

# Product Catalogue



## SUNRISE

### **WELDING ELECTRODES**

AL BEDAYA STEEL INDUSTRIES W.L.L.  
DOHA-QATAR



**Al Bedaya Steel Industries W.L.L.** was found with the aim of providing international quality welding consumables manufactured locally for the Qatar and GCC Market.

Al Bedaya Steel Industries W.L.L. manufactures Shielded Metal Arc Welding Electrodes under the brand name of SUNRISE since 2014 using the latest state of the art machinery and best quality raw material brought from reputed suppliers all over the world.

The manufacturing facility located in the small and medium industrial area has the capacity to produce from basic raw material 2400 tons of Shielded Metal Arc Welding Electrodes per year.

As the first welding electrode manufacturer in Qatar Al Bedaya Steel Industries W.L.L. is committed to meet and exceed market requirements of customers in the limited period has earned the goodwill of clients who are well satisfied with the quality and services of SUNRISE electrodes.

Our Organization is certified by ISO 9001:2015 for quality management systems. Our products Sunrise 7018 is approved by BUREAU VERITAS (BV) and also conforms to AWS standard.

Al Bedaya Steel Industries hopes to satisfy the welding consumable needs of its esteemed clients and customers for a long period by continuously expanding and modernizing its resources.

The vision of the company is to fully support our government Qatar Vision 2030 plan and pro actively help Qatar build a knowledge - based economy.

*About us...*

QP01, ISSUE 04. Date of issue 01.08.2019

## Quality Policy

### VISION STATEMENT

To provide world class products manufactured locally to our esteemed customers

### MISSION STATEMENT

To provide this pinnacle of customer loyalty through consistent quality products and services

### STATEMENT OF QUALITY POLICY

**Al Bedaya Steel Industries** is committed to maintaining and enhancing its reputation for providing welding consumables that comply with customer and external provider's requirements in a professional and customer friendly manner.

Through direction and leadership from the CEO we are committed to

- Develop and maintain a customer focused culture that seeks to identify and satisfy our customers' current and future needs and strives to delight them by meeting their expectations.
- Sustain quality excellence through continual improvement of our processes and products.
- Create an environment that cultivates a quality conscious workforce.
- Provide and maintain facilities conducive to the manufacture and supply of products that conform to requirements.
- Provide training and guidance to ensure staffs achieve their best potential and are able to carry out their responsibilities confidently and effectively.
- Develop mutually beneficial relationships with our external providers through compliance to the requirements.
- To satisfy all other applicable requirements.

  
Abdulla Mohammed Al - Deyab  
Chief Executive Officer





BUREAU  
VERITAS

Bureau Veritas Certification

# AL BEDAYA STEEL INDUSTRIES W.L.L.

SMALL & MEDIUM INDUSTRIES AREA, STREET # 8, BUILDING # 41, ZONE 81, DOHA, P.O.BOX:  
21112, STATE OF QATAR

*Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below*

## ISO 9001:2015

*Scope of certification*

**MANUFACTURE AND DISTRIBUTION OF SHIELDED METAL ARC WELDING  
ELECTRODES.**

Original cycle start date:	29-12-2015
Expiry date of previous cycle:	NA
Certification / Recertification Audit date:	NA
Certification / Recertification cycle start date:	09-11-2021
Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on:	28-12-2024

Certificate No.:	QA002871	Version:	1	Issue Date:	09-11-2021
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 Vinoth. K.P - Certification Manager



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*Certification Body Address: 5th Floor, 66 Prescott Street, London, E1 8HG, United Kingdom*

*Local Office: Bureau Veritas International Doha W.L.L, G1-G3, Ground Floor, KG Building (Bldg. No. 194, Street No. 230, Zone 26), C Ring Road, Opposite Gulf Times, P. O. Box: 22157, Doha, State of Qatar*

Further clarifications regarding the scope and validity of this certificate, and the applicability of the management system requirements, please call: +97440329729



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## Classification

AWS / SFA 5.1 : E 6013

## Characteristics

- ▲ All positions general purpose rutile based electrodes
- ▲ Steady arc, low spatter, fine rippled bead, easy detachable slag.
- ▲ Operates well on AC as well as DC (±)
- ▲ Radiography quality weld

## Applications

- ▲ Suitable for wide range of general fabrication
- ▲ Used for welding of storage tanks, vessels, boilers, pipe lines, bridges, railway coaches, & wagons, ship hulls, automobile parts & bodies, furniture, grill work etc.,

## Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Cr	% Mo	% V
As per AWS / SFA 5.1 <sup>a</sup>	0.20	1.20	1.00	N.S	N.S	0.30	0.20	0.30	0.08
Typical Results	0.065	0.47	0.20	0.018	0.016	0.01	0.01	< 0.01	< 0.01

Note : <sup>a</sup> Single values are maximum

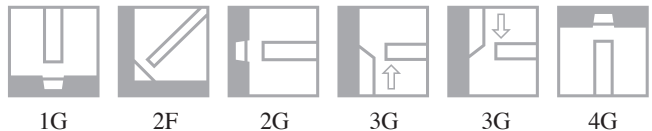
## Mechanical Properties

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ 0 ° C
As per AWS / SFA 5.1	330 min.	430 min.	17 min.	N.S
Typical Result	410	480	25.0	75

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (±)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 90	5.0	20
3.20	350 / 450	90 – 130	5.0	20
4.00	350 / 450	140 – 180	5.0	20
5.00	350 / 450	180 – 230	5.0	20

Recommended Welding Positions:



## Classification

AWS / SFA 5.1 : E 6013

## Characteristics

- ▲ All positions general purpose rutile based electrodes
- ▲ Steady arc, normal spatter, fine rippled bead, easy detachable slag.
- ▲ Operates well on AC as well as DC (±)
- ▲ Radiography quality weld

## Applications

- ▲ Suitable for wide range of general fabrication
- ▲ Used for welding of storage tanks, vessels, pipe Lines
- ▲ bridges, railway coaches, & wagons, automobile parts & bodies, furniture, grill work etc.,

## Deposited Weld Metal Composition , %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Cr	% Mo	% V
As per AWS / SFA 5.1 <sup>a</sup>	0.20	1.20	1.00	N.S	N.S	0.30	0.20	0.30	0.08
Typical Results	0.070	0.45	0.19	0.020	0.018	0.01	0.01	< 0.01	< 0.01

Note : <sup>a</sup> Single values are maximum

## Mechanical Properties

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ 0 ° C
As per AWS / SFA 5.1	330 min.	430 min.	17 min.	N.S
Typical Result	420	500	25	70

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (±)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 90	5.0	20
3.20	350 / 450	90 – 130	5.0	20
4.00	350 / 450	140 – 180	5.0	20
5.00	350 / 450	180 – 230	5.0	20

Recommended Welding Positions:



