A | E CrMo1 B 42 H5 |

## STICK ELECTRODES FOR STAINLESS STEEL

| Product name | Type | Chemical composition (typical values) in % | | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Mn | Si | S | P | Ni | Cr | Mo | Ferrite | | | | |
| LEXAL E 22 9 3N | SS DUPLEX, LEAN DUPLEX SUPERDUPLEX SUPERAUSTENITIC | ≤0.030 | 1 | 1 | - | - | 9 | 22.5 | 3.2 | 35-50 | AWS A5.4 | E2209-16* | EN ISO 3581-A | E (22 9 3 N L) R 12 |
| SAFINOX R 308L | STANDARD AUSTENITIC | 0.025 | 0.9 | 0.8 | ≤0.025 | ≤0.030 | 9.5 | 19.8 | - | 5-10 | AWS A5.4 | E308L-17 | EN ISO 3581-A | E 19 9 L R 12 |
| SAFINOX R 316L | | 0.035 | 0.9 | 0.8 | ≤0.025 | ≤0.025 | 12.0 | 19.0 | 2.6 | 5-10 | AWS A5.4 | E316L-17 | EN ISO 3581-A | E 19 12 3 L R 12 |
| SAFINOX R 309L | | ≤0.040 | 0.9 | 0.9 | ≤0.025 | ≤0.025 | 12.2 | 23.5 | - | 5-20 | AWS A5.4 | E309L-17 | EN ISO 3581-A | E 23 12 L R 12 |
| STARINOX 308L | | 0.025 | 0.9 | 0.8 | ≤0.025 | ≤0.030 | 9.5 | 19.8 | - | 5-10 | AWS A5.4 | E308L-16 | EN ISO 3581-A | E 19 9 L R 12 |
| STARINOX 316L | | 0.035 | 0.9 | 0.8 | ≤0.025 | ≤0.025 | 12.0 | 19.0 | 2.6 | 5-10 | AWS A5.4 | E316L-16 | EN ISO 3581-A | E 19 12 3 L R 12 |
| STARINOX 309L | | ≤0.040 | 0.9 | 0.9 | ≤0.025 | ≤0.025 | 12.2 | 23.5 | - | 5-20 | AWS A5.4 | E309L-16 | EN ISO 3581-A | E 23 12 L R 12 |
| SKYNOX E 308L | | 0.03 | 0.8 | 1 | 0.01 | 0.025 | 10 | 19.5 | - | 5-10 | AWS A5.4 | E308L-17 | EN ISO 3581-A | E 19 9 L R 12 |
| SKYNOX E 316L | | 0.03 | 0.8 | 1 | 0.01 | 0.025 | 11.5 | 19.5 | 2.7 | 5-10 | AWS A5.4 | E316L-17 | EN ISO 3581-A | E 19 12 3 L R 12 |
| SKYNOX E 308L | | 0.03 | 0.8 | 1 | 0.01 | 0.025 | 10 | 19.5 | - | 5-10 | AWS A5.4 | E308L-17 | EN ISO 3581-A | E 19 9 L R 12 |
| STARINOX 307 | | 0.12 | 5 | 1 | - | - | 9 | 18 | - | - | AWS A5.4 | E307-16* | EN ISO 3581-A | E 18 8 Mn R 12 E Fe10 |
| STARINOX 310 | | 0.1 | 1.7 | 0.6 | - | - | 21 | 27 | - | - | AWS A5.4 | E310-16 | EN ISO 3581-A | E 25 20 R 12 |
| STARINOX B 310 | | 0.09 | 2.0 | 0.7 | ≤0.02 | ≤0.03 | 20 | 26 | - | - | AWS A5.4 | E310-15 | EN ISO 3581-A | E 25 20 B 22 |
| STARINOX 310Mo | HIGH TEMPERATURE | 0.1 | 1.5 | 0.7 | ≤0.015 | ≤0.030 | 21 | 26 | 2.5 | - | AWS A5.4 | E310Mo-16 | EN ISO 3581-A | 310Mo* |
| STARINOX 312 | MAINTENANCE&REPAIR, DIFFICULT TO WELD, ARMOUR PLATES, DISSIMILAR | 0.08 | 1 | 1.2 | - | - | 12 | 28 | - | 25-50 | AWS A5.4 | E312-16* | EN ISO 3581-A | E Z (29 9) R 12 |
| STARINOX 312 P | | 0.1 | 1.8 | 0.7 | ≤0.015 | ≤0.030 | 12 | 29 | - | 25 | AWS A5.4 | E312-16* | EN ISO 3581-A | E Z (29 9) R 12 |

* Nearest classification.

## STICK ELECTRODES HARDFACING APPLICATIONS

| Product name | Type | Chemical composition (typical values) in % | | | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Mn | Si | Ni | Cr | Mo | Fe | V | W | Nb | | | | |
| SAFER R 400 | WEAR HB400 | 0.1 | 0.6 | 0.3 | - | 2.4 | - | bal. | - | - | - | - | - | EN 14700 | E Fe1 |
| SAFER B 400 | METAL TO METAL WEAR | 0.21 | <0.9 | <0.45 | - | 1.9 | - | - | - | - | - | - | - | EN 14700 | E Fe1 |
| SAFER R 600 | ABRASION+IMPACT | 0.6 | 1.1 | 1 | - | 2.8 | - | bal. | - | - | - | - | - | EN 14700 | E Z (Fe2) |
| SAFER B 600 | ABRASION+IMPACT | 0.5 | 0.3 | 0.4 | - | 8 | 0.5 | bal. | 0.5 | - | - | - | - | EN 14700 | E Z (Fe2) |
| SAFDUR 800 E | ABRASION | 5 | 1 | 1 | - | 24 | 5 | bal. | 1.2 | 2.5 | 6 | - | - | EN 14700 | E Fe16 |
| TOOLFRO | METAL TO METAL WEAR | 1.5 | 1 | - | - | 4 | 8 | bal. | 1.5 | 2.5 | - | - | - | EN 14700 | E Z (Fe2) |
| SAFMANGA | WEAR BY IMPACT (14%MN) | 0.60 | 15 | - | 4.80 | 4.50 | - | bal. | - | - | - | - | - | EN 14700 | E Z (Fe9) |
| SUPERSAFOR 60 | ABRASION | 4.30 | 1 | 1 | - | 34 | - | bal. | - | - | - | AWS A5.1 | E6013 | EN 14700 | E Z (Fe14) |

## STICK ELECTRODES FOR NICKEL ALLOYS

| Product name | Type | Chemical composition (typical values) in % | | | | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Mn | Si | S | P | Ni | Cr | Mo | Fe | Cu | Nb | Others* | | | | |
| ALIN 92 | NICKEL 182 TYPE ALLOY | 0.05 | 2.8 | 0.5 | 0.01 | 0.01 | bal. | 16 | 1.5 | 8 | 0.05 | 2 | Co = 0.05<br>Ta = 0.05 | AWS A5.11 | ENiCrFe-2 | EN ISO 14172-A | E Ni 6133 |
| STARCAST BM | NIFE CAST IRON<br>(BI-METAL CORE WIRE) | ≤1.5 | ≤0.8 | ≤0.8 | - | - | bal. | - | - | 45 | ≤1 | - | Al = ≤0.7 | AWS A5.15 | ENiFe-CI | EN ISO 1071-A | E C NiFe-CI 1 |
| STARCAST Ni | NI CAST IRON | 1.2 | 0.2 | 0.5 | - | - | bal. | - | - | 1 | - | - | - | AWS A5.15 | ENi-CI | EN ISO 1071-A | E C Ni-CI 1 |
| STARCAST NiCu | NICU CAST IRON | 0.35-0.55 | ≤2.30 | ≤0.75 | ≤0.025 | - | 60-70 | - | - | 3-6 | 25-35 | - | | AWS A5.15 | ENiCu-B | EN ISO 1071-A | E C NiCu-B 1 |
| STARCAST NiFe | NIFE CAST IRON | 1-2 | 0.8 | 0.8 | - | - | bal. | - | - | 43 | - | - | | AWS A5.15 | ENiFe-CI | EN ISO 1071-A | E C NiFe-CI 1 |

** Co and Ta maximums only when specified at time of order.

## STICK ELECTRODES FOR ALUMINIUM ALLOYS

| Product name | Type | Chemical composition (typical values) in % | | | | | | | | AWS | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mn | Si | Fe | Cu | Al | Zn | Mg | Si+Fe | | |
| ALCORD 5Si (SF) | AlSi | ≤0.05 | 4.5 | ≤0.8 | ≤0.3 | bal. | ≤0.1 | ≤0.05 | - | AWS A5.3 | EI-Al 99.8 |
| ALCORD Al | ALUMINIUM | ≤0.05 | - | - | 0.05-0.2 | ≥99 | - | - | ≤0.95 | AWS A5.3 | E1100* |

## MIG WIRES FOR MILD STEEL

| Product name | Chemical composition (typical values) in % | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | | | | |
| FILCORD | 0.08 | 1.1 | 0.6 | ≤0.025 | ≤0.025 | AWS A5.18 | ER70S-3 | EN ISO 14341-A | G 38 3 C1 2Si |
| FILCORD C | 0.08 | 1.5 | 0.9 | ≤0.025 | ≤0.025 | AWS A5.18 | ER70S-6 | EN ISO 14341-A | G 42 3 C1 3Si1 |
| FILCORD D | 0.07 | 1.7 | 0.9 | ≤0.025 | ≤0.025 | AWS A5.18 | ER70S-6 | EN ISO 14341-A | G 46 3 C1 4Si1 |

## MIG WIRES FOR LOW ALLOY STEEL

| Product name | Chemical composition (typical values) in % | | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | Cr | Ni | Mo | Cu | | | | |
| FILCORD 35 | 0.10 | 1.0 | 0.6 | ≤0.020 | ≤0.020 | - | - | 0.5 | - | AWS A5.28 | ER70S-A1 | EN ISO 21952-A | G MoSi |
| FILCORD 48 | 0.09 | 1.4 | 0.8 | ≤0.025 | ≤0.025 | 0.3 | 0.8 | - | 0.4 | AWS A5.28 | ER80S-G | EN ISO 14341-A | G 42 3 C1 Z |
| FILCORD 58 | 0.5 | 0.4 | 3 | - | - | 9.5 | - | - | - | - | - | EN 14700 | S Fe 8 |
| FILCORD 80 | 0.09 | 1.80 | 0.60 | 0.010 | 0.010 | - | - | 0.40 | - | AWS A5.28 | ER80S-D2 | EN ISO 14341-A | G 50 4 M21 4Mo |
| FILCORD 90 | 0.09 | 1.65 | 0.75 | 0.010 | 0.010 | 0.55 | 0.55 | 0.25 | - | AWS A5.28 | ER100S-G | EN ISO 16834-A | G 62 4 M21 Mn3NiCrMo |
| FILCORD 100 | 0.08 | 1.6 | 0.5 | ≤0.015 | ≤0.018 | 0.3 | 1.5 | 0.25 | - | AWS A5.28 | ER110S-G | EN ISO 16834-A | G 69 4 M21 Mn3Ni1CrMo |

## MIG WIRES FOR STAINLESS STEEL

| Product name | Chemical composition (typical values) in % | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | Cr | Ni | Mo | | | | |
| FILINOX 307 | 0.10 | 7 | 0.8 | ≤0.030 | ≤0.025 | 19 | 9 | - | AWS A5.9 | ER307 | EN ISO 14343-A | G 18 8 Mn |
| FILINOX 308LSI | 0.020 | 1.8 | 0.85 | ≤0.025 | ≤0.020 | 20 | 10 | - | AWS A5.9 | ER308LSi | EN ISO 14343-A | G 19 9 L Si |
| FILINOX 309LSI | 0.020 | 1.8 | 0.85 | ≤0.025 | ≤0.020 | 24 | 13 | - | AWS A5.9 | ER309LSi | EN ISO 14343-A | G 23 12 L Si |
| FILINOX 316LSI | 0.020 | 1.4 | 0.85 | ≤0.025 | ≤0.020 | 19 | 12.5 | 2.6 | AWS A5.9 | ER316LSi | EN ISO 14343-A | G 19 12 3 L Si |

## MIG WIRES FOR COPPER ALLOYS

| Product name | Chemical composition (typical values) in % | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Si | Mn | Ni | Cu | Fe | Al | | | | |
| FILCORD 46 | 0.1 | 0.2 | 0.7 | bal. | 0.4 | 8.0 | AWS A5.7 | ERCuAl-A1 | EN ISO 24373-A | S Cu 6100 (CuAl7) |

## TIG RODS FOR MILD STEEL

| Product name | Chemical composition (typical values) in % | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | | | | |
| ALTIG SG1 | 0.07 | 1 | 0.65 | ≤0.025 | ≤0.025 | AWS A5.18 | ER70S-3 | EN ISO 636-A | W 42 4 2Si |
| ALTIG SG2 | 0.08 | 1.5 | 0.9 | ≤0.025 | ≤0.025 | AWS A5.18 | ER70S-6 | EN ISO 636-A | W 42 4 3Si1 |

## TIG RODS FOR LOW ALLOY STEEL

| Product name | Chemical composition (typical values) in % | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | Cr | Ni | Mo | | | | |
| ALTIG 308L | 0.020 | 1.8 | 0.45 | ≤0.025 | ≤0.020 | 20 | 10 | - | AWS A5.9 | ER308L | EN ISO 14343-A | W 19 9 L |
| ALTIG 309L | 0.02 | 1.8 | 0.45 | ≤0.025 | ≤0.020 | 24 | 13 | - | AWS A5.9 | ER309L | EN ISO 14343-A | W 23 12L |
| ALTIG 316L | 0.020 | 1.4 | 0.45 | ≤0.025 | ≤0.020 | 19 | 12.5 | 2.6 | AWS A5.9 | ER316L | EN ISO 14343-A | W 19 12 3L |

## SELF-SHIELDED FLUX-CORED WIRES

| Product name | Chemical composition (typical values) in % | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | Al | | | | |
| SAFUNI 310 | 0.3 | 0.6 | 0.15 | ≤0.025 | ≤0.025 | 1.6 | AWS A5.20 | E71-T7 | EN ISO 17632-A | T 42 Z Y 1 H15 |

## GAS SHIELDED FLUX-CORED WIRES FOR HARDFACING APPLICATIONS

| Product name | Chemical composition (typical values) in % | | | | | EN/ISO | |
|---|---|---|---|---|---|---|---|
| | C | Mn | Si | Cr | Mo | | |
| SAFDUAL 560 | 0.42 | 0.55 | 2.6 | 9.5 | - | EN 14700 | T Fe8 |
| STEELCORED 58 | 0.5 | 1.5 | 0.6 | 5.5 | 0.6 | EN 14700 | T Fe8 |
| STEELCORED M 58 | 0.6 | 1.9 | 0.7 | 5.4 | 0.7 | EN 14700 | T Fe8 |

## GAS SHIELDED FLUX-CORED WIRES (MILD AND LOW ALLOY STEEL)

| Product name | Chemical composition (typical values) in % | | | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | Ni | Cr | Mo | Cu | Al | | | | |
| SAFDUAL 100 | 0.05 | 1.45 | 0.5 | ≤0.015 | ≤0.015 | - | - | - | - | - | AWS A5.20 | E71T-1M-JH4 | EN ISO 17632-A | T 42 3 P M 1 H5 |
| SAFDUAL 100Ni | 0.06 | 1.2 | 0.4 | ≤0.015 | ≤0.015 | 0.7 | - | - | - | - | AWS A5.29 | E81T1-GM-H4 | EN ISO 17632-A | T 46 4 1Ni P M21 1 H5 |
| SAFDUAL 128 | 0.05 | 1.3 | 0.4 | ≤0.015 | ≤0.015 | 0.85 | - | - | - | - | AWS A5.29 | E81T1-Ni1M-H4 | EN ISO 17632-A | T 46 5 1Ni P M 1 H5 |
| SAFDUAL 200 | 0.04 | 1.5 | 0.4 | ≤0.012 | ≤0.02 | - | - | - | - | - | AWS A5.18 | E70C-6M H4 | EN ISO 17632-A | T 46 5 M M 1 H5 |
| SAFDUAL 206 | 0.04 | 1.5 | 0.4 | ≤0.012 | ≤0.020 | - | - | - | - | - | AWS A5.18 | E70C-6M H4 | EN ISO 17632-A | T 46 4 M M 1 H5 |
| SAFDUAL 206A | 0.05 | 1.35 | 0.6 | ≤0.015 | ≤0.023 | - | - | - | - | - | AWS A5.18 | E70C-6M H4 | EN ISO 17632-A | T 42 2 M M 1 H5 |
| SAFDUAL R71 | 0.05 | 1.3 | 0.40 | ≤0.015 | ≤0.015 | - | - | - | - | - | AWS A5.20 | E71T1-1/9M H8 | EN ISO 17632-A | T 46 2 P M 1 H10 |
| SAFDUAL ZN | 0.4 | 1.2 | 0.3 | - | - | - | - | - | - | <3 | AWS A5.18 | E70C-GS | EN ISO 17632-A | T3T Z M M 1 H15 |
| STEELCORED 14 HD | 0.05 | 1.2 | 0.55 | 0.010 | 0.010 | - | - | - | - | - | AWS A5.20 | E71T-1M-JH4, E71T-1C-H4 | EN ISO 17632-A | T 46 3 P M 1 H5 |
| STEELCORED 19 HD | 0.05 | 1.2 | 0.5 | 0.010 | 0.010 | - | - | - | - | - | AWS A5.20 | E71T-1C-JH4 | EN ISO 17632-A | T 46 3 P C 1 H5 |
| STEELCORED 20 HD | 0.05 | 1.2 | 0.5 | 0.010 | 0.010 | 0.9 | - | - | - | - | AWS A5.29 | E81T1-Ni1M JH4 | EN ISO 17632-A | T 46 4 1Ni P M 1 H5 |
| STEELCORED 31 | 0.05 | 1.2 | 0.3 | ≤0.010 | ≤0.010 | - | - | - | - | - | AWS A5.20 | E70T-5C-JH4 | EN ISO 17632-A | T 42 4 B M 2 H5 |
| STEELCORED 42 | 0.06 | 1.5 | 0.3 | - | - | 2.3 | 0.4 | 0.4 | - | - | AWS A5.29 | E110T5-K4M-H4 | EN ISO 18276-A | T 69 6 Mn2NiCrMo B C 2 H5 |
| STEELCORED 48 | 0.05 | 1.1 | 0.25 | 0.010 | 0.010 | 1.2 | - | - | 0.5 | - | AWS A5.29 | E80T5-GM-H4 | EN ISO 17632-A | T 46 6 Z B M 2 H5 |
| STEELCORED 48 HD | 0.04 | 1.1 | 0.5 | ≤0.02 | ≤0.02 | 0.6 | 0.6 | - | 0.7 | - | AWS A5.29 | E81T1-GM-H4 | EN ISO 17632-A | T 50 3 Z P M 1 H5 |
| STEELCORED M 10 S | 0.07 | 1.6 | 0.4 | 0.010 | 0.010 | - | - | - | - | - | AWS A5.18 | E70C-6M H4 | EN ISO 17632-A | T 42 6 M M 1 H5 |
| STEELCORED M 42 | 0.05 | 1.6 | 0.5 | - | - | 1.9 | 0.45 | 0.4 | - | - | AWS A5.28 | E110C-GM H4 | EN ISO 18276-A | T 69 4 Mn2NiCrMo M M 1 H5 |
| STEELCORED M 48 | 0.05 | 1.0 | 0.4 | ≤0.01 | ≤0.01 | 0.5 | 0.5 | - | 0.5 | - | AWS A5.28 | E80C-G H4 | EN ISO 17632-A | T 46 3 Z M M 1 H5 |
| STEELCORED M 8 | 0.05 | 1.3 | 0.6 | - | - | - | - | - | - | - | AWS A5.18 | E70C-3M H4 | EN ISO 17632-A | T 46 2 M M 1 H5 |
| STEELCORED M10 | 0.06 | 1.3 | 0.6 | - | - | - | - | - | - | - | AWS A5.18 | E70C-6M H4 | EN ISO 17632-A | T 46 4 M M 1 H5 |

## GAS SHIELDED FLUX-CORED WIRES (STAINLESS STEEL)

| Product name | Chemical composition (typical values) in % | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | Ni | Cr | Mo | Ferrite | | | | |
| INOXCORED 307 | ≤0.13 | 6.5 | 0.7 | 9 | 19 | - | - | - | - | EN ISO 17633-A | T 18 8 Mn R C 3 |
| INOXCORED 308L | ≤0.04 | 1.7 | 0.6 | 10 | 20 | - | 5-10 | AWS A5.22 | E308LT0-1 | EN ISO 17633-A | T 19 9 L R M 3 |
| INOXCORED 309LV | ≤0.04 | 1.5 | 0.6 | 13 | 24 | - | 12-20 | AWS A5.22 | E309LT1-1 | EN ISO 17633-A | T 23 12 L P M 1 |
| INOXCORED 316L | ≤0.04 | 1.5 | 0.6 | 12 | 19 | 2.8 | 3-12 | AWS A5.22 | E316LT0-1 | EN ISO 17633-A | T 19 12 3 L R C 3 |
| INOXCORED 316LV | ≤0.04 | 1.5 | 0.6 | 12 | 19 | 2.8 | 5-10 | AWS A5.22 | E316LT1-1 | EN ISO 17633-A | T 19 12 3 L P M 1 |

## SAW WIRES FOR MILD STEEL

| Product name | Chemical composition (typical values) in % | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | Cu | | | | |
| AS 26 | 0.1 | 0.5 | 0.06 | ≤0.02 | ≤0.02 | - | AWS A5.17 | EL12 | EN ISO 14171-A | S1 |
| AS 35 | 0.1 | 1 | 0.12 | ≤0.025 | ≤0.025 | - | AWS A5.17 | EM12K | EN ISO 14171-A | S2 |
| AS 36 | 0.13 | 1.9 | 0.1 | ≤0.02 | ≤0.02 | - | AWS A5.17 | EH14 | EN ISO 14171-A | S4 |
| AS 37LN | 0.1 | 1.7 | 0.3 | ≤0.015 | ≤0.015 | 0.04 | AWS A5.17 | EH12K | EN ISO 14171-A | S3Si |

## SAW WIRES FOR LOW ALLOY STEEL

| Product name | Chemical composition (typical values) in % | | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | Ni | Cr | Mo | Cu | | | | |
| AS 40A | 0.1 | 1 | 0.15 | ≤0.02 | ≤0.02 | - | - | 0.5 | - | AWS A5.23 | EA2 | EN ISO 14171-A | S2Mo |
| AS 48 | 0.1 | 1 | 0.25 | ≤0.02 | ≤0.02 | 0.8 | <0.4 | - | 0.5 | AWS A5.23 | EG | EN ISO 14171-A | S2Ni1Cu |
| AS 66 | 0.12 | 1.7 | 0.2 | ≤0.015 | ≤0.015 | 0.95 | - | 0.5 | - | AWS A5.23 | EF3 | EN ISO 26304-A | S3Ni1Mo |
| AS 67 | 0.1 | 1.5 | 0.20 | <0.015 | <0.015 | 0.95 | - | 0.25 | - | AWS A5.23 | ENi6 | EN ISO 14171-A | S3Ni1Mo0.2 |

## SAW WIRES FOR STAINLESS STEEL

| Product name | Chemical composition (typical values) in % | | | | | | | | | AWS | | EN/ISO | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | Si | P | S | Ni | Cr | Mo | Nb | | | | |
| AS 308L | 0.02 | 1.8 | 0.4 | ≤0.02 | ≤0.02 | 10 | 20 | - | - | AWS A5.9 | ER308L | EN ISO 14343-A | S 19 9 L |
| AS 309L | 0.02 | 1.8 | 0.4 | ≤0.03 | ≤0.03 | 13 | 24 | - | - | AWS A5.9 | ER309L | EN ISO 14343-A | S 23 12 L |
| AS 316L | 0.02 | 1.7 | 0.4 | ≤0.02 | ≤0.02 | 12 | 18.5 | 2.75 | - | AWS A5.9 | ER316L | EN ISO 14343-A | S 19 12 3 L |
| AS 347 | 0.04 | 1.6 | 0.4 | ≤0.02 | ≤0.02 | 9.7 | 19.5 | - | 0.6 | AWS A5.9 | ER347 | EN ISO 14343-A | S 19 9 Nb |

# EN ISO 3580-A

## Classification of covered electrodes for Manual Metal Arc Welding of creep resistant steels

MOLIBAZ

**E Mo B 4 2 H5**

- **E** — Covered electrode
- **Mo** — Chemical composition
- **B** — Type of covering
- **4** — Current type and recovery
- **2** — Welding positions
- **H5** — H5 = max.5; H10 = max.10

1. All positions
2. All positions except vertical down
3. Flat and horizontal-vertical butt / fillet weld
4. Flat butt and fillet weld
5. Vertical down and according to symbol 3

| Symbol | Recovery | Current type |
|---|---|---|
| 1 | ≤ 105 | AC + DC |
| 2 | | DC |
| 3 | >105 ≤ 125 | AC + DC |
| 4 | | DC |

| | | | |
|---|---|---|---|
| **A** | Acid | **RC** | Rutilo-cellulosic |
| **C** | Cellulosic | **RA** | Rutilo-acid |
| **R** | Rutile | **RB** | Rutilo-basic |
| **RR** | Rutile, thick coated | **B** | Basic |

| Symbol | Cr | Mo | V | Others |
|---|---|---|---|---|
| Mo | - | 0,40-0,70 | - | - |
| MoV | 0,30-0,60 | 0,8-1,20 | 0,25-0,60 | - |
| CrMo0,5 | 0,40-0,65 | 0,40-0,65 | - | - |
| CrMo1 | 0,9-1,40 | 0,45-0,70 | - | - |
| CrMo1L | 0,9-1,40 | 0,45-0,70 | - | C<0,05 |
| CrMoV1 | 0,9-1,30 | 0,90-1,30 | 0,10-0,35 | - |
| CrMo2 | 2,0-2,6 | 0,90-1,30 | - | - |
| CrMo2L | 2,0-2,6 | 0,90-1,30 | - | C<0,05 |
| CrMo5 | 4,0-6,0 | 0,40-0,70 | - | |
| CrMo9 | 8,0-10,0 | 0,90-1,20 | 0,15 | Ni ≤1,0 |
| CrMo91 | 8,0-10,5 | 0,80-1,20 | 0,15-0,30 | Ni 0,40-1,0 |
| | | | | Nb 0,03-0,10 |
| | | | | W 0,02-0,07 |
| CrMoWV12 | 10,0-12,0 | 0,80-1,20 | 0,20-0,40 | Ni ≤ 0,8 |
| | | | | W 0,40-0,60 |
| Z | | Other | | |

# EN ISO 3581-A

## Classification of covered electrodes for Manual Metal Arc Welding of stainless and heat-resisting steels

**E 19 12 3 L R 1 2**

SAFINOX R 316L

- **E** — Covered electrode
- **19 12 3 L** — Chemical composition
- **R** — Type of covering
- **1** — Current type and recovery
- **2** — Welding positions

1. All positions
2. All positions except vertical down
3. Flat and horizontal-vertical butt / fillet weld
4. Flat butt and fillet weld
5. Vertical down and according to symbol 3

| Symbol | Recovery | Current type |
|---|---|---|
| 1 | ≤ 105 | AC + DC |
| 2 | | DC |
| 3 | >105 ≤ 125 | AC + DC |
| 4 | | DC |
| 5 | >125 ≤ 160 | AC + DC |
| 6 | | DC |

| | | | |
|---|---|---|---|
| **R** | Rutile | **RB** | Rutilo-basic |

| | C | Mn | Cr | Ni | Mo | Other |
|---|---|---|---|---|---|---|
| **Martensitic/ferritic** | | | | | | |
| 13 | 0,12 | 1,5 | 11-14 | - | - | - |
| 13 4 | 0,06 | 1,5 | 11 - 14 | 3 - 5 | 0,4 - 1 | - |
| 17 | 0,12 | 1,5 | 16 - 18 | | - | - |
| **Austenitic** | | | | | | |
| 19 9 | 0,08 | 2,0 | 18 - 21 | 9 - 11 | - | - |
| 19 9 L | 0,04 | 2,0 | 18 - 21 | 9 - 11 | - | - |
| 19 9 Nb | 0,08 | 2,0 | 18 - 21 | 9 - 11 | - | Nb |
| 19 12 2 | 0,08 | 2,0 | 17 - 20 | 10 - 13 | 2 - 3 | - |
| 19 12 3 L | 0,04 | 2,0 | 17 - 20 | 10 - 13 | 2 - 3 | - |
| 19 12 3 Nb | 0,08 | 2,0 | 17 - 20 | 10 - 13 | 2 - 3 | Nb |
| 19 13 4 N L | 0,04 | 1 - 5 | 17 - 20 | 12 - 15 | 3 - 4 | 0,20N |
| **Austenitic/Ferritic, high corrosion resistance** | | | | | | |
| 22 9 3 N L | 0,04 | 2,5 | 21 - 24 | 7 - 10 | 2 - 4 | [1] [5] |
| 25 7 2 N L | 0,04 | 2,0 | 24 - 28 | 6 - 8 | 1 - 3 | 0,20N |
| 25 9 3 CuN L | 0,04 | 2,5 | 24 - 27 | 7 - 10 | 2 - 4 | [2] [5] |
| 25 9 4 N L | 0,04 | 2,5 | 24 - 27 | 8 - 10 | 2 - 4 | [3] [5] |
| **Fully austenitic, high corrosion resistance** | | | | | | |
| 18 15 3 L | 0,04 | 1 - 4 | 16 - 19 | 14 - 17 | 2 - 3 | [5] |
| 18 16 5 N L | 0,04 | 1 - 4 | 17 - 20 | 15 - 19 | 3 - 5 | 0,20N [5] |

| | C | Mn | Cr | Ni | Mo | Other |
|---|---|---|---|---|---|---|
| **Fully austenitic, high corrosion resistance (cont.)** | | | | | | |
| 20 25 5 CuN L | 0,04 | 1 - 4 | 19 - 22 | 24 - 27 | 4 - 7 | [4] |
| 20 16 3 MnN L | 0,04 | 5 - 8 | 18 - 21 | 15 - 18 | 2 - 3 | 0,20N [5] |
| 25 22 2 N L | 0,04 | 1 - 5 | 24 - 27 | 20 - 23 | 2 - 3 | 0,20N |
| 7 31 4 Cu L | 0,04 | 2 - 5 | 26 -29 | 30 - 33 | 3 - 4 | [5] |
| **Special** | | | | | | |
| 18 8 Mn | 0,20 | 45 - 75 | 17 - 20 | 7 - 10 | - | |
| 18 9 MnMo | 0,04-1,4 | 3 - 5 | 18 - 21 | 9 - 11 | 0,5-1 | [5] |
| 20 10 3 | 0,10 | 2,5 | 18 - 21 | 9 - 12 | 1 - 3 | [5] |
| 23 12 L | 0,04 | 2,5 | 22 - 25 | 11 - 14 | - | - |
| 23 12 Nb | 0,10 | 2,5 | 22 - 25 | 11 - 14 | - | Nb |
| 23 12 2 L | 0,04 | 2,5 | 22 - 25 | 11 - 14 | 2 - 3 | - |
| 29 9 | 0,15 | 2,5 | 27 - 31 | 8 - 12 | - | - |
| **Heat resisting** | | | | | | |
| 16 8 2 | 0,08 | 2,5 | 14 - 16 | 7 - 9 | 1 - 2 | [5] |
| 19 9 H | 0,04-0,08 | 2,0 | 18 - 21 | 9 - 11 | - | - |
| 25 4 | 0,15 | 2,5 | 24 - 27 | 4 - 6 | - | - |
| 22 12 | 0,06-0,20 | 1 - 5 | 20 - 23 | 10 - 13 | - | - |
| 25 20 | 0,06-0,20 | 1 - 5 | 23 - 27 | 18 - 22 | - | - |
| 25 20 H | 0,35-0,45 | 2,5 | 23 - 27 | 18 - 22 | - | - |
| 18 36 | 0,25 | 2,5 | 14 - 18 | 33 - 37 | - | - |

[1] Nb
[2] 0,10 - 0,25N
[3] 0,10 - 0,20N, 1,5-2,5Cu
[4] 0,20-0,30N, 1,5Cu, 1,0W
[5] 1,2Cu
[6] 0,7-1,5Cu

