


# BÖHLER Ti 60 T-FD

## Seamless Cored Wire



All-positional rutile flux-cored wire for high strength steel, using M21 shielding gas.

Features	User benefits	
» Fast freezing rutile slag system	» Productive positional welding	
» Welder-friendly	» Low defect rate	
» Deep penetration	» Low defect rate	
» Smooth wetting	» Good fatigue resistance	
» Low spatter	» Less post weld cleaning	
» Dependable feedability	» Increased arc time	
» Copper-coated seamless cored wire	» Excellent current transfer » Resistance to moisture absorption	
» Low-hydrogen weld metal	» Low risk of HAC	
» CTOD tested at -10°C	» Excellent mechanical properties	

### For offshore and other demanding industries with impact requirements down to -40°C

Seamless tubular, copper-coated cored from the Diamond Spark range. For single- or multi-layer welding of low-temperature steels up to 500 MPa yield strength and impact requirements down to -60°C, also after post weld heat treatment. Alloyed with < 1% Ni to meet the NACE MR0175 requirement for SSC safe service in sour environments in oil and gas exploration and processing.

Superb weldability in all welding positions. Seamless wire design, giving optimal protection against moisture reabsorption, assuring very low-hydrogen weld metal. CTOD tested at -10°C.

### Exceptional weldability, productivity and low-hydrogen performance


BÖHLER Ti 60 T-FD is an all-positional rutile cored wire with excellent weldability. It is characterized by a smooth spray-arc droplet transfer in all welding positions, with very low spatter losses. Slag is easily removed. Welds have a deep penetration and a nice appearance with smooth wetting onto plate edges. If desired, a single current/voltage setting can be applied for all welding positions. Its fast freezing slag enables deposition rates in positional welding up to three times as high as obtainable with any other manual arc welding process. Root runs are welded economically on ceramic weld metal support. The seamless, copper-coated wire design adds sufficient stiffness and glide to overcome friction in liners, welding guns and contact tips.

The copper-coating enhances current transfer between contact tip and wire resulting in a stable arc. Controlled wire cast and helix largely avoids “dog tailing”, promoting straight, well positioned welds. The seamless design offers the best possible protection against moisture reabsorption during storage and use of the wires and thereby against hydrogen induced cracking. Diffusible hydrogen level is typically 2-3 ml/100g weld metal.

### Typical applications in offshore fabrication

- » TKY-joints
- » Offshore structures
- » Foundation piles

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Classifications		Operating data <small>Allows welding with standard power sources.</small>		
EN ISO 17632-A	AWS A5.36	Welding positions	Polarity	Shielding gas
T50 6 1Ni P M 1 H5	E81T1-M21A8-Ni1-H4		DC+	EN ISO 14175: M21, M33

Typical chemical composition, all weld metal, wt. %				
Shielding gas	C	Si	Mn	Ni
M21	0.07	0.45	1.3	0.85

Mechanical properties, all weld metal (single values typical)							
Shielding gas	Condition	Yield strength R <sub>p0.2%</sub> MPa	Tensile strength R <sub>m</sub> MPa	Elongation A <sub>5</sub> %	CVN Impact toughness ISO-V KV J -40 °C		CTOD tested
M21	as welded	550 (≥ 500)	610 (560 - 690)	25 (≥ 18)	100	75 (≥ 47)	- 10 °C
M21	PWHT: 550 - 600 °C / 2h	520 (≥ 500)	580 (560 - 690)	29 (≥ 18)	60		

Steels to be welded			
EN	ASTM		
S355JR, S355JO, S355J2, S450JO, S355NL-S460NL, S355M-S460M, S355ML-S460-ML, S460Q, S460QL P355GH, P355NH, P420NH, P460NH, P355N-P460N, P355NH-P460NH, L245NB-L415NB, L245MB-L485MB, L360QB-L485QB, aldur 500Q, aldur 500QL, aldur 500QL1	A 350 Gr. LF1 A 516 Gr. 65.70 A 572 Gr. 42, 50, 60, 65 A 573 Gr. 65, 70	A 588 Gr. B, C, K A 633 Gr. A, C, D, E A 662 Gr. B, C A 678 Gr. B A 707 Gr. L2, L3	A 841 Gr. A, B, C API 5L: X42 - X70, X52Q - X70Q

Approvals
TÜV, DB, DNV-GL, ABS, LR, BV, RINA, RS, CWB, CE

Overview spool types					
Plastic spool D200			Wire basket spool BS300		
	Precision layer wound  Dimensions: Ø external 200 mm Ø internal 52 mm Width 47 mm	Available spool weight: 5 kg  Available diameters: 1.0 mm 1.2 mm		Precision layer wound  Dimensions: Ø external 300 mm Ø internal 52 mm Width 100 mm	Available spool weight: 15 kg  Available diameters: 1.2 mm 1.4 mm 1.6 mm
Wire basket spool K300			Plastic spool D300		
	Precision layer wound  Dimensions: Ø external 300 mm Ø internal 180 mm Width 100 mm	Available spool weight: 16 kg  Available diameters: 1.2 mm 1.4 mm 1.6 mm		Precision layer wound  Dimensions: Ø external 300 mm Ø internal 52 mm Width 100 mm	Available spool weight: 15 kg  Available diameters: 1.2 mm 1.3 mm 1.4 mm 1.6 mm
Round drum					
	Weight: app. 230 kg flux cored wire  Dimensions: Height 780 mm Ø external 520 mm	Available diameters: 1.2 mm 1.4 mm 1.6 mm			