## Classification

AWS / SFA 5.1 : E 6010

## Characteristics

- ▲ All positions cellulose type electrodes
- ▲ Intensive arc, deep penetration, thin easily removable slag
- ▲ Good performance DC (+) , Recommended DC(-) for root pass
- ▲ Radiography quality weld

## Applications

- ▲ Suitable for pipe line welding
- ▲ Ship building, tank assembling, galvanized steel, casting repairing etc.,

## Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Cr	% Mo	% V
As per AWS / SFA 5.1 <sup>a</sup>	0.20	1.20	1.00	N.S	N.S	0.30	0.20	0.30	0.08
Typical Results	0.080	0.40	0.30	0.020	0.020	0.01	0.01	< 0.01	< 0.01

Note : <sup>a</sup> Single values are maximum

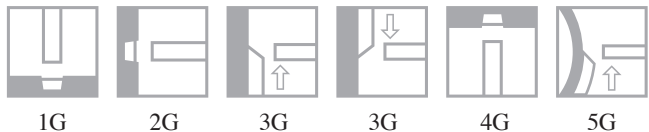
## Mechanical Properties

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - 30° C
As per AWS / SFA 5.1	330 min.	430 min.	22 min.	27 min.
Typical Results	425	510	26	52

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 90	2.0	10
3.20	350	90 – 110	2.0	10
4.00	350	110 – 160	2.0	10
5.00	350	150 – 200	2.0	10

Recommended Welding Positions:





## Classification

AWS / SFA 5.1 : E 7016

## Characteristics

- ▲ Basic coated electrode
- ▲ Smooth arc, less smoke, good penetration, excellent slag detachability , less spatter etc.,
- ▲ Good performance in AC as well as DC (+)
- ▲ Good impact properties at sub – zero temperature
- ▲ Radiography quality weld

## Applications

- ▲ Suitable for welding of unknown , medium carbon steels, high tensile steels, low alloy steels, high sulphur steels etc.,
- ▲ Used for welding of heavy machinery, boilers, ship buildings, earth moving equipment's etc.,
- ▲ Can be used for welding of cast iron to mild steel and gives non machinable weld.

## Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Cr	% Mo	% V
As per AWS / SFA 5.1 <sup>a</sup>	0.15	1.60	0.75	0.035	0.035	0.30	0.20	0.30	0.08
Typical Results	0.070	1.43	0.54	0.018	0.015	0.01	0.01	0.01	< 0.01

Note : <sup>a</sup> Single values are maximum

## Mechanical Properties

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - 30 ° C
As per AWS / SFA 5.1	400 min.	490 min.	22 min.	27 min.
Typical Result	460	575	27	76

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 100	2.50	20
3.20	350 / 450	100 - 140	2.50 / 5.0	20
4.00	350 / 450	140 – 190	2.50 / 5.0	20
5.00	350 / 450	180 – 240	2.50 / 5.0	20

Recommended Welding Positions:



## Classification

AWS / SFA 5.1 : E 7016 - 1

## Characteristics

- ▲ Basic coated low hydrogen electrode
- ▲ Soft arc, less smoke, good penetration, excellent slag detachability , less spatter etc.,
- ▲ Good impact properties at sub – zero temperature
- ▲ Good performance in AC as well as DC (+)
- ▲ Weld metal resistant to cool and hot cracking
- ▲ Radiography quality weld

## Applications

- ▲ Suitable for welding of unknown , medium carbon steels, high tensile steels, low alloy steels, high sulphur steels etc.,
- ▲ Cast iron to mild steel , produces non – machinable weld
- ▲ Off – shore process platform structures
- ▲ Used for welding of heavy machinery, boilers, pressure vessels, ship buildings, earth moving equipment's etc.,

## Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Cr	% Mo	% V
As per AWS / SFA 5.1 <sup>a</sup>	0.15	1.60	0.75	0.035	0.035	0.30	0.20	0.30	0.08
Typical Results	0.060	1.55	0.58	0.015	0.015	0.01	0.01	0.01	< 0.01

Note : <sup>a</sup> Single values are maximum

## Mechanical Properties

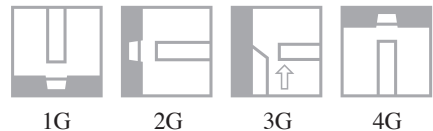
Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - 45 ° C
As per AWS / SFA 5.1	400 min.	490 min.	22 min.	27 min.
Typical Result	470	580	28	60

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 100	2.50	20
3.20	350 / 450	100 - 140	2.50 / 5.0	20
4.00	350 / 450	140 – 190	2.50 / 5.0	20
5.00	350 / 450	180 – 240	2.50 / 5.0	20

Note : Vacuum Packing also available

Recommended Welding Positions:



### Classification

AWS / SFA 5.1 : E 7018

Approval : BV , grade 4Y40H5

### Characteristics

- ▲ Basic coated electrode, all position except vertical - downwards welding
- ▲ Smooth arc, medium penetration, excellent slag detachability , least spatter etc.,
- ▲ Good performance in AC as well as DC (+)
- ▲ Good impact properties at sub – zero temperature
- ▲ Weld metal recovery is approximately 120 %
- ▲ Radiography quality weld

### Applications

- ▲ Dynamically loaded machinery, unknown steels, pressure vessels, boilers, pipe line, ship building
- ▲ High restricted joints, general constructions etc.,
- ▲ Repairing of equipment's used in mining, farming
- ▲ Depositing buffer layers on steels having higher carbon content

### Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Cr	% Mo	% V
As per AWS / SFA 5.1 <sup>a</sup>	0.15	1.60	0.75	0.035	0.035	0.30	0.20	0.30	0.08
Typical Results	0.060	1.41	0.40	0.018	0.014	0.01	0.01	0.01	< 0.01

Note : <sup>a</sup> Single values are maximum

### Mechanical Properties

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - 30 ° C
As per AWS / SFA 5.1	400 min.	490 min.	22 min.	27 min.
Typical Result	480	590	29	86

### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 100	2.50	20
3.20	350 / 450	100 – 140	2.50 / 5.0	20
4.00	350 / 450	140 – 190	2.50 / 5.0	20
5.00	350 / 450	190 – 250	2.50 / 5.0	20

Recommended Welding Positions:



### Classification

AWS / SFA 5.1 : E 7018

### Characteristics

- ▲ Basic coated electrode
- ▲ Smooth , stable and quiet arc , low spatter level
- ▲ Crack resistant weld
- ▲ Good performance in DC (+)
- ▲ Good impact properties at sub – zero temperature
- ▲ Weld metal recovery is approximately 115 -120 %
- ▲ Radiography quality weld

### Applications

- ▲ Suitable for mild steels, low alloy steels
- ▲ High restricted joints, general constructions
- ▲ Boilers, pressure vessels, bridges, tank constructions
- ▲ Slightly rusted components
- ▲ Buffer layer on high carbon steel

### Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Cr	% Mo	% V
As per AWS / SFA 5.1 <sup>a</sup>	0.15	1.60	0.75	0.035	0.035	0.30	0.20	0.30	0.08
Typical Results	0.060	1.25	0.46	0.019	0.016	0.01	0.01	0.01	< 0.01

Note : <sup>a</sup> Single values are maximum

### Mechanical Properties

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - 30 ° C
As per AWS / SFA 5.1	400 min.	490 min.	22 min.	27 min.
Typical Result	460	575	28	80

### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 100	2.50	20
3.20	350 / 450	100 – 140	2.50 / 5.0	20
4.00	350 / 450	140 – 190	2.50 / 5.0	20
5.00	350 / 450	190 – 250	2.50 / 5.0	20

Note : Vacuum Packing also available

Recommended Welding Positions:



### Classification

AWS / SFA 5.1 : E 7018 - 1 H4R

### Characteristics

- ▲ Basic low hydrogen iron powder type electrode
- ▲ Extremely smooth arc , good bead profile ,self-detachable slag
- ▲ Good performance in AC as well as DC (+)
- ▲ Good impact properties at - 45 ° C
- ▲ Weld metal recovery is approximately 120 %
- ▲ Radiography quality weld

### Applications

- ▲ Pressure vessels, boilers, pipeline, ship buildings
- ▲ Off –shore platform welding
- ▲ Critical applications
- ▲ General constructions, earth moving equipment's
- ▲ Buffer layers on steels having higher carbon content

### Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Cr	% Mo	% V
As per AWS / SFA 5.1 <sup>a</sup>	0.15	1.60	0.75	0.035	0.035	0.30	0.20	0.30	0.08
Typical Results	0.060	1.20	0.32	0.018	0.015	0.15	0.02	0.01	< 0.01

Note : <sup>a</sup> Single values are maximum

### Mechanical Properties

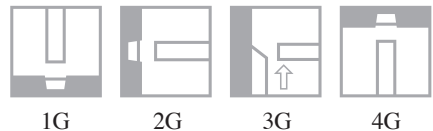
Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - 45 ° C
As per AWS / SFA 5.1	400 min.	490 min.	22 min.	27 min.
Typical Result	500	590	28	70

### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 100	2.50	20
3.20	350 / 450	100 – 140	2.50 / 5.0	20
4.00	350 / 450	140 – 190	2.50 / 5.0	20
5.00	350 / 450	190 – 250	2.50 / 5.0	20

Note : Vacuum Packing also available

Recommended Welding Positions:



## Classification

AWS / SFA 5.5 : E 7018 G

## Characteristics

- ▲ Basic coated low hydrogen low alloy electrode
- ▲ Least spatter , less smoke, medium penetration, easily removable slag
- ▲ Good performance in DC (+)
- ▲ Weld metal recovery is approximately 115 %
- ▲ Radiography quality weld

## Applications

- ▲ Low alloy steels and steel contains up to 1 % Ni for heat treated steels
- ▲ Heavy joints under restraint and subject to dynamic loading for low temperature application

## Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Cr	% Mo	% V
As per AWS / SFA 5.5 <sup>a</sup>	NS	1 min*	0.80*	0.030	0.030	0.50*	0.30*	0.20*	0.10*
Typical Results	0.075	0.90	0.34	0.021	0.020	1.0	0.01	0.01	<0.01

Note : \*undiluted weld metal shall have the minimum of at least one of the elements listed above

<sup>a</sup> Single values are maximum

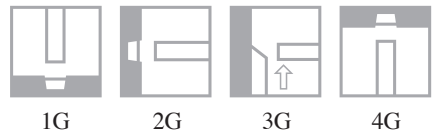
## Mechanical Properties

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - ° C
As per AWS / SFA 5.5	390 min.	490 min.	22 min.	NS
Typical Result	450	560	27	-

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 100	2.50	20
3.20	350 / 450	100 – 140	2.50 / 5.0	20
4.00	350 / 450	140 – 190	2.50 / 5.0	20
5.00	350 / 450	190 – 250	2.50 / 5.0	20

Recommended Welding Positions:



### Classification

AWS / SFA 5.5 : E 8018 B2

### Characteristics

- ▲ Basic coated low hydrogen low alloy electrode
- ▲ Smooth arc, less spatter and smoke, self – releasing slag.
- ▲ Fine ripple bead , good arc striking
- ▲ Well suitable for AC as well as DC(+)
- ▲ Weld metal recovery is approximately 120 %
- ▲ Radiography quality weld

### Applications

- ▲ Welding of 1.25 % Cr and 0.5 % Mo creep and heat resisting steel employed in the fabrication subjected to operating temperature of up to 570 °
- ▲ Creep resistance steel , used in chemical plant and equipment's, pressure vessels, oil refinery
- ▲ Steam power plant, power stations and ship

### Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Cr	% Mo
As per AWS / SFA 5.5 <sup>a</sup>	0.05 - 0.12	0.90	0.80	0.03	0.03	1.0 – 1.50	0.4 – 0.65
Typical Results	0.065	0.85	0.30	0.020	0.016	1.25	0.55

Note : <sup>a</sup> Single values are maximum

### Mechanical Properties

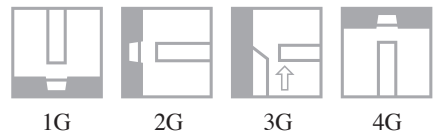
Post weld heat treatment at 690 ° C for 1 hour.

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - ° C
As per AWS / SFA 5.5	460 min.	550 min.	19 min.	NA
Typical Result	550	645	27	NA

### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 100	2.50	20
3.20	350 / 450	100 – 140	2.50 / 5.0	20
4.00	350 / 450	140 – 190	2.50 / 5.0	20
5.00	350 / 450	180 – 240	2.50 / 5.0	20

Recommended Welding Positions:



## Classification

AWS / SFA 5.5 : E 8018 B6

## Characteristics

- ▲ Basic coated low hydrogen low alloy electrode
- ▲ Smooth arc, less spatter and smoke
- ▲ Fine ripple bead, good arc striking, self-releasing slag
- ▲ Good performance in AC and DC(+)
- ▲ Weld metal recovery is approximately 120 %
- ▲ Radiography quality weld

## Applications

- ▲ Welding of 5.0 % Cr and 0.5 % Mo creep and heat resisting steel employed in the fabrication
- ▲ Creep resistance steel, used in chemical plant and equipment's, pressure vessels, oil refinery
- ▲ Steam power plant, power stations and ship

## Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Cr	% Mo
As per AWS / SFA 5.5 <sup>a</sup>	0.05 - 0.10	1.0	0.90	0.03	0.03	0.40	4.0 – 6.0	0.45 – 0.65
Typical Results	0.070	0.88	0.35	0.020	0.02	0.30	5.20	0.56

Note : <sup>a</sup> Single values are maximum

## Mechanical Properties,

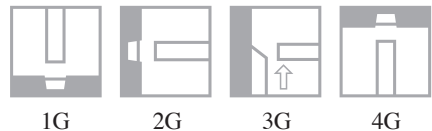
Post weld heat treatment at 740 ° C for 1 hour.

