



# TIG RODS

manufactured and distributed by  
**FSH WELDING GROUP**

| 1) UN-ALLOYED STEEL  |             |             |           |
|----------------------|-------------|-------------|-----------|
| TIG F55              | TIG GALVARC | AWS A5.18   | ER70S-2   |
| TIG F56              | TIG 70S3    | AWS A5.18   | ER70S-3   |
| TIG F57              | TIG 70S6    | AWS A5.18   | ER70S-6   |
| 2) LOW ALLOYED STEEL |             |             |           |
| TIG F61              | TIG 70SA 1  | AWS A5.28   | ER70S-A1  |
| TIG F63              | TIG 80SB2   | AWS A5.18   | ER80S-B2  |
| TIG F68              | TIG 90SB3   | AWS A5.28   | ER90S-B3  |
| TIG F69              | TIG CrMo5   | ISO 21952-A | W CrMo5Si |
| TIG F609             | TIG 80SB8   | AWS A5.28   | ER80S-B8  |
| TIG F691             | TIG 90SB9   | AWS A5.28   | ER90S-B9  |
| TIG F82              | TIG 80SNi2  | AWS A5.28   | ER80S-Ni2 |
| TIG A 60             | TIG A 60    | Aerospace   | A 60      |
| TIG BMS              | TIG BMS     | Aerospace   | 8CD12     |
| TIG SCVS             | TIG SCVS    | Aerospace   | 15CDV6    |
| TIG F66S             | TIG F66S    | Aerospace   | 25 CD4    |
| 3) STAINLESS STEEL   |             |             |           |
| TIG 18/8MN           | TIG 307 Si  | AWS A5.9    | -ER307    |
| TIG 20/10            | TIG 308L    | AWS A5.9    | ER308 L   |
| TIG 20/10C           | TIG 308H    | AWS A5.9    | ER308H    |
| TIG 20/10T           | TIG 321     | AWS A5.9    | ~ER321    |
| TIG 20/10NB          | TIG 347     | AWS A5.9    | ER347     |
| TIG 20/10M           | TIG 316L    | AWS A5.9    | ER316L    |
| TIG 20/10MN          | TIG 316MnN  | AWS A5.9    | ER316LMn  |
| TIG 20/10MNB         | TIG 318     | AWS A5.9    | ER318     |
| TIG 20/10MNBs        | TIG 318 Si  | AWS A5.9    | ~ER318    |
| TIG 24/12            | TIG 309L    | AWS A5.9    | ER309L    |
| TIG 24/12M           | TIG 309L Mo | AWS A5.9    | ER309LMo  |
| TIG 25/20            | TIG 310     | AWS A5.9    | ER310     |
| TIG 29/9             | TIG 312     | AWS A5.9    | ER312     |
| TIG 20/10MC          | TIG 316H    | AWS A5.9    | ER316H    |
| TIG 18/15            | TIG 317L    | AWS A5.9    | ER317L    |
|                      | TIG 347H    | AWS A5.9    | ER347H    |

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|             |               |             |                    |
|-------------|---------------|-------------|--------------------|
| TIG 20/25CU | TIG 385       | AWS A5.9    | ER385              |
| TIG 27/31CU | TIG 383       | AWS A5.9    | ER383              |
| TIG M13/0   | TIG 410       | AWS A5.9    | ER410              |
| TIG M13/4   | TIG 410NiMo   | AWS A5.9    | ER410NiMo          |
| TIG F17/0   | TIG 430       | AWS A5.9    | ER430              |
| TIG D22/09  | TIG 2209      | AWS A5.9    | ER2209             |
| TIG D25/09  | TIG 2509      | AWS A5.9    | ER2594             |
| TIG 21/10MA | TIG 253MA     | ISO 14343-A | W Z 21 10 N H      |
| TIG 16/8M   | TIG 16-8-2    | AWS A5.9    | ER16-8-2           |
| TIG 17/4CU  | TIG 17-4 Cu   | AWS A5.9    | ER630              |
| TIG 17/4MO  | TIG 17-4 Mo   | ISO 14343-A | W Z 17 4 Mo        |
| TIG 11/3M   | TIG Z12CNDV12 | ISO 14343-A | W Z 12 3 MoV       |
| TIG 22/21CO | TIG N155      | ISO 14343-A | W Z 22 21 3 CoWNbN |

#### 4) NICKEL ALLOYS

|            |               |           |                                 |
|------------|---------------|-----------|---------------------------------|
| TIG NI22   | TIG Ni22      | AWS A5.14 | ERNiCrMo-10                     |
| TIG NI59   | TIG Ni059     | AWS A5.14 | ~ERNiCrMo-13                    |
| TIG NI60   | TIG Ni60      | AWS A5.14 | ERNiCu-7                        |
| TIG NI65   | TIG Ni65      | AWS A5.14 | ERNiFeCr-1                      |
| TIG NI82   | TIG Ni82      | AWS A5.14 | ERNiCr-3                        |
| TIG NI90   | TIG Ni90      | ISO 18274 | S-Ni 7090<br>(NiCr20Co18Ti3)    |
| TIG NI263  | TIG Ni263     | ISO 18274 | S-Ni 7263<br>(NiCr20Co20Mo6Ti2) |
| TIG NI276  | TIG Ni276     | AWS A5.14 | ERNiCrMo-4                      |
| TIG NI601  | TIG Ni601     | AWS A5.14 | ERNiCrFe-11                     |
| TIG NI617  | TIG Ni617     | AWS A5.14 | ERNiCrCoMo-1                    |
| TIG NI625  | TIG Ni625     | AWS A5.14 | ERNiCrMo-3                      |
| TIG NI718  | TIG Ni718     | AWS A5.14 | ERNiFeCr-2                      |
| TIG NICR80 | TIG NiCr80.20 | AWS A5.14 | ERNiCr-6                        |
|            | TIG NiTi4     | AWS A5.14 | ERNi-1                          |
| TIG NIW    | TIG NiW       | AWS A5.14 | ERNiMo-3                        |
| TIG NIX    | TIG NiX       | AWS A5.14 | ERNiCrMo-2                      |
| TIG FENI50 | TIG FeNi50    | Without   |                                 |

## 5) ALUMINIUM ALLOYS

|            |               |           |                   |
|------------|---------------|-----------|-------------------|
| TIG AL99.7 | TIG Al99.5    | AWS A5.10 | ~ER1100           |
| TIG ALG3   | TIG AlMg3     | AWS A5.10 | ER5654            |
| TIG ALG5   | TIG AlMg5     | AWS A5.10 | ER5356            |
| TIG ALG4M  | TIG AlMg4.5Mn | AWS A5.10 | ER5183            |
| TIG ALG5M  | TIG AlMg5Mn   | AWS A5.10 | ER5556            |
| TIG ALG4Z2 | TIG AlMg4Z2   | ISO 18273 | S Al Z (AlMg4Zn2) |
| TIG ALC6   | TIG AlCu6     | AWS A5.10 | ER2319            |
| TIG ALS5   | TIG AlSi5     | AWS A5.10 | ER4043            |
| TIG ALS12  | TIG AlSi12    | AWS A5.10 | ER4047            |
|            |               |           |                   |

## 6) MAGNESIUM ALLOYS

|           |           |           |          |
|-----------|-----------|-----------|----------|
| TIG AZ92A | TIG AZ92A | AWS A5.19 | ER AZ92A |
| TIG EZ33A | TIG EZ33A | AWS A5.19 | ER EZ33A |

## 7) COPPER ALLOYS

|            |                |           |                               |
|------------|----------------|-----------|-------------------------------|
| TIG CUS    | TIG Cu110      | AWS A5.7  | ERCu                          |
| TIG CUS6   | TIG Cu114      | AWS A5.7  | ERCuSn-A                      |
| TIG CUS8   | TIG CuSn8      | ISO 24373 | S Cu 5210 (CuSn8P)            |
| TIG CUS13  | TIG CuSn13     | ISO 24373 | S Cu 5410 (CuSn12P)           |
| TIG CUSIL  | TIG CuSi3      | AWS A5.7  | ERCuSi-A                      |
| TIG CUAG   | TIG CuAg       | ISO 24373 | S Cu 1897 (CuAg1)             |
| TIG CUA8   | TIG CuAl8      | AWS A5.7  | ERCuAl-A1                     |
| TIG CUA8NI | TIG CuAl9Mn    | ISO 24373 | S Cu 6327<br>(CuAl8Ni2Fe2Mn2) |
| TIG CUA9   | TIG CuAl9      | AWS A5.7  | ERCuAl-A2                     |
| TIG CUA9NI | TIG CuAl9Ni    | AWS A5.7  | ERCuNiAl                      |
| TIG CUMN13 | TIG Cu118      | AWS A5.7  | ERCuMnNiAl                    |
| TIG CUNI10 | TIG CuNi 90.10 | ISO 24373 | S Cu 7061 (CuNi10)            |
| TIG CUNI30 | TIG CuNi30     | AWS A5.7  | ERCuNi                        |

## 8) TITANIUM ALLOYS

|               |            |           |        |
|---------------|------------|-----------|--------|
| TIG T40       | TIG T40    | AWS A5.16 | ERTi-2 |
|               | TIG T60    | AWS A5.16 | ERTi-4 |
| TIG TPD0.2    | TIG TPd0,2 | AWS A5.16 | ERTi-7 |
| TIG TA6V4 ELI | TIG TA6V4  | AWS A5.16 | ERTi-5 |

## 9) COBALT ALLOYS

|              |            |           |                |
|--------------|------------|-----------|----------------|
| TIG CO1      | TIG Co1    | AWS A5.21 | ERCoCr-C       |
| TIG CO6      | TIG Co6    | AWS A5.21 | ERCoCr-A       |
| TIG CO12     | TIG Co12   | AWS A5.21 | ERCoCr-B       |
| TIG CO21     | TIG Co21   | AWS A5.21 | ERCoCr-E       |
| TIG CO25     | TIG Co25   | EN 14700  | S Z Co1        |
|              |            |           |                |
| TIG FICO25   | TIG FICO25 | EN 14700  | S Z Co1        |
| TIG FICO31   | TIG Co31   | EN 4327   | CoCr26Ni11W8   |
| TIG FICO188  | TIG Co188  | EN 3888   | CoCr22Ni22W15  |
| TIG FICO414  | TIG Co414  | AFNOR     | KC 29NW        |
| TIG FICO694  | TIG Co694  | EN 4326   | CoCr28W20Ni5V1 |
| TIG FICO918  | TIG Co918  | AFNOR     | KC 20NTa       |
| TIG FICOT800 | TIG CoT800 | AFNOR     | KD 28C         |

## 10) HARDFACING – MAINTENANCE & REPAIR

|                 |                   |          |         |
|-----------------|-------------------|----------|---------|
| TIG 819 BS      | TIG 819 BS**      | EN 14700 | S Fe3   |
| TIG BMS         | TIG B.M.S.**      | EN 14700 | S Fe1   |
| TIG MV5S        | TIG MV5S          | EN 14700 | S Fe4   |
| TIG MARVAL 18S  | TIG MARVAL 18 S   | EN 14700 | S Fe5   |
| TIG MARVAL X12S | TIG MARVAL X 12 S | EN 14700 | S Z Fe7 |
|                 | TIG M.V.S.        | EN 14700 | S Fe4   |
| TIG SMV3S       | TIG S.M.V3S**     | EN 14700 | S Fe3   |
| TIG HB25        | TIG R250B         | EN 14700 | S Fe1   |
| TIG HB35        | TIG R350B         | EN 14700 | S Fe2   |
| TIG HB50        | TIG R500B         | EN 14700 | S Fe2   |
| TIG HB60        | TIG R600B         | EN 14700 | S Fe6   |
| TIG HBF17       | TIG HBCrMo17-1    | EN 14700 | S Fe8   |
| TIG HBC62       | TIG HBC62         | EN 14700 | S Fe4   |
| TIG HCUBE       | TIG CuBe2         | EN 14700 | S Z Cu1 |



# TIG F55

Old reference: TIG 70S2

## Classification

AWS A5.18 : ER70S-2

ISO 14341-A : W 2Ti

## Description & Applications

Copper coated solid wire for GTAW to weld low alloyed standard construction / boiler steels.

**Main applications:** Especially for galvanized and Zinc coated steels used for general metal constructions, in the automobile industry, blacksmithing etc.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Ni   | Cr   | Mo   | Al  | Ti  | Cu  | Zr   | V    | S    | P     | Fe   |
|------|-----|-----|------|------|------|-----|-----|-----|------|------|------|-------|------|
| 0.06 | 0.6 | 1.2 | 0.03 | 0.04 | 0.01 | 0.1 | 0.1 | 0.2 | 0.08 | 0.01 | 0.01 | 0.015 | Rem. |

## All Weld Metal Mechanical Properties

| $R_e$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) | KV ( J ) |     |
|---------------|---------------|-------------|----------|-----|
| 460           | 560           | 28          | -20°C    | 120 |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen / H <sub>2</sub> : 3-6 l/min |

FT En-T020C-1406

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# TIG F56

Old reference: Carbotig

## Classification

AWS A5.18 : ER70S-3  
 ISO 636-A : W2Si

Material N° : 1.5112

## Description & Applications

GTAW rods to weld low alloyed standard construction / boiler steels like S235 to S355 and P235 to P310.

**Main applications:** For general metal constructions, in the automobile industry, blacksmithing, ship building etc. Advise in piping systems, for root passes and high quality assemblies...

## Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cu  | P     | Ni   | Cr   | Mo    | S     | Fe   |
|------|------|-----|-----|-------|------|------|-------|-------|------|
| 0.07 | 0.65 | 1.1 | 0.2 | <0.02 | 0.04 | 0.04 | 0.009 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|------------------------|------------------------|----------------------|----------|-----|
| 420                    | 480                    | 26                   | +20°C    | 150 |
|                        |                        |                      | -20°C    | 90  |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | ISO 14175:<br>I1 (Ar) : 6-12 l/min<br>Back shielding: Nitrogen / H <sub>2</sub> : 3-6 l/min |

FT En-T021A-1501

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# TIG F56HP

## Classification

AWS A5.18 : ER70S-3  
 ISO 636-A : W 42 2 W2Si

Material N° : 1.5112

## Description & Applications

GTAW rods to weld low alloyed standard construction / boiler steels like S235 to S355 and P235 to P310.

**Main applications:** For general metal constructions, in the automobile industry, blacksmithing, ship building etc. Advise in piping systems, for root passes and high quality assemblies...

### Base material:

### Construction steels for general use

|                 |                            |   |
|-----------------|----------------------------|---|
| EN- Désignation | S185 – S355<br>P235 – P355 | L210 – L360                                 |
| ASTM            | A139<br>A210 grade A1, C   | A106 grade A, B, C<br>A131 grade 55, 60, 65 |

## Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cu  | P     | S     | Ni   | Cr   | Mo    | Fe   |
|------|------|-----|-----|-------|-------|------|------|-------|------|
| 0.07 | 0.65 | 1.1 | 0.2 | <0.02 | <0.02 | 0.03 | 0.05 | 0.009 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|------------------------|------------------------|----------------------|----------|-----|
| 460                    | 560                    | 26                   | +20°C    | 150 |
|                        |                        |                      | - 20°C   | 90  |
|                        |                        |                      | - 50°C   | 50  |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | ISO 14175:<br>I1 (Ar) : 6-12 l/min<br>Back shielding: Nitrogen / H <sub>2</sub> : 3-6 l/min |

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# TIG F57

Old reference: TIG 70S6

## Classification

AWS A5.18 : ER70S-6  
 ISO 636-A : W 46 2 W3Si1

Material N° : ~ 1.5125

## Description & Applications

GTAW rods to weld low alloyed standard construction / boiler steels like S235-S355, P235-P355, S255N-S420N.

**Main applications:** For general metal constructions, in the automobile industry, blacksmithing, ship building etc.

### Base material:

### Construction steels for general use , Tube steels, Ship steels

|                 |                                      |  |
|-----------------|--------------------------------------|--|
| EN- Designation | S185 – S355<br>P235 – P355           | L210 – L360                                    |
| Ship steels     | Quality A and B                      |  |
| ASTM            | A285 grade C<br>A442 grade 55,<br>60 | A414 grade C, D, E, F<br>A515 grade 55, 60, 65 |

## Typical Chemical Composition ( % )

| C    | Si   | Mn   | P     | S      | Ni   | Cr   | Mo    | Cu  | Fe   |
|------|------|------|-------|--------|------|------|-------|-----|------|
| 0.07 | 0.85 | 1.45 | <0.02 | <0.015 | 0.04 | 0.04 | 0.008 | 0.1 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|------------------------|------------------------|----------------------|----------|-----|
| 460                    | 530                    | 28                   | +20°C    | 120 |
|                        |                        |                      | -20°C    | 90  |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | ISO 14175:<br>I1 (Ar) : 6-12 l/min<br>Back shielding: Nitrogen / H <sub>2</sub> : 3-6 l/min |

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# TIG F57HP

## Classification

AWS A5.18 : ER70S-6  
 ISO 636-A : W 46 4 W3Si1

Material N° : ~ 1.5125

## Description & Applications

GTAW rods to weld low alloyed standard construction / boiler steels like S235-S355, P235-P355, S255N-S420N.

