

# **SW-316LT**

FLUX CORED ARC WELDING CONSUMABLE  
FOR WELDING OF EXTRA LOW-CARBON 18% Cr-12% Ni - 2% Mo  
STAINLESS STEEL FOR CRYOGENIC APPLICATIONS



## ❖ Specification

**AWS A5.22**

E316LT1-1/-4

**JIS Z3323**

TS316L-FB1

## ❖ Applications

SW-316LT is designed for welding of extra low-carbon 19%Cr-12%Ni-2% Mo stainless steels for cryogenic applications.

## ❖ Characteristics on Usage

SW-316LT is a titania type flux cored wire for all position welding with CO<sub>2</sub> & Ar+CO<sub>2</sub> mixed shielding gas. This wire is designed for Cryogenic applications, 316L austenitic stainless steels.

The high impact toughness at cryogenic temperature(-196℃) makes SW-316LT excellent in LNG applications.

Arc stability is excellent, so spatter loss is low and slag covering is Uniform with good removability

## ❖ Note on Usage

Use 100% CO<sub>2</sub> gas or Ar+20~25% CO<sub>2</sub> gas

## ❖ Packing

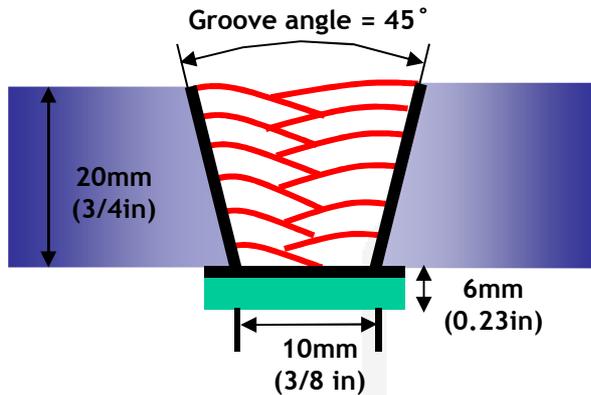
Diameter	1.2mm (0.045in)			
Spool *including ball pac	5kg (11lbs)	12.5kg (28lbs)	15kg (33lbs)	20kg (44lbs)



## Mechanical Properties & Chemical Composition of All Weld Metal

### ❖ Welding Conditions

Method by AWS Spec.



[ Joint Preparation & Layer Details ]

<b>Diameter(mm)</b>	: 1.2mm(0.045in)
<b>Shielding Gas</b>	: 100% CO <sub>2</sub>
<b>Flow Rate(ℓ /min.)</b>	: 20~22
<b>Amp./ Volt.</b>	: 210/30
<b>Stick-Out(mm)</b>	: 20(3/4 in)
<b>Pre-Heat(°C)</b>	: R.T . °C(°F)
<b>Interpass Temp.(°C)</b>	: ≤150°C(302°F)
<b>Polarity</b>	: DC(+)

### ❖ Mechanical Properties of All weld metal

Consumable	Tensile Test		CVN Impact Test J(ft · lbs)
	TS (Mpa/ksi)	EL (%)	-196°C (-320°F)
SW-316LT	535(78)	47	32(23.6)
AWS A5.22 E316LTX-X	≥ 485	≥ 30	Not Specified

### ❖ Chemical Analysis of All weld metal(wt%)

Consumable	Shielding Gas	Chemical Composition (%)								
		C	Si	Mn	P	S	Ni	Cr	Mo	Cu
SW-316LT	100%CO <sub>2</sub>	0.018	0.77	1.51	0.015	0.009	12.23	17.24	2.2	0.02
AWS A5.22 E316LTX-X		≤0.04	≤1.0	0.5~2.5	≤0.03	≤0.025	10.0~13.0	17.0~20.0	2.0~3.0	≤0.3

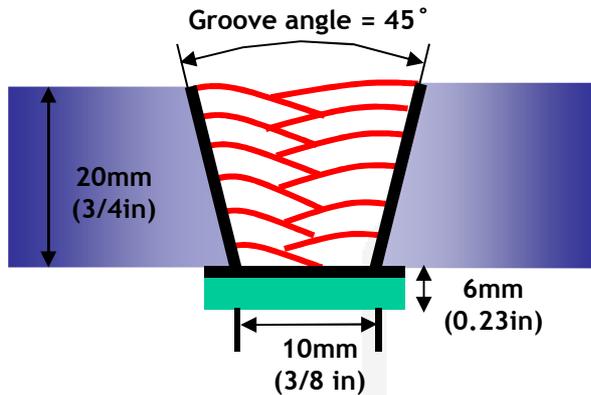
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## Mechanical Properties & Chemical Composition of All Weld Metal

### ❖ Welding Conditions

Method by AWS Spec.



