DAIKO®

# Petrochemical

WELDING CONSUMABLES

# A COMPLETE RANGE OF WELDING CONSUMABLES FOR EXPERT JOINING AND CLADDING IN PETROCHEMICAL APPLICATIONS


**For over forty years, DAIKO SRL has been a leading provider of welding consumables, renowned for consistently meeting the most stringent technical and quality standards across key industrial sectors. Initially specializing in corrosion-resistant alloys (CRAs), DAIKO has expanded its expertise to offer a comprehensive catalog covering all welding processes, including SMAW, GTAW, GMAW, FCAW, SAW, and ESW. This extensive range is the result of meticulous raw material selection and ongoing collaboration with top-tier international producers.**

One of our core strengths is our substantial inventory, which ensures rapid deliveries and precise order fulfillment for our customers. We are a trusted partner, recognized by prestigious clients worldwide across the oil & gas, chemical, and petrochemical industries, as well as in the manufacturing of pressure vessels, valves, and other critical applications where reliable, high-quality welding consumables are essential. With a proven track record of successful welding projects, we specialize in the joining of metals and CRAs used in the construction and maintenance of petrochemical facilities, including refineries, chemical plants, and pipelines.

Our consumables are engineered to withstand the harshest environments, offering exceptional resistance to corrosion from chemicals and gases such as sulfuric acid, chlorine, and hydrogen sulfide. Additionally, they provide outstanding high-temperature resistance, ensuring long-lasting durability and performance without degradation in the most demanding petrochemical applications.

**Discover the High Quality of the Daiko Welding Products!**
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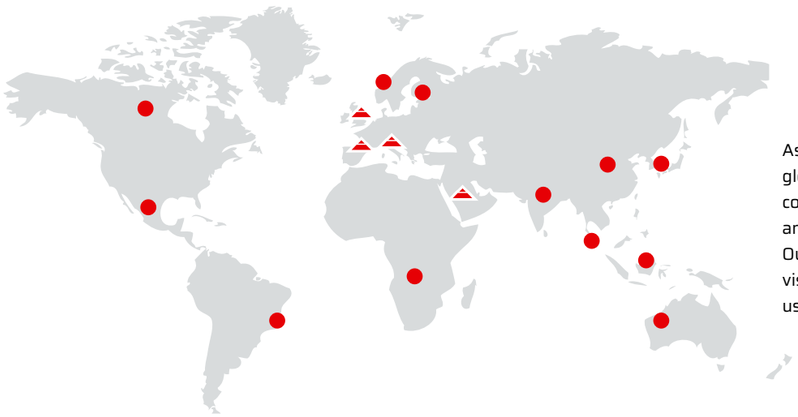
WELDING CONSUMABLES

## NICKEL ALLOY DAIKOW 625 OUR MOST RENOWNED WIRE

The exceptional performance of DAIKOWM 625 wire, honed over decades of experience, is recognized globally by even the most demanding users:
- Fully compliant with AWS A5.14, ERNiCrMo-3 specifications
- Strictly controlled chemical composition for every batch
- Maximum Fe content of 0.5%
- High quality and consistent weldability

**“DAIKOWM 625 is the best GMAW welding wire for joining and cladding a wide range of industrial components, particularly in applications involving robotic welding systems.”**



As an Italian company, we have built a global reputation for our unwavering commitment to technical excellence and exceptional customer service. Our deep-rooted values and strategic vision have fueled our growth and earned us worldwide recognition.



# DAIKOW 625

GTAW
GMAW
SAW

**PRODUCT:**
DAIKOW 625

**APPROVALS:**
TÜV (Mig-Tig), CE

**AVAILABLE IN:**
GMAW
GTAW
SAW

**SPECIFICATIONS:**
AWS A5.14 ER NiCrMo-3
DIN 1736 SG-NiCr21 Mo9Nb (2.4831)
EN ISO 18274 Ni6625

**SHIELDING GAS:**
GTAW: pure argon with back protection
GMAW: pure argon or mixture Ar + He

**APPLICATIONS:**
DAIKOW 625 welding wire is engineered to match the composition and properties of Alloy 625, offering exceptional high-temperature strength and structural stability. This alloy is renowned for its excellent resistance to general corrosion, pitting, crevice corrosion, and stress corrosion cracking, particularly in severe chloride environments. It performs reliably across a broad temperature range, from -269°C to over 1000°C.

DAIKOW 625 is ideal for welding Alloy 625, Alloy 825, Alloy 25-6MO, and various high-alloy austenitic and super austenitic stainless steels. It is also widely used for surfacing steel, welding 9% Ni steels, and joining other corrosion-resistant alloys such as Alloy 20.

Typical applications include furnace equipment, petrochemical and power generation plants, and overlays on pumps, valves, and shafts in offshore and marine environments, where high pitting resistance (PREN > 50) is critical. This wire is extensively used in the petrochemical industry, particularly in production and processing operations, due to its robust performance in harsh conditions.

**TYPICAL COMPOSITION %:**

| C | Mn | Si | S | P | Cr | Ni | Mo | Nb+Ta | Cu | Al | Ti | Fe |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.02 | 0.02 | 0.10 | 0.005 | 0.005 | 22.0 | 65.0 | 9.0 | 3.50 | 0.05 | 0.20 | 0.20 | <0.3 |

**TYPICAL PROPERTIES “AS WELDED”:**
tensile strength = 760 N/mm2
0,2% proof stress = 520 N/mm2
elongation on 4D = 50%
impact energy at -40°C > 200J
-196°C > 80J
PREN > 50
hardness “as welded” = 250 HV

**COMPLEMENTARY PRODUCTS:**
Smaw Electrode: DAIKO 112
Flux Cored Wire: DAIKOFCW 625P
Strip: DAIKOSTRIP 625
SAW Flux: DAIKOFLUX 960-W
ESW Flux: DAIKOFLUX 940

**SPECIFICATIONS:**
AWS A5.11, ENiCrMo-3
AWS A5.34, ENiCrMo3T1-4
AWS A5.14, EQNiCrMo-3

**PACKAGING:**

| | | | |
|---|---|---|---|
| **MIG*** | BS300 | RANGE Ø 0,80 ÷ 1,60 mm | Kg 15 |
| **SAW*** | K415 | RANGE Ø 1,60 ÷ 4,00 mm | Kg 25 |
| **ROD*** | CARTON BOX | RANGE Ø 1,00 ÷ 4,00 mm | Kg 5 |
| **TOURET** | DIN760 | RANGE Ø 1,00 ÷ 2,40 mm | Kg 150-250 |
| **DRUM** | | RANGE Ø 1,20 ÷ 1,60 mm | Kg 150-250 |

Other packaging available upon request.
*** all tradenames in the catalog are characterized by the suffixes “M” for GMAW, “T” for GTAW and “S” for SAW**

# 625
## NICKEL ALLOYS



### APPLICATION & USE:

Engineered to replicate the composition of alloy 625, this consumable is widely recognized for its exceptional resistance to general corrosion, pitting, crevice, and stress corrosion cracking, especially in challenging chloride environments. Elevated levels of Cr, Mo, and Nb contribute to its remarkable performance, endowing it with unparalleled strength that surpasses standard nickel-base alloys. With a broad operational range spanning from -269°C to above 1000°C, it is well-suited for welding heat-resistant alloys like Inconel 601, Incoloy 800/800H, or their combinations with other alloys, catering to various applications in furnace equipment, petrochemical plants, and power generation facilities. This consumable is versatile for performing overmatching corrosion-resistant welds in alloy 825, Hastelloys G and G3, alloy 28, 904L, and the 6%Mo superaustenitic stainless steel 254SMo.

Additionally, it is employed for overlays on pumps, valves, and shafts, particularly in demanding offshore and marine environments where high pitting resistance (PRE = 50) and tolerance to dilution are imperative. In welding high-strength ferrous alloys, including cryogenic 9% nickel steels, and for the reclamation of dies demanding rapid work-hardening and toughness, this consumable stands as a preferred choice. Notably, no preheat is required, and the maximum interpass temperature is set at 250°C. For superaustenitic alloys, the interpass temperature should be rigorously controlled, not exceeding 100°C.

### ALLOY TYPE

Consumables matching the nickel base 625 alloy with typical composition of Ni-21%Cr-9%Mo-3.5%Nb.

### MICROSTRUCTURE

In the as-welded condition this nickel base weld metal consists of solid-solution strengthened austenite with carbides.

### ALLOY TYPE

Prior to initiating the welding or application of heat to any nickel-base alloy, it is paramount to ensure the base metal undergoes a comprehensive cleaning process. Substances such as oil, grease, paint, lubricants, marking pencils, temperature-indicating materials, threading compounds, and similar elements frequently contain sulfur or lead, presenting a potential risk of inducing cracking (embrittlement) in both the base metal and the weld metal if present during welding or heating. For welding activities involving fully austenitic and nickel base steels, meticulous care should be taken to minimize factors such as heat input, interpass temperature, and dilution with the parent metal. It is crucial to strictly adhere to a low heat input, capped at a maximum of 1.5 kJ/mm, and observe an interpass temperature limit of 100°C. Generally, post-weld heat treatment (PWHT) is not required; however, in specific cases, quench annealing at 1050°C may be necessary.

### MATERIALS TO BE WELDED

Also suitable to join 9%Ni steels.
**EN W.Nr.:** 2.4856.
**ASTM:** A494 CW-6MC , 904L.
**UNS:** N06625, S31254.
**PROPRIETARY:** Inconel® 625, 601 (Special Metals), Nicrofer 6020hMo, 6022hMo (VDM), 254SMO (Outokumpu), Incoloy® 800H, 825 (Special Metals).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKO 112** | SMAW | **A5.11** ENiCrMo-3 | **14172** E Ni 6625 |
| **DAIKOFCW 625P** | FCAW | **A5.34** ENiCrMo3T1-4 | **12153** T Ni 6625P M 21 2 |
| **DAIKOWT 625** | GTAW | **A5.14** ERNiCrMo-3 | **18274** S Ni 6625 |
| **DAIKOWM 625** | GMAW | **A5.14** ERNiCrMo-3 | **18274** S Ni 6625 |
| **DAIKOWS 625** | SAW | **A5.14** ERNiCrMo-3 | **18274** S Ni 6625 |
| **DAIKOSTRIP 625** | SAW - ESW | **A5.14** EQNiCrMo-3 | - |

# 82
## NICKEL ALLOYS

**APPLICATION & USE:**

These weld metals lack a direct equivalent parent material, but their composition shares similarities with Inconel™ 600. The inclusion of Mn and Nb enhances their resistance to hot cracking, enabling them to withstand dilution by various combinations of nickel-base and ferrous alloys. They maintain consistent properties over a broad service temperature range, spanning from -269°C to temperatures exceeding 900°C. Applications encompass the welding of heat-resisting nickel-base alloys for use in furnace equipment, reaching temperatures up to approximately 900°C.Also employed for mixed welds involving different nickel-base alloys, such as Monel 400, and stainless, low alloy, or C-Mn steels, eliminating the need for preheating. Moreover, they find utility in transition welds between creep-resisting ferritic and austenitic steels, like 2CrMo and 316H, for prolonged service at elevated temperatures in petrochemical and power generation plants. Ideal for cryogenic applications involving 3% or 5% Ni steels in vessels and pipework operating at or below -100°C. Stress relief is optional. Preheat and PWHT depend on the base material, with no preheat needed for most nickel-base materials

**ALLOY TYPE**

Inconel™ 600 type consumables with manganese and niobium additions.

