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Sandvik Bioline 316LVM

(Wire)

Sandvik Bioline 316LVM is a molybdenum-alloyed vacuum arc-remelted stainless steel for the production of both temporary and permanent implants. The grade is characterized by:

- High strength
- High fatigue strength
- Excellent microcleanliness
- Excellent structural homogeneity
- High surface finish

STANDARDS

- UNS S31673
- DIN X 2 CrNiMo 18 15 3

Product standards
- Bar and wire: ASTM F138
- ISO 5832-1
- BS ISO 5832-1 (replaces BS 7252-1)

CHEMICAL COMPOSITION (NOMINAL) %

C max	Si	Mn	P max	S max	Cr	Ni	Mo	Cu max	N max
0.025	0.6	1.7	0.025	0.003	17.5	14	2.8	0.10	0.10

FORMS OF SUPPLY

Wire, spools / coils
Size range:
Spools: 0.010-2 mm (0.0004-0.79 in.)
Coils: 1-5 mm (0.039-0.197 in.)

The wire in spools/coils is delivered bright drawn.

Tolerances
Ground bars: h8 as standard, h6 on request
Drawn in coil/spool: D2

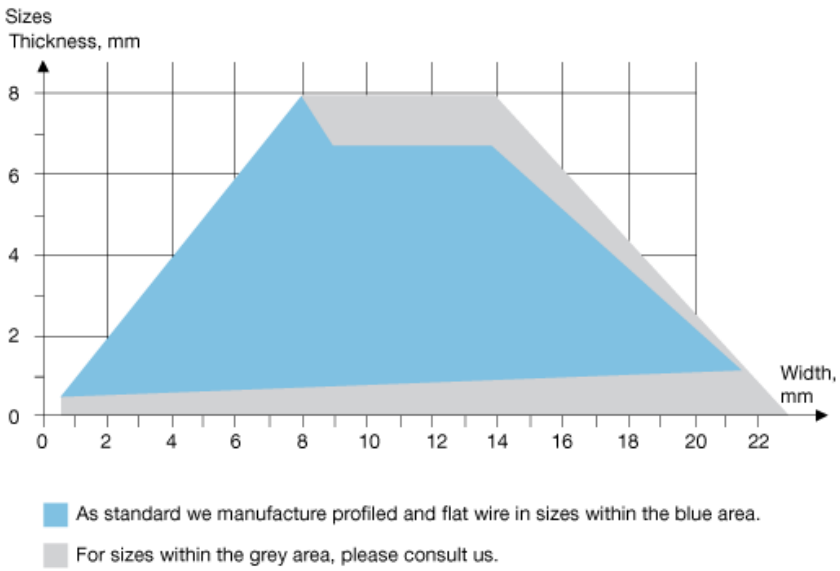
Tighter tolerances can be offered on request.

Wire, straightened lengths
Bright drawn: diameter 0.60-5.0 mm (0.02-0.197 in.)
Ground diameter: 0.6-10 mm (0.02-0.394 in.)

Tolerances
Drawn, straightened: h9
Tighter tolerances to be discussed in each and every individual case.

Profiles (shaped wire)
A wide selection of solid profile shapes can be delivered in the size range below.

Thickness: max. 8 mm (0.315 in.)
Width: 0.80-21 mm (0.031-0.827 in.)



Maximum cross section 104 mm^2

Other product forms
Sandvik Bioline 316LVM can also be supplied as bar (round or flat) and tube (thick wall or thin wall).

MECHANICAL PROPERTIES

Product form	Condition	Tensile strength	Proof strength	Elongation	Hardness, Brinell		
		R_m	$R_{p0,2}$	A, %			
		MPa	ksi	MPa	ksi		
		min	min	min	min	typical	typical
Bar, Wire	Annealed	490	71	190	28	45	160
Bar, Wire	Medium tensile	900	131	700	101	15	285
Bar, Wire	High tensile	1100	160	800	116	12	300
Bar, Wire	Extra high tensile	1400	203				
Tube, thick wall	Bright annealed	515-690	75-100	220	32	min 45	155-210
Tube, thick wall	Cold finished	860-1100	125-160	690	100	min 12	260-330
Profile	Cold rolled	860-1100	125-160	690	100	12	260-330
Tube , thin wall Tube, thin wall	Annealed Cold worked	490-690 860-1100	71-100 125-160	190 690	28 100	40 12	

Note that extra high tensile strength can be achieved for diameter ≤ 5 mm

PHYSICAL PROPERTIES

Property		
Density (20 °C)	8.0 g/cm^3	0.29 lb/in^3
Modulus of elasticity, x10^3 (20°C)	200 MPa	29.0ksi
Specific heat capacity (20°C)	485 J/(kg °C)	0.11Btu/(lb°F)
Thermal conductivity (20°C)	14W /(m°C)	8 Btu/(ft h °F)
Thermal expansion, x10^{-6} (30-100°C)	16.5 per °C	9.5 per °F

CORROSION RESISTANCE

Sandvik Bioline 316LVM has very good resistance in physiological environments to:

- General and intergranular corrosion due to high purity and low ferrite content
- Pitting and crevice corrosion due to the high molybdenum content

Sandvik Bioline 316LVM is capable of passing the Monypenny Strauss intergranular corrosion test, in accordance with ISO / ASTM requirements.

MACHINING

	Hardness	Cutting speed range	Feed range		
		SFM	**m/min**	**IPR**	**mm/rev**
Turning	160-300	900-145	275-45	0.002-0.024	0.05-0.6
Milling	160-300	870-165	265-50	0.002-0.016	0.05-0.4
Drilling	160-300	115-195	35-60	0.002-0.012	0.05-0.3

APPLICATIONS

Sandvik Bioline 316LVM is used by customers for implant applications; hip stems, femoral heads, spinal systems, acetabular cups, intramedullary nails, bone screws, knee joints, and pins, bone and nail plates, internal fixation devices, dental implants, staples.

This grade is also used for cardiovascular applications: guide wires, cardiac stents and for surgical instruments and tools; blood lancets, stylets, trocars.

DISCLAIMER:
Sandvik is not providing any products or services that are intended or may be construed to be recommending or otherwise advising on, in any manner, the design, suitability, appropriateness or effectiveness, from a medical/biological/safety perspective, of any medical material, instrument and/or medical device.