

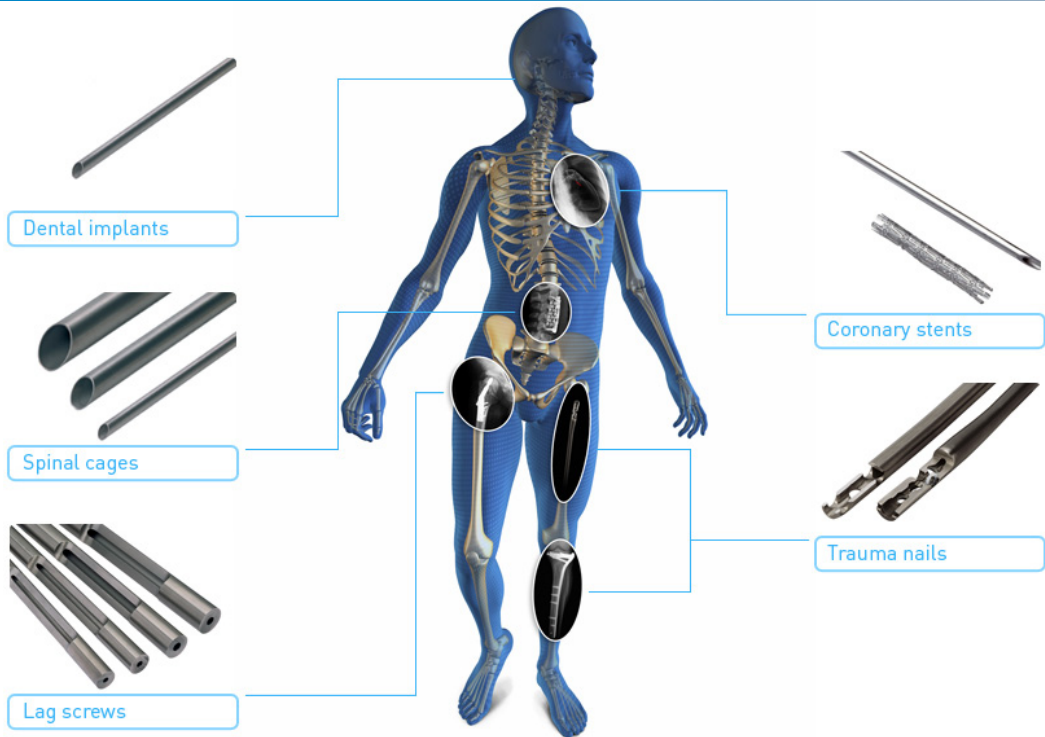
Datasheet

Experience

The demand for high performance stainless steel and titanium alloys that can offer excellent strength-to-weight ratios is constantly increasing. This in combination with high levels of microbiological corrosion resistance and fatigue life properties is the challenge which has been exceeded by our tubular medical pre-materials.

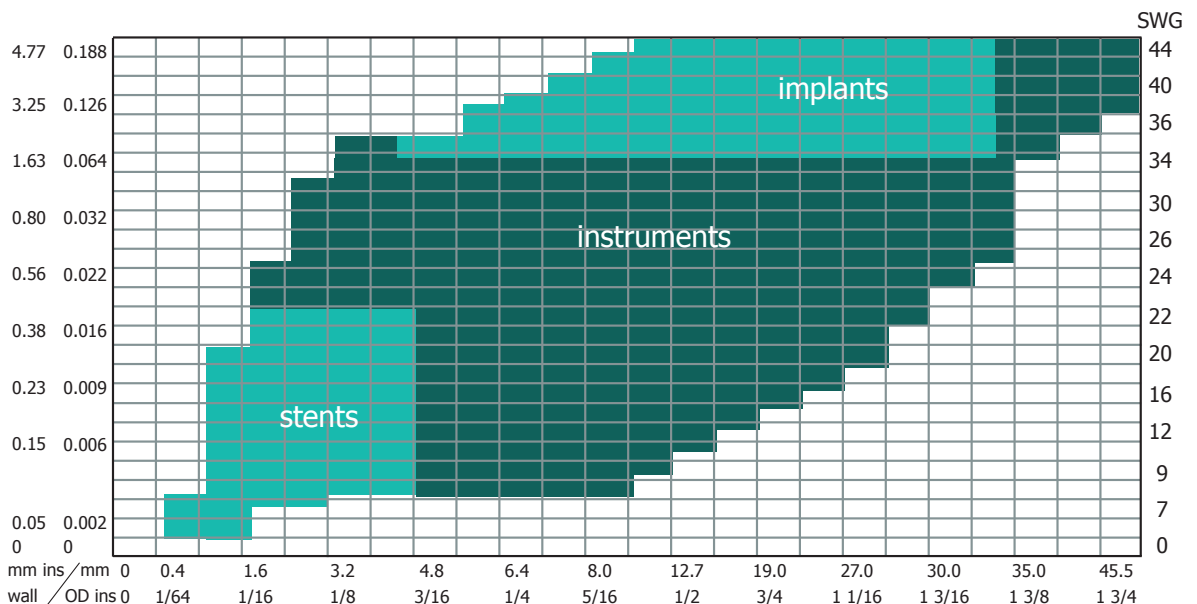
Our high levels of ID and OD surface finish, tolerance and ovality controls yield a product which is cost competitive against the existing gun drilled technology. At the same time it can offer the further benefits of consistency and typically 10ft (3m) lengths.

