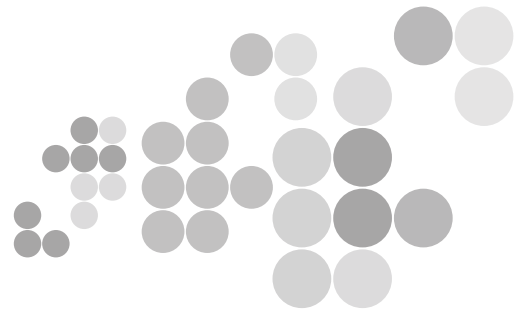


ToughDrill™

Tubes for the Mining Industry



ISO 14001:2004



OHSAS 18001:2007



ISO/TS 16949 : 2002

ISMT LIMITED

Solutions You Can Trust

Toughdrill™

Tubes for the Mining Industry

At ISMT the mining and drilling industry is a special focus area. We manufacture a very wide array of tubes catering to virtually every application in this industry. Typical end use of our tubes includes:

- Drill Rods
- Drill Casings
- Drill Steel (Hex as well as round OD)
- DTH Hammer Casings & Pistons
- Core Drill Barrels
- Thin Walled Tubes (eg. TBW, TNW Outer and Inner)

Toughdrill tubes embody over 20 years of experience in the manufacture of application specific tubes for the mining and drilling industry. These tubes are manufactured to the highest industry standards tested rigorously. As a result, we can virtually guarantee that our tubes will outperform and outlast any other tube in the industry.

TOTAL PROCESS CONTROL

At ISMT we believe the only way to guarantee quality is to stand responsible for the entire production process. For that reason we produce all our steel in-house. We bring to bear over 20 years of experience in manufacturing high-grade Bearing steel to all our manufacturing processes and to all our steel products (we are among a few select manufacturers globally to be approved by SKF and FAG for the supply of Bearing steels).



We produce our steel through the electric arc furnace route. The raw material mix is chosen and prepared carefully to ensure the highest standards of cleanliness. All heats are ladle refined and vacuum degassed before continuous casting and rolling. Right through the production process, we maintain full traceability of the material and a record of the tightly controlled process parameters. This ultra-clean steel forms the starting point for the manufacture of our tubes.

The manufacture of precision seamless tubes is as much a matter of equipment as it is of experience and process technology. At ISMT we believe in investing in the finest of equipment. For making seamless tubes we operate three Assel Mills, one PQF Mill, Pilger Mills, and Cold Draw Benches. Our tube-mills are imported from Shloemann Mannesman in Germany and incorporate the best in technology. With regards to experience, our team is amongst the most technically qualified anywhere in the world - the tubes that we produce for the mining industry reflect this experience.

“BEST IN CLASS” TOLERANCES

ISMT offers the tightest tolerances in the industry. We are able to do so because of the proprietary processes that we have developed. For example, to ensure tight control over eccentricity (+/- 5%) we provide very high cross sectional reductions during the cold-drawing process. Similarly, we use special surface treatment processes that we have developed to ensure good dimensional control and surface cleanliness after heat treatment. In the same vein, to ensure a good surface finish, all our cold-draw tooling is either made from special materials such as Tungsten Carbide or is TiN coated. For applications that demand a superior surface finish we also offer Bright Annealed tubes.

1 IN 6000 STRAIGHTNESS

We understand the importance of tube straightness to the mining industry. Therefore, we subject each and every tube to a stringent 5 point TIR straightness check and correction procedure with special attention to tube end straightness. By doing so we, guarantee a straightness of 1 in 6000 or better.

LOW RESIDUAL HOOP STRESS

For Drill Rod tubes we have developed a unique process that allows us to guarantee very low residual hoop stress of 65 MPa (max). Further information on this special product (used for very demanding drilling conditions) is available upon request.

Standard Toughdrill™ Tubes**

**Toughdrill tubes are manufactured to the following standard specifications, grades, sizes, and tolerances. In addition to standard tubes, we also manufacture tubes to customer specific requirements.

STANDARD SPECIFICATIONS

ASTM/ASME	Swedish	BS	JIS	API
DCDMA	SIS-74130-IE	4019	G 3465	5D

STANDARD GRADES

ISTM Grade	Mechanical Properties			C	Mn	Mo	Cr	V
	Yield Strength min.mpa.	Ultimate Strength Tensile min.mpa.	Elongation% min. (Gauge Length 2")					
Toughdrill 550	550	620	15	0.4	0.7	-	-	-
Toughdrill 620	620	725	15	0.42	1.5	-	-	-
Toughdrill N80	550	690	15	0.2	1.5	-	-	-
Toughdrill 710	710	820	15	0.4	1.6	-	-	-
Toughdrill 4130	650	750	15	0.3	0.5	0.2	0.95	-
Toughdrill 4142	740	860	15	0.43	0.9	0.2	0.95	-

* Special Grades with higher mechanical properties of yield strength upto 850 and Ultimate Tensile Strength upto 950 Mpa can be given as per specific requirements.