**MICROSTRUCTURE**

High nickel austenite with some carbides.

**MATERIALS TO BE WELDED**

Nickel base alloys to themselves and to mild, low alloy and stainless steels.
High temperature transition joints. Cryogenic 3% and 5% Ni steels.
**PROPRIETARY:** Inconel® 600 (Special Metals), Nimonic 75® (Special Metals).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKO 182** | SMAW | **A5.11** ENiCrFe-3 | **14172 E** Ni 6182 |
| **DAIKOFCW 82** | FCAW | **A5.34** ENiCrT0-4 | **12153 T** Ni 6082 R M21 3 |
| **DAIKOWT 82** | GTAW | **A5.14** ERNiCr-3 | **18274 S** Ni 6082 |
| **DAIKOWM 82** | GMAW | **A5.14** ERNiCr-3 | **18274 S** Ni 6082 |
| **DAIKOWS 82** | SAW | **A5.14** ERNiCr-3 | **18274 S** Ni 6082 |
| **DAIKOSTRIP 82** | SAW - ESW | **A5.14** ERNiCr-3 | - |



# C276
## NICKEL ALLOYS

**APPLICATION & USE:**

The deposited weld replicates the composition of parent alloy C276, comprising Ni-15%Cr-16%Mo-4%W-5%Fe. Precise control over C and Si levels is implemented to minimize carbide and intermetallic phase precipitates. While cast versions may have higher carbon and silicon content, repair welds typically undergo solution treatment for optimum corrosion resistance. Alloy C276 exhibits high resistance to corrosion in a broad range of acids and salts under oxidizing and reducing conditions, including hydrochloric and hydrofluoric acids, hypochlorites, chlorides, wet chlorine gas, sulphuric, phosphoric, and various organic acids. Noteworthy is its exceptional resistance to crevice corrosion, pitting in seawater (surpassing alloy 62), and chloride-induced stress corrosion cracking. With excellent properties extending to below -196°C, Alloy C276 finds applications in welding 5-9%Ni cryogenic installations. Its versatile use includes pumps, valves, pipework, and vessels in aggressive chemical plant environments, as well as equipment for flue gas desulphurization and critical offshore oil and gas production equipment. Importantly, preheating is unnecessary, and it is advisable to keep the interpass temperature below 100°C, with a restricted heat input to 1.5 kJ/mm.

**ALLOY TYPE**

Alloy C276 is a Ni-15%Cr-16%Mo-4%W-5%Fe nickel base alloy.

**MICROSTRUCTURE**

In the as-welded condition the weld metal consists of austenite with some carbides.

**MATERIALS TO BE WELDED**

**EN W.Nr.**: 2.4819 (NiMo16Cr15W), 2.4883 (G-NiMo16Cr).
**ASTM:** A494 CW-12MW, A743/A744 CW-12M.
**UNS:** N10276.
**PROPRIETARY:** Hastelloy® Alloy C-276 (Haynes International Inc), Inconel® Alloy C-276 (Special Metals), Nicrofer 5716hMoW (VDM).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKO C276** | SMAW | **A5.11** ENiCrMo-4 | **14172** E Ni 6276 |
| **DAIKOFCW C276P** | FCAW | **A5.34** ENiCrMo4T1-4 | - |
| **DAIKOFCW C276** | FCAW | **A5.34** ENiCrMo4T0-4 | - |
| **DAIKOWT 276** | GTAW | **A5.14** ERNiCrMo-4 | **18274** S Ni 6276 |
| **DAIKOWM 276** | GMAW | **A5.14** ERNiCrMo-4 | **18274** S Ni 6276 |
| **DAIKOWS 276** | SAW | **A5.14** ERNiCrMo-4 | **18274** S Ni 6276 |
| **DAIKOSTRIP C276** | SAW - ESW | **A5.14** EQNiCrMo-4 | - |

# 59
# NICKEL ALLOYS

**APPLICATION & USE:**

Designed to match the alloy 59, the weld deposit proudly showcases a precise composition of 59% Ni, 23% Cr, and 16% Mo. Alloy 59 surpasses alloys C276 and C4 in performance across a broader range of oxidizing environments, thanks to its elevated molybdenum content. With an increase in chromium to 23%, alloy 59 exceeds alloy C22 in cumulative alloying levels, making it apt for welding this specific alloy group. Beyond this primary role, alloy 59 consumables deliver resilient and durable Nb-free weld metal, making them well-suited for dissimilar welds involving superaustenitic and superduplex stainless steels or combinations with nickel base alloys. Applications of alloy 59 in highly corrosive environments span diverse industries, including scrubbers for flue gas desulphurization (FGD), digesters, papermaking equipment, chemical process plants, corrosion-resistant overlays, and challenging offshore and petrochemical settings. The consumable eliminates the need for preheating, with recommended heat input below 1 kJ/mm and an interpass temperature capped at 100°C, to minimize precipitates that could compromise the corrosion resistance and ductility of the weld metal.

**ALLOY TYPE**

Ni-23%Cr-16%Mo alloy commonly known as alloy 59.

**MICROSTRUCTURE**

Solid-solution strengthened high nickel austenite, with some micro segregation typical of as deposited weld metal.

**MATERIALS TO BE WELDED**

Dissimilar joints between any combination of the listed alloys and dissimilar joints between them and superduplex stainless steels.
**EN W.Nr.:** 2.4605 (NiCr23Mo16Al), 2.4602 (NiCr21Mo14W), 2.4811, 2.4836 (NiCr20Mo15), 2.4697 (G-NiCr20Mo15).
**ASTM:** A494 gr. CX2MW.
**UNS:** N06059, N06022, S32654, S31254, S34565.
**PROPRIETARY:** Nicrofer 5923hMo, 5621hMoW (VDM), Inconel®Alloy 686 (Special Metals), Hastelloy® Alloy C-2000, C22 (Haynes International Inc), 654SMO (Outokumpu), Uranus B66 (Usinor Industeel).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKO 59K** | SMAW | **A5.11** ENiCrMo-13 | **14172** E Ni 6059 |
| **DAIKOWT 59** | GTAW | **A5.14** ERNiCrMo-13 | **18274** S Ni 6059 |
| **DAIKOWM 59** | GMAW | **A5.14** ERNiCrMo-13 | **18274** S Ni 6059 |
| **DAIKOWS 59** | SAW | **A5.14** ERNiCrMo-13 | **18274** S Ni 6059 |
| **DAIKOSTRIP 59** | SAW - ESW | **A5.14** EQNiCrMo-13 | - |



# 400
# NICKEL ALLOYS

**APPLICATION & USE:**

Weld metal derived from Monel alloy 400, enhanced with elevated levels of Mn and Ti to counteract hot cracking and porosity, employed for welding alloy 400 and similar materials within the Ni-Cu alloy system, such as pure nickel and cupronickel. While welds in alloy K500 are acceptable, they fail to match the strength of this precipitation-hardened alloy. Castings of alloy 400 with 1.5% Si or higher are prone to HAZ cracking. In dissimilar joints involving alloy 400 and other alloys or steels, sensitivity to dilution by Fe (20-30%) or Cr (3-6%) can result in diminished ductility in the weld metal near the fusion boundary. Direct welds to mild or low alloy steels are satisfactory with dilution control, although ERNiCr-3 wire is preferable and necessary for stainless and higher chromium alloys. Alloy 400 boasts a beneficial combination of strength, thermal conductivity, and resistance to corrosion by seawater, inorganic salts, sulphuric and hydrofluoric acids, hydrogen fluoride, and alkalis. Its applications encompass heat exchangers, piping, vessels, and evaporators in the offshore, marine, chemical, petrochemical, and power engineering industries. No preheat is required, and a maximum interpass temperature should be maintained at 150°C

**ALLOY TYPE**

Nickel-copper alloy based on alloy 400 with raised levels of manganese and titanium to suppress hot cracking and porosity.

**MICROSTRUCTURE**

Solid solution, single phase alloy, slightly ferromagnetic near room temperature.

**MATERIALS TO BE WELDED**

**EN W.Nr.:** 2.4360, 2.4361, 2.4365.
**ASTM:** A494 M-35-1, A494 M-35-2.
**UNS:** N04400, N04405, N05500.
**PROPRIETARY:** Monel® Alloy 400, R405, K500 (Special Metals), Nicorros (VDM).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKO 190** | SMAW | **A5.11** ENiCu-7 | **14172** E Ni 4060 |
| **DAIKOWT 418** | GTAW | **A5.14** ERNiCu-7 | **18274** S Ni 4060 |
| **DAIKOWM 418** | GMAW | **A5.14** ERNiCu-7 | **18274** S Ni 4060 |
| **DAIKOWS 418** | SAW | **A5.14** ERNiCu-7 | **18274** S Ni 4060 |
| **DAIKOSTRIP 418** | SAW - ESW | **A5.14** EQNiCu-7 | - |

# 686
## NICKEL ALLOYS

### APPLICATION & USE:

Tailored with precision, these consumables are designed to replicate the composition and characteristics of alloy 686. The heightened levels of Nickel (Ni) and Molybdenum (Mo) offer robust resistance in reducing conditions, complemented by the substantial Chromium (Cr) content providing resilience against oxidizing media. Notably, the inclusion of Molybdenum (Mo) and Tungsten (W) enhances resistance to localized corrosion, specifically addressing issues such as pitting. The low Carbon (C) content plays a pivotal role in minimizing grain boundary precipitation, ensuring the preservation of corrosion resistance within the heat-affected zones of welded joints. Remarkably versatile, this alloy also furnishes a durable Nb-free weld metal, suitable for dissimilar welds involving superaustenitic and superduplex stainless steel, or combinations thereof with Nickel-based alloys. Furthermore, it exhibits exceptional as-welded resistance to sulfuric or hydrochloric acids, their mixtures, and displays resilience against crevice or pitting corrosion in hot concentrated acid chloride solutions. Predominantly applied in chemical and petrochemical processing, pollution control, oil and gas extraction, oil refining, and marine environments, these consumables are invaluable. Their utility extends to dissimilar metal welding applications, providing protection against preferential weld-metal attack, particularly when joining Molybdenum-containing alloys or alloy-clad steels.



### ALLOY TYPE

The nominal composition (wt. %) of the filler metal of this classification is 57 Ni, 21 Cr, 16 Mo, and 4 W.

### MICROSTRUCTURE

Single-phase austenitic Ni-Cr-Mo-W alloy.

### WELDING & PWHT

Prior to welding or subjecting any nickel-base alloy to heat, it is imperative that the base metal undergo thorough cleaning. Common substances such as oil, grease, paint, lubricants, marking pencils, temperature-indicating materials, and threading compounds frequently contain sulfur or lead, posing a potential risk of inducing cracking (embrittlement) in both the base metal and the weld metal if present during welding or heating. When conducting welding activities involving fully austenitic and nickel base steels, meticulous attention must be paid to minimize factors such as heat input, interpass temperature, and dilution with the parent metal. Striving for a low heat input is essential, with a strict maximum of 1.5 kJ/mm, coupled with a stringent interpass temperature limit of 100°C. It is noteworthy that, in this context, no post-weld heat treatment is deemed necessary to restore corrosion resistance. These precision-oriented measures are critical in ensuring the integrity and performance of welds in fully austenitic and nickel base steels, particularly with regard to corrosion resistance.