Applications



Size Range

Our size range for medical products is based upon manufacture of cold drawn tubing from 0.30 mm (0.012") to 50.8mm (2") OD. Tolerances: OD and ID up to 0.0127mm (0.0005") are achievable.



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Integrity Assurance

The process for quality control within Fine Tubes is critical in respect of consistently achieving the highest level of specification requirements.

Reduction control through pilgering and drawing is specific to each product dimension and specification requirements. This is the driver for tolerance control, OD and ID surface finish control, inclusion levels and final grain size.

ID surface finish is further refined by passivation, polishing or electropolishing processes.

OD surfaces are finished down to $0.1\mu\text{m}$ ($0.25\mu''$), ID down to $0.2\mu\text{m}$ ($0.5\mu''$).

Grain size is based upon ASTM E112. Our process control enables grain size control to obtain levels ≥ 8 .

Typical Manufacturing Standards

- ASTM F2063-00 - NiTi Shape Memory Alloy
- ASTM F136 1996 Ti6/4 ELI
- ASTM F138-00 316L/316LVM
- ASTM F2063-00 - NiTi Shape Memory Alloys
- ASTM F1314 1995 22Cr-13Ni-5Mn
- 21Cr 10Ni 3Mn 2.5 Mo
- ISO 5832-11 1994 BS7252: Part 11 - Ti 6Al 7Nb
- ISO 5832-9 1993 BS7252: Part 9
- ISO DIN 25832-1
- DIN 17449 W-Nr 1.4401

Tube Advantages

ID Surface Finish: Refined by centreless grinding and/or ID electropolishing to achieve $0.2\mu\text{m}$ ($0.5\mu''$).

ID Defect Levels: UT tested to levels down to 20 microns ($0.02\text{mm}/0.0008''$).

Fatigue life: Control of texture combined with extra low levels of interstitial impurities leads to higher fatigue performance than equivalent drilled bars.

Tolerances: In-house control to ISO 286-2 h8.

Outside Diameter	Tolerance +/-	
	mm	Inches
6-10 mm	0.022	0.00086
>10-18 mm	0.027	0.00011
>18-30 mm	0.033	0.0013

ID/OD ratio: Our tube production can be controlled over full length to maintain small IDs from 0.3mm to 0.15mm of OD

ISO5832-1 'D' 316LVM Type of Inclusion	Thin Required (Typical)	Thick Required (Typical)
A - Sulphides	1.5 (0)	1 (0)
B - Aluminates	1.5 (0)	1 (0)
C - Silicates	1.5 (0)	1 (0)
D - Globular Oxides	1.5 (0.5)	1 (0)

ASTM F1314 22-13-5	Thin Required (Typical)	Thick Required (Typical)
A - Sulphides	1.5 (0)	1 (0)
B - Aluminates	1.5 (0)	1 (0)
C - Silicates	1.5 (0)	1 (0)
D - Globular Oxides	1.5 (1.0)	1 (0)