**Main applications:** For general metal constructions, in the automobile industry, blacksmithing, ship building etc.

### Base material:

### Construction steels for general use , Tube steels, Ship steels

|                 |                                      |  |
|-----------------|--------------------------------------|--|
| EN- Designation | S185 – S355<br>P235 – P355           | L210 – L360                                    |
| Ship steels     | Quality A and B                      |  |
| ASTM            | A285 grade C<br>A442 grade 55,<br>60 | A414 grade C, D, E, F<br>A515 grade 55, 60, 65 |

## Typical Chemical Composition ( % )

|      |      |      |       |        |      |      |       |      |      |
|------|------|------|-------|--------|------|------|-------|------|------|
| C    | Si   | Mn   | P     | S      | Ni   | Cr   | Mo    | Cu   | Fe   |
| 0.07 | 0.85 | 1.45 | <0.02 | <0.015 | 0.04 | 0.04 | 0.001 | 0.15 | Base |

## All Weld Metal Mechanical Properties

|               |               |             |            |     |
|---------------|---------------|-------------|------------|-----|
| $R_e$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) | $KV$ ( J ) |     |
| 470           | 560           | 26          | +20°C      | 120 |
|               |               |             | -20°C      | 90  |
|               |               |             | -40°C      | 60  |

## Welding Current & Instructions

|              |   |
|--------------|---|
| Welding mode | Shielding Gas   |
| TIG<br>= -   | ISO 14175:<br>I1 (Ar) : 6-12 l/min<br>Back shielding: Nitrogen / H <sub>2</sub> : 3-6 l/min |

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# TIG F57N

## Classification

AWS A5.18 : ER70S-G  
 ISO 636-A : W0

## Description & Applications

Copper coated solid wire for GTAW to weld low alloyed standard construction / boiler steels like S235-S355, P235-P355, S255N-S355.

This chromium content higher than ER70S-3 or ER70S-6 gives a particular resistance to corrosion/erosion due to the water.

**Main applications:** For pipping (in particular Nuclear) for root pass for high quality level of welding with specific control

**Base material:**

**Construction steels for general use , Tube steels, Ship steels**

|                 |             |             |
|-----------------|-------------|-------------|
| EN- Designation | S185 – S355 | L210 – L360 |
|                 | P235 – P355 |             |

## Typical Chemical Composition ( % )

| C    | Si   | Mn   | P     | S     | Cr   | Mo   | Ni   | Cu   | V     | Ti    | Zr    | Fe   |
|------|------|------|-------|-------|------|------|------|------|-------|-------|-------|------|
| 0.09 | 0.61 | 1.10 | 0.012 | 0.012 | 0.32 | 0.02 | 0.09 | 0.16 | 0.001 | 0.002 | 0.002 | Base |

## All Weld Metal Mechanical Properties

| $R_e$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) | KV ( J ) |     |
|---------------|---------------|-------------|----------|-----|
| 530           | 610           | 25          | -20°C    | 160 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | ISO 14175 :<br>Ar : 6-12 l/min<br>Back shielding : Nitrogen / H <sub>2</sub> : 3-6 l/min |

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# TIG F60

Old reference: TIG 80SD2

## Classification

AWS A5.28 : ER80S-D2

ISO 636-B : W4M31

## Description & Applications

Copper coated solid wire for GTAW -alloyed with Mo- for welding creep resisting steels used at temperatures up to 500°C. Good resistance to Hydrogen attacks (chemical installations). Used for piping systems, boilers...

### Base materials:

### Steels and pipes for boiler and pressure vessels:

|                 |  |
|-----------------|--|
| NF A 36-206     | : 15D3 - 18MD4 -05   |
| DIN 17155-17245 | : HI - HIII - GS C 25 17 Mn4   |
| DIN 17175-17102 | : 19Mn5 - 15Mo3 - GS22Mo4 St35,8 - St 45,8 - 17Mn4 - 19Mn5 - 15Mo3 - StE255 - StE420 |
| BS              | : BS 1504 Gr 245 BS 3100 Gr B1 BS 3606 Gr 243,245                                    |
| ASTM            | : A335 Gr P1 - A352 GrLC1 - A204 GrA and B-A 155 Gr CM 65/70                         |

## Typical Chemical Composition (%)

| C    | Si   | Mn   | Mo  | Cu   | P    | S    | O/T   | Fe   |
|------|------|------|-----|------|------|------|-------|------|
| 0.08 | 0.70 | 1.90 | 0.5 | 0.15 | 0.01 | 0.01 | <0.50 | Base |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> (MPa) | R <sub>m</sub> (MPa) | A <sub>5</sub> (%) | KV (J)    |
|-------------------------|----------------------|--------------------|-----------|
| 520                     | 630                  | 26                 | +20°C 200 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen /H <sub>2</sub> : 3 - 6 l/min |

FT En-T041A-1410

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# TIG F61

Old reference: TIG 70SA1

## Classification

AWS A5.28 : ER70S-A1

ISO 636-A : W2Mo

ISO 21952-A W MoSi

## Description & Applications

GTAW rods for welding creep resisting steels (alloyed Mo) used at temperatures up to 500°C. Good resistance to Hydrogen attacks (chemical installations).

**Main applications:** For piping systems, boilers...

### Base materials

#### Aciers de construction et aciers résistant au fluage / température

| EN              | ASTM                                    |
|-----------------|---|
| 16Mo3           | A161/A209/A250 gr T1 ;A335 gr P1        |
| P355GH          | A537 Cl1; A414 gr G ; A612              |
| S420N – S460N   | A572 grade 65 , A633 grade E            |
| S500N           | A225 grade C , A517 grade...            |
| P460N           | A225 grade C                            |
| S420NL - S500NL | A633 grade E, A225 grade C , A517 grade |
| P420NH - P500NH | A633 grade E, A225 grade C , A517 grade |

## Typical Chemical Composition (%)

| C    | Si  | Mn  | Mo  | Ni   | Cu   | Cr   | V     | Al    | Ti+Zr | P    | S    | Fe   |
|------|-----|-----|-----|------|------|------|-------|-------|-------|------|------|------|
| 0.09 | 0.6 | 1.1 | 0.5 | 0.05 | 0.15 | 0.09 | 0.003 | 0.003 | 0.001 | 0.01 | 0.01 | Base |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ (MPa) | $R_m$ (MPa) | $A_5$ (%) | KV (J)    |
|------------------|-------------|-----------|-----------|
| 520              | 630         | 26        | +20°C 200 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen /H <sub>2</sub> : 3 - 6 l/min |

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# TIG F63

Old reference: TIG 80SB2

## Classification

AWS A5.28 : ER80S-B2  
ISO 21952-B : W 1CM

Material N° : 1.7339

## Description & Applications

GTAW rods to weld heat and creep resistant Cr/Mo steels applied at service temperatures up to 550°C.

**Main applications:** petrochemical industry, chemical industry.

### Base materials:

### Steels and pipes for boiler and pressure vessels:

|             |   |  |
|-------------|---|--|
| NF A 36-206 | : | 15D3 - 18MD4 -05 -15CD2.05 - 15 CD4.05 |
| DIN 17155   | : | 13 CrMo 4.4 - 15CrMo3 - 13CrMoV42      |
| DIN 1681    | : | GS 22 CrMo5.4 – GS 22 Mo4              |
| ASTM        | : | A537 - A299 A355 GrP11 u. P12          |

### Heat treatable steels:

|             |   |               |
|-------------|---|---------------|
| NF A 35-551 | : | 18CD4 - 16CM5 |
| NF A 35-552 | : | 25CD4         |
| DIN 17210   | : | 25CrMo4       |

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr  | Mo  | Cu  | P     | S     | Fe   |
|-----|-----|-----|-----|-----|-----|-------|-------|------|
| 0.1 | 0.5 | 0.6 | 1.3 | 0.5 | 0.2 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|------------------------|------------------------|----------------------|-----------|
| 490                    | 590                    | 25                   | +20°C 200 |

After PWHT at 700°C/1h

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen / H <sub>2</sub> : 3-6 l/min |

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# TIG F68

Old reference: TIG 90SB3

## Classification

AWS A5.28 : ER90S-B3  
 ISO 21952-A : W Z CrMo2Si

Material N° : 1.7384

## Description & Applications

GTAW rods for welding creep resisting steels (alloyed with Cr and Mo) used in service up to 600°C (including 2% Cr- 1% Mo castings). High resistance to H2S...

**Main applications:** For overheaters, valve bodies, pipes, boilers, hydrocrackers.

### Base materials:

#### Steels and pipes for boiler and pressure vessels:

|                               |   |
|-------------------------------|---|
| NF A 36-206                   | : 15CD4-05 – 10CD9-10   |
| DIN 17155 and 17245           | : 10 Cr Mo 9.10 – 10 Cr Si Mo V7  |
|                               | : 24 CrMo V55 – 12 Cr Mo 9.10 GS 12 Cr MO 9.10...                       |
| BS                            | : 1501 Gr 622 to 1504 Gr 622, BS 359 Gr 622/640 1503 Gr 660, 1504Gr 660 |
| ASTM                          | : A 387 GrD – A 335 GrP 22 – A 213 GrT 22, T36                          |
| Nuance Vallourec: Chromesco 3 |   |

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr  | Mo  | Cu  | P      | S      | Fe   |
|-----|-----|-----|-----|-----|-----|--------|--------|------|
| 0.1 | 0.6 | 0.6 | 2.4 | 1.0 | 0.2 | <0.015 | <0.015 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|------------------------|------------------------|----------------------|-----------|
| 550                    | 630                    | 22                   | +20°C 180 |
| After PWHT 700°C/1h    |                        |                      |           |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen / H <sub>2</sub> : 3-6 l/min |

ind.13

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# TIG F69

Old reference: TIG CrMo5

## Classification

AWS A5.9 : ER502

AWS A5.28 : ER80SB-6

ISO 21952-A : W CrMo5Si

## Description & Applications

GTAW rod for welding of creep resisting steels used in the chemical industry and in thermal power plants. Good resistance against steam and hot gases.

**Main applications:** High temperature exchangers, piping...

**Base materials:**

**Steels and pipes for boiler and pressure vessels:**

|         |   |   |
|---------|---|---|
| EN      | : | 17 CrMo 3 5 – 12 CrMo 19 5 – G X12 CrMo5  |
| Mat. N° | : | 1.7332 ; 1.7362 ; 1.7363  |
| ASTM    | : | A387 Gr 5Cl1 et 2 – A199 Gr T5 – A182 Gr F5 – A213 G T5<br>A335 Gr P5 – A336 Gr F5 – A369 GrF5 – A217 Gr C5 |
| EN      | : | 17 CrMo 3 5 – 12 CrMo 19 5 – G X12 CrMo5  |

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr  | Ni  | Mo   | Cu   | P     | S     | Fe   |
|------|-----|-----|-----|-----|------|------|-------|-------|------|
| 0.08 | 0.4 | 0.5 | 5.6 | 0.1 | 0.55 | 0.15 | <0.02 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|------------------------|------------------------|----------------------|
| 500                    | 620                    | 20                   |
| After PWHT at 730°C/2h |                        |                      |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen / H <sub>2</sub> : 3-6 l/min |

ind.10



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# TIG F609

Old reference: TIG 80SB8

## Classification

AWS A5.28 : ER80S-B8

ISO 21952-A : W CrMo9Si

## Description & Applications

GTAW rods for welding creep resisting steels of similar chemical composition used at service temperatures up to 600°C. Deposit resisting to temperature and creep up to 600°C. Highly resistant to hot gas and overheated steam.

**Main applications:** For power plants, heat exchangers, tubes, steam boilers...

### Base materials:

|        | EN           | ASTM                     |
|--------|--------------|--------------------------|
| 1.7386 | X12CrMo9-1   | A187 Gr F9 ; A336 Gr F9  |
| 1.7386 | X12CrMo9-1   | A335 Gr P9               |
| 1.7386 | X12CrMo9-1   | A199 / A200 / A213 Gr T9 |
| 1.7389 | GX12CrMo10-1 | A217 C12                 |

Steels and pipes for boiler and pressure vessels

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr  | Mo  | Cu  | P      | S      | Fe   |
|------|-----|-----|-----|-----|-----|--------|--------|------|
| 0.07 | 0.4 | 0.5 | 9.0 | 1.0 | 0.2 | <0.015 | <0.015 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 530                       | 670                    | 24                   | +20°C 150 |
| After PWHT 760°C/2h       |                        |                      |           |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen / H <sub>2</sub> : 3-6 l/min |

Pre-heating and interpass temperature: 200-300°C. Post weld heat treatment is advised at 760°C during 2 hours and then cooled slowly (55°C/h) up to 580°C, following by air cooling to room temperature.

ind.10





# TIG F691

Old reference: TIG 90SB9

## Classification

AWS A5.28 : ER90S-B9

ISO 21952-A : W CrMo91

## Description & Applications

GTAW rods for welding creep resisting steels of similar chemical composition (known as P91) used at service temperatures up to 650°C. Deposit resisting to temperature and creep up to 650°C. Highly resistant to hot gas and overheated steam.

**Main applications:** For power plants, heat exchangers, tubes, steam boilers...

### Base materials **Plates and pipes for boiler and pressure vessels**

| Mat. N° | EN            | ASTM                                    |
|---------|---------------|---|
| 1.7386  | X12CrMo9-1    | A187 Gr F9; A336 Gr F9; A335 Gr P9      |
| 1.4903  | X10CrMoVNb9-1 | A199 gr. T91; A335 gr. P91; A213 gr T91 |

## Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cr  | Ni   | Mo   | Cu   | V   | Nb   | N    | P     | S     |
|------|------|-----|-----|------|------|------|-----|------|------|-------|-------|
| 0.09 | 0.25 | 0.6 | 8.8 | 0.65 | 0.95 | 0.03 | 0.2 | 0.06 | 0.05 | 0.002 | 0.007 |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa )    | $R_m$ ( MPa ) | $A_5$ ( % ) |
|-----------------------|---------------|-------------|
| 650                   | 750           | 18          |
| After PWHT 760°C / 2h |               |             |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen /H <sub>2</sub> : 3 - 6 l/min |

Preheating and interpass temperature: 200-300°C. post weld heat treatment is advised at 760°C/2h, slow cooling (80°C/h) up to 300°C. Then, slow cooling at still air.

ind.11



# TIG F81

Old reference: TIG 80SNi1

## Classification

AWS A5.28 : ER80S-Ni1

ISO 636-A : W3Ni1

## Description & Applications

Filler metal rod for GTAW welding under shielding gas for fine grain construction steels and nickel alloyed steels. Resistant to low temperature down to -40°C. Good characteristics of cold toughness.

**Main applications:** For liquid gas distribution pipes, tanks, off shore, and petro-chemistry.

### Base materials

### High strength steels, fine grain construction steels, cold tough:

|      |  |
|------|--|
| EN   | S185 – S355 – P235GH – P355 – L210 – L415 – S/P275 – S/P460 – E295 – E335 – E360 – P295GH – P355GH – P235 – P265 – A St35 – A St52 – GP240R.   |
| ASTM | A302 Gr A, B, C, D – A333 Gr 126 – A414 Gr G – A487 Gr BQ CQ<br>A521 Gr AA, AB, CE, CF, LF1 – A537 C12 – A572 Gr 60&65<br>A350 Gr 126 – A350 Gr LF1, LF2 – A607 Gr 60&65 – A633 Gr A&B<br>LF5 A668 Gr E&F – A714 Gr I à VI |

## Typical Weld Metal Composition ( % )

|      |     |     |     |      |       |       |      |
|------|-----|-----|-----|------|-------|-------|------|
| C    | Si  | Mn  | Ni  | Mo   | P     | S     | Fe   |
| 0.10 | 0.6 | 1.2 | 1.0 | 0.35 | <0.02 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0,2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )       |
|---------------------------|------------------------|----------------------|----------------|
| 500                       | 600                    | 26                   | +20°C<br>-40°C |
|                           |                        |                      | 130<br>80      |

## Weld Current & Instructions

| Welding mode | Shielding gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding: Nitrogen /H <sub>2</sub> : 3 - 6 l/min |

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# TIG F82

Old reference: TIG 80SNi2

## Classification

AWS A5.28 : ER80S-Ni2

ISO 636-A : W2Ni2

## Description & Applications

Filler metal rod for GTAW welding under shielding gas for fine grain construction steels and nickel alloyed steels. Resistant to low temperature down to -60°C. Good characteristics of cold toughness.

**Main applications:** For liquid gas distribution pipes, tanks, off shore, and petro-chemistry.

### Base materials

#### High strength steels, fine grain construction steels, cold tough:

| EN               | Material N° | ASTM                                    |
|------------------|-------------|---|
| 12Ni9            | 1.5635      |   |
| 14Ni6            | 1.5622      | A352 gr. LC2                            |
| 13MnNi6-3 1.6217 | 1.6217      |   |
| S/P275-S/P420    |             | A516 / A255 / A299 / A333 / A350        |
| P235T1/2-P355N   |             | A369 / A210/ A106                       |
| L210-L485        |             |   |
| S255 - S550      |             | A516 / A255 / A333 / A350 / A612 / A714 |

## Typical Weld Metal Composition ( % )

| C    | Si  | Mn  | Ni  | Mo   | P     | S     | Fe   |
|------|-----|-----|-----|------|-------|-------|------|
| 0.08 | 0.6 | 1.1 | 2.5 | 0.05 | <0.02 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |      |
|---------------------------|------------------------|----------------------|----------|------|
| 530                       | 620                    | 26                   | -20°C    | 130  |
|                           |                        |                      | -40°C    | 100  |
|                           |                        |                      | -60°C    | > 90 |

## Weld Current & Instructions

| Welding mode | Shielding gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding: Nitrogen /H <sub>2</sub> : 3 - 6 l/min |

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## TIG A 60

### Classification

AIR 9117 : A 60

### Description & Applications

GTAW rod for welding of steels such as XC18S, E26, E36...

