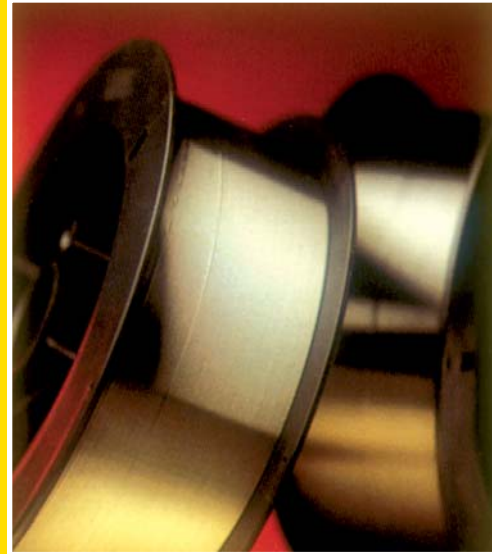


Eutectic Stainless Steel Wires & Rods



*Specifications on the complete line of
Stainless Steel GTA and GMA Alloys*



TIG - TECTIC®
MIG - TECTIC®

ER308

Welds the unstabilized stainless steels such as types 301, 302, 304 and 305. These grades are typically encountered in the dairy, food processing, distillery and chemical industries.

Standards

AWS: A5.9 Class. ER308
ASME: SFA5.9 Class. ER308
MIL-E: 19333 Class. MIL - 308

Typical Composition (%)
(all weld metal deposit*)

C	0.05
N	0.05
Si	0.30
Mn	1.70
Ni	9.5
Cr	20.0
Fe	Balance

* Gases used were 98% Ar + 2% O₂ for GMA welding and pure argon for GTA welding.

Description

Tig-Tectic and Mig-Tectic ER308 are respectively rod and wire forms of the same nominal 18Cr - 8Ni chemistry. Rod and wire are bright finished for ease of handling and feedability.

Typical Mechanical Properties

Tensile Strength	87,000 psi (600 N/mm ²)
Yield Strength (0.2% offset)	57,000 psi (395N/mm ²)
Elongation (1=5d)	34%
Reduction in Area	56%
Hardness (HRB)	85
Hardness (Brinell)	160

Metallurgical Structure

Weld deposits have an austenitic matrix containing a measured ferrite content of 10FN - Schaeffer-DeLong Diagram
8.5FN - Standardized Magne Gauge Method

MIG - TECTIC

ER308L

Used to weld type 304L and such stainless grades as 301, 302, 304 and 305, which are typically found in food, beverage, dairy and distillery industries.

Standards

AWS: A5.9 Class. ER308
ASME: SFA5.9 Class. ER308
MIL-E: 19333 Class. MIL - 308

Typical Composition (%)
(all weld metal deposit*)

C	0.02
N	0.05
Si	0.30
Mn	1.70
Ni	10.0
Cr	20.0
Fe	Balance

* Gases used were 98% Ar + 2% O₂ for GMA welding and pure argon for GTA welding.

Description

Mig-Tectic ER308L is a nominal chemistry of 18Cr - 8Ni. Corrosion resistance is improved due to the low carbon content. Wire is brightly finished for ease of handling and feedability.

Typical Mechanical Properties

Tensile Strength	87,000 psi (600 N/mm ²)
Yield Strength (0.2% offset)	57,000 psi (395N/mm ²)
Elongation (1=5d)	34%
Reduction in Area	56%
Hardness (HRB)	85
Hardness (Brinell)	160

Metallurgical Structure

Weld deposits have an austenitic matrix containing a measured ferrite content of 9FN - Schaeffer-DeLong Diagram
8.5FN - Standardized Magne Gauge Method

TIG - TECTIC
MIG - TECTIC

ER308LSi

Welds AISI grades such as 304 and 304L. These alloys are also suitable for transition welds when used with clad steels.

Standards

AWS: A5.9 Class. ER308LSi
ASME: SFA5.9 Class. ER308LSi
MIL-E: 19333 Class. MIL - 308LSi

Typical Composition (%)
(all weld metal deposit*)

C	0.02
N	0.04
Si	0.80
Mn	1.60
Ni	10.50
Cr	20.0
Fe	Balance

* Gases used were 98% Ar + 2% O₂ for GMA welding and pure argon for GTA welding.

Description

Tig-Tectic and Mig-Tectic ER308LSi are respectively rod and wire forms of the same nominal 18Cr - 8Ni chemistry. However, the addition of silicon markedly improves the weld puddle wetting action which results in a smoother weld deposit having an excellent joint face transition.