# EN ISO 2560-A

## Classification of covered electrodes for Manual Metal Arc Welding of non alloyed and fine grain steels

SAFER NF 59

**E 50 6 Mn1Ni B 4 2 H5** $H_{DM}$(ml/100g)

H5 = max.5
H10 = max.10
H15 = max.15

1. All positions
2. All positions except vertical down
3. Flat and horizontal-vertical butt / fillet weld
4. Flat butt and fillet weld
5. Vertical down and according to symbol 3

Welding positions

Current type and recovery

| Symbol | Recovery | Current type |
|---|---|---|
| 1 | ≤ 105 | AC + DC |
| 2 | | DC |
| 3 | >105 ≤ 125 | AC + DC |
| 4 | | DC |
| 5 | > 160 | AC + DC |
| 6 | | DC |

Type of covering

| | | | |
|---|---|---|---|
| **A** | Acid | **RC** | Rutilo-cellulosic |
| **C** | Cellulosic | **RA** | Rutilo-acid |
| **R** | Rutile | **RB** | Rutilo-basic |
| **RR** | Rutile thick coated | **B** | Basic |

Chemical composition

| Symbol | Mn | Ni | Mo |
|---|---|---|---|
| - | 2,0 | - | - |
| Mo | 1,4 | - | 0,3-0,6 |
| MnMo | >1,4-2,0 | - | 0,3-0,6 |
| 1Ni | 1,4 | 0,6-0,12 | - |
| 2Ni | 1,4 | 1,8-2,6 | - |
| 3Ni | 1,4 | >2,6-3,8 | - |
| Mn1Ni | >1,4-2,0 | 0,6-0,12- | |
| 1NiMo | 1,4 | 0,6-0,12 | 0,3-0,6 |
| Z | | Other | |

Minimum impact of avg. 47 Joule at

Z = no requirem.
A = +20°C
O = 0° C
2 = -20°C
3 = -30°C
4 = -40°C
5 = -50°C
6 = -60°C

Min. yield strength (N/mm²)

| Symbol | Yield | Tensile | $A_5$ |
|---|---|---|---|
| 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% |

Covered electrode

# EN-ISO 18275-A

## Classification of covered electrodes for Manual Metal Arc Welding of high strength steels

SAFER MD 56

**E 55 5 1NiMo B 3 2 H5 T**

Stress relieved 1h / 560-600°C

$H_{DM}$(ml/100g)

H5 = max.5
H10 = max.10

1. All positions
2. All positions except vertical down
3. Flat and horizontal-vertical butt / fillet weld
4. Flat butt and fillet weld
5. Vertical down and according to symbol 3

Welding positions

Current type and recovery

| Symbol | Recovery | Current type |
|---|---|---|
| 1 | ≤ 105 | AC + DC |
| 2 | | DC |
| 3 | >105 ≤ 125 | AC + DC |
| 4 | | DC |
| 5 | > 160 | AC + DC |
| 6 | | DC |

Type of covering

| | | | |
|---|---|---|---|
| **A** | Acid | **RC** | Rutilo-cellulosic |
| **C** | Cellulosic | **RA** | Rutilo-acid |
| **R** | Rutile | **RB** | Rutilo-basic |
| **RR** | Rutile thick coated | **B** | Basic |

Chemical composition

| Symbol | Mn | Ni | Cr | Mo |
|---|---|---|---|---|
| MnMo | 1,4-2,0 | - | - | 0,3-0,6 |
| Mn1Ni | 1,4-2,0 | 0,6-1,2 | - | - |
| 1NiMo | <1,4 | 0,6-1,2 | - | 0,3-0,6 |
| 1,5NiMo | <1,4 | 1,2-1,8 | - | 0,3-0,6 |
| 2NiMo | <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 |
| Mn2Ni1CrMo | 1,4-2,0 | 1,8-2,6 | 0,3-0,6 | 0,3-0,6 |
| Z | | | 0,6-1,0 Other | 0,3-0,6 |

Minimum impact of avg. 47 Joule at

Z = no requirem.
A = +20°C
O = 0° C
2 = -20°C
3 = -30°C
4 = -40°C
5 = -50°C
6 = -60°C
7 = -70°C
8 = -80°C

Min. yield strength (N/mm²)

| Symbol | Yield | Tensile | $A_5$ |
|---|---|---|---|
| 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% |

Covered electrode

# EN ISO 14341-A

## Classification of solid wires and deposits for MIG/MAG Welding of non alloy and fine grain steels

**G 42 3 M 2Si** FILCORD

- **G** — Solid wire for GMAW-process
- **4** — Min. yield strength (N/mm²)
- **2** — Minimum impact of avg. 47 Joule at:
  Z = no requirem.
  A = +20°C
  O = 0° C
  2 = -20°C
  3 = -30°C
  4 = -40°C
  5 = -50°C
  6 = -60°C
- **M** — Type of shielding gas:
  M = M2 mixed shielding gas (without helium)
  C = 100 CO2
- **2Si** — Chemical composition:

| Symbol | Si | Mn | Ni | Mo |
|---|---|---|---|---|
| 0 | | | | |
| 2Si | 0,50-0,80 | 0,90-1,30 | 0,15 | 0,15 |
| 3Si1 | 0,70-1,00 | 1,30-1,60 | 0,15 | 0,15 |
| 4Si1 | 0,80-1,20 | 1,60-1,90 | 0,15 | 0,15 |
| 3Si2 | 1,00-1,30 | 1,30-1,60 | 0,15 | 0,15 |
| | | | Al | Ti + Zr |
| 2Ti | 0,40-0,80 | 0,90-1,40 | 0,05-0,20 | 0,05-0,25 |
| 3Ni1 | 0,50-0,90 | 1,00-1,60 | 0,80-1,50 | 0,15 |
| 2Ni2 | 0,40-0,80 | 0,80-1,40 | 2,10-2,70 | 0,15 |
| 2Mo | 0,30-0,70 | 0,90-1,30 | 0,15 | 0,40-0,60 |
| 4Mo | 0,50-0,80 | 1,70-2,10 | 0,15 | 0,40-0,60 |
| | | | | Al |
| 2Al | 0,30-0,50 | 0,90-1,30 | 0,15 | 0,35-0,75 |

| Symbol | Yield | Tensile | $A_5$ |
|---|---|---|---|
| 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% |

# EN ISO 636-A

## Classification of rods, wires and deposits for Tungsten Inert Gas Welding of non alloy and fine grain steels

**W 42 4 2Si** ALTIG SG1

- **W** — GTAW-process, wire and weld metal
- **4** — Min. yield strength (N/mm²)
- **2** — Minimum impact of avg. 47 Joule at:
  Z = no requirem.
  A = +20°C
  O = 0° C
  2 = -20°C
  3 = -30°C
  4 = -40°C
  5 = -50°C
  6 = -60°C
- **Si** — Chemical composition:

| Symbol | Si | Mn | Ni | Mo |
|---|---|---|---|---|
| 0 | | | | |
| 2Si | 0,50-0,80 | 0,90-1,3 | | |
| 3Si1 | 0,70-1,00 | 1,30-1,60 | | |
| 4Si1 | 0,80-1,20 | 1,60-1,90 | | |
| | | | Al | Ti + Zr |
| 2Ti | 0,40-0,80 | 0,90-1,40 | 0,05-0,20 | 0,05-0,25 |
| 3Ni1 | 0,50-0,90 | 1,00-1,60 | 0,80-1,50 | |
| 2Ni2 | 0,40-0,80 | 0,80-1,40 | 2,10-2,70 | |
| 2Mo | 0,30-0,70 | 0,90-1,30 | | 0,40-0,60 |

| Symbol | Yield | Tensile | $A_5$ |
|---|---|---|---|
| 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% |

# EN ISO 14343-A

## Classification of wire electrodes, wires and rods for arc welding stainless and heat-resisting steels

**G 19 12 3 L Si** — FILINOX 316LSI

G = GMAW
W = GTAW
P = PAW
S = SAW

Chemical composition

Classification
Si = 0,65 - 1,2%

[1] Nb
[2] 0,10 - 0,25N
[3] 0,10 - 0,20N, 1,5-2,5Cu
[4] 0,20-0,30N, 1,5Cu, 1,0W
[5] 1,2Cu
[6] 0,7-1,5Cu

Solid wire for :

| | C | Mn | Cr | Ni | Mo | Other |
|---|---|---|---|---|---|---|
| **Martensitic/ferritic** | | | | | | |
| 13 | 0.12 | 1.5 | 11-14 | - | - | - |
| 13 4 | 0,06 | 1,5 | 11 - 14 | 3 - 5 | 0,4 - 1 | - |
| 17 | 0,12 | 1,5 | 16 - 18 | | - | - |
| **Austenitic** | | | | | | |
| 19 9 | 0,08 | 2,0 | 18 - 21 | 9 - 11 | - | - |
| 19 9 L | 0,04 | 2,0 | 18 - 21 | 9 - 11 | - | - |
| 19 9 Nb | 0,08 | 2,0 | 18 - 21 | 9 - 11 | - | Nb |
| 19 12 2 | 0,08 | 2,0 | 17 - 20 | 10 - 13 | 2 - 3 | - |
| 19 12 3 L | 0,04 | 2,0 | 17 - 20 | 10 - 13 | 2 - 3 | - |
| 19 12 3 Nb | 0,08 | 2,0 | 17 - 20 | 10 - 13 | 2 - 3 | Nb |
| 19 13 4 N L | 0,04 | 1 - 5 | 17 - 20 | 12 - 15 | 3 - 4 | 0,20N |
| **Austenitic/Ferritic, high corrosion resistance** | | | | | | |
| 22 9 3 N L | 0,04 | 2,5 | 21 - 24 | 7 - 10 | 2 - 4 | [1] [5] |
| 25 7 2 N L | 0,04 | 2,0 | 24 - 28 | 6 - 8 | 1 - 3 | 0,20N |
| 25 9 3 CuN L | 0,04 | 2,5 | 24 - 27 | 7 - 10 | 2 - 4 | [2] [5] |
| 25 9 4 N L | 0,04 | 2,5 | 24 - 27 | 8 - 10 | 2 - 4 | [3] [5] |
| **Fully austenitic, high corrosion resistance** | | | | | | |
| 18 15 3 L | 0,04 | 1 - 4 | 16 - 19 | 14 - 17 | 2 - 3 | [5] |
| 18 16 5 N L | 0,04 | 1 - 4 | 17 - 20 | 15 - 19 | 3 - 5 | 0,20N [5] |

| | C | Mn | Cr | Ni | Mo | Other |
|---|---|---|---|---|---|---|
| **Fully austenitic, high corrosion resistance (cont.)** | | | | | | |
| 20 25 5 CuN L | 0,04 | 1 - 4 | 19 - 22 | 24 - 27 | 4 - 7 | [4] |
| 20 16 3 MnN L | 0,04 | 5 - 8 | 18 - 21 | 15 - 18 | 2 - 3 | 0,20N [5] |
| 25 22 2 N L | 0,04 | 1 - 5 | 24 - 27 | 20 - 23 | 2 - 3 | 0,20N |
| 7 31 4 Cu L | 0,04 | 2 - 5 | 26 -29 | 30 - 33 | 3 - 4 | [5] |
| **Special** | | | | | | |
| 18 8 Mn | 0,20 | 45 - 75 | 17 - 20 | 7 - 10 | - | |
| 18 9 MnMo | 0,04-1,4 | 3 - 5 | 18 - 21 | 9 - 11 | 0,5-1 | [5] |
| 20 10 3 | 0,10 | 2,5 | 18 - 21 | 9 - 12 | 1 - 3 | [5] |
| 23 12 L | 0,04 | 2,5 | 22 - 25 | 11 - 14 | - | - |
| 23 12 Nb | 0,10 | 2,5 | 22 - 25 | 11 - 14 | - | Nb |
| 23 12 2 L | 0,04 | 2,5 | 22 - 25 | 11 - 14 | 2 - 3 | - |
| 29 9 | 0,15 | 2,5 | 27 - 31 | 8 - 12 | - | - |
| **Heat resisting** | | | | | | |
| 16 8 2 | 0,08 | 2,5 | 14 - 16 | 7 - 9 | 1 - 2 | [5] |
| 19 9 H | 0,04-0,08 | 2,0 | 18 - 21 | 9 - 11 | - | - |
| 25 4 | 0,15 | 2,5 | 24 - 27 | 4 - 6 | - | - |
| 22 12 | 0,06-0,20 | 1 - 5 | 20 - 23 | 10 - 13 | - | - |
| 25 20 | 0,06-0,20 | 1 - 5 | 23 - 27 | 18 - 22 | - | - |
| 25 20 H | 0,35-0,45 | 2,5 | 23 - 27 | 18 - 22 | - | - |
| 18 36 | 0,25 | 2,5 | 14 - 18 | 33 - 37 | - | - |

# EN ISO 17632-A

## Classification of tubular electrodes for metal arc welding with or without a gas shield of non alloy and fine grain steels

**T 46 4 1Ni P M 1 H5** — SAFDUAL 100Ni

Flux-cored wire

Min. yield strength (N/mm²)

| Symbol | Yield | Tensile | $A_5$ |
|---|---|---|---|
| 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% |

Minimum impact of avg. 47 Joule at

Z = no requirem.
A = +20°C
O = 0° C
2 = -20°C
3 = -30°C
4 = -40°C
5 = -50°C
6 = -60°C

Chemical composition

| Symbol | Mn | Ni | Mo |
|---|---|---|---|
| - | 2,0 | - | - |
| Mo | 1,4 | - | 0,3-0,6 |
| MnMo | >1,4-2,0 | - | 0,3-0,6 |
| 1Ni | 1,4 | 0,6-0,12 | - |
| 2Ni | 1,4 | 1,8-2,6 | - |
| 3Ni | 1,4 | >2,6-3,8 | - |
| Mn1Ni | >1,4-2,0 | 0,6-0,12 | - |
| 1NiMo | 1,4 | 0,6-0,12 | 0,3-0,6 |
| z | | Other | |

Type of electrode core

| Without shielding gas | |
|---|---|
| V | Rutile or basic / fluoride |
| W | Basic/fluoride , slow freezing slag |
| Y | Basic/fluoride, fast freezing slag |
| S | Other types |

Type of shielding gas

| Symbol Characteristics | |
|---|---|
| With shielding gas (C and M2) | |
| R | Rutile, slow freezing slag |
| P | Rutile, fast freezing slag |
| B | Basic |
| M | Metal powder |

M = M2 mixed shielding gas (without helium)
C = 100 CO2

Welding positions

1. All positions
2. All positions except vertical down
3. Flat and horizontal-vertical butt / fillet weld
4. Flat butt and fillet weld
5. Vertical down and according to symbol 3

$H_{DM}$(ml/100g)

H5 = max.5
H10 = max.10
H15 = max.15

# EN ISO 14174

## Classification of flux for submerged arc welding

**S A FB 1 55 AC H5** → $H_{DM}$(ml/100g) → H5 = max.5 / H10 = max.10 / H15 = max.15

AS 589

- **Current type** → AC = AC or DC / DC = DC only
- **Metallurgical behaviour**

| | | |
|---|---|---|
| burn-out | 1 | > 0,7 |
| | 2 | > 0,5 – 0,7 |
| | 3 | > 0,3 – 0,5 |
| | 4 | > 0,1 – 0,3 |
| Neutral | 5 | 0 – 0,1 |
| pick-up | 6 | > 0,1 – 0,3 |
| | 7 | > 0,3 – 0,5 |
| | 8 | > 0,5 – 0,7 |
| | 9 | > 0,7 |

- **Applications** → 1. Structural steels, HSLA, etc / 2. Stainless and/or nickel and nickel-based alloys / 3. Surfacing wear-resisting weld
- **Type of flux**

| | | | |
|---|---|---|---|
| MS | manganese - silicate | $MnO + SiO_2$ | ≥ 50 |
| | | CaO | ≤ 15 |
| CS | calcium - silicate | $CaO + MgO + SiO_2$ | ≥ 55 |
| | | $CaO + MgO$ | ≥ 15 |
| ZS | zirconium - silicate | $ZrO_2 + SiO_2 + MnO$ | ≥ 45 |
| | | $ZrO_2$ | ≥ 15 |
| RS | rutile - silicate | $TiO_2 + SiO_2$ | ≥ 50 |
| | | $TiO_2$ | ≥ 20 |
| AR | aluminate - rutile | $Al_2O_3 + TiO_2$ | ≥ 40 |
| | | $Al_2O_3 + SiO_2 + MgO$ | ≥ 40 |
| AB | aluminate - Basic | $Al_2O_3$ | ≥ 20 |
| | | $CaF_2$ | ≥ 22 |
| | | $Al_2O_3 + SiO_2 + ZrO_2$ | ≥ 40 |
| AS | aluminate - silicate | $CaF_2 + MgO$ | ≥ 30 |
| | | $ZrO_2$ | ≥ 5 |
| AF | aluminate - fluorure basic | $Al_2O_3 + CaF_2$ | ≥ 70 |
| | | $CaO + MgO + CaF_2 + MnO$ | ≥ 50 |
| FB | fluorure - basic | $SiO_2$ | ≤ 20 |
| | | $CaF_2$ | ≥ 15 |
| Z | any other composition | | |

- **Manufacturing process** → F = fused / A = agglomerated / M = mixed
- **Submerged arc welding**

# EN ISO 14171-A

## Classification of wire and wire/flux combinations for submerged arc welding of non alloy and fine grain steels

**S 42 6 FB S3Si** AS 37LN/AS589

- **Chemical composition**

| Symbol | | Mn | Ni | Mo |
|---|---|---|---|---|
| SZ | any other agreed composition | | | |
| S1 | 0,15 | 0,35-0,60 | - | 0,3-0,6 |
| S2 | | 0,80-1,30 | | |
| S3 | | 1,31-1,75 | | |
| S4 | | 1,76-2,25 | | |
| S1Si | 0,15-0,40 | 0,35-0,60 | | |
| S2Si | 0,15-0,40 | 0,80-1,30 | | |
| S2Si2 | 0,40-0,60 | 0,80-1,30 | | |
| S3Si | 0,15-0,40 | 1,31-1,85 | | |
| S4Si | 0,15-0,40 | 1,86-2,25 | | |
| S1Mo | 0,05-0,25 | 0,35-0,60 | | 0,45-0,65 |
| S2Mo | | 0,80-1,30 | | 0,45-0,65 |
| S3Mo | | 1,31-1,75 | | 0,45-0,65 |
| S4Mo | | 1,76-2,25 | | 0,45-0,65 |
| S2Ni1 | | 0,80-1,30 | 0,80-1,20 | |
| S2Ni1,5 | | 0,80-1,30 | 1,21-1,80 | |
| S2Ni2 | | 0,80-1,30 | 1,81-2,40 | |
| S2Ni3 | 0,05-0,25 | 0,80-1,30 | 2,81-3,70 | 0,3-0,6 |
| S2Ni1Mo | | 0,80-1,30 | 0,80-1,20 | 0,45-0,65 |
| S3Ni1,5 | | 1,31-1,70 | 1,21-1,80 | - |
| S3Ni1Mo | | 1,31-1,80 | 0,80-1,20 | 0,45-0,65 |
| S3Ni1,5Mo | | 1,20-1,80 | 1,20-1,80 | 0,30-0,50 |

- **Type of flux**

| Symbol | Type of flux |
|---|---|
| MS | Manganese-silicate |
| CS | Calcium-silicate |
| ZS | Zirconium-silicate |
| RS | Rutile-silicate |
| AR | Aluminate-rutile |
| AB | Aluminate-Basic |
| AS | Aluminate-silicate |
| AF | Aluminate-fluorure basic |
| FB | Fluorure-basic |
| Z | any other type |

- **Minimum impact of avg. 47 Joule at**

| Symbol | |
|---|---|
| Z | no requirem. |
| A | +20°C |
| O | 0° C |
| 2 | -20°C |
| 3 | -30°C |
| 4 | -40°C |
| 5 | -50°C |
| 6 | -60°C |

- **Min. yield strength (N/mm²)**

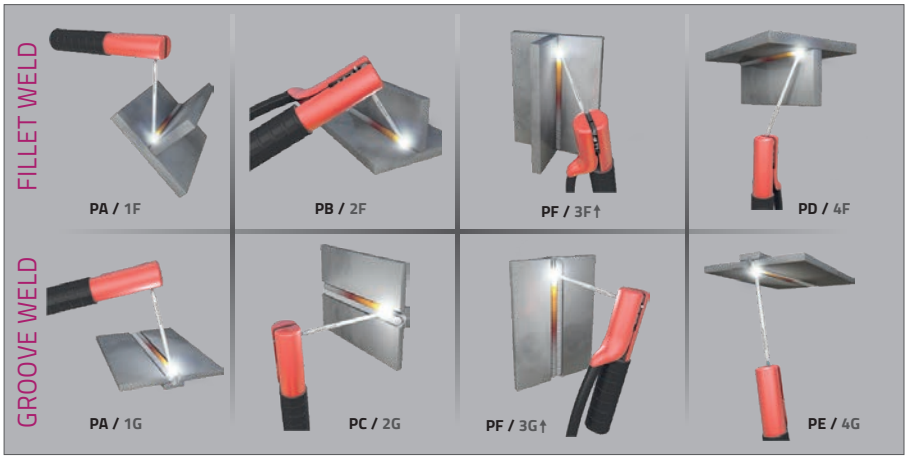
| Two-run | | |
|---|---|---|
| Symbol | Re | Rm |
| 3T | ≥ 355 | ≥ 470 |
| 4T | ≥ 420 | ≥ 520 |
| 5T | ≥ 500 | ≥600 |

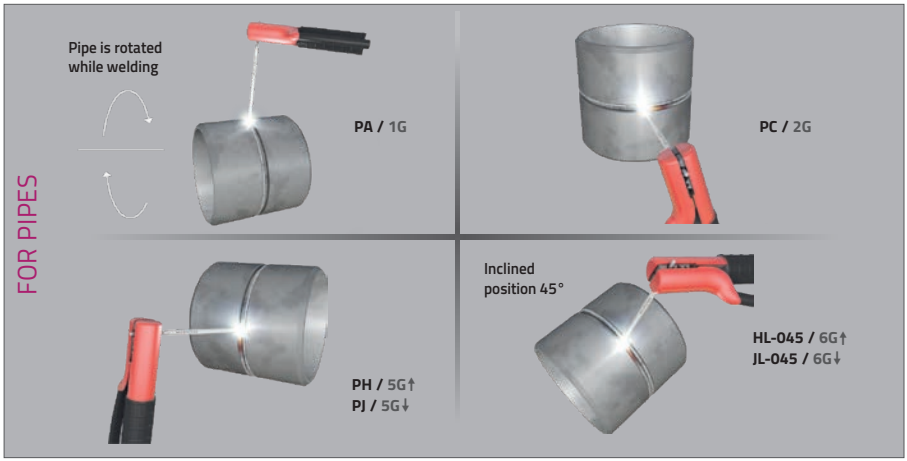
| Multi-run | | | |
|---|---|---|---|
| Symbol | Yield | Tensile | $A_s$ |
| 35 | ≥ 355 | 440-570 | ≥ 22% |
| 38 | ≥ 380 | 470-600 | ≥ 20% |
| 42 | ≥ 420 | 500-640 | ≥ 20% |
| 46 | ≥ 460 | 530-680 | ≥ 20% |
| 50 | ≥ 500 | 560-720 | ≥ 18% |

- **Submerged arc welding**

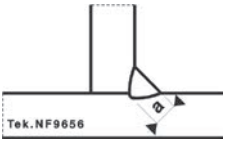
Some welding engineers prefer to use the standard AWS/ASME terminology for welding positions – some use a general description – some use a mixture of both!
It is useful in describing welding procedures if we all understand each other. This chart shows the basic AWS/ASME (and BS EN) welding positions, together with the outline descriptions. The AWS/ASME positions are described in ASME IX and the European terminology is used in BS EN 287-1 and defined in ISO 6947.

## ASME (BS EN) POSITIONS

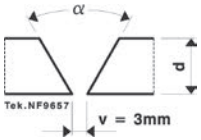


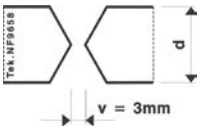
## Weld metal volume per meter

| Fillet size "a" (mm) | Theoretical content ($cm^3$) | Formula: ($a^2$ x L) "a"(mm) |
|---|---|---|
| 3 | 9 |  |
| 3.5 | 12.3 | |
| 4 | 16 | |
| 4.5 | 20.3 | |
| 5 | 25 | |
| 5.5 | 30.3 | |
| 6 | 36 | |
| 8 | 64 | |
| 10 | 100 | |

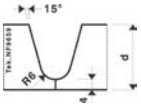


| Thickness "t" (mm) | Theoretical content ($cm^3$) | | | Formula: V50° : d (0.466d + v) L<br>V60° : d (0.577d + v) L<br>V70° : d (0.700d + v) L |
|---|---|---|---|---|
| | V50° | V60° | V70° | |
| 6 | 35 | 39 | 43 |  |
| 8 | 54 | 61 | 69 | |
| 10 | 77 | 88 | 100 | |
| 12 | 103 | 119 | 137 | |
| 14 | 133 | 155 | 179 | |
| 16 | 167 | 196 | 227 | |
| 18 | 205 | 241 | 281 | |
| 20 | 246 | 291 | 340 | |



| Thickness "t" (mm) | Theoretical content ($cm^3$) | | | Formula: X50° : d (0.233d + v) L<br>X60° : d (0.228d + v) L<br>X70° : d (0.350d + v) L |
|---|---|---|---|---|
| | V50° | V60° | V70° | |
| 14 | 88 | 98 | 111 |  |
| 16 | 108 | 122 | 138 | |
| 18 | 129 | 147 | 167 | |
| 20 | 153 | 175 | 200 | |
| 25 | 220 | 255 | 294 | |
| 30 | 300 | 349 | 405 | |
| 35 | 390 | 458 | 534 | |
| 40 | 493 | 581 | 680 | |



| Thickness "t" (mm) | Theoretical content ($cm^3$) | Formula: ((d-10)² x 0,27 + 12d - 73) |
|---|---|---|
| 20 | 194 |  |
| 25 | 288 | |
| 30 | 395 | |
| 35 | 516 | |
| 40 | 650 | |



## DETERMINATION OF WELDING COSTS

| | | |
|---|---|---|
| weld content deposit per electrode | = | number of electrodes |
| price per electrode x number | = | costs of electrodes |
| number of electrodes x arc time | = | total arc time |
| total arc time x100 percentage duty cycle | = | total work time |
| total work time x hourly wage | = | wage costs |
| costs of electrodes + wage costs | = | total costs |

### Ferrite Number

To facilitate international communication (specifications, certifications), the internationally accepted term Ferrite Number (FN) has been introduced to indicate a delta-ferrite content in stainless steel weld metal.

The Ferrite Number is often used as an indicator of resistance to weld metal hot cracking. This aspect and other engineering properties have been correlated with the FN value of the weld metal. For various service conditions the following typical levels reflect good experiences:

- fully austenitic weld metal:
  - high corrosion resistance in severe oxidising and reducing acidic and chloride containing media: FN < 0.5
  - fully austenitic CrNiMoN weld metal, non-magnetic: FN < 0.5
  - low ferrite CrNiN and CrNiMoN weld metal, cryogenic applications: FN 3-6 or < 0.5
- general purpose stainless steel weld metal with corrosion resistance and high resistance to hot cracking and microfissures: FN 6-15
- buffer layer of austenitic/ferritic weld deposits for dissimilar joints and buffer layers in clad steel: FN 15-35
- austenitic/ferritic weld metal with high stress and pitting corrosion resistance as well as a balanced structure for toughness and corrosion: FN 30-70

### Control of welding of constructions often requires the determination of the Ferrite Number (FN)

### Ferrite Measurement

An internationally accepted standardised method to determine the ferrite content is based upon an arbitrarily defined relationship between a magnetic force and weld ferrite content. This is necessary because an absolute and correct determination of the ferrite content is not available as a result of inherent inaccuracy of metallographic examination and the nonexistence of a calibration method for the absolute ferrite content in stainless steel. The attracting force between a defined permanent magnet and weld metal, containing delta-ferrite is measured by means of a torsion balance. The values are in fact compared with the values obtained in measurements using the same magnet, attracting a carbon steel base plate with a non magnetic copper coating of a specified thickness. A calibration method provides the necessary linear relation. The principles are accepted as the international standard ISO 8249 and AWS A4.2-91. The European Standardization will adopt the ISO standard.
The range in the revised standards has been extended to 100FN (originally 0-28FN).
Coated thickness standards are available from the "U.S. National Institute of Standards and Technology" (NIST). A precision torsion balance or the commercially available "Magne Gage" (fig.3) are suitable for the determination of the Ferrite Number under laboratory conditions (horizontal position). A permanent magnet of defined dimensions and magnetic strength, according ISO 8249, shall be used.
Secondary standards for the checking and calibration of field equipment in the range 0-100FN are available from NIST.

### Calculation of ferrite content

The ferrite content is estimated on the basis of calculation, using the as deposited weld metal chemical composition.
The Cr- and Ni-equivalent is plotted in diagrams, based on the metallographic studies, such as:

- the Schaeffler Diagram1), published in 1949, is considered as most suitable for a general picture of weld metal structures for a wide range of compositions, but not accurate for ferrite containing austenitic weld metals;
- the DeLong Diagram (1973)2), widely used up to 1985, for a limited range of CrNi (Mo, N)-stainless steel weld metal grades;
- the WRC 1992 Constitution Diagram (1992), published by Kotecki and Siewert (1992)3) has been based upon the WRC 1988 Constitution Diagram, earlier published by Siewert, McCowan and Olson4) as a result of a review and of more than 950 weld metal sample analyses and FN determinations (including data from Lincoln Electric). For this diagram, a better accuracy has been reported due to the accurate determination of the effect of Mn, Si, C, N and Nb.
- Also reference is made to the ESPY Diagram5) for the calculation of the ferrite content.

[1)-5)] See References, p. 29

## Application of Ferrite Diagrams

The various ferrite diagrams are suitable to estimate the Ferrite Number in weld metal. Ongoing verifications indicate that the new WRC 1992 Constitution Diagram provides the best estimate. The old Schaeffler diagram still provide useful information in a wide range of weld metal compositions. It provides guidelines for dissimilar joints and welding clad steel, calculation of composition and position of the diluted weld metal.

The following pages contain a reprint of a combination of the Schaeffler and the WRC 1992 Constitution Diagram (fig. 1) and the standard WRC 1992 Constitution Diagram on full scale (fig. 2). In using these diagrams for the estimation of weld metal structure, one should always take into account the effects of different welding conditions (temperature/time-cycles, welding parameters, surface effects) which usually influence FN values, compared with measurements on all weld metal deposit samples.