### Typical Chemical Composition ( % )

| C     | Si  | Mn  | Cu  | P     | S     | Si+Al+Ti | Fe   |
|-------|-----|-----|-----|-------|-------|----------|------|
| <0.12 | 0.6 | 1.0 | 0.2 | <0.02 | <0.02 | <0.90    | Rem. |

### All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|------------------------|------------------------|----------------------|
| 380                    | 550                    | 24                   |

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen / H <sub>2</sub> : 3-6 l/min |

ind.10

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## TIG BMS

### Classification

AIR 9117 : 8CD12

### Description & Applications

Solid rod for TIG welding of steels such as 15CrMoV6, 25CrMo4, 35CrMo4, 20CrMo12... Product of high purity for welding without micro-porosity.

Also used for build up of tool steels.

### Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr  | Mo  | P      | S      | Fe   |
|------|-----|-----|-----|-----|--------|--------|------|
| 0.06 | 0.7 | 1.1 | 2.7 | 1.0 | <0.015 | <0.015 | Rem. |

### All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | Hardness |
|------------------------|------------------------|----------------------|----------|
| 440                    | 570                    | 24                   | ~36 HRC  |

After PWHT 730°C/2h

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen / H <sub>2</sub> : 3-6 l/min |

Preheating of work-pieces: ~250°C. Post weld heat treatment: 730°C/2h.

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# TIG MV5S

## Classification

DIN 8555 : MSG-3-GZ-60-P

EN 14700 : S Fe4

## Description & Applications

Solid rod for TIG welding and hardfacing. Resistant to temperatures up to 550°C. Product of high purity for welding without microporosity. Mainly used for build up on equipments stressed by high impact and abrasion.

**Main applications:** Moulds for plastic injections, cold working stools, shredder hammers

## Typical Chemical Composition ( % )

| C   | Cr  | Mo  | V   | W   | Fe   |
|-----|-----|-----|-----|-----|------|
| 0.5 | 5.0 | 1.3 | 0.4 | 1.3 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
60 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Pre-heating at 300-400°C of massive parts. Maintain temperature during welding and cold slowly.

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## TIG SCVS

### Classification

AIR 9117 : 15CDV6 Material N° 1.7734

### Description & Applications

Solid rod for TIG welding of steels such as 15CrMoV6, 25CrMo4, 35CrMo4, 20CrMo12... Also used for hardfacing

Product of high purity for welding without microporosity. Exist in copper coated version

**Main applications :** Hardfacing for tool steels, plastic molds,

### Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cr  | Mo  | V    | P     | S     | Fe   |
|------|------|-----|-----|-----|------|-------|-------|------|
| 0.14 | 0.15 | 1.0 | 1.4 | 0.9 | 0.25 | <0.02 | <0.02 | Rem. |

### All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa )      | R <sub>m</sub> ( MPa )      | A <sub>5</sub> ( % ) | Hardness |
|-----------------------------|-----------------------------|----------------------|----------|
| 930                         | 1080-1280                   | 10                   | 42 HRC   |
| Depending on heat treatment | Depending on heat treatment |                      |          |

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen / H <sub>2</sub> : 3-6 l/min |

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# TIG F66S

## Classification

AIR 9117 : 25CD4 Material N° : 1.7218  
 EN 4331 : 25CrMnMo4-2-2

## Description & Applications

Solid rod for TIG welding of steels such as 25CrMo4, 35CrMo4, 20CrMo12... Product of high purity for welding without microporosity.

Also used for hardfacing of tool steels.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr  | Mo  | Ni   | P     | S     | Fe   |
|------|-----|-----|-----|-----|------|-------|-------|------|
| 0.23 | 0.2 | 0.7 | 1.2 | 0.2 | 0.15 | <0.02 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa )      | R <sub>m</sub> ( MPa )      | A <sub>5</sub> ( % ) | Hardness |
|-----------------------------|-----------------------------|----------------------|----------|
| 750                         | 880-1080                    | 12                   | 46 HRC   |
| Depending on heat treatment | Depending on heat treatment |                      |          |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Nitrogen / H <sub>2</sub> : 3-6 l/min |

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# TIG 18/8MN

Old reference: TIG 307Si

## Classification

ISO 14343-A : W 18 8 Mn  
 AWS A5.9 : ~ ER307

Material.N° : 1.4370

## Description & Applications

Solid rod for TIG welding and overlaying on manganese steel, high sulphur and phosphorus contain steels. Also used for joining dissimilar steels as construction steels to stainless steels, as well as for cushion layers prior hardfacing, for repairing of pieces submitted to shocks or wear.

**Main applications:** Civil engineering, cimenteries...

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni  | Mo  | Cu   | P     | S     | Fe   |
|------|-----|-----|------|-----|-----|------|-------|-------|------|
| 0.09 | 0.9 | 7.0 | 19.0 | 8.5 | 0.1 | 0.08 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 450                       | 650                    | 40                   | +20°C 120 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 20/10

Old reference: TIG 308L

## Classification

ISO 14343-A : W 19 9 L  
 AWS A5.9 : ER308L

Material.N° : 1.4316

## Description & Applications

Solid low carbon rod for TIG welding of stainless steels (304L, 304, 347, 321...). The TIG process is particularly suited for welding of piping systems, works of fine thinness equal or inferior than 3 mm and for penetration passes.

## Typical Chemical Composition ( % )

| C     | Si   | Mn  | Cr   | Ni  | P     | S      | Fe   |
|-------|------|-----|------|-----|-------|--------|------|
| 0.015 | 0.42 | 1.8 | 19.5 | 9.8 | <0.02 | <0.015 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|---------------------------|------------------------|----------------------|----------|-----|
| 430                       | 600                    | 38                   | +20°C    | 150 |
|                           |                        |                      | -196°C   | 50  |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

ind.10

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# TIG 20/10C

Old reference: TIG 308H

## Classification

ISO 14343-A : W 19 9 H  
AWS A5.9 : ER308H

Material.N° : 1.4948

## Description & Applications

Solid low carbon rod for TIG welding of stainless steels (type 304H, 308H, 321H, and 347H). This type is generally reserved for creep-resistant pieces and oxidation resistance of working temperatures between 400° to 750° C.

The TIG process is particularly suited for welding of piping systems, works of fine thinness equal or inferior than 3 mm and for penetration passes.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni  | P     | S      | Fe   |
|------|-----|-----|------|-----|-------|--------|------|
| 0.05 | 0.4 | 1.8 | 19.9 | 9.7 | <0.02 | <0.015 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  | FN |
|---------------------------|------------------------|----------------------|-----------|----|
| 380                       | 580                    | 35                   | +20°C 100 | 6  |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

ind.10



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# TIG 20/10T

Old reference: TIG 321

## Classification

ISO 14343-A : W Z 19 9 Ti  
 AWS A5.9 : ~ER321

Material N° : 1.4541

## Description & Applications

Solid rod for TIG welding of stabilised stainless steels (321...) or low carbon content stainless steels (304L...). Good intergranular resistant corrosion. The TIG process is particularly suited for welding of piping systems, works of fine thinness equal or inferior than 3 mm.

**Main applications:** Aeronautical industry.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni   | Mo  | Cu  | Ti  | P     | S     | Fe   |
|------|-----|-----|------|------|-----|-----|-----|-------|-------|------|
| 0.03 | 0.5 | 1.5 | 18.0 | 10.5 | 0.3 | 0.3 | 0.2 | <0.03 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 460                       | 630                    | 35                   | +20°C 110 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 20/10NB

Old reference: TIG 347

## Classification

ISO 14343-A : W 19 9 Nb  
AWS A5.9 : ER347

Material.N° : 1.4551

## Description & Applications

Solid rod for TIG welding of stabilised stainless steels (347, 321...) or low carbon content stainless steels (304L...). Good intergranular resistant corrosion.  
The TIG process is particularly suited for welding of piping systems, works of fine thinness equal or inferior than 3 mm and for penetration passes.

## Typical Chemical Composition ( % )

| C     | Si  | Mn  | Cr   | Ni  | Mo  | Nb  | Cu  | P     | S     | Fe   |
|-------|-----|-----|------|-----|-----|-----|-----|-------|-------|------|
| 0.045 | 0.4 | 1.5 | 19.4 | 9.3 | 0.1 | 0.6 | 0.1 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 490                       | 660                    | 35                   | +20°C 140 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 20/10M

Old reference: TIG 316L

## Classification

ISO 14343-A : W 19 12 3 L  
 AWS A5.9 : ER316L

Material.N° : 1.4430

## Description & Applications

Low carbon solid rod for TIG welding of stabilised stainless steels (316, 316L...) stabilised or not. Service temperature from -120°C up to +400°C. The TIG process is particularly suited for welding of piping systems, works of fine thinness equal or inferior than 3 mm and for penetration passes.

**Main applications:** Applied in the chemical and petrochemical industries, refineries, food industries...

### Base materials:

| UNS    | Grade | EN 10088          | N° Mat. |
|--------|-------|-------------------|---------|
| S31600 | 316   | X5CrNiMo17-12- 2  | 1.4401  |
| S31603 | 316L  | X2CrNiMo17-12-2   | 1.4404  |
| S31635 | 316Ti | X6CrNiMoTi17-12-3 | 1.4571  |
| S30400 | 304   | X5CrNi18-10       | 1.4301  |
| S30403 | 304L  | X2CrNi18-10       | 1.4306  |

## Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cr   | Ni   | Mo  | Cu   | P     | S     | Fe   |
|------|------|-----|------|------|-----|------|-------|-------|------|
| 0.02 | 0.45 | 1.8 | 18.6 | 12.4 | 2.8 | 0.08 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )        |
|---------------------------|------------------------|----------------------|-----------------|
| 410                       | 610                    | 35                   | +20°C<br>-196°C |
|                           |                        |                      | 140<br>45       |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 20/10MN

Old reference: TIG 316MnN

## Classification

ISO 14343-A : W 20 16 3 Mn N L      Material N° : 1.4455  
 AWS A5.9 : ER316LMn

## Description & Applications

Rod for Gas Tungsten Arc Welding, designed to weld austenitic stainless like 316L grade. Non-magnetic and free of ferrite on weld deposit. Mainly used for cryogenic applications.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni   | Mo  | Cu   | P     | S     | N    | Fe   |
|------|-----|-----|------|------|-----|------|-------|-------|------|------|
| 0.02 | 0.5 | 7.0 | 20.0 | 16.0 | 3.0 | 0.15 | <0.02 | <0.01 | 0.15 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|---------------------------|------------------------|----------------------|----------|-----|
| 500                       | 650                    | 30                   | +20°C    | 140 |
|                           |                        |                      | -196°C   | 95  |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon or Nitrogen: 3-6 l/min |

Ind.10

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# TIG 20/10MNB

Old reference: TIG 318

## Classification

ISO 14343-A : W 19 12 3 Nb  
AWS A5.9 : ER318

Material.N° : 1.4576

## Description & Applications

Low carbon solid rod for TIG welding of stabilised stainless steels (318, 316Ti...). Good intergranular resistant corrosion. Service temperature from -120°C up to +400°C. The TIG process is particularly suited for welding of piping systems, works of fine thickness equal or inferior than 3 mm and for penetration passes.

**Main applications:** Applied in the petrochemical industries and for sea water applications...

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni   | Mo  | Nb  | Cu  | P     | S     | Fe   |
|------|-----|-----|------|------|-----|-----|-----|-------|-------|------|
| 0.04 | 0.4 | 1.7 | 19.6 | 11.5 | 2.6 | 0.6 | 0.2 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 400                       | 620                    | 35                   | +20°C 120 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 20/10MNBS

Old reference: TIG 318Si

## Classification

ISO 14343-A : W 19 12 3 Nb Si  
 AWS A5.9 : ~ER318

Material N° : 1.4576

## Description & Applications

Low carbon solid rod for TIG welding of stabilised stainless steels (318, 316Ti...). Good intergranular resistant corrosion. Service temperature from -120°C up to +400°C. The TIG process is particularly suited for welding of piping systems, works of fine thickness equal or inferior than 3 mm and for penetration passes.

**Main applications:** Applied in the petrochemical industries and for sea water applications...

## Typical Chemical Composition (%)

| C    | Si   | Mn  | Cr   | Ni   | Mo  | Nb  | Cu  | P     | S     | Fe   |
|------|------|-----|------|------|-----|-----|-----|-------|-------|------|
| 0.04 | 0.85 | 1.7 | 19.6 | 11.5 | 2.6 | 0.6 | 0.2 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> (MPa) | R <sub>m</sub> (MPa) | A <sub>5</sub> (%) | KV (J)    |
|-------------------------|----------------------|--------------------|-----------|
| 400                     | 620                  | 35                 | +20°C 120 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 24/12

Old reference: TIG 309L

## Classification

ISO 14343-A : W 23 12 L  
AWS A5.9 : ER309L

Material.N° : 1.4332

## Description & Applications

Solid rod for TIG welding of stainless steels (309, 309L...). Well adapted for welding of dissimilar steels. Its high ferrite content allows for greater dilution without risk of cracking. Also suitable for welding high temperature steels and as buffer layer before hardfacing.

## Typical Chemical Composition ( % )

| C     | Si  | Mn  | Cr   | Ni   | Mo  | Cu   | P     | S     | Fe   |
|-------|-----|-----|------|------|-----|------|-------|-------|------|
| 0.015 | 0.4 | 1.8 | 23.2 | 13.8 | 0.1 | 0.08 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|---------------------------|------------------------|----------------------|----------|-----|
| 420                       | 620                    | 35                   | +20°C    | 140 |
|                           |                        |                      | -60°C    | 70  |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 24/12M

Old reference: TIG 309LMo

## Classification

ISO 14343-A : W 23 12 2 L  
 AWS A5.9 : ~ER309LMo

Material N° : 1.4459

## Description & Applications

Rod for Gas Tungsten Arc Welding for joining of stainless steels, 23 Cr - 12 Ni - 2 Mo type, used to weld on 316L stainless steels and for dissimilar joints between construction / mild steels and stainless steels. Used for intermediate layer for a 316L type cladding and buffer layer before hardfacing. Highly crack resistant. Highly corrosion resistance.

## Typical Chemical Composition ( % )

| C     | Si   | Mn  | Cr   | Ni   | Mo  | Cu  | P     | S     | Fe   | FN   |
|-------|------|-----|------|------|-----|-----|-------|-------|------|------|
| 0.015 | 0.55 | 1.5 | 21.5 | 14.5 | 2.6 | 0.1 | <0.02 | <0.01 | Rem. | ~ 12 |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
| 400                       | 600                    | 35                   | 20°C 120 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon or Nitrogen/H <sub>2</sub> : 3 - 6 l/min |

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# TIG 25/20

Old reference: TIG 310

## Classification

ISO 14343-A : W 25 20  
 AWS A5.9 : ER310

Material.N° : 1.4842

## Description & Applications

Solid rod for TIG welding of similar austenitic steels (310...). Well adapted for welding of dissimilar steels.

Also suitable for welding high temperature resistant steels till about 1000°C.

## Typical Chemical Composition ( % )

| C   | Si   | Mn  | Cr   | Ni   | Mo  | Cu  | P     | S     | Fe   |
|-----|------|-----|------|------|-----|-----|-------|-------|------|
| 0.1 | 0.45 | 1.7 | 26.0 | 20.5 | 0.1 | 0.1 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|---------------------------|------------------------|----------------------|----------|-----|
| 380                       | 580                    | 40                   | +20°     | 170 |
|                           |                        |                      | -196°C   | 60  |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 29/9

Old reference: TIG 312

## Classification

ISO 14343-A : W 29 9  
AWS A5.9 : ER312

Material.N° : 1.4337

## Description & Applications

Solid rod for TIG welding of dissimilar steels with an austenitic-ferritic stainless steel deposit. Well adapted for steels difficult to weld as tool steels, Mn steels, spring steels... Metal deposit highly resistant to cracks, suitable for buffer layers before hardfacing and for building up cutting tools.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr   | Ni  | Mo   | Cu  | P     | S     | Fe   |
|-----|-----|-----|------|-----|------|-----|-------|-------|------|
| 0.1 | 0.4 | 1.8 | 30.2 | 9.3 | 0.15 | 0.1 | <0.02 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 520                       | 730                    | 25                   | +20°C 100 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 316H

## Classification

AWS A5.9 : ER316H

ISO 14343-A : W 19 12 3 H

## Description & Applications

Rod for Gas Tungsten Arc Welding, with increased carbon and approx. 5% ferrite designed to weld 17/12/2 (316H) stainless steels as well as stabilized grades used for high temperature service up to 750°C.