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - ° C
As per AWS / SFA 5.5	460 min.	550 min.	19 min.	NA
Typical Result	520	650	26	NA

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 100	2.50	20
3.20	350 / 450	100 – 140	2.50 / 5.0	20
4.00	350 / 450	140 – 190	2.50 / 5.0	20
5.00	350 / 450	180 – 240	2.50 / 5.0	20

Recommended Welding Positions:





## Classification

AWS / SFA 5.5 : E 9018 B3

## Characteristics

- ▲ Basic coated low hydrogen low alloy electrode
- ▲ Smooth arc, less spatter and smoke
- ▲ Fine ripple bead, good arc striking, self-releasing slag
- ▲ Well suitable for AC and DC (+)
  
- ▲ Weld metal recovery is approximately 120 %
  
- ▲ Radiography quality weld

## Applications

- ▲ Welding of 2.50 % Cr and 1.0 % Mo creep and heat resisting steel employed in the fabrication subjected to operating temperature of up to 600 ° C
- ▲ Steam pipe of boilers for electric power plant and marine use.
- ▲ Maximum service temperature Equipment's used in oil & refining industries
- ▲ Equipment's used in oil & refining industries

## Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Cr	% Mo
As per AWS / SFA 5.5 <sup>a</sup>	0.05 - 0.12	0.90	0.80	0.03	0.03	2.0 - 2.50	0.90 – 1.20
Typical Results	0.075	0.80	0.42	0.02	0.02	2.25	1.0

Note : <sup>a</sup> Single values are maximum

## Mechanical Properties

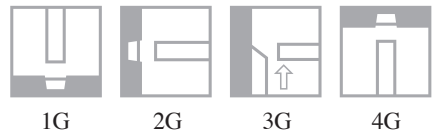
Post weld heat treatment at 690° C for 1 hour.

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - ° C
As per AWS / SFA 5.5	530 min	620 min	17 min	NA
Typical Result	580	680	26	NA

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 100	2.50	20
3.20	350 / 450	100 – 140	2.50 / 5.0	20
4.00	350 / 450	140 – 190	2.50 / 5.0	20
5.00	350 / 450	180 – 240	2.50 / 5.0	20

Recommended Welding Positions:



### Classification

AWS / SFA 5.5 : E 10018 D2

### Characteristics

- ▲ Basic coated low hydrogen low alloy electrode
- ▲ Good arc characteristics
- ▲ Easy removable slag
- ▲ Low spatter and smoke level
- ▲ Well suitable for AC and DC(+)
- ▲ Weld metal recovery is approximately 115 %
- ▲ Radiography quality weld

### Applications

- ▲ Suitable for welding of Mn – Mo steels, castings
- ▲ Carbon steels, low alloy steels, Q & T steels, high yield steels etc.,
- ▲ Pipe line in offshore
- ▲ Penstocks, alloy forgings, structures and pressure vessels
- ▲ Earth moving equipments

### Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% P	% S	% Ni	% Mo
As per AWS / SFA 5.5 <sup>a</sup>	0.15	1.65 – 2.00	0.80	0.03	0.03	0.90	0.25 – 0.45
Typical Results	0.075	1.75	0.44	0.021	0.02	0.60	0.38

Note : <sup>a</sup> Single values are maximum

### Mechanical Properties,

Post weld heat treatment at 620° C for 1 hour.

Requirements	Yield Strength, MPa	Tensile Strength, MPa	% Elongation, L = 4D	Avg. Charpy V – Notch, joules @ - 50 ° C
As per AWS / SFA 5.5	600 min	690 min	16 min	27 min
Typical Result	680	790	26	60

### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 100	2.50	20
3.20	350 / 450	100 – 140	2.50 / 5.0	20
4.00	350 / 450	140 – 190	2.50 / 5.0	20
5.00	350 / 450	180 – 240	2.50 / 5.0	20

Recommended Welding Positions:



## Classification

AWS / SFA 5.4 : E 308 L - 16

## Characteristics

- ▲ Rutile coated all position stainless steel electrode
- ▲ Produces smooth arc, very less spatter and smoke
- ▲ Self-releasing slag, fine ripple bead
- ▲ Suitable for AC as well as DC(+)
- ▲ Weld metal is of radiography quality

## Applications

- ▲ Suitable for stainless steel grade AISI 302, 304, 304L, 308,308 L etc.,
- ▲ Stabilized stainless steel of similar composition of the steel where the working temperature is maximum 350 ° C.
- ▲ Boilers, reactors, turbines, piping in refinery , oil and gas industries

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.04	18 - 21	9 - 11	0.75	0.5 – 2.5	1.0	0.04	0.03	0.75
Typical Results	0.025	18.25	9.60	< 0.10	1.42	0.60	0.02	0.015	< 0.10

Note : <sup>a</sup> Single values are maximum

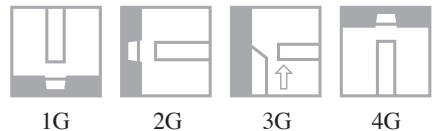
## Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	520 min	30 min
Typical Result	580	35

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.4 : E 309 L - 16

## Characteristics

- ▲ Rutile coated all position stainless steel electrode
- ▲ Excellent corrosion and oxidation resistance up to 1100 ° C
- ▲ Smooth arc, very less spatter and smoke
- ▲ Easily detachable slag, excellent bead appearance
- ▲ Suitable for AC as well as DC(+)
- ▲ Weld metal is of radiography quality

## Applications

- ▲ Welding of 22 % Cr / 12 % Ni grade steels
- ▲ Dissimilar steels such as stainless steel to carbon steel, low alloy steels
- ▲ Surfacing application of steels , building up mild steel to improve wear resistance
- ▲ Building up worn out parts of wear resisting steel
- ▲ Joining corrosion resistant clad steels

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.04	22 - 25	12 - 14	0.75	0.5 – 2.5	1.0	0.04	0.03	0.75
Typical Results	0.025	23.25	13.02	< 0.10	1.52	0.60	0.024	0.016	< 0.10

Note : <sup>a</sup> Single values are maximum

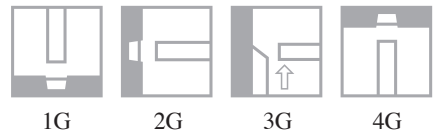
## Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	520 min	30 min
Typical Result	610	36

