

Document Title: Description	Function Group: 000	Information Type: Service Information	Date: 4/15/2025
Profile: BL70 Volvo			

Description

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Valid for serial numbers			
Model	Production site	Serial number start	Serial number stop
BL70 Volvo			

BL70 is a four-wheel drive rigid backhoe loader.

The engine is a four-cylinder, four-stroke, direct-injection, turbocharged diesel engine.

The transmission has a single stage hydraulic torque converter and a hydro-mechanical power shuttle gearbox.

The front and rear axles have fully floating drive shafts with planetary type reductions. The rear axle has a dog-clutch type differential lock and integral oil immersed multi-disc brakes.

The service brake is hydraulically operated. The parking brake is electro-hydraulically operated.

The steering system is hydrostatic with a load-sensing steering unit and a double acting steering cylinder.

The electrical system voltage is 12 VDC. Electrical and electro-hydraulic functions are monitored and controlled by a Vehicle Electronic Control Unit (V-ECU).



Figure 1
Backhoe loader BL70

Document Title: Volvo standard tightening torques	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Volvo standard tightening torques

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The tightening torques in the following tables apply to bolts and nuts with tensile strength. The tables should be used as a general instruction for tightening bolts and nuts without specified values. The charts contains values for course thread bolts and nuts.

Torque values should be increased with $\approx 10\%$, for flange bolts.

All standard torques for bolts are without surface treatment.

The standard torque for bolts lubricated with oil should be reduced with 20% of the given value.

Standard tightening torque charts

Bolt size Metric Coarse Threads	Tensile strength 8.8		Tensile strength 10.9	
	(Nm)	(lbf ft)	(Nm)	(lbf ft)
M5	6	4	8	6
M6	10	7	14	11
M8	25	18	35	26
M10	50	37	70	52
M12	87	64	122	90
M14	139	103	195	144
M16	213	157	299	220
M18	293	216	413	305
M20	416	307	585	432
M24	719	530	1010	745
M27	1060	782	1490	1100
M30	1140	840	2025	1493
M36	2500	1844	3600	2653

Bolt size Inch SAE Coarse Threads	Tensile strength 5		Tensile strength 8	
	(lbf ft)	(Nm)	(lbf ft)	(Nm)
1/4	10	13,6	14	19
5/16	21	28,5	29	39,3
3/8	37	50,2	52	70
7/16	59	80	84	114
1/2	90	122	128	174
9/16	130	176	184	250
5/8	180	244	254	345

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3/4	320	434	451	612
7/8	515	700	728	988
1	775	1052	1091	1480
1 1/8	953	1290	1545	2100
1 1/4	1344	1823	2180	2960
1 3/8	1600	2170	2650	3600
1 1/2	2000	2714	3200	4340

Document Title: Conversion tables	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Conversion tables

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Length

Unit	cm	m	km	in	ft	yd	mile
cm	1	0.01	0.00001	0.3937	0.03281	0.01094	0.000006
m	100	1	0.001	39.37	3.2808	1.0936	0.00062
km	100000	1000	1	39370.7	3280.8	1093.6	0.62137
in	2.54	0.0254	0.000025	1	0.08333	0.02777	0.000015
ft	30.48	0.3048	0.000304	12	1	0.3333	0.000189
yd	91.44	0.9144	0.000914	36	3	1	0.000568
mile	160930	1609.3	1.6093	63360	5280	1760	1

1 mm = 0.1 cm - 1 mm = 0.001 m

Area

Unit	cm ²	m ²	km ²	a	ft ²	yd ²	in ²
cm ²	1	0.0001	-	0.000001	0.001076	0.000012	0.155000
m ²	10000	1	0.000001	0.01	10.764	1.1958	1550.000
km ²	-	1000000	1	10000	1076400	1195800	-
a	0.01	100	0.0001	1	1076.4	119.58	-
ft ²	-	0.092903	-	0.000929	1	0.1111	144.000
yd ²	-	0.83613	-	0.008361	9	1	1296.00
in ²	6.4516	0.000645	-	-	0.006943	0.000771	1

1 ha = 100 a - 1 mile² = 259 ha = 2.59 km²

Volume

Unit	cm ³ = cc	m ³	l	in ³	ft ³	yd ³
cm ³ = ml	1	0.000001	0.001	0.061024	0.000035	0.000001
m ³	1000000	1	1000	61024	35.315	1.30796
dm ³ (l)	1000	0.001	1	61.024	0.035315	0.001308
in ³	16.387	0.000016	0.01638	1	0.000578	0.000021
ft ³	28316.8	0.028317	28.317	1728	1	0.03704
yd ³	764529.8	0.76453	764.53	46656	27	1