### MATERIALS TO BE WELDED

Used for welding nickel-chromium-molybdenum alloy to itself, to steel, to other nickel-base alloys, and for cladding steel using the GTAW, GMAW, and SAW processes. It is also suitable to weld overmatching 625, C276, C4, C22, 59 alloys and superduplex and superaustenitic steels.
**EN W.Nr.:** 2.4606 (NiCr21Mo16W).
**UNS:** N06686, N06022, N06059, N06200, N08367, N08926, N08031.
**PROPRIETARY:** Inconel® Alloy 686 (Special Metals), Incoloy® Alloy 25-6MO, 27-7MO (Special Metals).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKO 686K** | SMAW | **A5.11** ENiCrMo-14 | **14172** E Ni 6686 |
| **DAIKOWT 686** | GTAW | **A5.14** ERNiCrMo-14 | **18274** S Ni 6686 |
| **DAIKOWM 686** | GMAW | **A5.14** ERNiCrMo-14 | **18274** S Ni 6686 |
| **DAIKOWS 686** | SAW | **A5.14** ERNiCrMo-14 | **18274** S Ni 6686 |

# 2209
## DUPLEX - SUPERDUPLEX

### APPLICATION & USE:

Duplex stainless steel pipes, plates, fittings, and forgings feature a microstructure composed of approximately equal parts austenite and ferrite. This balanced microstructure, combined with a carefully controlled alloying process, imparts exceptional characteristics to these alloys. One of the most notable features is their significantly higher strength compared to standard austenitic steels like type 316L, making them particularly robust and durable in demanding applications. Beyond their mechanical strength, duplex stainless steels offer superior corrosion resistance across a wide range of environments. This makes them especially well-suited for use in harsh and challenging conditions. They are particularly resistant to chloride-induced stress corrosion cracking (CSCC) and pitting, which are common concerns in chloride-rich environments such as seawater. This elevated resistance ensures long-term reliability and performance in applications exposed to aggressive corrosive agents. In the offshore oil and gas industry, as well as in chemical and petrochemical processing, duplex stainless steels are increasingly being adopted for a variety of critical applications. These include pipework systems, flowlines, risers, manifolds, and other key components that must withstand extreme environmental conditions and mechanical stress. The exceptional properties of these alloys make them an ideal choice for such demanding sectors. Additionally, the filler metals derived from duplex stainless steels are integral to welding applications where exceptionally high strength and corrosion resistance are required. These filler metals ensure that welded structures maintain their integrity and performance in the most rigorous environments, making them indispensable in the construction and maintenance of stainless steel structures in industries where reliability and durability are paramount.



### ALLOY TYPE

22%Cr standard ferritic-austenitic duplex stainless steels.

### MICROSTRUCTURE

Multipass welds in the as-welded condition contain about 25-50% ferrite depending on dilution and heat input/cooling rate conditions.

### WELDING & PWHT

Preheating is typically considered unnecessary in welding processes, and adherence to a maximum interpass temperature of 150°C is recommended. The acceptable range for heat input falls within 1.0-2.5 kJ/mm, contingent on material thickness, though certain codes impose more stringent limits, often capping it at 1.75 or 2.0 kJ/mm. While welds in wrought duplex stainless steels are commonly left in the as-welded condition, substantial repairs to castings are typically specified in the solution-treated state. Experience in the field has consistently demonstrated favorable material properties when employing a treatment regimen involving exposure to 1120°C for 3-6 hours, followed by a water quenching process. In some instances, incorporating an additional cooling step to 1060°C before quenching has shown promising results in further enhancing the structural characteristics and overall performance of the welded components

### MATERIALS TO BE WELDED

**EN W.Nr.:** 1.4462 (X2CrNiMoN22-5-3), 1.4362 (X2CrNiN23-4).
**ASTM:** A182 Gr F51, A890 Gr 4A (cast).
**UNS:** S31803, S32205, S32101, S32304, S32001, J92205.
**PROPRIETARY:** SAF2205, SAF 2304 (Sandvik), Uranus® 45N, 35N (Industeel), A903 (voestalpine), Cronifer 2205LCN (VDM), Maresist F51 (Schmidt + Clemens), SM22Cr (Nippon Steel Corporation), LDX 2101 (Outokumpu).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 2209B** | SMAW | **A5.4** E2209-15 | **3581-A** E 22 9 3 N L B 42 |
| **G-TECH 2209** | SMAW | **A5.4** E2209-16 | **3581-A** E 22 9 3 N L R 12 |
| **G-TECH 2209R** | SMAW | **A5.4** E2209-17 | **3581-A** E 22 9 3 N L R 12 |
| **DAIKOFCW 2209** | FCAW | **A5.22** E2209T0-4 | **17633-A** T 22 9 3 N L R M21 3 |
| **DAIKOFCW 2209P** | FCAW | **A5.22** E2209T1-4 | **17633-A** T 22 9 3 N L P M21 3 |
| **DAIKOWT 2209** | GTAW | **A5.9** ER2209 | **14343-A** W 22 9 3 N L |
| **DAIKOWM 2209** | GMAW | **A5.9** ER2209 | **14343-A** G 22 9 3 N L |
| **DAIKOWS 2209** | SAW | **A5.9** ER2209 | **14343-A** S 22 9 3 N L |
| **DAIKOSTRIP 2209** | SAW - ESW | **A5.9** EQ2209 | **14343-A** B 22 9 3 N L |

# 2507
## DUPLEX - SUPERDUPLEX

**APPLICATION & USE:**

Superduplex stainless steel pipes, plates, fittings, and forgings are engineered with a microstructure that comprises approximately equal parts austenite and ferrite. This carefully balanced composition, combined with a strategic alloying process, imparts a range of superior characteristics that make Superduplex an outstanding choice for demanding industrial applications. One of the key attributes of Superduplex stainless steel is its significantly higher strength compared to standard austenitic steels like type 316L. This increased strength ensures enhanced robustness and durability, even in the most challenging conditions. Beyond its mechanical strength, Superduplex stainless steel also offers excellent general corrosion resistance across a variety of environments, making it highly versatile and reliable. In addition to its general corrosion resistance, Superduplex excels in more specific scenarios, particularly in chloride-rich environments. The alloy exhibits exceptional resistance to chloride-induced stress corrosion cracking (CSCC) and pitting, which are common issues in harsh marine environments, such as seawater. This makes Superduplex an ideal material for use in coastal and offshore applications where exposure to aggressive chlorides is a concern. Moreover, in environments involving dilute sulfuric acid contaminated with chloride ions, Superduplex grade 2507 outperforms even highly alloyed austenitic steels like 904L, which are specifically designed for resistance to pure sulfuric acid. This superior performance in such corrosive conditions further underscores the alloy's suitability for a wide range of demanding applications. As a result of these remarkable properties, Superduplex stainless steels are increasingly being adopted in the offshore oil and gas industry, as well as in chemical and petrochemical processing sectors. Their applications are expanding to include critical infrastructure such as pipework systems, flowlines, risers, manifolds, and other essential components that require both high strength and superior corrosion resistance.

**ALLOY TYPE**

25%Cr ferritic-austenitic superduplex stainless steels.

**MICROSTRUCTURE**

Austenite-ferrite duplex microstructure in AW or solution annealed condition with an approximate 30- 60% ferrite level, depending on heat cycle conditions.

**WELDING & PWHT**

Preheating is typically deemed unnecessary, with stringent control over the interpass temperature, capped at 150°C. While a heat input ranging between 1.0 and 2.0 kJ/mm (depending on material thickness) is generally deemed acceptable, it's worth noting that numerous codes impose a stricter maximum limit, often restricting it to 1.5 or 1.75 kJ/mm. Notably, welds in wrought duplex stainless steels are customarily left in the as-welded condition. However, for substantial repairs to castings, specifications often recommend adopting the solution-treated condition. Drawing from accumulated experience, it has been observed that desirable material properties can be attained through a treatment regimen involving exposure to 1120°C for a duration of 3-6 hours, followed by a water quenching process. This established procedure has demonstrated positive outcomes in enhancing the structural characteristics and overall performance of the welded components.

**MATERIALS TO BE WELDED**

**EN W.Nr.:** 1.4410 (X2CrNiMoN25-7-4).
**ASTM:** A182 F53, A182 F55, A890 Gr5A, A890 Gr6A.
**UNS:** S32750, S32760, J93404.
**PROPRIETARY:** SAF 2507 (Sandvik), Uranus® 47N (Industeel).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 2594** | SMAW | **A5.4** E2594-16 | **3581-A** E 25 9 4 N L R 42 |
| **G-TECH 2594B** | SMAW | **A5.4** E2594-15 | **3581-A** E 25 9 4 N L B 42 |
| **DAIKOFCW 2594P** | FCAW | **A5.22** E2594T1-1/4 | **17633-A** T 25 9 4 N L P C1/M21 1 |
| **DAIKOWT 2594** | GTAW | **A5.9** ER2594 | **14343-A** W 25 9 4 N L |
| **DAIKOWM 2594** | GMAW | **A5.9** ER2594 | **14343-A** G 25 9 4 N L |
| **DAIKOWS 2594** | SAW | **A5.9** ER2594 | **14343-A** S 25 9 4 N L |
| **DAIKOSTRIP 2594** | SAW - ESW | **A5.9** EQ2594 | **14343-A** B 25 9 4 N L |



# ZERON® 100
## DUPLEX - SUPERDUPLEX

**APPLICATION & USE:**

Zeron® 100 stands out for its remarkable strength and exceptional resistance to both corrosion and erosion, making it a top choice for use in highly aggressive environments. The alloy's superior performance is partly due to the addition of copper and tungsten (Cu+W), which significantly enhances its resistance to sulphuric and hydrochloric acids. This advantage places Zeron® 100 above similar alloys that do not contain these elements. Its resilience is particularly beneficial in offshore applications, where it effectively resists pitting and stress-corrosion cracking in seawater—a critical factor for long-term durability in such challenging conditions. Additionally, Zeron® 100 demonstrates high resistance to caustic alkalis and phosphoric acid, further expanding its range of applications. The alloy's service temperature typically spans from -50°C to 280°C, although its upper limit is constrained by thermal instability, occurring at around 450°C, and the risk of sigma phase embrittlement. These characteristics define the operational boundaries of Zeron® 100, ensuring it performs reliably under specified conditions. In the oil and gas industry, Zeron® 100 is widely used in various demanding applications, including process pipework, risers, manifolds, pressure vessels, valves, pumps, and desalination plants. It is also crucial in systems for flue-gas desulphurization (FGD), which further underscores its versatility. Beyond the oil and gas sector, Zeron® 100 is employed in the mining, chemical, and pharmaceutical industries, where its robust properties meet the rigorous demands of these fields. Moreover, Zeron® 100 wires are specifically used for joining supermartensitic stainless steels, highlighting the material's adaptability and effectiveness across a broad spectrum of industrial applications. This combination of strength, corrosion resistance, and versatility makes Zeron® 100 an indispensable material in industries requiring durable and reliable solutions.

**ALLOY TYPE**

25%Cr ferritic-austenitic superduplex stainless steels matching the proprietary Zeron® 100 alloy.