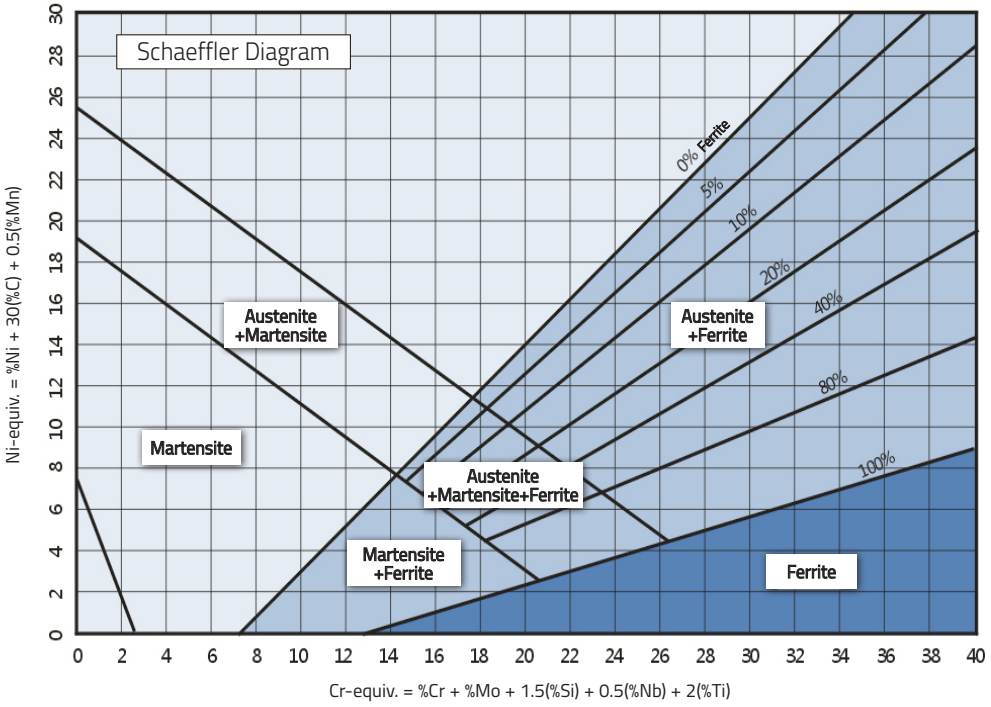



**Fig. 1 Combined Schaeffler / WRC 1992 Constitution Diagram**

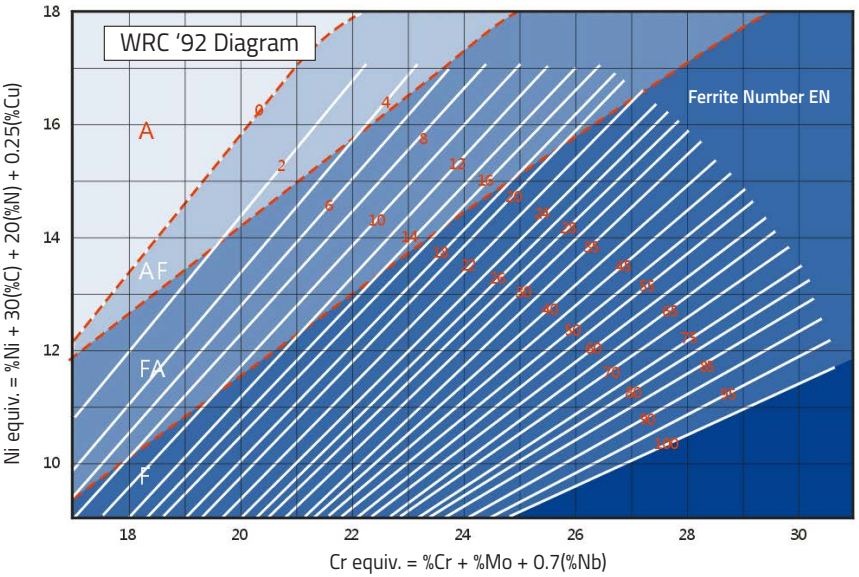



Fig. 2 WRC 1992 Constitution Diagram

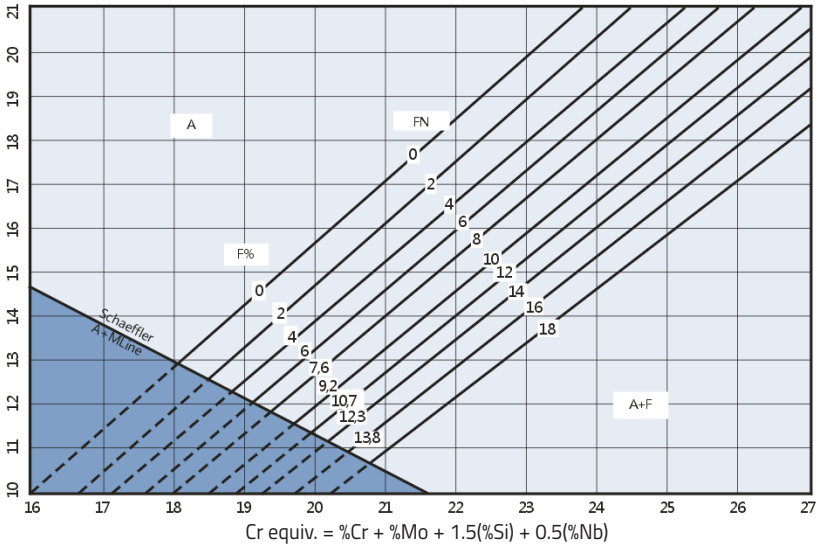



Fig. 3 W.T. DeLong, Welding Journal, July 1973, page. 273-286

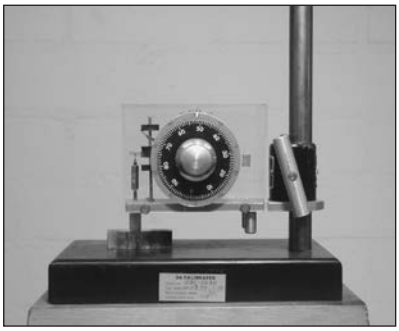


Fig. 4 Magne Gage

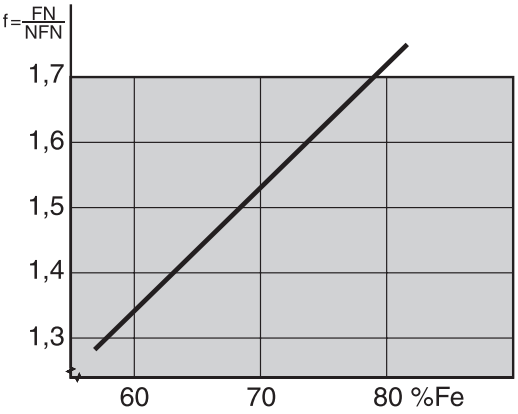



Fig. 5 Iron content versus factor f

**Ferrite Number versus Ferrite Content**

The Ferrite Number is not equal to the volumetric ferrite content (%). Although an absolute ferrite content can not be measured accurately, a reasonable estimate of the ferrite content can be made by dividing the Ferrite Number by the factor f (% ferrite = FN / f) which is dependant of the iron content in the weld metal as shown in figure 5.

**Limitations**

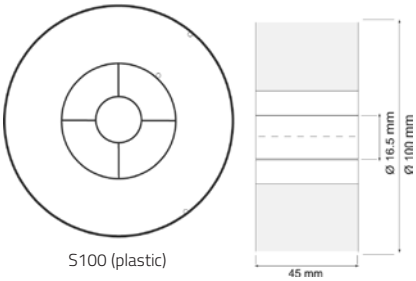
With the practice of measuring the Ferrite Number or ferrite content, welding conditions deviating from the standardised conditions have always to be taken into account. Furthermore, comparison tests showed that the accuracy between measurements in various laboratories may show differences up to +/- 10%.

**Lincoln Electric laboratories**

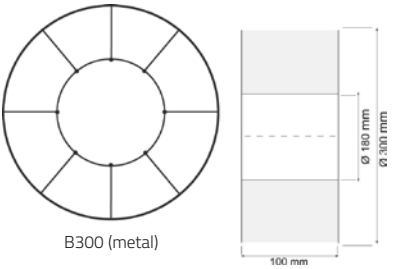
Since 1966 the Lincoln Electric R&D departments have always been involved in the international development of ferrite determinations. The laboratories are equipped with calibrated Magne Gages and on site measurement equipment. Primary coating thickness standards and secondary standards are available for contract calibration work.

**References**

1) Schaeffler A.E., Metal Progress 56 (1949) p680-680s
2) DeLong W.T., Welding Journal 53 (1974) p273s-286s
3) Kotecki D.J., Siewert T.A., Welding Journal (1992) p171s-178s
4) Siewert T.A., McCowan C.N., Olson D.L., Welding Journal (1988) p289s-298s
5) Espy R.H., Welding Journal 61 (1982) p149s-156s

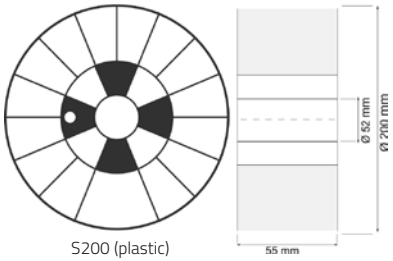



S100 (plastic)

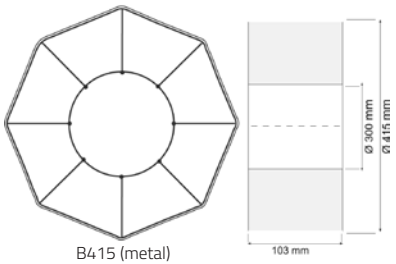



B300 (metal)

*Adaptor : K10158*
*K10158-1 (plastic)*

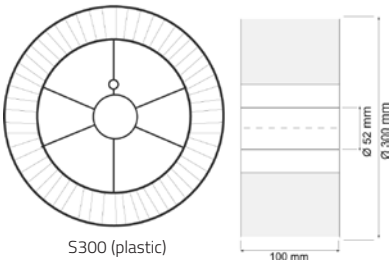



S200 (plastic)

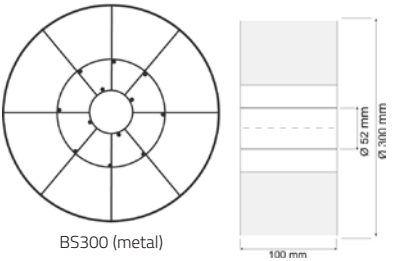



B415 (metal)

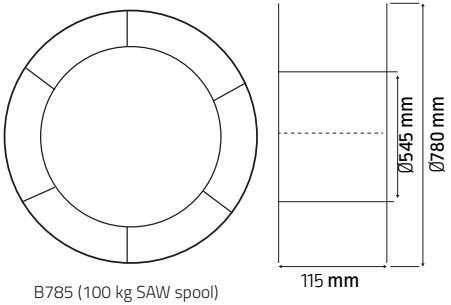
*Adaptor : K299 (axis 25mm)*
*K1504-1 (axis 50mm)*




S300 (plastic)




BS300 (metal)




B785 (100 kg SAW spool)

*Adaptor : K10410*

# ACCUTRAK® DRUMS


**200/250 kg**


**500 kg**

## FEATURES

- Drum structure done in resistant fiber carton
- Specifically designed retaining for easy pay off
- Approved Integrated Lifting Belts
- No hood needed
- Recyclable


300 & 400 kg
SPEED FEED DRUMS


600 kg
SPEED FEED DRUMS


300/600 kg
ACCUTRAK® DRUMS

| DRUMS | 300 kg Speed Feed | 400 kg Speed Feed | 600 kg Speed Feed | 300 kg Accutrak | 600 kg Accutrak |
|---|---|---|---|---|---|
| **Wire Diameter (mm)** | 1.6 to 4.8 | | | 2.0 | 1.6 to 2.4 |
| **Wire grade** | All including mild steel and low alloy | | | | |
| **Pallet load (kg)** | 600 | 800 | 600 | 600 | 600 |
| **Pallet dimension (mm) LxWxH** | 1200 x 800 x 1030 | | 720 x 720 x 1051 | 1200 x 800 x 1030 | 720 x 720 x 1051 |
| **Drum dimension (mm) Diameter x H** | 580 x 890 | | 720 x 720 x 1051 | 580 x 890 | 720 x 720 x 1051 |
| **Nb of pallets/container** | N/A | | 35 | N/A | 35 |
| **Nb of drums/pallets** | 2 | | 1 | 2 | 1 |
| **Turntable** | AD1329-13 | | USE21000558 | - | – |
| **Overseas transportation** | N/A | | yes | N/A | yes |

## 1. Scope

Covered arc welding electrodes, manufactured by Lincoln Electric Europe, delivered in their original packaging.
The packaging consists of either:

A cardboard boxes in outer carton;
B foil protected cardboard boxes in outer carton;
C plastic (PE) boxes with sealed cap, suitable for reclosing;
D hermetically sealed metal tin (LINC CAN™) in outer carton;
E hermetically vacuum sealed aluminium foil packs Sahara ReadyPack® (SRP) in outer carton.;
F hermetically vacuum sealed foil packs (Protech®, VPMD- Vacuum Pack Medium, VPMC- Vacuum pack Micro) in outer carton.

| | Packaging type | | | | | |
|---|---|---|---|---|---|---|
| **Electrode grades** | **A** | **B** | **C** | **D** | **E** | **F** |
| Mild steel | X | X | X | X | | X |
| Low alloy high strength steel | | X | | X | | X |
| Low temperature fine grain steel | | X | | X | X | X |
| Creep resistant steel | | X | | | | X |
| Stainless steel | | X | X | X | X | X |
| Duplex and Superduplex stainless steel | | X | | | | X |
| Nickel base electrodes | | | X | | | X |
| Hardfacing-; maintenance and repair electrodes | | | X | | | |

## 2. Storage

2a. Storage of electrodes in cardboard boxes requires humidity and temperature controlled storage areas.
General recommended storage conditions include:
- temperature 17-27°C, relative humidity ≤60%
- temperature 27-37°C, relative humidity ≤50%.
- electrode boxes may be stored in layers to a maximum of 7.

2b. Plastic boxes require storage conditions suitable to cardboard boxes

2c. No temperature and humidity requirements are applicable for electrodes in Linc-Can Mini-Pack and Sahara ReadyPacks, providing that (vacuum) seal is present in undamaged packs.
General recommended storage conditions include:
- Sahara ReadyPacks & Mini-Pack in outer cartons may be stored in layers to a maximum of 7;
- Linc Can in outer boxes may be stored in layers to a maximum of 5;
- Prevent damage and heating above 60°C for Linc-Can and Sahara ReadyPacks;
- Prevent damage and heating above 40°C for Mini-Pack.

## 3. Handling

3a. Re-drying and subsequential holding, as recommended in table 1, is required for products in the following conditions
- rutile electrodes, being humidified for any reason;
- basic low hydrogen electrodes in cardboard boxes;
- basic low hydrogen electrodes, returned from shop floor or damaged Sahara ReadyPacks, Mini-Pack or Linc Can;
- stainless steel and Ni-base electrodes after long and unknown storage conditions (deviating from recommendations);
- Wearshield electrodes in plastic (PE) boxes, stored for more than 1 year under conditions as described under section 2a. or earlier when the condition deviates from those recommended.

3b. Electrodes in Sahara ReadyPack and Linc-Can can be used without re-drying, providing that vacuum or seal is present in the undamaged packaging. The electrodes can be consumed in the as received condition, direct from the packaging within a period of 8 hours after opening under the conditions of ≤35°C and ≤90% RH, with the electrodes remaining in the opened packaging and protected against excessive conditions as condensation, rain, etc. This time can be extended to 12 hours under the conditions of ≤27°C and ≤70% RH. Once opened Linc-Cans should be closed during welding operations using the plastic lid that is supplied with the tin. If vacuum or seal is not present, the electrodes shall follow the re-dry and holding procedure as recommended in table 1 for the EMR-Sahara® Range. Electrodes in Mini-Pack can be used without re-drying, provided that the vacuum is present in the undamaged packaging. The electrodes can be consumed in the as received condition, direct from the packaging within a period of 4 hours after opening under the conditions of ≤35°C and ≤90% RH, with the electrodes remaining in the opened packaging and protected against excessive conditions as condensation, rain, etc.

## REDRYING AND HOLDING RECOMMENDATIONS

The re-drying time / temperature listed in Table 1, is a general guideline. Specific individual re-drying instructions on the product label may differ.

Table 1. Covered electrode re-dry times and temperatures

| Electrode product groups | Re-drying time (h)* | Temp. (°C) | Holding |
|---|---|---|---|
| Mild steel:<br>- rutile E6013<br>- rutile E6012, E7024 | 0.5-1h<br>1-2h | 70-80<br>100-120 | Cabinet 10-20°C above ambient temperature |
| - basic, low hydrogen (HDM <8 ml/100g)<br>- basic, very low hydrogen* | 2-6h<br>2-6h | 250-375<br>325-375 | a. Holding oven max. one year at 120-180°C<br>b. Quiver max. 10h at RT-125°C (see illustration fig. 1)<br>c. Plastic (PE) box max. 2 weeks workshop conditions |
| Low alloy:<br>- basic, very low hydrogen** | 2-6h | 325-375 | |
| Hardfacing-; maintenance & repair electrodes | | | |
| Stainless steel:<br>- non EMR-SAHARA electrodes<br>- EMR-SAHARA range | 1-6h<br>1-6h | 200-300<br>125-300 | Holding oven unlimited time at 75-125°C quiver max. 10h at RT-125°C |
| Ni-base | 1-6h | 200-300 | |

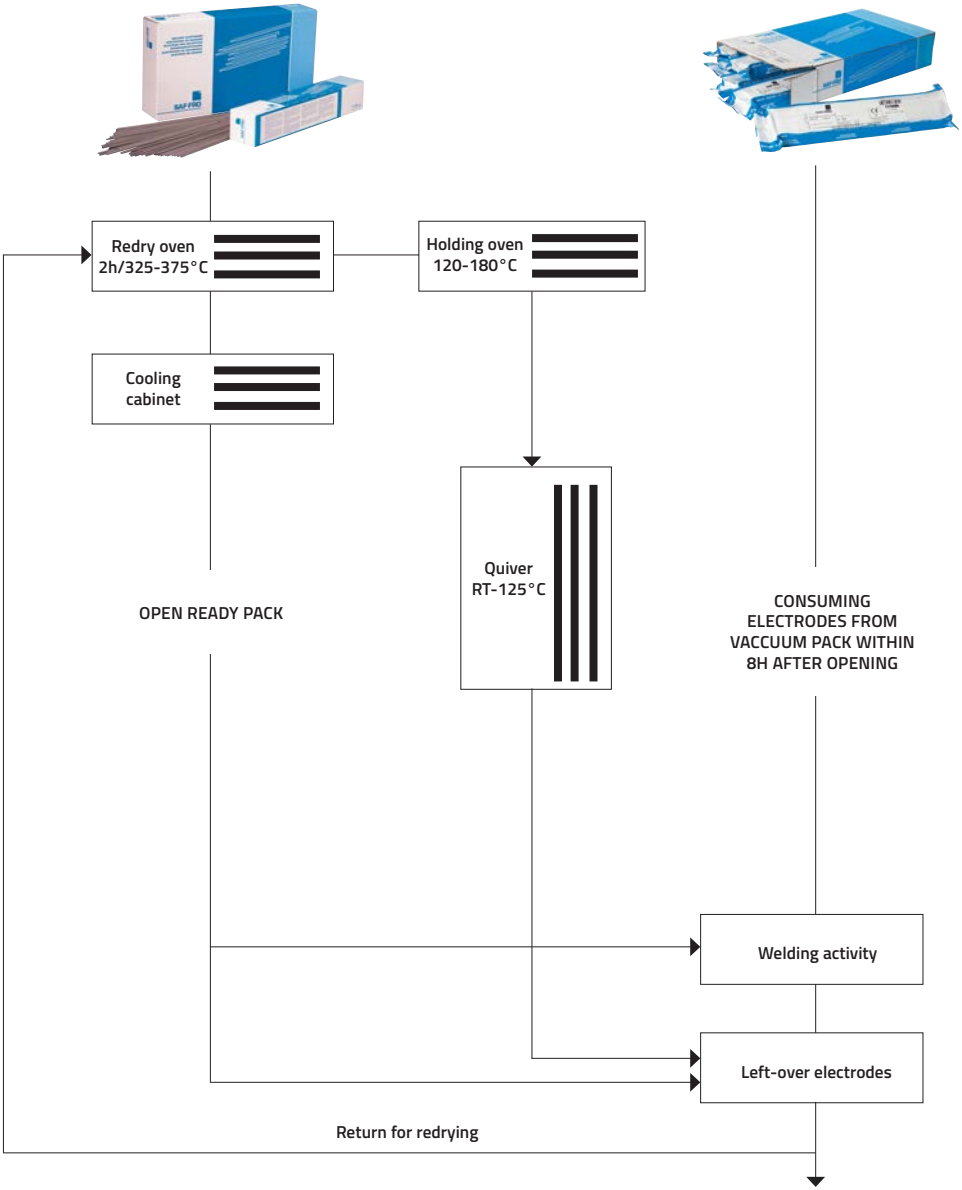
* Re-drying can be repeated twice within the indicated max. time of 6h. Re-drying of electrodes should be carried out by taking them out of the packaging and place the electrodes in approx. 3 cm thick layers in a temperature controlled air-circulation oven.

** If these EMR-SAHARA, vacuum packing electrodes are re--dried a maximum content HDM of ≤5ml/100g is valid.

**4. Deteriorated product**

Covered electrodes that have suffered from serious water and moisture contamination, or have been exposed to the atmosphere over long periods of time cannot be restored in their original condition and should be discarded.

**Figure 1:**
Recommended handling procedure of stick electrodes



## FLUX-CORED WIRES

### 1. Scope

Tubular cored wires with the following trade names are supplied in various spooling and packaging

| Product family | Packaging |
|---|---|
| Gas shielded mild steel and<br>low alloyed flux and metal cored wires. | - spool in plastic bag in cardboard box<br>- spool in Al/PE vacuum packaging in cardboard outer box<br>- spool in plastic protection on pallet<br>- Accutrak® drums<br>- spool in cardboard box or plastic bucket or hermetically sealed cans<br>- spool in plastic bag in cardboard box |

### 2. Storage

Exposure to a humid environment with only a relative thin plastic foil shall be prevented.
Tubular wire, packed in the original foil and cardboard box or drum require controlled warehouse conditions such as:
- temperature 17-27°C, relative humidity: ≤60%;
- temperature 27-37°C, relative humidity: ≤50%.

INNERSHIELD wires in plastic buckets or in hermetically sealed cans and OUTERSHIELD as well as COR-A-ROSTA in Al/PE bags under vacuum, if applicable, do not require measures against moisture pick-up. Damage of the packaging shall be prevented.

### 3. Handling

3a. OUTERSHIELD, INNERSHIELD xxx-H types and COR-A-ROSTA
Spools outside the protective packaging allow exposure to normal workshop conditions during ≤72 hours.
Drums fitted with the original lid or recommended drum hood allow exposure to normal workshop conditions during 2 weeks
3b. INNERSHIELD, non xxx-H types:
Spools outside the protective packaging allow 2 weeks exposure to normal workshop conditions.
In all cases the products require protection against contamination with moisture, dirt and oil products. During interruption of the production process for more than 8 hours, wire spools shall be stored in their plastic bag in the above-mentioned storage conditions.

### 4. Deteriorated product

Cored electrode products that are rusty, have suffered from serious water and moisture contamination, or have been exposed to the atmosphere over long periods of time cannot be restored in their original condition and should be discarded.

## MIG WIRES & TIG RODS

### 1. Scope

Solid wires and rods can be supplied in various packaging units in tubes, spools and drums.

### 2. Storage

Exposure to a humid environment shall be prevented.
The following storage conditions are recommended.
Solid wire in the original packaging require controlled warehouse conditions such as:
- temperature 17-27°C, relative humidity ≤60%
- temperature 27-37°C, relative humidity ≤50%

### 3. Handling

Rods and spools outside the protective packaging allow 2 weeks of exposure to normal workshop conditions.
In all cases, the products require protection against contamination with moisture, dirt and oil products.
During interruption of the production process for more than 8 hours, wire spools shall be stored in their plastic bag in the above mentioned storage conditions. Damage of packaging should be avoided

### 4. Deteriorated product

Products that are oxidized, have suffered from serious water and moisture contamination, or have been exposed to the atmosphere over long periods, cannot be restored in their original condition and should be discarded.

FLUX

**1. Scope**

Welding fluxes are supplied in plastic bags, bulk bags, Sahara ReadyBags, Drybags, Bigbag Dry and metal drums

**2. Storage**

The following storage conditions are recommended:
Welding fluxes, packed in plastic bags, require controlled warehouse conditions such as:
- temperature 17-27°C, relative humidity: ≤60%
- temperature 27-37°C, relative humidity: ≤50%

Product in metal drums, Sahara ReadyBags, Drybags and Bigbag Dry does not require special storage conditions but rust and damage of the packaging shall be prevented.

**3. Handling**

Product characteristics as specified for the original condition, are retained if the product is treated in accordance with the following recommendations:

| | Storage conditions | |
|---|---|---|
| **Packaging** | **0-6 months, temperature ≤37°C or rel. humidity <50%** | **>6 months or temperature >37°C or relative humidity 50-90%*** |
| Plastic bags | use as is** | redry 1-2h / 300-375°C |
| Sahara ReadyBag / Drybag / Bigbag Dry | use as is | use as is |
| Metal drums | use as is | use as is |

* if storage conditions include a relative humidity over 90% the flux may have been deteriorated so that re-drying becomes ineffective.

** if a severe application is considered (HAZ or weld metal hardness HV10 >350, heavy restraint, etc.) re-drying 1-2h / 300-375°C is recommended.

For MIL800-H, MIL800-HPNi and 842-H fluxes Follow all previous procedures, with the following changes:

- Set temperature between 120°-205°C.
- For ovens in which heating rods are inserted into the flux, do not let the temperature of flux adjacent to the rods exceed 205°C. Re-drying is carried out with the product removed from the original packaging and treated in an oven with an even temperature. It is recommended to have either an oven atmosphere circulation over a maximum flux height of 3 cm or to have the flux moving. The re-drying operation can be repeated to a maximum of 4 times. Re-dried flux and flux handled in the welding operation, shall be kept dry, preferably at a temperature of 50-120°C above ambient temperature, time unlimited.

**4. Deteriorated product**

Welding fluxes that have suffered from serious water and moisture contamination, or have been exposed to the atmosphere over long periods of time cannot be restored in their original condition and should be discarded

**5. Recycling**

Non consumed flux collected from the weld shall be cleaned from slag, metal and/or other contamination. Damage of the flux by heavy impingement in the transport system shall be prevented. Prevent separation of the different grain fraction in cyclones or in "dead" corners. Add new flux in the hopper in a circulation system before a level of 25% of the full hopper is reached.

## SHELF LIFE FOR ALL CONSUMABLES

Shelf life indicates how long our goods can be stocked at customer's premises and is not an integration to warranty.
Shelf life for all consumables is 3 years, with two exceptions described below, provided storage and handling conditions are met,
- for consumables with vacuum packing, shelf life can be extended to 5 years
- for Al (alloy) consumables, the shelf life is limited to 1 year.

Individual products might have a longer shelf life, but as standards or formulas might change, we do not extend shelf life.

# STICK ELECTRODES



MMA CONSUMABLES STICK ELECTRODES

# FLEXAL 60

**TOP FEATURES**
- Also used for root passes on higher-strength pipe steels, up to X 80.
- Excellent weldability in all position
- Shall be used in DC+ or DC- current.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E6010 |
| EN ISO 2560-A | E 38 3 C 21 |

**CURRENT TYPE**
DC-, DC+

**WELDING POSITIONS**
All positions



**APPROVALS**

| ABS | LR | DNV | TÜV | CE |
|---|---|---|---|---|
| + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si |
|---|---|---|
| 0.1 | 0.6 | 0.2 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | -20°C | -30°C |
| AWS A5.1 | AW | ≥330 | ≥430 | ≥22 | not specified | ≥27 |
| EN ISO 2560-A | AW | ≥380 | 470-600 | ≥20 | not specified | ≥47 |
| Typical values | AW | ≥380 | 470-570 | ≥24 | ≥47 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 40-80 |
| 3.2 x 350 | 60-110 |
| 5.0 x 350 | 110-170 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | MCAN | 555 | 9.0 | W000288292 |
| 3.2 x 350 | MCAN | 355 | 9.5 | W000288293 |
| 4.0 x 350 | MCAN | 237 | 9.5 | W000288294 |
| 5.0 x 350 | MCAN | 158 | 9.5 | W000288295 |

# Blucord

**TOP FEATURES**

- Good slag detachability and excellent bead appearance
- Efficiency 100%
- Operates on low open circuit voltage

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E6013 |
| EN ISO 2560-A | E 42 0 R 12 |

**CURRENT TYPE**

AC, DC-

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| ABS | LR | BV | DNV | CE |
|---|---|---|---|---|
| + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.08 | 0.6 | 0.40 | 0.025 | 0.010 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) 0°C |
|---|---|---|---|---|---|
| AWS A5.1 | AW | ≥330 | ≥430 | ≥17 | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | ≥47 |
| Typical values | AW | ≥430 | 510-550 | ≥24 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 1.6 x 250 | 35-50 |
| 2.0 x 300 | 50-70 |
| 2.5 x 300 | 60-90 |
| 2.5 x 350 | 55-90 |
| 3.2 x 350 | 80-130 |
| 3.2 x 450 | 90-130 |
| 4.0 x 450 | 120-180 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 1.6 x 250 | CBOH | 250 | 1.5 | W000380881 |
| 2.0 x 300 | CBOH | 161 | 1.9 | W000380882 |
| 2.5 x 300 | CBOX | 215 | 3.8 | W000380884 |
| 2.5 x 350 | CBOX | 240 | 4.1 | W000380886 |
| 3.2 x 350 | CBOX | 140 | 4.3 | W000380887 |
| 3.2 x 450 | CBOX | 130 | 5.7 | W000380893 |
| 4.0 x 450 | CBOX | 85 | 5.1 | W000380895 |

# SAFER G 38

**TOP FEATURES**

- Suitable for trade, small workshops, assembly applications
- Good striking and restraking characteristics.
- For small transformers, operates on low circuit voltage, good welding properties on AC current.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E6013 |
| EN ISO 2560-A | E 38 0 R 12 |

**CURRENT TYPE**

AC, DC-

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| CE |
|---|
| + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.08 | 0.5 | 0.4 | ≤0.03 | ≤0.02 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) 0°C |
|---|---|---|---|---|---|
| AWS A5.1 | AW | ≥330 | ≥430 | ≥17 | not specified |
| EN ISO 2560-A | AW | ≥380 | 470-600 | ≥20 | ≥47 |
| Typical values | AW | ≥430 | 490-580 | ≥24 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 300 | 60-90 |
| 3.2 x 350 | 110-135 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | CBOX | 237 | 3.8 | W000380900 |
| 3.2 x 350 | CBOX | 141 | 4.5 | W000380901 |

# SAFER G 47N

**TOP FEATURES**

- Easy striking and restriking
- Stable arc with very low spatter and the slag is generally self-releasing
- Suitable for use with mains transformers.
- The weld beads are finely-rippled and clean, blending into the base plate without undercut.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E6013 |
| EN ISO 2560-A | E 42 0 RR 12 |

**CURRENT TYPE**

AC, DC-

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| ABS | LR | BV | CE |
|---|---|---|---|
| + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si |
|---|---|---|
| 0.08 | 0.6 | 0.45 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) 0°C |
|---|---|---|---|---|---|
| AWS A5.1 | AW | ≥330 | ≥430 | ≥17 | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | ≥47 |
| Typical values | AW | ≥420 | 500-610 | ≥22 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-90 |
| 3.2 x 350 | 100-140 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | CBOX | 210 | 4.2 | W000378933 |
| 3.2 x 350 | CBOX | 125 | 4.3 | W000378939 |

# SAFER G 48N

**TOP FEATURES**
- Easy to use even for fillet weld in vertical down position
- Flat or slightly convex beads and easy slag removal
- Working on poorly prepared pieces, pipes, tubes, etc.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E6013 |
| EN ISO 2560-A | E 38 0 RC 11 |

**CURRENT TYPE**
AC, DC-

**WELDING POSITIONS**
All positions



**APPROVALS**

| ABS | LR | BV | DNV | CE |
|---|---|---|---|---|
| + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.07 | 0.6 | 0.4 | ≤0.03 | ≤0.03 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) 0°C |
|---|---|---|---|---|---|
| AWS A5.1 | AW | ≥330 | ≥430 | ≥17 | not specified |
| EN ISO 2560-A | AW | ≥380 | 470-600 | ≥20 | ≥47 |
| Typical values | AW | ≥420 | 500-550 | ≥24 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 1.6 x 300 | 35-50 |
| 2.0 x 350 | 45-65 |
| 2.5 x 350 | 60-95 |
| 3.2 x 350 | 85-125 |
| 3.2 x 450 | 95-125 |
| 4.0 x 350 | 120-180 |
| 4.0 x 450 | 140-190 |
| 5.0 x 450 | 160-230 |

# SAFER G 48N

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 1.6 x 300 | CBOH | 240 | 1.6 | W000384783 |
| 2.0 x 350 | CBOH | 160 | 1.9 | W000384858 |
| 2.5 x 350 | CBOH | 120 | 2.1 | W000384661 |
| | CBOX | 260 | 4.5 | W000258557 |
| 3.2 x 350 | CBOH | 65 | 1.8 | W000384660 |
| | CBOX | 160 | 4.4 | W000258558 |
| 3.2 x 450 | CBOX | 160 | 5.6 | W000258559 |
| 4.0 x 350 | CBOX | 105 | 4.5 | W000258560 |
| 4.0 x 450 | CBOX | 105 | 5.8 | W000258561 |
| 5.0 x 450 | CBOX | 67 | 6.1 | W000384782 |