[ Joint Preparation & Layer Details ]

<b>Diameter(mm)</b>	: 1.2mm(0.045in)
<b>Shielding Gas</b>	: Ar+200% CO2
<b>Flow Rate(ℓ /min.)</b>	: 20~22
<b>Amp./ Volt.</b>	: 210/29
<b>Stick-Out(mm)</b>	: 20(3/4 in)
<b>Pre-Heat(°C)</b>	: R.T. °C(°F)
<b>Interpass Temp.(°C)</b>	: ≤150°C(302°F)
<b>Polarity</b>	: DC(+)

### ❖ Mechanical Properties of All weld metal

Consumable	Tensile Test		CVN Impact Test J(ft · lbs)
	TS (Mpa/ksi)	EL (%)	-196°C (-320°F)
SW-316LT	542(79)	46	33(24.3)
AWS A5.22 E316LTX-X	≥ 485	≥ 30	Not Specified

### ❖ Chemical Analysis of All weld metal(wt%)

Consumable	Shielding Gas	Chemical Composition (%)								
		C	Si	Mn	P	S	Ni	Cr	Mo	Cu
SW-316LT	Ar+20%CO2	0.018	0.77	1.51	0.015	0.009	12.23	17.24	2.2	0.02
AWS A5.22 E316LTX-X		≤0.04	≤1.0	0.5~ 2.5	≤0.03	≤0.025	10.0~ 13.0	17.0~ 20.0	2.0~3.0	≤0.3

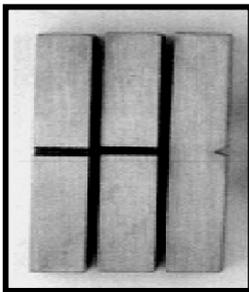
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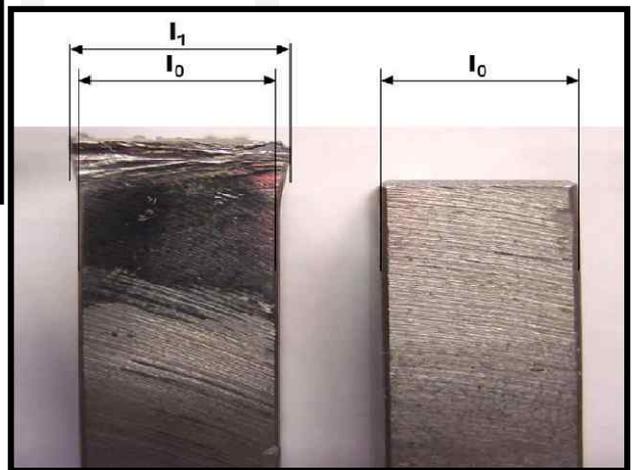
**Mechanical Properties  
& Chemical Composition of All Weld Metal**

❖ **Lateral expansion**

Consumable	Shielding Gas	Lateral expansion(mm)					
		-196 °C					
		X1	X2	X3	X4	X5	Avg.
SW-316LT	100% CO2	0.62	0.57	0.61	0.46	0.48	0.55
	Ar+20% CO2	0.54	0.61	0.55	0.48	0.61	0.56
<b>ASME B31.3 ≥ 0.38mm</b>							



**Lateral expansion =  $I_1 - I_0$**



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**Mechanical Properties  
& Chemical Composition of All Weld Metal**

❖ **Bead Appearance**

Horizontal Fillet(2F, PB) , Base : STS 304L(6mm,0.23in)	Fillet Vertical up(3F, PF) , Base : STS 304L(6mm,0.23in)	
		
<p>100% CO2(220A/30V)</p>		
	<p>100% CO2(160A/25V)</p>	<p>Ar+20% CO2(160A/24V)</p>
<p>Ar+20% CO2(220A/28V)</p>		

❖ **δ – Ferrite No.**

Consumable	Shielding Gas	Diagram		
		Schaeffler	DeLong	WRC(1992)
SW-316LT	100% CO2	3.4	5.9	3.0
	Ar+20% CO2	3.4	5.9	3.0

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## Welding Efficiency & Proper Welding Condition

### ❖ Deposition Rate & Efficiency

Consumable (size)	Shielding Gas	Welding Conditions		Wire Feed Speed m/min (in/min)	Deposition Efficiency(%)	Deposition Rate kg/hr(lb/hr)
		Amp. (A)	Volt. (V)			
1.2mm (0.045 in)	100%CO <sub>2</sub>	210	30	12(472)	86~88	4.6(10.1)
	Ar-20%CO <sub>2</sub>	210	29	12(472)	87~89	4.8(10.6)
Remark					Deposition efficiency =(Deposited metal weight/Wire weight used)×100	Deposition rate =(Deposited metal weight/Welding time,min.)×60

### ❖ Proper Current Range

Consumable	Shielding Gas	Welding Position	Wire Dia.	
			1.2mm (0.045 in)	1.6mm (1/16 in)
SW-316LT Cored	100%CO <sub>2</sub> or Ar-20~25%CO <sub>2</sub>	F	160~220Amp	250~290Amp
		HF	160~220Amp	250~290Amp
		V-Up & OH	140~180Amp	-

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