

VOLVO BM 616 B/646



Specification Volvo BM Loader 616B/646

PRODUCTIVE

The 616B and 646 give the choice of 2- or 4-wheel drive, differential lock, large wheels and good weight distribution, all of which give these machines the qualities for efficient operation in general construction and road-works, cross-country power line erection, plus all trenching and ditching duties.

RELIABLE

Mounted on Volvo BM's well proven loader chassis, giving extensive component co-ordination, the 616B and 646 are sturdy and reliable both in quality and performance.

ECONOMICAL

The machines' versatility is due to their off-road mobility and to the availability of a wide range of attachments. These factors make the 616B and 646 efficient specialist machines for a wide variety of jobs.



ENGINE

616B

Volvo BM D42

646

Volvo BM TD42

Output	59 kW at 38 rev/s	63 kW at 38 rev/s
SAE J 270 Br.	(62 kW as per SAE J 316)	
Max. torque	265 Nm at 25 rev/s	299 Nm at 27 rev/s
SAE J 270 Br.	(269 Nm as per SAE J 816)	
Bore	105.57 mm (4.156 in)	
Stroke	120 mm (4.724 in)	
No. of cylinders	4	
Displacement	4.2 litres (256 in ³)	

The D42 is a 4-cylinder direct-injection 4-stroke diesel engine, with overhead valves and replaceable wet cylinder linings, plus a balancing unit for vibrationless operation.

The engine's air-intake cleaning system is of the 2-stage type.

1. Precleaner of cyclone type.
2. Cyclone cleaner with paper filter and catch-all filter.
3. Indicator lamp on instrument panel warns when filter should be cleaned or replaced.



ELECTRICAL SYSTEM

Voltage	24 V
Alternator	43 A (1200 W)
Battery	Two, 12 V and 96 Ah
Starter Motor	3 kW (4 hp)

The batteries are located on the right-hand side of the machine behind a lockable security door. The well-protected fuses are mounted in two boxes to the left and in front of the cab instrument panel.



TORQUE CONVERTER

Single-stage converter with free-wheel stator.
Torque ratio 3.65:1.



TRANSMISSION

Volvo BM hydromechanical gearbox with power shift.

Max. speeds with 18.4–34/14 tyres

Speeds forward and reverse	1. ~ 4.5 mph (7 km/h)
	2. ~ 7.5 mph (12 km/h)
	3. ~ 12 mph (19 km/h)
	4. ~ 19 mph (30 km/h)

The Volvo BM transmission has two forward gears and two reverse in one low and one high gear range.



AXLES

Type Volvo BM

Drive axle with final drives in central final drive housing.

Differential lock type Volvo BM

616B: Front axle: box construction with 28° oscillation.

646: Front axle: drive axle with differential, sealed spherical steering joints and planetary type hub reduction. Drive shafts are fully floating. The motive power is transmitted from the hydraulic gearbox and dropbox via the propeller shaft. Front axle oscillation 20°.



BRAKES

Fully enclosed disc brakes, located before the final drives. Hydraulic operation by foot pedal. Steering brake operated by lever with automatic return selector valve. Parking brake: mechanically operated by lever.



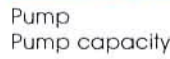
TYRES

616B	front	12.5–20/10
	..	14.5–20/10
	rear	18.4–34/14
	..	18.4–30/12
646	front	14.9–24/14
	rear	18.4–34/14



STEERING SYSTEM

Hydrostatic with twin cylinders on steering axle.



Pump
Pump capacity

Gear pump
33 litres/min (7.3 UK gal/min)
at 2300 rev/min

Operating pressure

9 MPa (1300 lbf/in²)

The machine can still be steered in the event of a pressure loss.



HYDRAULIC SYSTEM

Common for loader and excavator unit

Pump
Pump capacity
Operating pressure

Gear pump
113 litres (25 UK gal) at 1775 rev/min
Max. operating pressure 17 MPa
(2465 lbf/in²)

Oil tank volume
Hydraulic system volume
Oil filter

110 litres (24 UK gal)
190 litres (42 UK gal)
Full-flow filtration through filter cartridge with magnetic core.

Safety pressure relief valve located in loader valve; opening pressure 17 MPa (2465 lbf/in²).

There is a transport by-pass between the pump and the loader's control valve consisting of a flow regulator and selector valve. This limits the oil flow to 60 l/min (13 UK gal/min) when the transport gear is engaged. When the working gear is engaged for excavation, the capacity of the pump at 1775 rev/min is 113 l/min — 25 gal/min.

