

Document Title: Tightening torques for hydraulic hoses, general	Function Group: 030	Information Type: Service Information	Date: 7/26/2025
Profile:			

Tightening torques for hydraulic hoses, general

Before fitting pipe couplings, plugs and hoses.

- Make sure that the sealing surfaces are clean, free of pores and scratches and have the prescribed surface structure.
- Check elastic seal rings for defects.
- Oil in threads, fittings (cones), sealing and contact surfaces.

Document Title: Tightening blanking plugs	Function Group: 030	Information Type: Service Information	Date: 7/26/2025
Profile:			

Tightening torques, blanking plugs

Blanking plugs with ED seal	
Connection thread (mm)	Tightening torque (Nm)
M10 x 1.0	10
M12 x 1.5	20
M14 x 1.5	30
M16 x 1.5	35
M18 x 1.5	40
M20 x 1.5	50
M22 x 1.5	60
M26 x 1.5	70
M27 x 2.0	90
M33 x 2.0	140
M42 x 2.0	240
M48 x 2.0	300

Blanking plugs with ED seal	
Connection thread (inches)	Tightening torque (Nm)
G 1/8	10
G 1/4	30
G 3/8	35
G 1/2	60
G 3/4	90
G 1	140
G 1 1/4	240
G 1 1/2	300

Blanking plugs with O-ring seal (ISO 6149)	
Connection thread (mm)	Tightening torque (Nm)
M10 x 1.0	10
M12 x 1.5	20
M14 x 1.5	30
M16 x 1.5	35
M18 x 1.5	40
M22 x 1.5	60
M26 x 1.5	70
M27 x 2.0	90
M33 x 2.0	140
M42 x 2.0	240

Sample of manual. Download All 768 pages at:

<https://www.arepairmanual.com/downloads/volvo-ec160-excavators-service-manual/>

Document Title: Tightening torques, bolts and nuts	Function Group: 030	Information Type: Service Information	Date: 7/26/2025
Profile:			

Tightening torques, bolts and nuts

Allen head and hexagon bolts						
Thread (mm)	Wrench size (width across flats)		Torque (Nm)			
	Hexagon (mm)	Allen head (mm)	8.8 FZB and Fe/Zn-Fe Dry	8.8 FZB and Fe/Zn-Fe Lubricated	10.9 Lubricated	12.9 Untreated Lubricated
M5	8	4	6	5		
M6	10	5	10	9		20
M8	13	6	25	22		40
M10	16	8	50	44	60	80
M12	18	10	90	75	105	140
M14	21	12	140	125	175	220
M16	24	14	220	190	275	340
M20	30	17	450	380	540	650
M24	36	19	770	660	900	1 120
M27	41	–	1 100	940	1 350	1 620
M30	46	22	1 500	1 280	1 840	2 210
M36	55		2 500	2 300	3 210	3 850

Flange bolts			
Thread (mm)	Wrench size, width across flats (mm)	Torque (Nm)	
		8.8 Fe/Zn-Fe Dry	8.8 Fe/Zn-Fe Lubricated
M5	8	7	6
M6	10	12	10
M8	12	28	24
M10	14	56	48
M12	17	100	85
M14	18	160	140
M16	21	250	220

The pretensioning force achieved at a given tightening torque depends on, among other things, the coefficient of friction of the bolted joint.

In turn, the coefficient of friction depends on the surface treatment and lubrication condition. The values are calculated assuming a coefficient of friction of 0.2 for dry chromated flange bolts and 0.15 for lubricated chromated flange bolts. The lower torque for Allen head bolts and traditional hex bolts, in relation to flange bolts, is due to the smaller torque arm for the friction force under the bolt head.

Fe/Zn-Fe = Black chromated zinc - iron

FZB = Blank chromated

Bolts for track shoes	
Thread	Tightening torque (Nm)
9/16 – 18 UNF	235 ±20

Document Title: Tightening general tolerances	Function Group: torques, 030	Information Type: Service Information	Date: 7/26/2025
Profile:			

Tightening torques, general tolerances

Tightening torques in Nm							
Nm	5 – 10	11 – 50	51 – 100	101 – 200	201 – 400	401 – 1 000	1 001 –
Tolerance	1.5	4	10	20	40	80	100

Document Title: Tightening torques, hose clips	Function Group: 030	Information Type: Service Information	Date: 7/26/2025
Profile:			

Tightening torques, hose clips

Hose clips with worms	
Intended for hose–outside diameter (mm)	Tightening torque (Nm)
10 – 19	2.5
20 – 30	3.5
31 – 49	4.5
50 – 231	5.5

Document Title: Tightening torques, ORFS connections	Function Group: 030	Information Type: Service Information	Date: 7/26/2025
Profile:			

Tightening torques, ORFS connections

ORFS-connections (ISO 8434-3)		
Thread (inches)	For hose diameter	Tightening torque (Nm)
9/16 – 18 UNF	1/4" / 6.4 mm	25 ±1
11/16 – 16 UN	3/8" / 9.5 mm	35 ±3
13/16 – 16 UN	1/2" / 12.7 mm	55 ±5
1 – 14 UNS	5/8" / 15.9 mm	85 ±3
1 3/16 – 12 UN	3/4" / 19 mm	120 ±5
1 7/16 – 12 UN	1" / 25.4 mm	160 ±10
1 11/16 – 12 UN		190 ±10
2 – 12 UN		220 ±10