STANDARD SIZE

Wireline drill rod tubes

Designation	Outer Dia(mm)		Inner Dia(mm)		Outer Dia(inch)		Inner Dia(inch)	
	Min	Max	Min	Max	Min	Max	Min	Max
A-wireline	44.45	44.70	34.82	35.07	1.75	1.76	1.371	1.381
B-wireline	55.55	55.80	45.95	46.20	2.187	2.197	1.809	1.819
N-wireline	69.85	70.10	60.07	60.32	2.75	2.76	2.365	2.375
M-wireline	88.90	89.28	77.62	78.00	3.50	3.515	3.056	3.071
P-wireline	114.30	114.68	102.79	103.17	4.50	4.515	4.047	4.062
S-wireline	139.70	140.08	125.12	125.50	5.500	5.515	4.926	4.941

“W” Design flush joint casing tubes

Designation	Outer Dia(mm)		Inner Dia(mm)		Outer Dia(inch)		Inner Dia(inch)	
	Min	Max	Min	Max	Min	Max	Min	Max
RW	36.50	36.63	30.23	30.48	1.437	1.442	1.19	1.20
EW	46.02	46.27	38.10	38.35	1.812	1.822	1.50	1.51
AW	57.15	57.40	48.42	48.67	2.250	2.260	1.906	1.916
BW	73.03	73.28	60.33	60.58	2.875	2.885	2.375	2.385
NW	88.90	89.28	76.20	76.58	3.50	3.515	3.000	3.015
HW	114.30	114.68	101.22	101.60	4.50	4.515	3.985	4.00
PW	139.70	140.08	126.87	127.25	5.50	5.515	4.995	5.01

STANDARD TOLERANCES

	Outside Dia	Tolerance	Inside Dia	Tolerance
inches	1 < OD < 1.575	+ 0.0051, - 0	ID < 2.953	+ 0, - 0.010
	1.575 < OD < 3.150	+ 0.010, - 0	2.953 < ID < 5.512	+ 0, - 0.015
	3.15 < OD < 5.512	+ 0.015, - 0	ID < 5.512	+ 0, - 0.018
mm	25,40 < OD < 40	+ 0.13, - 0	ID < 75	+ 0, - 0.25
	40 < OD < 80	+ 0.25, - 0	75 < ID < 140	+ 0, - 0.38
	80 < OD < 140	+ 0.38, - 0	ID < 0.40	+ 0, - 0.45

STANDARD LENGTHS

Standard Toughdrill tubes are supplied in unit lengths of 3,000mm (+5, -0mm). However, we can also supply tubes in any length as per your requirements.

STANDARD PACKING

Each tube is oiled, internally as well as externally, and then packed into hexagonal bundles. This ensures that the tubes are corrosion protected and that they retain their straightness during transport. Upon request we can provide end caps and also wrap the bundles in LDPE sheets.