Typical Mechanical Properties

Tensile Strength	87,000 psi (600 N/mm ²)
Yield Strength (0.2% offset)	57,000 psi (395N/mm ²)
Elongation (1=5d)	42%
Reduction in Area	60%
Hardness (HRB)	85
Hardness (Brinell)	160

Metallurgical Structure

Weld deposits have an austenitic matrix containing a measured ferrite content of 12FN - Schaeffer-DeLong Diagram
11.5FN - Standardized Magne Gauge Method

TIG - TECTIC
MIG - TECTIC

ER309L

Recommended for weld overlays and for dissimilar metal joining carbon-manganese steels such as AISI stainless steel grades as 302, 304, 309 and 309L.

Standards

AWS: A5.9 Class. ER309L
ASME: SFA5.9 Class. ER309L
MIL-E: 19333 Class. MIL - 309L

Typical Composition (%)
(all weld metal deposit*)

C	0.015
N	0.06
Si	0.40
Mn	2.0
Ni	13.50
Cr	23.50
Fe	Balance

* Gases used were 98% Ar + 2% O₂ for GMA welding and pure argon for GTA welding.

Description

Tig-Tectic and Mig-Tectic ER309L are respectively rod and wire forms of the same nominal 23Cr - 13Ni chemistry. The low carbon content and high alloy content enables these alloys to be used for joining stainless steels to non-alloy and low alloy steels. Weld deposit temperatures are tolerant up to 600° F (315° C).

Typical Mechanical Properties

Tensile Strength	87,000 psi (600 N/mm ²)
Yield Strength (0.2% offset)	58,000 psi (400N/mm ²)
Elongation (1=5d)	40%
Reduction in Area	60%
Hardness (HRB)	85
Hardness (Brinell)	160

Metallurgical Structure

Weld deposits have an austenitic matrix containing a measured ferrite content of 11FN - Schaeffer-DeLong Diagram
10.5FN - Standardized Magne Gauge Method

**TIG - TECTIC
MIG - TECTIC**

ER310

Suitable for joining the heat resistant austenitic steel grade AISI 310 and for joining and surfacing low alloyed steels.

Standards

AWS:	A5.9	Class. ER310
ASME:	SFA5.9	Class. ER310
MIL-E:	19333	Class. MIL - 310

Typical Composition (%)
(all weld metal deposit*)

C	0.10	
N	0.06	
Si	0.40	
Mn	1.80	
Ni	21.0	
Cr	26.0	
Fe	Balance	* Gases used were 98% Ar + 2% O ₂ for GMA welding and pure argon for GTA welding.

Description

Tig-Tectic and Mig-Tectic ER310 are respectively rod and wire forms of the same nominal 25Cr - 20Ni chemistry. Rod and wire are bright finished for ease of handling and feedability. Scaling resistance in air up to 2000° F (1095° C) and in reducing atmospheres up to 1200° F (650° C) are typical in-service temperature limits.

Typical Mechanical Properties

Tensile Strength	87,000 psi (600 N/mm ²)
Yield Strength (0.2% offset)	57,000 psi (395 N/mm ²)
Elongation (l=5d)	43%
Reduction in Area	69%
Hardness (HRB)	85
Hardness (Brinell)	160

Metallurgical Structure

Undiluted weld deposits are fully austenitic.

**TIG - TECTIC
MIG - TECTIC**

ER312

Used when welding dissimilar metal combinations such as carbon-manganese and low alloy steels to stainless steel.

Standards

AWS:	A5.9	Class. ER312
ASME:	SFA5.9	Class. ER312
MIL-E:	19333	Class. MIL - 312

Typical Composition (%)
(all weld metal deposit*)

C	0.11	
N	0.05	
Si	0.40	
Mn	1.60	
Ni	9.0	
Cr	29.0	
Fe	Balance	* Gases used were 98% Ar + 2% O ₂ for GMA welding and pure argon for GTA welding.

Description

Tig-Tectic and Mig-Tectic ER312 are respectively rod and wire forms of the same nominal 29Cr - 9Ni chemistry. Rod and wire are bright finished for ease of handling and feedability. The higher chromium content in these alloys promotes a highly crack-resistant two phase structure.

Typical Mechanical Properties

Tensile Strength	106,000 psi (730 N/mm ²)
Yield Strength (0.2% offset)	75,000 psi (520 N/mm ²)
Elongation (l=5d)	25%
Reduction in Area	30%
Hardness (HRB)	95-105
Hardness (Brinell)	200-250

Metallurgical Structure

An austenitic-ferritic structure containing a minimum FN of 30.