**Main applications:** In petrochemical industries, tanks, heat exchangers, piping systems.

## Base materials

### Stainless steels for general use:

| UNS    | Alloy | EN 10088          | Mat. N° |
|--------|-------|-------------------|---------|
| S31600 | 316   | X5CrNiMo17 12 2   | 1.4401  |
| S31609 | 316H  | X6CrNiMoN17 132   | 1.4919  |
| S31635 | 316Ti | X10CrNiMoTi18 12  | 1.4573  |
| S31640 | 316Cb | X6NiCrMoNb17 12 2 | 1.4580  |
| J92920 | 316H  |                   |         |

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni   | Mo  | Cu   | P    | S    | Fe   | FN  |
|------|-----|-----|------|------|-----|------|------|------|------|-----|
| 0.05 | 0.4 | 1.7 | 18.5 | 11.5 | 2.1 | 0.05 | 0.02 | 0.01 | Rem. | ~ 5 |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
|--------------------|---------------|-------------|
| > 380              | > 580         | > 30        |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon or Nitrogen / H <sub>2</sub> : 3-6 l/min |

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# TIG 18/15

Old reference: TIG 317L

## Classification

AWS A5.9 : ER317L  
UNS : S31783

ISO 14343-A : W 18 15 3 L

## Description & Applications

Rod for Gas Tungsten Arc Welding low carbon stainless steel composition with about 3,5%Mo. For welding and cladding on austenitic Cr-Ni-Mo stainless and clad plates. Compared to 316L-grades the higher Mo-content provides better general corrosion resistance, especially to crevice and pitting corrosion in chloride containing solutions.

**Main applications:** Used in the chemical and petrochemical industries, in refineries, in the food industries and for ship building to weld pipes, tanks...

### Base materials

#### Stainless steels for general use:

| UNS    | Alloy  | EN 10088         | Material N° | UGINE           |
|--------|--------|------------------|-------------|-----------------|
| S31603 | 316L   | X2CrNiMo17-12-2  | 1.4404      | UGINOX 18-11 ML |
| S31653 | 316LN  | X2CrNiMoN17-13-3 | 1.4429      | UGINOX 17-10 M  |
| S31700 | 317    | X5CrNiMo17-13-3  | 1.4449      |                 |
| S31703 | 316LMo | X2CrNiMo18-14-3  | 1.4435      | UGINOX 18-13 MS |
| S31703 | 317L   | X2CrNiMo 18-15-4 | 1.4438      |                 |

## Typical Chemical Composition (%)

| C    | Si  | Mn  | Cr   | Ni   | Mo  | Cu   | P     | S     | Fe   | FN   |
|------|-----|-----|------|------|-----|------|-------|-------|------|------|
| 0.01 | 0.4 | 1.4 | 18.8 | 13.6 | 3.5 | 0.10 | <0.03 | <0.02 | Rem. | ~ 10 |

## All Weld Metal Mechanical Properties

| $R_{p0,2}$ (MPa) | $R_m$ (MPa) | $A_5$ (%) |
|------------------|-------------|-----------|
| > 380            | > 580       | > 30      |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon or Nitrogen /H <sub>2</sub> : 3 - 6 l/min |

Ind.11

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# TIG 347H

## Classification

AWS A5.9 : ER347 (347H)

ISO 14343-A : W 19 9 Nb

## Description & Applications

Rod for Gas Tungsten Arc Welding, Niobium / Columbium stabilized 18%Cr-8%Ni type stainless steel rod with increased Carbon, suited to weld Ti or Nb stabilized stainless steels, used for high temperature service.

### Base materials

#### Stainless steels for high temperature services:

| UNS    | Alloy | EN 10088      | Material N° |
|--------|-------|---------------|-------------|
| S30409 | 304H  | X6CrNi18-10   | 1.4948      |
| S32109 | 321H  | X8CrNiTi18-10 | 1.4878      |
| S34709 | 347H  | X7CrNiNb18-10 | 1.4912      |

## Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cr   | Ni  | Mo  | Cu  | Nb   | P     | S     | FN  |
|------|------|-----|------|-----|-----|-----|------|-------|-------|-----|
| 0.05 | 0.45 | 1.7 | 19.5 | 9.1 | 0.2 | 0.1 | 0.65 | <0.03 | <0.02 | ~10 |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
|--------------------|---------------|-------------|
| >380               | >580          | >30         |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding :Argon or Nitrogen /H <sub>2</sub> : 3-6 l/min |

Ind.11

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# TIG 20/25CU

Old reference: TIG 385

## Classification

ISO 14343-A : W 20 25 5 Cu L  
 AWS A5.9 : ER385

Material N° : 1.4519

## Description & Applications

Very low carbon content solid rod for TIG welding of totally austenitic stainless steels (Uranus B6\*, 904L...). Very good resistance to attacks by phosphoric and sulphuric acids. High resistance against pitting and stress corrosion in chloride containing media.

The TIG process is particularly suited for welding of piping systems, works of fine thinness equal or inferior than 3 mm and for penetration passes.

\* Trademark of CREUSOT LOIRE

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni   | Mo  | Cu  | P     | S     | Fe   |
|------|-----|-----|------|------|-----|-----|-------|-------|------|
| 0.01 | 0.4 | 1.8 | 20.0 | 25.0 | 4.5 | 1.5 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|---------------------------|------------------------|----------------------|----------|-----|
| 350                       | 550                    | 36                   | +20°C    | 120 |
|                           |                        |                      | -196°C   | 80  |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 27/31CU

Old reference: TIG 383

## Classification

AWS A5.9 : ER383

ISO 14343-A : W 27 31 4 Cu L

## Description & Applications

Very low carbon content GTAW rod for joining of totally austenitic stainless steels (Uranus B28, Sanicro 28...). Very good resistance to attacks by phosphoric and sulphuric acids. High resistance against pitting and stress corrosion in chloride containing media.

TIG welding is particularly recommended for piping systems, root penetration and for thin thickness plates.

Sanicro is a trade name of Sandvik, Uranus is a trade name of Creusot Loire Industries

## Base materials

| UNS    | Aciers | EN 10088          | N°d'alliage | UGINE / CLI |
|--------|--------|-------------------|-------------|-------------|
| N08028 | 28     | X1NiCrMoCu31-27-4 | 1.4563      | URANUS B28  |
| N08904 | 904L   | X1NiCrMoCu25-20-5 | 1.4539      | URANUS B6   |

## Typical Chemical Composition (%)

| C    | Si   | Mn  | Cr   | Ni   | Mo  | Cu  | P     | S     | Fe   |
|------|------|-----|------|------|-----|-----|-------|-------|------|
| 0.01 | 0.15 | 1.8 | 27.0 | 31.0 | 3.5 | 1.0 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> (MPa) | R <sub>m</sub> (MPa) | A <sub>5</sub> (%) | KV (J)    |
|-------------------------|----------------------|--------------------|-----------|
| 350                     | 550                  | 35                 | +20°C 100 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon/Nitrogen : 3-6 l/min |

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# TIG M13/0

Old reference: TIG 410

## Classification

ISO 14343-A : W 13  
 AWS A5.9 : ER410

Material N° : 1.4009

## Description & Applications

Solid rod for TIG welding stainless steels (403, 405, 416...). Resistant to atmosphere corrosion, water corrosion and light acids.

Mainly applied in welding and hardfacing of piping systems, working at service temperature < 450°C.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | P     | S     | Fe   |
|------|-----|-----|------|-------|-------|------|
| 0.10 | 0.3 | 0.5 | 13.0 | <0.03 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
| 250                       | 450                    | 15                   | +20°C 90 |

After PWHT at 750°C/2h

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG M13/0C

Old reference: TIG 420 / Finox14R

## Classification

AWS A5.9 : ER420

N° Mat. : 1.4028

## Description & Applications

Stainless filler metal used for hardfacing steel with 13% chromium designed to resist at atmospheric, water and steam corrosion

**Main applications:** Used for pipind, valves, taps with a service temperature up to 450°C

## Typical Chemical Composition ( % )

| C   | Si  | Mn   | Cr   | P     | S     | Fe   |
|-----|-----|------|------|-------|-------|------|
| 0.3 | 0.5 | 0.55 | 13.0 | <0.03 | <0.02 | Base |

## All Weld Metal Mechanical Properties

Hardness  
~350 HB

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG M13/4

Old reference: TIG 410NiMo

## Classification

AWS A5.9 : ER410NiMo  
ISO 14343-A : W 13 4

Material N° : ~1.4351

## Description & Applications

GTAW rod for repair and construction welding of martensitic Cr-Ni steels with a similar composition. These steels / castings are used for hydraulic turbines, pumps, valve bodies, compressor parts... Soft fusion, slag easy to remove, nice aspect of weld bead.

### Base materials

### Martensitic stainless steels and castings:

| UNS    | Alloy  | EN/ Symbol     | Material N° |
|--------|--------|----------------|-------------|
| J91540 | CA6-NM | G-X5CrNi13-4   | 1.4313      |
| S41500 |        | X3CrNiMo13-4   | 1.4313      |
|        |        | G-X4CrNi13-4   | 1.4317      |
|        |        | G-X5CrNiMo13-4 | 1.4407      |
|        |        | X3CrNiMo13-4   | 1.4413      |
|        |        | G-X4CrNiMo13-4 | 1.4414      |

## Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cr   | Ni  | Mo  | Cu   | P     | S     | Fe   |
|------|------|-----|------|-----|-----|------|-------|-------|------|
| 0.02 | 0.45 | 0.5 | 12.3 | 4.2 | 0.5 | 0.08 | <0.03 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 750                       | 840                    | 19                   | +20°C 120 |

After PWHT 580°C / 8h

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon/Nitrogen : 3-6 l/min |

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# TIG F17/0

Old reference: TIG 430

## Classification

ISO 14343-A : W 17  
AWS A5.9 : ER430

Material.N° : 1.4016

## Description & Applications

Solid rod for TIG welding of stainless steels with 17% Chromium content. Good oxidation resistant up to 900°C also in sulfurous gases, used for chimneys as well as for sea water applications,...

**Main applications:** Surfacing of fittings and valves.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni  | Mo  | Cu   | P     | S     | Fe   |
|------|-----|-----|------|-----|-----|------|-------|-------|------|
| 0.05 | 0.4 | 0.5 | 16.5 | 0.3 | 0.1 | 0.08 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 300                       | 450                    | 15                   |

After PWHT 760°C/2h

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG D22/09

Old reference: TIG 2209

## Classification

ISO 14343-A : W 22 9 3 NL  
 AWS A5.9 : ER2209

Material N° : 1.4462

## Description & Applications

Very low carbon content solid rod for TIG welding Duplex steels (austenitic-ferritic microstructure). Resistant in chloride containing media against pitting corrosion as well as crevice and stress corrosion.

**Main applications:** For pumps, vessels, piping systems etc. attacked by chloride containing solutions. But also for impellers and other components which require high strength combined with corrosion attack.

### Base materials:

| UNS    | Alloy | EN 10088        | Material N° | CLI        |
|--------|-------|-----------------|-------------|------------|
| S31803 |       | X2CrNiMoN22-5-3 | 1.4462      | URANUS 45N |
| S32304 | 35N   | X2CrNi23-4      | 1.4362      | URANUS 35N |
| S32900 | 329   | X3CrNiMoN27-5-2 | 1.4460      |            |

## Typical Chemical Composition ( % )

| C     | Si  | Mn  | Cr   | Ni  | Mo  | N <sub>2</sub> | P     | S     | Fe   |
|-------|-----|-----|------|-----|-----|----------------|-------|-------|------|
| 0.012 | 0.5 | 1.7 | 23.0 | 8.8 | 3.2 | 0.14           | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|---------------------------|------------------------|----------------------|----------|-----|
| 600                       | 760                    | 26                   | +20°C    | 150 |
|                           |                        |                      | -50°C    | 120 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG D25/09

Old reference: TIG 2509

## Classification

AWS A5.9 : ER2594  
 ISO 14343-A : W 25 9 4 N L  
 UNS : S32750

## Description & Applications

Very low carbon content solid GTAW rod for joining Duplex and Super Duplex Stainless Steels (austenitic-ferritic microstructure). Resistant in chloride containing media against pitting corrosion as well as crevice and stress corrosion. Pitting index (PREN): > 40.

**Main applications:** For pumps, vessels, piping systems etc. attacked by chloride containing solutions. But also for impellers and other components which require high strength combined with corrosion attack.

### Base materials

| UNS    | Alloy | EN 10088            | Material N° | CLI         |
|--------|-------|---------------------|-------------|-------------|
| S31803 |       | X2CrNiMoN22-5-3     | 1.4462      | URANUS 45   |
| S32304 | 35N   | X2CrNi23-4          | 1.4362      | URANUS 35N  |
| S32550 | 52N   | G-X2CrNiMoCuN26 6 3 | 1.4517      | URANUS 52N  |
|        | 52N+  | X2CrNiMoCuN25-6-3   | 1.4507      | URANUS 52N+ |
| S32750 | 2507  | X2CrNiMoN25-7-4     | 1.4410      |             |
| S32760 | 100   | X2CrNiMoCuWN25-7-4  | 1.4501      | URANUS 70N  |
| S32900 | 329   | X3CrNiMoN27-5-2     | 1.4460      |             |

## Typical Chemical Composition ( % )

| C     | Si  | Mn  | Cr   | Ni  | Mo  | N <sub>2</sub> | P     | S      | Fe   |
|-------|-----|-----|------|-----|-----|----------------|-------|--------|------|
| 0.012 | 0.5 | 0.6 | 25.5 | 9.2 | 4.0 | 0.25           | <0.03 | <0.015 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0,2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|---------------------------|------------------------|----------------------|----------|-----|
| 630                       | 820                    | 25                   | +20°C    | 130 |
|                           |                        |                      | -40°C    | 90  |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon/Nitrogen : 3-6 l/min |

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# TIG 20/10MA

Old reference: TIG 253MA

## Classification

ISO 14343-A : W Z 21 10 N H

Material N° : ~1.4835

## Description & Applications

Rod for Gas Tungsten Arc Welding with an austenitic stainless steel deposit resisting to scaling and oxidation up to 1100°C.

**Main applications:** Ovens, thermal equipment for heat treatment, chemical installations.

### Base materials

| UNS    | Alloy | EN 10095         | Material N° | UGINE          |
|--------|-------|------------------|-------------|----------------|
|        |       | X15CrNiSi20-12   | 1.4828      | UGINOX R 20-12 |
|        |       | X12CrNi22-12     | 1.4829      |                |
| S30815 | 253MA | X8CrNiSiN21-11   | 1.4893      |                |
|        |       | X9CrNiSiN21-11-2 | 1.4835      |                |

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni   | N    | P     | S     | Fe   | FN |
|------|-----|-----|------|------|------|-------|-------|------|----|
| 0.08 | 1.5 | 0.5 | 21.0 | 10.0 | 0.15 | <0.02 | <0.01 | Rem. | ~5 |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 450                       | 650                    | 38                   | +20°C 120 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon or Nitrogen / H <sub>2</sub> : 3-6 l/min |

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# TIG 16/8M

Old reference: TIG 16-8-2

## Classification

ISO 14343-A : W 16 8 2

AWS A5.9 : ER16-8-2

## Description & Applications

Solid rod with low ferrite content for TIG welding similar steels, 316H, used at high temperature (up to 650/700°C).

**Main applications:** Distillation column in petrochemical or incineration industry

## Typical Chemical Composition ( % )

| C   | Si   | Mn  | Cr   | Ni  | Mo  | Cu   | P     | S     | Fe   |
|-----|------|-----|------|-----|-----|------|-------|-------|------|
| 0.1 | 0.45 | 2.1 | 16.5 | 8.6 | 2.0 | <0.2 | <0.03 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
| >380                      | >550                   | >35                  | 20°C >60 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 17/4CU

Old reference: TIG 17-4 Cu

## Classification

ISO 14343-A : W Z 17 4 Cu  
 AWS A5.9 : ER630

AMS : 5825  
 Material N° : 1.4548

## Description & Applications

Filler metal used for welding stainless steels of similar compositions type 17-4PH, X5CrNiCuNb17-4-4, XAS.

**Main applications:** Aerospace, marine pump and turbine, Repairing of turbine discs, turbine blades.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni  | Mo     | Cu  | Nb  | P     | S     | Fe   |
|------|-----|-----|------|-----|--------|-----|-----|-------|-------|------|
| 0.03 | 0.5 | 0.6 | 16.0 | 5.0 | < 0.75 | 3.5 | 0.2 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
|--------------------|---------------|-------------|
| 930                | 1030          | 10          |

After PWHT 1H at 1020°C-1050°C, followed by a precipitation hardening for 4H at 610°C-630°C

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 17/4MO

Old reference: TIG 17-4Mo

## Classification

ISO 14343-A : W Z 17 4 Mo

## Description & Applications

Solid rod for TIG welding and repairing steels of similar chemical composition.