1 gal (US) = 3785.41 cm³ = 231 in³ = 0.83267 gal (UK)

Weight

Unit	g	kg	t	oz	lb
g	1	0.001	0.000001	0.03527	0.0022
kg	1000	1	0.001	35.273	2.20459
t	1000000	1000	1	35273	2204.59
oz	28.3495	0.02835	0.000028	1	0.0625
lb	453.592	0.45359	0.000454	16	1

1 ton (metric) = 1.1023 ton (US) = 0.9842 ton (UK)

Pressure

Unit	kp/cm ²	bar	Pa=N/m ²	kPa	lbf/in ²	lbf/ft ²
kp/cm ²	1	0.98067	98066.5	98.0665	14.2233	2048.16
bar	1.01972	1	100000	100	14.5037	2088.6
Pa=N/m ²	0.00001	0.001	1	0.001	0.00015	0.02086
kPa	0.01020	0.01	1000	1	0.14504	20.886
lbf/in ²	0.07032	0.0689	6894.76	6.89476	1	144
lbf/ft ²	0.00047	0.00047	47.88028	0.04788	0.00694	1

kg/cm² = 735.56 Dry (mmHg) = 0.96784 atm

Unit explanations

Unit	abbreviation
Newton meter	Nm
Kilopoundmeter	kpm
Kilopascal	kPa
Megapascal	MPa
Kilowatt	kW
kilojoule	kJ
British thermal unit	Btu
Calorie	ca

Approx. conversion

SI unit	Conversion factor	Non SI	Conversion factor	SI
Torque				
Nm	x10.2	=kg/cm	x0.8664	=lb in
Nm	x0.74	=lbf-ft	x1.36	=Nm
Nm	x0.102	=kg/m	x7.22	=lbft
Pressure (Pa = N/m²)				
kPa	x4.0	=in.H ₂ O	x0.249	=kPa
kPa	x0.30	=in.Hg	x3.38	=kPa
kPa	x0.145	=psi	x6.89	=kPa
bar	x14.5	=psi	x0.069	=bar
kp/cm ²	x14.22	=psi	x0.070	=kp/cm ²
N/mm ²	x145.04	=psi	x0.069	=bar
MPa	x145	=psi	x0.00689	=MPa
Power (W = J/s)				
kW	x1.36	=hp(cv)	x0.736	=kW

Document Title: Tightening torque	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Tightening torque

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Valid for serial numbers			
Model	Production site	Serial number start	Serial number stop
BL70 Volvo	Wroclaw	11145	99999

Propeller shaft	
Connections to transmission and axles	34 – 41 Nm (25 – 30 lbf ft)

Rear axle	
Mounting to frame	900 + 140 Nm (664 + 103 lbf ft)

Transmission	
Transmission to mounting bracket	85 ± 15 Nm (63 ± 11 lbf ft)
Mounting bracket to frame	173 ± 15 Nm (127.5 ± 11 lbf ft)

Engine	
Engine to mounting bracket	220 ± 35 Nm (160 ± 25.5 lbf ft)
Mounting bracket to frame	173 ± 15 Nm (127.5 ± 11 lbf ft)

Document Title: Engine, specifications	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Engine, specifications

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Valid for serial numbers			
Model	Production site	Serial number start	Serial number stop
BL70 Volvo	Wroclaw	10001	11488

General	
Make	Volvo
Designation	D4DCBE1/D4DCBE2
Type	Dry sleeve
Aspiration (standard)	Turbo
Number of cylinders	4
Bore	101 mm (3.98 in)
Stroke	126 mm (4.96 in)
Displacement	4.038 dm ³ (246.5 in ³)
Number of valves	8
Rotation direction	CCW
Compression ratio	19.0:1
Firing sequence	1-3-4-2
Low idle	900 rpm
High idle	2380 rpm

Performance		
Max. flywheel output at 2000 rpm	ISO 9249/DIN 6271 net	68 kW (91 hp)
	SAE J1349 gross	70 kW (94 hp)
	SAE J1349 net	68 kW (91 hp)
	DIN 79929 net	68 kW (91 hp)
Max. torque at 1500 rpm	ISO 9249/DIN 6271 net	385 Nm (284 lbf ft)
	SAE J1349 gross	389 Nm (287 lbf ft)
	SAE J1349 net	385 Nm (284 lbf ft)
	DIN 79929 net	385 Nm (284 lbf ft)

