

Rutile electrode

Classification

AWS A5.1-91 : E6013
 EN 499-94 : E 42 0 RR 12

General description

Rutile electrode, especially for down hand welding in structural steel
 Smaller sizes most versatile for thin plate material
 Very smooth appearance
 Self releasing slag

Welding positions



ISO/ASME PA/1G PB/2F PC/2G PE/4G

Current type

AC / DC electr. -

Approvals

ABS	BV	CTL	DB	DNV	FORCE	GL	LR	TÜV
2	2	+	+	2	+	2	2	+

Chemical composition (w%), typical, all weld metal

C	Mn	Si
0.1	0.95	0.4

Mechanical properties, all weld metal

	Condition	Yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Impact ISO-V(J) 0°C
Required: AWS A5.1-91		min. 331	min. 414	min. 17	not required
EN 499-94		min. 420	500-640	min. 20	min. 47
Typical values	AW	480	560	26	50

Packaging, available sizes and identification

	Diameter (mm)	1.8	2.0	2.5	3.2	3.2	4.0	4.0	5.0
	Length (mm)	300	300	350	350	450	350	450	450
Unit: box	Pieces / unit (nominal)	270	200	130	140	125	80	80	55
	Net weight/unit (kg)	2.3	2.4	2.8	4.8	5.8	4.5	5.9	6.1

Identification Imprint: 6013/Universalis Tip colour: red

Universalis®. rev. EN 15

Materials to be welded

Steel	Code	Type
General structural steel	EN 10025	S185, S235, S275, S355
Ship plates	ASTM A131	Grade A, B, D, AH32 to DH36
Cast steel	EN 10213-2	G P 240R
Pipe material	EN 10208-1	L210, L240, L290, L360
	EN 10208-2	L240, L290, L360.
	API 5LX	X42, X46, X52, X60
	EN 10216-1/ EN 10217-1	P235, P275 P355
Boiler & pressure vessel steel	EN 10028-2	P235, P265, P295, P355
Fine grained steel	EN 10113-2	S275, S355,
	EN 10113-3	S275, S355

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy E(kJ)	Dep.rate H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
1.8 x 300	40 - 60	AC	50	63	0.3	8.3	227	1.89
2.0 x 300	40 - 65	AC	41	58	0.5	11.4	178	2.00
2.5 x 350	70 - 100	AC	51	134	0.8	21.1	93	1.96
3.2 x 350	100 - 140	AC	57	281	1.3	39.3	47	1.85
3.2 x 450	100 - 140	AC	69	341	1.5	49.6	36	1.79
4.0 x 350	150 - 200	AC	55	399	2.0	56.3	33	1.85
4.0 x 450	150 - 200	AC	69	483	2.1	66.9	25	1.67
5.0 x 450	180 - 250	AC	83	882	2.9	112.0	15	1.69

*stub end 35 mm

Welding parameters, optimum fill passes

Welding position Diameter (mm)	PA/1G Current (A)	PB/2F	PC/2G	PE/4G
1.8	50			
2.0	50			
2.5	100	95	85	85
3.2	130	120	115	105
4.0	185	185	160	130
5.0	260	260		

Remarks

Best choice for welding thin plates.

Application advice

High yield strength steels such as S355, L360, P355 and X60 preheat according EN 1011-1