**MICROSTRUCTURE**

Austenite-ferrite duplex microstructure in AW or solution annealed condition with an approximate 30- 60% ferrite level, depending on heat cycle conditions.

**WELDING & PWHT**

Preheating is typically unnecessary. Maintain interpass temperature below 150°C. Acceptable heat input falls within the range of 1.0–2.0 kJ/mm, contingent on material thickness; however, many codes impose a maximum limit of 1.5 or 1.75 kJ/mm. While welds in wrought duplex stainless steels are typically preserved in the as-welded state, significant repairs to castings are commonly mandated in the solution-treated condition. Empirical evidence suggests favorable properties following treatment at 1120°C for 3-6 hours, followed by water quenching.

**MATERIALS TO BE WELDED**

**EN W.Nr.:** 1.4508, 1.4501, 1.4469.
**ASTM:** A890 6A, A182 F55, A890 5A.
**UNS:** S32760, J93380, S32750, S32550, S32520, S39274, S32950, J93404.
**PROPRIETARY:** DP3W (Nippon Steel Corporation), 7-Mo Plus (Carpenter), SAF 2507 (Sandvik), Zeron® 100.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 2595B** | SMAW | **A5.4** E2595-15 | **3581-A** E 25 9 4 N L B 42 |
| **DAIKOFCW 2595** | FCAW | **A5.22** E2594T0-4 | **17633-A** T 25 9 4 Cu N L R M21 3 |
| **DAIKOWT 2594Cu** | GTAW | **A5.9** ER2594 | **14343-A** W 25 9 4 N L |
| **DAIKOWM 2594Cu** | GMAW | **A5.9** ER2594 | **14343-A** G 25 9 4 N L |
| **DAIKOWS 2594Cu** | SAW | **A5.9** ER2594 | **14343-A** S 25 9 4 N L |

# 308L
## AUSTENITIC STAINLESS STEELS

**APPLICATION & USE:**

Designed specifically for welding 18Cr/8Ni stainless steels, including grades such as 301, 302, 303, nitrogen-bearing 304LN, and titanium-stabilized 321, these welding consumables deliver exceptional versatility and performance across a broad range of applications. They are engineered to perform effectively within service temperatures ranging from -100°C to approximately 400°C, making them ideal for diverse industries including food processing, brewing, pharmaceutical equipment, architectural and general fabrication, and even nuclear engineering. However, it's important to highlight that these consumables, particularly the 308L grade, are not suitable for elevated temperature structural applications involving 304/304H stainless steel; in such cases, 308H is recommended. For applications requiring cryogenic performance at temperatures as low as -196°C, 308LCF is the preferred choice. These welding consumables provide reliable, high-quality performance across a wide range of temperatures and applications, ensuring that they meet the rigorous demands of industries requiring both versatility and specialized performance in their welding processes. This austenitic stainless steel does not require preheating, with a recommended maximum interpass temperature of 250°C. Additionally, no post-weld heat treatment is necessary, simplifying the welding process and ensuring efficient production.

**ALLOY TYPE**

308L austenitic stainless steels for joining 304L base materials.

**MICROSTRUCTURE**

Austenite with a controlled level of ferrite, normally in the range 3-12FN depending on the application.

**MATERIALS TO BE WELDED**

**EN W.Nr.:** 1.4306 (X2CrNi19-11), 1.4301 (X5CrNi18-10), 1.4311 (X2CrNiN18-10), 1.4308 (X5CrNi19-10), 1.4541 (X6CrNiTi18-10), 1.4543 (X 3 CrNiCuTi 12-9), 1.4561 (X1CrNiMoTi18-13-2), 1.4550 (X6CrNiNb18-10)+
**ASTM:** 304L, 304, 304LN, CF3, CF8, 321, 347.
**UNS:** S30403, S30400, S30453, S32100, S34700.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 308LB** | SMAW | **A5.4** E308L-15 | **3581-A** E 19 9 L B 42 |
| **G-TECH 308L** | SMAW | **A5.4** E308L-16 | **3581-A** E 19 9 L R 32 |
| **G-TECH 308LR** | SMAW | **A5.4** E308L-17 | **3581-A** E 19 9 LR 12 |
| **DAIKOFCW 308L** | FCAW | **A5.22** E308LT0-1/4 | **17633-A** T 19 9 L R C1/M21 3 |
| **DAIKOFCW 308LP** | FCAW | **A5.22** E308LT1-1/4 | **17633-A** TZ 19 9 L P C1/M21 1 |
| **DAIKOWT 308L** | GTAW | **A5.9** ER308L | **14343-A** W 19 9 L |
| **DAIKOWM 308L** | GMAW | **A5.9** ER308L | **14343-A** G 19 9 L |
| **DAIKOWS 308L** | SAW | **A5.9** ER308L | **14343-A** S 19 9 L |
| **DAIKOWT 308LSi** | GTAW | **A5.9** ER308LSi | **14343-A** W 19 9 L Si |
| **DAIKOWM 308LSi** | GMAW | **A5.9** ER308LSi | **14343-A** G 19 9 L Si |
| **DAIKOSTRIP 308L** | SAW - ESW | **A5.9** EQ308L | **14343-A** B 19 9 L |



# 308H
## AUSTENITIC STAINLESS STEELS

**APPLICATION & USE:**

The 308H consumables are specifically crafted to match unstabilized 18Cr-10Ni austenitic stainless steels, providing elevated temperature strength and oxidation resistance. Carbon content is controlled within the range of 0.04-0.08%, and weld metal Cr and Ni are kept low to minimize embrittlement by sigma phase. Ferrite is controlled to further mitigate embrittlement, and minor elements and residuals are carefully managed to optimize high-temperature properties. No bismuth-bearing constituents are permitted to ensure compliance with API 582 (<0.002%Bi). Consideration of 308H consumables is advised for welding thick (>12mm) stabilized grades 321H or 347H, preventing in-service HAZ cracking and maintaining creep rupture ductility associated with 347 weld metal. Some authorities recommend type 16-8-2 for these steels, including 304H. Widely used in petrochemical and chemical process plants, especially for fabricating cyclones and transfer lines in catalytic crackers (cat crackers) operating within the range of 400-815°C. No preheat is required, and the maximum interpass temperature is set at 250°C. Post-weld heat treatment (PWHT) is not necessary.

**ALLOY TYPE**

High carbon 308 austenitic stainless steels.

**MICROSTRUCTURE**

Austenite with delta ferrite controlled 2-8FN.

**MATERIALS TO BE WELDED**

For 304/304H materials used at elevated temperatures.
**EN W.Nr.:** 1.4948 (X 6 CrNi 18 11).
**ASTM:** 304H, A351 Gr CF10, CF8.
**UNS:** S30409.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 308HB** | SMAW | **A5.4** E308H-15 | **3581-A** E 19 9 H B 4 |
| **G-TECH 308H** | SMAW | **A5.4** E308H-16 | **3581-A** E 19 9 H R 3 |
| **DAIKOFCW 308HP** | FCAW | **A5.22** E308HT1-1/4 | **17633-A** TZ 19 9 H R C1/M21 3 |
| **DAIKOWT 308H** | GTAW | **A5.9** ER308H | **14343-A** W 19 9 H |
| **DAIKOWM 308H** | GMAW | **A5.9** ER308H | **14343-A** G 19 9 H |
| **DAIKOWS 308H** | SAW | **A5.9** ER308H | **14343-A** S 19 9 H |

# 309L
## AUSTENITIC STAINLESS STEELS

**APPLICATION & USE:**

Commonly employed for buffer layers and overlays on CMn, mild steel, or low alloy steels, and for joining 304L/321 clad plates, as well as in dissimilar welds. Subsequent layers are applied using a suitable filler to align with the cladding, such as 308L or 347. In dissimilar joints, the capacity to tolerate dilution is leveraged when joining stainless types 410, 304L, 321, and 316L to mild and low alloy steels, including stiffeners, brackets, and other attachments. Typically, service temperatures exceeding 400°C are avoided. This filler metal is also utilized for welding 12%Cr 'utility ferritics' like Cromwell 3CR12, to itself and other steels. If the service demands corrosion resistance below 400°C, it is feasible to weld wrought and cast steels of the 23Cr-12Ni type (e.g., ASTM 309 and CH8, BS 309S24, and 309C30). However, for high-temperature structural service, it is advisable to use weld metal with carefully managed higher carbon and lower ferrite. Preheat and interpass temperatures depend on the base material hardenability, with no preheat typically required for mild steels, and it can extend up to 250°C for hardenable steels.

**ALLOY TYPE**

24%Cr-13%Ni (309L) austenitic stainless for dissimilar joint buffer layers etc.

**MICROSTRUCTURE**

Austenite with ferrite in the range 8-20FN. GMAW tends to have lower ferrite (8-15 FN) than the MMA and FCW consumables.

**MATERIALS TO BE WELDED**

Mainly used under high dilution conditions, particularly dissimilar welds between stainless and CMn steels.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 309LR** | SMAW | **A5.4** E309L-17 | **3581-A** E 23 12 L R 32 |
| **G-TECH 309L** | SMAW | **A5.4** E309L-16 | **3581-A** E 23 12 L R 32 |
| **G-TECH 309LB** | SMAW | **A5.4** E309L-15 | **3581-A** E 23 12 L B 42 |
| **DAIKOFCW 309L** | FCAW | **A5.22** E309LT0-1/4 | **17633-A** T 23 12 L R C1/M21 3 |
| **DAIKOFCW 309LP** | FCAW | **A5.22** E309LT1-1/4 | **17633-A** T 23 12 L P |
| **DAIKOWT 309L** | GTAW | **A5.9** ER309L | **14343-A** W 23 12 L |
| **DAIKOWM 309L** | GMAW | **A5.9** ER309L | **14343-A** G 23 12 L |
| **DAIKOWS 309L** | SAW | **A5.9** ER309L | **14343-A** S 23 12 L |
| **DAIKOWT 309LSi** | GTAW | **A5.9** ER309LSi | **14343-A** W 23 12 L S |
| **DAIKOWM 309LSi** | GMAW | **A5.9** ER309LSi | **14343-A** G 23 12 L S |
| **DAIKOSTRIP 309L** | SAW - ESW | **A5.9** EQ309L | **14343-A** B 23 12 L/21 13 L |



# 309LMo
## AUSTENITIC STAINLESS STEELS

**APPLICATION & USE:**

Typically utilized for buffer layers and overlays on C-Mn, mild steel, or low alloy steels, and for joining 316L clad plates. Subsequent layers are added with an appropriate filler to align with the cladding, such as 316L or 318. Additionally, it functions as a buffer layer before engaging in hardsurfacing with chromium carbide types. Its ability to tolerate dilution is harnessed when joining stainless types 410, 304L, 321, and 316L to mild and low alloy steels, including stiffeners, brackets, and other attachments. Service temperatures exceeding 300°C are generally avoided. For some applications, a more economical alternative like 309L or 307 may be suitable. The high level of alloying and ferrite content allows dilution from a wide range of alloyed and hardenable steels, ensuring crack-free welds. Preheat and interpass temperatures are influenced by the base material hardenability, with no preheat typically required for mild steels, and it can extend up to 250°C for hardenable steels.