**Main applications:** Repairing of Pelton\* turbine.

\* Trademark of Aubert & Duval

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni  | Mo  | P     | S     | Fe   |
|------|-----|-----|------|-----|-----|-------|-------|------|
| 0.05 | 0.3 | 0.9 | 16.0 | 4.4 | 1.0 | <0.03 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
|---------------------------|------------------------|----------------------|----------|

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

Preheating of work-pieces at 100-150°C. Maintain temperature during welding and then slow cooling at still air. Annealing is advised at 580-620°C/4-8h.

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# TIG 11/3M

Old reference: TIG Z12CNDV12

## Classification

ISO 14343-A : W Z 12 3 MoV

EN 3890

X11CrNiMoV12-3

## Description & Applications

Solid rod for TIG welding and repairing steels of similar chemical composition as Z12CNDV12.

**Main applications:** Repairing of turbine blades.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni  | Mo  | V   | N <sub>2</sub> | P      | S      | Fe   |
|------|-----|-----|------|-----|-----|-----|----------------|--------|--------|------|
| 0.12 | 0.3 | 0.7 | 11.8 | 2.7 | 1.7 | 0.3 | 0.03           | <0.035 | <0.025 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
|---------------------------|------------------------|----------------------|----------|

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

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# TIG 22/21CO

Old reference: TIG N155

## Classification

ISO 14343-A : W Z 22 21 3 CoWNbN      AMS : 5794

## Description & Applications

Solid rod for TIG welding of similar alloys. Good resistance to heat and corrosion.

**Main applications:** For turbines and in aeronautical industry.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr   | Ni   | Mo  | Co   | W   | Nb  | N <sub>2</sub> | Fe   |
|-----|-----|-----|------|------|-----|------|-----|-----|----------------|------|
| 0.1 | 0.4 | 1.5 | 22.0 | 21.0 | 3.2 | 20.0 | 2.8 | 1.0 | 0.15           | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
|---------------------------|------------------------|----------------------|----------|

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon / Nitrogen : 3-6 l/min |

ind.10

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# TIG NI22

Old reference: TIG Ni22

## Classification

AWS A5.14 : ERNiCrMo-10      Material N° : 2.4635  
 ISO 18274 : S-Ni6022 (NiCr21Mo13Fe4W3)

## Description & Applications

Nickel alloy with high content of Cr and Mo for GTAW, which gives it exceptional corrosion resistance. It is particularly recommended for welding of C 276, C 22, other highly corrosion resistant Ni-alloys and special stainless steels.

**Main applications:** Works well in different environments, de-pollution (absorbers, chimneys), sea water and fertiliser, flue gas desulphurisation.

### Base materials

| UNS    | Alloy  | DIN                | Material N° |
|--------|--------|--------------------|-------------|
| N06022 | C-22   | NiCr21Mo14W        | 2.4602      |
| N10276 | C-276  | NiMo16Cr15W        | 2.4819      |
| N06455 | C-4    | NiMo16Cr16Ti       | 2.4610      |
| N06625 | 625    | NiCr22Mo9Nb        | 2.4856      |
| N08825 | 825    | NiCr21Mo           | 2.4858      |
| N08926 | 254SMo | X1NiCrMoCuN25 20 6 | 1.4529      |

## Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cr   | Mo   | W   | Fe  | P     | S     | Ni   |
|------|------|-----|------|------|-----|-----|-------|-------|------|
| 0.01 | 0.05 | 0.1 | 21.4 | 13.2 | 3.0 | 3.0 | <0.01 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
| 480                       | 740                    | 42                   | 20°C 180 |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon: 3-6 l/min |

ind.08

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# TIG Ni59

Old reference: TIG Ni059

## Classification

ISO 18274 : S-Ni6059 (NiCr23Mo16)

AWS A5.14 : ERNiCrMo-13

## Description & Applications

Nickel alloy for TIG welding with high content of Cr and Mo, which gives it exceptional corrosion resistance. It is particularly recommended for cladding of carbon steels and for welding of C 276, C 22, alloy 59, other highly corrosion resistant Ni-alloys and special stainless steels.

**Main applications:** Works well in different environments, de-pollution (absorbers, chimneys), sea water and fertiliser, flue gas desulphurisation.

### Base materials

| UNS    | Alloy  | DIN                | Material N° |
|--------|--------|--------------------|-------------|
| N06022 | C-22   | NiCr21Mo14W        | 2.4602      |
| N10276 | C-276  | NiMo16Cr15W        | 2.4819      |
| N06455 | C-4    | NiMo16Cr16Ti       | 2.4610      |
| N06625 | 625    | NiCr22Mo9Nb        | 2.4856      |
| N08825 | 825    | NiCr21Mo           | 2.4858      |
| N08926 | 254SMo | X1NiCrMoCuN25 20 6 | 1.4529      |

## Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cr   | Mo   | Fe  | Al  | P     | S     | Ni   |
|------|------|-----|------|------|-----|-----|-------|-------|------|
| 0.01 | 0.05 | 0.1 | 25.0 | 15.0 | 0.2 | 0.1 | <0.01 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 420                       | 740                    | 30                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG NI60

Old reference: TIG Ni60

## Classification

ISO 18274 : S-Ni 4060 (NiCu30Mn3Ti)      AWS A5.14 : ERNiCu-7

## Description & Applications

Solid rod for TIG welding of "Monel" alloy for components for chemical and petrochemical installations, for sea water and off shore applications. Excellent resistance against corrosion. Recommended for steels/ Copper-Nickel or steels/Copper/Copper Nickel alloys assemblies.

**Main applications:** Chemical industries, ship building, desalination equipments...

\* Trademark of Inco Alloys

### Base materials:

| UNS    | Alloy     | DIN         | Material N° |
|--------|-----------|-------------|-------------|
| C70600 | CuNi90/10 | CuNi10Fe1Mn | 2.0872      |
| C71500 | CuNi70/30 | CuNi30Mn1Fe | 2.0882      |
| N04400 | 400       | NiCu30Fe    | 2.4360      |
| N05500 | K-500     | NiCu30Al    | 2.4375      |

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Fe  | Ti  | Cu   | P     | S     | Ni   |
|------|-----|-----|-----|-----|------|-------|-------|------|
| 0.03 | 0.4 | 3.5 | 0.6 | 2.2 | 29.0 | <0.01 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 320                       | 510                    | 38                   | +20°C 180 |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

ind.10

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# TIG NI61

Old reference: TIG NiTi4

## Classification

ISO 18274 : S-Ni 2061 (NiTi3)

AWS A5.14 : ERNi-1

## Description & Applications

Filler metal use for welding pure Nickel grades types: Alloy 200, Ni201, Ni99.2, LC-Ni99. Also use in heterogeneous welding of steel on Nickel ou Copper-Nickel alloys.

**Main applications:** Chemical and petrochemical industries, sub assembly layers

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Fe  | Ti  | Cu  | P     | S     | Ni   |
|------|-----|-----|-----|-----|-----|-------|-------|------|
| 0.02 | 0.2 | 0.3 | 0.1 | 3.3 | 0.1 | <0.01 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 350                       | 540                    | 40                   | +20°C 250 |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG NI65

Old reference: TIG Ni65

## Classification

ISO 18274 : S-Ni 8065 (NiFe30Cr21Mo3)      AWS A5.14 : ERNiFeCr-1

## Description & Applications

Solid rod for TIG welding of Nickel-Iron-Chromium-Molybden alloys which has a good resistance to oxidizing and reducing acids like sulphuric and phosphoric acid as well as sea water.

**Base materials:** Alloy 825, UNS N08825, NiCr21Mo, 2.4858.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Mo  | Fe   | Cu  | Ti  | P     | S     | Ni   |
|------|-----|-----|------|-----|------|-----|-----|-------|-------|------|
| 0.02 | 0.2 | 0.6 | 20.5 | 3.2 | 30.0 | 1.8 | 0.9 | <0.01 | <0.01 | 41.0 |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) | KV ( J ) |
|--------------------|---------------|-------------|----------|
|--------------------|---------------|-------------|----------|

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

ind.10

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# TIG NI82

Old reference: TIG Ni82

## Classification

ISO 18274 : S-Ni 6082 (NiCr20Mn3Nb)

AWS A5.14 : ERNiCr-3

## Description & Applications

Solid rod for TIG welding of high nickel content alloys like Inconel 600\* or Incoloy 800\*. High resistance at low temperatures on steels of 5% and 9% Ni. Used in the construction of equipment submitted to oxidizing and corrosive attacks at high temperatures.

\* Trade mark INCO ALLOYS

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Fe  | Nb  | Ti  | P     | S     | Ni   |
|------|-----|-----|------|-----|-----|-----|-------|-------|------|
| 0.03 | 0.2 | 3.2 | 20.5 | 2.0 | 2.3 | 0.3 | <0.01 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |     |
|---------------------------|------------------------|----------------------|----------|-----|
| 430                       | 670                    | 42                   | +20°C    | 160 |
|                           |                        |                      | -196°C   | 100 |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

ind.12

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# TIG NI90

Old reference: TIG Ni90

## Classification

ISO 18274 : S-Ni 7090 (NiCr20Co18Ti3)

## Description & Applications

Solid rod for TIG welding of alloys like NIMONIC 80A and 90.

## Typical Chemical Composition ( % )

| C     | Si  | Mn  | Cr   | Fe  | Ti  | Co   | Al  | Cu  | Ni   |
|-------|-----|-----|------|-----|-----|------|-----|-----|------|
| <0.13 | 0.3 | 0.5 | 20.0 | 1.0 | 2.5 | 16.0 | 1.5 | 0.1 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
|                           |                        |                      |          |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG NI263

## Classification

ISO 18274 : S-Ni 7263 (NiCr20Co20Mo6Ti2) AMS : 5966

## Description & Applications

Solid rod for TIG welding of NIMONIC 263 alloy.

**Main applications:** Aeronautical industry.

## Typical Chemical Composition ( % )

| C    | Si   | Mn   | Cr   | Fe  | Mo  | Co   | Ti   | Al  | Ni   |
|------|------|------|------|-----|-----|------|------|-----|------|
| 0.05 | 0.25 | 0.05 | 20.0 | 0.7 | 5.9 | 20.0 | 2.15 | 0.5 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
|                           | 630                    | 12                   |          |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG NI 276

Old reference: TIG Ni276

## Classification

ISO 18274 : S-Ni 6276 (NiMo16Cr15Fe6W4)    AWS A5.14 : ERNiCrMo-4

## Description & Applications

Solid rod for TIG welding base material of similar composition like NiMo16Cr15W, UNS N10276, alloys C-276 and others. Excellent resistance in oxide, chloride, acid and saline environments. TIG Ni276 is appropriate for lining sheet plates.

**Main applications:** Equipment of de-pollution, piping systems in chemical industry...

## Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cr   | Mo   | Fe  | W   | Ni   |
|------|------|-----|------|------|-----|-----|------|
| 0.01 | 0.05 | 0.4 | 16.0 | 16.0 | 6.0 | 3.5 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 480                       | 780                    | 35                   | +20°C 100 |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG NI601

Old reference: TIG Ni601

## Classification

ISO 18274 : S-Ni 6601 (NiCr23Fe15Al)      AWS A5.14 : ERNiCrFe-11

## Description & Applications

Solid rod for TIG welding of similar Nickel-Chrom-Iron-Aluminum alloys. Used in the construction of equipments submitted to high temperature up to 1150°C.  
Preferred process: GTAW.

**Main applications:** Furnaces, heat treatment equipments.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Fe   | Al  | Cu  | Co  | P     | S     | Ni   |
|------|-----|-----|------|------|-----|-----|-----|-------|-------|------|
| 0.05 | 0.2 | 0.5 | 23.0 | 14.0 | 1.3 | 0.1 | 0.3 | <0.01 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) | KV ( J ) |
|--------------------|---------------|-------------|----------|
|--------------------|---------------|-------------|----------|

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG NI617

## Classification

ISO 18274 : S-Ni6617 (NiCr22Co12Mo9)  
 AWS A5.14 : ERNiCrCoMo-1

Material N° : 2.4627  
 DIN 1736 : SG-NiCr22Co12Mo

## Description & Applications

Solid GTAW rod for joining and repairing of high temperature alloys used at operation temperatures up to 1100°C.

**Main applications:** Construction of gas turbines, combustion chambers, ovens, thermal equipment for heat treatment, petrochemical installation.

### Base materials

| UNS    | Alloy | DIN            | Material N° |
|--------|-------|----------------|-------------|
| N08810 | 800H  | X5NiCrAlTi3120 | 1.4958      |
|        | DS    | X8NiCrSi3818   | 1.4862      |
| N06601 | 601   | NiCr23Fe       | 2.4851      |
| N06617 | 617   | NiCr23Co12Mo   | 2.4663      |

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Mo  | Co   | Fe  | Al  | Ti  | Ni   |
|------|-----|-----|------|-----|------|-----|-----|-----|------|
| 0.07 | 0.2 | 0.5 | 22.0 | 8.5 | 11.2 | 0.9 | 1.0 | 0.4 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )   |
|---------------------------|------------------------|----------------------|------------|
| >450                      | >750                   | >30                  | +20°C >110 |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG NI625

## Classification

ISO 18274 : S-Ni 6625 (NiCr22Mo9Nb)      AWS A5.14 : ERNiCrMo-3

## Description & Applications

Solid rod for TIG welding of high nickel alloys as well as for special austenitic stainless steels. Used in the construction of equipment submitted to oxidizing and corrosive attacks. Excellent resistance to pitting, crevice and stress corrosion cracking in the presence of chlorides. Highly resistant at low temperatures, therefore also applied to weld 9% Ni steels.

## Typical Chemical Composition ( % )

| C    | Si   | Mn  | Cr   | Mo  | Fe  | Nb  | P     | S     | Ni   |
|------|------|-----|------|-----|-----|-----|-------|-------|------|
| 0.01 | 0.15 | 0.1 | 22.0 | 8.7 | 0.3 | 3.6 | <0.01 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) | KV ( J ) |     |
|--------------------|---------------|-------------|----------|-----|
| 520                | 790           | 40          | +20°C    | 160 |
|                    |               |             | -196°C   | 100 |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

ind.10

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# TIG NI718

Old reference: Finox 718

## Classification

ISO 18274 : S-Ni 7718 (NiFe19Cr19Nb5Mo3)    AMS :    5832  
 AWS A5.14 : ERNiFeCr-2

## Description & Applications

Solid rod for TIG welding of alloys like INCONEL 718, X750, for structural hardening, for high mechanical resistance up to 700°C. Excellent resistance against thermal shocks and oxidation. Also used for hardfacing of hot working tools.

**Main applications:** Aerospace, cryogenic tank, Hardfacing of hot working tool.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Mo  | Ni   | Nb  | Al  | Ti  | Fe   |
|------|-----|-----|------|-----|------|-----|-----|-----|------|
| 0.04 | 0.2 | 0.2 | 19.0 | 3.0 | 52.0 | 5.0 | 0.5 | 0.9 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )                               |
|---------------------------|------------------------|----------------------|--|
| > 900                     | > 1200                 | > 8                  | 240 HB as welded<br>~45 HRC after PWHT |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |



# TIG NICKR80

Old reference: TIG FINICRO 80.20

## Classification

ISO 18274 : S-Ni 6076 (NiCr20)      AWS A5.14 : ERNiCr-6  
 EN 4329 : NiCr20                              AMS : 5676

## Description & Applications

Solid rod for TIG welding of alloy like Brightray, Inconel 600, Incoloy DS and Nimonic 75.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr   | Fe  | Cu  | P     | S     | Ni   |
|-----|-----|-----|------|-----|-----|-------|-------|------|
| 0.1 | 0.2 | 0.5 | 20.0 | 0.5 | 0.1 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
|                           | > 560 MPa              | > 25                 |          |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

ind.13

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# TIG NiTi4

## Classification

ISO 18274 : S-Ni 2061 (NiTi3)

AWS A5.14 : ERNi-1

## Description & Applications

Solid rod for TIG welding of Nickel alloys like Ni 200 and 201, UNS N02200 and N02201, Ni99.2 and LC-Ni99. Lining of steel; welding of steel to Nickel and Nickel-Copper alloys.

### Base materials:

| UNS    | Alloy | DIN       | Material N° |
|--------|-------|-----------|-------------|
| N02200 | 200   | Ni99.2    | 2.4066      |
| N02201 | 201   | LC-Ni99   | 2.4068      |
| N02205 | 205   | LC-Ni99.6 | 2.4061      |
|        |       | Ni99.6    | 2.4060      |

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Fe  | Ti  | Cu  | P     | S     | Ni   |
|------|-----|-----|-----|-----|-----|-------|-------|------|
| 0.02 | 0.2 | 0.3 | 0.1 | 3.3 | 0.1 | <0.01 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J )  |
|---------------------------|------------------------|----------------------|-----------|
| 350                       | 540                    | 40                   | +20°C 250 |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

ind.10

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# TIG NiW

Old reference: TIG NiW

## Classification

ISO 18274 : S-Ni 1004 (NiMo25Cr5Fe5)      AMS : 5786  
 AWS A5.14 : ERNiMo-3

## Description & Applications

Solid rod for TIG welding of dissimilar alloys known as HASTELLOY W®.

Used in the aeronautical industry for reparation and maintenance of engines.