# SAFER GTI

**TOP FEATURES**
- Ideal for tack welding and short beads
- Applications include mains transformers with low circuit voltage.
- Self-releasing slag

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E6013 |
| EN ISO 2560-A | E 42 0 RC 11 |

**CURRENT TYPE**
AC, DC+

**WELDING POSITIONS**
All positions



**APPROVALS**

| ABS | LR | BV | DNV | TÜV | CE |
|---|---|---|---|---|---|
| + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si |
|---|---|---|
| 0.08 | 0.6 | 0.4 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20°C | -10°C |
| AWS A5.1 | AW | ≥330 | ≥430 | ≥17 | not specified | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | not specified | ≥47 |
| Typical values | AW | ≥420 | 500-600 | ≥24 | ≥60 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.0 x 300 | 50-65 |
| 2.5 x 350 | 70-95 |
| 3.2 x 350 | 100-135 |
| 4.0 x 350 | 130-190 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.0 x 300 | CBOH | 160 | 1.6 | W000384860 |
| 2.5 x 350 | CBOX | 240 | 4.3 | W000258572 |
| 3.2 x 350 | CBOX | 155 | 4.8 | W000258573 |
| 4.0 x 350 | CBOX | 105 | 4.8 | W000258575 |

# SPEEDARC

**TOP FEATURES**

- Excellent striking and restriking qualities.
- Electrodes welds with a stable arc and very spattering loss.
- The slag is self-releasing.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E6013 |
| EN ISO 2560-A | E 42 0 R 12 |

**CURRENT TYPE**

AC, DC-

**WELDING POSITIONS**

All positions

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.08 | 0.5 | 0.4 | ≤0.03 | ≤0.02 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) 0°C |
|---|---|---|---|---|---|
| AWS A5.1 | AW | ≥330 | ≥430 | ≥17 | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | ≥47 |
| Typical values | AW | ≥430 | 500-610 | ≥24 | ≥47 |

*AW: As-welded

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.0 x 300 | CBOX | 323 | 3.8 | W000387731 |
| 2.0 x 350 | VPMC | 75 | 1.0 | W000387728 |
| 2.5 x 350 | VPMC | 50 | 1.0 | W000387729 |
| | CBOX | 230 | 4.5 | W000387732 |
| 3.2 x 350 | VPMC | 35 | 1.1 | W000387730 |
| | CBOX | 141 | 4.5 | W000387733 |
| 3.2 x 450 | CBOX | 139 | 5.8 | W000387734 |
| 4.0 x 450 | CBOX | 92 | 5.9 | W000387735 |
| 5.0 x 450 | CBOX | 60 | 5.8 | W000387736 |

# SUPERTIT FIN

**TOP FEATURES**

- Excellent striking and restriking qualities.
- Electrodes welds with a stable arc and very spattering loss.
- The slag is self-releasing.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E6013 |
| EN ISO 2560-A | E 42 0 R 12 |

**CURRENT TYPE**

AC, DC-

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| ABS | LR | BV | DNV | TÜV | DB | CE |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.08 | 0.5 | 0.4 | ≤0.03 | ≤0.02 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) 0°C |
|---|---|---|---|---|---|
| AWS A5.1 | AW | ≥330 | ≥430 | ≥17 | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | ≥47 |
| Typical values | AW | ≥430 | 500-610 | ≥24 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.0 x 300 | 50-70 |
| 2.5 x 300 | 60-90 |
| 2.5 x 350 | 60-90 |
| 3.2 x 350 | 110-135 |
| 3.2 x 450 | 110-135 |
| 4.0 x 350 | 160-180 |
| 4.0 x 450 | 160-180 |
| 5.0 x 450 | 180-210 |

# SUPERTIT FIN

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 1.6 x 250 | CBOH | 250 | 1.5 | W000380868 |
| 2.0 x 300 | CBOH | 161 | 1.9 | W000380870 |
| 2.5 x 300 | CBOH | 161 | 1.9 | W000387692 |
| | CBOX | 237 | 3.8 | W000288259 |
| 2.5 x 350 | CBOX | 230 | 4.5 | W000288260, W000387693 |
| 3.2 x 350 | CBOX | 141 | 4.5 | W000288261, W000387694 |
| 3.2 x 450 | CBOX | 139 | 5.8 | W000288262 |
| 4.0 x 350 | CBOX | 93 | 4.5 | W000288263, W000387695 |
| 4.0 x 450 | CBOX | 90 | 5.8 | W000288264 |
| 5.0 x 450 | CBOX | 62 | 6.0 | W000288265 |

# SAFER GF 130

**TOP FEATURES**

- Easy striking and restriking
- Low spatter loss and self-releasing slag
- The weld bead is smooth with well blended toes, without undercut into the base plate
- Can be welded in "touch" technique
- AC welding requires equipment with OCV of min. 60 V.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E7024 |
| EN ISO 2560-A | E 42 0 RR 53 |

**CURRENT TYPE**

AC, DC-, DC+

**WELDING POSITIONS**

Flat/Horizontal

**APPROVALS**

| CE |
|---|
| + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.02 | 0.6 | 0.5 | ≤0.02 | ≤0.03 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C |
| AWS A5.1 | AW | ≥400 | ≥490 | ≥22 | not specified | ≥20 |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | ≥47 | not specified |
| Typical values | AW | >420 | 500-560 | >24 | >47 | not specified |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 4.0 x 450 | 170-210 |
| 5.0 x 450 | 235-300 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 4.0 x 450 | CBOX | 70 | 5.9 | W000371208 |
| 5.0 x 450 | CBOX | 45 | 5.8 | W000371206 |

# BASICORD A

**TOP FEATURES**

- Excellent weldability in all positions except vertical down.
- High deposit rate and good bead appearance
- Very low spatter both in DC and AC.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E7018-1 H4 |
| EN ISO 2560-A | E 46 5 B 32 H5 |

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| ABS | LR | BV | DNV | RINA | CE |
|---|---|---|---|---|---|
| + | + | + | + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Mo | Cu | V |
|---|---|---|---|---|---|---|---|---|---|
| 0.06 | 1.5 | ≤0.5 | ≤0.020 | ≤0.010 | ≤0.05 | ≤0.05 | ≤0.01 | ≤0.05 | ≤0.02 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | -40°C | -46°C | -50°C |
| AWS A5.1 | AW | ≥400 | ≥490 | ≥22 | not specified | ≥27 | not specified |
| EN ISO 2560-A | AW | ≥460 | 530-680 | ≥20 | not specified | not specified | ≥47 |
| Typical values | AW | ≥470 | 530-640 | ≥26 | ≥47 | ≥27 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 300 | 65-105 |
| 3.2 x 450 | 90-145 |
| 4.0 x 450 | 125-180 |
| 5.0 x 450 | 180-240 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | 90 | 1.7 | W000288423 |
| 3.2 x 450 | VPMD | 55 | 2.6 | W000288425 |
| 4.0 x 450 | VPMD | 40 | 2.8 | W000288426 |
| 5.0 x 450 | VPMD | 20 | 2.1 | W000288427 |

# SAFER N 49

**TOP FEATURES**

- ISO-V toughness at -30°C. Deposit free from porosity and good of X-ray quality.
- Optimum AC weldability requires an OCV > 65V.
- Very good gap bridging and ideally suited for root passes and positional welding.
- The glassy slag is easily removed from the finely-rippled.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E7016-H8 |
| EN ISO 2560-A | E 38 3 B 12 H10 |

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All position, except vertical down



**APPROVALS**

| TÜV | DB | CE |
|---|---|---|
| + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.06 | 0.9 | 0.7 | ≤0.020 | ≤0.015 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -30°C |
|---|---|---|---|---|---|
| AWS A5.1 | AW | ≥400 | ≥490 | ≥22 | ≥27 |
| EN ISO 2560-A | AW | ≥380 | 470-600 | ≥20 | ≥47 |
| Typical values | AW | ≥400 | 490-600 | ≥22 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.0 x 350 | 55-65 |
| 2.5 x 350 | 50-95 |
| 3.2 x 350 | 80-150 |
| 3.2 x 450 | 95-150 |
| 4.0 x 450 | 120-190 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.0 x 350 | CBOX | 330 | 4.2 | W000380888 |
| 2.5 x 350 | CBOX | 200 | 3.9 | W000288524 |
| 3.2 x 350 | CBOX | 125 | 4.1 | W000288525 |
| 3.2 x 450 | CBOX | 125 | 5.3 | W000288526 |
| 4.0 x 450 | CBOX | 80 | 5.2 | W000288527 |

# SAFER NF 510A

**TOP FEATURES**
- Very low hydrogen content after re-drying.
- Excellent mechanical properties.
- Deposit free from porosity, excellent slag detachability.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E7018 H4 |
| EN ISO 2560-A | E 42 4 B 32 H5 |

**CURRENT TYPE**
AC, DC+

**WELDING POSITIONS**
All positions

**APPROVALS**

| ABS | LR | BV | DNV | RINA | TÜV | CE |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.05 | 1.2 | 0.4 | ≤0.020 | ≤0.015 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | -30°C | -40°C | -50°C |
| AWS A5.1 | AW | ≥400 | ≥490 | ≥22 | ≥27 | not specified | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | not specified | ≥47 | not specified |
| Typical values | AW | ≥420 | 510-640 | ≥24 | ≥27 | ≥47 | ≥70 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-95 |
| 3.2 x 350 | 100-135 |
| 3.2 x 450 | 100-135 |
| 4.0 x 350 | 110-210 |
| 4.0 x 450 | 110-210 |
| 5.0 x 450 | 170-240 |

# SAFER NF 510A

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMC | 28 | 0.6 | W000385538 |
| | VPMD | 90 | 1.9 | W000258592 |
| | CBOX | 195 | 4.2 | W000258598 |
| 3.2 x 350 | VPMD | 55 | 1.9 | W000258593 |
| | CBOX | 120 | 4.2 | W000258599 |
| 3.2 x 450 | VPMD | 55 | 2.4 | W000258594 |
| | CBOX | 120 | 5.3 | W000258600 |
| 4.0 x 350 | VPMD | 40 | 2.1 | W000258595 |
| | CBOX | 85 | 4.5 | W000258601 |
| 4.0 x 450 | VPMD | 40 | 2.7 | W000258596 |
| | CBOX | 85 | 5.7 | W000258602 |
| 5.0 x 450 | CBOX | 55 | 5.7 | W000258603 |

# SAFER NF 510P

**TOP FEATURES**

- High welding speed in Vertical Up.
- Low moisture content of the coating and low diffusible hydrogen.
- Deposit free from porosity.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E7018-1 H4 |
| EN ISO 2560-A | E 42 5 B 42 H5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| ABS | LR | BV | DNV | DB | CE |
|---|---|---|---|---|---|
| + | + | + | + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.07 | 1.1 | 0.4 | ≤0.02 | ≤0.02 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | -30°C | -50°C |
| AWS A5.1 | AW | ≥400 | ≥490 | ≥22 | ≥27 | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | not specified | ≥47 |
| Typical values | AW | ≥420 | ≥510 | ≥22 | ≥27 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-90 |
| 3.2 x 450 | 100-140 |
| 4.0 x 450 | 140-190 |
| 5.0 x 450 | 190-250 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | CBOX | 185 | 4.1 | W000279864 |
| 3.2 x 450 | CBOX | 120 | 5.5 | W000279866, W000288321 |
| 4.0 x 450 | CBOX | 85 | 5.8 | W000279867, W000288322 |
| 5.0 x 450 | CBOX | 55 | 5.5 | W000279868 |

# SAFER NF 510S

**TOP FEATURES**

- Very low hydrogen content after re-drying.
- Easy slag removal.
- Excellent mechanical properties.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E7018-1 H4 |
| EN ISO 2560-A | E 42 5 B 42 H5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| ABS | LR | BV | DNV | RINA | DB | CE |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.07 | 1.1 | 0.4 | ≤0.020 | ≤0.020 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | -30°C | -46°C | -50°C |
| AWS A5.1 | AW | ≥400 | ≥490 | ≥22 | ≥27 | ≥27 | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | not specified | not specified | ≥47 |
| Typical values | AW | ≥430 | 510-640 | ≥22 | ≥27 | ≥27 | ≥50 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 300 | 65-90 |
| 2.5 x 350 | 65-90 |
| 3.2 x 350 | 100-140 |
| 3.2 x 450 | 100-140 |
| 4.0 x 450 | 140-190 |
| 5.0 x 450 | 190-250 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | CBOX | 185 | 3.5 | W000380889 |
| 2.5 x 350 | CBOX | 185 | 4.1 | W000279875, W000288330 |
| 3.2 x 350 | CBOX | 120 | 4.2 | W000279876 |
| 3.2 x 450 | CBOX | 120 | 5.5 | W000279877, W000288332 |
| 4.0 x 450 | CBOX | 85 | 5.8 | W000279878 |
| 5.0 x 450 | CBOX | 55 | 5.5 | W000279879 |

# SAFER NF 58

**TOP FEATURES**

- Very low diffusible hydrogen content, high impact toughness down to - 50°C and CTOD tested.
- Weld metal recovery: ~120%.
- DC and AC welding current.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E7018-1 H4 |
| EN ISO 2560-A | E 42 5 B 32 H5 |

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| ABS | LR | BV | DNV | TÜV | DB | CE |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.07 | 1.4 | 0.3 | ≤0.025 | ≤0.02 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | -30°C | -46°C | -50°C |
| AWS A5.1 | AW | ≥400 | ≥490 | ≥22 | ≥27 | ≥27 | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | not specified | not specified | ≥47 |
| Typical values | AW | ≥430 | 510-640 | ≥22 | ≥27 | ≥27 | ≥50 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-105 |
| 3.2 x 350 | 90-140 |
| 3.2 x 450 | 90-140 |
| 4.0 x 450 | 135-180 |
| 5.0 x 450 | 170-230 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 100 | 2.0 | W000258620 |
| 3.2 x 350 | VPMD | 55 | 1.9 | W000258621 |
| 3.2 x 450 | VPMD | 55 | 2.5 | W000258622 |
| 4.0 x 450 | VPMD | 40 | 2.6 | W000258624 |
| 5.0 x 450 | VPMD | 25 | 2.6 | W000258625 |

# SANBAZ

**TOP FEATURES**

- Excellent welding characteristics in all positions except vertical down position.
- Spatter very low in both DC and AC, with a high deposition rate.
- Low moisture reabsorption coated and Hd < 4 ml/100 g.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E7018-1 H4R |
| EN ISO 2560-A | E 46 5 B 32 H5 |

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| ABS | LR | BV | DNV | TÜV | DB | CE |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.070 | 1.2 | 0.4 | ≤0.020 | ≤0.010 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | -30°C | -45°C | -50°C |
| AWS A5.1 | AW | ≥400 | ≥490 | ≥22 | ≥27 | ≥27 | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | not specified | not specified | ≥47 |
| Typical values | AW | ≥430 | 510-590 | ≥22 | ≥27 | ≥27 | ≥90 |
| Typical values | PWHT 620°C/1h | ≥420 | 500-590 | ≥22 | ≥27 | ≥27 | ≥90 |

*AW: As-welded; PWHT: Postweld Heat Treatment

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-90 |
| 3.2 x 450 | 120-140 |
| 4.0 x 450 | 160-190 |
| 5.0 x 450 | 180-230 |

# SANBAZ

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 86 | 2.0 | W000288476 |
| | CBOX | 172 | 4.0 | W000288468 |
| 3.2 x 450 | VPMD | 52 | 2.5 | W000288478 |
| | CBOX | 116 | 5.5 | W000288470 |
| 4.0 x 450 | VPMD | 37 | 2.5 | W000288480 |
| | CBOX | 81 | 5.5 | W000288472 |
| 5.0 x 450 | CBOX | 56 | 5.5 | W000288473 |

# SUPERBAZ

**TOP FEATURES**

- The weld metal diffusible hydrogen content conforms to low hydrogen, < 5 ml/100g deposited weld metal.
- Impact toughness down to -40 °C.
- Weld metal recovery:~120%.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E7018 H4 |
| EN ISO 2560-A | E 42 4 B 42 H5 |

**CURRENT TYPE**

DC-, DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| ABS | LR | BV | DNV | TÜV | DB | CE |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.08 | 1.1 | 0.45 | ≤0.025 | ≤0.015 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | -30°C | -40°C |
| AWS A5.1 | AW | ≥400 | ≥490 | ≥22 | ≥27 | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | not specified | ≥47 |
| Typical values | AW | ≥430 | 510-610 | ≥24 | ≥27 | ≥70 |
| Typical values | PWHT 600°Cx1h | ≥420 | ≥500 | ≥22 | ≥27 | ≥70 |

*AW: As-welded; PWHT: Postweld Heat Treatment

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-90 |
| 3.2 x 350 | 120-140 |
| 3.2 x 450 | 120-140 |
| 4.0 x 350 | 160-190 |
| 4.0 x 450 | 160-190 |
| 5.0 x 450 | 210-230 |

# SUPERBAZ

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 85 | 1.9 | W000383266 |
| | CBOX | 180 | 4.0 | W000288306 |
| 3.2 x 350 | CBOX | 112 | 4.0 | W000288307 |
| 3.2 x 450 | VPMD | 55 | 2.6 | W000383267 |
| | CBOX | 117 | 5.5 | W000288308 |
| 4.0 x 350 | CBOX | 79 | 4.0 | W000288309 |
| 4.0 x 450 | CBOX | 81 | 5.5 | W000288310 |
| 5.0 x 450 | CBOX | 55 | 5.5 | W000288311 |

# TENSILFRO 70

**TOP FEATURES**
- Self releasing slag
- No spatter.
- Good electric arc and controllable cold weld pool.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E7018-1 H4R |
| EN ISO 2560-A | E 42 5 B 32 H5 |

**CURRENT TYPE**
AC, DC+

**WELDING POSITIONS**
All position, except vertical down



**APPROVALS**

| ABS | LR | BV | DNV | RINA | CE |
|---|---|---|---|---|---|
| + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Mo | V |
|---|---|---|---|---|---|---|---|---|
| 0.06 | 1.3 | 0.35 | ≤0.03 | ≤0.03 | ≤0.08 | ≤0.08 | ≤0.06 | ≤0.06 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | -30°C | -50°C |
| AWS A5.1 | AW | ≥400 | ≥490 | ≥22 | ≥27 | not specified |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | not specified | ≥47 |
| Typical values | AW | ≥450 | 520-640 | ≥26 | ≥80 | ≥60 |
| Typical values | PWHT 620°C/1h | ≥420 | 510-630 | ≥26 | ≥110 | ≥100 |

*AW: As-welded; PWHT: Postweld Heat Treatment

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 300 | 70-100 |
| 3.2 x 450 | 90-145 |
| 4.0 x 450 | 110-180 |
| 5.0 x 450 | 180-240 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | 90 | 1.8 | W000288440 |
| 3.2 x 450 | VPMD | 55 | 2.6 | W000288441 |
| 4.0 x 450 | VPMD | 40 | 2.7 | W000288442 |
| 5.0 x 450 | VPMD | 25 | 2.6 | W000288443 |

# FLEXAL 70

**TOP FEATURES**

- Excellent weldability in all position
- Used for root and hot passes as well as filling and capping up to X60 grades
- Shall be welded in DC+/- mode.
- When root pass welding, negative polarity is recommended

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.5 | E7010-P1 |
| EN ISO 2560-A | E 42 3 Mo C 21 |

**WELDING POSITIONS**

All positions

**APPROVALS**

| ABS | LR | DNV | TÜV |
|---|---|---|---|
| + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Mo |
|---|---|---|---|
| 0.1 | 0.7 | 0.2 | 0.5 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | +20°C | -20°C | -30°C |
| AWS A5.5 | AW | ≥415 | ≥430 | ≥22 | not specified | not specified | ≥27 |
| EN ISO 2560-A | AW | ≥420 | 500-640 | ≥20 | not specified | not specified | ≥47 |
| Typical values | AW | ≥420 | 500-640 | ≥22 | ≥60 | ≥47 | ≥47 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 40-80 |
| 3.2 x 350 | 60-110 |
| 4.0 x 350 | 90-140 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 350 | MCAN | 355 | 9.5 | W000288297 |
| 4.0 x 350 | MCAN | 237 | 9.5 | W000288298 |
| 5.0 x 350 | MCAN | 158 | 9.5 | W000288299 |

# FLEXAL 80

**TOP FEATURES**

- Excellent weldability in all position
- Used for root and hot passes as well as filling and capping up to X70 grades
- Clearly visible weld puddle for improved control and weldability
- Shall be used in DC+ or DC- current.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.5 | E8010-G |
| EN ISO 2560-A | E 46 3 1NiMo C 21 |

**CURRENT TYPE**

DC-, DC+

**WELDING POSITIONS**

All positions

**APPROVALS**

| ABS | LR | DNV | TÜV |
|---|---|---|---|
| + | + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Ni | Mo |
|---|---|---|---|---|
| 0.1 | 0.8 | 0.2 | 0.7 | 0.5 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | +20°C | -20°C | -30°C |
| AWS A5.5 | AW or PWHT | ≥460 | ≥550 | ≥19 | not specified | not specified | not specified |
| EN ISO 2560-A | AW | ≥460 | 530-680 | ≥20 | not specified | not specified | ≥47 |
| Typical values | AW | ≥485 | 570-680 | ≥22 | ≥60 | ≥47 | ≥47 |

*AW: As-welded; PWHT: Postweld Heat Treatment

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 350 | 60-110 |
| 4.0 x 350 | 90-140 |
| 5.0 x 350 | 110-170 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 350 | MCAN | 355 | 9.5 | W000288301 |
| 4.0 x 350 | MCAN | 238 | 9.5 | W000288302 |
| 5.0 x 350 | MCAN | 156 | 9.5 | W000288303 |

# SAFER MD 56

**TOP FEATURES**
- 120% efficiency
- Easy striking.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.5 | E8018-G H4 |
| EN ISO 18275-A | E 55 5 1NiMo B 32 H5 |

**CURRENT TYPE**
DC+

**WELDING POSITIONS**
All position, except vertical down

**APPROVALS**

| ABS | BV | DNV | TÜV | CE |
|---|---|---|---|---|
| + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Ni | Mo |
|---|---|---|---|---|---|---|
| 0.06 | max 1.4 | 0.35 | ≤0.020 | ≤0.015 | 0.6-1.2 | 0.3-0.6 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -50°C |
|---|---|---|---|---|---|
| AWS A5.5 | AW or PWHT** | ≥460 | ≥550 | ≥19 | not specified |
| EN ISO 18275-A | AW | ≥550 | 610-780 | ≥18 | ≥47 |
| Typical values | AW | ≥550 | 620-720 | ≥20 | ≥47 |

*AW: As-welded; PWHT: Postweld Heat Treatment

**PWHT: In accordance with the agreement between the purchaser and the supplier.

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-90 |
| 3.2 x 450 | 95-130 |
| 4.0 x 450 | 130-180 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | TBD | 0.0 | W100258642 |
| 3.2 x 450 | VPMD | TBD | 0.0 | W100258643 |
| 4.0 x 450 | VPMD | TBD | 0.0 | W100258644 |

# SAFER ND 80

**TOP FEATURES**

- The weld metal is of extremely high metallurgic purity, retaining good ISO-V toughness up to -40°C. The SAFER ND 80 is used for applications with a higher yield strength up to 700 Mpa and down to -40°C.
- Easy striking.
- 120% efficiency

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.5 | E11018-G H4 |
| EN ISO 18275-A | E 69 6 Mn2NiMo B 42 H5 |

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| CE |
|---|
| + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Mo |
|---|---|---|---|---|---|---|---|
| 0.065 | 1.85 | 0.35 | ≤0.02 | ≤0.012 | <0.2 | 2.6 | 0.4 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -60°C |
|---|---|---|---|---|---|
| AWS A5.5 | AW or PWHT** | ≥670 | ≥760 | ≥15 | not specified |
| EN ISO 18275-A | AW | ≥690 | 760-960 | ≥17 | ≥47 |
| Typical values | AW | ≥690 | 770-940 | ≥20 | ≥80 |

*AW: As-welded; PWHT: Postweld Heat Treatment

**PWHT: In accordance with the agreement between the purchaser and the supplier.

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-90 |
| 3.2 x 350 | 85-145 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 105 | 1.7 | W000380842 |
| 3.2 x 350 | VPMD | 60 | 2.1 | W000380278 |

# SAFER NF 59

**TOP FEATURES**
- Very low diffusible hydrogen content
- High impact toughness down to - 50°C and CTOD tested.
- DC welding current.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.5 | E8018-G H4 |
| EN ISO 2560-A | E 50 6 Mn1Ni B 42 H5 |

**CURRENT TYPE**
DC+

**WELDING POSITIONS**
All position, except vertical down

**APPROVALS**

| CE |
|---|
| + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Ni |
|---|---|---|---|---|---|
| 0.06 | 1.6 | 0.3 | ≤0.020 | ≤0.015 | 0.75 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20°C | -60°C |
| AWS A5.5 | AW | ≥460 | ≥550 | ≥19 | not specified | not specified |
| AWS A5.5 | PWHT** | ≥460 | ≥550 | ≥19 | not specified | not specified |
| EN ISO 2560-A | AW | ≥500 | 560-720 | ≥18 | | ≥47 |
| Typical values | AW | ≥510 | 590-680 | ≥24 | ≥150 | ≥80 |
| Typical values | PWHT 580°C x 1,5h | ≥510 | 590-680 | ≥24 | ≥150 | ≥80 |

*AW: As-welded, PWHT: Post Weld Heat Treatment
**PWHT: In accordance with the agreement between the purchaser and the supplier.

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-90 |
| 3.2 x 350 | 95-130 |
| 4.0 x 450 | 130-180 |
| 5.0 x 450 | 170-230 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 87 | 2.0 | W100380224 |
| 3.2 x 350 | VPMC | 21 | 0.8 | W100382959 |
| | VPMD | 54 | 2.0 | W100380225 |
| 4.0 x 450 | VPMD | 37 | 2.5 | W100380226 |
| 5.0 x 450 | VPMD | 24 | 2.5 | W100380811 |

# NIBAZ 65

**TOP FEATURES**

- Stable arc; the slag is easy to remove
- Very low hydrogen content- max.4ml/100g weld metal
- Weld metal recovery: RE =113%.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.5 | E8018-G H4 |
| EN ISO 2560-A | E 50 6 Mn1Ni B 42 H5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| LR | BV | DNV | TÜV | CE |
|---|---|---|---|---|
| + | + | + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Ni |
|---|---|---|---|---|---|
| 0.055 | 1.2 | 0.5 | ≤0.020 | ≤0.015 | 1.0 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -60°C |
|---|---|---|---|---|---|
| AWS A5.5 | AW | ≥460 | ≥550 | ≥19 | not specified |
| AWS A5.5 | PWHT 620°C/1h | ≥460 | ≥550 | ≥19 | not specified |
| EN ISO 2560-A | AW | ≥500 | 560-720 | ≥18 | ≥47 |
| EN ISO 2560-A | PWHT 620°C/1h | ≥500 | 560-720 | ≥18 | ≥47 |
| Typical values | AW | ≥500 | 600-720 | ≥22 | ≥47 |
| Typical values | PWHT 620°C/1h | ≥460 | 550-720 | ≥22 | ≥47 |

*AW: As-welded; PWHT: Postweld Heat Treatment

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-90 |
| 3.2 x 350 | 130-150 |
| 3.2 x 450 | 130-150 |
| 4.0 x 450 | 160-190 |
| 5.0 x 450 | 200-250 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 87 | 2.0 | W000401662 |
| | CBOX | 176 | 4.0 | W000288561 |
| 3.2 x 350 | VPMD | 54 | 2.0 | W000401663 |
| 3.2 x 450 | CBOX | 118 | 5.5 | W000380829 |
| 4.0 x 450 | VPMD | 37 | 2.5 | W000400333 |
| | CBOX | 81 | 5.5 | W000288564 |
| 5.0 x 450 | CBOX | 53 | 5.5 | W000288565 |

# SUPERBAZ 65

**TOP FEATURES**

- The diffusible hydrogen content of metal places the electrode in class A, very low hydrogen content- max.5ml/100g weld metal.
- Excellent operability.
- 100% efficiency.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.5 | E8018-G H4 |
| EN ISO 2560-A | E 50 6 Mn1Ni B 42 H5 |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Ni |
|---|---|---|---|---|---|
| 0.055 | 1.2 | 0.5 | ≤0.020 | ≤0.015 | 1.0 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -60°C |
|---|---|---|---|---|---|
| AWS A5.5 | AW | ≥460 | ≥550 | ≥19 | not specified |
| AWS A5.5 | PWHT 620°C/1h | ≥460 | ≥550 | ≥19 | not specified |
| EN ISO 2560-A | AW | ≥500 | 560-720 | ≥18 | ≥47 |
| EN ISO 2560-A | PWHT 620°C/1h | ≥500 | 560-720 | ≥18 | ≥47 |
| Typical values | AW | ≥500 | 600-720 | ≥22 | ≥47 |
| Typical values | PWHT 620°C/1h | ≥460 | 550-720 | ≥22 | ≥47 |

*AW: As-welded; PWHT: Postweld Heat Treatment

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 65-90 |
| 3.2 x 350 | 130-150 |
| 4.0 x 450 | 160-190 |
| 5.0 x 450 | 200-250 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 87 | 2.0 | W000400348 |
| 3.2 x 350 | VPMD | 54 | 2.0 | W000400349 |
| 4.0 x 450 | VPMD | 37 | 2.5 | W000400351 |
| 5.0 x 450 | VPMD | 24 | 2.5 | W000404402 |

# MOLIBAZ

**TOP FEATURES**

- Excellent operability in all position welding except downhill.
- Stable arc with excellent bead shape and low spatter.
- Efficiency about 120%.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.5 | E7018-A1 H4 |
| EN ISO 3580-A | E Mo B 42 H5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| TÜV | CE |
|---|---|
| + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Mo |
|---|---|---|---|---|---|
| ≤0.06 | 0.8 | 0.4 | ≤0.020 | ≤0.015 | 0.55 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20°C | -20°C |
| AWS A5.5 | AW | ≥390 | ≥490 | ≥22 | | not specified |
| AWS A5.5 | PWHT 620°C/1h | ≥390 | ≥490 | ≥22 | | not specified |
| EN ISO 3580-A | AW | ≥355 | ≥510 | ≥22 | | ≥47 |
| EN ISO 3580-A | PWHT 620°C/1h | ≥355 | ≥510 | ≥22 | | ≥47 |
| Typical values | AW | ≥460 | 530-610 | ≥24 | | ≥47 |
| Typical values | PWHT 620°C/1h | ≥430 | 510-610 | ≥24 | | ≥47 |

*AW: As-welded; PWHT: Postweld Heat Treatment

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 60-90 |
| 3.2 x 450 | 110-135 |
| 4.0 x 450 | 140-190 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 87 | 2.0 | W000384493 |
| 3.2 x 450 | VPMD | 54 | 2.5 | W000384494 |
| 4.0 x 450 | VPMD | 37 | 2.5 | W000384496 |

# CROMOBAZ

**TOP FEATURES**

- Excellent operability in all position welding except downhill
- Stable arc with excellent bead shape
- Efficiency 120%.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.5 | E8018-B2 H4 |
| EN ISO 3580-A | E CrMo1 B 42 H5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| TÜV | CE |
|---|---|
| + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Mo |
|---|---|---|---|---|---|---|
| 0.065 | 0.9 | 0.45 | ≤0.015 | ≤0.010 | 1.30 | 0.50 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.5 | PWHT 690°C x 1h | ≥460 | ≥550 | ≥19 | not specified |
| EN ISO 3580-A | PWHT 690°C x 1h | ≥355 | ≥510 | ≥20 | ≥47 |
| Typical values | PWHT 690°C x 1h | ≥460 | 550-690 | ≥20 | ≥60 |

* PWHT: Postweld Heat Treatment

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 60-90 |
| 3.2 x 450 | 110-135 |
| 4.0 x 450 | 140-190 |
| 5.0 x 450 | 200-240 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 87 | 2.0 | W000384498 |
| 3.2 x 450 | VPMD | 53 | 2.5 | W000384499 |
| 4.0 x 450 | VPMD | 37 | 2.5 | W000384500 |
| 5.0 x 450 | VPMD | 25 | 2.5 | W000384501 |

# SAFINOX R 308L

**TOP FEATURES**
- Suitable for use with either AC [minimum OCV 50V] or DC positive.
- Easy arc striking and restriking.
- Efficiency 100%.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.4 | E308L-17 |
| EN ISO 3581-A | E 19 9 L R 12 |

**CURRENT TYPE**
AC, DC+

**WELDING POSITIONS**
All positions

**APPROVALS**

| ABS | BV | DNV | TÜV | DB | CE |
|---|---|---|---|---|---|
| + | + | + | + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Ferrite |
|---|---|---|---|---|---|---|---|
| 0.025 | 0.9 | 0.8 | ≤0.030 | ≤0.025 | 19.8 | 9.5 | 5-10 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥520 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥320 | ≥510 | ≥30 | not specified |
| Typical values | AW | ≥320 | ≥520 | ≥35 | ≥60 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.0 x 300 | 30-60 |
| 2.5 x 300 | 55-80 |
| 3.2 x 350 | 70-110 |
| 4.0 x 350 | 120-140 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.0 x 300 | VPMD | 150 | 1.7 | W000288732 |
| | CBOX | 310 | 3.5 | W000288726 |
| 2.5 x 300 | VPMD | 90 | 1.7 | W000288733 |
| | CBOX | 190 | 3.6 | W000288727 |
| 3.2 x 350 | CBOX | 120 | 4.2 | W000288729 |
| 4.0 x 350 | CBOX | 80 | 4.2 | W000288730 |

# SAFINOX R 309L

**TOP FEATURES**

- Easy arc striking and restriking.
- Suitable for use with either AC [minimum OCV 50V] or DC positive.
- Efficiency 100%.