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.4 : E 309 - 16

## Characteristics

- ▲ Rutile coated all position stainless steel electrode
- ▲ Excellent corrosion and oxidation resistance up to 1100 ° C
- ▲ Smooth arc, very less spatter and smoke
- ▲ Easily detachable slag, excellent bead appearance
- ▲ Suitable for AC as well as DC(+)
- ▲ Weld metal is of radiography quality

## Applications

- ▲ Welding of 22 % Cr / 12 % Ni grade steels
- ▲ Dissimilar steels such as stainless steel to carbon steel, low alloy steels
- ▲ Surfacing application of steels , building up mild steel to improve wear resistance
- ▲ Building up worn out parts of wear resisting steel
- ▲ Joining corrosion resistant clad steels

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.15	22 - 25	12 - 14	0.75	0.5 – 2.5	1.0	0.04	0.03	0.75
Typical Results	0.075	23.00	12.85	< 0.10	1.45	0.65	0.026	0.020	< 0.10

Note : <sup>a</sup> Single values are maximum

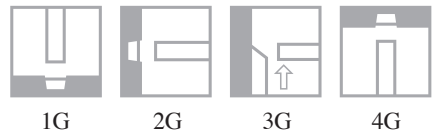
## Mechanical Properties,

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	550 min	30 min
Typical Result	630	36

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.4 : E 310 - 16

## Characteristics

- ▲ Rutile coated all position stainless steel electrode
- ▲ Quiet and stable arc, less spatter and smoke
- ▲ Easy / Self-releasing slag, fine ripple bead
- ▲ Suitable for AC as well as DC(+)
- ▲ Weld metal is of radiography quality

## Applications

- ▲ Heat resisting chromium and Cr – Nickel steel, containing 25 % Cr and 20 % Nickel
- ▲ Joining difficult steels such as armor plates and ferrite stainless steels and dissimilar steels
- ▲ Industrial furnace, equipment's, cladding side of stainless steels , straight chrome steels
- ▲ Gas turbine combustion chamber part , service temperature up to 1200 ° C

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.08 – 0.20	25 - 28	20 – 22.5	0.75	1.0 – 2.5	0.75	0.03	0.03	0.75
Typical Results	0.10	26.0	21.5	< 0.1	1.50	0.65	0.018	0.016	< 0.3

Note : <sup>a</sup> Single values are maximum

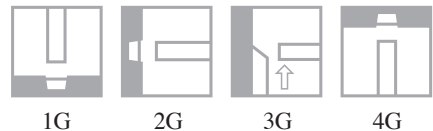
## Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	550 min	30 min
Typical Result	680	37

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.4 : E 312 - 16

## Characteristics

- ▲ Rutile type all position stainless steel electrode
- ▲ Easy striking and restriking, stable arc, less smoke
- ▲ Easy / Self-releasing slag
- ▲ Suitable for AC as well as DC(+)
- ▲ Weld metal is of radiography quality

## Applications

- ▲ Designed to weld 29 % Cr / 9 % Ni steel, cast steels
- ▲ High resistance to oxidation, crack and fissures
- ▲ Repairing of rollers, forging dies, hot work tools
- ▲ Dissimilar joints between stainless steel and high carbon steels, unknown steels

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.15	28 - 32	8 - 10.5	0.75	0.5 – 2.50	1.0	0.04	0.03	0.75
Typical Results	0.10	29.5	8.9	< 0.1	1.55	0.60	0.018	0.016	< 0.2

Note : <sup>a</sup> Single values are maximum

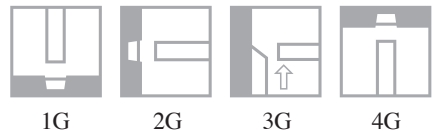
## Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	660 min	22 min
Typical Result	730	30

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.4 : E 316 L - 16

## Characteristics

- ▲ Rutile type all position extra low carbon stainless steel electrode
- ▲ Very less spatter, smooth arc, easy striking and restriking, less smoke
- ▲ Self-releasing slag
- ▲ Suitable for AC as well as DC(+)
- ▲ Radiography quality weld

## Applications

- ▲ Designed to weld 18 % Cr / 12 % Ni / 2.5 % Mo stainless steel
- ▲ Chemical , food storage tanks, pipes in chemical, textile, paper industries
- ▲ Ideal for joining wrought and cast material to similar composition
- ▲ Resistance to stress cracking , hot cracking
- ▲ Corrosion resistance at high temperature up to 800 ° C

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.04	17 - 20	11 - 14	2 - 3	0.5 – 2.50	1.0	0.04	0.03	0.75
Typical Results	0.025	18.50	12.05	2.20	1.55	0.64	0.030	0.012	< 0.20

Note : <sup>a</sup> Single values are maximum

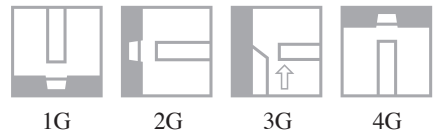
## Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	490 min	30 min
Typical Result	570	35

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:





## Classification

AWS / SFA 5.4 : E 308 L - 17

## Characteristics

- ▲ Acid – rutile base electrode
- ▲ Very less spatter and smoke, self-releasing slag, fine ripple bead
- ▲ Suitable for AC as well as DC(+)
- ▲ Resistance to oxidation, scaling and crack
- ▲ Weld metal is of radiography quality

## Applications

- ▲ Welding of stainless steel grade AISI 302, 304, 304L, 308,308 L etc.,
- ▲ Fabrication of boilers , reactors, turbines
- ▲ Piping in refinery , oil and gas industries, chemical industries

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.04	18 - 21	9 - 11	0.75	0.5 – 2.5	1.0	0.04	0.03	0.75
Typical Results	0.025	19.0	10.50	< 0.10	1.50	0.62	0.02	0.012	< 0.10

Note : <sup>a</sup> Single values are maximum

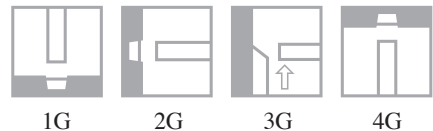
## Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	520 min	30 min
Typical Result	600	36

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.4 : E 309 L - 17

## Characteristics

- ▲ Acid - Rutile base all position stainless steel electrode
- ▲ Excellent corrosion and oxidation resistance up to 1100 ° C
- ▲ Smooth arc, very less spatter and smoke
- ▲ Easily detachable slag, excellent bead appearance
- ▲ Suitable for AC as well as DC(+)
- ▲ Weld metal is of radiography quality

## Applications

- ▲ Welding of 22 % Cr / 12 % Ni grade steels
- ▲ Dissimilar steels such as stainless steel to carbon steel, low alloy steels
- ▲ Surfacing application of steels , building up mild steel to improve wear resistance
- ▲ Building up worn out parts of wear resisting steel
- ▲ Joining corrosion resistant clad steels

