

## Classifications

EN ISO 17633-A	EN ISO 17633-B	AWS A5.22
T 22 9 3 N L R M21/C1 3	TS 2209-F M21/C1 0	E2209T0-4/1

## Characteristics and typical fields of application

Rutile duplex stainless steel flux-cored wire of 22 9 3 N L R / E2209T0 type for welding of 22Cr steel grades such as EN 1.4462 / UNS S31803 and similar. Designed to fulfil the high demands set in offshore, shipyards, chemical tankers, chemical/petrochemical, pulp & paper, etc. Very good resistance to pitting, intergranular corrosion and stress corrosion cracking in chloride containing environments i.e. seawater. Meets the corrosion test requirements per ASTM A262 Practice B, C and E, and ASTM G48 Method A (24 h) up to 22°C in as-welded condition and 30°C in solution annealed condition. Over-alloyed in nickel to promote austenite formation. Easy handling and high deposition rate result in high productivity with excellent welding performance and very low spatter formation. Increased travel speeds as well as easy slag removal with little demand for cleaning and pickling provide considerable savings in time and money. The wire shows good wetting behavior and results in a smooth weld finish. The wide arc ensures even penetration and side-wall fusion to prevent lack of fusion. Suitable for service temperatures from -40°C to 250°C. For welding in vertical-up and overhead positions, BÖHLER CN 22/9 PW-FD should be preferred.

## Base materials

Same and similar alloyed duplex steels, as well as dissimilar joints or weld claddings. EN 1.4462 X2CrNiMoN22-5-3, EN 1.4362 X2CrNiN23-4, EN 1.4162 X2CrNiMoN21-5-1; UNS S32205, S31803, S32304, S32101; Outokumpu 2205, 2304, LDX 2101<sup>®</sup>, SAF 2205, SAF 2304; 1.4462 X2CrNiMoN22-5-3 with 1.4583 X6CrNiMoNb17-13-3, 1.4462 X2CrNiMoN22-5-3 with P235GH/ P265GH, S255N, P295GH, S460N, etc.

## Typical analysis of all-weld metal

	C	Si	Mn	Cr	Ni	Mo	N	PRE <sub>N</sub>	Ferrite WRC-92
wt.-%	0.027	0.8	0.9	22.7	9.0	3.2	0.13	≥ 35	45 – 65

## Mechanical properties of all-weld metal – typical values (minimum values)

Condition	Yield strength	Tensile strength	Elongation	Impact work	
	R <sub>p0.2</sub>	R <sub>m</sub>	A (L <sub>0</sub> =5d <sub>0</sub> )	ISO-V KV J	
	MPa	MPa	%	20°C	-30°C
u	<b>620</b> (≥ 450)	<b>800</b> (≥ 690)	<b>27</b> (≥ 20)	<b>60</b>	<b>45</b> (≥ 32)

u untreated, as-welded – shielding gas Ar + 18 % CO<sub>2</sub>

## Operating data

	Ø (mm)	Wire feed m/min	Arc length mm	Current A	Voltage V
	1.2	6.5 – 15.5	~ 3	150 – 280	24 – 30

Welding with standard GMAW power source with DC+ polarity. No pulsing needed. Backhand (drag) technique preferred with a work angle of appr. 80°. Ar + 15 – 25 % CO<sub>2</sub> as shielding gas offers the best weldability. 100 % CO<sub>2</sub> can be also used, but the voltage should be increased by 2 V and the weld metal austenite content increases somewhat. The gas flow should be 15 – 18 l/min. The heat input should be 0.5 – 2.5 kJ/mm, the interpass temperature max. 150°C and the wire stick-out 15 – 20 mm. Re-drying of the wire possible at 150°C for 24 h if necessary. The scaling temperature is approx. 850°C in air. Post-weld heat treatment generally not needed. In special cases, solution annealing can be performed at 1100 – 1150°C followed by water quenching. Ferrite measured with Fischer Feritescope 39 – 47 FN.

## Approvals

ABS (M21), CWB, DNV GL, LR, RINA (M21), BV (C1+Ø1.2), CE, DB (43.014.31), TÜV (07133.)