**CLASSIFICATION**

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

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All positions

**APPROVALS**

| ABS | LR | BV | DNV | TÜV | DB | CE |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Ferrite |
|---|---|---|---|---|---|---|---|
| ≤0.040 | 0.9 | 0.9 | ≤0.025 | ≤0.025 | 23.5 | 12.2 | 5-20 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥520 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥320 | ≥510 | ≥25 | not specified |
| Typical values | AW | ≥320 | ≥520 | ≥35 | ≥60 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 300 | 55-80 |
| 3.2 x 350 | 70-110 |
| 5.0 x 350 | 145-180 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | 90 | 1.8 | W000288841 |
| | CBOX | 200 | 3.9 | W000288838 |
| 3.2 x 350 | VPMD | 55 | 2.0 | W000288842 |
| | CBOX | 120 | 4.3 | W000288839 |
| 5.0 x 350 | CBOX | 50 | 4.3 | W000375921 |

# SAFINOX R 316L

**TOP FEATURES**

- Suitable for use with either AC [minimum OCV 50V] or DC positive.
- Easy arc striking and restriking.
- Efficiency 100%.

**CLASSIFICATION**

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

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All positions

**APPROVALS**

| ABS | LR | BV | DNV | RINA | TÜV | DB | CE |
|---|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Mo | Ferrite |
|---|---|---|---|---|---|---|---|---|
| 0.035 | 0.9 | 0.8 | ≤0.025 | ≤0.025 | 19.0 | 12.0 | 2.6 | 5-10 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥490 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥320 | ≥510 | ≥25 | not specified |
| Typical values | AW | ≥350 | ≥510 | ≥30 | ≥50 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 1.6 x 300 | 20-40 |
| 2.0 x 300 | 30-60 |
| 2.5 x 300 | 55-80 |
| 3.2 x 350 | 70-110 |
| 4.0 x 350 | 120-140 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 1.6 x 300 | VPMD | 250 | 1.8 | W000375898 |
| 2.0 x 300 | VPMD | 150 | 1.7 | W000288796 |
| | CBOX | 310 | 3.6 | W000288791 |
| 2.5 x 300 | VPMD | 90 | 1.7 | W000288797 |
| | CBOX | 190 | 3.5 | W000288792 |
| 3.2 x 350 | VPMD | 55 | 2.0 | W000288798 |
| | CBOX | 120 | 4.3 | W000288793 |
| 4.0 x 350 | CBOX | 80 | 4.2 | W000288794 |

# STARINOX 308L

**TOP FEATURES**

- Excellent operability and is particularly suitable for downhand butt and fillet welding applications, the 2.5mm and 3.2mm diameter electrodes can be used for positional welding.
- Combines a stable spray arc transfer resulting in excellent weld bead shape and appearance with a slight concave profile in horizontal vertical fillet welds. There is very little spatter and in combination with the self-releasing slag, post welding cleaning time is maintained to a minimum.
- Under wet corrosive conditions suitable for operating temperatures up to 350°C, resistant to scaling up to 800°C.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.4 | E308L-16 |
| EN ISO 3581-A | E 19 9 L R 12 |

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All positions



**APPROVALS**

| ABS | BV | DNV | TÜV | DB | CE |
|---|---|---|---|---|---|
| + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Ferrite |
|---|---|---|---|---|---|---|---|
| 0.025 | 0.9 | 0.8 | ≤0.030 | ≤0.025 | 19.8 | 9.5 | 5-10 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥520 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥320 | ≥510 | ≥30 | not specified |
| Typical values | AW | ≥320 | ≥520 | ≥35 | ≥60 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.0 x 300 | 30-60 |
| 2.5 x 300 | 55-80 |
| 3.2 x 350 | 70-110 |
| 4.0 x 350 | 120-140 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.0 x 300 | VPMD | 150 | 1.7 | W000288719 |
| 2.5 x 300 | VPMD | 90 | 1.7 | W000288720 |
| 3.2 x 350 | VPMD | 55 | 1.9 | W000288722 |
| 4.0 x 350 | VPMD | 40 | 2.1 | W000288723 |

# STARINOX 309L

**TOP FEATURES**

- Excellent operability and is particularly suitable for downhand butt and fillet welding applications, the 2.5mm and 3.2mm diameter electrodes can be used for positional welding.
- Combines a stable spray arc transfer resulting in excellent weld bead shape and appearance with a slight concave profile in horizontal vertical fillet welds. There is very little spatter and in combination with the self-releasing slag, post welding cleaning time is maintained to a minimum.
- Suitable for use with either AC [minimum OCV 50V] or DC positive.

**CLASSIFICATION**

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

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All positions



**APPROVALS**

| ABS | LR | BV | DNV | TÜV | DB | CE |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Ferrite |
|---|---|---|---|---|---|---|---|
| ≤0.040 | 0.9 | 0.9 | ≤0.025 | ≤0.025 | 23.5 | 12.2 | 5-20 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥520 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥320 | ≥510 | ≥30 | not specified |
| Typical values | AW | ≥320 | ≥520 | ≥35 | ≥60 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 300 | 55-80 |
| 3.2 x 350 | 70-110 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | 90 | 1.8 | W000375910 |
| 3.2 x 350 | VPMD | 55 | 2.0 | W000375913 |

# STARINOX 316L

**TOP FEATURES**

- Excellent operability and is particularly suitable for downhand butt and fillet welding applications, the 2.5mm and 3.2mm diameter electrodes can be used for positional welding.
- Combines a stable spray arc transfer resulting in excellent weld bead shape and appearance with a slight concave profile in horizontal vertical fillet welds. There is very little spatter and in combination with the self-releasing slag, post welding cleaning time is maintained to a minimum.
- Suitable for use with either AC [minimum OCV 50V] or DC positive.

**CLASSIFICATION**

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

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All positions



**APPROVALS**

| ABS | LR | BV | DNV | RINA | TÜV | DB | CE |
|---|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Mo | Ferrite |
|---|---|---|---|---|---|---|---|---|
| 0.035 | 0.9 | 0.8 | ≤0.025 | ≤0.025 | 19.0 | 12.0 | 2.6 | 5-10 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥490 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥320 | ≥510 | ≥25 | not specified |
| Typical values | AW | ≥350 | ≥510 | ≥30 | ≥50 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.0 x 300 | 30-60 |
| 2.5 x 300 | 55-80 |
| 3.2 x 350 | 70-110 |
| 4.0 x 350 | 120-140 |
| 5.0 x 350 | 145-180 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.0 x 300 | VPMD | 150 | 1.7 | W000288785 |
| 2.5 x 300 | VPMD | 90 | 1.7 | W000288786 |
| 3.2 x 350 | VPMD | 55 | 2.0 | W000288788 |
| 4.0 x 350 | VPMD | 40 | 2.1 | W000288789 |
| 5.0 x 350 | VPMD | 20 | 1.7 | W000288790 |

# STARINOX 307

**TOP FEATURES**

- The weld metal is highly crack-resistant and non-scaling < 850 °C.
- The hardness of the all-weld metal is 180 HB which works hardens up to 300 HB under impact loads.
- Stainless, fully austenitic chromium-nickel-manganese weld metal, small amounts of delta ferrite are possible.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.4 | E307-16* |
| EN ISO 3581-A | E 18 8 Mn R 12 E Fe10 |

* Nearest classification

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All positions



**APPROVALS**

| CE |
|---|
| + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Ni |
|---|---|---|---|---|
| 0.12 | 5 | 1 | 18 | 9 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20 °C | Hardness | |
|---|---|---|---|---|---|---|---|
| | | | | | | HRc | HB |
| AWS A5.4 | AW | not specified | ≥590 | ≥30 | not specified | not specified | not specified |
| EN ISO 3581-A | AW | ≥350 | ≥500 | ≥25 | not specified | not specified | not specified |
| EN 14700 | AW | not specified | not specified | not specified | not specified | 180-200 | 38-42 |
| Typical values | AW | ≥420 | ≥500 | ≥30 | ≥47 | not specified | not specified |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 300 | 80-130 |
| 4.0 x 350 | 120-160 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 300 | VPMD | 60 | 1.6 | W000380168 |
| 4.0 x 350 | VPMD | 40 | 2.0 | W000380155 |

# STARINOX 312

**TOP FEATURES**

- The microstructure of the higher strength weld metal consists of ferritic-austenitic Cr-Ni steel, with ~30% delta-ferrite, and is highly crack resistant, rust-proof and non-scaling <1100°C.
- Very good weldability, weld metal transfer is in fine droplets with easy slag removal.
- Very good weld bead shape.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.4 | E312-16* |
| EN ISO 3581-A | E Z (29 9) R 12 |

* Nearest classification

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| DB | CE |
|---|---|
| + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Ni | Ferrite |
|---|---|---|---|---|---|
| 0.08 | 1 | 1.2 | 28 | 12 | 25-50 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C | Hardness (HB) |
|---|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥660 | ≥22 | not specified | not specified |
| EN ISO 3581-A | AW | not specified | ≥660 | ≥15 | not specified | not specified |
| Typical values | AW | ≥450 | ≥650 | ≥20 | ≥30 | 220 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 350 | 75-115 |
| 4.0 x 350 | 90-140 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 90 | 1.9 | W100258738 |
| 3.2 x 350 | VPMD | 58 | 2.0 | W100258739 |
| 4.0 x 350 | VPMD | 40 | 1.9 | W100258740 |

# STARINOX 312 P

### TOP FEATURES

- The microstructure of the higher strength weld metal consists of ferritic-austenitic Cr-Ni steel, with ~30% delta-ferrite, and is highly crack resistant, rust-proof and non-scaling <1100°C.
- Specially designed for all welding positions.
- Good compromise between weldability, bead appearance and mechanical characteristics.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.4 | E312-16* |
| EN ISO 3581-A | E Z (29 9) R 12 |

* Nearest classification

### CURRENT TYPE

AC, DC+

### WELDING POSITIONS

All position, except vertical down



### APPROVALS

| CE |
|---|
| + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S | Cr | Ni | Ferrite |
|---|---|---|---|---|---|---|---|
| 0.1 | 1.8 | 0.7 | ≤0.030 | ≤0.015 | 29 | 12 | 25 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C | Hardness (HB) |
|---|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥660 | ≥22 | not specified | not specified |
| EN ISO 3581-A | AW | not specified | ≥660 | ≥15 | not specified | not specified |
| Typical values | AW | ≥450 | ≥650 | ≥20 | ≥30 | 220 |

*AW: As-welded

### OUTPUT RANGE

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 350 | 70-100 |

### PACKAGING AND AVAILABLE SIZES

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 350 | VPMD | 65 | 2.1 | W000258731 |

# STARINOX 310

**TOP FEATURES**

- Fully austenitic microstructure containing 25%Cr and 20%Ni, non-scaling <1150°C, but not resistant to sulphurous gases.
- Excellent weldability, with a spatter free arc and self-releasing slag, combined with a very smooth bead appearance
- Very smooth bead appearance

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.4 | E310-16 |
| EN ISO 3581-A | E 25 20 R 12 |

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| CE |
|---|
| + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Ni |
|---|---|---|---|---|
| 0.1 | 1.7 | 0.6 | 27 | 21 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥550 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥350 | ≥550 | ≥20 | not specified |
| Typical values | AW | ≥350 | ≥550 | ≥30 | ≥60 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 300 | 50-90 |
| 3.2 x 350 | 80-110 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | 100 | 2.1 | W100258707 |
| 3.2 x 350 | VPMD | 60 | 2.0 | W100258708 |

# STARINOX B 310

**TOP FEATURES**

- Fully austenitic weld metal containing 25%Cr and 20%Ni.
- Particularly suitable for positional welding.
- Typical applications are in fluidised bed combustors, kilns, radiant tubes, tube hangers for petroleum refining and steam boilers, burners and combustion chambers.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.4 | E310-15 |
| EN ISO 3581-A | E 25 20 B 22 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All position, except vertical down

**APPROVALS**

| CE |
|---|
| + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni |
|---|---|---|---|---|---|---|
| 0.09 | 2.0 | 0.7 | ≤0.03 | ≤0.02 | 26 | 20 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥550 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥350 | ≥550 | ≥20 | not specified |
| Typical values | AW | ≥400 | ≥550 | ≥30 | ≥60 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 300 | 50-80 |
| 3.2 x 350 | 70-110 |
| 4.0 x 350 | 110-140 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | 95 | 1.8 | W000288874 |
| 3.2 x 350 | VPMD | 60 | 2.1 | W000288875 |
| 4.0 x 350 | VPMD | 40 | 2.1 | W000288876 |

# STARINOX 310Mo

### TOP FEATURES

- Suitable for the welding of AISI 310, of heat resisting castings, Type 316 clad steels, or for the overlay of carbon steels, cladding of refractory austenitic steels of grades 25% Cr 20% Ni with or without molybdenum. It is used extensively for overlaying digesters in the pulp and paper industry.
- Also used for welding other molybdenum bearing stainless steels to mild or carbon steel.
- Higher resistance to hot cracking than STARINOX 310 due to the addition of molybdenum and a reduction in carbon limit. This electrode is not recommended for multi-run welding when a highly ductile weld deposit is required.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.4 | E310Mo-16 |
| EN ISO 3581-A | 310Mo* |

* Nearest classification

### CURRENT TYPE

DC+

### WELDING POSITIONS

All position, except vertical down



### APPROVALS

CE

+

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S | Cr | Ni | Mo |
|---|---|---|---|---|---|---|---|
| 0.1 | 1.5 | 0.7 | ≤0.030 | ≤0.015 | 26 | 21 | 2.5 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥550 | ≥30 | not specified |
| EN ISO 3581-A | AW | not specified | ≥550 | ≥28 | not specified |
| Typical values | AW | ≥350 | ≥550 | ≥30 | ≥60 |

*AW: As-welded

### OUTPUT RANGE

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 300 | 50-70 |
| 3.2 x 350 | 70-100 |

### PACKAGING AND AVAILABLE SIZES

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | TBD | 0.0 | W100258716 |
| 3.2 x 350 | VPMD | TBD | 0.0 | W100258717 |

# LEXAL E 22 9 3N

**TOP FEATURES**
- Weld metal transfer is in fine droplets, good fusion of the joint faces.
- Easy slag removal and finely rippled bead surface.
- Maximum operating temperature <250°C.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.4 | E2209-16* |
| EN ISO 3581-A | E (22 9 3 N L) R 12 |

* Nearest classification

**CURRENT TYPE**
AC, DC+

**WELDING POSITIONS**
All position, except vertical down



**APPROVALS**

| DNV | CE |
|---|---|
| + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Ni | Mo | N | Ferrite |
|---|---|---|---|---|---|---|---|
| ≤0.030 | 1 | 1 | 22.5 | 9 | 3.2 | 0.15 | 35-50 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20°C | -40°C |
| AWS A5.4 | AW | not specified | ≥690 | ≥20 | not specified | not specified |
| EN ISO 3581-A | AW | not specified | ≥690 | ≥15 | not specified | not specified |
| Typical values | AW | ≥550 | ≥690 | ≥20 | ≥50 | ≥32 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 350 | 80-110 |
| 4.0 x 350 | 80-150 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 350 | VPMD | 55 | 1.9 | W100380228 |
| 4.0 x 350 | VPMD | 41 | 2.1 | W100380229 |

# SKYNOX E 308L

**TOP FEATURES**

- Excellent striking and re-striking.
- Arc transfer is more stable and concentrated thanks to the double coated technology, with good wetting of the joint faces, finely-rippled bead surface, easy slag removal.
- Very good wetting of the joint faces, finely-rippled bead surface, easy slag removal.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.4 | E308L-17 |
| EN ISO 3581-A | E 19 9 L R 12 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

Flat/Horizontal

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Ferrite |
|---|---|---|---|---|---|---|---|
| 0.03 | 0.8 | 1 | 0.025 | 0.01 | 19.5 | 10 | 5-10 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥520 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥320 | ≥510 | ≥30 | not specified |
| Typical values | AW | ≥420 | ≥520 | ≥35 | ≥50 |

*AW: As-welded

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | 90 | 1.7 | W000387163 |
| 3.2 x 350 | VPMD | 55 | 1.9 | W000387164 |
| 4.0 x 350 | VPMD | 40 | 2.1 | W000387165 |
| 5.0 x 350 | VPMD | 20 | 1.6 | W000387166 |

# SKYNOX E 309L

**TOP FEATURES**

- Excellent striking and re-striking.
- Arc transfer is more stable and concentrated thanks to the double coated technology.
- Good wetting of the joint faces, finely-rippled bead surface, easy slag removal.

**CLASSIFICATION**

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

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

Flat/Horizontal



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Ferrite |
|---|---|---|---|---|---|---|---|
| 0.03 | 0.9 | 1 | 0.025 | 0.01 | 24 | 13 | 8-15 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥520 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥320 | ≥510 | ≥25 | not specified |
| Typical values | AW | ≥420 | ≥520 | ≥35 | ≥50 |

*AW: As-welded

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | 90 | 1.8 | W000387167 |
| 3.2 x 350 | VPMD | 55 | 2.0 | W000387168 |
| 4.0 x 350 | VPMD | 40 | 2.2 | W000387169 |
| 5.0 x 350 | VPMD | 20 | 1.7 | W000387170 |

# SKYNOX E 316L

**TOP FEATURES**
- Suitable for root pass
- Lower porosity, good striking and restriking
- Excellent slag removal

**CLASSIFICATION**

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

**CURRENT TYPE**
DC+

**WELDING POSITIONS**
Flat/Horizontal

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Mo | Ferrite |
|---|---|---|---|---|---|---|---|---|
| 0.03 | 0.8 | 1 | 0.025 | 0.01 | 19.5 | 11.5 | 2.7 | 5-10 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AWS A5.4 | AW | not specified | ≥490 | ≥30 | not specified |
| EN ISO 3581-A | AW | ≥320 | ≥510 | ≥25 | not specified |
| Typical values | AW | ≥450 | ≥510 | ≥35 | ≥50 |

*AW: As-welded

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | 90 | 1.7 | W000387171 |
| 3.2 x 350 | VPMD | 55 | 2.0 | W000387172 |
| 4.0 x 350 | VPMD | 40 | 2.1 | W000387173 |
| 5.0 x 350 | VPMD | 20 | 1.7 | W000387174 |

# ALIN 92

**TOP FEATURES**

- MMA electrode with a basic flux system on a nearly matching core wire designed to give radiographically sound weld metal.
- Good weldability in all position including pipework in the ASME 5G/6G positions.
- Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.11 | ENiCrFe-2 |
| EN ISO 14172-A | E Ni 6133 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All positions

**APPROVALS**

| ABS | BV | CE |
|---|---|---|
| + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Cr | Ni | Mo | Nb | Fe | Cu | Co* | Ta* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.05 | 2.8 | 0.5 | 0.01 | 0.01 | 16 | bal. | 1.5 | 2 | 8 | 0.05 | 0.05 | 0.05 |

* Co and Ta maximums only when specified at time of order.

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | | Impact ISO-V (J) -196°C |
|---|---|---|---|---|---|---|
| | | | | 4d | 5d | |
| AWS A5.11 | AW | not specified | ≥550 | ≥30 | not specified | not specified |
| EN ISO 14172-A | AW | ≥360 | ≥550 | not specified | ≥27 | not specified |
| Typical values | AW | ≥420 | ~700 | ≥42 | ≥39 | 110 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 300 | 50-70 |
| 3.2 x 350 | 70-95 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 300 | VPMD | 105 | 1.9 | W100258751 |
| 3.2 x 350 | VPMD | 65 | 1.9 | W100258752 |

# ALCORD 5Si (SF)

**TOP FEATURES**

- This MMA electrode is also well suited for oxy-acetylene welding.
- Slag residues are corrosive and must be completely removed from the weld bead.
- The coating is highly hygroscopic, consequently electrodes must be stored in an absolutely dry location, or redried if required.
- Shall be used in DC+ current.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.3 | EI-Al 99.8 |
| DIN 1732 | EI-AlSi 5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

Flat/Horizontal

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| Si | Fe | Cu | Mn | Mg | Zn | Al |
|---|---|---|---|---|---|---|
| 4.5 | ≤0.8 | ≤0.3 | ≤0.05 | ≤0.05 | ≤0.1 | bal. |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation |
|---|---|---|---|---|
| AWS A5.3 | AW | not specified | ≥95 | not specified |
| EN ISO 18273 | AW | not specified | not specified | not specified |
| Typical values | AW | ≥90 | ≥160 | ≥15 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 60-90 |
| 3.2 x 350 | 80-110 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | PE Tube | TBD | 2.0 | W000289025 |
| 3.2 x 350 | PE Tube | TBD | 2.0 | W000289026 |

# ALCORD Al

**TOP FEATURES**

- This electrode is also well suited for oxy-acetylene welding.
- Slag residues are corrosive and must be completely removed from the weld bead.
- The coating is highly hygroscopic, consequently electrodes must be stored in an absolutely dry location, or redried if required.
- Shall be used in DC+ current.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.3 | ~ E1100 |
| DIN 1732 | EI-Al 99.8 |

* Nearest classification

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

Flat/Horizontal



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| Si+Fe | Cu | Mn | Al |
|---|---|---|---|
| ≤0.95 | 0.05-0.2 | ≤0.05 | ≥99 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation |
|---|---|---|---|---|
| AWS A5.3 | AW | not specified | ≥80 | not specified |
| EN ISO 18273 | AW | not specified | not specified | not specified |
| Typical values | AW | ≥30 | ≥80 | ≥30 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 60-90 |
| 3.2 x 350 | 80-110 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | PE Tube | TBD | 2.0 | W000289029 |
| 3.2 x 350 | PE Tube | TBD | 2.0 | W000289030 |

# SAFER R 400

**TOP FEATURES**

- Weld metal hardness of ~240 - 290 HV1 0 in the as-welded condition, it can reach 400 HV after water-quenching. Deposit a maximum of 3 layers.
- Excellent weldability in all position except Vertical Down.
- Shall be used in DC- or AC mode.

**CLASSIFICATION**

EN 14700 E Fe1

**CURRENT TYPE**

AC, DC-

**WELDING POSITIONS**

All position, except vertical down

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Fe |
|---|---|---|---|---|
| 0.1 | 0.6 | 0.3 | 2.4 | bal. |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Hardness (HB) |
|---|---|---|
| EN ISO 14700 | AW | 150-450 |
| Typical values | AW | 240-290 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 450 | 100-135 |
| 4.0 x 450 | 120-170 |
| 5.0 x 450 | 150-220 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 450 | CBOX | 165 | 6.3 | W000258788 |
| 4.0 x 450 | CBOX | 120 | 6.8 | W000258789 |
| 5.0 x 450 | CBOX | 85 | 7.3 | W000258790 |

# SAFER B 400

**TOP FEATURES**

- Weld metal hardness~ 375-450HB can only be machined by using sintered hard metal tools.
- Excellent weldability in all position except Vertical Down and Overhead positions.
- Shall be used in DC+ or AC current.

**CLASSIFICATION**

EN 14700 E Fe1

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

Flat/Horizontal

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr |
|---|---|---|---|
| 0.21 | <0.9 | <0.45 | 1.9 |



**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Hardness (HB) |
|---|---|---|
| EN ISO 14700 | AW | 150-450 |
| Typical values | AW | 375-450 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 450 | 120-140 |
| 4.0 x 450 | 160-190 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 450 | CBOX | 117 | 5.5 | W000380871 |
| 4.0 x 450 | CBOX | 81 | 5.5 | W000380874 |

# SAFER R 600

**TOP FEATURES**

- Used for hardfacing carbon steels and low alloy steels against abrasion by mineral particles and medium impact and shock. Weld metal hardness ~550-650HV which can be ground. Very good resistance to moderate impacts.
- Preheating to 400°C is always necessary, particularly for large work pieces and deposit a maximum of 3 layers. When welding crack sensitive base materials a buffer layer is required using 307 type MMA electrode.
- Excellent weldability in all position except Vertical Down.

**CLASSIFICATION**

EN 14700 E Z (Fe2)

**CURRENT TYPE**

AC, DC-

**WELDING POSITIONS**

All position, except vertical down

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Fe |
|---|---|---|---|---|
| 0.6 | 1.1 | 1 | 2.8 | bal. |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Hardness (HRc) |
|---|---|---|
| EN ISO 14700 | AW | 30-58 |
| Typical values | AW | 52-57 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 450 | 85-125 |
| 4.0 x 450 | 100-150 |
| 5.0 x 450 | 150-210 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 450 | CBOX | 140 | 5.7 | W000258791 |
| 4.0 x 450 | CBOX | 95 | 5.9 | W000258792 |
| 5.0 x 450 | CBOX | 60 | 5.9 | W000258793 |

# SAFER B 600

**TOP FEATURES**
- Typical HRc 55-59
- Stable arc and very low spattering loss
- Slag is easy to remove

**CLASSIFICATION**

| | |
|---|---|
| EN 14700 | E Z (Fe2) |
| DIN 8555 | E 6-UM-60 |

**CURRENT TYPE**
DC+

**WELDING POSITIONS**
Flat/Horizontal



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Mo | Fe | V |
|---|---|---|---|---|---|---|
| 0.5 | 0.3 | 0.4 | 8 | 0.5 | bal. | 0.5 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Hardness HRc |
|---|---|---|
| EN ISO 14700 | AW | 30-58 |
| DIN 8555 | AW | 57-62 |
| Typical values | AW | 58 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 450 | 100-120 |
| 4.0 x 450 | 140-160 |
| 5.0 x 450 | 180-210 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 450 | CBOX | 113 | 5.5 | W000380858 |
| 4.0 x 450 | CBOX | 78 | 5.5 | W000380859 |
| 5.0 x 450 | CBOX | 49 | 5.5 | W000380861 |

# SAFDUR 800 E

**TOP FEATURES**
- The deposit is only machinable by grinding.
- Flat welding position only
- Shall be used in DC+ or AC mode.

**CLASSIFICATION**
EN 14700 E Fe16

**CURRENT TYPE**
AC, DC-

**WELDING POSITIONS**
Flat/Horizontal

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Mo | Nb | Fe | V | W |
|---|---|---|---|---|---|---|---|---|
| 5 | 1 | 1 | 24 | 5 | 6 | bal. | 1.2 | 2.5 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Hardness (HRc) |
|---|---|---|
| EN ISO 14700 | AW | 60-70 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 350 | 105-140 |
| 4.0 x 450 | 130-170 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 350 | CBOX | 90 | 4.5 | W000258794 |
| 4.0 x 450 | CBOX | 55 | 5.5 | W000258795 |

# SAFMANGA

**TOP FEATURES**
- MMA electrode for wear resisting hard facing deposits.
- Flat welding position only.
- Shall be used in DC+ current.

**CLASSIFICATION**

| | |
|---|---|
| EN 14700 | E Z (Fe9) |
| DIN 8555 | E 7-UM-200 KP |

**CURRENT TYPE**
AC, DC+

**WELDING POSITIONS**
Flat/Horizontal

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Cr | Ni | Fe |
|---|---|---|---|---|
| 0.60 | 15 | 4.50 | 4.80 | bal. |



**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Hardness | |
|---|---|---|---|
| | | (HRc) | (HB) |
| EN ISO 14700 | AW | 40-50 | 200-250 |
| Typical values | AW | 40-50 | 200-225 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 450 | 110-135 |
| 4.0 x 450 | 140-175 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 450 | CBOX | 135 | 6.0 | W000258786 |
| 4.0 x 450 | CBOX | 95 | 6.5 | W000258787 |

# SUPERSAFOR 60

**TOP FEATURES**

- Used for hardfacing carbon steels and low alloy steels against abrasion by mineral particles and but exhibits limited resistance to impact and shock, the deposit is only machinable by grinding.
- Smooth, regular weld beads are deposited with only minimum penetration.
- The hardness cracks which typically appear in this weld metal are not detrimental to resistance against mineral abrasion.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.1 | E6013 |
| EN 14700 | E Z (Fe14) |

**CURRENT TYPE**

AC, DC+

**WELDING POSITIONS**

Flat

**APPROVALS**

| ABS | LR | BV | DNV | TÜV |
|---|---|---|---|---|
| + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Fe |
|---|---|---|---|---|
| 4.30 | 1 | 1 | 34 | bal. |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Hardness HRc |
|---|---|---|
| EN ISO 14700 | AW | 40-60 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 450 | 120-150 |
| 4.0 x 450 | 140-190 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 450 | CBOX | 75 | 5.5 | W000258796 |
| 4.0 x 450 | CBOX | 45 | 4.7 | W000258797 |

# TOOLFRO

**TOP FEATURES**

- Good warm hardness and excellent service life.
- Weld metal hardness of ~58HRC in the as-welded condition, it can reach 65HRC after Quench an Temper.
- Weld metal can only be machined by grinding.