**TIG - TECTIC
MIG - TECTIC**

ER316L

Suitable for welding AISI 304 and AISI 316 grades. This alloy in both its wrought and cast form is widely used in the Pulp & Paper, Synthetic Fiber and Cloth Dyer industries.

Standards

AWS:	A5.9	Class. ER316L
ASME:	SFA5.9	Class. ER316L
MIL-E:	19333	Class. MIL - 316L

Typical Composition (%)
(all weld metal deposit*)

C	0.015	
N	0.05	
Si	0.30	
Mn	1.80	
Mo	2.60	
Ni	12.0	
Cr	18.50	
Fe	Balance	* Gases used were 98% Ar + 2% O ₂ for GMA welding and pure argon for GTA welding.

Description

Tig-Tectic and Mig-Tectic ER316L are respectively rod and wire forms of the same nominal 18Cr - 2.5Mo chemistry. Both product types are bright finished for ease of handling and feedability. The molybdenum is added to improve high temperature strength and to improve corrosion resistance in reducing media.

Typical Mechanical Properties

Tensile Strength	88,000 psi (610 N/mm ²)
Yield Strength (0.2% offset)	59,000 psi (410 N/mm ²)
Elongation (l=5d)	35%
Reduction in Area	40%
Hardness (HRB)	85
Hardness (Brinell)	160

Metallurgical Structure

Weld deposits have an austenitic matrix containing a measured ferrite content of 11FN - Schaeffer-DeLong Diagram
10.5FN - Standardized Magne Gauge Method

**TIG - TECTIC
MIG - TECTIC**

ER316LSi

Suitable for joining AISI 304, 304L, 316 and 316L grades of stainless steel. Grades of steel which are widely used by the Petrochemical, Pharmaceutical, Pulp & Paper and Transportation industries.

Standards

AWS:	A5.9	Class. ER316LSi
ASME:	SFA5.9	Class. ER316LSi
MIL-E:	19333	Class. MIL - 316LSi

Typical Composition (%)
(all weld metal deposit*)

C	0.02	
N	0.06	
Si	0.90	
Mn	1.70	
Mo	2.60	
Ni	11.50	
Cr	18.50	
Fe	Balance	* Gases used were 98% Ar + 2% O ₂ for GMA welding and pure argon for GTA welding.

Description

Tig-Tectic and Mig-Tectic ER316LSi are respectively rod and wire forms of the same nominal 18Cr - 2.5Mo chemistry. Alloys contain an increased amount of silicon which improves weld puddle fluidity and welding characteristics. Both product types are brightly finished for ease of handling and feedability.

Typical Mechanical Properties

Tensile Strength	88,000 psi (610 N/mm ²)
Yield Strength (0.2% offset)	58,000 psi (400 N/mm ²)
Elongation (l=5d)	37%
Reduction in Area	68%
Hardness (HRB)	85
Hardness (Brinell)	160

Metallurgical Structure

Weld deposits have an austenitic matrix containing a measured ferrite content of 9FN - Schaeffer-DeLong Diagram
8FN - Standardized Magne Gauge Method

**TIG - TECTIC
MIG - TECTIC**

ER317L

Principally used for welding type 317 stainless steel when pitting and corrosion resistance is required. Requirements typically encountered in the Pulp & Paper Petrochemical industries.

Standards

AWS: A5.9 Class. ER317L
ASME: SFA5.9 Class. ER317L
MIL-E: 19333 Class. MIL - 317L

Typical Composition (%)
(all weld metal deposit*)

C	0.02	
N	0.05	
Si	0.40	
Mn	1.70	
Mo	3.50	
Ni	13.0	* Gases used were 98% Ar + 2% O ₂
Cr	18.50	for GMA welding and pure argon
Fe	Balance	for GTA welding.

Description

Tig-Tectic and Mig-Tectic ER317L are respectively rod and wire forms of the same nominal 19Cr - 13 Ni -2.5 Mo chemistry. The molybdenum content in these alloys improves both pitting resistance and general resistance to most organic and inorganic acids.

Typical Mechanical Properties

Tensile Strength	87,000 psi	(600 N/mm ²)
Yield Strength (0.2% offset)	55,000 psi	(380 N/mm ²)
Elongation (1 = 5d)	47%	
Reduction in Area	70%	
Hardness (HRB)	85	
Hardness (Brinell)	160	

Metallurgical Structure

Weld deposits have an austenitic matrix containing a measured ferrite content of 7FN - Schaeffer-DeLong Diagram
6FN - Standardized Magne Gauge Method

**TIG - TECTIC
MIG - TECTIC**

ER347

Suitable for welding the AISI grades 321 and 347. Due to the niobium content, both high temperature (750° F/400° C) and general corrosion applications are recommended.