Hydraulic system - excavator

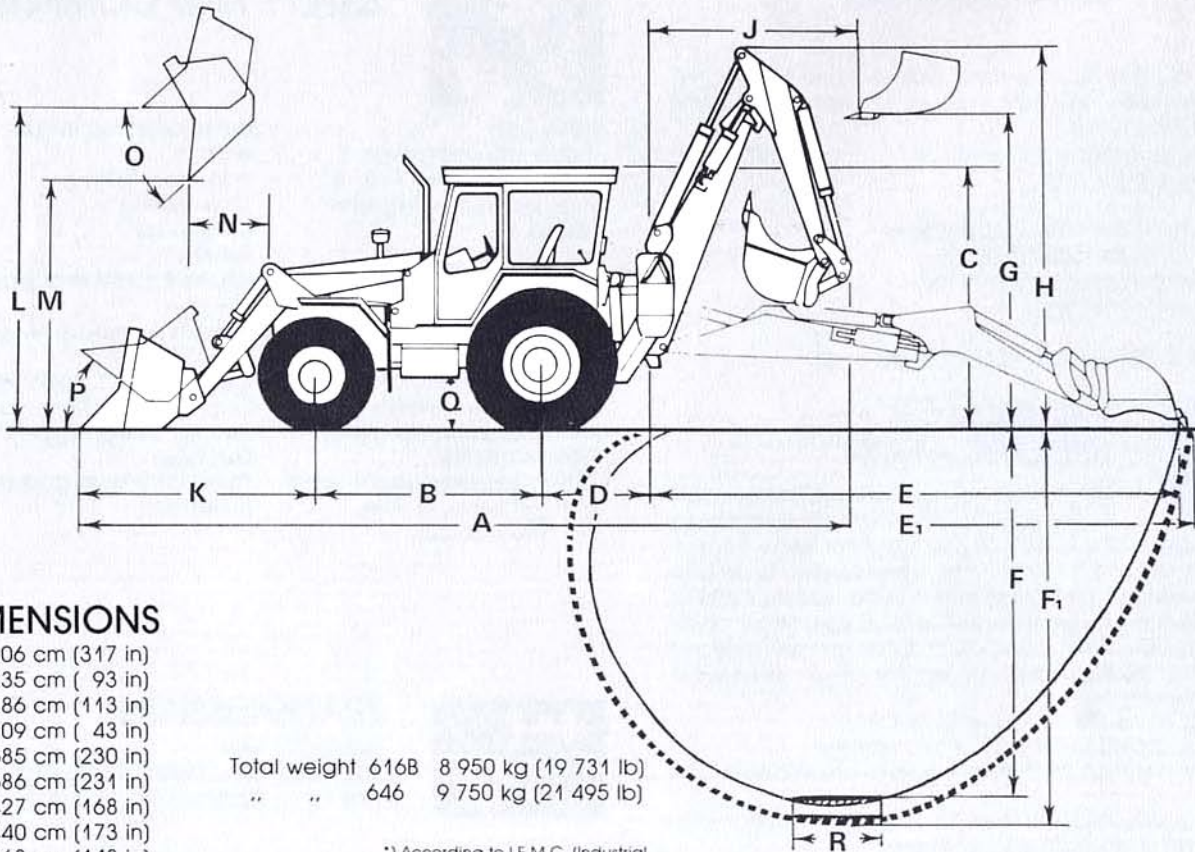
The control valve for the excavator unit incorporates a shock valve for the boom, excavating, slewing and bucket cylinders. A throttle check valve is connected to the piston-rod side of the boom and excavator cylinders. This limits the rate of descent, but allows full flow during lifting. The excavator unit is operated by two levers. Lateral angulation of the bucket arm is controlled by a foot pedal (left foot). The control valve has 7 functions: two outriggers, slew, boom, bucket arm, bucket and lateral angulation.