Document Title: Engine, specifications	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Engine, specifications

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BL70 Volvo	Wroclaw	11489	99999

General	
Make	Volvo
Designation	D5D CDE3
Type	Dry sleeve
Aspiration (standard)	Turbo
Number of cylinders	4
Bore	108 mm (4.25 in)
Stroke	130 mm (5.12 in)
Displacement	4.8 dm ³ (292.9 in ³)
Number of valves	8
Rotation direction	CCW
Compression ratio	18.1:1
Firing sequence	1-3-4-2
Low idle	900 rpm
High idle	2325 rpm

Performance		
Max. flywheel output at 2200 rpm	ISO 14396 Gross	70 kW (93.8 hp)
Max. torque at 1500 rpm	ISO 9249/DIN 6271 net	400 Nm (295 lbf ft)

Document Title: Engine, weights	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Engine, weights

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Valid for serial numbers			
Model	Production site	Serial number start	Serial number stop
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Engine (dry)	380 kg (838 lb)
Engine hood	20 kg (44 lb)
Cooler	27 kg (60 lb)

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Engine, weights

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BL70 Volvo	Wroclaw	11489	99999

Engine (dry)	520 kg (1146.2 lb)
Engine hood	25 kg (55.1 lb)
Cooler	25,6 kg (56.4 lb)

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Engine, capacities

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Model	Production site	Serial number start	Serial number stop
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Engine including filter	14 litres (3.7 US gal)
Cooling system	19 litres (5.0 US gal)
Fuel tank	120 litres (31.7 US gal)

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Engine, capacities

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Engine without filter	14.5 litres (3.8 US gal)
Cooling system	22 litres (5.8 US gal)
Fuel tank	120 litres (31.7 US gal)

Document Title: Engine, tightening torque	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Engine, tightening torques

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Engine mounting to engine	140 ±15 Nm (103 ±11 lbf ft)
Engine mounting to frame	173 ±15 Nm (127 ±11 lbf ft)
Propeller shaft to gearbox	31–41 Nm (23–30 lbf ft)

Document Title: Engine, tightening torque	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Engine, tightening torques

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BL70 Volvo	Wroclaw	11489	99999

Engine mounting to engine	173 ± 15 Nm (127 ± 11 lbf ft)
Engine mounting to frame	220 ± 35 Nm (162 ± 25 lbf ft)
Propeller shaft to gearbox	34 – 41 Nm (25 – 30 lbf ft)

Document Title: Engine mount, tightening torque	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Engine mount, tightening torque

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Valid for serial numbers			
Model	Production site	Serial number start	Serial number stop
BL70 Volvo			

Engine	
Engine to mounting bracket	220 ± 35 Nm (160 ± 25.5 lbf ft)
Mounting bracket to frame	173 ± 15 Nm (127.5 ± 11lbf ft)

Document Title: Lubrication specification	Function Group: system, 030	Information Type: Service Information	Date: 4/15/2025
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Lubrication system, specification

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Valid for serial numbers			
Model	Production site	Serial number start	Serial number stop
BL70 Volvo	Wroclaw	10001	11488

Lubrication system	
Type	Forced-feed lubrication
Pump type	gear pump
Oil pressure > 1100 rpm	0.45 MPa (4.5 bar) (65 psi)
Oil pressure minimum (warm engine, low idling)	0.08 MPa (0.8 bar) (12 psi)
Oil temperature, normal	80 °C (176 °F)
Oil temperature, max	125 °C (257 °F)
Oil flow at 2500 rpm	65 litres (17.2 US gal) per minute
Oil filter, filtering size	0.012 mm (0.0005 in)
oil cooler, bypass valve opening pressure	0.21 ± 0.035 MPa (2.1 ± 0.35 bar) (30 ± 5 psi)
Lubrication oil filter, bypass valve opening pressure	0.25 ± 0.05 MPa (2.5 ± 0.5 bar) (36 ± 7.25 psi)
Control valve opening pressure	0.4 ± 0.04 MPa (4 ± 0.4 bar) (58 ± 7.25 psi)

