

For welding steel such as:

Outokumpu	EN	ASTM	SS*	BS*	NF*
2205	1.4462	S32205	2377	318S13	Z3 CND 22-05 Az

* Obsolete national standards, replaced by EN 10088.

Characteristics

AVESTA 2205 basic is an electrode of the basic type. Despite its basic coating, the electrode is very easy to weld and offers better mechanical properties than the AC/DC type.

AVESTA 2205 basic is primarily designed for welding the duplex grade Outokumpu 2205 and similar steel grades, but it can also be used for welding 2304™ type of steels.

AVESTA 2205 basic provides a ferritic-austenitic weldment that combines many of the good properties of both ferritic and austenitic stainless steels. Due to the high content of both Cr and Mo a very good resistance to general and pitting corrosion is obtained. The duplex microstructure gives a high tensile strength and hereby also an excellent resistance to stress corrosion cracking.

AVESTA 2205 basic is "over-alloyed" with respect to nickel, to ensure the right ferrite balance in the weld metal.

Welding directions

Outokumpu 2205 should be welded in the same manner as ordinary stainless austenitic steel, i.e. high currents should be avoided and the material should be allowed to cool to below 150°C between successive passes.

However, duplex steels are somewhat more difficult to weld compared to austenitic steels such as 316L, mainly with respect to fluidity and penetration into the parent metals.

To utilise the good properties of a duplex steel it is of the utmost importance to obtain a good ferrite content in the weld. This is best achieved by welding with sufficient root gap (0.08-0.10 inch, 2-2.5 mm), which also ensures good penetration, by using the right amount of filler metal and by welding with a controlled heat input (12.7-63.5 kJ/in, 0.5-2.5 kJ/mm).

Duplex steels have remarkably lower thermal expansion than for example 304 and 316 type steels. The deformation and extension during welding is therefore somewhat lower

Weld deposit data

Metal recovery approx. 110 %.

Packaging data

Diam. inch	Diam. mm	Length mm/inch	Weight/capsule, lbs	Electrodes/capsule, approx.	Weight/carton, lbs
3/32	2.5	300 / 12	8.0	210	24
1/8	3.25	350 / 14	9.1	123	27
5/32	4.0	350 / 14	10.0	92	30

Standard designations

EN 1600 E 22 9 3 N L B
AWS A5.4 E2209-15

Typical analysis % (All weld metal)

C	Si	Mn	Cr	Ni	Mo	N
0.02	0.5	0.8	23.0	9.5	3.0	0.16

Ferrite 30 FN WRC-92

Mechanical properties

	Typical values (IIV)	
Yield strength, R _{p0.2}	635 N/mm ²	62 ksi
Tensile strength, R _m	820 N/mm ²	119 ksi
Elongation, A ₅	26 %	26 %
Impact strength, KV		
+20°C	80 J	59 ft-lb
-40°C	55 J	41 ft-lb
Hardness approx.	240 Brinell	

Welding data

DC+ or AC	Diam. inch	Current, A
	3/32	50–70
	1/8	70–110
	5/32	100–140

Interpass temperature: Max. 300° F (150°C).

Heat input: 12.7-63.5 kJ/in (0.5 – 2.5 kJ/mm).

Heat treatment: Generally none. In special cases quench annealing at 2102-2102°F (1100-1150°C).

Structure: Austenite with approx. 30 % ferrite.

Scaling temperature: Approx. 1562°F (850°C) (air)

Corrosion resistance: Very good resistance to pitting and stress corrosion cracking in chloride containing environments.

Approvals: –

Welding positions