**CLASSIFICATION**

EN 14700 E Z (Fe2)

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

Flat/Horizontal

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Cr | Mo | Fe | V | W |
|---|---|---|---|---|---|---|
| 1.5 | 1 | 4 | 8 | bal. | 1.5 | 2.5 |



**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Hardness (HRc) |
|---|---|---|
| EN ISO 14700 | AW | 30-58 |
| Typical values | AW | 58 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 80-100 |
| 3.2 x 450 | 135-150 |
| 4.0 x 450 | 180-200 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | CBOX | 157 | 4.0 | W000380880 |
| 3.2 x 450 | CBOX | 99 | 5.2 | W000380883 |
| 4.0 x 450 | CBOX | 69 | 5.5 | W000380885 |

# STARCAST Ni

**TOP FEATURES**

- Easy arc striking, stable arc, finely-rippled bead surface, the weld metal is machinable.
- Weld using a low heat input and weld with short beads, ~10 to 30 mm and in order to reduce weld residual stresses, hammer-peen welds immediately after welding and before cooling.
- Welding on DC-, gives pulsed arc welding, deep penetration, smooth surface, no lack of fusion.
- Welding on AC, lowest heat input, important at filling

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.15 | ENi-CI |
| EN ISO 1071-A | E C Ni-CI 1 |

**CURRENT TYPE**

AC, DC-

**WELDING POSITIONS**

All position, except vertical down

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Fe | Ni |
|---|---|---|
| 0.7 | 2 | Rem |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | 0.2% Proof strength (MPa) | Tensile strength (MPa) | Elongation (%) | Hardness (HB) |
|---|---|---|---|---|---|
| AWS A5.15 | AW | 262-414 | 276–448 | 3-6 | 135–218 |
| EN ISO 1071-A | AW | ≥200 | ≥250 | ≥3 | not specified |
| Typical values | AW | 270 | 445 | 8 | 175 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 60-80 |
| 3.2 x 350 | 75-120 |
| 4.0 x 350 | 100-150 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 125 | 2.1 | W100258771 |
| 3.2 x 350 | VPMD | 83 | 2.6 | W100258772 |
| 4.0 x 350 | VPMD | 50 | 2.5 | W100258773 |

# STARCAST NiFe

**TOP FEATURES**
- Higher weld metal strength than STARCAST Ni
- Easy striking, stable arc, finely-rippled bead surface.
- Weld at low heat input with short beads, ~10 to 30 mm, and hammer peen
- Weld metal can be machined.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.15 | ENiFe-CI |
| EN ISO 1071-A | E C NiFe-CI 1 |

**CURRENT TYPE**
AC, DC-, DC+

**WELDING POSITIONS**
All position, except vertical down

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Ni | Fe |
|---|---|---|---|---|
| 1-2 | 0.8 | 0.8 | bal. | 43 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Hardness (HB) |
|---|---|---|---|---|---|
| AWS A5.15 | AW | 296–434 | 400–579 | 6–18 | 165–218 |
| EN ISO 1071-A | AW | ≥250 | ≥350 | ≥6 | not specified |
| Typical values | AW | ≥300 | 400-580 | ≥6 | ≥165 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 4.0 x 350 | 90-125 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.0 x 300 | VPMD | 130 | 2.1 | W100258777 |
| 3.2 x 300 | VPMD | 80 | 2.1 | W100258778 |
| 4.0 x 350 | VPMD | 49 | 2.4 | W100258779 |

# STARCAST BM

**TOP FEATURES**

- The bi-metal core wire gives excellent welding characteristics including positional welding. Higher weld metal strength than STARCAST Ni.
- Striking, stable arc, finely-rippled bead surface.
- Weld at low heat input and with short beads, ~10 to 30 mm, and hammer peen.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.15 | ENiFe-CI |
| EN ISO 1071-A | E C NiFe-CI 1 |

**CURRENT TYPE**

AC, DC-, DC+

**WELDING POSITIONS**

All positions

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Ni | Cu | Fe | Al |
|---|---|---|---|---|---|---|
| ≤1.5 | ≤0.8 | ≤0.8 | bal. | ≤1 | 45 | ≤0.7 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Hardness (HB) |
|---|---|---|---|---|---|
| AWS A5.15 | AW | 296–434 | 296–434 | 6–18 | 165–218 |
| EN ISO 1071-A | AW | ≥250 | ≥350 | ≥6 | not specified |
| Typical values | AW | ≥300 | 400-580 | ≥6 | 165-200 |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 2.5 x 350 | 50-70 |
| 3.2 x 350 | 80-110 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 2.5 x 350 | VPMD | 125 | 2.0 | W100383718 |
| 3.2 x 350 | VPMD | 83 | 2.6 | W100258784 |

# STARCAST NiCu

**TOP FEATURES**
- The weld metal is machinable
- Short beads technic is recommended in order to have the lowest heat input.
- Easy arc striking, stable arc, finely-rippled bead surface.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.15 | ENiCu-B |
| EN ISO 1071-A | E C NiCu-B 1 |

**CURRENT TYPE**
AC, DC-, DC+

**WELDING POSITIONS**
All position, except vertical down

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | S | Ni | Cu | Fe |
|---|---|---|---|---|---|---|
| 0.35-0.55 | ≤2.30 | ≤0.75 | ≤0.025 | 60-70 | 25-35 | 3-6 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Required | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -40°C |
|---|---|---|---|---|---|
| AWS A5.15 | AW | not specified | not specified | not specified | not specified |
| EN ISO 1071-A | AW | ≥190 | ≥300 | ≥15 | not specified |
| Typical values | AW | ≥190 | ≥300 | ≥15 | not specified |

*AW: As-welded

**OUTPUT RANGE**

| Diameter x Length (mm) | Current range (A) |
|---|---|
| 3.2 x 350 | 70-120 |
| 4.0 x 350 | 100-140 |

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Electrodes/pack | Net weight/pack (kg) | Item number |
|---|---|---|---|---|
| 3.2 x 350 | VPMD | 70 | 2.3 | W100289021 |
| 4.0 x 350 | VPMD | 48 | 2.4 | W100289022 |

GMAW & GTAW CONSUMABLES

# MIG/MAG & TIG WIRES

## MIG/MAG WIRES

### MILD STEEL



### LOW ALLOY STEEL



### STAINLESS STEEL



### COPPER ALLOYS



## TIG WIRES

### MILD STEEL



### STAINLESS STEEL



GMAW & GTAW CONSUMABLES MIG/MAG & TIGWIRES

# FILCORD

**TOP FEATURES**
- Used mainly for single pass welding and for steels that have a rusty or dirty surfaces.
- Stable arc and excellent feedability
- Excellent mechanical properties

**TYPICAL APPLICATIONS**
- General fabrication
- Heavy Fabrication
- Automotive

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.18 | ER70S-3 |
| EN ISO 14341-A | G 38 3 C1 2Si |
| | G 42 3 M21 2Si |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| C1 | Active gas 100% $CO_2$ |
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



**APPROVALS**

| DB | CE |
|---|---|
| + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.08 | 1.1 | 0.6 | ≤0.025 | ≤0.025 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) 0°C |
|---|---|---|---|---|---|
| M21 | AW | ≥420 | 480-550 | ≥22 | ≥90 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 0.8 | SPOOL (S200) | 5.0 | C08P005R1E22 |
| | SPOOL (S300) | 15.0 | C08P015S1E22 |
| | SPOOL (B300) | 16.0 | C08K016S1E22 |
| 1.0 | SPOOL (S300) | 15.0 | C10P015S1E22 |
| | SPOOL (B300) | 16.0 | C10K016S1E22 |
| | DRUM | 300.0 | C10D300E1E22 |
| 1.2 | SPOOL (S300) | 15.0 | C12P015S1E22 |
| | SPOOL (B300) | 16.0 | C12K016S1E22 |
| | SPOOL (BS300) | 16.0 | C12L016S1E22 |
| | DRUM | 300.0 | C12D300E1E22 |
| 1.6 | SPOOL (S300) | 15.0 | C16P015S1E22 |
| | DRUM | 250.0 | C16D250E1E22 |

# FILCORD C

### TOP FEATURES
- Good performances in terms of feedability and weldability
- Stable arc and low spatter
- High productivity

### TYPICAL APPLICATIONS
- General fabrication
- Heavy Fabrication
- Automotive
- Structural fabrication
- Robotics

### CLASSIFICATION

| | |
|---|---|
| AWS A5.18 | ER70S-6 |
| EN ISO 14341-A | G 42 3 C1 3Si1 |
| | G 42 4 M21 3Si1 |

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| C1 | Active gas 100% $CO_2$ |
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| M14 | Mixed gas Ar+ 0.5-5% $CO_2$+ 0,5-3% $O_2$ |



### APPROVALS

| ABS | DNV | TÜV | DB | CE |
|---|---|---|---|---|
| + | + | + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.08 | 1.5 | 0.9 | ≤0.025 | ≤0.025 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | +20°C | -30°C | -40°C |
| M21 | AW | ≥420 | 500-640 | ≥24 | ≥90 | ≥70 | ≥47 |
| C1 | AW | ≥420 | 500-640 | ≥22 | ≥70 | ≥47 | |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 0.6 | SPOOL (S200) | 5.0 | C06P005R6E22 |
| 0.8 | SPOOL (S200) | 5.0 | C08P005R6E22 |
| | SPOOL (S300) | 15.0 | C08P015S6E22 |
| | SPOOL (B300) | 16.0 | C08K016P6E22 |
| | DRUM | 300.0 | C08D300E6E22 |
| 1.0 | SPOOL (S200) | 5.0 | C10P005R6E22 |
| | SPOOL (S300) | 15.0 | C10P015S6E22 |
| | SPOOL (B300) | 16.0 | C10K016P6E22 |
| | SPOOL (BS300) | 16.0 | C10L016S6E22 |
| | DRUM | 300.0 | C10D300E6E22 |
| 1.2 | SPOOL (S300) | 15.0 | C12P015S6E22 |
| | SPOOL (B300) | 16.0 | C12K016P6E22 |
| | SPOOL (BS300) | 16.0 | C12L016S6E22 |
| | DRUM | 300.0 | C12D300E6E22 |
| 1.6 | SPOOL (B300) | 16.0 | C16K016P6E22 |

# FILCORD D

### TOP FEATURES
- Good performances in terms of feedability and weldability
- Stable arc and low spatter
- High productivity

### TYPICAL APPLICATIONS
- General fabrication
- Heavy Fabrication
- Automotive
- Structural fabrication
- Robotics

### CLASSIFICATION

| | |
|---|---|
| AWS A5.18 | ER70S-6 |
| EN ISO 14341-A | G 46 3 C1 4Si1 |
| | G 46 4 M21 4Si1 |

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| C1 | Active gas 100% $CO_2$ |
| M14 | Mixed gas Ar+ 0.5-5% $CO_2$+ 0,5-3% $O_2$ |
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



### APPROVALS

| ABS | TÜV | DB | CE |
|---|---|---|---|
| + | + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.07 | 1.7 | 0.9 | ≤0.025 | ≤0.025 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | +20°C | -30°C | -40°C |
| M21 | AW | ≥460 | 550-680 | ≥24 | ≥100 | ≥80 | ≥70 |
| C1 | AW | ≥460 | 550-680 | ≥24 | ≥80 | ≥47 | |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 0.8 | SPOOL (B300) | 16.0 | C08K016P3E22 |
| 1.0 | SPOOL (B300) | 16.0 | C10K016P3E22 |
| | DRUM | 300.0 | C10D300E3E22 |
| 1.2 | SPOOL (B300) | 16.0 | C12K016P3E22 |
| | DRUM | 300.0 | C12D300E3E22 |

# FILCORD 35

**TOP FEATURES**

- Used for welding low alloy creep resistant ferritic steels and fine grained steels
- Ideal for low temperature applications in the as welded condition with service temperatures in range -30°C to +500°C

**TYPICAL APPLICATIONS**

- Chemical plant construction
- Petrochemical

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.28 | ER70S-A1 |
| EN ISO 21952-A | G MoSi |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| C1 | Active gas 100% $CO_2$ |
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |

**APPROVALS**

| TÜV | DB | CE |
|---|---|---|
| + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Mo |
|---|---|---|---|---|---|
| 0.10 | 1.0 | 0.6 | ≤0.020 | ≤0.020 | 0.5 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Shielding gas | Condition | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20°C | -20°C |
| M21 | AW (*) | ≥480 | 515-620 | ≥22 | ≥100 | ≥47 |
| M21 | PWHT 580°C x 15h (**) | ≥380 | 480-560 | ≥19 | ≥100 | ≥47 |

* AW = As welded

** PWHT = Post welding heat treatment

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000282954 |

# FILCORD 48

**TOP FEATURES**

- The addition of Ni and Cu to the weld metal provides increased resistance to atmospheric corrosion compared to conventional C-Mn steels
- Copper percentage help preventing further oxidation of the weld bead
- Excellent mechanical characteristics and resistance to corrosion.

**TYPICAL APPLICATIONS**

- Infrastructures
- Transmission towers, barriers, ducting, chimneys
- Exhaust Systems

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.28 | ER80S-G |
| EN ISO 14341-A | G 42 3 C1 Z |
| | G 42 4 M21 Z |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| C1 | Active gas 100% $CO_2$ |
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



**APPROVALS**

| TÜV | CE |
|---|---|
| + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cr | Ni | Cu |
|---|---|---|---|---|---|---|---|
| 0.09 | 1.4 | 0.8 | ≤0.025 | ≤0.025 | 0.3 | 0.8 | 0.4 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|
| | | | | | +20°C | -30°C | -40°C |
| M21 | AW | ≥420 | 500-640 | ≥22 | ≥120 | ≥90 | >80 |
| C1 | AW | >420 | 500-640 | ≥22 | ≥100 | ≥47 | |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | S12K016PCE22 |

# FILCORD 58

### TOP FEATURES

- High resistance against corrosion, abrasion and impact deformation. Hardness approximately 55-60HRc
- Weld deposits can be used at service temperatures <450°C with a minimal loss of abrasion resistance. The as deposited weld metal can be shaped or profiled by grinding.
- Ferritic and martensitic structure

### TYPICAL APPLICATIONS

- Earthmoving equipment components such as excavator parts, bucket edges
- Hardfacing
- Repair

### CLASSIFICATION

| | |
|---|---|
| EN 14700 | S Fe 8 |

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M20 | Mixed gas Ar+ >5-15% $CO_2$ |
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| M24 | Mixed gas Ar+ >5-15% $CO_2$+ >0,5-3% $O_2$ |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE

| C | Mn | Si | Cr |
|---|---|---|---|
| 0.5 | 0.4 | 3 | 9.5 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Condition* | Hardness (HRc) |
|---|---|
| AW | 57-62 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (BS300) | 12.0 | W000283295 |

# FILCORD 80

### TOP FEATURES

- Suitable for applications in petrochemical process plant where some resistance to hot hydrogen attack is necessary
- Suitable for applications in petrochemical process plant where some resistance to hot hydrogen attack is necessary
- For welding 0.5% Mo low-alloy steels and for high strength steels.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.28 | ER80S-D2 |
| EN ISO 14341-A | G 50 4 M21 4Mo |

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M20 | Mixed gas Ar+ >5-15% $CO_2$ |
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |

### TYPICAL APPLICATIONS

- Chemical
- Petrochemical



### APPROVALS

| TÜV | CE |
|---|---|
| + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE

| C | Mn | Si | P | S | Mo |
|---|---|---|---|---|---|
| 0.09 | 1.80 | 0.60 | 0.010 | 0.010 | 0.40 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -40°C |
|---|---|---|---|---|---|
| M21 | AW | ≥600 | ≥690 | ≥20 | ≥58 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (B300) | 16.0 | S10K016PDE22 |
| 1.2 | SPOOL (B300) | 16.0 | S12K016PDE22 |
| | DRUM | 300.0 | S12D300EDE22 |

# FILCORD 90

**TOP FEATURES**
- The weld metal contains less than 1% Ni conforming to NACE requirement.
- For welding high yield strength steels.

**TYPICAL APPLICATIONS**
- Infrastructures
- Pipelaying
- Structural Steels

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.28 | ER100S-G |
| EN ISO 16834-A | G 62 4 M21 Mn3NiCrMo |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |

**APPROVALS**

| DB | CE |
|---|---|
| + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cr | Ni | Mo |
|---|---|---|---|---|---|---|---|
| 0.09 | 1.65 | 0.75 | 0.010 | 0.010 | 0.55 | 0.55 | 0.25 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -40°C |
|---|---|---|---|---|---|
| M21 | AW | ≥690 | ≥790 | ≥21 | ≥95 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (B300) | 16.0 | S10K016PZE22 |
| 1.2 | SPOOL (B300) | 16.0 | S12K016PZE22 |
| | DRUM | 300.0 | S12D300EZE22 |

# FILCORD 100

**TOP FEATURES**

- Excellent mechanical properties.
- For low temperature applications down to -40°C.
- Low heat inputs are recommended to obtain optimum joint mechanical properties.

**TYPICAL APPLICATIONS**

- Infrastructures
- Earthmoving
- Structural Steels
- Cranes

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.28 | ER110S-G |
| EN ISO 16834-A | G 69 4 M21 Mn3Ni1CrMo |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M20 | Mixed gas Ar+ >5-15% $CO_2$ |
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| M24 | Mixed gas Ar+ >5-15% $CO_2$+ >0,5-3% $O_2$ |
| M26 | Mixed gas Ar+ >15-25% $CO_2$+ >0,5-3% $O_2$ |



**APPROVALS**

| DB | CE |
|---|---|
| + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cr | Ni | Mo |
|---|---|---|---|---|---|---|---|
| 0.08 | 1.6 | 0.5 | ≤0.015 | ≤0.018 | 0.3 | 1.5 | 0.25 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -40°C |
|---|---|---|---|---|---|
| M21 | AW | ≥700 | ≥790 | ≥20 | ≥64 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (B300) | 16.0 | S10K016PVE22 |
| | DRUM | 300.0 | S10D300EVE22 |
| 1.2 | SPOOL (B300) | 16.0 | S12K016PVE22 |
| | DRUM | 300.0 | S12D300EVE22 |

# FILINOX 307

**TOP FEATURES**

- The increased silicon content promotes weld pool fluidity resulting in a smoother weld deposit.
- Useful in case of difficult weldability.
- Often used as a buffer layer for hardfacing applications

**TYPICAL APPLICATIONS**

- Hardenable steels
- Exhaust Systems
- Dissimilar joints
- Shipbuilding

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.9 | ER307 |
| EN ISO 14343-A | G 18 8 Mn |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M12 | Mixed gas Ar+ 0.5-5% $CO_2$ |
| M13 | Mixed gas Ar+ 0.5-3% $O_2$ |



**APPROVALS**

| TÜV | DB | CE |
|---|---|---|
| + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cr | Ni |
|---|---|---|---|---|---|---|
| 0.10 | 7 | 0.8 | ≤0.030 | ≤0.025 | 19 | 9 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20°C | -120°C |
| M12 | AW | ≥420 | ≥590 | ≥40 | ≥100 | >32 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (BS300) | 15.0 | W000283112 |
| 1.2 | SPOOL (BS300) | 15.0 | W000283113 |

# FILINOX 308LSI

### TOP FEATURES

- The low carbon reduces the propensity to intergranular carbide precipitation, which increases the resistance to intergranular corrosion without the use of stabilizers.
- The increased silicon content results in increased weld pool fluidity to give a smooth deposit appearance.
- Better weldability and appearance

### CLASSIFICATION

| | |
|---|---|
| AWS A5.9 | ER308LSi |
| EN ISO 14343-A | G 19 9 L Si |

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M12 | Mixed gas Ar+ 0.5-5% $CO_2$ |
| M13 | Mixed gas Ar+ 0.5-3% $O_2$ |

### TYPICAL APPLICATIONS

- Pipework
- Plates fabrication
- Vessel construction
- Cladding



### APPROVALS

| TÜV | DB | CE |
|---|---|---|
| + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE

| C | Mn | Si | P | S | Cr | Ni |
|---|---|---|---|---|---|---|
| 0.020 | 1.8 | 0.85 | ≤0.025 | ≤0.020 | 20 | 10 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | 20°C | -120°C |
| M13 | AW | ≥350 | ≥520 | ≥35 | ≥80 | ≥32 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 0.8 | SPOOL (BS300) | 15.0 | W000283021 |
| 1.0 | SPOOL (BS300) | 15.0 | W000283022 |
| 1.2 | SPOOL (BS300) | 15.0 | W000283023 |

# FILINOX 309LSI

### TOP FEATURES

- Also used for the welding of clad steels where service temperatures are below 300°C.
- The weld metal has a delta-ferrite content of ~12% resulting in a high resistance to hot cracking.
- The increased silicon content results in increased weld pool fluidity to give a smooth deposit appearance.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.9 | ER309LSi |
| EN ISO 14343-A | G 23 12 L Si |

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M12 | Mixed gas Ar+ 0.5-5% $CO_2$ |
| M13 | Mixed gas Ar+ 0.5-3% $O_2$ |

### TYPICAL APPLICATIONS

- General fabrication
- Transport
- Process Industries

### APPROVALS

| TÜV | DB | CE |
|---|---|---|
| + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE

| C | Mn | Si | P | S | Cr | Ni |
|---|---|---|---|---|---|---|
| 0.020 | 1.8 | 0.85 | ≤0.025 | ≤0.020 | 24 | 13 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20°C | -80°C |
| M13 | AW | ≥350 | ≥520 | ≥30 | ≥55 | ≥32 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (BS300) | 15.0 | W000283097 |
| 1.2 | SPOOL (BS300) | 15.0 | W000283098 |

# FILINOX 316LSI

### TOP FEATURES

- The higher Si level results in a smooth weld bead shape and even appearance with excellent toe blending particularly in fillet welds.
- The weld metal has a high resistance to pitting and crevice corrosion by non-oxidising acids.
- Used for applications with service temperatures <400°C.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.9 | ER316LSi |
| EN ISO 14343-A | G 19 12 3 L Si |

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M12 | Mixed gas Ar+ 0.5-5% $CO_2$ |
| M13 | Mixed gas Ar+ 0.5-3% $O_2$ |

### TYPICAL APPLICATIONS

- Pipework
- Plates fabrication
- Shipbuilding
- Cladding



### APPROVALS

| TÜV | DB | CE |
|---|---|---|
| + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE

| C | Mn | Si | P | S | Cr | Ni | Mo |
|---|---|---|---|---|---|---|---|
| 0.020 | 1.4 | 0.85 | ≤0.025 | ≤0.020 | 19 | 12.5 | 2.6 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|---|
| | | | | | | +20°C | -120°C |
| Typical values | M13 | AW | ≥350 | ≥510 | ≥30 | ≥80 | >32 |

* AW = As welded

Gas test: M13

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 0.8 | SPOOL (BS300) | 15.0 | W000283078 |
| 1.0 | SPOOL (BS300) | 15.0 | W000283079 |
| 1.2 | SPOOL (BS300) | 15.0 | W000283080 |

# FILCORD 46

**TOP FEATURES**

- Used for welding galvanized steel sheets and components in the automobile industry.
- It is an iron-free aluminum bronze, which composition offers a very high resistance to sea water-corrosion and to the most commonly used acids in any concentrations and at a wide range of operating temperatures.
- High erosion resistance.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.7 | ERCuAl-A1 |
| EN ISO 24373-A | S Cu 6100 (CuAl7) |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| I1 | Inert gas Ar (100%) |
| I3 | Inert gas Ar+ 0.5-95% He |

**TYPICAL APPLICATIONS**

- Automotive components
- Galvanized Steels

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| Mn | Si | Ni | Cu | Fe | Al |
|---|---|---|---|---|---|
| 0.2 | 0.1 | 0.7 | Rest | 0.4 | 8.0 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Shielding gas | Condition* | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C | Hardness (HB) |
|---|---|---|---|---|---|
| I1 | AW | 390-450 | ≥45 | >80 | 80-100 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (S300) | 12.0 | W000283262 |
| | DRUM | 200.0 | W000283264 |
| 1.2 | SPOOL (S300) | 12.0 | W000283265 |

# ALTIG SG1

**TOP FEATURES**
- Excellent mechanical and toughness properties for low temperature applications, down to -40°C.
- Stable Arc
- Good feedability

**TYPICAL APPLICATIONS**
- General fabrication
- Construction

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.18 | ER70S-3 |
| EN ISO 636-A | W 42 4 2Si |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| I1 | Inert gas Ar (100%) |

**APPROVALS**

| TÜV | DB | CE |
|---|---|---|
| + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.07 | 1 | 0.65 | ≤0.025 | ≤0.025 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20 °C | -40 °C |
| I1 | AW | ≥420 | 500-640 | ≥22 | ≥90 | ≥47 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.6 | PE Tube | 5.0 | T16T005R1S22 |
| 2.0 | PE Tube | 5.0 | T20T005R1S22 |
| 2.4 | PE Tube | 5.0 | T24T005R1S22 |
| 3.2 | PE Tube | 5.0 | T32T005R1S22 |

# ALTIG SG2

**TOP FEATURES**
- Excellent mechanical and toughness properties for low temperature applications, down to -40°C.
- Smooth bead appearance
- Good feedability

**TYPICAL APPLICATIONS**
- General fabrication
- Construction

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.18 | ER70S-6 |
| EN ISO 636-A | W 42 4 3Si1 |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| I1 | Inert gas Ar (100%) |

**APPROVALS**

| TÜV | DB | CE |
|---|---|---|
| + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.08 | 1.5 | 0.9 | ≤0.025 | ≤0.025 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20 °C | -40 °C |
| I1 | AW | ≥420 | 500-640 | ≥24 | ≥90 | ≥47 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.6 | PE Tube | 5.0 | T16T005R6S22 |
| 2.0 | PE Tube | 5.0 | T20T005R6S22 |
| 2.4 | PE Tube | 5.0 | T24T005R6S22 |
| 3.2 | PE Tube | 5.0 | T32T005R6S22 |

# ALTIG 308L

### TOP FEATURES

- The low carbon content reduces the propensity to intergranular carbide precipitation, which increases the resistance to intergranular corrosion without the use of stabilizers.
- The weld metal provides good corrosion resistance properties to intergranular attack from a range of liquid media at service temperatures up to 300°C.
- Excellent mechanical strength and corrosion resistance.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.9 | ER308L |
| EN ISO 14343-A | W 19 9 L |

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| I1 | Inert gas Ar (100%) |

### TYPICAL APPLICATIONS

- Pipework
- Petrochemical
- Nuclear Power generation
- LNG



### APPROVALS

| TÜV | DB | CE |
|---|---|---|
| + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE

| C | Mn | Si | P | S | Cr | Ni |
|---|---|---|---|---|---|---|
| 0.020 | 1.8 | 0.45 | ≤0.025 | ≤0.020 | 20 | 10 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20 °C | -120 °C |
| I1 | AW | ≥350 | ≥520 | ≥35 | ≥80 | ≥40 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Diameter x Length (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | PE Tube | 5.0 | W000283419 |
| 1.6 | PE Tube | 5.0 | W000283420 |
| 2.0 | PE Tube | 5.0 | W000283421 |
| 2.4 | PE Tube | 5.0 | W000283422 |
| 3.2 | PE Tube | 5.0 | W000283423 |

# ALTIG 309L

### TOP FEATURES

- The weld metal has a delta-ferrite content of ~12% resulting in a high resistance to hot cracking.
- Also used for the welding of clad steels where service temperatures are below 300°C.
- 300°C maximum operating temperature.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.9 | ER309L |
| EN ISO 14343-A | W 23 12L |

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| I1 | Inert gas Ar (100%) |

### TYPICAL APPLICATIONS

- Petrochemical
- Nuclear Power generation
- Shipbuilding

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE

| C | Mn | Si | P | S | Cr | Ni |
|---|---|---|---|---|---|---|
| 0.02 | 1.8 | 0.45 | ≤0.025 | ≤0.020 | 24 | 13 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20 °C | -80 °C |
| I1 | AW | ≥350 | ≥520 | ≥30 | ≥47 | ≥32 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Diameter x Length (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.6 | PE Tube | 5.0 | W000283480 |
| 2.0 | PE Tube | 5.0 | W000283481 |
| 2.4 | PE Tube | 5.0 | W000283482 |

# ALTIG 316L

**TOP FEATURES**

- The weld metal has a high resistance to crevice corrosion by oxidising acids.
- Excellent mechanical and chemical characteristics.
- Suitable for welding or hard-facing stainless steels with the same chemical composition

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.9 | ER316L |
| EN ISO 14343-A | W 19 12 3L |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| I1 | Inert gas Ar (100%) |

**TYPICAL APPLICATIONS**

- Petrochemical
- Nuclear Power generation

**APPROVALS**

| TÜV | DB | CE |
|---|---|---|
| + | + | + |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cr | Ni | Mo |
|---|---|---|---|---|---|---|---|
| 0.020 | 1.4 | 0.45 | ≤0.025 | ≤0.020 | 19 | 12.5 | 2.6 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20 °C | -196 °C |
| I1 | AW | ≥350 | ≥510 | ≥30 | ≥80 | ≥32 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Diameter x Length (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | PE Tube | 5.0 | W000283455 |
| 1.6 | PE Tube | 5.0 | W000283456 |
| 2.0 | PE Tube | 5.0 | W000283457 |
| 2.4 | PE Tube | 5.0 | W000283458 |
| 3.2 | PE Tube | 5.0 | W000283459 |

# FLUX-CORED WIRES



FCAW-G & FCAW-S CONSUMABLES FLUX-CORED WIRES

# SAFDUAL 100



### TOP FEATURES

- SAFDUAL 100 is rutile flux cored wire for gas shielded metal arc welding of unalloyed steels
- The optimized fill ratio results in increased deposition rate and productivity leading to savings in total welding cost.
- The weld pool is easily controllable in positional welding with outstanding arc properties and quality levels.
- Low spatter and easy slag removal result in smooth and regular welds.
- Can be used in semiautomatic and mechanized processes, very well suited for use on ceramic backing.
- Preferably used under mixed gas. The use of $CO_2$ is possible.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.20 | E71T-1M-JH4 |
| | E71T-1C-H4 |
| EN ISO 17632-A | T 42 3 P M 1 H5 |
| | T 42 2 P C 1 H5 |
| EN ISO 17632-B | T 49 3 T1-1MA-UH5 |
| | T 49 2 T1-1CA-UH5 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All positions

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |

### APPROVALS

| ABS | LR | BV | DNV | RINA | CRS | PRS |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.05 | 1.45 | 0.5 | ≤0.015 | ≤0.015 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|---|
| | | | | | | -20°C | -30°C |
| Typical values | M21 | AW | ≥420 | 500-640 | ≥26 | ≥80 | ≥47 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (B300) | 16.0 | W000281679 |
| 1.2 | SPOOL (S200) | 5.0 | W000281680 |
| | SPOOL (B300) | 16.0 | W000281681 |
| 1.6 | SPOOL (B300) | 16.0 | W000281682 |

# SAFDUAL R71

### TOP FEATURES

- General purpose rutile flux cored wire for welding of unalloyed steels in all welding positions.
- Product design, deep penetration and outstanding weldability make this wire an ideal solution for shipbuilding applications.
- It can be used in manual and mechanized processes, very well suited for use on ceramic backing and with long liner.
- Increased productivity and savings in total welding cost comparing to welding with manual stick electrodes.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.20 | E71T1-1/9M H8 |
| | E71T1-1/9C H8 |
| EN ISO 17632-A | T 46 2 P M 1 H10 |
| | T 42 2 P C 1 H10 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All positions

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |



### APPROVALS

| ABS | LR | BV | DNV | RINA | RMRS | CRS | PRS |
|---|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.05 | 1.3 | 0.40 | ≤0.015 | ≤0.015 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -20°C |
|---|---|---|---|---|---|---|
| Typical values | C1 | AW | ≥530 | ≥590 | ≥25 | ≥47 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000387318 |

# SAFDUAL ZN

**TOP FEATURES**

- The best solution for robotic and semiautomatic welding of Zn coated steel
- Low spatter level and very regular bead appearance
- Improved quality of welds by optimized solidification time resulting in reduced level of porosity
- To be used with Ar/$CO_2$ gas shielding both on CV and pulsed modes

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.18 | E70C-GS |
| EN ISO 17632-A | T3T Z M M 1 H15 |
| EN ISO 17632-B | T43TG-1MS-H15 |

**CURRENT TYPE**

DC-

**WELDING POSITIONS**

All positions

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



**APPROVALS**

| TÜV | DB |
|---|---|
| + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Al |
|---|---|---|---|
| 0.4 | 1.2 | 0.3 | <3 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (S200) | 5.0 | W000281641 |
| | SPOOL (B300) | 16.0 | W000281642 |
| | DRUM | 200.0 | W000281643 |
| 1.2 | SPOOL (B300) | 16.0 | W000281644 |

# STEELCORED 14 HD

### TOP FEATURES

- All positional capability with outstanding performance in vertical up welding of fillet and butt welds.
- Coefficient of flux fill and current capacity designed to deliver all positional weldability.
- Savings in welding cost resulting from easy slag removal and lack of spatters.
- Ideal for applications in shibulding and steel construction.
- Designed for mix gas, use of $CO_2$ is possible.