**ALLOY TYPE**

23%Cr-13%Ni-2.5%Mo (309Mo) austenitic stainless steel.

**MICROSTRUCTURE**

Austenite with ferrite normally in the range 10-30FN.

**MATERIALS TO BE WELDED**

Mainly used under high dilution conditions, particularly dissimilar welds between stainless and CMn steels. There are no comparable base materials.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 309LMoB** | SMAW | **A5.4** E309LMo-15 | **3581-A** E 23 12 2 LB |
| **G-TECH 309LMoR** | SMAW | **A5.4** E309LMo-17 | **3581-A** E 23 12 2 LR |
| **G-TECH 309LMo** | SMAW | **A5.4** E309LMo-16 | **3581-A** E 23 12 2 LR 12 |
| **DAIKOFCW 309LMo** | FCAW | **A5.22** E309LMoT0-1/4 | **17633-A** T 23 12 2 L R C1/M21 3 |
| **DAIKOFCW 309LMoP** | FCAW | **A5.22** E309LMoT1-1/4 | **17633-A** T 23 12 2 L P C1/M21 1 |
| **DAIKOWT 309LMo** | GTAW | **A5.9** (ER309LMo) | **14343-A** W 23 12 2 L |
| **DAIKOWM 309LMo** | GMAW | **A5.9** (ER309LMo) | **14343-A** G 23 12 2 L |
| **DAIKOWS 309LMo** | SAW | **A5.9** (ER309LMo) | **14343-A** S 23 12 2 L |
| **DAIKOSTRIP 309LMo** | SAW - ESW | **A5.9** EQ309LMo | **14343-A** B 23 12 2 L/21 13 3 L |

# 316L
## AUSTENITIC STAINLESS STEELS

**APPLICATION & USE:**

These welding materials are meticulously engineered for Mo-bearing austenitic stainless steels, with molybdenum content ranging from 1.5% to 3%. They are compatible with titanium or niobium-stabilized versions, as well as nitrogen-bearing or free machining variations of these alloys. Specifically designed for applications involving Type 316/316L steels, these materials are highly valued for their outstanding resistance to pitting, acids, and general corrosion. While these materials excel in many demanding environments, it's important to note that they are not recommended for elevated temperature structural applications involving 316/316H steels. For cryogenic applications down to -196°C, 316LCF should be considered for optimal performance. The welding process with these materials is straightforward, requiring no preheating. It is crucial, however, to adhere to a maximum interpass temperature of 250°C to ensure weld integrity. Additionally, post-weld heat treatment (PWHT) is not necessary, further simplifying the welding procedure and ensuring efficient production in various industrial applications.

**ALLOY TYPE**

316L Mo bearing austenitic stainless.

**MICROSTRUCTURE**

Austenite with a controlled level of ferrite, normally in the range 2-10FN depending on the application.

**MATERIALS TO BE WELDED**

**EN W.Nr.:** 1.4404 (X2CrNiMo 17-12-2), 1.4401 (x 5CrNiMo 17 12 2), 1.4436 (X 3 CrNiMo 17 13 3), 1.4406 (X 2 CrNiMoN 17 11 2), 1.4429 (X 2 CrNiMoN 17 13 3), 1.4408 (GX5CrNiMo19-11-2), 1.4437 (GX6CrNiMo18-12).
**ASTM:** 316L, 316, 316LN, CF3M, CF8M.
**UNS:** S31603, S31600, S31653.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 316LB** | SMAW | **A5.4** ER316L-15 | **3581-A** E 19 12 3 LB 42 |
| **G-TECH 316LR** | SMAW | **A5.4** ER316L-17 | **3581-A** E 19 12 3 LR |
| **G-TECH 316L** | SMAW | **A5.4** ER316L-16 | **3581-A** E 19 12 3 LR |
| **DAIKOFCW 316L** | FCAW | **A5.22** E316LT0-1/4 | **17633-A** T 19 12 3 L |
| **DAIKOFCW 316LP** | FCAW | **A5.22** E316LT1-1/4 | **17633-A** T 19 12 3 L P C1/M21 1 |
| **DAIKOWT 316L** | GTAW | **A5.9** ER316L | **14343-A** W 19 12 3 L |
| **DAIKOWM 316L** | GMAW | **A5.9** ER316L | **14343-A** G 19 12 3 L |
| **DAIKOWS 316L** | SAW | **A5.9** ER316L | **14343-A** S 19 12 3 L |
| **DAIKOWT 316LSi** | GTAW | **A5.9** ER316LSi | **14343-A** W 19 12 3 L |
| **DAIKOWM 316LSi** | GMAW | **A5.9** ER316LSi | **14343-A** G 19 12 3 L |
| **DAIKOSTRIP 316L** | SAW - ESW | **A5.9** EQ316L | **14343-A** B 19 12 3 L |



# 317L
## AUSTENITIC STAINLESS STEELS

**APPLICATION & USE:**

These consumables are employed for welding 317/317L austenitic stainless steels, showcasing notable effectiveness in challenging corrosion environments prevalent in industries such as chemicals, flue gas desulfurization, seawater desalination, and especially in pulp & paper and textile sectors. Their versatile applications extend to marine, papermaking, chemical processes, and food processing. Notably, they are suitable for surpassing 316/316L steels, leveraging a higher Mo content in the weld metal to enhance pitting and crevice resistance in highly corrosive environments. These steels exhibit excellent resistance to stress corrosion cracking and maintain high pitting resistance. With a service temperature ranging from -120°C to 300°C, careful welding is essential, as subsequent passes may induce precipitates of secondary phases in the weld metal. To address this, a recommended low heat input of max. 1.5 kJ/mm and an interpass temperature of max. 150°C are suggested. Generally, post-weld heat treatment is not required, though, in specific instances, solution annealing at 1080 - 1130°C followed by water quenching can be considered.

**ALLOY TYPE**

The nominal composition (wt. %) of alloy is 19.5 Cr, 14 Ni, 3.5 Mo, similar but more alloyed than ER316.

**MICROSTRUCTURE**

The fillers are fully-austenitic and slightly over-alloyed.

**MATERIALS TO BE WELDED**

**EN W.Nr.:** 1.4436 (X3CrNiMo17-13-3), 1.4439 (X2CrNiMoN17-13-5), 1.4429 (X2CrNiMoN17-13-3), 1.4438 (X2CrNiMo18-15-4), 1.4583 (X10CrNiMoNb18-12).
**ASTM:** 316Cb, 316LN, 317LN, 317L, A351 CG8M, CG3M.
**UNS:** S31726, J92999.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 317L** | SMAW | **A5.4** E317L-16 | **3581-A** E 19 13 4 N LR 32 |
| **DAIKOFCW 317** | FCAW | **A5.22** E317LT0-1/4 | **17633-A** TZ 19 13 4 L R C1 / M21 3 |
| **DAIKOWT 317L** | GTAW | **A5.9** ER317L | **14343-A** W 18 15 3 L / 19 13 4 L |
| **DAIKOWM 317L** | GMAW | **A5.9** ER317L | **14343-A** G 18 15 3 L / 19 13 4 L |
| **DAIKOWS 317L** | SAW | **A5.9** ER317L | **14343-A** S 18 15 3 L /19 13 4 L |
| **DAIKOSTRIP 317** | SAW - ESW | **A5.9** EQ317L | **14343-A** B 19 13 4 L |

# 347
## AUSTENITIC STAINLESS STEELS

**APPLICATION & USE:**

These welding materials have been specifically developed for use with titanium (Ti) and niobium (Nb)-stabilized 18Cr/8Ni stainless steel types 321 and 347, making them an ideal choice for applications requiring both durability and stability. In addition to their primary use with these stabilized grades, they are also highly effective when used with unstabilized stainless steel grades like 304 and 304L, offering a broad range of application possibilities. These materials perform reliably across a wide service temperature range, typically from -100°C to about 400°C, making them versatile enough to meet the demands of various industries. Their applications closely mirror those of 308L consumables, covering sectors such as food processing, brewing, pharmaceutical equipment manufacturing, architectural projects, general fabrication, and nuclear engineering. This versatility underscores their value in industries where both hygiene and structural integrity are critical. However, it's important to note that while these materials are well-suited for many applications, the 347-grade consumables are generally not recommended for elevated temperature structural applications where a carbon content of 0.04-0.08% is required for creep resistance. In such high-temperature scenarios, it is advisable to consult data sheets for 347H, which is specifically designed to handle the rigors of such conditions. For cryogenic applications, particularly those requiring a Charpy lateral expansion of more than 0.38mm (15 mils) at -196°C, it is recommended to use unstabilized weld metal with low carbon content and controlled ferrite levels. This ensures that the weld metal retains its toughness and reliability even in extreme cold, a critical factor in industries where cryogenic storage and transportation are common. The welding process using these materials is simplified by the fact that no preheating is required, which streamlines the operation and reduces preparation time. Additionally, maintaining a recommended maximum interpass temperature of 250°C is crucial for achieving optimal weld quality and preventing any potential degradation of the material. Furthermore, no post-weld heat treatment (PWHT) is necessary, which further enhances the efficiency of the welding process and reduces overall production time.

**ALLOY TYPE**

347 austenitic stainless steel for joining 321 and 347 base materials.

**MICROSTRUCTURE**

Austenite with a controlled level of ferrite, normally in the range 3-12FN.

**MATERIALS TO BE WELDED**

**EN W.Nr.**: 1.4541, 1.4543, 1.4561, 1.4550, 1.4552 (cast).
**ASTM:** 321, 347, CF8C (cast).
**UNS:** S32100, S34700.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 347R** | SMAW | **A5.4** E347-17 | **3581-A** E 19 9 Nb R 32 |
| **DAIKOFCW 347P** | FCAW | **A5.22** E347T1-1/4 | **17633-A** T 19 9 Nb P C1/M21 2 |
| **DAIKOFCW 347** | FCAW | **A5.22** E347T0-1/4 | **17633-A** T 19 9 Nb P |
| **DAIKOWT 347** | GTAW | **A5.9** ER347 | **14343-A** W 19 9 Nb |
| **DAIKOWM 347** | GMAW | **A5.9** ER347 | **14343-A** G 19 9 Nb S |
| **DAIKOWS 347** | SAW | **A5.9** ER347 | **14343-A** S 19 9 Nb |
| **DAIKOWT 347Si** | GTAW | **A5.9** ER347Si | **14343-A** W 19 9 Nb Si |
| **DAIKOWM 347Si** | GMAW | **A5.9** ER347Si | **14343-A** G 19 9 Nb Si |
| **DAIKOSTRIP 347** | SAW - ESW | **A5.9** EQ347 | **14343-A** B 19 9 Nb |



# 347H
## AUSTENITIC STAINLESS STEELS

**APPLICATION & USE:**

Utilized in welding titanium and niobium stabilized 18Cr/8Ni stainless steel, specifically types 321H and 347H, this method is employed across various components like catalytic crackers, cyclones, transfer lines, furnace parts, steam piping, superheater headers, and gas and steam turbine elements. Its applications span industries including petrochemical, chemical, and power generation. The significance of alloy 16.8.2 cannot be overstated, serving as a more ductile alternative to 347H consumables to prevent in-service Heat-Affected Zone (HAZ) failure in 347H base material exceeding 12mm in thickness. When dealing with thicker sections of 321H/347H, the preferred choice is 16.8.2 consumables. For general corrosion resistance at temperatures up to 400°C, recommended consumables are 347 or 308L. In cryogenic applications (>0.38mm Charpy lateral expansion at -196°C), it is advisable to use unstabilized weld metal. Notably, no preheating or Post Weld Heat Treatment (PWHT) is required, and the maximum interpass temperature is limited to 250°C.

