

# Outershield® 20-H

## Creep resistant rutile cored wire

### Classification

AWS A5.29/A5.29M : E 91T1-B3M-H4  
ISO 17634-A : T CrMo2 P M 2 H5

### General description

All position mix gas shielded 2.25% Cr 1% Mo-alloyed rutile cored wire  
Superior weldability, low spatter, good bead appearance  
Outstanding operator appeal  
Very low hydrogen ( $H_{DM} < 5 \text{ ml/100g}$ )  
Superior product consistency with optimal alloy control  
Excellent wire feeding

### Welding positions



### Current type/Shielding gas (ISO 14175)

DC +  
M21 : Mixed gas Ar+ (>15-25%) CO<sub>2</sub>  
Amount : 15-25 l/min

### Approvals

TÜV  
+

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

Shielding gas	C	Mn	Si	P	S	Cr	Mo	H <sub>DM</sub> ml/100g
M21	0.06	0.75	0.21	0.013	0.008	2.23	1.09	3

### Mechanical properties, typical, all weld metal

	Shielding gas	Condition	Yield strength (N/mm <sup>2</sup> )	Tensile strength (N/mm <sup>2</sup> )	Elongation (%)	Impact ISO-V (J)	
						+20°C	-20°C
Required: AWS A5.29		SR <sup>1)</sup>	min. 540	620-760	min. 17	not required	
EN 17634-A		SR <sup>2)</sup>	min. 400	min. 500	min. 18	47	
Typical values	M21	SR <sup>3)</sup>	570	680	19	160	60

Stress relieving: SR<sup>1)</sup> = 690 ± 15°C/1h, SR<sup>2)</sup> = 690-750°C/1h, SR<sup>3)</sup> = 1h/690°C

### Packaging and available sizes

Unit type	Diameter (mm)
	1.2
15 kg spool B300	X

Outershield® 20-H: rev. EN 23

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## Materials to be welded

Steel grades/Standard      Type

### Creep and hydrogen resistant steels

EN 10028-2	10 CrMo 9-10 & similar alloys
EN 10222-2	12 CrMo 9-10 & similar alloys
ASTM A387	Grade 21 & 22
ASTM A182	Grade F22
ASTM A217	Grade WC9
ASTM A234	Grade WP22
ASTM A199/A200	Grade T21 & T22
ASTM A213	Grade T22
ASTM A335	Grade P22

## Calculation data

Diameter (mm)	Electrical Stick-out (mm)	Wire feed speed (cm/min)	Current (A)	Arc Voltage (V)	Deposition Rate (kg/h)	kg Wire/ kg weld metal
1.2	20	445	130	20-22	1.6	1.20
		700	180	23-25	2.5	1.20
		950	220	25-27	3.4	1.20
		1270	265	27-29	4.5	1.20
		1590	305	30-32	5.9	1.20

## Welding parameters, optimum fill passes in shielding gas Ar + (>15 - 25)% CO<sub>2</sub>

Diameter (mm)	Welding positions				
	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
1.2	230-280A	230-280A	200-240A	200-240A	160-220A
	26-32V	26-32V	25-32V	25-28V	23-28V

## Remarks/ Application advice

Recommended preheat temperature: 200 - 250°C

Recommended tempering heat treatment range: 690-750°C

Time depends on material thickness