

*Isabella*

240 / 629.2222  
BERGWARD  
HEAVY

ENGINE 4 M 1.5 II

General Description

The four cylinder engine has a bore of 75 mm and a stroke of 84 mm. The relatively low mean piston speed of appr. 10.1 m/Sek. ensures a long piston life when the car is driven in the normal speed range. The three bearing crankshaft is drop forged in one operation and has hardened journals, the first main bearing, (Fly-wheel side), takes the end float. Main bearings, as well as bigend inserts are made of Super Micro material. All admissible clearances as well as undersizes for main- and bigend bearings (inserts) are quoted on the technical data page. Main bearing cap bolts as well as connecting rod bolts are expanding bolts. These expanding bolts (10 K material) must be fitted with a torque according to instructions and must not be re-used. No locking devices are employed in connection with expanding bolts.

Besides the standard size piston, suitable for 75 mm bore, there are 3 undersizes, 1, 2, and 3, the different sizes varying by 0.01 mm (.00039"). The various numbers 0 - 3 are marked on the engine block surface by the factory. To ensure piston clearance of 0.04 mm (.00157"), pistons must not be interchanged.

Camshaft setting is marked on both timing pinions and must not be altered. For alteration possibilities of the valve timing see group M 3 working process 30. With the standard setting, as marked on the timing pinions, valve timing is obtained as quoted on the following technical data pages. Valveplay must be adjusted on warmed up running engine. (See group M Engine M 10).

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Torque Conn. rod bolt	4.5 m/kg or 35 ft/lb
Bigend end float (side clearance)	0.065 - 0.15 mm (.00255 - .00433")
Adm. weight difference of conn. rods	Maximum 5 g or 2.8 dram
Gudgeon pin (king pin) bush	25/21.6 $\phi$ x 26 mm
Gudgeon (king) pin	22/18 $\phi$ x 62 mm
Locking device	Spring ring 22 DIN 73/23
Type of piston	Solid skirt, autothermic desax. (offset) 1.5 mm or .0591"
Piston running clearance	0.04 mm or .00157"
Piston rings: Groove 1	Compression ring 75/68.4 x 2 (.078")
Groove 2	" 75/68.4 x 2 (.078")
Groove 3	" HN 75/68.4 x 2.5 (.0984")
Groove 4	Oil ring BS 75/68.4 x 4.5 (.177")
Up and down play of rings	0.02 mm (.000787")
Ring gap	0.1-0.3 mm (.00394 - .0118")

d) Camshaft

Camshaft bearings	3, running in engine block
Type of bearings	plain bushes WM 10 material: (lead bronze. lined steel bushes)
Drive	helical spur wheel
Bore diameter in block	45 $\phi$ H 7 = 45 (+ 0.025 + 0.000) $\phi$
Camshaft journal dia.	41 $\phi$ f 7 = 41 (- 0.025 - 0.05) $\phi$
Bush dimensions	
Bore diameter	41 $\phi$ H 7 = 41 (+ 0.025 + 0.000) $\phi$
Length	28 $\pm$ 0.1 mm

e) Cylinderhead (one piece L. A. casting)