**ALLOY TYPE**

Controlled, high carbon Nb stabilized stainless steel for elevated temperature service.

**MICROSTRUCTURE**

Austenite with 2-9FN, typically 4FN (solid wire typically 8FN).

**MATERIALS TO BE WELDED**

**EN W.Nr.**: 1.4941 (X6CrNiTiB18-10), 1.4961 (X8CrNiNb16-13), 1.4878 (X8CrNiTi18-10).
**ASTM:** 321H, 347H.
**UNS:** S32109, S34709.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 347HB** | SMAW | **A5.4** E347-15 | **3581-A** E 19 9 Nb B 42 |
| **G-TECH 347H** | SMAW | **A5.4** E347-16 | **3581-A** E 19 9 Nb R 32 |
| **DAIKOWT 347H** | GTAW | **A5.9** ER347 | **14343-A** W 19 9 Nb |
| **DAIKOWM 347H** | GMAW | **A5.9** ER347 | **14343-A** G 19 9 Nb |
| **DAIKOWS 347H** | SAW | **A5.9** ER347 | **14343-A** S 19 9 Nb |

# CuNi 70-30
## COPPER ALLOYS

**APPLICATION & USE:**

These 70/30 consumables are ideal for surfacing and cladding applications when an appropriate buttering layer is used, typically either Alloy 400 or pure nickel. They are specifically designed for welding 70/30, 80/20, and 90/10 base materials, providing a strong match in both strength and color to the 70/30 base materials. Notably, they also offer overmatching strength compared to the 90/10 alloys, making them versatile for various demanding applications. Common applications for these consumables include offshore construction, desalination plants, evaporators, condensers, and other components within salt and seawater processing systems. These environments require materials that can withstand the corrosive effects of saltwater while maintaining structural integrity over time. One of the advantages of using these consumables is that preheating is generally not necessary, which simplifies the welding process and reduces preparation time. The recommended maximum interpass temperature is 150°C, and no post-weld heat treatment (PWHT) is required, further enhancing the efficiency and convenience of the welding process. However, it is critical to ensure that the weld zone is meticulously free of contamination from foreign materials, particularly those containing lead, tin, or zinc. Contamination from these elements can lead to weld metal cracking, compromising the integrity of the weld and the overall durability of the structure.

**ALLOY TYPE**

70/30 copper-nickel alloys.

**MICROSTRUCTURE**

Solid solution, single phase alloy.

**MATERIALS TO BE WELDED**

**EN W.Nr.**: 2.0872 (CuNi10Fe), 2.0882 (CuNi30Mn1Fe), 2.0883 (CuNi30Fe2Mn2).
**ASTM:** C71500, C96400 (cast).
**UNS:** C71500, C96400, C70600, C96200.
**PROPRIETARY:** Cunifer 30 (VDM), Cunifer 10 (VDM), Osna®-30 (KME), Osna®-10 (KME).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 413** | SMAW | **A5.6** ECuNi | - |
| **DAIKO 187** | SMAW | **A5.6** ECuNi | - |
| **DAIKOWT 413** | GTAW | **A5.7** ERCuNi | **24373** Cu 7158 / CuNi30Mn1FeTi |
| **DAIKOWM 413** | GMAW | **A5.7** ERCuNi | **24373** Cu 7158 / CuNi30Mn1FeTi |
| **DAIKOSTRIP 413** | SAW | **A5.7** EQCuNi | - |



# CuNi 90-10
## COPPER ALLOYS

**APPLICATION & USE:**

These consumables are well-suited for surfacing and cladding applications, delivering optimal performance when used with an appropriate buttering layer, typically Alloy 400 or pure nickel. Their versatility makes them ideal for a wide range of demanding environments, including offshore construction, desalination plants, and various critical components such as evaporators and condensers involved in salt and seawater processing systems. One of the key advantages of these consumables is that preheating is generally not required, streamlining the welding process and enhancing efficiency. The welding process is further simplified by the restriction of the interpass temperature to a maximum of 150°C, which eliminates the need for post-weld heat treatment (PWHT). This feature not only saves time but also reduces operational complexity, making these consumables an excellent choice for projects where both reliability and efficiency are crucial. However, maintaining the purity of the weld zone is of utmost importance. It is essential to take meticulous precautions to prevent contamination by foreign materials, particularly those containing lead, tin, or zinc. Such contaminants can cause significant issues, including weld metal cracking, which could compromise the structural integrity of the finished product. In summary, these consumables provide robust and reliable performance in a variety of industrial applications, particularly in harsh environments where saltwater exposure is a concern. Their ease of use, combined with their resistance to corrosion and ability to maintain weld integrity, makes them an invaluable asset for ensuring long-lasting, high-quality welds.

**ALLOY TYPE**

90/10 copper-nickel alloys.

**MICROSTRUCTURE**

Solid solution, single phase alloy.

**MATERIALS TO BE WELDED**

**EN W.Nr.:** 2.0872 (CuNi10Fe), 2.0882 (CuNi30Mn1Fe), 2.0883 (CuNi30Fe2Mn2).
**ASTM:** C71500, C96400 (cast).
**UNS:** C70600, C96200.
**PROPRIETARY:** Cunifer 10 (VDM), Osna®-10 (KME).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKOWT 412** | GTAW | **A5.7** ERCuNi | **24373** Cu 7061 |
| **DAIKOWM 412** | GMAW | **A5.7** ERCuNi | **24373** Cu 7061 |

# Gr. 6
## COBALT ALLOYS

**APPLICATION & USE:**

This cobalt-based alloy is widely recognized as the most extensively used type, offering abrasion resistance, along with robust defenses against corrosion, erosion, and thermal shock. It excels in resisting galling, sliding friction, and compression across various temperatures. The alloy's distinctive features include a hypereutectic structure comprising roughly 13% eutectic chromium carbides distributed within a solid solution matrix of cobalt, chromium, and tungsten. It is extensively employed for surfacing valves, valve seats, hot shear blades, punches and dies, ingot tong ends, and equipment utilized in handling hot steel. Noteworthy applications include its use for cat cracker slide valves in the petrochemical industry, as well as across a broad spectrum of sectors such as steel, cement, marine, and power generation.

Preheating within the range of 100-300°C, or even higher, along with slow cooling, may be necessary to mitigate the risk of cracking in multi-run deposits and/or highly restrained conditions. The deposits are machinable using carbide tools and can be refined through grinding as needed. Importantly, these alloys remain impervious to allotropic transformation, ensuring that their properties endure even after subsequent heat treatment of the base metal.

**ALLOY TYPE**

Cobalt based alloy composed of 27%-32% Chrome, 4%-6% Tungsten, 1%-2% Carbon, 3%-4% Nickel, 1%-2% Silicon and 3%-4% Iron.

**MICROSTRUCTURE**

In the as-welded condition the microstructure consists of a cobalt based austenite with a number of carbides and other complex phases.

**MATERIALS TO BE WELDED**

Used for surfacing mild, low alloy and stainless steels, and also for nickel base alloys. Can also be used for the repair of UNS R30006, Stellite 6 (Deloro Stellite).

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 1006** | SMAW | **A5.13** ECoCr-A | - |
| **DAIKOFCW 1006LC** | FCAW | **A5.21** ERCCoCr-A | **14700** TCo2 |
| **DAIKOFCW 1006** | FCAW | **A5.21** ERCCoCr-A | **14700** TCo2 |
| **DAIKOWT 1006** | GTAW | **A5.21** ERCoCr-A | - |
| **DAIKOWM 1006** | GMAW | **A5.21** ERCoCr-A | - |



# Gr. 12
## COBALT ALLOYS

**APPLICATION & USE:**

These consumables exhibit an exceptional combination of characteristics, providing resistance to metal-to-metal wear, corrosion, erosion, and thermal shock. Specifically engineered for temperatures up to 800°C, they consist of chromium, nickel, and molybdenum alloys, collectively imparting excellent mechanical properties for enhanced corrosion and wear resistance. The resulting weld deposit demonstrates robust creep strength, making it well-suited for enduring high-temperature environments. With an optimal ferrite content in the joint, this filler material finds application in a range of scenarios, including heavy structural fabrications, oil rigs, boilers, pressure vessels, and cryogenic storage tanks. Notably, it surpasses similar fillers in terms of superior impact values at low temperatures. Widely utilized for surfacing valves and valve seats in the oil and gas industries, as well as for enhancing the durability of screw conveyors, augers in rubber and plastic industries, saw teeth in wood industries, and critical components like cams, shafts, tappets, and push rods in engines, among other applications.

**ALLOY TYPE**

Similar in composition to deposits made using ERCoCr-A electrodes and rods except for a slightly higher percentage of carbides.

**MICROSTRUCTURE**

Chromium and tungsten carbides (approximately 16%) in an austenitic type matrix.

**WELDING & PWHT**

Prior to engaging in the welding process, it is imperative to meticulously cleanse the joint surface and its immediate vicinity. Complete removal of grease, oil, crayon marks, sulfur compounds, and any extraneous substances is paramount. Exercise caution to prevent contact between the joint area and copper or copper-bearing materials. Ideally, although not obligatory, the alloy should find itself in the solution-annealed state before initiating the welding procedure. The necessity for preheating arises only when the base metal temperature descends below 0°C. During welding, it is advisable to maintain relatively low interpass temperatures. This approach is designed to cultivate optimal conditions for a seamless welding operation.

**MATERIALS TO BE WELDED**

It is used to surface valves and valve seats for oil& gas industries, screw conveyors and augers for rubber and plastic, saw teeth for wood industries, cams, shafts, tappets and push rods for engines, etc.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 1006** | SMAW | **A5.13** ECoCr-A | - |
| **DAIKOFCW 1006LC** | FCAW | **A5.21** ERCCoCr-A | **14700** TCo2 |
| **DAIKOFCW 1006** | FCAW | **A5.21** ERCCoCr-A | **14700** TCo2 |
| **DAIKOWT 1006** | GTAW | **A5.21** ERCoCr-A | - |

# Gr. 1
## COBALT ALLOYS

**APPLICATION & USE:**

The high percentage of carbides gives the alloy higher wear resistance accompanied by reductions in the impact and corrosion resistance. The higher hardness also means a greater tendency to check during cooling. The checking tendency may be minimized by closely monitoring preheating, interpass temperature, and postheating techniques. While the cobalt-chromium deposits soften somewhat at elevated temperatures, they normally are considered immune to tempering. Weld metal deposited by ERCoCr-C electrodes and rods is used to build-up items such as mixers, rotors, or wherever harsh abrasion and low impact are encountered. Suitable also for applications such as pump sleeves, rotary seal rings, wear pads, expeller screws and bearing sleeves. The addition of tungsten enhances high temperature hardness and matrix toughness for excellent adhesive and solid particle erosion wear resistance. It retains its hardness, 43-58 HRC, at temperatures up to 760°C. Preheat at 300°C and over in general.

**ALLOY TYPE**

Cobalt alloy for hardfacing with excellent corrosion and abrasion resistance with low impact.