Standards

AWS: A5.9 Class. ER347
ASME: SFA5.9 Class. ER347
MIL-E: 19333 Class. MIL - 347

Typical Composition (%)
(all weld metal deposit*)

C	0.03	
N	0.05	
Si	0.40	
Nb	0.55	
Mn	1.20	
Ni	9.50	* Gases used were 98% Ar + 2% O ₂
Cr	19.50	for GMA welding and pure argon
Fe	Balance	for GTA welding.

Description

Tig-Tectic and Mig-Tectic ER347 are respectively rod and wire forms of the same nominal 19Cr - 9Ni chemistry. The addition of niobium reduces susceptibility to intergranular corrosion and improves creep through strength.

Typical Mechanical Properties

Tensile Strength	88,000 psi	(600 N/mm ²)
Yield Strength (0.2% offset)	58,000 psi	(400 N/mm ²)
Elongation (1 = 5d)	42%	
Reduction in Area	73%	
Hardness (HRB)	85	
Hardness (Brinell)	160	

Metallurgical Structure

Weld deposits have an austenitic matrix containing a measured ferrite content of 8FN - Schaeffer-DeLong Diagram
7.5FN - Standardized Magne Gauge Method

GAS METAL ARC WELDING

Welding Parameters

WIRE DIAMETER		WIRE FEED RATE		CURRENT RANGE	VOLTAGE RANGE	SHIELDING GAS FLOWS	
<i>In.</i>	<i>mm</i>	<i>ft / min.</i>	<i>m / min</i>	<i>Amps</i>	<i>Volts</i>	<i>cfh</i>	<i>l / min</i>
Short -Arc Welding							
.035	0.9	13-26	4-8	65-145	15-19	25	12
Spray- Arc Welding							
.035	0.9	20-40	6-12	145-225	22-28	40	19
.045	1.2	16-30	5-9	180-260	23-28	40	19

* Short-Arc welding use 90% Ar + 7.5% He + 2.5% CO₂
Spray-Arc welding use 98% Ar + 2% O₂

GAS TUNGSTEN ARC WELDING

WIRE THICKNESS		FILLER ROD	WELDING CURRENT			TUNGSTEN (1) DIAMETER	SHIELDING GAS CUP SIZE		SHIELDING GAS FLOW (2)		
<i>In.</i>	<i>mm</i>	<i>Diameter</i>	<i>Flat</i>	<i>Vertical</i>	<i>Overhead</i>	<i>In.</i>	<i>mm</i>	<i>In.</i>	<i>mm</i>	<i>cfh</i>	<i>l / min</i>
1/16	1.6	1/16	80-110	70-90	70-100	1/16	1.6	1/4, 5/16, 3/8	6.3 / 8.0 / 9.5	11	5.0
3/32	2.4	3/32	100-130	90-120	100-120	1/16	1.6	1/4, 5/16, 3/8	6.3 / 8.0 / 9.5	11	5.0
1/8	3.2	3/32	120-150	110-135	105-140	3/32	2.4	1/4, 5/16, 3/8	6.3 / 8.0 / 9.5	11	5.0
3/16	5.0	1/8	200-275	150-225	150-225	1/8	3.2	3/8, 7/16, 1/2	9.5 / 11.0 / 12.7	13	6.0
1/4	6.3	3/16	275-375	210-275	200-275	1/8	3.2	Water Cooling Needed		13	6.0
1/2	12.7	1/4	350-450	225-280	225-280	3/16	5.0	Water Cooling Needed		13	7.0

(1) Thoriated tungsten electrodes are recommended.
(2) Gas flow is given in liters per minute (l/min) in metric

YOUR RESOURCE FOR PROTECTION, REPAIR AND JOINING SOLUTIONS



Eutectic Corporation
N94 W14355 Garwin Mace Drive
Menomonee Falls, WI 53051 USA
P 800-558-8524 • F 262-255-5542
www.eutectic.com

Eutectic Services
12300 Carmen Avenue
Milwaukee, WI 53225 USA
P 800-558-8524 • F 262-255-5542



Statement of Liability: Due to variations inherent in specific applications, the technical information contained herein, including any information as to suggested product applications or results, is presented without representation or warranty, expressed or implied. Without limitation, there are no warranties of merchantability or of fitness for a particular purpose. Each process and application must be fully evaluated by the user in all respects, including suitability, compliance with applicable law and non-infringement of the rights of others, and Eutectic Corporation and its affiliates shall have no liability in respect thereof.