® Trade mark of Haynes alloys

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr  | Mo   | Fe  | Cu     | Co     | V    | W    | P     | S     | Ni   |
|------|-----|-----|-----|------|-----|--------|--------|------|------|-------|-------|------|
| 0.03 | 0.2 | 0.4 | 5.0 | 24.0 | 6.0 | < 0.01 | < 0.01 | 0.02 | 0.03 | <0.01 | <0.01 | Base |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
|                           |                        |                      |          |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG NIX

Old reference: TIG NiX

## Classification

ISO 18274 : S-Ni 6002 (NiCr21Fe18Mo9)      AMS :      5798  
 AWS A5.14 : ERNiCrMo-2

## Description & Applications

Solid rod for TIG welding, popularly known as HASTELLOY X®. Nickel Base alloy generally used for turbines and engines. Best compromise between resistance to oxidation and mechanical characteristics at high temperature.

**Main applications:** Aeronautical industry (combustion chamber, etc).

® Trade mark of Haynes alloys

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Fe   | Mo  | Co  | W   | Al  | Cu   | Ni   |
|------|-----|-----|------|------|-----|-----|-----|-----|------|------|
| 0.07 | 0.3 | 0.6 | 22.0 | 19.3 | 8.5 | 1.0 | 0.8 | 0.3 | 0.25 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 420                       | 680                    | 23                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG FENI36

## Classification

Without

## Description & Applications

Filler metal filling a Ferro-Nickel alloy used for welding alloys Invar-Type. Materials having a very low thermal expansion.

**Main applications:** Molds for composite, cladding of natural gas tanks

## Typical Chemical Composition ( % )

|      |     |     |      |        |        |     |
|------|-----|-----|------|--------|--------|-----|
| C    | Si  | Mn  | Ni   | P      | S      | Fe  |
| 0.01 | 0.1 | 0.3 | 36.0 | <0.010 | <0.010 | Rel |

## All Weld Metal Mechanical Properties

|                    |               |             |
|--------------------|---------------|-------------|
| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
| 300                | 400           | 28          |

## Welding Current & Instructions

|              |   |
|--------------|---|
| Welding mode | Shielding Gas   |
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG FENI50

## Classification

Without

## Description & Applications

Solid rod for TIG welding and reparation of nodular cast iron, either cold or after moderate heating. The deposit has a colour very similar to cast iron. Can be machined. TIG FeNi50 is also used for heterogeneous assembly of cast iron with steel.

### Base materials:

#### Nodular cast iron

| ASTM             | DIN                                | NFA  |
|------------------|------------------------------------|--|
| A536 Grade 60-80 | GGG-40 à GGG-60<br>GTS-35 à GTS-65 | FGS 400-12 à FGS 600-3<br>MN350-10 à MN650-3 |

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Ni   | P      | S      | Fe   |
|------|-----|-----|------|--------|--------|------|
| 0.03 | 0.6 | 0.7 | 55.0 | <0.015 | <0.015 | 43.0 |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 290                       | 320                    | 10                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG AL99.7

Old reference: TIG Al99.5

## Classification

AWS A5.10 : ~ER1100  
ISO 18273 : S Al 1070 (Al99.7)

Material N° : 3.0259

## Description & Applications

Solid rod for TIG welding of pure Aluminium and similar composition alloys. Often used for its excellent electrical conductivity or for its high resistance against certain corrossions.

### Base materials:

| Alloy     | DIN     | Material N° |
|-----------|---------|-------------|
| 1080A     | Al 99.5 | 3.0255      |
| 1050A     | Al 99.7 | 3.0275      |
| 1100      | Al 99.7 | 3.0285      |
| 3004-3005 | Al 99   | 3.0205      |
| 3303      |         |             |

## Typical Chemical Composition ( % )

|      |      |       |      |      |      |
|------|------|-------|------|------|------|
| Si   | Fe   | Cu    | Zn   | Mn   | Al   |
| 0.03 | 0.13 | 0.001 | 0.01 | 0.01 | Rem. |

## All Weld Metal Mechanical Properties

|                    |               |             |
|--------------------|---------------|-------------|
| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
| 70                 | 100           | 30          |

## Welding Current & Instructions

|              |  |
|--------------|--|
| Welding mode | Shielding Gas                              |
| TIG<br>~     | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG ALG3

Old reference: TIG AlMg3

## Classification

AWS 5.10 : ~ER5654  
ISO 18273 : S Al 5754 (AlMg3)

Material N° : 3.3536

## Description & Applications

Solid rod for TIG welding of Aluminium alloys with up to 3% Mg. Very often used in marine construction for their excellent resistance to salt water corrosion and other types of construction.

### Base materials:

| Alloy | DIN         | Material N° |
|-------|-------------|-------------|
| 3004  | Al Mg1      | 3.3315      |
| 3005  | Al Mg2.5    | 3.3523      |
| 3303  | Al Mg3      | 3.3535      |
| 5005  | Al Mg Si0.5 | 3.3206      |

## Typical Chemical Composition ( % )

| Si   | Fe   | Cu    | Mn   | Mg  | Zn   | Ti   | Al   |
|------|------|-------|------|-----|------|------|------|
| 0.05 | 0.13 | 0.002 | 0.15 | 3.1 | 0.01 | 0.08 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 120                       | 250                    | 22                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>~     | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG ALG5

Old reference: TIG AlMg5

## Classification

AWS A5.10 : ER5356  
 ISO 18273 : S Al 5356 (AlMg5Cr)

Material N° : 3.3556

## Description & Applications

Solid rod for TIG welding of Aluminium alloys with more than 3% Mg, up to 5 % of Mg. Very often used in marine construction for their excellent resistance to salt water corrosion and for their very good mechanical characteristics, but also in the railway sector for the welding of wagons to transport phosphate, and also in the road sector for trucks and tractors.

### Base materials:

|             |   |                                     |
|-------------|---|-------------------------------------|
| DIN         | : | Al Mg5; Al Mg4, 5                   |
| Material N° | : | 3.3555; 3.3345                      |
| Alloy       | : | 5056; 5083; 5086; 5454; 5754; 6005A |

## Typical Chemical Composition ( % )

| Si   | Fe   | Cu    | Mn   | Mg  | Zn   | Ti   | Cr  | Al   |
|------|------|-------|------|-----|------|------|-----|------|
| 0.05 | 0.13 | 0.002 | 0.15 | 4.8 | 0.01 | 0.13 | 0.1 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 120                       | 280                    | 30                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>~     | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG ALG5M

Old reference: TIG AlMg5Mn

## Classification

AWS A5.10 : ER5556

ISO 18273 : S Al 5556A (AlMg5Mn)

## Description & Applications

Solid rod for TIG welding of Aluminium alloy AG5MC. High mechanical characteristic.

**Main applications:** For diverse construction such as armament to boiler-making.

## Typical Chemical Composition ( % )

| Si  | Fe  | Cu   | Mn  | Mg  | Zn   | Ti  | Cr  | Al   |
|-----|-----|------|-----|-----|------|-----|-----|------|
| 0.2 | 0.4 | 0.01 | 0.7 | 5.2 | 0.02 | 0.1 | 0.1 | Rem. |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
|--------------------|---------------|-------------|
|--------------------|---------------|-------------|

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>~     | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG ALG4Z2

Old reference: TIG AlMg4Z2

## Classification

ISO 18273 : S Al Z (AlMg4Zn2)

## Description & Applications

Solid rod for TIG welding of Aluminium alloy of AZ 5 G.

Normally used in nuclear industry, armament, etc.

## Typical Chemical Composition ( % )

| Si   | Fe  | Cu    | Cr   | Mn  | Ti  | Mg  | Zn  | Al   |
|------|-----|-------|------|-----|-----|-----|-----|------|
| 0.05 | 0.1 | 0.003 | 0.09 | 0.4 | 0.1 | 4.0 | 2.0 | Rem. |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
|--------------------|---------------|-------------|
|--------------------|---------------|-------------|

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>~     | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG ALS5

Old reference: TIG AISi5

## Classification

AWS A5.10 : ER4043  
ISO 18273 : S Al 4043 (AlSi5)

Material N° : 3.2245

## Description & Applications

Solid rod for TIG welding of Aluminium alloys with a Si content up to 7%. Applicable for a wide variety of Aluminium alloys. Widely used in foundry reparations.

### Base materials:

|                    |   |   |
|--------------------|---|---|
| <b>DIN</b>         | : | AlMgSi0,5; AlMgSi1; AlSi7Mg; ISi5Mg                           |
| <b>Alloy</b>       | : | 3004; 3005; 3303; 5005; 6060; 6061; 6070;<br>6063; 6071; 6351 |
| <b>Material N°</b> | : | 3.3206; 3.3210; 3.2371; 3.2341                                |

## Typical Chemical Composition ( % )

| Si  | Fe   | Cu    | Mn   | Mg    | Zn    | Ti    | Al   |
|-----|------|-------|------|-------|-------|-------|------|
| 5.0 | <0.4 | 0.001 | 0.05 | 0.003 | 0.003 | 0.006 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 80                        | 120                    | 20                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>~     | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG ALS7

Old reference: TIG AISi7/FIAL 14

## Classification

AWS A5.10 : R-357.0      AMS : 4246  
 ISO 18273 : S Al 4018 (AlSi7Mg)

## Description & Applications

Solid rod for TIG welding of Aluminium alloys with a Si content up to 7%. Applicable for a wide variety of Aluminium alloys. Widely used in foundry reparations.

### Base materials:

|                 |   |                                    |
|-----------------|---|------------------------------------|
| <b>AFNOR</b>    | : | AS7                                |
| <b>Alliages</b> | : | 6060, 6061, 6063, 6070, 6071, 6351 |

## Typical Chemical Composition ( % )

| Si  | Fe  | Cu    | Mn   | Mg  | Ti  | Al   |
|-----|-----|-------|------|-----|-----|------|
| 7.0 | 0.1 | 0.001 | 0.01 | 0.5 | 0.1 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 85                        | 130                    | 19                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>~     | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG ALS12

Old reference: TIG AISi12

## Classification

AWS A5.10 : ER4047  
ISO 18273 : S Al 4047 (AlSi12)

Material N° : 3.2585

## Description & Applications

Solid rod for TIG welding of Aluminium castings with more than 7% Si. Very similar to a eutectic brazing product (570-585°C), therefore very good flowing and wetting characteristics.

**Main applications:** For the repairation of foundry pieces or unidentified nuances of aluminium alloys, this is often the case in repairation of agricultural equipments / machinery.

## Typical Chemical Composition ( % )

| Si   | Fe   | Cu    | Mn   | Mg   | Zn   | Al   |
|------|------|-------|------|------|------|------|
| 12.0 | <0.5 | 0.007 | 0.05 | 0.02 | 0.03 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 70                        | 140                    | 18                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>~     | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG AZ92A

## Classification

AWS A5.19 : ERAZ92A  
AMS : 4395

AFNOR : Mg Al 9

## Description & Applications

Solid rod for TIG welding of most of the Magnesium-Aluminium-Zinc alloys.

**Main applications:** Welding of AM100A

## Typical Chemical Composition ( % )

| Al  | Mn  | Si   | Cu    | Zn  | Be     | Fe    | Mg   |
|-----|-----|------|-------|-----|--------|-------|------|
| 9.0 | 0.3 | 0.01 | 0.001 | 1.8 | 0.0005 | 0.002 | Rem. |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
|--------------------|---------------|-------------|
|--------------------|---------------|-------------|

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG EZ33A

## Classification

AWS A5.19 : EREZ33A  
AMS : 4396

AFNOR : Mg Zn 2

## Description & Applications

Solid rod for TIG welding of wrought and cast base Magnesium alloys working at high temperature.

## Typical Chemical Composition ( % )

| Zn  | Mn    | Si    | Cu    | Fe    | Zr  | Ce  | Mg   |
|-----|-------|-------|-------|-------|-----|-----|------|
| 2.5 | <0.03 | <0.01 | <0.01 | 0.002 | 0.6 | 3.2 | Rem. |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
|--------------------|---------------|-------------|
|--------------------|---------------|-------------|

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG CUS

Old reference: TIG Cu110

## Classification

ISO 24373 : S Cu 1898 (CuSn1)      Material N° : 2.1006  
AWS A5.7 : ERCu

## Description & Applications

Solid rod for TIG welding of oxygen free Copper and Cooper alloys. Good flow and porosity free weld seams due to the alloying with Tin. The melting temperature is relatively low and projections are minor. If a high electrical conductivity is required use TIG CuAg.

## Typical Chemical Composition ( % )

| Si  | Mn  | Sn  | P    | Cu   |
|-----|-----|-----|------|------|
| 0.2 | 0.4 | 0.8 | 0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 50                        | 190                    | 35                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG CUS6

Old reference: TIG Cu114

## Classification

ISO 24373 : S Cu 5180 (CuSn6P)      Material N° : 2.1022  
 AWS A5.7 : ERCuSn-A

## Description & Applications

Solid rod for TIG welding and repairing of copper and similar copper tin alloys. Welding of zinc coated sheets. Surfacing of friction surfaces.

### Base materials:

| UNS    | DIN      | Material N° |
|--------|----------|-------------|
| C50700 | CuSn2    | 2.1010      |
| C51100 | CuSn4    | 2.1016      |
| C51900 | CuSn6    | 2.1020      |
| C52100 | CuSn8    | 2.1030      |
|        | CuSn6Zn  | 2.1080      |
| C52400 | G-CuSn10 | 2.1050      |

## Typical Chemical Composition ( % )

| Sn  | P   | Pb    | Cu   |
|-----|-----|-------|------|
| 6.0 | 0.2 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 150                       | 300                    | 20                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG CUS8

Old reference: TIG CuSn8

## Classification

ISO 24373 : S Cu 5210 (CuSn8P)

Material.N° : 2.1025

## Description & Applications

Solid rod for TIG welding of Copper-Tin bronzes.

**Main applications:** For surfacing of friction surfaces and welding of galvanized sheets.

## Typical Chemical Composition ( % )

| Sn  | P   | Cu   |
|-----|-----|------|
| 8.0 | 0.1 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
|                           | 260                    | 20                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG CUS13

Old reference: TIG CuSn13

## Classification

ISO 24373 : S Cu 5410 (CuSn12P)      Material.N° : 2.1056

## Description & Applications

Solid rod for TIG welding of Copper-Tin bronzes as well as for Copper-Tin castings.

**Main applications:** Often applied to surface worn pieces as it has a good resistance to wear.

## Typical Chemical Composition ( % )

| Sn   | P   | Cu   |
|------|-----|------|
| 13.0 | 0.2 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
|                           | 320                    | 5                    |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

ind.10

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# TIG CUSIL

Old reference: TIG CuSi3

## Classification

ISO 24373 : S Cu 6560 (CuSi3Mn1)      Material N° : 2.1461  
AWS A5.7 : ERCuSi-A

## Description & Applications

Solid rod for TIG welding, especially recommended for hardfacings resistant to wear.

**Main applications:** Used in welding of galvanized sheets and also for welding of bronze.

## Typical Chemical Composition ( % )

| Sn  | Mn  | Si  | Zn   | Al    | Pb    | Cu   |
|-----|-----|-----|------|-------|-------|------|
| 0.8 | 1.0 | 3.0 | <0.1 | <0.01 | <0.02 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 150                       | 350                    | 42                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG CUAG

## Classification

ISO 24373 : S Cu 1897 (CuAg1)

Material N° : 2.1211

## Description & Applications

Solid rod for TIG welding of oxygen free Copper and copper alloys where a high electrical conductivity is required. For equipments and pipes made of copper and especially for conductor rails. Good flow, porosity free welds seams and high electrical conductivity due to the alloying with Silver. The melting temperature is relatively low and projections are minor.

## Typical Chemical Composition ( % )

| Ag  | Al    | Fe    | Mn   | Ni+Co | P    | Pb    | Si    | As    | Cu   |
|-----|-------|-------|------|-------|------|-------|-------|-------|------|
| 1.0 | <0.01 | <0.01 | 0.06 | 0.01  | 0.04 | <0.01 | <0.01 | <0.05 | Rem. |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) | Electrical conductivity<br>(Sxm/mm <sup>2</sup> ) |
|--------------------|---------------|-------------|---|
| 60                 | 190           | 35          | 40-46   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG CUA8

Old reference: TIG CuAl8

## Classification

ISO 24373 : S Cu 6100 (CuAl7)  
 AWS A5.7 : ERCuAl-A1

Material N° : 2.0921

## Description & Applications

Solid rod recommended for assemblies made of copper-aluminium like pipelines and heat exchangers. Frequently used for hardfacing pumps. In general, the product has an excellent resistance to friction and to marine corrosion. Also used in assemblies of galvanised sheets, special brass (CuZn20Al).

### Base materials:

| UNS    | Alloy     | DIN       | Material N° |
|--------|-----------|-----------|-------------|
| C60600 |           | CuAl5     | 2.0916      |
| C61000 |           | CuAl8     | 2.0920      |
| C68700 | Yorcalbro | CuZn20Al2 | 2.0460      |

## Typical Chemical Composition ( % )

| Si   | Fe   | Mn  | Ni  | Pb    | Al  | Zn   | Cu   |
|------|------|-----|-----|-------|-----|------|------|
| 0.03 | 0.05 | 0.1 | 0.2 | <0.02 | 8.1 | <0.1 | Base |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 180                       | 400                    | 40                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

Pre-heating at 200 to 300°C is advised for massive parts.