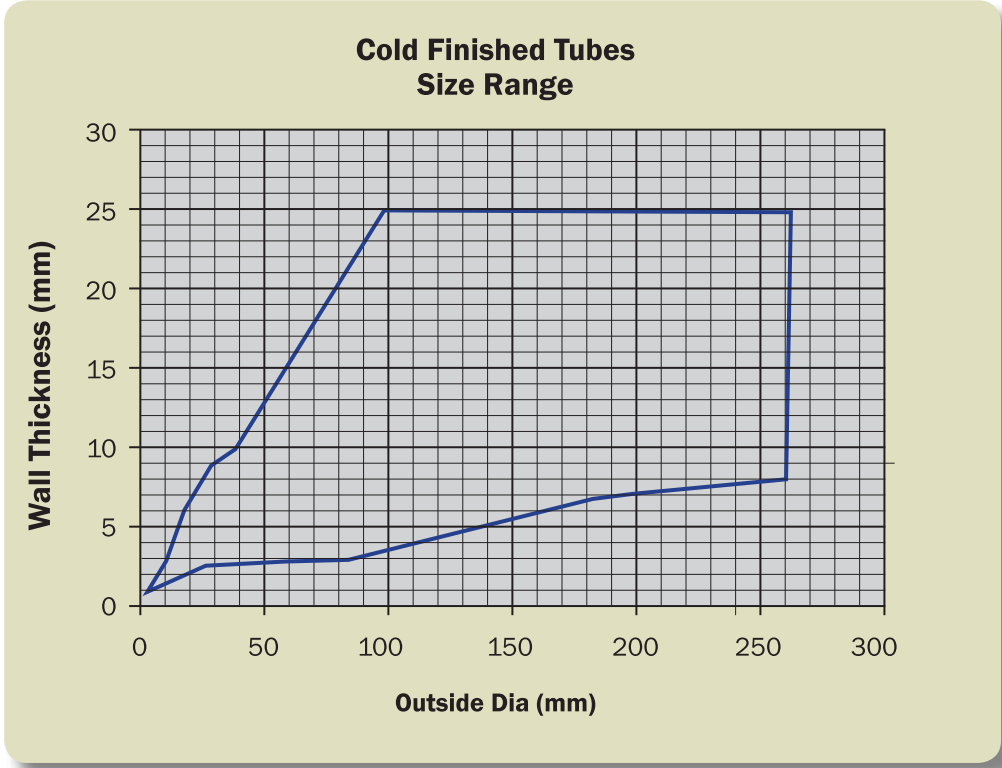
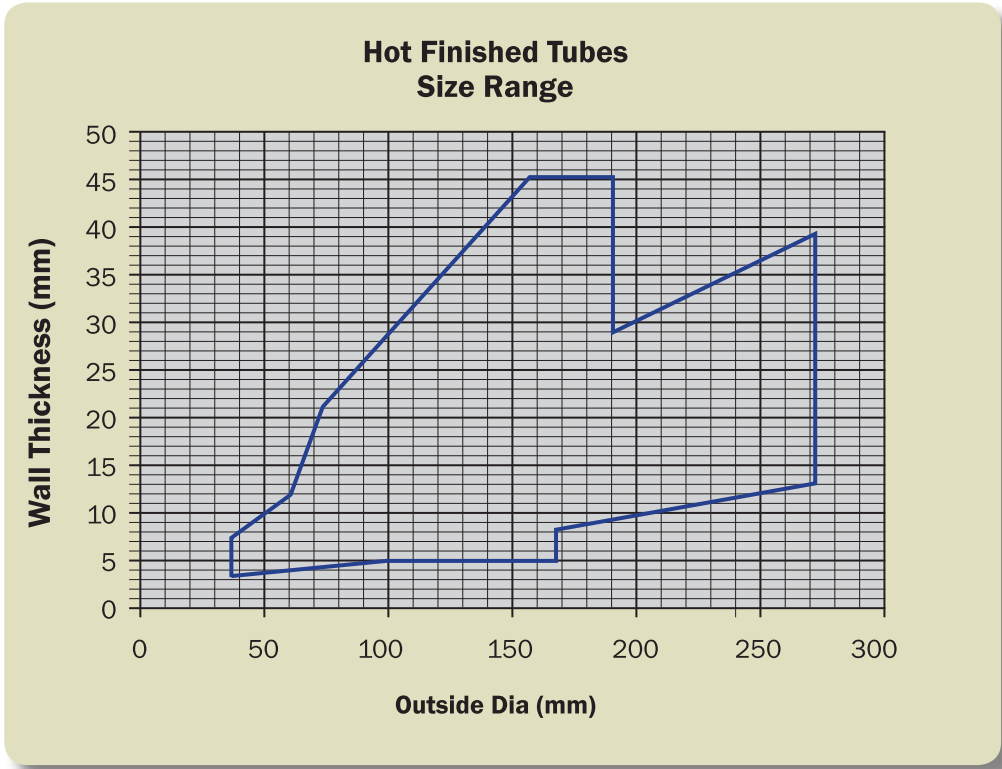
TESTING & INSPECTION

All our tubes are Eddy Current tested for surface defects and sub-surface cracks. Test certificates as per EN 10204-3.1 B verifying grade, chemistry, and mechanical properties are supplied with all products.

Customer Specific Toughdrill™ Tubes

In addition to the standard products listed above, ISMT manufactures Toughdrill tubes to customer specifications with respect to sizes, grades, heat treatments, lengths, tolerances and packaging.

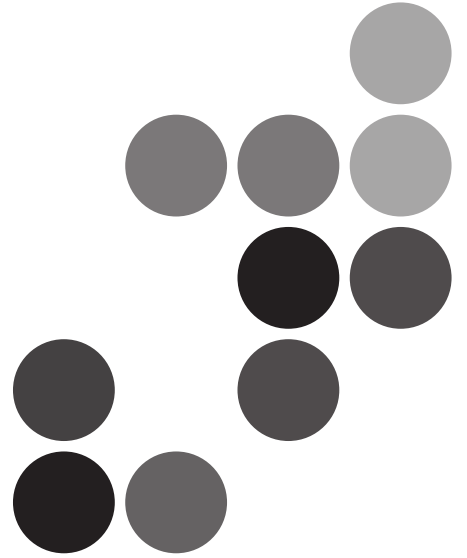
These customized tubes are available in the following size ranges:



ISMT manufactures carbon/alloy steel and seamless tubes for:

- Energy and Power Generation
- Automotive Components
- Hydraulic and Pneumatic Pressure Lines
- Hydraulic Cylinders
- Gas Cylinders
- Mining and Construction
- Bearings
- General Engineering Applications
- Oil and Petroleum Applications

Product details are available on request



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