Stainless Steel for Implants

ALLOY UNS No.	Werkstoff	Chemical Analysis %											Density		Temper		Tensile Rm (min)		Yield Rp 0.2% (min)		Elong. % min	Hardness HV	Application		
		C	Mn	Ni	Cr	Fe	Mo	Ti	Nb	Other	N	g/cm ³	lb/in ³	ksi	MPa	ksi	MPa	ksi	MPa						
316LVM S31673	1.4441	0.030 max	2.0 max	11.0-14.0	17.0-19.0	bal	2.0-3.0									7.93	0.286	ANN	70	485	25	170	35	200 max	Vacuum remelt or ESR to achieve highest microcleanliness levels and structural homogeneity.
Rex 734 S31675		0.080 max	2.0-4.3	9.0-11.0	19.5-22.0	bal	2.0-3.0									7.89	0.285	ANN	107	740	62	430	35	300 max	Medical implant grade.
N50 S20910	1.3964	0.060 max	4.0-6.0	11.5-13.5	20.5-23.5	bal	1.5-3.0									7.880	0.285	ANN	100	690	55	380	35	285 max	Nitrogen strengthened austenitic grade with exceptional strength in the cold worked condition.
MP35N R30035		0.03 max	0.2 max	33.0-37.0	19.0-21.0	1.0 max	9.0-10.5									8.43	0.304	HT	220	1514	200	1380	10	528 max	Nickel cobalt alloy with very high strength, toughness and outstanding corrosion resistance.

Stainless Steel for Surgical Instruments

ALLOY UNS No.	Werkstoff	Chemical Analysis %											Density		Temper		Tensile Rm (min)		Yield Rp 0.2% (min)		Elong. % min	Hardness HV	Application		
		C	Mn	Ni	Cr	Fe	Mo	Nb	Other	N	g/cm ³	lb/in ³	ksi	MPa	ksi	MPa	ksi	MPa							
304L S30403	1.4306	0.035 max	2.0 max	8.0-11.0	18.0-20.0	bal										7.93	0.286	ANN	70	485	25	170	35	200 max	Lower carbon of 304 with good weldability.
316L S31603	1.4404 1.4435	0.035 max	2.0 max	10.0-13.0	16.0-18.0	bal	2.0-2.5									7.93	0.286	ANN	70	485	25	170	35	200 max	Standard AOD melt austenitic stainless steel grade.
17/4PH S17400	1.4542	0.070 max	2.0 max	3.0-5.0	15.0-17.5	bal										7.9	0.286	HT	155	1070	145	1000	5	300 min	316L with minimum molybdenum content of 2.5%. Capable of developing high mechanical properties by solution treatment & age hardening.
15/5PH S15500 630A	1.4545	0.070 max	1.0 max	3.50-5.5	14.5-15.5	bal										7.8	0.282	HT	155	1070	145	1000	12	331-401	Capable of developing high mechanical properties by solution treatment and age hardening.

Titanium Alloys

ALLOY UNS No.	Werkstoff	Chemical Analysis %											Density		Temper		Tensile Rm (min)		Yield Rp 0.2% (min)		Elong. % min	Application		
		C	Fe	Ti	N	Al	Other	g/cm ³	lb/in ³	ksi	MPa	ksi	MPa	ksi	MPa									
CP Grade 2 R50400	3.7035	0.08 max	0.30 max	bal	0.03 max											4.51	0.163	ANN	50	345	40-65	275-450	20	Very high strength to weight ratio combined with excellent seawater corrosion resistance.
Ti 3A/2.5V Grade 9 R56320	3.7194	0.08 max	0.25 max	bal	0.03 max											4.48	0.162	CWSR	125	860	105	725	10	High strength to weight ratio. Excellent corrosion resistance.
Ti 6Al/4V Grade 5 R56400	3.7165	0.10 max	0.40 max	bal	0.05 max											4.43	0.160	ANN	50	345	40	275	20	Very high strength to weight ratio.
Ti 6Al/4V Grade 5 ELI R56401	3.7165			bal												4.33	0.156	CWSR	159	1100	141	980	8	ELI grade, very high strength to weight ratio.
Ti 425 Ti 4A/2.5V			1.5	bal														CWSR	146	1006	129	890	14	Very high strength to weight ratio with improved ductility.

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medical



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