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.04	22 - 25	12 - 14	0.75	0.5 – 2.5	1.0	0.04	0.03	0.75
Typical Results	0.02	23.75	13.50	< 0.10	1.50	0.62	0.024	0.016	< 0.10

Note : <sup>a</sup> Single values are maximum

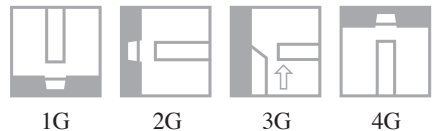
## Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	520 min	30 min
Typical Result	630	38

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.4 : E 310 - 17

## Characteristics

- ▲ Acid - Rutile type all position stainless steel electrode
- ▲ Smooth and stable arc , less spatter and smoke
- ▲ Easy / Self-releasing slag, fine ripple bead
- ▲ Suitable for AC as well as DC(+)
- ▲ Weld metal is of radiography quality

## Applications

- ▲ Heat resisting chromium and Cr – Nickel steel, containing 25 % Cr and 20 % Nickel
- ▲ Joining difficult steels such as armor plates and ferrite stainless steels and dissimilar steels
- ▲ Industrial furnace, equipment's, cladding side of stainless steels , straight chrome steels
- ▲ Gas turbine combustion chamber part , service temperature up to 1200 ° C

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.08 – 0.20	25 - 28	20 – 22.5	0.75	1.0 – 2.5	0.75	0.03	0.03	0.75
Typical Results	0.10	26.75	21.60	< 0.1	1.55	0.62	0.015	0.013	< 0.3

Note : <sup>a</sup> Single values are maximum

## Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	550 min	30 min
Typical Result	660	36

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.4 : E 312 - 17

## Characteristics

- ▲ Acid - Rutile type all position stainless steel electrode
- ▲ Easy striking and restriking, stable arc, less smoke
- ▲ Easy / Self-releasing slag
- ▲ Suitable for AC as well as DC(+)
- ▲ Weld metal is of radiography quality

## Applications

- ▲ Versatile electrode designed to weld 29 % Cr / 9 % Ni steel, cast steels as well as dissimilar steels
- ▲ High resistance to oxidation, crack and fissures
- ▲ Repairing of rollers, forging dies, hot work tools
- ▲ Buffer layer to steels before welding of hard facing Electrodes
- ▲ Good scaling resistance up to 1150 ° C

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.15	28 - 32	8 -10.5	0.75	0.5 – 2.50	1.0	0.04	0.03	0.75
Typical Results	0.10	30.50	9.50	< 0.1	1.60	0.65	0.018	0.016	< 0.2

Note : <sup>a</sup> Single values are maximum

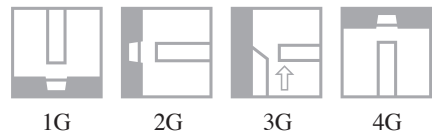
## Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	660 min	22 min
Typical Result	750	34

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.4 : E 316 L - 17

## Characteristics

- ▲ Acid – Rutile all position stainless steel electrode
- ▲ Less spatter, smooth arc, easy striking and restriking, less smoke
- ▲ Self-releasing slag
- ▲ Resistance to stress cracking , hot cracking
- ▲ Suitable for AC as well as DC(+)
- ▲ Radiography quality weld

## Applications

- ▲ Suitable for 18 % Cr / 12 % Ni / 2.5 % Mo stainless steel
- ▲ Chemical , food storage tanks, pipes in chemical, textile, paper and boards, paint and dye industries
- ▲ Ideal for joining wrought and cast material to similar composition
- ▲ Corrosion resistance at high temperature up to 800 ° C

## Deposited Weld Metal Composition, %

Requirements	% C	% Cr	% Ni	% Mo	% Mn	% Si	% P	% S	% Cu
As per AWS / SFA 5.4 <sup>a</sup>	0.04	17 - 20	11 - 14	2 - 3	0.5 – 2.50	1.0	0.04	0.03	0.75
Typical Results	0.025	19.10	12.50	2.30	1.52	0.60	0.026	0.012	< 0.20

Note : <sup>a</sup> Single values are maximum

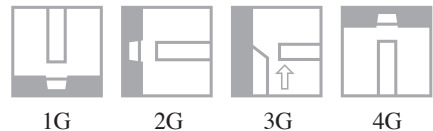
## Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
As per AWS / SFA 5.4	490 min	30 min
Typical Result	590	37

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.15 : E Ni - CI

## Characteristics

- ▲ Designed for cold welding of cast iron
- ▲ Easily machinable and resistance to corrosion
- ▲ Easy striking and re striking
- ▲ Uniform bead, easily removable slag
- ▲ Suitable for AC as well as DC(+)

## Applications

- ▲ Joining cast iron to cast iron or other ferrous and non – ferrous materials
- ▲ Grey and malleable cast iron
- ▲ Repairs and filing of castings and many critical jobs
- ▲ Buffer layer before filling with nickel ferrous type

## Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Si	% S	% Fe	% Ni	% Cu
As per AWS / SFA 5.15 <sup>a</sup>	2.0	2.50	4.0	0.03	8.0	85 min	2.50
Typical Results	0.80	0.62	0.50	0.020	< 0.5	98	< 0.10

Note : <sup>a</sup> Single values are maximum

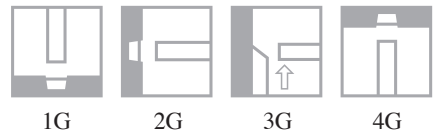
## Mechanical Properties,

Requirements	Hardness, BHN
As per AWS / SFA 5.15	135 - 218
Typical Result	170

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	50 – 80	2.0	10
3.20	350	75 – 100	2.0	10
4.00	350	100 – 140	2.0	10
5.00	350	140 – 170	2.0	10

Recommended Welding Positions:



## Classification

AWS / SFA 5.15 : E NiFe - CI

## Characteristics

- ▲ Produces machinable weld
- ▲ Steady and quite arc , intimate fuse with base metal
- ▲ Easy striking and restriking
- ▲ Thin and easily removable slag
- ▲ Suitable for AC as well as DC(+)

## Applications

- ▲ Welding and repairing of malleable cast iron, nodular Iron
- ▲ Foundry defects, pump casting, ferrous and non – ferrous materials
- ▲ Cast iron with high phosphorous content
- ▲ Joining cast iron to ferrous and non – ferrous materials

## Deposited Weld Metal Composition, maximum (%)

Requirements	% C	% Mn	% Si	% S	% Fe	% Ni	% Cu
As per AWS / SFA 5.15 <sup>a</sup>	2.0	2.5	4.0	0.03	Reminder	45 - 60	2.50
Typical Results	1.0	0.70	0.60	0.018	Reminder	56	< 0.10