Cylinder dimensions	Bore	Piston rod dia.	Stroke
Slewing cylinders	100 mm	45 mm	366 mm
Boom cylinder	125 mm	60 mm	927 mm
Bucket arm cylinder	125 mm	60 mm	845 mm
Bucket cylinder	110 mm	60 mm	740 mm
Lateral angulation cylinder	110 mm	60 mm	250 mm
Outrigger cylinders	110 mm	60 mm	436 mm

Hydraulic system — loader

The loader is operated by a single lever located to the right of the operator's seat. The hydraulic system is double-acting: the loader can relieve the load on the front end during excavation work to maintain machine stability. The lifting arm is equipped with a bucket indicator to show the angle of the bucket in relation to the ground. Third hydraulic function and single-acting lift function (float position) are available as optional extras.

Cylinder dimensions	Bore	Piston rod dia.	Stroke
Lift cylinders	110 mm	50 mm	525 mm
Tilt cylinders	100 mm	45 mm	366 mm

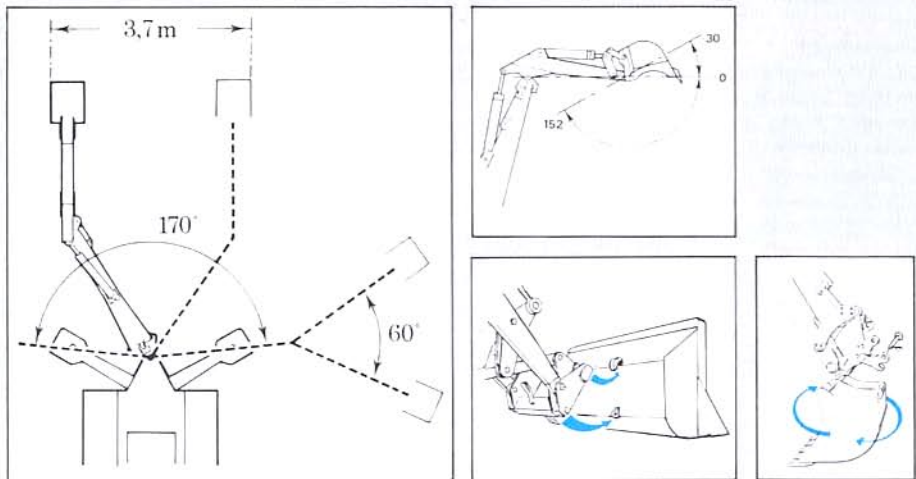


DIMENSIONS

A	806 cm (317 in)
B	235 cm (93 in)
C	286 cm (113 in)
D	109 cm (43 in)
E*)	585 cm (230 in)
E ₁	586 cm (231 in)
F*)	427 cm (168 in)
F ₁	440 cm (173 in)
G	363 cm (143 in)
H	405 cm (160 in)
J	242 cm (95 in)
K	232 cm (91 in)
L	337 cm (133 in)
M	288 cm (113 in)
N	58 cm (23 in)
O	35°
P	35°
Q	41 cm (16 in)
R*)	60 cm (24 in)

Total weight 616B 8 950 kg (19 731 lb)
 " " 646 9 750 kg (21 495 lb)

*) According to I.E.M.C. (Industrial Equipment Manufacturers Council)



Lateral angulation of the bucket arm makes the 616B & 646 into a highly versatile excavator. The dimensions given on the drawing show the range of movement possible by using the hydraulic lateral angulation system. As both the excavator and loader units are fitted with snap-on couplings, the appropriate attachment for each job can be fitted quickly.



CAPACITIES

Cooling system	16 litres (28 UK pints)
Oil volume, engine	10.5 litres (18 UK pints)
Oil volume in gear box incl. converter	22 litres (39 UK pints) — at change
Final drive and differential housing	16 litres (28 UK pints)
Fuel tank	50 litres (11 UK gal)
Hydraulic system	96 litres (21 UK gal)
Oil tank volume	190 litres (42 UK gal)
646 differential housing	110 litres (24 UK gal)
	6.0 litres (11 pints), planetary gear 2x5.0 litres (2x9 pints)



COMFORT

The operator is well protected. The robust cab has been approved in accordance with impact test specifications and is safe and roomy, with good visibility. The low noise level provides a pleasant working environment especially desirable during long shifts.

The cab has a door on each side and an opening rear window. The right-hand door window can also be opened. The sun roof serves also as an emergency exit. As the cab is mounted on rubber pads, structure-borne noise and vibration transmitted through the chassis to the operator, is reduced to a low level. The operator's spring seat is equipped with a damping device. It is adjustable vertically, fore-and-aft and has an adjustable backrest. The driver can swivel the seat easily from a forward driving position to a rear-facing position for excavating. All instruments and controls are marked with symbols and located — according to frequency of use — within convenient reach and sight.



