

SC-91

FLUX CORED ARC WELDING CONSUMABLE
FOR WELDING OF 620MPa CLASS
HIGH TENSILE STEEL

2022.02

**❖ Specification****AWS A5.29** E91T1-GC**(AWS A5.29M** E621T1-GC)**JIS Z 3313** T 57 2 T1-1 C A-N1 H10**KS D 7104** YFW-C602R**❖ Applications**

All position welding for construction machinery, bridge structures and storage tanks.

❖ Characteristics on Usage

SC-91 is an all position flux cored wire designed for 100% CO₂ shielding. You can get smooth arc, and low spatter, good weld ability. The weld metal impact values at -20°C is excellent and has good bead appearance, slag covering is uniform and easy to remove.

❖ Note on Usage

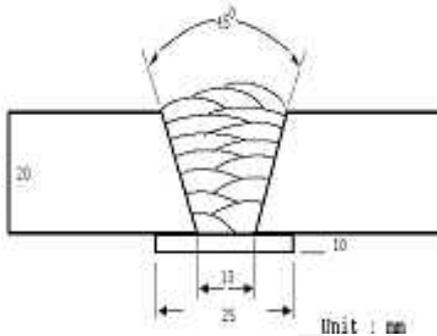
1. For preheating guidelines, please refer to your local standards and codes relative to your best practices.
2. One-side welding defects such as hot cracking may occur with wrong welding parameter such as high welding speed.
3. Use 100% CO₂ gas.



Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Welding Position	: 1G(PA)
Diameter	: 1.2mm (0.045in)
Shielding Gas	: 100%CO ₂
Flow Rate	: 20 ℓ /min
Amp./ Volt.	: 280A / 32V
Stick-Out	: 20~25mm (0.79~0.98in)
Pre-Heat	: R.T .
Interpass Temp.	: 150±15℃ (302±59°F)
Polarity	: DC(+)

❖ Mechanical Properties of all weld metal

Consumable	Tensile Test			CVN Impact Test J(ft · lbs)	
	YS MPa (lbs/in ²)	TS MPa (lbs/in ²)	EL (%)	0℃ (32°F)	-20℃ (-4°F)
SC-91	640 (93,000)	655 (95,000)	24.0	105 (77)	72 (53)
AWS A5.29 E91T1-GC	≥ 540 (78,000)	620~760 (90,000~ 110,000)	≥ 17.0	No Specified	

❖ Chemical Analysis of all weld metal(wt%)

Consumable	C	Si	Mn	P	S	Ni
SC-91	0.061	0.50	1.20	0.012	0.013	0.84
AWS A5.29 E91T1-GC	-	≤ 1.00	≥ 0.50	≤ 0.03	≤ 0.03	≥ 0.50

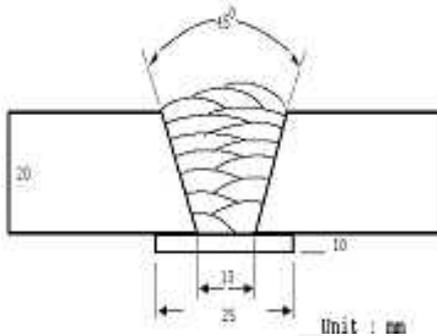
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Welding Position	: 1G(PA)
Diameter	: 1.4mm (0.052in)
Shielding Gas	: 100%CO ₂
Flow Rate	: 20 ℓ /min
Amp./ Volt.	: 300A / 32V
Stick-Out	: 20~25mm (0.79~0.98in)
Pre-Heat	: R.T .
Interpass Temp.	: 150±15°C (302±59°F)
Polarity	: DC(+)

❖ Mechanical Properties of all weld metal

Consumable	Tensile Test			CVN Impact Test J(ft · lbs)	
	YS MPa (lbs/in ²)	TS MPa (lbs/in ²)	EL (%)	0°C (32°F)	-20°C (-4°F)
SC-91	645 (94,000)	660 (96,000)	24.5	100 (74)	70 (52)
AWS A5.29 E91T1-GC	≥ 540 (78,000)	620~760 (90,000~ 110,000)	≥ 17.0	No Specified	

❖ Chemical Analysis of all weld metal(wt%)

Consumable	C	Si	Mn	P	S	Ni
SC-91	0.063	0.52	1.22	0.011	0.013	0.85
AWS A5.29 E91T1-GC	-	≤ 1.00	≥ 0.50	≤ 0.03	≤ 0.03	≥ 0.50

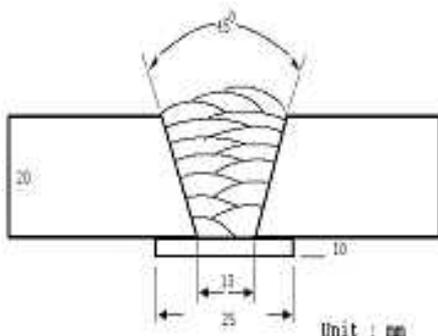
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Mechanical Properties & Chemical Composition of All Weld Metal

❖ Welding Conditions

Method by AWS Spec.