### TYPICAL APPLICATIONS

- Shipbuilding
- Steel construction

### CLASSIFICATION

| | |
|---|---|
| AWS A5.20 | E71T-1M-JH4, E71T-1C-H4 |
| EN ISO 17632-A | T 46 3 P M 1 H5 |
| | T 46 2 P C 1 H5 |
| EN ISO 17632-B | T552T1-1CA-UH5 |
| | T553T1-1MA-UH5 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All positions

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |

FCAW

### APPROVALS

| ABS | LR | BV | DNV | RINA | TÜV | DB |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.05 | 1.2 | 0.55 | 0.010 | 0.010 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|---|
| | | | | | | -20°C | -30°C |
| Typical values | M21 | AW | ≥460 | 550-650 | ≥24 | ≥80 | ≥50 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (B300) | 16.0 | W000281664 |
| 1.2 | SPOOL (S200) | 5.0 | W000384576 |
| | SPOOL (B300) | 16.0 | W000281666 |
| | SPOOL (S300) | 16.0 | W000384699 |

# STEELCORED 19 HD

**TOP FEATURES**

- Seamless high deposition rutile flux cored wire with an enhanced degree of fill for welding of unalloyed steels in $CO_2$ gas.
- All positional capability with outstanding performance in vertical up welding of fillet and butt welds.
- Coefficient of flux fill and current capacity designed to deliver all positional weldability.
- Savings in welding cost resulting from easy slag removal and lack of spatters.
- Ideal for applications in shibulding and steel construction.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.20 | E71T-1C-JH4 |
| EN ISO 17632-A | T 46 3 P C 1 H5 |
| EN ISO 17632-B | T553T1-1CA-UH5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All positions

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| C1 | Active gas 100% $CO_2$ |



**APPROVALS**

| ABS | LR | BV | DNV | RINA | TÜV |
|---|---|---|---|---|---|
| + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.05 | 1.2 | 0.5 | 0.010 | 0.010 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|---|
| | | | | | | -20°C | -30°C |
| Typical values | C1 | AW | ≥460 | 550-650 | ≥24 | ≥80 | ≥50 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (S200) | 5.0 | W000281669 |
| 1.2 | DRUM | 200.0 | W000281672 |

# STEELCORED 31

**TOP FEATURES**

- General purpose seamless copper coated basic flux cored wire. High quality welds with good slag removal.
- Weld metal with very low content of diffusible hydrogen (HD< 3 ml/100g deposited weld metal)
- Excellent mechanical properties and purity of weld metal.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.20 | E70T-5C-JH4 |
| | E70T-5M-JH4 |
| EN ISO 17632-A | T 42 4 B M 2 H5 |
| | T 42 4 B C 2 H5 |
| EN ISO 17632-B | T494T5-1CA-UH5 |
| | T494T5-1MA-UH5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All position, except vertical down

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |



**APPROVALS**

| ABS | LR | BV | DNV | RINA | TÜV |
|---|---|---|---|---|---|
| + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.05 | 1.2 | 0.3 | ≤0.010 | ≤0.010 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -40°C |
|---|---|---|---|---|---|---|
| Typical values | C1 | AW | ≥420 | 500-640 | ≥25 | ≥80 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000281707 |
| 1.6 | SPOOL (B300) | 16.0 | W000281710 |

# SAFUNI 310

**TOP FEATURES**

- General purpose self-shielded wire.
- No shielding gas required, optimal solution for outdoor applications.
- Can be used for welding of galvanized parts.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.20 | E71-T7 |
| AWS A5.36 | E71T7-AZ-G-H16 |
| EN ISO 17632-A | T 42 Z Y 1 H15 |

**CURRENT TYPE**

DC-

**WELDING POSITIONS**

All positions



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Al |
|---|---|---|---|---|---|
| 0.3 | 0.6 | 0.15 | ≤0.025 | ≤0.025 | 1.6 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| Typical values | AW | ≥420 | ≥540 | ≥22 | ≥30 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (S200) | 4.0 | W000281810 |
| 1.2 | SPOOL | 16.0 | W000281811 |
| 1.6 | SPOOL | 16.0 | W000281812 |

# SAFDUAL 200

**TOP FEATURES**

- SAFDUAL 200 is a high deposition rate metal cored wire with impact properties at - 50°C. Better tolerance of variable gap and surface conditions in relation to MAG process
- Good side wall wetting, regular bead profile, optimized amount of silicates, reduced spatters
- Bridging and root passing capabilities with short and pulsed arc
- Very good weldability with short, pulsed and spray arc. Suitable for robotic applications

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.18 | E70C-6M H4 |
| EN ISO 17632-A | T 46 5 M M 1 H5 |
| EN ISO 17632-B | T555T15-1MA-UH5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All positions

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



**APPROVALS**

| ABS | BV | CWB | DNV | LRS | RINA |
|---|---|---|---|---|---|
| + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.04 | 1.5 | 0.4 | ≤0.012 | ≤0.02 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -50°C |
|---|---|---|---|---|---|---|
| Typical values | M21 | AW | ≥460 | 560-680 | ≥27 | ≥47 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000236594, W000281636 |
| 1.6 | SPOOL (B300) | 16.0 | W000281639 |

# SAFDUAL 206

**TOP FEATURES**

- SAFDUAL 206 is a high deposition rate metal cored wire delivering very good impact properties at -40°C. Better tolerance of variable gap and surface conditions in relation to MAG process
- Good side wall wetting, regular bead profile, optimized amount of silicates and reduced spatters
- Bridging and root passing capabilities with short and pulsed arc
- Very good weldability with short, pulsed and spray arc. Suitable for robotic applications

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.18 | E70C-6M H4 |
| EN ISO 17632-A | T 46 4 M M 1 H5 |
| EN ISO 17632-B | T494T1-1MA-UH5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All positions

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



**APPROVALS**

| ABS | BV | CWB | DNV | LRS | TÜV/DB | CE |
|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.04 | 1.5 | 0.4 | ≤0.012 | ≤0.020 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -40°C |
|---|---|---|---|---|---|---|
| Typical values | M21 | AW | >460 | 530-680 | ≥27 | ≥90 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000281630 |
| | DRUM | 200.0 | W000281632 |

# SAFDUAL 206A

### TOP FEATURES

- SAFDUAL 206A is a high deposition rate metal cored wire delivering very good impact properties at - 20°C. Better tolerance of variable gap and surface conditions in relation to MAG process
- Good side wall wetting, regular bead profile, optimized amount of silicates and reduced spatters
- Bridging and root passing capabilities with short and pulsed arc
- Very good weldability with short, pulsed and spray arc. Suitable for robotic applications

### CLASSIFICATION

| | |
|---|---|
| AWS A5.18 | E70C-6M H4 |
| EN ISO 17632-A | T 42 2 M M 1 H5 |
| EN ISO 17632-B | T 49 2T15 1MA UH5 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All positions

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



### APPROVALS

| ABS | BV | CWB | DB | DNV | LRS | RINA | TÜV/DB |
|---|---|---|---|---|---|---|---|
| + | + | + | + | + | + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.05 | 1.35 | 0.6 | ≤0.015 | ≤0.023 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -20°C |
|---|---|---|---|---|---|---|
| Typical values | M21 | AW | >420 | 500-640 | ≥26 | ≥90 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (B300) | 16.0 | W000281620 |
| 1.2 | SPOOL (B300) | 16.0 | W000281622 |
| | DRUM | 200.0 | W000281624 |

# STARDUAL 206 HP

**TOP FEATURES**

- STARDUAL 206 HP is low fume metal cored wire for welding of mild steels. Better tolerance of variable gap and surface conditions in relation to MAG process
- High deposition rate and very good weldability. Very low amount of silicates.
- Good side wall wetting. Bridging and root passing capabilities with short and pulsed arc
- Very good weldability with short, pulsed and spray arc. Suitable for robotic applications, very good performance of pulse modes

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.18 | E70C-6M H4 |
| EN ISO 17632-A | T 42 3 M M 1 H5 |
| EN ISO 17632-B | T493T15-1MA-UH5 |

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



**APPROVALS**

| ABS | LR | BV | DNV | TÜV | DB |
|---|---|---|---|---|---|
| + | + | + | + | + | + |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000263887 |

# STEELCORED M 8

**TOP FEATURES**
- General purpose seamless copper coated metal cored wire.
- Little formation of silicates on the weld surface.
- High deposition rate and fast travel speeds, good side wall fusion, very regular bead appearance.
- Very good weldability with short, pulsed and spray arc. Suitable for robotic applications

**TYPICAL APPLICATIONS**
- Steel construction

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.18 | E70C-3M H4 |
| EN ISO 17632-A | T 46 2 M M 1 H5 |
| EN ISO 17632-B | T552T15-1MA-UH5 |

**CURRENT TYPE**
DC+

**WELDING POSITIONS**
All positions

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



**APPROVALS**

| LR | BV | DNV | RINA | TÜV | DB |
|---|---|---|---|---|---|
| + | + | + | + | + | BV |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si |
|---|---|---|
| 0.05 | 1.3 | 0.6 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -20°C |
|---|---|---|---|---|---|---|
| Typical values | M21 | AW | ≥460 | 550-660 | ≥24 | ≥50 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (B300) | 16.0 | W000281600 |
| 1.2 | SPOOL (B300) | 16.0 | W000281602 |
| | DRUM | 200.0 | W000281603 |

# STEELCORED M10

**TOP FEATURES**

- Seamless copper coated metal cored wire for welding of steel with Re up to 460MPa and very good impact properties at -40°C.
- Better tolerance of variable gap and surface conditions in relation to MAG process. Bridging and root passing capabilities with short and pulsed arc.
- Very good weldability with short, pulsed and spray arc. Suitable for robotic applications.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.18 | E70C-6M H4 |
| EN ISO 17632-A | T 46 4 M M 1 H5 |
| EN ISO 17632-B | T554T15-1MA-UH5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All positions

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



**APPROVALS**

| ABS | BV | DNV | RINA | TÜV | DB |
|---|---|---|---|---|---|
| + | + | + | + | + | BV |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si |
|---|---|---|
| 0.06 | 1.3 | 0.6 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | +20°C | -20°C | -40°C |
| Typical values | M21 | AW | ≥460 | 550-660 | ≥24 | ≥120 | ≥80 | ≥47 |
| Typical values | M21 | 580°C x 2h/cuptor | ≥460 | 550-660 | ≥24 | | | ≥80 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (S200) | 5.0 | W000281608 |
| | SPOOL (B300) | 16.0 | W000281609 |
| 1.2 | SPOOL (B300) | 16.0 | W000281612 |
| | DRUM | 200.0 | W000281613 |
| 1.4 | SPOOL (B300) | 16.0 | W000281614 |
| 1.6 | DRUM | 200.0 | W000281618 |
| 2.4 | DRUM | 250.0 | W000273683 |

# STEELCORED M 10 S

### TOP FEATURES

- Seamless copper coated metal cored wire for welding of steel with Re up to 420MPa and very good impact properties at -60°C.
- Better tolerance of variable gap and surface conditions in relation to MAG process. Bridging and root passing capabilities with short and pulsed arc.
- Very good weldability with short, pulsed and spray arc. Suitable for robotic applications.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.18 | E70C-6M H4 |
| EN ISO 17632-A | T 42 6 M M 1 H5 |
| EN ISO 17632-B | T496T15-1MA-UH5 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All positions

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



### APPROVALS

| CE |
|---|
| + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.07 | 1.6 | 0.4 | 0.010 | 0.010 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -60°C |
|---|---|---|---|---|---|---|
| Typical values | M21 | AW | ≥420 | 500-640 | ≥26 | ≥60 |
| Typical values | M21 | 620°C x 1h | ≥420 | 500-640 | ≥27 | ≥80 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000371257 |

# SAFDUAL 100Ni



### TOP FEATURES

- SAFDUAL 100Ni is rutile flux cored delivering good impact properties at -40°C. Ni alloyed, for welding with mix gas.
- The optimized fill ratio results in increased deposition rate and productivity leading to savings in total welding cost.
- At least two times higher productivity comparing to basic manual electrode in positional welding.
- Can be used in semiautomatic and mechanized processes, very well suited for use on ceramic backing.
- The weld pool is easily controllable in positional welding with outstanding arc properties and quality levels.
- Low spatter and easy slag removal result in smooth and regular welds.

### TYPICAL APPLICATIONS

- Offshore
- Steel construction

### CLASSIFICATION

| | |
|---|---|
| AWS A5.29 | E81T1-GM-H4 |
| EN ISO 17632-A | T 46 4 1Ni P M21 1 H5 |
| EN ISO 17632-B | T554T1-1M21A-N1-UH5 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All positions

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |

### APPROVALS

| DB |
|---|
| + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S | Ni |
|---|---|---|---|---|---|
| 0.06 | 1.2 | 0.4 | ≤0.015 | ≤0.015 | 0.7 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -40°C |
|---|---|---|---|---|---|---|
| Typical values | M21** | AW | ≥460 | 570-680 | ≥24 | ≥80 |

* AW = As welded

** Gas test: 82% Ar + 18% $CO_2$

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (S200) | 5.0 | W000281690 |
| | SPOOL (B300) | 16.0 | W000281691, W000384147 |

# SAFDUAL 128

### TOP FEATURES

- Rutile 0.9%Ni flux cored wire with excellent all-positional weldability and good impact toughness at -50°C.
- Can be welded in all positions with one setting of parameters. Ideal for offshore and naval shipyard applications. To be used with Ar/$CO_2$ gas shielding.
- Best in class welding performance and productivity in positional welding.
- Optimal solution for welding of wind mill foundations, offshore and steel constructions.
- Can be applied for applications requiring CTOD testing.
- Meets NACE MR-0175 requirements

### TYPICAL APPLICATIONS

- Offshore
- Wind tower foundations
- Steel construction

### CLASSIFICATION

| | |
|---|---|
| AWS A5.29 | E81T1-Ni1M-H4 |
| EN ISO 17632-A | T 46 5 1Ni P M 1 H5 |
| EN ISO 17632-B | T 55 5 T1-1MA-N1-UH5 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All positions

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |

FCAW

### APPROVALS

| ABS | LR | DNV |
|---|---|---|
| + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S | Ni |
|---|---|---|---|---|---|
| 0.05 | 1.3 | 0.4 | ≤0.015 | ≤0.015 | 0.85 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|---|
| | | | | | | -40°C | -50°C |
| Typical values | M21 | AW | ≥460 | 550-690 | ≥22 | ≥80 | ≥60 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000281695 |

# STEELCORED 20 HD

**TOP FEATURES**

- Seamless high deposition rutile flux cored wire with 1%Ni and impact toughness at -40°C.
- Excellent mechanical properties and diffusible Hydrogen content below 5 ml per 100g of deposited weld metal.
- All positional capability with outstanding performance in vertical up welding of fillet and butt welds
- Ideal for applications in steel construction, offshore and shipbuilding segments.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.29 | E81T1-Ni1M JH4 |
| | E81T1-M21A4-Ni1-H4 |
| EN ISO 17632-A | T 46 4 1Ni P M 1 H5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All positions

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



**APPROVALS**

| ABS | LR | DNV | RINA | DB |
|---|---|---|---|---|
| + | + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Ni |
|---|---|---|---|---|---|
| 0.05 | 1.2 | 0.5 | 0.010 | 0.010 | 0.9 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -40°C |
|---|---|---|---|---|---|---|
| Typical values | M21 | AW | ≥490 | 570-670 | ≥24 | ≥80 |
| | M21 | 580°C x 2h/cuptor | ≥490 | 570-670 | ≥22 | ≥100 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000281676 |

# STEELCORED 42

### TOP FEATURES

- Seamless basic flux cored wire for gas shielded metal arc welding of high-strength fine grain structural steels with minimum yield strength of 690 MPa and impact toughness at -60°C
- Very stable mechanical properties thanks to precisely controlled chemical composition and basic slag system.

### TYPICAL APPLICATIONS

- Offshore
- Steel construction

### CLASSIFICATION

| | |
|---|---|
| AWS A5.29 | E110T5-K4M-H4 |
| EN ISO 18276-A | T 69 6 Mn2NiCrMo B C 2 H5 |
| EN ISO 18276-B | T786T5-1 CA-N4C1M2-UH5 |
| | T786T5-1 MA-N4C1M2-UH5 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All position, except vertical down

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



### APPROVALS

| ABS | BV | DNV | TÜV |
|---|---|---|---|
| + | + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | Cr | Ni | Mo |
|---|---|---|---|---|---|
| 0.06 | 1.5 | 0.3 | 0.4 | 2.3 | 0.4 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | -20°C | -40°C | -60°C |
| Typical values | M21 | AW | ≥690 | 760-900 | ≥17 | | ≥80 | ≥47 |
| | M21 | 580°C x 2 h | ≥670 | 760-840 | ≥17 | ≥60 | ≥47 | |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000281726 |

# STEELCORED 48

**TOP FEATURES**

- Seamless copper coated basic flux cored wire for welding of weathering steels.
- The weld metal is very crack-resistant, cold-tough down to -60°C with very low hydrogen content.
- Very stable mechanical properties thanks to precisely controlled chemical composition and basic slag system.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.29 | E80T5-GM-H4 |
| EN ISO 17632-A | T 46 6 Z B M 2 H5 |
| EN ISO 17632-B | T556T5-1MA-G-UH5 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All position, except vertical down

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



**APPROVALS**

| TÜV | DB |
|---|---|
| + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | P | S | Ni | Cu |
|---|---|---|---|---|---|---|
| 0.05 | 1.1 | 0.25 | 0.010 | 0.010 | 1.2 | 0.5 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -60°C |
|---|---|---|---|---|---|---|
| Typical values | C1 | AW | ≥460 | 540-640 | ≥24 | ≥47 |

* AW = As welded

Gas test: 100% $CO_2$

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000289151 |

# STEELCORED 48 HD

### TOP FEATURES

- Seamless copper coated special rutile cored wire for welding of weathering steels such as Patinax or Corten.
- Excellent weldability. Very good slag removal, regular bead profile and side wall wetting.
- Flux fill ration and current capacity designed to deliver optimal all positional performance.

### TYPICAL APPLICATIONS

- Welding of weathering steels

### CLASSIFICATION

| | |
|---|---|
| AWS A5.29 | E81T1-GM-H4 |
| EN ISO 17632-A | T 50 3 Z P M 1 H5 |
| EN ISO 17632-B | T573T1-1MA-NCC1-UH5 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All positions

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S | Cr | Ni | Cu |
|---|---|---|---|---|---|---|---|
| 0.04 | 1.1 | 0.5 | ≤0.02 | ≤0.02 | 0.6 | 0.6 | 0.7 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -30°C |
|---|---|---|---|---|---|---|
| Typical values | | AW | ≥500 | 560-720 | ≥18 | ≥47 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000281718 |

# STEELCORED M 42

### TOP FEATURES

- Seamless copper coated metal cored wire for welding of high strength steels with minimum yield strength of 690 MPa.
- Due to the easily controllable weld pool in the short-arc range, STEELCORED M 42 is suitable for positional welding both on CV and pulse modes.
- Higher deposition rate and more regular weld profile comparing to MAG welding with solid wires.
- Very good weldability with short, pulsed and spray arc. Suitable for robotic applications.
- Meets AWS A5.28: E110C-K4 H4.

### TYPICAL APPLICATIONS

- Steel construction
- Transportation.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.28 | E110C-GM H4 |
| EN ISO 18276-A | T 69 4 Mn2NiCrMo M M 1 H5 |
| EN ISO 18276-B | T784T15-1MA-N4C1M2-UH5 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All position, except vertical down

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |

FCAW

### APPROVALS

| TÜV | DB |
|---|---|
| + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | Cr | Ni | Mo |
|---|---|---|---|---|---|
| 0.05 | 1.6 | 0.5 | 0.45 | 1.9 | 0.4 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -40°C |
|---|---|---|---|---|---|---|
| Typical values | M21 | AW | ≥690 | 760-850 | ≥17 | ≥70 |
| Typical values | M21 | 580°C x 2h | ≥690 | 760-850 | ≥17 | ≥47 |

* AW = As welded

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000281730 |

# STEELCORED M 48

### TOP FEATURES
- Seamless copper coated metal cored wire for welding of weathering steels.
- Good side wall wetting, regular bead profile, optimized amount of silicates and reduced spatters.
- Very good weldability with short, pulsed and spray arc. Suitable for robotic applications.

### TYPICAL APPLICATIONS
- Steel construction

### CLASSIFICATION
| | |
|---|---|
| AWS A5.28 | E80C-G H4 |
| EN ISO 17632-A | T 46 3 Z M M 1 H5 |
| EN ISO 17632-B | T553T15-1MA-NCC1-UH5 |

### CURRENT TYPE
DC+

### WELDING POSITIONS
All positions

### SHIELDING GASES (ACC. EN ISO 14175)
| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |



### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | P | S | Cr | Ni | Cu |
|---|---|---|---|---|---|---|---|
| 0.05 | 1.0 | 0.4 | ≤0.01 | ≤0.01 | 0.5 | 0.5 | 0.5 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -30°C |
|---|---|---|---|---|---|---|
| Typical values | M21 | AW | ≥470 | 560-720 | ≥24 | ≥47 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000281720 |

# INOXCORED 307

**TOP FEATURES**

- The best quality of welds with standard CV power sources helps to reduce investment expenditures.
- Produces welds with optimal corrosion resistance due to balanced chemical composition.
- Reduced spatter, better performance and weldability comparing to solid wires.
- Savings in total welding cost resulting from reduced cleaning. Spatter free welds with easy slag removal.

**CLASSIFICATION**

EN ISO 17633-A T 18 8 Mn R C 3

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

Flat/Horizontal

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |



**APPROVALS**

| CE |
|---|
| + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Ni |
|---|---|---|---|---|
| ≤0.13 | 6.5 | 0.7 | 19 | 9 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|---|
| Typical values | M21 | AW | ≥400 | ≥590 | ≥30 | ≥30 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (BS300) | 15.0 | W000281788 |

# INOXCORED 308L

### TOP FEATURES

- Alloyed rutile flux cored wire for downhand welding of corrosion resistant 308 Cr-Ni steels.
- INOXCORED 308L produces welds with high corrosion resistance due to low carbon and balanced chemical composition.
- Application of standard Ar/$CO_2$ or $CO_2$ shielding gases optimizes welding cost.
- The best quality of welds with standard CV power sources helps to reduce investment expenditures.
- High productivity generates savings in total welding costs. Optimal semiautomatic process with high duty cycle.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.22 | E308LT0-1 |
| | E308LT0-4 |
| EN ISO 17633-A | T 19 9 L R M 3 |
| | T 19 9 L R C 3 |
| EN ISO 17633-B | TS308L-FB0 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

Flat/Horizontal

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |



### APPROVALS

| LR | DNV | TÜV | DB |
|---|---|---|---|
| + | + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | Cr | Ni | Ferrite |
|---|---|---|---|---|---|
| ≤0.04 | 1.7 | 0.6 | 20 | 10 | 5-10 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|---|
| | | | | | | +20°C | -196°C |
| Typical values | M21 | AW | ≥350 | ≥520 | ≥35 | ≥40 | ≥27 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (BS300) | 15.0 | W000281756 |

# INOXCORED 309LV

### TOP FEATURES

- High alloyed rutile flux cored wire for positional welding of dissimilar joints, buffer layers or cladding.
- INOXCORED 309LV exhibits outstanding, almost spatter-free, welding properties with very easy slag removal. Designed for welding in the horizontal (PD), overhead (PE) and vertical-up (PF) positions.
- INOXCORED 309LV delivers welds with high corrosion resistance due to low carbon and balanced chemical composition.
- The best quality of welds with standard CV power sources helps to reduce investment expenditures. Application of standard Ar/$CO_2$ or $CO_2$ shielding gases optimizes welding cost.
- High productivity generates savings in total welding costs. Optimal semiautomatic process with high duty cycle.
- Savings in total welding cost resulting from reduced cleaning. Spatter free welds with easy slag removal.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.22 | E309LT1-1<br>E309LT1-4 |
| EN ISO 17633-A | T 23 12 L P M 1<br>T 23 12 L P C 1, |
| EN ISO 17633-B | TS309L-FB1 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

All positions

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |

FCAW

### APPROVALS

| LR | DNV | RINA | TÜV | DB |
|---|---|---|---|---|
| + | + | + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | Cr | Ni | Ferrite |
|---|---|---|---|---|---|
| ≤0.04 | 1.5 | 0.6 | 24 | 13 | 12-20 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|---|
| | | | | | | +20°C | -60°C |
| Typical values | M21 | AW | ≥320 | ≥520 | ≥30 | ≥40 | ≥27 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (BS300) | 15.0 | W000281780 |
| 1.2 | SPOOL (S200) | 4.5 | W000281781 |
| | SPOOL (BS300) | 15.0 | W000281782 |

# INOXCORED 316L

### TOP FEATURES

- Alloyed rutile flux cored wire for downhand welding of corrosion resistant 316 Cr-Ni-Mo steels.
- INOXCORED 316L produces welds with high corrosion resistance due to low carbon and balanced chemical composition.
- The best quality of welds with standard CV power sources helps to reduce investment expenditures.
- High productivity generates savings in total welding costs. Optimal semiautomatic process with high duty cycle. Application of standard Ar/$CO_2$ or $CO_2$ shielding gases optimizes welding cost.
- Savings in total welding cost resulting from reduced cleaning. Spatter free welds with easy slag removal.
- Higher overall performance and weldability comparing to solid wires and manual stick electrodes.

### CLASSIFICATION

| | |
|---|---|
| AWS A5.22 | E316LT0-1 |
| | E316LT0-4 |
| EN ISO 17633-A | T 19 12 3 L R C 3 |
| | T 19 12 3 L R M 3 |
| EN ISO 17633-B | TS316L-FB0 |

### CURRENT TYPE

DC+

### WELDING POSITIONS

Flat/Horizontal

### SHIELDING GASES (ACC. EN ISO 14175)

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |

FCAW

### APPROVALS

| LR | DNV | TÜV | DB |
|---|---|---|---|
| + | + | + | + |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| C | Mn | Si | Cr | Ni | Mo | Ferrite |
|---|---|---|---|---|---|---|
| ≤0.04 | 1.5 | 0.6 | 19 | 12 | 2.8 | 3-12 |

### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|---|
| | | | | | | +20°C | -110°C |
| Typical values | M21 | AW | ≥320 | ≥510 | ≥30 | ≥47 | ≥27 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

### PACKAGING AND AVAILABLE SIZES

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (BS300) | 15.0 | W000281766 |

# INOXCORED 316LV

**TOP FEATURES**

- Alloyed rutile flux cored wire with a fast-freezing slag for positional welding of corrosion resistant 316 Cr-Ni-Mo steels.
- INOXCORED 316LV exhibits outstanding, almost spatter-free, welding properties with very easy slag removal. Designed for welding in the horizontal (PD), overhead (PE) and vertical-up (PF) positions.
- INOXCORED 316LV delivers welds with high corrosion resistance due to low carbon and balanced chemical composition.
- The best quality of welds with standard CV power sources helps to reduce investment expenditures.
- High productivity generates savings in total welding costs. Optimal semiautomatic process with high duty cycle. Application of standard Ar/$CO_2$ or $CO_2$ shielding gases optimizes welding cost.
- Savings in total welding cost resulting from reduced cleaning. Spatter free welds with easy slag removal.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.22 | E316LT1-1 |
| | E316LT1-1 |
| EN ISO 17633-A | T 19 12 3 L P M 1 |
| | T 19 12 3 L P C 1 |
| EN ISO 17633-B | TS316L-FB1 |

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All positions

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |

**APPROVALS**

| LR | DNV | RINA | TÜV |
|---|---|---|---|
| + | + | + | + |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Ni | Mo | Ferrite |
|---|---|---|---|---|---|---|
| ≤0.04 | 1.5 | 0.6 | 19 | 12 | 2.8 | 5-10 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|---|
| | | | | | | +20°C | -110°C |
| Typical values | M21 | AW | ≥320 | ≥510 | ≥30 | ≥47 | ≥27 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.0 | SPOOL (BS300) | 15.0 | W000281760 |
| 1.2 | SPOOL (S200) | 4.5 | W000281761 |
| | SPOOL (BS300) | 15.0 | W000281762 |

# SAFDUAL 560

**TOP FEATURES**

- Metal cored gas shielded wire for hardfacing
- Can be used for hardfacing of wear parts, such as excavator components, scraper blades, dipper teeth, worm conveyors, beaters, crusher jaws, crusher cones, subjected to heavy wear
- The weld metal is tough, free of cracks and therefore resistant to shock and impact
- Machining is only possible by grinding

**CLASSIFICATION**

EN 14700 T Fe8

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

All positions

**SHIELDING GASES (ACC. EN ISO 14175)**

M21 Mixed gas Ar+ >15-25% $CO_2$

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr |
|---|---|---|---|
| 0.42 | 0.55 | 2.6 | 9.5 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Hardness (HRc) |
|---|---|---|---|
| Typical values | M21 | AW | 57-60 |

* AW = As welded

Gas test: 82% Ar+18% $CO_2$

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000281808, W000386331 |
| 1.6 | SPOOL (B300) | 16.0 | W000281809 |

# STEELCORED 58

**TOP FEATURES**

- The weld metal is tough, free of cracks and therefore resistant to shock and impact.
- Machining is only possible by grinding. A tough buffer layer using STEELCORED 31 is only required with highly hardenable base plates.

**CLASSIFICATION**

EN 14700 T Fe8

**CURRENT TYPE**

DC+

**WELDING POSITIONS**

Flat/Horizontal

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Mo |
|---|---|---|---|---|
| 0.5 | 1.5 | 0.6 | 5.5 | 0.6 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Hardness (HRc) |
|---|---|---|---|
| Typical values | C1 | AW | 57-62 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.2 | SPOOL (B300) | 16.0 | W000281801 |

# STEELCORED M 58

**TOP FEATURES**
- STEELCORED M 58 is a seamless copper coated metal cored wire for the hardfacing of wear parts.
- Hardness 57-62 HRC.

**TYPICAL APPLICATIONS**
- Hardfacing.

**CLASSIFICATION**
EN 14700 T Fe8

**CURRENT TYPE**
DC+

**WELDING POSITIONS**
Flat/Horizontal

**SHIELDING GASES (ACC. EN ISO 14175)**

| | |
|---|---|
| M21 | Mixed gas Ar+ >15-25% $CO_2$ |
| C1 | Active gas 100% $CO_2$ |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| C | Mn | Si | Cr | Mo |
|---|---|---|---|---|
| 0.6 | 1.9 | 0.7 | 5.4 | 0.7 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| | Shielding gas | Condition* | Hardness (HRc) |
|---|---|---|---|
| Typical values | C1 | AW | 57-60 |

* AW = As welded

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.6 | SPOOL (B300) | 16.0 | W000281807 |

SUBMERGED ARC WELDING CONSUMABLES

# SAW WIRES & FLUXES

## SAW WIRES

### MILD STEEL



### LOW ALLOY STEEL



### STAINLESS STEEL



## FLUXES



SUBMERGED ARC WELDING CONSUMABLES SAW WIRES & FLUXES

# AS 26

**TOP FEATURES**

- A low carbon, low manganese, low silicon general purpose wire
- Provides the lowest hardness and is best suited for use with the SAF-FRO active fluxes
- Excellent choice when welding on oily plates.