Note : <sup>a</sup> Single values are maximum

## Mechanical Properties,

Requirements	Hardness, BHN
As per AWS / SFA 5.15	165 - 218
Typical Result	190

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	50 – 80	2.0	10
3.20	350	75 – 100	2.0	10
4.00	350	100 – 140	2.0	10
5.00	350	140 – 170	2.0	10

Recommended Welding Positions:



**Classification**

AWS / SFA 5.15 : E St

**Characteristics**

- ▲ Produces Non- Machinable weld on cast iron
- ▲ Improve crack resistivity
- ▲ Steady and quite arc , intimate fuse with base metal
- ▲ Easy striking and restriking
- ▲ Thin and easily removable slag
- ▲ Suitable for AC as well as DC(+)

**Applications**

- ▲ Joining and repairing of cast iron parts
- ▲ Cast iron to mild steel
- ▲ Cast iron furnace equipment's
- ▲ Foundry defects, pump casting, ferrous and non – ferrous materials
- ▲ Joining cast iron to ferrous and non – ferrous materials

**Chemical Composition, %**

Requirements	% C	% Mn	% Si	% P	% S	% Fe
As per AWS / SFA 5.15 <sup>a</sup>	0.15	0.60	0.15	0.04	0.04	Reminder
Typical Results	0.10	0.50	0.10	0.03	0.03	Reminder

Note : <sup>a</sup> Single values are maximum

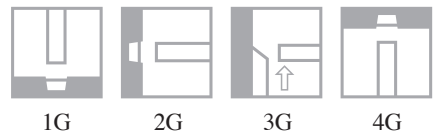
**Mechanical Properties**

Requirements	Hardness, BHN
As per AWS / SFA 5.15	250 - 400
Typical Result	390

**Recommended Welding Current & Packing Data**

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	50 – 80	2.0	10
3.20	350	75 – 110	2.0	10
4.00	350	100 – 150	2.0	10
5.00	350	130 – 180	2.0	10

Recommended Welding Positions:







## Characteristics

- ▲ Specially designed for fast and smooth cutting
- ▲ Piercing , gouging and beveling
- ▲ Negligible slag deposit
- ▲ Good performance on AC and DC, negative

## Applications

- ▲ Suitable for carbon steels, low alloy steels, high tensile steels, stainless steels
- ▲ Removing defects in cast iron, gouging weld defects

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (-)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
3.20	350 / 450	140 – 180	5.0	20
4.00	450	200 – 280	5.0	20
5.00	450	250 – 320	5.0	20

## Characteristics

- ▲ All positions electrode
- ▲ Easy striking and restriking, stable arc, less smoke
- ▲ Easy / Self-releasing slag
- ▲ Suitable for AC as well as DC(+)
- ▲ Weld metal is of radiography quality

## Applications

- ▲ Designed to weld Cr ,Ni steels, cast steels
- ▲ High resistance to oxidation, crack and fissures
- ▲ Repairing of rollers, forging dies, hot work tools, springs
- ▲ Dissimilar joints between stainless steel and high carbon steels, unknown steels
- ▲ Machinable build – up and overlay

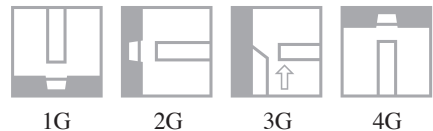
## Mechanical Properties

Requirements	Tensile Strength, MPa
Typical Result	775

## Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 80	2.0	10
3.20	350	80 – 110	2.0	10
4.00	350	110 – 140	2.0	10
5.00	350	140 – 180	2.0	10

Recommended Welding Positions:



### Characteristics

- ▲ Produces machinable weld and resistance to corrosion
- ▲ Deposit is soft and has good resistance to cracking
- ▲ Easy striking and restriking
- ▲ Easily detachable slag
- ▲ Suitable for AC as well as DC, positive

### Applications

- ▲ Joining and repairing of cast iron parts
- ▲ Joining cast iron to ferrous and non – ferrous materials
- ▲ Reclamation of defective castings
- ▲ Fill – up small cavities
- ▲ Cylinder blocks, motor , generator, pump casting, impeller

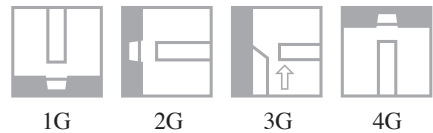
### Hardness Test

Typical Hardness , BHN	175
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### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	50 – 80	2.0	10
3.20	350	75 – 100	2.0	10
4.00	350	100 – 140	2.0	10
5.00	350	140 – 170	2.0	10

Recommended Welding Positions:



### Characteristics

- ▲ Basic type coating
- ▲ Resistant to embrittlement and creep at high temperature up to 820 ° C
- ▲ Quite and stable arc with less spatter
- ▲ Easily detachable slag, fine rippled bead
- ▲ Suitable for DC, positive

### Applications

- ▲ Welding of Ni, Cr, Fe alloys, cryogenic steel
- ▲ Dissimilar materials such as INCONEL alloys to joined to carbon steel, stainless steels
- ▲ Nickel to stainless steel, stainless steel to carbon Steel
- ▲ Corrosion resistant tank, furnace compounds, refineries, pressure vessels ,chemical plants

### Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Fe	% P	% S	% Si	% Cu	% Ni	% Cr	% Nb +Ta	% Mo
Typical Results	0.05	2.50	9.0	0.02	0.015	0.52	0.10	71.0	15.5	1.20	1.50

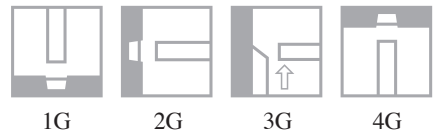
### Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
Typical Result	670	40

### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	50 – 70	2.0	10
3.20	350	65 – 100	2.0	10
4.00	350	95 – 130	2.0	10
5.00	350	130 – 170	2.0	10

Recommended Welding Positions:



### Characteristics

- ▲ Basic coated electrode
- ▲ Deposits are smooth
- ▲ Less spatter, easy detachable slag
- ▲ Good performance in DC, positive

### Applications

- ▲ Welding of Ni, Cr, Fe alloys
- ▲ Repairing and joining of nickel alloys, 5 – 9 % nickel Steels
- ▲ INCONEL alloys, cryogenic stainless steel
- ▲ Dissimilar metals such as INCONEL alloys join to carbon steels, stainless steel, nickel steel
- ▲ other high temperature steels
- ▲ Oven parts, burners, heat treatment equipments, transport tank of liquid gas

### Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Fe	% P	% S	% Si	% Cu	% Ni	% Cr	% Nb +Ta
Typical Results	0.05	7.0	6.50	0.02	0.015	0.75	0.10	68.0	15.30	1.10