[Joint Preparation & Layer Details]

Welding Position	: 1G(PA)
Diameter	: 1.6mm (1/16in)
Shielding Gas	: 100%CO ₂
Flow Rate	: 20 ℓ /min
Amp./ Volt.	: 320~330A / 29~30V
Stick-Out	: 20~25mm (0.79~0.98in)
Pre-Heat	: R.T .
Interpass Temp.	: 150±15℃ (302±59°F)
Polarity	: DC(+)

❖ Mechanical Properties of all weld metal

Consumable	Tensile Test			CVN Impact Test J(ft · lbs)	
	YS MPa (lbs/in ²)	TS MPa (lbs/in ²)	EL (%)	0℃ (32°F)	-20℃ (-4°F)
SC-91	650 (94,000)	665 (96,000)	24.0	95 (70)	65 (48)
AWS A5.29 E91T1-GC	≥ 540 (78,000)	620~760 (90,000~ 110,000)	≥ 17.0	No Specified	

❖ Chemical Analysis of all weld metal(wt%)

Consumable	C	Si	Mn	P	S	Ni
SC-91	0.063	0.52	1.20	0.011	0.013	0.85
AWS A5.29 E91T1-GC	-	≤ 1.00	≥ 0.50	≤ 0.03	≤ 0.03	≥ 0.50

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Welding Efficiency

❖ Deposition Rate & Efficiency

Consumable (size)	Welding Conditions		Wire Feed Speed m/min (in/min)	Deposition Efficiency %	Deposition Rate kg/hr(lb/hr)
	Amp.(A)	Volt.(V)			
SC-91 1.2mm (0.045in)	200	26	10.2 (400)	84~87	3.4 (7.5)
	250	28	11.5 (450)	85~88	4.5 (9.9)
	300	33	15.3 (600)	86~88	5.2 (11.4)
SC-91 1.4mm (0.052in)	250	28	7.6 (300)	85~87	3.9 (8.6)
	300	32	10.2 (400)	85~88	4.8 (10.6)
	330	36	12.8 (500)	86~89	5.8 (12.8)
SC-91 1.6mm (1/16in)	280	31	6.4 (250)	85~88	4.2 (9.2)
	330	33	7.6 (300)	86~88	4.8 (10.6)
	350	34	8.1 (320)	87~89	5.3 (11.7)
	400	38	9.2 (360)	87~90	5.7 (12.5)
Remark				Deposition efficiency =(Deposited metal weight/ Wire weight used)×100	Deposition rate =(Deposited metal weight/ Welding time,min.)×60

* Shielding Gas : 100%CO₂

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Diffusible Hydrogen Content

❖ Welding Conditions

Diameter	: 1.4mm (0.052in)	Amps(A) / Volts(V)	: 240A / 27V
Shielding Gas	: 100%CO ₂	Stick-Out	: 20~25mm (0.79~0.98in)
Flow Rate	: 20 l /min	Welding Speed	: 30 cm/min (12 in/min)
Welding Position	: 1G (PA)	Current Type & Polarity	: DC(+)

❖ Hydrogen Analysis Using Gas Chromatography Method

Hydrogen Evolution Time	: 72 hrs
Evolution Temp.	: 45 °C (113°F)
Barometric Pressure	: 780 mm-Hg

❖ Result(ml/100g Weld Metal)

X1	X2	X3	X4
5.7	5.4	5.3	5.2

Average Hydrogen Content 5.4 ml / 100g Weld Metal

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Proper Welding Condition

❖ Proper Current Range

Consumable	Shielding Gas	Welding Position	Wire Dia.		
			1.2mm (0.045in)	1.4mm (0.052in)	1.6mm (1/16in)
SC-91	100%CO ₂	F & HF	120~300Amp	200~350Amp	200~400Amp
		V-Up & OH	120~260Amp	180~280Amp	180~280mp
		V-Down	200~300Amp	220~320Amp	250~320Amp

❖ F No & A No

F No	A No
6	10