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.17 | EL12 |
| EN ISO 14171-A | S1 |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.1 | 0.5 | 0.06 | ≤0.02 | ≤0.02 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 2.0 | SPOOL | 25.0 | AS26-2-25VCI |
| 2.4 | SPOOL | 25.0 | AS26-24-25VCI |
| | DRUM | 400.0 | AS26-24-400 |
| 3.2 | SPOOL | 25.0 | AS26-32-25VCI |
| | DRUM | 400.0 | AS26-32-400 |
| 4.0 | SPOOL | 25.0 | AS26-4-25VCI |

# AS 35

**TOP FEATURES**

- Industry standard for submerged arc welding applications
- A low carbon, medium manganese, low silicon general purpose submerged arc wire
- A good choice for a wide range of applications with single or multiple pass subarc welding

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.17 | EM12K |
| EN ISO 14171-A | S2 |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.1 | 1 | 0.12 | ≤0.025 | ≤0.025 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.6 | SPOOL | 25.0 | AS35-16-25VCI |
| | DRUM | 600.0 | AS35-16-600AC |
| 2.0 | SPOOL | 25.0 | AS35-2-25VCI |
| | DRUM | 400.0 | AS35-2-400 |
| 2.4 | SPOOL | 25.0 | AS35-24-25VCI |
| | DRUM | 400.0 | AS35-24-400 |
| 3.2 | SPOOL | 25.0 | AS35-32-25VCI |
| | DRUM | 400.0 | AS35-32-400 |
| 4.0 | SPOOL | 25.0 | AS35-4-25VCI |
| | SPOOL | 100.0 | AS35-4-100 |
| | DRUM | 400.0 | AS35-4-400 |
| 4.8 | SPOOL | 25.0 | AS35-48-25VCI |
| | SPOOL | 100.0 | AS35-48-100 |

# AS 36

**TOP FEATURES**

- For yield strength above 420MPa
- Recommended with neutral fluxes
- Good alternative to EH12K grade

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.17 | EH14 |
| EN ISO 14171-A | S4 |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S |
|---|---|---|---|---|
| 0.13 | 1.9 | 0.1 | ≤0.02 | ≤0.02 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 1.6 | SPOOL | 25.0 | AS36-16-25VCI |
| 2.0 | SPOOL | 25.0 | AS36-2-25VCI |
| 2.4 | SPOOL | 25.0 | AS36-24-25VCI |
| 3.2 | SPOOL | 25.0 | AS36-32-25VCI |
| 4.0 | SPOOL | 25.0 | AS36-4-25VCI |

# AS 37LN

**TOP FEATURES**

- A low carbon, high manganese, medium silicon wire primarily designed to be used in multirun conditions
- Capable of producing weld deposits with impact properties exceeding 47 J at -62 °C when used with AS589 in As Welded or after post weld heat treatment conditions
- Actual (Type 3.1) certificates for each lot of wire showing chemical composition are available

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.17 | EH12K |
| EN ISO 14171-A | S3Si |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cu |
|---|---|---|---|---|---|
| 0.1 | 1.7 | 0.3 | ≤0.015 | ≤0.015 | 0.04 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 2.4 | SPOOL | 25.0 | AS37LN-24-25VCI |
| | DRUM | 400.0 | AS37LN-24-400 |
| 3.2 | SPOOL | 25.0 | AS37LN-32-25VCI |
| 4.0 | SPOOL | 25.0 | AS37LN-4-25VCI |
| | DRUM | 400.0 | AS37LN-4-400 |

# AS 40A

**TOP FEATURES**

- A low carbon, medium manganese, low silicon, 0,5% molybdenum wire used for single or multiple pass welds
- A standard choice for pipe fabrication and other limited pass applications
- Actual (Type 3.1) certificates for each lot of wire showing chemical composition are available

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.23 | EA2 |
| EN ISO 14171-A | S2Mo |

**TYPICAL APPLICATIONS**

- Longitudinal and spiral pipe welding

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Mo |
|---|---|---|---|---|---|
| 0.1 | 1 | 0.15 | ≤0.02 | ≤0.02 | 0.5 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 2.0 | SPOOL | 25.0 | AS40A-2-25VCI |
| 2.4 | SPOOL | 25.0 | AS40A-24-25VCI |
| 3.2 | SPOOL | 25.0 | AS40A-32-25VCI |
| 4.0 | SPOOL | 25.0 | AS40A-4-25VCI |
| | DRUM | 400.0 | AS40A-4-400 |

# AS 48

**TOP FEATURES**
- Contains Nickel and Copper
- For Cor-ten steels and equivalent
- Recommended with AS 589 flux

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.23 | EG |
| EN ISO 14171-A | S2Ni1Cu |

**TYPICAL APPLICATIONS**
- Weathering steel structure

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cr | Ni | Cu |
|---|---|---|---|---|---|---|---|
| 0.1 | 1 | 0.25 | ≤0.02 | ≤0.02 | <0.4 | 0.8 | 0.5 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 2.4 | DRUM | 300.0 | AS48-24-300SF |
| 3.2 | SPOOL | 25.0 | AS48-32-25VCI |
| | DRUM | 300.0 | AS48-32-300SF |
| 4.0 | SPOOL | 25.0 | AS48-4-25VCI |
| | DRUM | 300.0 | AS48-4-300SF |

# AS 66

**TOP FEATURES**

- Delivers a high strength and low temperature fracture toughness weld metal
- Compatible with NACE requirement on Ni content
- Actual (Type 3.1) certificates for each lot of wire showing chemical composition are available
- Higher strength achieved than with AS 67

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.23 | EF3 |
| EN ISO 26304-A | S3Ni1Mo |
| EN ISO 14171-A | S3Ni1Mo |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Ni | Mo |
|---|---|---|---|---|---|---|
| 0.12 | 1.7 | 0.2 | ≤0.015 | ≤0.015 | 0.95 | 0.5 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 4.0 | SPOOL | 25.0 | AS66-4-25VCI |
| | DRUM | 300.0 | AS66-4-300 |

# AS 67

**TOP FEATURES**

- 1% Nickel and 0,2% Molybdenum wire to combine high strength and high toughness properties
- Impact toughness properties down to -60°C
- Actual (Type 3.1) certificates for each lot of wire showing chemical composition are available
- Comply with NACE requirement

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.23 | ENi6 |
| EN ISO 14171-A | S3Ni1Mo0,2 |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Ni | Mo |
|---|---|---|---|---|---|---|
| 0.1 | 1.5 | 0.20 | <0.015 | <0.015 | 0.95 | 0.25 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 2.4 | SPOOL | 25.0 | AS67-24-25VCI |
| 3.2 | SPOOL | 25.0 | AS67-32-25VCI |
| 4.0 | SPOOL | 25.0 | AS67-4-25VCI |
| 4.8 | SPOOL | 25.0 | AS67-48-25VCI |

# AS 308L

**TOP FEATURES**

- Cr-Ni Austenitic wire
- High resistance to intergranular corrosion and oxidizing environments

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.9 | ER308L |
| EN ISO 14343-A | S 19 9 L |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cr | Ni |
|---|---|---|---|---|---|---|
| 0.02 | 1.8 | 0.4 | ≤0.02 | ≤0.02 | 20 | 10 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 2.4 | SPOOL | 25.0 | W000286606 |
| 3.2 | SPOOL | 25.0 | W000286608 |

# AS 309L

**TOP FEATURES**

- Designed to be used primarily with basic fluxes that recover nearly all of the wire chromium in the deposit
- Reduced carbon levels (0.03% max) that offer increased resistance to inter-granular corrosion

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.9 | ER309L |
| EN ISO 14343-A | S 23 12 L |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cr | Ni |
|---|---|---|---|---|---|---|
| 0.02 | 1.8 | 0.4 | ≤0.03 | ≤0.03 | 24 | 13 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 2.4 | SPOOL | 25.0 | W000286645 |
| 3.2 | SPOOL | 25.0 | W000286647 |
| 4.0 | SPOOL | 25.0 | W000286650 |

# AS 316L

**TOP FEATURES**

- High resistance to intergranular corrosion and general corrosion conditions
- The 2-3% molybdenum improve pitting corrosion resistance of the weld deposit
- Precison layer wound spool

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.9 | ER316L |
| EN ISO 14343-A | S 19 12 3 L |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cr | Ni | Mo |
|---|---|---|---|---|---|---|---|
| 0.02 | 1.7 | 0.4 | ≤0.02 | ≤0.02 | 18.5 | 12 | 2.75 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 2.0 | SPOOL | 25.0 | W000286630 |
| 2.4 | SPOOL | 25.0 | W000286632 |
| 3.2 | SPOOL | 25.0 | W000286634 |
| 4.0 | SPOOL | 25.0 | W000286637 |

# AS 347

**TOP FEATURES**

- The addition of niobium reduces intergranular corrosion in severe operating conditions
- Niobium stabilized stainless steel wire used for the welding of 347 and 321 stainless steel grades
- Recommended with Lexal F500 flux

**CLASSIFICATION**

| | |
|---|---|
| AWS A5.9 | ER347 |
| EN ISO 14343-A | S 19 9 Nb |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, WIRE**

| C | Mn | Si | P | S | Cr | Ni | Nb |
|---|---|---|---|---|---|---|---|
| 0.04 | 1.6 | 0.4 | ≤0.02 | ≤0.02 | 19.5 | 9.7 | 0.6 |

**PACKAGING AND AVAILABLE SIZES**

| Wire diameter (mm) | Packaging | Weight (kg) | Item number |
|---|---|---|---|
| 2.4 | SPOOL | 25.0 | W000286619 |
| 4.0 | SPOOL | 25.0 | W000286624 |

# AS 231

### TOP FEATURES

- Active flux for single or limited amount of passes
- Excellent operability in high speed fillet weld and lap joint configuration
- Excellent slag removal

### CLASSIFICATION

| **Flux** | EN ISO 14174: SA AR 1 87 AC | |
|---|---|---|
| **Flux/wire** | AWS 5.17 | EN 14171-A |
| AS 26 | F7A0-EL12 | S 42 A AR S1 |
| AS 26 | | S 4T A AR S1 |
| AS 35 | F7A0-EM12K | S 42 0 AR S2 |
| AS 35 | | S 4T 0 AR S2 |

### CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL

| Wire grade | C | Mn | Si |
|---|---|---|---|
| AS 26 | 0.04 | 1.1 | 0.6 |
| AS 35 | 0.04 | 1.3 | 0.6 |



### MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL

| Wire grade | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) -20°C |
|---|---|---|---|---|---|
| AS 26 | AW | ≥ 400 | 520-650 | ≥22 | 27 |
| AS 35 | AW | ≥400 | 520-650 | ≥22 | 27 |

* AW = As welded

### FLUX CHARACTERISTICS

| | |
|---|---|
| Current type | AC, DC+ |
| Basicity (Boniszewski) | 0.4 |
| Redrying | 300-350°C x 2h |

### PACKAGING AND AVAILABLE SIZES

| Packaging | Weight (kg) | Item number |
|---|---|---|
| BAG | 25.0 | W000280300 |

# AS 231S

**TOP FEATURES**

- Higher activity than AS 231
- For single pass application only
- Excellent operability in high speed fillet weld configuration

**CLASSIFICATION**

| | | |
|---|---|---|
| **Flux** | EN ISO 14174: SA AR 1 98 AC | |
| **Flux/wire** | ISO 14171-A | AWS A5.17 |
| AS 26 | S 42 Z AR S1 | F7AZ-EL12 |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| Wire grade | C | Mn | Si |
|---|---|---|---|
| AS 26 | 0.04 | 1.5 | 1.4 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Wire grade | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) +20°C |
|---|---|---|---|---|---|
| AS 26 | AW | ≥420 | 490-650 | ≥22 | 27 |

* AW = As welded

**FLUX CHARACTERISTICS**

| | |
|---|---|
| Current type | AC, DC+ |
| Basicity (Boniszewski) | 0.4 |
| Grain size (EN ISO 14174) | 2-16 |
| Redrying | 300-350°Cx2h |

**PACKAGING AND AVAILABLE SIZES**

| Packaging | Weight (kg) | Item number |
|---|---|---|
| BAG | 25.0 | W000280304 |

# AS 450

**TOP FEATURES**

- Semi basic, semi active flux
- For moderate impact toughness requirements
- Excellent for fillet welds applications

**CLASSIFICATION**

| | | |
|---|---|---|
| **Flux** | EN ISO 14174: S A AB 1 76 AC H5 | |
| **Flux/wire** | ISO 14171-A | AWS A5.17 |
| AS 35 | S 38 2 AB S2 | F7A2-EM12K |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| Wire grade | C | Mn | Si |
|---|---|---|---|
| AS 35 | 0.05 | 1.3 | 0.4 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Wire grade | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C |
| AS 35 | AW | >380 | >490 | >22 | 80 | 47 |

* AW = As welded

**FLUX CHARACTERISTICS**

| | |
|---|---|
| Current type | AC, DC+ |
| Basicity (Boniszewski) | 1.2 |
| Grain size (EN ISO 14174) | 2-16 |
| Redrying | 300-350°Cx2-4h |

**PACKAGING AND AVAILABLE SIZES**

| Packaging | Weight (kg) | Item number |
|---|---|---|
| BAG | 25.0 | W000280314 |

# AS 461

**TOP FEATURES**

- Moderate silicon and manganese pick-up flux
- Compatible with a wide range of applications
- Suitable for one side welding as well

**CLASSIFICATION**

| | |
|---|---|
| **Flux** | EN ISO 14174: S A AB 1 67 AC H5 |

| **Flux/wire** | AWS 5.17 | AWS 5.23 | EN 14171-A |
|---|---|---|---|
| AS 26 | F6A2/F6P2-EL12 | | S 35 2 AB S1 |
| AS 35 | F7A2-EM12K | | S 42 3 AB S2 |
| AS 40A | | F8A3/F8P2-EA2-A2 | S 46 2 AB S2Mo |
| AS 67 | | F8A4-ENi6-Ni6 | S 50 4 AB S3Ni1Mo0,2 |
| AS 37LN | F7A6/F7P6-EH12K | | S 42 4 AB S3Si |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| Wire grade | C | Mn | Si | Mo | Ni |
|---|---|---|---|---|---|
| AS 26 | 0.05 | 1.0 | 0.4 | | |
| AS 35 | 0.05 | 1.5 | 0.6 | | |
| AS 40A | 0.07 | 1.5 | 0.6 | 0.5 | |
| AS 37LN | 0.07 | 1.7 | 0.7 | | |
| AS 67 | 0.09 | 1.5 | 0.3 | 0.2 | 0.95 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Wire grade | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | -20°C | -30°C | -40°C | -50°C |
| AS 26 | AW | ≥355 | 440-550 | ≥24 | ≥ 40 | ≥ 27 | | |
| AS 26 | PWHT 620°C/1h | ≥330 | 420-550 | ≥22 | ≥ 60 | ≥ 27 | | |
| AS 35 | AW | ≥420 | 510-640 | ≥24 | ≥ 100 | ≥ 60 | ≥ 27 | |
| AS 35 | PWHT 620°C/1h | ≥400 | 490-650 | ≥22 | ≥ 100 | ≥ 60 | ≥ 47 | |
| AS 37LN | AW | ≥440 | 530-650 | ≥22 | ≥ 90 | | ≥ 70 | ≥ 27 |
| AS 37LN | PWHT 620°C/1h | ≥420 | 560-690 | ≥20 | ≥ 90 | | ≥ 60 | ≥ 27 |
| AS40A | AW | ≥500 | 560-680 | ≥22 | ≥ 100 | ≥ 27 | | |
| AS40A | PWHT 620°C/1h | ≥480 | 560-690 | ≥20 | ≥ 90 | ≥ 27 | | |
| AS 67 | AW | ≥ 500 | 590-660 | ≥ 22 | | | ≥ 50 | |

*AW = As welded; PWHT = Post weld heat treatment

**FLUX CHARACTERISTICS**

| | |
|---|---|
| Current type | AC, DC+ |
| Basicity (Boniszewski) | 1.3 |
| Redrying | 300-350°C x 2h |

**PACKAGING AND AVAILABLE SIZES**

| Packaging | Weight (kg) | Item number |
|---|---|---|
| BAG | 25.0 | W000280307 |

# AS 461C

**TOP FEATURES**

- High silicon pick-up flux
- Smooth bead surface
- Suitable for one side welding as well

**CLASSIFICATION**

| | |
|---|---|
| **Flux** | EN ISO 14174: S A AB 1 87 AC H5 |

| **Flux/wire** | AWS 5.17 | AWS 5.23 |
|---|---|---|
| AS 26 | F6A2/F6P2-EL12 | |
| AS 35 | F7A4/F7P4-EM12K | |
| AS 35 | | F7TA0G-EM12K |
| AS 37LN | | F7TA0-EH12K |
| AS40A | | F8A2/F8P2-EA2 A2 |
| AS40A | | F8TA4G-EA2-A2 |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| Wire grade | C | Mn | Si | Mo |
|---|---|---|---|---|
| AS 26 | 0.05 | 1.0 | 0.4 | |
| AS 35 | 0.06 | 1.5 | 0.7 | |
| AS 37LN | 0.07 | 1.7 | 0.7 | |
| AS40A | 0.05 | 1.6 | 0.7 | 0.5 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Wire grade | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | -20°C | -30°C | -40°C | -50°C |
| AS 26 | AW | ≥355 | 440-550 | ≥24 | 40 | 27 | | |
| AS 26 | PWHT 620°C/1h | ≥330 | 420-550 | ≥22 | 60 | 27 | | |
| AS 35 | AW | ≥420 | 510-640 | ≥22 | 100 | 50 | 27 | |
| AS 35 | PWHT 620°C/1h | ≥400 | 490-650 | ≥22 | 110 | 60 | 40 | |
| AS 37LN | AW | ≥440 | 530-650 | ≥22 | 90 | | 50 | 27 |
| AS 37LN | PWHT 620°C/1h | ≥420 | 510-650 | ≥22 | 90 | | 50 | 27 |
| AS40A | AW | ≥490 | 570-680 | ≥20 | 50 | 27 | | |
| AS40A | PWHT 620°C/1h | ≥480 | 560-690 | ≥20 | 50 | 27 | | |

*AW = As welded; PWHT = Post weld heat treatment

**FLUX CHARACTERISTICS**

| | |
|---|---|
| Current type | AC, DC+ |
| Basicity (Boniszewski) | 1.3 |
| Redrying | 300-350°C x 2h |

**PACKAGING AND AVAILABLE SIZES**

| Packaging | Weight (kg) | Item number |
|---|---|---|
| BAG | 25.0 | W000276634, W000387635 |

# AS 461Si

**TOP FEATURES**

- High silicon pick-up flux
- Smooth bead surface
- Suitable for one side welding as well

**CLASSIFICATION**

| | | |
|---|---|---|
| **Flux** | EN ISO 14174: S A AB 1 87 AC H5 | |
| **Flux/wire** | AWS A5.17 | AWS A5.23 |
| AS 26 | F6A2/F6P2-EL12 | |
| AS 35 | F7A4/F7P4-EM12K | |
| AS 37LN | F7A6/F7P6-EH12K | |
| AS 40A | | F8A2/F8P2-EA2 A2 |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| Wire grade | C | Mn | Si | Mo |
|---|---|---|---|---|
| AS 26 | 0.05 | 1.0 | 0.4 | - |
| AS 35 | 0.06 | 1.5 | 0.7 | - |
| AS 37LN | 0.07 | 1.7 | 0.7 | - |
| AS 40A | 0.05 | 1.6 | 0.7 | 0.5 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Wire grade | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | -20°C | -30°C | -40°C | -50°C |
| AS 26 | AW | ≥355 | 440-550 | ≥24 | ≥40 | ≥27 | | |
| | 620°Cx1h | ≥330 | 420-550 | ≥22 | ≥60 | ≥27 | | |
| AS 35 | AW | ≥420 | 510-640 | ≥22 | ≥100 | ≥50 | ≥27 | |
| | 620°Cx1h | ≥400 | 490-650 | ≥22 | ≥110 | ≥60 | ≥40 | |
| AS 37LN | AW | ≥440 | 530-650 | ≥22 | ≥90 | | ≥50 | ≥27 |
| | 620°Cx1h | ≥420 | 510-650 | ≥22 | ≥90 | | ≥50 | ≥27 |
| AS 40A | AW | ≥490 | 570-680 | ≥20 | ≥50 | ≥27 | | |
| | 620°Cx1h | ≥480 | 560-690 | ≥20 | ≥50 | ≥27 | | |

* AW = As welded

**FLUX CHARACTERISTICS**

| | |
|---|---|
| Current type | AC, DC+ |
| Basicity (Boniszewski) | 1.3 |
| Grain size (EN ISO 14174) | 2-16 |
| Redrying | 300-350°Cx2h |

**PACKAGING AND AVAILABLE SIZES**

| Packaging | Weight (kg) | Item number |
|---|---|---|
| BAG | 25.0 | W000280309 |

# AS 589

**TOP FEATURES**

- Excellent Impact toughness and CTOD properties
- Low diffusible hydrogen
- Excellent slag removal

**CLASSIFICATION**

| | |
|---|---|
| **Flux** | EN ISO 14174: SA FB 1 55 AC H5 |

| **Flux/wire** | AWS A5.17 | AWS A5.23 |
|---|---|---|
| AS 35 | F7A6/F6P8-EM12K | |
| AS 37LN | F7A8/F7P8-EH12K | |
| AS 40A | | F8A4/F8P4-EA2-A2 |
| AS 66 | | F9A8/F9P8-EF3-F3 |
| AS 67 | | F8A10/F8P10-ENi6-Ni6 |
| AS Cr1Mo | | F8P4-EB2R-B2 |
| AS Cr2Mo | | F8P2-EB3R-B3 |



**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| Wire grade | C | Mn | Si | Cr | Ni | Mo |
|---|---|---|---|---|---|---|
| AS 35 | 0.07 | 0.9 | 0.2 | - | - | - |
| AS 37LN | 0.07 | 1.6 | 0.3 | - | - | - |
| AS 40A | 0.07 | 0.9 | 0.2 | - | - | 0.5 |
| AS 66 | 0.07 | 1.5 | 0.3 | - | 0.95 | 0.5 |
| AS 67 | 0.07 | 1.3 | 0.3 | - | 0.9 | 0.2 |
| AS Cr1Mo | 0.07 | 0.9 | 0.3 | 1.0 | - | 0.5 |
| AS Cr2Mo | 0.08 | 0.6 | 0.3 | 2.2 | - | 1.0 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Wire grade | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C | -40°C | -60°C |
| AS 35 | AW | ≥360 | 450-550 | ≥28 | ≥160 | ≥100 | ≥50 | |
| AS 37LN | AW | ≥450 | 530-630 | ≥25 | ≥180 | | ≥100 | ≥70 |
| AS 40A | AW | ≥470 | 550-680 | ≥24 | ≥120 | ≥100 | ≥50 | |
| AS 66 | AW | ≥550 | 650-750 | ≥20 | ≥120 | ≥90 | ≥70 | ≥47 |
| | PWHT 600°Cx2h | ≥540 | 630-730 | ≥22 | ≥140 | ≥120 | ≥90 | ≥70 |
| AS 67 | AW | ≥500 | 560-680 | ≥22 | | | ≥145 | ≥70 |
| | PWHT 600°Cx2h | ≥470 | 540-660 | ≥24 | | | ≥160 | ≥70 |

*AW = As welded; PWHT = Post weld heat treatment

**FLUX CHARACTERISTICS**

| | |
|---|---|
| Current type | AC, DC+ |
| Basicity (Boniszewski) | 3.1 |
| Grain size (EN ISO 14174) | 2-20 |
| Redrying | 300-350°Cx2-4h |

**PACKAGING AND AVAILABLE SIZES**

| Packaging | Weight (kg) | Item number |
|---|---|---|
| BAG | 25.0 | W000280315 |

# AS 630

**TOP FEATURES**

- Extremely clean weld metal deposit
- Excellent Impact toughness and CTOD properties
- Highly resistant to moisture pick-up

**CLASSIFICATION**

| | |
|---|---|
| **Flux** | EN ISO 14174: SA FB 1 55 AC H5 |

| **Flux/wire** | AWS A5.17 | AWS A5.23 |
|---|---|---|
| AS 35 | F7A6/F6P8-EM12K | |
| AS 37LN | F7A8/F7P8-EH12K | |
| AS 40A | | F8A4/F8P4-EA2-A2 |
| AS 66 | | F9A8/F9P8-EF3-F3 |
| AS 67 | | F8A10/F8P10-ENi6-Ni6 |
| AS Cr1Mo | F8P4-EB2R-B2 | |
| AS Cr2Mo | F8P2-EB3R-B3 | |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| Wire grade | C | Mn | Si | Cr | Ni | Mo |
|---|---|---|---|---|---|---|
| AS 35 | 0.07 | 0.9 | 0.2 | - | - | - |
| AS 37LN | 0.07 | 1.6 | 0.3 | - | - | - |
| AS 40A | 0.07 | 0.9 | 0.2 | - | - | 0.5 |
| AS 66 | 0.07 | 1.5 | 0.3 | - | 0.95 | 0.5 |
| AS 67 | 0.07 | 1.3 | 0.3 | - | 0.9 | 0.2 |
| AS Cr1Mo | 0.07 | 0.9 | 0.3 | 1.0 | - | 0.5 |
| AS Cr2Mo | 0.08 | 0.6 | 0.3 | 2.2 | - | 1.0 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Wire grade | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 0°C | -20°C | -40°C | -60°C |
| AS 35 | AW | ≥360 | 450-550 | ≥25 | ≥160 | ≥100 | | |
| AS 37LN | AW | ≥450 | 530-630 | ≥25 | ≥180 | ≥140 | ≥100 | ≥70 |
| AS 40A | AW | ≥470 | 550-680 | ≥24 | ≥120 | ≥100 | ≥50 | |
| AS 66 | AW | ≥550 | 650-750 | ≥20 | ≥120 | ≥90 | ≥70 | ≥47 |
| | PWHT 600°Cx2h | ≥540 | 630-730 | ≥22 | ≥140 | ≥120 | ≥90 | ≥70 |
| AS 67 | AW | ≥500 | 560-680 | ≥22 | | | ≥145 | ≥70 |
| | PWHT 600°Cx2h | ≥470 | 550-660 | ≥24 | | | ≥160 | ≥70 |
| AS Cr1Mo | PWHT 680°Cx2h | ≥380 | 530-630 | ≥24 | | ≥160 | | |
| | PWHT 920°C/air+710°C | ≥310 | 430-530 | ≥30 | | ≥160 | | |
| AS Cr2Mo | PWHT 720°Cx8h | ≥450 | 550-650 | ≥22 | | ≥80 | | |
| | PWHT 940°C/air+740°C | ≥400 | 520-620 | ≥22 | | ≥80 | | |

*AW = As welded; PWHT = Post weld heat treatment

# AS 630

**FLUX CHARACTERISTICS**

| | |
|---|---|
| Current type | AC, DC+ |
| Basicity (Boniszewski) | 3.1 |
| Grain size (EN ISO 14174) | 2-20 |

**PACKAGING AND AVAILABLE SIZES**

| Packaging | Weight (kg) | Item number |
|---|---|---|
| BAG | 25.0 | W000280317 |

# LEXAL F500

**TOP FEATURES**

- Neutral agglomerated flux
- Excellent behavior on stabilized stainless steel grades
- Excellent slag detachability even at high interpass temperatures

**CLASSIFICATION**

| | |
|---|---|
| **EN ISO 14174** | S A FB 2 |

**CHEMICAL COMPOSITION (WEIGHT %), TYPICAL, ALL WELD METAL**

| Wire grade | C | Mn | Si | Cr | Ni | Mo | Nb | Cu |
|---|---|---|---|---|---|---|---|---|
| AS 308L | 0.02 | 1.5 | 0.5 | 18 | 9 | | | ≤0.35 |
| AS 309L | 0.02 | 1.5 | 0.5 | 22 | 13 | | | |
| AS 316L | 0.02 | 1.5 | 0.5 | 18 | 10 | 2.5 | | |
| AS 347 | 0.07 | 1.5 | 0.5 | 18 | 9 | | 1 | ≤0.35 |

**MECHANICAL PROPERTIES, TYPICAL, ALL WELD METAL**

| Wire grade | Condition* | Yield strength (MPa) | Tensile strength (MPa) | Elongation (%) | Impact ISO-V (J) | |
|---|---|---|---|---|---|---|
| | | | | | +20°C | -60°C |
| AS 308L | AW | ≥350 | ≥500 | ≥35 | ≥75 | |
| AS 309L | AW | ≥400 | ≥550 | ≥30 | ≥70 | ≥70 |
| AS 316L | AW | ≥350 | ≥520 | ≥30 | ≥75 | |
| AS 347 | AW | ≥500 | ≥570 | ≥30 | | ≥70 |

* AW = As welded

**FLUX CHARACTERISTICS**

| | |
|---|---|
| Current type | AC, DC+ |
| Basicity (Boniszewski) | 2.2 |
| Grain size (EN ISO 14174) | 2-16 |
| Redrying | 300-350°C |

**PACKAGING AND AVAILABLE SIZES**

| Packaging | Weight (kg) | Item number |
|---|---|---|
| BAG | 25.0 | W000280318 |

## BENEFITS

**For a well-made welding bead:**

- Without copper contamination
- Without risk of burn through in the first pass position (used as a support)
- Without re-welding
- Without risk of lack of fusion
- No turning of the work piece
- Bigger root thickness permits higher welding current for the hot pass
- An increase in first pass deposit rate
- Wide root gap
- Total penetration without turning the parts to be welded
- Total penetration of joints difficult to access in reverse position
- Smooth profile of the root pass

**For a well-made weld preparation before welding:**

- Ideal to compensate for variations in preparation of sheet edge backlashes
- Easy to use (adhesive/metallic support
- Simplify chamfering preparations

**For higher productivity:**

- Without gouging operation
- Without grinding operation
- Provides time saving and high quality
- Easy-to-use slats technique

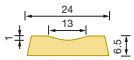
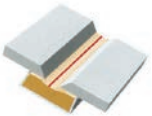
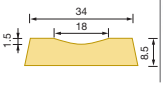
KERALINE has a very low moisture absorption rate and a high melting point, allowing use at high welding intensity, up to 600A.

### The selection of KERALINE slat types for different welding processes

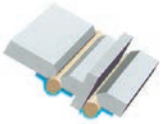
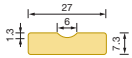
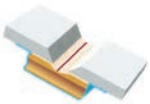
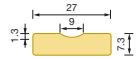
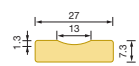
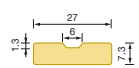
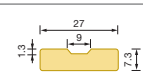
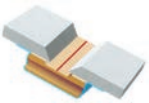
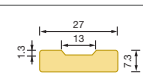
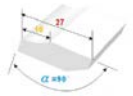
| | MMA | TIG | MIG/MAG | SAW |
|---|---|---|---|---|
| KERALINE TA 1 | – | ✔ | ✔ | – |
| KERALINE TA 2 | – | ✔ | ✔ | – |
| KERALINE TA 3 | ✔ | – | ✔ | – |
| KERALINE TF 1 | – | ✔ | ✔ | – |
| KERALINE TF 2 | – | ✔ | ✔ | – |
| KERALINE TF 3 | ✔ | – | ✔ | – |
| KERALINE TR 1 | ✔ | – | ✔ | – |

| | MMA | TIG | MIG/MAG | SAW |
|---|---|---|---|---|
| KERALINE TR 2 | ✔ | – | ✔ | – |
| KERALINE TR 3 | ✔ | – | ✔ | – |
| KERALINE TR 4 | ✔ | – | ✔ | – |
| KERALINE TR 5 | ✔ | – | ✔ | – |
| KERALINE TR 6 | ✔ | – | ✔ | – |
| KERALINE TM 1 | ✔ | ✔ | ✔ | ✔ |
| KERALINE TM 2 | ✔ | ✔ | ✔ | ✔ |

### The selection of KERALINE slat types for different supports, shapes and dimensions

| | Type | Item number | Dimensions (mm) | 3D diagram | Application | Packing |
|---|---|---|---|---|---|---|
| Ceramic-on-metallic support | KERALINE TM1-13 mm | W000010403 |   |  |  | 600 mm / piece<br>10 pieces per bag<br>(6 meters)<br>7 bags/carton (42 meters) |
| | KERALINE TM2-18 mm | W000010404 |   | | | 600 mm / piece<br>9 pieces per bag<br>(5.4 meters)<br>5 bags/carton (27 meters) |

Ceramic-on-aluminium tape

| Type | Item number | Dimensions (mm) | 3D diagram | Application | Packing |
|---|---|---|---|---|---|
| KERALINE TR1-6 mm | W000010397 | Ø 6 |  |  | 600 mm / piece<br>50 pieces per bag (30 meters)<br>5 bags/carton (150 meters) |
| KERALINE TR2-7 mm | W000010398 | Ø 7 | | | |
| KERALINE TR3-8 mm | W000010399 | Ø 8 | | | 600 mm / piece<br>20 pieces per bag (12 meters)<br>8 bags/carton (96 meters) |
| KERALINE TR4-9 mm | W000010400 | Ø 9 | | | 600 mm / piece<br>20 pieces per bag (12 meters)<br>7 bags/carton (84 meters) |
| KERALINE TR5-12 mm | W000010401 | Ø 12 | | | 600 mm / piece<br>20 pieces per bag (12 meters)<br>5 bags/carton (60 meters) |
| KERALINE TR6-15 mm | W000010402 | Ø 15 | | | 600 mm / piece<br>15 pieces per bag (9 meters)<br>5 bags/carton (45 meters) |
| KERALINE TA1-6 mm | W000010391 |  |  |  | 600 mm / piece<br>10 pieces per bag (6 meters)<br>6 bags/carton (36 meters) |
| KERALINE TA2-9 mm | W000010392 |  | | | |
| KERALINE TA3-13 mm | W000010393 |  | | | |
| KERALINE TF1-6 mm | W000010394 |  | | | |
| KERALINE TF2-9 mm | W000010395 |  |  |  | 600 mm / piece<br>10 pieces per bag (6 meters)<br>6 bags/carton (36 meters) |
| KERALINE TF3-13 mm | W000010396 |  | | | |
| KERALINE TJ10 T FULL PENETRATION | W000262368 |  |  |  | 600 mm / piece<br>10 pieces per bag (6 meters)<br>6 bags/carton (36 meters) |
| SET OF CERAMIC BACKING RAD 150 | W000275493 |  |  |  | 16 pieces /Circle<br>18 Circles/carton (18 meters) |
| SET OF CERAMIC BACKING RAD 200 | W000275532 | |  |  | 4 pieces/Segment<br>20 Segments / SET<br>12 Sets/carton (12 meters) |
| SET OF CERAMIC BACKING RAD 100 | W000404095 | |  |  | 12 pieces /Circle<br>22 Circles/carton (22 meters) |

NOTES

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