LOADER — SPECIFICATION

The snap-on coupling is of the same type as those fitted to the Volvo BM Allrounders, permitting use of 621/641 attachments (see attachment booklet).

Lifting force to top position 3.37 m (11 ft)	26 kN (5730 lbf)
Breakout force at bucket lip	41 kN kgf (9040 lbf)
Max. lifting height under flat bucket bottom	3.37 m (11 ft)
Max. clearance under tipped bucket	2.81 m (9.2 ft)
Distance between tipped bucket at top position and front of loader	0.67 m (2.2 ft)
Breakout angle	35°
Tipping angle at 2.44 m (8 ft) tipping height	45°



EXCAVATOR — SPECIFICATION

The cylinder attachment points have self-aligning sealed link bearings to eliminate stresses and play. All hydraulic hoses have the same internal diameter and most of these are the same length, to simplify spare parts stocking. The bucket arm can be rotated continuously in relation to the boom. One cylinder, foot-operated, can rotate the bucket arm $\pm 30^\circ$. This rotating action can be utilised at any time during an excavation cycle. This design provides a number of advantages:

- you can dig along the foot of walls, fences etc.
- you can dig ditches to the side of the machine
- you can do clean-up and exposing work around wells and stones etc.

The machine is delivered with snap-on couplings as standard to facilitate bucket and attachment changes.

Excavation depth	4.22 m (13.8 ft)
Reach	5.86 m (19.23 ft)
Loading height	3.77 m (12.37 ft)
Breakout force at bucket lip	5 000 kgf (11 000 lbf)
Excavating force at bucket lip	3 410 kgf (7 520 lbf)
Bucket volume rec.std.	380 litres (13.4 ft ³)
Slew with laterally angled bucket arm	170 + 2 x 30°
Max. lifting force in hook (incl. bucket)	1 000 kgf (2 200 lbf) — boom cyl.
Max. lifting force in hook (incl. bucket)	1 600 kgf (3 530 lbf) — bucket arm cyl.
Parallel excavation	3.6 m (12 ft) wide with 70 cm (28 in) wide bucket

STANDARD EQUIPMENT



ENGINE AND ELECTRICAL SYSTEM

Fuel gauge, battery partition	Engine temperature gauge
Pilot lamp, indicator for air cleaner	Pilot lamp, parking brake
Pilot lamp, driving and working lights	Pilot lamp, charging
Pilot lamp, engine oil pressure	Starter switch
	Pilot lamp, rotating warning beacon

STANDARD EQUIPMENT cont.



SAFETY AND COMFORT

Safety cab	Battery partition in cab
Interior rear-view mirror, 1	Horn
Exterior rear-view mirror, 2	Instrument lighting
Main headlights, bright/dim beams, 2	Cab lighting
Working lights, forward, 2	Lifting hook
Working lights, rear, 2	Ashtray
Parking/position lights, forward and rear, 2	Wipers for front and rear windows
Tail-lights and brake lights	Protection plate under steering axle (616B)
Direction indicators front and rear with hazard flasher	Instrument panel with: engine temperature gauge, hour counter, fuel gauge
Socket for inspection lamp	Tool box
Cigarette lighter	Transport braces (chains) for outriggers
Central warning lamp in excavating position for vital machine functions	



TRANSMISSION

Differential lock
Pilot lamp, transmission temperature
Pilot lamp, transmission oil pressure



HYDRAULIC SYSTEM

Pilot lamp for temperature of working hydraulics
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Snap-on coupling for attachments on both excavator and loader

OPTIONAL EQUIPMENT

Underbody protection plates, front and middle	Hydraulic take-off on vibrating cable layer
Front fenders, 2	Hydraulic take-off on hydraulic post-raiser
Cab ventilator with or without heating	Extra protection for bucket cylinder
Air conditioning	Safety belt
Float position valve for loader unit	Warning triangles
Third hydraulic function for loader attachments	Rotating warning beacon
Hydraulic take-off on excavator for hand-held tools	Adjustable working beams
Hydraulic take-off on excavator-mounted tools	Window washers
	Fuel filling pump
	Hydraulic oil cooler

The manufacturers reserve the right to change specification or design without prior notice. Illustration do not necessarily show the machine in its standard version.

VOLVO BM

VOLVO BM AB ESKILSTUNA SWEDEN

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ENGELSKA

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