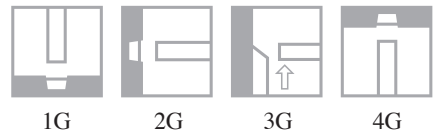
### Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
Typical Result	630	38

### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	50 – 70	2.0	10
3.20	350	65 – 100	2.0	10
4.00	350	95 – 130	2.0	10
5.00	350	130 – 170	2.0	10

Recommended Welding Positions:



### Characteristics

- ▲ Basic coated welding electrode
- ▲ Less spatter, stable arc
- ▲ Easily removable slag
- ▲ weld metal free from porosity
- ▲ Suitable for DC, positive

### Applications

- ▲ Welding of rails end and crossings
- ▲ Shear blade, brake shoes, conveyor parts
- ▲ Cold punching dies, pulleys, groove rollers
- ▲ Clutches, cog wheels of cast irons

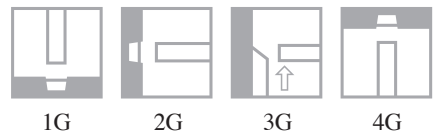
### Hardness Test,

Typical Hardness , HRC	30
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### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 90	2.0	10
3.20	350	100 - 140	2.0	10
4.00	350	140 - 190	2.0	10
5.00	350	190 - 260	2.0	10

Recommended Welding Positions:



### Characteristics

- ▲ Rutile base electrode
- ▲ Producing medium hard facing deposit
- ▲ Quite and stable arc
- ▲ Easily detachable slag
- ▲ Good performance on AC as well as DC, negative

### Applications

- ▲ Cladding of couplings, conveyor parts
- ▲ Cold punching dies, axles
- ▲ Track , shaft, roller
- ▲ Clutches, cog wheels of cast irons

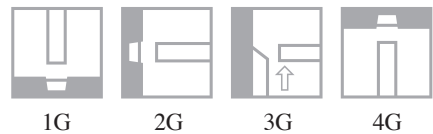
### Hardness Test,

Typical Hardness , HRC	30
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### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (-)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	60 – 90	2.0	10
3.20	350	100 - 140	2.0	10
4.00	350	140 - 180	2.0	10
5.00	350	180 - 220	2.0	10

Recommended Welding Positions:



### Characteristics

- ▲ Rutile coated electrode
- ▲ Producing coarse chromium carbide in an austenitic matrix
- ▲ Quite and stable arc, less smoke , easily detachable slag
- ▲ Good performance on AC and DC (±)

### Applications

- ▲ Surfacing of crushers
- ▲ Earth moving equipment's , using in coal, ore, minerals, dust extractor, sand pump, mixer
- ▲ Dis- integrator hammer
- ▲ Crane wheels, caterpillar teeth

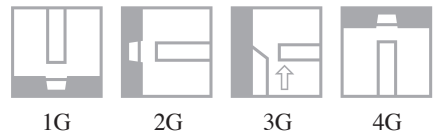
### Hardness Test,

Typical Hardness , HRC	60
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### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (±)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	90 - 120	2.0	10
3.20	350	100 - 140	2.0	10
4.00	350	130 - 200	2.0	10
5.00	350	160 - 230	2.0	10

Recommended Welding Positions:





### Characteristics

- ▲ Specially formulated flux coating aids welding in deep holes and tight corners
- ▲ Perfect weld metal matching with cast iron
- ▲ Unmatched performance on contaminated surface
- ▲ Stable arc, less spatter, easily detachable slag
- ▲ Suitable for AC and DC, positive

### Applications

- ▲ Suitable for welding of cast iron those are in dirty, greasy, burned and contaminated surface
- ▲ Foundry defects, corroded or oxidized cast iron, furnace equipment's
- ▲ Machine frames, sealing of oil soaking cast iron
- ▲ Heat affected cast iron, steel to cast iron

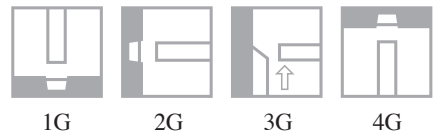
### Hardness Test,

Typical Tensile Strength, MPa	350
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### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	50 - 70	2.0	10
3.20	350	80 - 110	2.0	10
4.00	350	110 - 140	2.0	10
5.00	350	150 - 180	2.0	10

Recommended Welding Positions:



### Characteristics

- ▲ Basic coated type electrode
- ▲ Fully nickel base high CrMoNb alloyed austenite steel all position electrode
- ▲ Smooth and stable arc, less smoke and spatter, easily removable slag
- ▲ Good performance on DC, positive

### Applications

- ▲ Corrosion resistant alloys
- ▲ Dissimilar steels joints such as INCONEL alloys, stainless steels, low alloys
- ▲ Can be used at elevated temperature maximum 1200 ° where the high resistance to oxidation and carburization

### Deposited Weld Metal Composition, %

Requirements	% C	% Mn	% Fe	% P	% S	% Si	% Cu	% Ni	% Cr	% Nb + Ta	% Mo
Typical Results	0.04	0.60	2.0	0.02	0.01	0.35	0.10	61.50	21.0	3.50	9.0

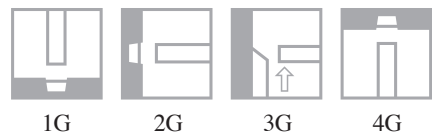
### Mechanical Properties

Requirements	Tensile Strength, MPa	% Elongation, L = 4D
Typical Result	790	41

### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	50 – 70	2.0	10
3.20	350	75 – 100	2.0	10
4.00	350	95 – 130	2.0	10
5.00	350	130 – 170	2.0	10

Recommended Welding Positions:



### Characteristics

- ▲ Basic coated type electrode
- ▲ Deposit is hard and non – machinable with excellent resistance to abrasion and wear
- ▲ Smooth arc, easily removable slag
- ▲ Good performance on AC as well as DC, positive

### Applications

- ▲ Welding and repairing of high carbon and high sulphur steels, crane wheels, shear blades
- ▲ Metal cutting and forming tools, oil expellers worms, dipper teeth
- ▲ Cement die rings, screw conveyors, dredger buckets
- ▲ Working edge of all earth moving equipment's

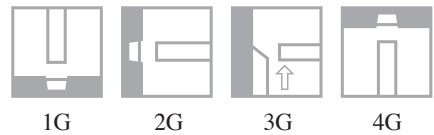
### Hardness Test,

Typical Hardness , HRC	56
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### Recommended Welding Current & Packing Data

Diameter, mm	Length, mm	Current & Polarity AC / DC (+)	Packing Data	
		Amps.	Weight per Packet, kg.	Weight per outer carton, kg.
2.50	350	70 – 90	2.0	10
3.20	350	100 – 140	2.0	10
4.00	350	140 – 180	2.0	10
5.00	350	170 – 220	2.0	10

Recommended Welding Positions:









# SUNRISE

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