**MICROSTRUCTURE**

Primary hypereutectic carbides (approximately 19%) are found in in an austenitic type matrix.

**WELDING & PWHT**

Ensure thorough cleaning of both the joint surface and its adjacent area prior to welding, diligently removing any contaminants such as grease, oil, crayon marks, sulfur compounds, and other foreign matter. Exercise caution to avoid any contact between the joint area and copper or copper-bearing materials. While it is preferable, albeit not mandatory, for the alloy to be in a solution-annealed condition during welding, preheating is typically deemed unnecessary as long as the base metal temperature remains above 0°C. Throughout the welding process, maintain consistently low interpass temperatures for optimal results. For further enhancement, it is advisable to implement postheating at 600°C and facilitate a slow cooling process after welding to effectively prevent the occurrence of cracking.

**MATERIALS TO BE WELDED**

It bonds well with all steels including stainless.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 1010** | SMAW | **A5.13** ECoCr-C | - |
| **DAIKOFCW 1010** | FCAW | **A5.21** ERCCoCr-C | - |
| **DAIKOWT 1010** | GTAW | **A5.21** ERCoCr-C | - |
| **DAIKOWM 1010** | GMAW | **A5.21** ECoCr-C | - |



# Gr. 21
## COBALT ALLOYS

**APPLICATION & USE:**

This low-carbon cobalt-based alloy type seamlessly blends commendable high-temperature strength with heightened ductility. The enhanced ductility contributes to superior resistance to weld cracking compared to its high-carbon counterparts. It exhibits notable resistance to corrosion, oxidation, and sulfidation, displaying robust resistance to cavitation erosion and better resistance to thermal shock than high-carbon types. While its galling resistance is somewhat lower than high-carbon types, it compensates with superior bed-in properties. This alloy is widely employed for surfacing valves, valve seats, hot shear blades, hot work dies, ingot tong ends, and equipment designed for handling hot steel. It serves as a preferred material for cat cracker slide valves in the petrochemical industry and finds diverse applications across a broad spectrum of industries, including steel, cement, marine, and power generation. While preheating is generally not mandatory, it is advisable for the first layer when deposited on hardenable alloy steels. Interpass control to approximately 200°C maximum is recommended to minimize potential hot cracking in heavy multipass deposits. The deposits exhibit machinability with carbide tools and can be refined through grinding as necessary.

**ALLOY TYPE**

CoCrMo alloy matrix containing dispersed hard carbides.

**MICROSTRUCTURE**

In the as-welded condition the microstructure consists of a cobalt based austenite with a number of carbides and other complex phases.

**MATERIALS TO BE WELDED**

Used for surfacing mild, low alloy and stainless steels and also for nickel base alloys. Can also be used for the repair of similar base materials (UNS R30021, Stellite 21 - Deloro Stellite) although it is optimized for surfacing not joining.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 1021** | SMAW | **A5.13** ECoCr-E | - |
| **DAIKOFCW 1021** | FCAW | **A5.21** ERCCoCr-E | **14700** TCo1 |
| **DAIKOWT 1021** | GTAW | **A5.21** ERCoCr-E | - |
| **DAIKOWM 1021** | GMAW | **A5.21** ERCoCr-E | - |

# Gr. 25
## COBALT ALLOYS

**APPLICATION & USE:**

This filler, derived from the L605 rolled alloy, provides a comprehensive solution for applications that demand exceptional resistance to thermal fatigue, mechanical stress, and corrosive environments. Its design makes it an indispensable material in industries where the highest levels of performance and durability are required. Engineered to excel in resisting thermal fatigue, this filler is ideal for rebuilding tools used in hot steel operations, such as scissors and punches within the steel industry. The non-magnetic weld metal produced offers impressive mechanical strength and outstanding oxidation resistance up to 980°C. It effectively resists sulphuration and wear in metal-to-metal contacts, providing robust protection against corrosion, abrasion, cavitation, and high-impact forces, particularly at elevated temperatures. This filler stands out for its ability to endure in both oxidizing and reducing atmospheres, maintaining its integrity at temperatures up to 1150°C. This makes it particularly valuable in extreme heat and harsh conditions. Its versatility is demonstrated across a wide range of demanding applications, including molding and die work for hot forming processes. It is widely utilized in the petrochemical industry, where it is employed in high-pressure steam control valves, various other types of valves, shear blades, turbine blade recharging, extrusion dies, forging dies and tools, furnace components, and tools specifically designed for working with hot steel.

**ALLOY TYPE**

Cobalt-based alloy with additions of chromium, tungsten and nickel for excellent high temperature strength and oxidation resistance

**MICROSTRUCTURE**

Chromium and tungsten carbides in an austenitic type matrix.

**WELDING & PWHT**

Prior to welding, ensure a thorough cleaning of the joint surface and surrounding area to remove contaminants like grease, oil, crayon marks, sulfur compounds, and foreign matter. Avoid any contact between the joint area and copper or copper-bearing materials. While it's preferable for the alloy to be in a solution-annealed condition during welding, preheating is generally unnecessary as long as the base metal temperature stays above 0°C. Maintain low interpass temperatures during welding. For multiple weld passes, use auxiliary cooling methods if needed, ensuring they don't introduce contaminants. Post-weld heat treatment is usually unnecessary under normal conditions.

**MATERIALS TO BE WELDED**

It is used for rebuilding and/or hardfacing of tools that work hot steel, such as scissors, punches, etc. for the steel industry.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **G-TECH 1025** | SMAW | - | **14700** E Z Co1 (L 605) |
| **DAIKOFCW 1025** | FCAW | - | **14700** T Co1 |
| **DAIKOWT 1025** | GTAW | - | **14700** S Z Co (L 605) |
| **DAIKOWM 1025** | GMAW | - | **14700** T Z Co (L 605) |



# Gr. 1
## TITANIUM ALLOYS

**APPLICATION & USE:**

Unalloyed Ti grade renowned for its peak ductility, cold formability, and impact toughness, coupled with exceptional resistance across a broad spectrum of media—from mildly reducing to highly oxidizing, with or without chlorides—and noteworthy weldability. As the lowest strength unalloyed commercially pure grade, it finds application in scenarios prioritizing ductility, including explosive cladding, loose linings, expanded metal, and deep drawing applications, with a key focus on the chemical industry. Tailored for applications like pump sleeves, rotary seal rings, wear pads, expeller screws, and bearing sleeves, it is also integral to electrolytic applications, serving as coated anode substrates for chlorine and sodium chlorate production. The resulting weld deposit, maintaining a hardness of 43-58 HRC even at temperatures up to 760°C, is ductile, ensuring excellent corrosion resistance and offering impressive weldability. Notably, it is suitable for hardfacing, delivering remarkable corrosion and abrasion resistance with minimal impact.

**ALLOY TYPE**

Gr. 1 titanium, commercially pure.

**MICROSTRUCTURE**

Single-phase and near single-phase alpha alloys (compact hexagonal lattice-HCP).

**WELDING & PWHT**

Titanium, being a reactive metal, is susceptible to embrittlement by oxygen, nitrogen, and hydrogen at elevated temperatures. As a result, safeguarding the metal from atmospheric contamination becomes crucial. This protection is achieved by shielding the metal with welding-grade inert gas. Throughout arc welding, it is imperative to maintain this shielding until the titanium has cooled below about 430°C. To ensure optimal welding conditions, the titanium metal itself must be free of thick oxide and undergo thorough chemical cleaning Prior to welding initiation. Contamination from oxide, water, grease, or dirt can also lead to embrittlement. For titanium welding rods, ensure they're clean and free of heavy oxide, moisture, grease, and dirt. Cleaning between passes is usually unnecessary if the weld bead stays bright and silvery. Discoloration like straw or light blue can be removed with a stainless steel wire brush. However, contaminated weld beads with dark blue, gray, or white powdery discoloration must be completely ground off. The joint requires meticulous preparation and cleaning before proceeding with additional welding.

**MATERIALS TO BE WELDED**

Suitable for welding Titanium grade 1, 2, 3 and 4.
**EN W.Nr.:** 3.7025, 3.7035, 3.7055, 3.7065.
**ASTM:** Ti-Gr 1, Ti-Gr 2, Ti-Gr 3, Ti-Gr 4.
**UNS:** R504007, R50400, R50550, R50700.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKOWT Ti 1** | GTAW | **A5.16** ERTi-1 | - |
| **DAIKOWM Ti 1** | GMAW | **A5.16** ERTi-1 | - |

# Gr. 2
## TITANIUM ALLOYS

**APPLICATION & USE:**

It is a GTAW and GMAW filler metal used for welding commercial pure titanium alloys commonly found in applications requiring high temperature resistance and resistance to chemical reagents. Although there are four grades of Commercial Pure Titanium filler metals, C.P. Grade 2 (ERTi-2) is the most popular because of its good balance of strength, formability and weldability. The most common application of Commercial Pure Titanium is the aircraft industry, where tensile strength and weight ratios are so critical. Other uses would include cryogenic and petrochemical applications such as chemical process heat exchangers, pressure vessels and piping systems, pulp bleaching systems, electro chemical and chemical storage tanks. Compared to the other grades of commercially pure titanium, Grade 2 is slightly weaker than Grade 3, but stronger than Grade 1 and equally resistant to corrosion. Grade 2 offers excellent balance of moderate strength and reasonable ductility. This material is also non-magnetic.

**ALLOY TYPE**

Gr. 2 titanium, commercially pure.

**MICROSTRUCTURE**

Pure alpha alloys (compact hexagonal lattice-HCP).

**WELDING & PWHT**

Titanium, being a reactive metal, is susceptible to embrittlement by oxygen, nitrogen, and hydrogen at elevated temperatures. As a result, safeguarding the metal from atmospheric contamination becomes crucial. This protection is achieved by shielding the metal with welding-grade inert gas. Throughout arc welding, it is imperative to maintain this shielding until the titanium has cooled below about 430°C. To ensure optimal welding conditions, the titanium metal itself must be free of thick oxide and undergo thorough chemical cleaning Prior to welding initiation. Contamination from oxide, water, grease, or dirt can also lead to embrittlement. For titanium welding rods, ensure they're clean and free of heavy oxide, moisture, grease, and dirt. Cleaning between passes is usually unnecessary if the weld bead stays bright and silvery. Discoloration like straw or light blue can be removed with a stainless steel wire brush. However, contaminated weld beads with dark blue, gray, or white powdery discoloration must be completely ground off. The joint requires meticulous preparation and cleaning before proceeding with additional welding.