Nut tightening Torque-cylinderhead bolts	10.0 m / kg or 70 ft/lb
Valve gear	O. H. V.
Valve timing	Checked with valve clearance 0.38 mm or .0150"
Inlet opens	18 <sup>o</sup> b. T. D. C. or 44 mm
Inlet closes	56 <sup>o</sup> a. B. D. C. or 137 mm
Exhaust opens	56 <sup>o</sup> b. B. D. C. or 137 mm
Exhaust closes	18 <sup>o</sup> a. T. D. C. or 44 mm
Flywheel diameter	280 mm or 11 1/32"
1 <sup>o</sup> measured on flywheel	2.44 mm or .0961"
Valve clearance, hot	Inlet and Exhaust valve 0.2 mm or .00787"
Valve dimensions	Inlet Exhaust, armoured
Length mm	110 (appr. 4 21/64") 111 (appr. 4 3/8")
Valve head dia. mm	35 (appr. 1 3/8") 30 (appr. 1 3/16")
Valve stem dia. mm	9 e 8 9 e 8
Valve face angle	45 <sup>o</sup> 45 <sup>o</sup>
Valve seat width	Inlet and Exhaust 1.5 - 2.0 mm (.0591" - .0787")
Valve stem - adm. untrue	0.02 mm (.000787")
Adm. untrue between stem and head	0.03 mm (.00118")
Adm. untrue - push rod	0.1 - 0.2 mm (.00394-.00787")
Valve spring:	Poundage Length Effective Wire Diameter
Inner spring	
E 12.14-41	kg mm coils mm
Length unloaded	0 45
Valve, closed	7.3 37.7 6.5 2.6 dia.
Valve, opened	15.8 29.2
Outer spring	
E 12.14-40	
Length unloaded	0 51 4.5 3.6 dia.
Valve, closed	14.8 42.5
Valve, opened	29.7 34

Valve guide:  
 Material Ge 26.91 (Cast Iron)  
 Overall length mm Inlet and Exhaust 60 (appr. 2 3/8")  
 Limit size of valve guide bore:  
 Inner diameter  $9 \text{ } \varnothing \text{ H } 7 = 9 \text{ ( } + 0.015 \text{ ) } \varnothing$   
 $\text{ + } 0.000$   
 Outer diameter  $15 \text{ } \varnothing \text{ s } 6 = 15 \text{ ( } + 0.039 \text{ ) } \varnothing$   
 $\text{ + } 0.028$   
 Valve seat ring  
 Material: Leadsteel or Chrome - Nickel - Molybdenum Alloy.  
 Bore - dia. - cylinderhead  
 Inlet  
 $37 \text{ } \varnothing \text{ H } 7 = \text{ ( } + 0.025 \text{ )}$   
 $\text{ - } 0.000$   
 Exhaust  
 $33 \text{ } \varnothing \text{ H } 7 = \text{ ( } + 0.025 \text{ )}$   
 $\text{ - } 0.000$   
 Outer diameter of ring  
 Inlet  
 $37 \text{ } \varnothing \text{ + } 0.18$   
 $\text{ + } 0.15$   
 Exhaust  
 $33 \text{ } \varnothing \text{ + } 0.18$   
 $\text{ + } 0.15$   
 Valve seat ring, cooled to 60° C below zero is shrunk into heated up cylinder head.

f) Lubrication

Type Gear pump  
 Drive from crankshaft  
 Oilfilter gauze intake screen, additional surface oilfilter in side flow.  
 Oilpressure, hot engine at least 1.5 Atü. or appr. 22 lb./sq. in.  
 Engine housing breather breather tube outside  
 Valve chamber breathing by carburettor suction.

g) Cooling

Waterpump Impeller pump on engine block coupled with fan.  
 Waterpump drive from crankshaft by fan belt.  
 Waterpump lubrication 9.5 x 925/975 narrow fan belt.  
 greaser, roller bearing grease only.  
 Feed water pump grease through drip bore.  
 Thermostat release temperature 75° C  $\pm$  2° or appr. 167° F  
 Fan 2 Double blades, 350 mm or appr. 13 51/64"  $\varnothing$  adm. balance error 15 cm /g

h) Carburettor

Spare part No. C 71.17 - 25 U  
 Type Solex 32 P J C B  
 Main jet 130  
 Pilot jet g 55  
 Pump jet 40  
 Air correction jet 875  
 Venturi 26  
 Starter fuel jet 1.5  
 Starter air jet 4  
 Pilot air jet 1.6  
 Emulsion tube 1.5  
 Float weight 5.7 g (appr. 2.85 dram)  
 Float needle valve 1.5  
 Split pin - dashpot pump center hole  
 Airfilter "Knecht" Air silencer with wet filter element (Cleaner) or  
 "Knecht" Air silencer with oilfilter element (Cleaner) (Export)

i) Fuel pump

Fuel pump Solex diaphragm pump PE 10209  
 Drive Camshaft eccentric disk

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