Document Title: Lubrication specification	Function Group: system, 030	Information Type: Service Information	Date: 4/15/2025
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Lubrication system, specification

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Valid for serial numbers			
Model	Production site	Serial number start	Serial number stop
BL70 Volvo	Wroclaw	11489	99999

Lubrication system	
Pump type	Forced-feed lubrication
Pump type	Gear pump
Oil pressure	0.38 – 0.45 MPa (3.8 — 4.5 bar) (55.11 — 65.26 psi)
Oil pressure minimum	0.08 MPa (0.8 bar) (12 psi)
Oil temperature, normal	80 °C (176 °F)
Oil temperature, max	125 °C (257 °F)
Oil flow at 2500 rpm	70 litres (18.5 US gal) per minute
Oil filter, filtering size	0.015 mm (0.0006 in)
Safety relief valve opening pressure	1.0 ± 0.1 MPa (10 ± 1 bar) (145 ± 14.5 psi)
Lubrication oil filter, bypass valve opening pressure	0.25 ± 0.05 MPa (2.5 ± 0.5 bar) (36 ± 7.25 psi)
Control valve opening pressure	0.4 ± 0.05 MPa (4 ± 0.5 bar) (58 ± 7.25 psi)

Document Title: Fuel system, specifications	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Fuel system, specifications

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Fuel feed pump	
Type	Gear pump
Feed pressure	0.5 MPa (5 bar) (72 psi)
Feed pressure after fuel filter (minimum, at 1500 rpm)	0.28 MPa (2.8 bar) (41 psi)
Relief valve opening pressure	0.6 MPa (6 bar) (87 psi)
By-pass valve opening pressure	0.050 MPa (0.5 bar) (7 psi)
Fuel flow (minimum, at 220 rpm)	9 litres (2.4 US gal) per minute

Injection pump	
Timing setting	3° btdc

Injectors	
Quantity	4
Bore	0.203 mm (0.008 in)
Opening pressure	22 MPa (220 bar) (3190 psi)
Adjusting pressure	22 MPa (220 bar) (3190 psi)
Max pressure	160 MPa (1600 bar) (23200 psi)
Check leakage	20 MPa (200 bar) (2900 psi) for 10 sec

Document Title: Fuel system, specifications	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Fuel system, specifications

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Fuel feed pump	
Type	Belt driven rotor pump
Feed pressure	MPa (0.35 — 0.6 bar) (psi)
Feed pressure after fuel filter (minimum, at 1500 rpm)	0.06 — 0.08 MPa (0.6 — 0.8 bar) (8.7 — 11.6 psi)
Relief valve opening pressure	0.6 MPa (6 — 8 bar) (87 psi)
By-pass valve opening pressure	0.050 MPa (0.5 bar) (7 psi)
Fuel flow	10 litres (2.6 US gal) per minute

Injection pump	
Timing setting	0.5° btdc

Injectors	
Quantity	4
Bore	0.203 mm (0.008 in)
Opening pressure	25 MPa (250 bar) (3190 psi)
Adjusting pressure	22 MPa (220 bar) (3190 psi)
Max pressure	160 MPa (1600 bar) (23200 psi)
Check leakage	20 MPa (200 bar) (2900 psi) for 10 sec

Document Title: Inlet and exhaust system, specification	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Inlet and exhaust system, specification

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Valid for serial numbers			
Model	Production site	Serial number start	Serial number stop
BL70 Volvo			

Valve mechanism	
Valve arrangement	Overhead valves
Valve clearance, cold engine	
Inlet valves	0.3 ± 0.05 mm (0.0118 ± 0.0020 in)
Exhaust valves	0.5 ± 0.05 mm (0.0197 ± 0.0020 in)

Turbocharger	
Designation	Turbocharger with waste gate

Air cleaner with connections, air pre-heater	
Type of air cleaner	Two stage
Preheating coil	none

Cold start	
Cold start aid (standard)	Glow plugs
Cold start aid (optional)	Engine pre-heater

Document Title: Inlet and exhaust system, tightening torques	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Inlet and exhaust system, tightening torques

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Valid for serial numbers			
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nuts, connecting flexible exhaust pipe to turbocharger	24 + 4 Nm (18 + 3 lbf ft)
retaining clamp, connecting flexible exhaust tube to silencer	40 Nm (30 lbf ft)
retaining screws, exhaust bracket	48 ± 8 Nm (35 ± 5.9 lbf ft)
retaining clamp, exhaust pipe	60 Nm (44 lbf ft)

