

**HOLLOW BAR to VM 312 – 1995 / mecaVaL 147 M**


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**MecaVaL 147 M** is a carbon - manganese steel micro alloyed with vanadium, generally supplied black as rolled with a typical tensile strength range of 550 – 750 MPa and high yield strength, offering a combination of strength and toughness plus excellent machinability and weldability.

**Typical Applications:**

Tubular parts for the automotive, oil and gas, construction, general engineering and agricultural industry, such as bushes, hydraulic cylinders, hollow shafts, rings, hollow rolls for conveyors, nuts etc.

**Sizes and Tolerances:**

Refer: Clean turned sizes (C.T.S.)

C.T.S. applies to lengths of up to 3 times the nominal OD. E.g. for OD 100mm the machined length would be 300mm max.

**Straightness:**

Short lengths: f 1mm/m

Longer lengths: f  $\frac{10L}{8+L}$

(f in mm and L in meters)

**Chemical Composition (wt%)**

<b>Carbon</b>	<b>0.22</b>
<b>Silicon</b>	<b>0.35</b>
<b>Manganese</b>	<b>1.60</b>
<b>Vanadium</b>	<b>0.08 / 0.15</b>
<b>Phosphorus</b>	<b>0.030</b>
<b>Sulphur</b>	<b>0.020 / 0.040</b>

**Related Specifications:**

BS 6258-1988	Grade 600
Werkstoff 1.5217	20MnV 6
UNS	K01907

**Machinability:** Improved machinability due to silicon-calcium treatment and controlled sulphur content, with cutting speeds increased by (20 – 45%) or tool life increased (2 – 4 times). NB. Under any cutting condition mecaVaL 147 M improves swarf fragmentation.

**Heat treatment and surface hardening**

Will through harden with a moderate improvement in strength and can also be carburised, carbonitrided, nitrided and induction hardened.

**Mechanical Properties - (Minimum guarantees at room temperature)**

<b>WT</b>	<b>&lt; 16mm</b>	<b>&lt; 25mm</b>	<b>&lt; 30mm</b>	<b>&lt; 40mm</b>	<b>&lt; 50mm</b>	<b>&lt; 70mm</b>
<b>Rp 0.2 (MPa)</b>	470	460	430	420	410	400
<b>Rm (MPa)</b>	620	610	550	550	550	550
<b>A % on 5.65 So</b>	18	18	18	18	18	18

**Typical Mechanical Properties – As supplied**

<b>Yield Strength MPa</b>	<b>Tensile strength MPa</b>	<b>Elongation %</b>	<b>Hardness HB</b>
490	685	20	200

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**Typical (minimum) properties** – Water quenched at 925°C and tempered at 580°C.

<b>WT</b>	<b>Yield Strength MPa</b>	<b>Tensile Strength MPa</b>	<b>Elongation %</b>	<b>Impact KV J</b>	<b>Hardness HB</b>
<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 welding not recommended when surface hardened or through hardened.

Welding details for guidance only

**Welding procedure:**

A pre-heat or post-heat not generally required however, pre-heating larger sections can be beneficial as can a post-weld stress relieve. (Ave. Ceq = 0.50)

**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 and temper when hand warm.

**Tempering:**

Heat to 500°C-600°C Cool in still air

**High or Medium Frequency Induction hardening:**

Heat quickly to required case depth at 870°C-925°C and quench immediately in oil or water. Temper at 150°C-200°C. All de-carburised surface material must first be removed. Typical Case Rc48

**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 Rc60

**Carbonitriding:**

Carbonitride at 870°C-880°C, quench in oil or water. Temper at 150°C-200°C. Typical case Rc60

**Nitriding:**

Heat to 490°C-530°C  
Hold till case depth obtained and cool in furnace. Typical case Rc55  
NB. If pre-hardening and tempering the tempering temperature should be higher than the nitriding temperature.