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# TIG CUA8NI

Old reference: TIG CuAl9Mn

## Classification

ISO 24373 : S Cu 6327 (CuAl8Ni2Fe2Mn2) Material N° : 2.0922

## Description & Applications

Solid rod for TIG welding recommended for assembly of Copper-Aluminium of similar composition. Frequently used for welding and reparation of pumps and piping systems for sea water. Often used in anti-wear surfacing. Also used for assembly of galvanized sheets. The product corresponds to Indret N°108 specifications.

## Typical Chemical Composition ( % )

|     |     |     |     |       |      |
|-----|-----|-----|-----|-------|------|
| Mn  | Fe  | Al  | Ni  | Zn    | Cu   |
| 1.8 | 1.4 | 8.5 | 2.3 | 0.017 | Base |

## All Weld Metal Mechanical Properties

|                    |               |             |
|--------------------|---------------|-------------|
| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
| 330                | 650           | 27          |

## Welding Current & Instructions

|              |  |
|--------------|--|
| Welding mode | Shielding Gas                              |
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG CUA9

Old reference: TIG CuAl9

## Classification

ISO 24373 : S Cu 6180 (CuAl10Fe)

AWS A5.7 : ERCuAl-A2

## Description & Applications

Solid rod for TIG welding of cupro-aluminium alloys of similar composition. Deposits are harder than those of TIG CuAl8, and are often used for hardfacing of ferritic/perlitic steels. High resistance to wear and abrasion. Assemblies for welding and hardfacing of aluminium-bronze, of aluminium covered steels, of cast iron in machining tools industry and in naval construction. Welding of aluminium-bronze piping resistant to seawater corrosion, erosion and cavitation.

## Typical Chemical Composition ( % )

| Fe  | Zn    | Al  | Ni    | Pb    | Si   | Cu   |
|-----|-------|-----|-------|-------|------|------|
| 1.2 | <0.02 | 9.8 | 0.007 | <0.02 | <0.1 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
|                           | 500                    | 35                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG CUA9NI

Old reference: TIG CuAl9Ni

## Classification

ISO 24373 : S Cu 6328 (CuAl9Ni5Fe3Mn2)      AWS A5.7 : ERCuNiAl

## Description & Applications

Solid rod for TIG welding, to assembly of cupro-aluminium of similar composition. It has better resistance to wear and corrosion than TIG CuAl9Mn.

## Typical Chemical Composition ( % )

| Mn  | Fe  | Al  | Ni  | Cu   |
|-----|-----|-----|-----|------|
| 1.3 | 3.2 | 9.0 | 4.5 | Rem. |

## All Weld Metal Mechanical Properties

| $R_{p0.2}$ ( MPa ) | $R_m$ ( MPa ) | $A_5$ ( % ) |
|--------------------|---------------|-------------|
| 400                | 700           | 15          |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

ind.10



# TIG CUMN13

Old reference: TIG Cu118

## Classification

ISO 24373 : S Cu 6338 (CuMn13Al8Fe3Ni2) Material N° : 2.1368  
 AWS A5.7 : ERCuMnNiAl

## Description & Applications

Solid rod for TIG welding of Copper-Aluminium, for surfacing on steels and cast iron as well as for cavitation resistant overlayers. It has high resistance to wear and marine / sea water corrosion.

### Base materials:

| UNS    | DIN          | Material N° |
|--------|--------------|-------------|
| C62300 | CuAl10Fe3Mn2 | 2.0936      |
| C63000 | CuAl10Ni5Fe4 | 2.0966      |
|        | G-CuAl10Fe   | 2.0940      |
|        | CuAl9Mn2     | 2.0960      |
|        | G-CuAl8Mn    | 2.0962      |

## Typical Chemical Composition ( % )

| Fe  | Mn   | Al  | Ni  | Zn    | Si   | Cu   |
|-----|------|-----|-----|-------|------|------|
| 2.5 | 12.0 | 7.5 | 2.0 | <0.15 | 0.03 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 400                       | 650                    | 20                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG CUNI10

Old reference: TIG CuNi90.10

## Classification

ISO 24373 : S Cu 7061 (CuNi10)      Material.N° : 2.0873

## Description & Applications

Solid rod for TIG welding of Copper-Nickel types Cu90-Ni10 and lower Ni-alloyed Cu-Ni alloys.

### Base materials:

| UNS    | Alloy     | DIN         | Material N° |
|--------|-----------|-------------|-------------|
| C70600 | CuNi90/10 | CuNi10Fe1Mn | 2.0872      |

## Typical Chemical Composition ( % )

| Mn  | Fe  | Si   | Ni   | P     | Pb    | Ti  | Cu   |
|-----|-----|------|------|-------|-------|-----|------|
| 0.8 | 1.0 | <0.2 | 10.5 | <0.02 | <0.02 | 0.4 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 200                       | 320                    | 15                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG CUNI30

Old reference: TIG CuNi30

## Classification

ISO 24373 : S Cu 7158 (CuNi30Mn1FeTi)      Material.N° : 2.0837  
 AWS A5.7 : ERCuNi

## Description & Applications

Solid rod for TIG welding of different Copper-Nickel types as Cu/Ni70.30, 80.20 and 90.10.

**Main applications:** For offshore applications, seawater desalination plants, for ship building, in the chemical industry.

### Base materials:

| UNS    | Alloy     | DIN         | Material N° |
|--------|-----------|-------------|-------------|
| C70600 | CuNi90/10 | CuNi10Fe1Mn | 2.0872      |
|        | CuNi80/20 | CuNi20Fe    | 2.0878      |
| C71500 | CuNi70/30 | CuNi30Mn1Fe | 2.0882      |

## Typical Chemical Composition ( % )

| Mn  | Fe  | Si   | Ni   | P     | Pb    | Ti  | Cu   |
|-----|-----|------|------|-------|-------|-----|------|
| 0.7 | 0.6 | <0.2 | 30.0 | <0.02 | <0.02 | 0.4 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 240                       | 400                    | 32                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas                              |
|--------------|--|
| TIG<br>= -   | Ar : 5-10 l/min<br>Argon / He : 5-10 l/min |

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# TIG T40

## Classification

ISO 24304      Ti 0120 (Ti99.6)  
 AWS A5.16    :    ERTi-2

N° de Mat.    : 3.7035  
 AMS            : 4951

## Description & Applications

Solid rod for TIG welding of pure titanium Grade 2 type.

**Main applications:** Heat exchangers, condensers, evaporators for nuclear plants, oil refinery, aeronautical and chemical industries.

## Typical Chemical Composition ( % )

| C     | N <sub>2</sub> | H      | O         | Fe    | Ti   |
|-------|----------------|--------|-----------|-------|------|
| <0.03 | <0.015         | <0.008 | 0.08-0.16 | <0.12 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 290                       | 390-540                | 20                   |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG TPD0.2

## Classification

ISO 24304 : Ti 2401 (TiPd0.2A)  
 AWS A5.16 : ERTi-7

## Description & Applications

Solid rod for TIG welding of similar titanium alloy. The addition of Palladium increases the resistance to reduction background.

**Main applications:** Heat exchangers.

## Typical Chemical Composition ( % )

| C     | N <sub>2</sub> | H <sub>2</sub> | O <sub>2</sub> | Fe    | Pd        | Ti   |
|-------|----------------|----------------|----------------|-------|-----------|------|
| <0.03 | <0.015         | <0.008         | 0.08-0.16      | <0.12 | 0.12-0.25 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | KV ( J ) |
|---------------------------|------------------------|----------------------|----------|
|---------------------------|------------------------|----------------------|----------|

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

ind.10



# TIG TA6V4

## Classification

ISO 24304 : Ti 6402 (TiAl6V4B)      N° de Mat. : 3.7164 / 3.7165  
 AWS A5.16 : ERTi-5                      AMS : 4954

## Description & Applications

Solid rod for TIG welding of similar titanium alloy.

**Main applications:** Aeronautical industry.

## Typical Chemical Composition ( % )

| C     | N <sub>2</sub> | H <sub>2</sub> | O <sub>2</sub> | Fe    | Al  | V   | Y      | Ti   |
|-------|----------------|----------------|----------------|-------|-----|-----|--------|------|
| <0.05 | <0.03          | <0.005         | 0.12-0.20      | <0.22 | 6.0 | 4.0 | <0.005 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 900                       | 960-1270               | 8                    |

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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## TIG TA6V4 ELI

### Classification

ISO 24304 : Ti 6408 (TiAl6V4A)      AMS : 4956  
AWS A5.16 : ERTi-23

### Description & Applications

Solid rod for TIG welding of similar titanium alloy. The decrease of interstitial elements increase the weldability and the hardness.

**Main applications:** Aeronautical industry.

### Typical Chemical Composition ( % )

| C     | N <sub>2</sub> | H <sub>2</sub> | O <sub>2</sub> | Fe    | Al  | V   | Y      | Ti   |
|-------|----------------|----------------|----------------|-------|-----|-----|--------|------|
| <0.05 | <0.03          | <0.005         | 0.12-0.20      | <0.22 | 6.0 | 4.0 | <0.005 | Rem. |

### All Weld Metal Mechanical Properties

| R <sub>p0.2</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) |
|---------------------------|------------------------|----------------------|
| 900                       | 960-1270               | 8                    |

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|---|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding : Argon : 3-6 l/min |

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# TIG CO1

## Classification

AWS A5.21 : ERCoCr-C                      EN 14700 : S Co3  
DIN 8555 : WSG-20-GO-55-CSTZ

## Description & Applications

Cobalt Base continues cast hardfacing rod for TIG and oxy-acetylene welding. Very good resistance to metal-metal wear, abrasion and corrosion and heat up to 900°C. Excellent gliding characteristics, good to polish. Only machinable with tungsten carbide tools or by grinding.

**Main applications:** Cutting tools, shredding tools, mixing and drilling tools, hot working tools without thermal shock, extrusion screws.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr   | Ni  | W    | Mo  | Fe  | P     | S     | Co   |
|-----|-----|-----|------|-----|------|-----|-----|-------|-------|------|
| 2.4 | 1.2 | 0.2 | 31.0 | 2.2 | 12.5 | 0.3 | 2.5 | <0.02 | <0.03 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
53-57 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Preheat large components or special steels to 500-600°C. Keep this temperature during welding and cool down slowly, preferable in an oven, to reduce the risk of cracking while cooling.  
For oxy-acetylene welding use a reducing flame (slight excess of acetylene).

ind.10

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# TIG CO6

## Classification

AWS A5.21 : ERCoCr-A                      EN 14700 : S Co2  
DIN 8555 : WSG-20-GO-40-CTZ

## Description & Applications

Cobalt Base continues cast hardfacing rod for TIG and oxy-acetylene welding. Very good resistance to metal-metal wear, cavitation and corrosion as well as heat up to 900°C. Excellent gliding characteristics, good to polish, non-magnetic. Machinable with tungsten carbide tools or by grinding.

**Main applications:** Valves, valve seats and other sealing faces, hot press tools, pump parts, extrusion screws.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr   | Ni  | W   | Mo  | Fe  | P     | S     | Co   |
|-----|-----|-----|------|-----|-----|-----|-----|-------|-------|------|
| 1.2 | 1.3 | 0.1 | 29.5 | 2.5 | 4.6 | 0.3 | 2.4 | <0.02 | <0.03 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
39-43 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Preheat large components or special steels to 300-600°C. Keep this temperature during welding and cool down slowly, preferable in an oven, to reduce the risk of cracking while cooling.  
For oxy-acetylene welding use a reducing flame (slight excess of acetylene).

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# TIG CO12

## Classification

AWS A5.21 : ERCoCr-B                      EN 14700 : S Co2  
DIN 8555 : WSG-20-GO-50-CSTZ

## Description & Applications

Cobalt Base continues cast hardfacing rod for TIG and oxy-acetylene welding. Very good resistance to metal-metal wear, abrasion, cavitation, corrosion and heat up to 900°C. Excellent gliding characteristics, good to polish. Only machinable with tungsten carbide tools or by grinding.

**Main applications:** Cutting tools, shredding tools, saw blades, extrusion dies, mixing tools, hot working tools without thermal shock, extrusion screws in the wood, paper and plastic industry.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr   | Ni  | Mo  | W   | Fe  | P     | S     | Co   |
|-----|-----|-----|------|-----|-----|-----|-----|-------|-------|------|
| 1.4 | 1.4 | 0.1 | 30.5 | 2.4 | 0.2 | 8.4 | 2.0 | <0.02 | <0.03 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
47-50 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Preheat large components or special steels to 400-600°C. Keep this temperature during welding and cool down slowly, preferable in an oven, to reduce the risk of cracking while cooling.  
For oxy-acetylene welding use a reducing flame (slight excess of acetylene).

ind.10

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## TIG CO21

### Classification

AWS A5.21 : ERCoCr-E                      EN 14700 : S Co1  
DIN 8555 : WSG-20-GO-300-CKTZ

### Description & Applications

Cobalt Base continues cast hardfacing rod for TIG welding. Very good resistance to metal-metal wear, thermal shock, corrosion and heat up to 1000°C. Excellent gliding characteristics, high toughness, good to polish, non-magnetic.

**Main applications:** Engine valves, hot forging dies, gas turbines.

### Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni  | Mo  | W    | Fe  | P     | S     | Co   |
|------|-----|-----|------|-----|-----|------|-----|-------|-------|------|
| 0.25 | 0.6 | 0.3 | 27.8 | 2.4 | 5.4 | 0.01 | 1.4 | <0.02 | <0.03 | Rem. |

### All Weld Metal Mechanical Properties

Hardness  
29-33 HRC

Hardness at 600°C  
~240 HB

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Preheat large components or special steels to 200-400°C. Keep this temperature during welding and cool down slowly, preferable in an oven, to reduce the risk of cracking while cooling.

ind.10

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## TIG CO25

### Classification

DIN 8555 : WSG 20-GZ-250-CKTZ      EN 14700 : S Z Co1

### Description & Applications

Cobalt Base continues cast hardfacing rod for TIG welding. Very good resistance to metal-metal wear, thermal shock and corrosion up to 1000°C even in sulphuric gases. Non magnetic deposit.

**Main applications:** Surfacing of engine valves, forging dies, gas turbines, mixers.

### Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni  | Mo   | W    | Fe  | Co   |
|------|-----|-----|------|-----|------|------|-----|------|
| 0.15 | 0.9 | 0.7 | 21.0 | 9.8 | 0.03 | 15.0 | 3.0 | Rem. |

### All Weld Metal Mechanical Properties

Hardness  
~230 HB

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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# TIG FICO25

## Classification

DIN 8555 : WSG 20-GZ-250-CKTZ      Material N° : 2.4964  
AFNOR : KC20WNx      AMS : 5796

## Description & Applications

Cobalt Base continues cast hardfacing rod for TIG welding. Very good resistance to metal-metal wear, thermal shock and corrosion up to 1000°C even in sulphuric gases. Non magnetic deposit.

**Main applications:** Engine valves, forging dies, gas turbines, mixers.

**Base materials:** Alloy 25, UNS R30605, AMS 5537, Material N° 2.4964, CoCr20W15Ni and similar.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr   | Ni   | W    | Fe   | P     | S     | Co   |
|-----|-----|-----|------|------|------|------|-------|-------|------|
| 0.1 | 0.1 | 1.5 | 20.0 | 10.0 | 15.0 | <1.0 | <0.01 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
~230 HB

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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# TIG FICO31

## Classification

AFNOR : KC 26 NW  
AMS : 5789

ISO 14700 : S Co1

## Description & Applications

Solid rod for GTAW / TIG welding used for aeronautical applications. The deposit is Corrosion and heat resistant.

**Main applications:** Aeronautical industry.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Fe  | Cr   | Ni   | W   | P    | S     | Co   |
|-----|-----|-----|-----|------|------|-----|------|-------|------|
| 0.5 | 0.8 | 0.8 | 1.0 | 25.0 | 10.5 | 7.5 | 0.01 | 0.006 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
~ 30 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

ind.10

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# TIG FICO188

## Classification

AMS : 5801 Material N° : 2.4683  
EN 3888 : CoCr22Ni22W15

## Description & Applications

Cobalt Base continues cast hardfacing rod for TIG welding. Very good resistance against oxidation up to 1150°C. Welding of oxidation and creep resisting alloy like alloy 188 , UNS R30188, AMS 5608 , Material N° 2.4683 , CoCr22NiW and similar.

**Main applications:** Gas turbine engine combustor cans, spray bars, flame-holders, after-burner liners...

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr   | Ni   | W    | Fe   | La   | Co   |
|-----|-----|-----|------|------|------|------|------|------|
| 0.1 | 0.3 | 0.8 | 22.0 | 23.0 | 14.0 | <3.0 | 0.06 | Rem. |

## All Weld Metal Mechanical Properties

Hardness

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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## TIG FICO414

### Classification

AFNOR : KC 29 NW

### Description & Applications

Solid rod for TIG welding for repairing and hardfacing of jet engine or turbine parts.