**MATERIALS TO BE WELDED**

Suitable for welding Titanium grade 1, 2, 3 and 4.
**EN W.Nr.**: 3.7025, 3.7035, 3.7055, 3.7065.
**ASTM:** Ti-Gr 1, Ti-Gr 2, Ti-Gr 3, Ti-Gr 4.
**UNS:** R504007, R50400, R50550, R50700.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKOWT Ti 2** | GTAW | **A5.16** ERTi-2 | - |
| **DAIKOWM Ti 2** | GMAW | **A5.16** ERTi-2 | - |



# Gr. 5
## TITANIUM ALLOYS

**APPLICATION & USE:**

DAIKOW Ti 5 is a titanium grade 5 alloy, also known as Ti 6Al-4V or “6-4,” and is the most commonly used titanium alloy. It offers an ultimate tensile strength of at least 895 MPa, making it a robust choice for various demanding applications. This alloy is known for its good weldability and can be heat treated to enhance its strength or toughness. Grade 5 titanium is widely utilized in the aerospace industry, particularly in the manufacture of aircraft components such as landing gear, wing spars, and compressor blades. Its corrosion resistance is comparable to that of Grade 2 titanium, making it suitable for use in environments where corrosion protection is essential, but with the added advantage of higher strength. This makes it ideal for high-stress applications like shafts, high-strength bolting, and keys. In addition to its strength, Grade 5 titanium is characterized by good hot formability and excellent weldability, making it versatile in various fabrication processes. It is also highly resistant to saltwater, marine atmospheres, and a range of corrosive media at temperatures below 300°C, further broadening its applicability in marine and industrial environments where durability and corrosion resistance are critical.

**ALLOY TYPE**

Gr. 5 titanium.

**MICROSTRUCTURE**

Alpha (compact hexagonal lattice-HCP) and Beta alloys (body centered cubic lattice-BCC) .

**WELDING & PWHT**

Titanium, being a reactive metal, is susceptible to embrittlement by oxygen, nitrogen, and hydrogen at elevated temperatures. As a result, safeguarding the metal from atmospheric contamination becomes crucial. This protection is achieved by shielding the metal with welding-grade inert gas. Throughout arc welding, it is imperative to maintain this shielding until the titanium has cooled below about 430°C. To ensure optimal welding conditions, the titanium metal itself must be free of thick oxide and undergo thorough chemical cleaning Prior to welding initiation. Contamination from oxide, water, grease, or dirt can also lead to embrittlement. For titanium welding rods, ensure they're clean and free of heavy oxide, moisture, grease, and dirt. Cleaning between passes is usually unnecessary if the weld bead stays bright and silvery. Discoloration like straw or light blue can be removed with a stainless steel wire brush. However, contaminated weld beads with dark blue, gray, or white powdery discoloration must be completely ground off. The joint requires meticulous preparation and cleaning before proceeding with additional welding.

**MATERIALS TO BE WELDED**

Grade 5, Ti-6Al-4V.
**EN W.Nr.:** 3.7165.
**ASTM:** Ti-Gr 5.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKOWT Ti 5** | GTAW | **A5.16** ERTi-5 | - |
| **DAIKOWM Ti 5** | GMAW | **A5.16** ERTi-5 | - |

# Gr. 7
## TITANIUM ALLOYS

**APPLICATION & USE:**

DAIKOW Ti 7 is a titanium alloy that maintains the same mechanical properties as DAIKOW Ti 2 but with superior corrosion resistance, making it an ideal choice for critical applications where enhanced durability is essential. This alloy is particularly advantageous for welding projects involving Grade 2 or Grade 16 titanium, where the added corrosion protection can significantly extend the lifespan of components. The key to DAIKOW Ti 7's improved performance lies in its alloy composition, which includes 0.12% palladium. This addition significantly enhances the alloy's resistance to corrosion, particularly in environments susceptible to crevice or under-deposit corrosion, such as marine and industrial settings. The incorporation of palladium allows DAIKOW Ti 7 to maintain a strong defense against corrosive agents while preserving the low density that is characteristic of titanium alloys, ensuring the material remains both strong and lightweight. Due to its robust properties, DAIKOW Ti 7 is widely used in applications where corrosion resistance is critical. These include the production of valves, heat exchangers, piping, and fittings, all of which benefit from the alloy's ability to withstand harsh conditions. Whether exposed to aggressive chemicals or challenging environmental conditions, components made with DAIKOW Ti 7 can be expected to deliver long-lasting, reliable performance, making it a preferred material in industries such as chemical processing, marine engineering, and oil and gas.

**ALLOY TYPE**

Gr. 7 titanium.

**MICROSTRUCTURE**

Single-phase and near single-phase alpha alloys (compact hexagonal lattice-HCP).

**WELDING & PWHT**

Titanium, being reactive, is susceptible to embrittlement by oxygen, nitrogen, and hydrogen, particularly at higher temperatures. Shielding the metal from atmospheric contamination during welding, using inert gas, is crucial. This shielding must be maintained until the titanium cools below approximately 430°C post-arc welding. To ensure optimal welding, the titanium must be free of thick oxide and undergo thorough chemical cleaning before initiating the welding process. Contamination from oxide, water, grease, or dirt can lead to embrittlement. Therefore, it's essential to ensure that titanium welding rods are both chemically clean and free from heavy oxide, absorbed moisture, grease, and dirt. If the weld bead retains a bright, silvery appearance, cleaning between passes is generally unnecessary. However, discoloration like straw or light blue can be effectively removed by wire brushing with a clean stainless steel wire brush. Conversely, weld beads showing signs of contamination, such as dark blue, gray, or white powdery discoloration, require thorough removal through grinding. After removing contaminated weld beads, meticulous joint preparation and cleaning are essential before proceeding with subsequent welding operations.

**MATERIALS TO BE WELDED**

Grade 7, Ti-0.15Pd and in some case for welding titanium base metal grades of 2, 16, and 26.
**UNS:** R52400.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKOWT Ti 7** | GTAW | **A5.16** ERTi-7 | - |
| **DAIKOWM Ti 7** | GMAW | **A5.16** ERTi-7 | - |



# Gr. 12
## TITANIUM ALLOYS

**APPLICATION & USE:**

DAIKO Ti 12 is a distinguished titanium alloy known for its exceptional corrosion resistance, achieved through the strategic addition of small amounts of nickel (Ni) and molybdenum (Mo). These elements not only enhance the alloy's strength, delivering superior mechanical properties compared to commercially pure titanium grades, but also play a crucial role in improving the material's corrosion resistance. The inclusion of nickel and molybdenum in DAIKO Ti 12 significantly alters the surface electrochemistry, particularly in areas prone to crevice corrosion or beneath surface deposits, thereby offering enhanced protection against corrosive environments. This makes DAIKO Ti 12 an ideal choice for applications where resistance to crevice corrosion is critical, especially in high-temperature brines. Originally developed as an intermediate-strength grade, DAIKO Ti 12 addresses the need for heightened corrosion resistance in challenging conditions, while also maintaining cost-effectiveness. This balance of performance and affordability makes it a compelling alternative to Grade 7 alloys, offering a reliable solution for industries requiring robust materials that can withstand harsh environments without incurring excessive costs. DAIKO Ti 12's unique combination of enhanced corrosion resistance and superior mechanical properties positions it as a preferred material for demanding applications, providing long-lasting performance in environments where other alloys might fail. Its ability to deliver high-level performance in tough conditions, coupled with its cost advantages, makes DAIKO Ti 12 an excellent choice for a wide range of industrial uses.

**ALLOY TYPE**

Gr. 12 titanium.

**MICROSTRUCTURE**

Single-phase and near single-phase alpha alloys (compact hexagonal lattice-HCP).

**WELDING & PWHT**

Titanium, being a reactive metal, is susceptible to embrittlement when exposed to elevated temperatures and certain contaminants, including oxygen, nitrogen, and hydrogen. To prevent such issues, it is imperative to shield the metal from atmospheric contamination, which is achieved by using welding-grade inert gas during the welding process. Throughout arc welding, the titanium should remain shielded from the ambient air atmosphere until it cools below approximately 430°C. For optimal welding results, the titanium metal must be devoid of thick oxide and chemically clean before initiating the welding process. Contamination from oxide, water, grease, or dirt can lead to embrittlement. Therefore, it is essential to ensure that titanium welding rods are not only chemically clean but also free of heavy oxide, absorbed moisture, grease, and dirt. In instances where the weld bead maintains its bright and silvery appearance, cleaning between passes is generally unnecessary. However, if straw or light blue discoloration is observed on the weld, it can be remedied by wire brushing using a clean stainless steel wire brush. Conversely, if the weld beads display signs of contamination, such as dark blue, gray, or white powdery discoloration, thorough removal through grinding is mandatory. Following the removal of contaminated weld beads, the joint should be meticulously prepared and cleaned before commencing with subsequent welding operations.

**MATERIALS TO BE WELDED**

Grade 12,Ti-0.3Mo-0.8Ni.

| AVAILABLE PRODUCTS | Process | Specifications AWS | Specifications EN ISO |
|---|---|---|---|
| **DAIKOWT Ti 12** | GTAW | **A5.16** ERTi-12 | - |
| **DAIKOWM Ti 12** | GMAW | **A5.16** ERTi-12 | - |

# QUALITY POLICY

**DAIKO Srl is strategically aligned to deliver an elevated standard of professionalism across both service and product domains, ensuring a distinctive level of promptness characteristic of a true professional partner.**


## TOTAL QUALITY MANAGEMENT

DAIKO places a strong emphasis on delivering exceptional service and ensuring prompt responses to cater to the diverse needs of our customers, spanning both services and products. This commitment is the driving force behind the adoption of an ISO 9001 certified Quality Management System and attaining approval as a manufacturer of Welding Consumables pursuant to VdTÜV-Merkblatt Schweißtechnik 1153:2017.

By embracing its Total Quality Management, DAIKO has established a structured framework that prioritizes ongoing enhancement. This approach ensures that our products and services consistently evolve, adapting to the dynamic landscape of customer requirements. Through this commitment, we aim to instill confidence in our customers, assuring them that DAIKO is a reliable partner dedicated to elivering excellence and continual improvements in every aspect of our offerings.

**Discover the DAIKO Quality Management System!**
Scan the QRcode to download the latest certifications.

In executing quality initiatives, DAIKO Srl actively incorporates risk-based thinking. This entails a meticulous evaluation and management of risks and opportunities within the organizational context, with careful consideration given to the diverse needs and expectations of interested parties. To strengthen this commitment, a robust Quality Management System (QMS) has been developed, overseeing coordinated processes with a keen focus on:

### CUSTOMERCENTRIC APPROACH

01

Embrace a customer-centric philosophy by thoroughly considering and addressing the diverse needs and expectations of our customers in every aspect of our operations. This customer-focused mindset guides our decision-making and actions to ensure the delivery of solutions that resonate with and exceed customer expectations.

### QUALITY OBJECTIVES

02

Dedicate ourselves to achieving quality objectives that directly contribute to enhancing customer satisfaction. This commitment involves setting and consistently surpassing benchmarks that align with the evolving expectations of our customers, fostering a culture of continuous improvement.

### TRANSPARENT COMMUNICATION

03

Prioritize timely, accurate, and transparent communication as the cornerstone of our operational framework. By fostering an environment of open communication, we lay the foundation for ongoing learning and improvement.This transparency ensures that valuable insights are shared, leading to informed decision-making and continual advancement.

### INCLUSIVE ENGAGEMENT

04

Actively engage and involve all employees and contractors in our relentless pursuit of improvement. Recognizing that every individual within our organization plays a vital role, we foster a collaborative culture where ideas are valued, and participation is encouraged. This inclusive approach ensures that diverse perspectives contribute to our collective growth and success.

### QUALIFIED PARTNERS

05

Forge partnerships with qualified suppliers and manufactures to guarantee the highest product consistency for our customers. Working closely with reputable industrial partners who share our commitment to quality allows us to maintain the integrity of our offerings. This collaboration enhances our ability to meet and exceed customer expectations by delivering products that consistently meet stringent standards.

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DAIKO