TIG rods, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
BOHLER TIG N 308L AWS A5.9: ER 308L EN ISO 14343-A: W 19 9 L	C: ≤0.02 Si: 0.40 Mn: 1.75 Ni: 9.5 Cr: 19.80 Mo: 0.16 FN: 3-11 (WRC-92)	UTS: ≥550 MPa YS: ≥400 MPa El: ≥35% CVN Impact: +20°C: ≥100J -196°C: ≥35J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	-	BOHLER TIG N 308L designed for welding austenitic stainless steel type 19 Cr 10 Ni or similar. The wire is also suitable for welding titanium and niobium stabilized steels such as ASTM 321 and ASTM 347 in cases where the construction is used at temperatures not exceeding 400°C. GTAW rod of type W 19 9 L/ ER 308L designed for first class welding with good wetting characteristics and excellent CVN down to -196°C.
BOHLER TIG N 309L AWS A5.9: ER 309L EN ISO 14343-A: W 23 12 L	C: ≤0.02 Si: 0.32 Mn: 1.83 Ni: 12.37 Cr: 23.20 Mo: 0.13 FN: 10-14 (WRC-92)	UTS: ≥520 MPa YS: ≥320 MPa El: ≥30% CVN Impact: +20°C: ≥100J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	-	BOHLER TIG N 309L is a high alloy 23 Cr 13 Ni wire primarily intended for surfacing low alloy steels and for dissimilar welding between mild steels and stainless steels, offering a ductile and crack resistant weldment. The chemical composition, when surfacing, is equivalent to that of ASTM 304 from the first run. The weld metal reduces inter granular corrosion where severe corrosion condition exist requiring high alloy weld metal.
BOHLER TIG N 316L AWS A5.9: ER316L EN ISO 14343-A: W 19 12 3 L	C: ≤0.02 Si: 0.37 Mn: 1.58 Ni: 11.50 Cr: 18.37 Mo: 2.65 FN: 4-10 (WRC-92)	UTS: ≥520 MPa YS: ≥400 MPa El: ≥30% CVN Impact: +20°C: ≥100J -196°C: ≥32J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	-	BOHLER TIG N 316L rod of type W 19 12 3L / ER 316L engineered to a very precise analysis to create a weld deposit of high purity, superior hot cracking and corrosion resistance. CVN toughness down to -196°C, resistant to intergranular corrosion up to +400°C. The filler metal is also suitable for welding titanium and niobium stabilised steels such as ASTM 316Ti in cases where the construction is used at temperatures not exceeding 400°C.
THERMANIT X AWS A5.9: ER307(mod.) EN ISO 14343-A: W 18 8 Mn	C: 0.08 Si: 0.8 Mn: 7.0 Cr: 19.0 Ni: 9.0	UTS: 620 MPa YS: 450 MPa El: 35% CVN Impact: +20°C: 100J	1.0 x 1000 1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	TÜV, DB, DNV, CE	Stainless. Resistant to scaling up to 850°C (1562°F). No adequate resistance against sulphureous combustion gases at temperatures above 500°C (932°F). For joining and surfacing applications with heat resistant Cr-steels / cast steel grades and heat resistant austenitic steels / cast steel grades. Well suited for fabricating austenitic ferritic joints – max. application temperature 300°C (572°F). For joining unalloyed/low alloy or Cr-steels / cast steel grades to austenitic steels. Low heat input required in order to avoid brittle martensitic.

