HOLLOW BAR to VM 312 – 1995 / MecaVaL 147 M

MecaVaL 147M Carbon-Vanadium Manganese micro-alloyed steel, generally supplied black as rolled with a tensile strength range of 550 – 750 MPa, plus high yield strength, offering a combination of strength and toughness, with excellent machinability and weldability.

Chemical Composition (wt%)

Carbon	**≤ 0.22**
Silicon	**≤ 0.35**
Manganese	**≤1.60**
Vanadium	**0.08 / 0.15**
Phosphorus	**≤0.030**
Sulphur	**0.020 / 0.040**

Typical Applications:
Tubular parts such as hollow rolls for conveyors, hydraulic cylinders, rings, bushes, hollow shafts and nuts etc.

Related Specifications:

EN 10294-1	Grade E 470
Werkstoff	1.5217 20MnV 6

Sizes and Tolerances:
Refer: Clean turned sizes **(C.T.S.)**

Straightness:
Short lengths: f ≤ 1mm/m
Longer lengths: $f \leq \frac{10\ L}{8 + L}$
(f in mm and L in meters)

Machinability:
Improved machinability with cutting speeds increased by (20 – 45%) or tool life increased (2 – 4 times).

Heat treatment:
Will through harden, carbonitride, carburise, nitride & induction harden.

Mechanical Properties – (Minimum guarantees at room temperature)

WT	< 16mm	< 25mm	< 30mm	< 40mm	< 50mm	< 70mm
Rp 0.2 (MPa)	470	460	430	420	410	400
Rm (MPa)	620	610	550	550	550	550
A % on **$5.65\sqrt{S_o}$**	18	18	18	18	18	18

Typical Mechanical Properties – As supplied – for guidance only

Yield Strength MPa	**Tensile strength MPa**	**Elongation %**	**Hardness HB**
490	685	20	200

Typical (minimum) properties – Water quenched and tempered at 580°C.

WT	Yield Strength MPa	Tensile Strength MPa	Elongation %	Impact KV J	Hardness HB
<20	650	750	16	40	220
<25	620	700	17	40	210
<30	570	650	17	40	195

Typical properties for guidance only

Welding:
Excellent weldability as supplied but not recommended when surface hardened or through hardened.

HEAT TREATMENT

Normalising:
Heat to 900°C-925°C Cool in still air

Stress Relieving:
Heat to 550°C-650°C Cool in still air

Hardening:
Heat to 870°C-925°C
Quench in oil or water.

Tempering:
Heat to 500°C-600°C Cool in still air

High or Medium Frequency Induction hardening:
Heat to case depth at 870°C-925°C
Quench immediately in oil or water.
Temper at 150°C-200°C.
First remove de-carburised material
Typical Case **HRC 48**

Welding procedure:
A pre-heat or post-heat not required.
(Ave. Ceq = 0.50)

Carburising:
Carburise at 880°C – 920°C

Core Refining: Optional
Oil quench at 870°C – 880°C

Case Hardening:
Water quench at 760°C-780°C
Temper at 150°C-200°C
Typical case **HRC 60**

Carbonitriding:
Carbonitride at 870°C-880°C
Quench in oil or water
Temper at 150°C-200°C.
Typical case **HRC 60**

Nitriding:
Heat to 490°C-530°C
Hold till case depth developed.
Typical case **HRC 55**
NB. If pre-hardening and tempering the tempering temperature must be higher than the nitriding temperature.