**Main applications:** Aeronautical industry.

### Typical Chemical Composition ( % )

| C    | Si  | Mn  | Fe  | Cr   | Ni   | W   | B     | Co   |
|------|-----|-----|-----|------|------|-----|-------|------|
| 0.12 | 0.8 | 0.9 | 0.1 | 29.0 | 10.2 | 7.0 | 0.002 | Rem. |

### All Weld Metal Mechanical Properties

Hardness

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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## TIG FICO694

### Classification

AFNOR : KC 28 W

EN 4326 : CoCr28W20Ni5V1

### Description & Applications

Solid rod for TIG Welding. Corrosion and heat resistant for aeronautical applications.

**Main applications:** Hardfacing of gas turbine blade shroud interlock surfaces and other wear attacked areas.

### Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni  | Fe   | W    | B     | V   | Co   |
|------|-----|-----|------|-----|------|------|-------|-----|------|
| 0.85 | 0.6 | 0.3 | 28.0 | 5.8 | <3.0 | 20.0 | <0.05 | 1.0 | Rem. |

### All Weld Metal Mechanical Properties

Hardness

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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## TIG FICO918

### Classification

AFNOR : KC 20 NTa

### Description & Applications

Solid rod for TIG welding and repairing and hardfacing of jet engine or turbine parts.

**Main applications:** Aeronautical industry.

### Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr   | Ni   | Ta  | Fe   | Al   | Cu   | Co   |
|------|-----|-----|------|------|-----|------|------|------|------|
| 0.07 | 0.1 | 0.1 | 20.0 | 20.0 | 7.5 | 0.05 | 0.07 | 0.06 | Rem. |

### All Weld Metal Mechanical Properties

Hardness

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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## TIG FICOT800

### Classification

AFNOR : KD 28 C

### Description & Applications

Solid rod for TIG welding and hardfacing. Low coefficient of friction for aeronautical applications.

**Main applications:** Hardfacing of notches in jet engine turbine blade.

### Typical Chemical Composition ( % )

| C    | Si  | Cr   | Mo   | Ni  | Fe  | N    | P     | S     | Co   |
|------|-----|------|------|-----|-----|------|-------|-------|------|
| 0.01 | 3.5 | 18.0 | 29.0 | 1.0 | 1.0 | 0.01 | <0.01 | <0.01 | Rem. |

### All Weld Metal Mechanical Properties

Hardness

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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# TIG 819 BS

## Classification

EN 14700 : S Fe3

Material N° : 1.6773

## Description & Applications

Solid rod for TIG welding and hardfacing. Product of high purity for welding without micro porosity.

**Main applications:** To repair and to surface the parent material 36NiCrMo16, 1.6773. Used for cold working tools, swages for forging and punching tools as well as for moulds for plastics.

Available copper coated or bare.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr  | Ni  | Mo  | P      | S      | Fe   |
|------|-----|-----|-----|-----|-----|--------|--------|------|
| 0.35 | 0.3 | 0.4 | 1.7 | 3.8 | 0.3 | <0.015 | <0.010 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
~48 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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# TIG BMS

## Classification

AIR 9117 : 8 CD 12

## Description & Applications

Solid rod for TIG welding of steels such as 15CrMoV6, 25CrMo4, 35CrMo4, 20CrMo12... Product of high purity for welding without microporosity.

It is also used for hardfacing of tool steels.

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr  | Mo  | P      | S      | Fe   |
|------|-----|-----|-----|-----|--------|--------|------|
| 0.06 | 0.7 | 1.1 | 2.7 | 1.0 | <0.015 | <0.015 | Rem. |

## All Weld Metal Mechanical Properties

| R <sub>e</sub> ( MPa ) | R <sub>m</sub> ( MPa ) | A <sub>5</sub> ( % ) | Hardness |
|------------------------|------------------------|----------------------|----------|
| 440                    | 570                    | 24                   | ~36 HRC  |
| After PWHT 730°C/2h    |                        |                      |          |

## Welding Current & Instructions

| Welding mode | Shielding Gas  |
|--------------|--|
| TIG<br>= -   | Ar : 6-12 l/min<br>Back shielding: Nitrogen / H <sub>2</sub> : 3-6 l/min |

Preheating of work-pieces at ~250°C. Post weld heat treatment: 730°C/2h

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## TIG MARVAL 18S

### Classification

EN 14700 : S Fe5

Material N° : 1.6359

### Description & Applications

Solid rod for TIG welding of similar chemical composition steels. Product of high purity for welding without microporosity. The deposit can be machined with standard tools after welding and then age hardened by a subsequent heat treatment. Also used to weld Maraging steels like X2NiCoMo18-9-5; 1.6356 and others (Maraging 200-250).

**Main applications:** For building up dies for extrusion of Al-castings and plastics, for hot working tools, for moulds, etc...

### Typical Chemical Composition ( % )

| C     | Si   | Mn   | Ni   | Co  | Mo  | Ti  | Al  | Fe   |
|-------|------|------|------|-----|-----|-----|-----|------|
| <0.01 | <0.1 | <0.1 | 18.0 | 8.5 | 5.0 | 0.5 | 0.1 | Rem. |

### All Weld Metal Mechanical Properties

Hardness (As welded)  
~36 HRC

Hardness after age hardening  
4h at 480°C: ~50 HRC

### Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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# TIG MV5S

## Classification

DIN 8555 : MSG-3-GZ-60-P

EN 14700 : S Fe4

## Description & Applications

Solid rod for TIG welding and hardfacing. Resistant to temperatures up to 550°C. Product of high purity for welding without microporosity. Mainly used for build up on equipments stressed by high impact and abrasion.

**Main applications:** Moulds for plastic injections, cold working stools, shredder hammers

## Typical Chemical Composition ( % )

| C   | Cr  | Mo  | V   | W   | Fe   |
|-----|-----|-----|-----|-----|------|
| 0.5 | 5.0 | 1.3 | 0.4 | 1.3 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
60 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Pre-heating at 300-400°C of massive parts. Maintain temperature during welding and cold slowly.

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# TIG MARVAL X12S

## Classification

DIN 8555 : MSG 5-GZ-400-R  
EN 14700 : S Z Fe7

Material N° : 1.4530

## Description & Applications

Solid rod for TIG welding and for hardfacing. Product of high purity for welding without microporosity.

**Main applications:** Used to weld and to repair parent metals like X1CrNiMoAlTi12-9-2 and others.

## Typical Chemical Composition ( % )

| C     | Si   | Mn   | Cr   | Ni  | Mo  | Ti  | Al  | Fe   |
|-------|------|------|------|-----|-----|-----|-----|------|
| <0.01 | 0.05 | 0.02 | 12.0 | 9.4 | 2.0 | 0.3 | 0.7 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
~32 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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# TIG SMV3S\*

Old reference : TIG HB58HT

## Classification

EN 14700 : S Fe3

Material N° : 1.2343

## Description & Applications

Solid rod for TIG welding and hardfacing steels of similar chemical composition. Product of high purity for welding without microporosity.

**Main applications:** For hardfacing forging tools, moulds...

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr  | Mo  | V   | Fe   |
|------|-----|-----|-----|-----|-----|------|
| 0.38 | 0.9 | 0.3 | 5.0 | 1.3 | 0.5 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
~58 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Preheating at 300-400°C massive parts. Maintain temperature during welding and cold slowly.

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# TIG HB40HT

## Classification

EN 14700 : S Fe13

Material N° : 1.2367

## Description & Applications

Solid wire for hardfacing steels of similar chemical composition. The weld deposit distinguishes itself by its toughness and heat resistance. Therefore this grade is used for overlay and builds up of machinery parts and tools subject to impact, compression and wear used at operating temperatures up to 550° C. It is widely used for building up hammers, dies, swages, hot shear blades, rollers ...

### Base materials

### High strength carbon steels and hot working steels

| Material N° | DIN classification | Material N° | DIN classification |
|-------------|--------------------|-------------|--------------------|
| 1.2311      | 40CrMnMo 7         | 1.2367      | X38CrMoV 5 3       |
| 1.2343      | X38CrMoV 5 1       | 1.2606      | X37CrMoW 5 1       |
| 1.2344      | X40CrMoV 5 1       | 1.2713      | 55NiCrMoV 6        |
| 1.2365      | X32CrMoV 3 3       | 1.2714      | 56NiCrMoV 7        |

**Main applications:** For forging and drawing dies, cast moulds.

## Typical Chemical Composition ( % )

| C    | Si   | Mn   | Cr   | Mo   | P      | S      | Fe  |
|------|------|------|------|------|--------|--------|-----|
| 0.10 | 0.30 | 0.60 | 6.20 | 3.20 | <0.015 | <0.010 | Rem |

## All Weld Metal Mechanical Properties

Hardness (as welded)

37 - 42 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Preheat the workpiece to 250-400°C depending on thickness and ally composition. Keep low temperature during welding and let the workpiece cool slowly.

Subsequent machining is possible by gridding or with tungsten carbide tool.

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# TIG HB48HT

## Classification

EN 14700 : S Fe8

Material N° : ~1.2367

## Description & Applications

Solid wire for hardfacing steels of similar chemical composition. The weld deposit distinguishes itself by its toughness and heat resistance. Therefore this grade is used for overlay and builds up of machinery parts and tools subject to impact, compression and wear used at operating temperatures up to 550° C. It is widely used for building up hammers, dies, swages, hot shear blades, rollers ...

### Base materials

### High strength carbon steels and hot working steels

| Material N° | DIN classification | Material N° | DIN classification |
|-------------|--------------------|-------------|--------------------|
| 1.2311      | 40CrMnMo 7         | 1.2367      | X38CrMoV 5 3       |
| 1.2343      | X38CrMoV 5 1       | 1.2606      | X37CrMoW 5 1       |
| 1.2344      | X40CrMoV 5 1       | 1.2713      | 55NiCrMoV 6        |
| 1.2365      | X32CrMoV 3 3       | 1.2714      | 56NiCrMoV 7        |

**Main applications:** For forging and drawing dies, cast moulds.

## Typical Chemical Composition ( % )

| C    | Si   | Mn   | Cr   | Mo   | Ti   | P      | S      | Fe  |
|------|------|------|------|------|------|--------|--------|-----|
| 0.25 | 0.30 | 0.60 | 5.00 | 3.60 | 0.60 | <0.015 | <0.010 | Rem |

## All Weld Metal Mechanical Properties

Hardness (as welded)

42-47 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Preheat the workpiece to 250-400°C depending on thickness and ally composition. Keep low temperature during welding and let the workpiece cool slowly.

Subsequent machining is possible by gridding or with tungsten carbide tool.

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# TIG HB56HT

## Classification

EN 14700 : S Fe6

Material N° : ~1.2343

## Description & Applications

Solid wire for hardfacing steels of similar chemical composition. The weld deposit distinguishes itself by its toughness and heat resistance. Therefore this grade is used for overlay and builds up of machinery parts and tools subject to impact, compression and wear used at operating temperatures up to 550° C. It is widely used for building up hammers, dies, swages, hot shear blades, rollers ...

### Base materials

### High strength carbon steels and hot working steels

| Material N° | DIN classification | Material N° | DIN classification |
|-------------|--------------------|-------------|--------------------|
| 1.2311      | 40CrMnMo 7         | 1.2367      | X38CrMoV 5 3       |
| 1.2343      | X38CrMoV 5 1       | 1.2606      | X37CrMoW 5 1       |
| 1.2344      | X40CrMoV 5 1       | 1.2713      | 55NiCrMoV 6        |
| 1.2365      | X32CrMoV 3 3       | 1.2714      | 56NiCrMoV 7        |

**Main applications:** For forging and drawing dies, cast moulds.

## Typical Chemical Composition ( % )

| C    | Si   | Mn   | Cr   | Mo   | Ti   | P      | S      | Fe  |
|------|------|------|------|------|------|--------|--------|-----|
| 0.35 | 0.40 | 1.10 | 7.00 | 2.20 | 0.30 | <0.015 | <0.010 | Rem |

## All Weld Metal Mechanical Properties

Hardness (as welded)

52-57 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Preheat the workpiece to 250-400°C depending on thickness and ally composition. Keep low temperature during welding and let the workpiece cool slowly.

Subsequent machining is possible by gridding or with tungsten carbide tool.

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# TIG HB25

Old reference: TIG R250B

## Classification

DIN 8555 : WSG 1-GZ-250-P      Material N° : 1.8401  
EN 14700 : S Fe1

## Description & Applications

Copper coated solid rod for TIG welding to surfacing. Tough deposit, easy to machine.

**Main applications:** Used for surfacing of rails, shafts, rollers, crane wheels as well as for semi-hard build up and intermediate layers.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr  | Al  | Ti  | P     | S     | Fe   |
|-----|-----|-----|-----|-----|-----|-------|-------|------|
| 0.3 | 0.5 | 1.1 | 1.0 | 0.1 | 0.2 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
225-275 HB

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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# TIG HB35

Old reference: TIG R350B

## Classification

DIN 8555 : WSG 2-GZ-350-P      Material N° : 1.8405  
EN 14700 : S Fe2

## Description & Applications

Copper coated solid rod for TIG welding to surfacing.

**Main applications:** Hardfacing of pressing and stamping tools.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr  | Al  | Ti  | P     | S     | Fe   |
|-----|-----|-----|-----|-----|-----|-------|-------|------|
| 0.7 | 0.5 | 1.9 | 1.0 | 0.1 | 0.2 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
330-370 HB

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Preheat the parent metal, depending on the carbon-equivalent and thickness, up to about 350°C.

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# TIG HB50

Old reference: TIG R500B

## Classification

DIN 8555 : WSG 2-GZ-50  
EN 14700 : S Fe2

Material N° : 1.8425

## Description & Applications

Copper coated solid rod for TIG welding to surfacing.

**Main applications:** Hardfacing of civil engineering equipments such as shovel and bucket teeth, bucket edges, excavators as well as cutting edges.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr  | Al  | Ti  | P     | S     | Fe   |
|-----|-----|-----|-----|-----|-----|-------|-------|------|
| 1.1 | 0.5 | 1.9 | 1.8 | 0.1 | 0.2 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
~50 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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# TIG HB60

Old reference: TIG R600B

## Classification

DIN 8555 : WSG 6 GZ-60-S  
EN 14700 : S Fe6

Material N° : 1.4718

## Description & Applications

Copper coated solid rod for TIG welding. Used for hardfacing parts subject to high impact and medium abrasion. A kind of a universal hardfacing wire used in quarries, mines, steel works, cement works, crushing plants, the wood industry, in the car industry and others.

**Main applications:** Hardfacing of block presses, crusher jaws, wheel rims, rollers, caterpillar tracks, ploughshares, running surfaces, cutting edges etc

## Typical Chemical Composition ( % )

| C    | Si  | Mn  | Cr  | Ni   | P     | S     | Fe   |
|------|-----|-----|-----|------|-------|-------|------|
| 0.45 | 3.0 | 0.4 | 9.2 | 0.17 | <0.02 | <0.01 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
~60 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Tool steels have to be preheated to 300-400°C, depending on the thickness and composition.



# TIG HBF17

Old reference: TIG HBCrMo17-1

## Classification

DIN 8555 : WSG 6-GZ-50-RZ      Material N° : 1.4122  
EN 14700 : S Fe8

## Description & Applications

Solid rod for TIG welding to surfacing. Used for hardsurfacing parts subject to corrosion and heat as well as cold working tools. For gas, water and steam valves with service temperatures up to 500°C.

**Main applications:** Hardfacing and welding of Base metals X55CrNiMoV12, X55Cr14, X160CrMoV12.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr   | Mo  | Fe   |
|-----|-----|-----|------|-----|------|
| 0.4 | 0.5 | 0.5 | 16.5 | 1.1 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
~53 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Tool steels have to be preheated to 350-450°C, depending on the thickness and composition.

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# TIG HBC62

## Classification

DIN 8555 : WSG 4-GZ-60-S  
EN 14700 : S Fe4

Material N° : 1.3348

## Description & Applications

Solid rod for TIG welding to surfacing. Composition of high speed steel, used for hardsurfacing cold working tools as lathe tools, drilling tools, cutting tools.

**Main applications:** Hardfacing and repairing of high speed steels like 85WMoCrV6.5.4.2, 1.3339, 1.3333 and others.

## Typical Chemical Composition ( % )

| C   | Si  | Mn  | Cr  | Mo  | V   | W   | Fe   |
|-----|-----|-----|-----|-----|-----|-----|------|
| 1.0 | 0.4 | 0.2 | 3.6 | 8.5 | 1.8 | 1.6 | Rem. |

## All Weld Metal Mechanical Properties

Hardness  
~62 HRC

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

Tool steels have to be preheated to 350-450°C, depending on the thickness and composition.

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# TIG HCUBE

Old reference: TIG CuBe2

## Classification

EN 14700 : S Z Cu1

AFNOR : CuBe2

## Description & Applications

Solid rod for TIG welding to surfacing. Used for welding and surfacing of copper and copper beryllium.

## Typical Chemical Composition ( % )

| Be  | Co   | Ni   | Fe   | Cu   |
|-----|------|------|------|------|
| 2.0 | 0.25 | 0.02 | 0.01 | Rem. |

## All Weld Metal Mechanical Properties

Hardness

## Welding Current & Instructions

| Welding mode | Shielding Gas   |
|--------------|-----------------|
| TIG<br>= -   | Ar : 6-12 l/min |

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