TIG rods, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
AVESTA P5 AWS A5.9: ER309LMo(mod.) EN ISO 14343: W 23 12 2 L	C: 0.02 Si: 0.35 Mn: 1.5 Cr: 21.5 Ni: 15.0 Mo: 2.7 FN: 8(WRC-92)	UTS: 640 MPa YS: 470 MPa El: 30% CVN Impact: +20°C: 140J -40°C: 90J	1.6 x 1000 2.4 x 1000	TUV, DB, DNV, CE	Avesta P5 is a Mo-alloyed wire, type 309LMo for dissimilar joints of un-alloyed and stainless steels and for cladding on low-alloyed steels. The all-weld metal ensures a high resistance against cracking and is also suitable for welding of high strength steels. Corrosion resistance: Comparable but slightly better than 316L Structure: Austenit with 5 – 10% Ferrit Scaling temperature: 950°C (air)
AVESTA 309L AWS A5.9: ER309L	C: 0.02 Si: 0.36 Mn: 1.80 Cr: 23.00 Ni: 13.50 FN: 10 - 14 (WRC-92)	UTS: 590 MPa YS: 450 MPa El: 39% CVN Impact: +20°C: 202J -60°C: 154J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	DNV	AVESTA 309L is a high alloy 23 Cr 13 Ni wire primarily intended for surfacing low alloy steels and for dissimilar welding between mild steels and stainless steels, offering a ductile and crack resistant weldment. The chemical composition when surfacing is equivalent to that of ASTM 304 from the first run. One or two layers of 309L are usually combined with final layer of 308L, 316L or 347.
THERMANIT 13/04 Si AWS A5.9: ER410NiMo (mod.) EN ISO 14343-A: W 13 4	C: 0.01 Si: 0.7 Mn: 0.7 Cr: 12.3 Mo: 0.5 Ni: 4.7	Heat treatment: As welded UTS: 1000 MPa YS: 915 MPa El: 15% CVN Impact: +20°C: 85J Heat treatment: 600°C/ 8h UTS: 830 MPa (≥750) YS: 750 MPa (≥500) El: 21% (≥15) CVN Impact: +20°C: 150J -60°C: ≥32J	2.0 x 1000 2.4 x 1000	TÜV, CE	Solid wire TIG rod of W 13 4 / ER410NiMo (mod.) type for joining and surfacing applications with matching 13Cr(Ni) and 13Cr-steels and cast steel grades. Soft-martensitic; suitable for quenching and tempering. High resistance to corrosion fatigue cracking. Corrosion resistance similar to matching 13Cr(Ni)-steels and cast steel grades.
THERMANIT H-347 AWS A5.9: ER347 EN ISO 14343-A: W 19 9 Nb	C: 0.05 Si: 0.5 Mn: 1.8 Cr: 19.5 Ni: 9.5 Nb: ≥ 12×C	UTS: 570 MPa YS: 400 MPa El: 30% CVN Impact: +20°C: 65J -196°C: 27J	1.0 x 1000 1.2 x 1000 1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000 4.0 x 1000	TÜV, DB, CE	Solid wire TIG rod of W 19 9 Nb / ER347 type for joining and surfacing application with matching and similar stabilized and non-stabilized austenitic CrNi(N)-steels and cast steel grades. Max. service temperature 400°C. Corrosion resistance similar to matching stabilized austenitic CrN-steels.

TIG rods, high alloyed

Brand Standard AWS Standard EN ISO	Chemical Composition (%) Typical Values	Mechanical Properties Typical Values	Ø x L (mm)	Approvals	Characteristics and Applications
THERMANIT 22/09 AWS A5.9: ER2209 EN ISO 14343-A: W 22 9 3 N L	C: 0.02 Si: 0.4 Mn: 1.7 Cr: 22.5 Ni: 8.8 Mo: 3.2 N: 0.15	UTS: 800 MPa (≥550) YS: 600 MPa (≥ 450) El: 33% (≥ 20) CVN Impact: +20°C: 150J -40 °C: ≥ 47J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	TÜV, ABS, DNV, GL, LR, CE	Duplex stainless steel; resistant to inter-crystalline corrosion. Good resistance to stress corrosion cracking in chlorine- and hydrogen sulphide-bearing environment. High Cr- and Mo-contents provide resistance to pitting corrosion. For joining and surfacing work with matching and similar austenitic steels / cast steel grades. Attention must be paid to embrittlement susceptibility of the parent metal. Service temperature: -40°C to 250°C (32°F to 482 °F).
THERMANIT 25/09 CuT AWS A5.9: ER2594 EN ISO 14343-A: W 25 9 4 N L	C: 0.02 Si: 0.3 Mn: 0.8 Cr: 25.3 Mo: 3.7 Ni: 9.5 N: 0.22 Cu: 0.6 W: 0.6	UTS: 750 MPa YS: 600 MPa El: 25% CVN Impact: +20°C: 80J -50°C: 50J	1.6 x 1000 2.0 x 1000 2.4 x 1000 3.2 x 1000	-	Super duplex stainless steel; resistant to inter-crystalline corrosion. Very good resistance to pitting corrosion and stress corrosion cracking due to the high CrMo(N) content (pitting index ≥40). Well suited for conditions in offshore application, particularly for welding of super-martensitic stainless steels (13 % Cr); extra low hydrogen in the filler material available on request.
THERMANIT 21/33 So EN ISO 14343-A: WZ 21 33 Mn Nb	C: 0.12 Si: 0.20 Mn: 4.8 Cr: 21.5 Ni: 32.5 Nb: 1.2	UTS: 600 MPa YS: 400 MPa El: 17% CVN Impact: +20°C: 50J	2.0 x 1000 2.4 x 1000 3.2 x 1000	TÜV, CE	Resistant to scaling up to 1050°C (1922°F). Good resistance to carburizing atmospheres. For joining and surfacing applications with matching / similar heat resistant steels / cast steel grades.
THERMANIT 25/35 R EN ISO 14343-A: W Z 25 35	C: 0.40 Si: 1.0 Mn: 1.7 Cr: 25.5 Ni: 35.5 Nb: 1.2	UTS: 650 MPa YS: 450 MPa El: 8%	2.0 x 1000 2.4 x 1000 3.2 x 1000	-	For joining and surfacing work with matching / similar heat resistant steels and cast steel grades. Typical alloy for welding of pyrolysis furnace tubes. The weld deposit is applicable in a low sulphur, carbon enriching atmosphere up to 1150° C.