Document Title: Cooling specifications	system, 030	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Cooling system, specifications

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Cooling system	
Type	Pressurized closed circuit
Pressure valves opens at	0.05 MPa (0.5 bar) (7.3 psi)

Thermostat	
Type	Piston thermostat
Quantity	1
Begins to open at	83 °C (181 °F)
Fully open at	95 °C (203 °F)
Pressure	0.05 MPa (0.5 bar) (7.3 psi)

Coolant pump	
Type	Belt driven centrifugal
Flow at 2200 rpm	158 litres (41.7 US gal) per minute
Working pressure max	0.05 MPa (0.5 bar) (7.3 psi)

Cold start	
Cold start aid (standard)	Glow plugs
Cold start aid (optional)	Engine pre-heater

Document Title: Cooling specifications	Function Group: system, 030	Information Type: Service Information	Date: 4/15/2025
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Cooling system, specifications

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Cooling system	
Type	liquid cooled, pressurized closed circuit
Pressure valves opens at	0.1 MPa (1 bar) (14.5 psi)

Thermostat	
Type	Piston thermostat
Quantity	1
Begins to open at	87 °C (188.6 °F)
Fully open at	102 °C (215.6 °F)
Pressure	0.13 MPa (1 bar) (18.9 psi)

Coolant pump	
Type	Belt driven rotary vane pump
Flow at 2200 rpm	200 litres (52.8 US gal) per minute
Working pressure max	0.1 MPa (1.3 bar) (14.5 psi)

Cold start	
Cold start aid (standard)	Glow plugs
Cold start aid (optional)	Engine pre-heater

Document Title: Cooling system, tightening torques	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Cooling system, tightening torques

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Fan shroud	24 ± 4 Nm (18 ± 3 lbf ft)
Fan	24 ± 4 Nm (18 ± 3 lbf ft)
Fan guard	15 Nm (13 lbf ft)
Fan adapter	30 ± 3 Nm (22 ± 2.2 lbf ft)
Upper hose (radiator to coolant pump)	4.5 ± 0.3 Nm (3.3 ± 0.2 lbf ft)
lower hose (radiator to coolant pump)	4.5 ± 0.3 Nm (3.3 ± 0.2 lbf ft)
Attachment bracket to frame	10 ± 1.5 Nm (7.5 ± 1.1 lbf ft)
Coolant tank to attachment bracket	20 ± 3 Nm (14.75 ± 2.2 lbf ft)
Front hose to expansion tank (radiator)	3 ± 0.3 Nm (2.2 ± 0.2 lbf ft)
Hoses from coolant pump to expansion tank	3.5 ± 0.3 Nm (2.5 ± 0.2 lbf ft)

Document Title: Electrical specifications	Function Group: system, 030	Information Type: Service Information	Date: 4/15/2025
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Electrical system, specifications

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General	
System voltage	12 VDC

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Battery, specifications

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BL70 Volvo			

Battery	
Quantity	One (two as option)
Battery Voltage (nominal)	12 V / battery
Capacity	110 Ah / battery
Battery disconnect switch	Connected to negative terminal (-)

State of charge	
Fully charged battery	12.7 V
Semi charged battery	12.4 V
Discharged battery	11.6 and lower

Battery electrolyte density at +20 °C (68 °F)	
Fully charged battery	1.275–1.285 g/cm ³
Recharge battery at	1.250 g/cm ³

Document Title: Alternator, specifications	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Alternator, specifications

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BL70 Volvo	Wroclaw	10001	11488

Alternator	
Type	Alternating current (AC)
Regulator	Zener diod, integrated
Charging voltage, at +20 °C (68 °F)	14 V
Current rating	95 A
Rated output	1.3 kW
Rotation	Clockwise (from drive shaft)

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BL70 Volvo	Wroclaw	11489	99999

Alternator	
Type	Alternating current (AC)
Regulator	Electronic
Charging voltage	13,8 V
Current rating	95 A
Rated output	1.3 kW
Rotation	Clockwise (from drive shaft)



Document Title: Starter motor, specifications	Function Group: 030	Information Type: Service Information	Date: 4/15/2025
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Starter motor, specifications

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Valid for serial numbers			
Model	Production site	Serial number start	Serial number stop
BL70 Volvo			

Starter motor	
Voltage	12 VDC
Power rating	3 kW
Number of gear teeth	9