Document Title: Tightening torques, valve connections	Function Group: 030	Information Type: Service Information	Date: 7/26/2025
Profile:			

Tightening torques, valve connections

ORFS-connections with ED seal (DIN 3852 form E)		
Connection thread (mm)	For hose diameter	Tightening torque (Nm)
M10 x 1.0	1/4" / 6.4 mm	17
M12 x 1.5	1/4" / 6.4 mm	35
M14 x 1.5	3/8" / 9.5 mm	60
M16 x 1.5	3/8" / 9.5 mm	95
M18 x 1.5	1/2" / 12.7 mm	120
M20 x 1.5		170
M22 x 1.5	5/8" / 15.9 mm	190
M27 x 2.0	3/4" / 19 mm	250
M33 x 2.0	1" / 25.4 mm	500
M42 x 2.0		600
M48 x 2.0		800

ORFS-connections with ED seal (DIN 3852 form E)		
Connection thread (inches)	For hose diameter	Tightening torque (Nm)
G 1/8	1/4" / 6.4 mm	10
G 3/8	1/4" / 6.4 mm	39
G 1/2	3/8" / 9.5 mm	59
G 3/4	3/8" / 9.5 mm	88
G 1	1/2" / 12.7 mm	137
G 1 1/4	5/8" / 15.9 mm	235
G 1 1/2	3/4" / 19 mm	294

ORFS-connections with O-ring seal (ISO 6149)		
Connection thread (mm)	For hose diameter	Tightening torque (Nm)
M8 x 1.0		10
M10 x 1.0	1/4" / 6.4 mm	20
M12 x 1.5	1/4" / 6.4 mm	35
M14 x 1.5	3/8" / 9.5 mm	45
M16 x 1.5	3/8" / 9.5 mm alt. 1/2" / 12.7 mm	55
M18 x 1.5	1/2" / 12.7 mm	70
M22 x 1.5	5/8" / 15.9 mm	100
M27 x 2.0	3/4" / 19 mm	170
M33 x 2.0		310
M42 x 2.0		330
M48 x 2.0		420
M60 x 2.0		500

ORFS-connections with O-ring seal (ISO 6149)		
Connection thread (inches)	For hose diameter	Tightening torque (Nm)
7/16 – 20 UNF	1/4" / 6.4 mm	21
1/2 – 20 UNF	1/4" / 6.4 mm	37
9/16 – 18 UNF	3/8" / 9.5 mm	47
3/4 – 16 UNF	1/2" / 12.7 mm	81
7/8 – 14 UNF	5/8" / 15.9 mm	141
1/16 – 12 UNF	3/4" / 19 mm	189
1 5/16 – 12 UNF		284
1 5/8 – 12 UNF		347
1 7/8 – 12 UNF		425

Document Title: Time Guide	Function Group: 070	Information Type: Service Information	Date: 7/26/2025
Profile:			

Time Guide

EC160

1	Standard parts, service
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17	Service	
1763-02	0.25	Jump starting the machine, connecting the cables
1763-01	0.25	Jump starting the machine, removing the cables
1711-15	8.00	Arrival and pre-delivery inspection
1721-15	2.00	Warranty service, 1
1722-15	2.00	Warranty service, 2

2	Engine with mounting and equipment
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21	Engine	
210-01	6.00	Engine assembly, remove
210-04	25.00	Engine assembly, recondition
210-02	6.50	Engine assembly, install
2111-01	3.00	Cylinder head, remove
2112-03	6.50	Cylinder head, replace gasket
2111-09	3.00	Cylinder head, check for leaks
2111-02	3.50	Cylinder head, install
213-04	20.00	Engine block, ream cylinder liner seatings (all)
213-10	10.00	Engine block, measure cylinder wear (all)
213-03	14.00	Engine block, replace cylinder liners and pistons (all)
2141-08	1.00	Valves, inspect (all)
2142-04	1.50	Valves, adjust (all)
2116-03	0.50	Valve cover, replace gasket
2167-03	6.00	Crankshaft, replace front seal
2167-03	7.00	Crankshaft, replace rear seal

2172-03	2.00	Oil sump gasket, replace
2211-03	4.00	Oil pump, replace
218-01	3.00	Engine mounting, RH front, remove
218-02	3.25	Engine mounting, RH front, install
218-01	3.00	Engine mounting, LH front, remove
218-02	3.25	Engine mounting, LH front, install
218-01	2.50	Engine mounting, RH rear, remove
218-02	2.75	Engine mounting, RH rear, install
218-01	2.00	Engine mounting, LH rear, remove
218-02	3.00	Engine mounting, LH rear, install

23	Fuel system
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2341-01	1.50	Fuel tank, remove
2341-02	1.00	Fuel tank, install
2344-01	0.50	Fueling pump, remove
2344-02	0.75	Fueling pump, install
2361-01	1.50	Injection pump, remove
2361-02	1.75	Injection pump, install
2366-03	0.75	Injection pump, replace regulator housing seal
2331-01	0.50	Feed pump, remove
2331-04	1.25	Feed pump, recondition
2331-02	0.50	Feed pump, install
2331-08	0.25	Feed pump, check feed pressure
2371-03	0.50	Injector, replace
2379-03	1.00	Injector, replace copper sleeve
2371-08	2.00	Injectors, check and adjust (all)

25	Inlet system, exhaust system
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2521-03	1.50	Exhaust pipe, replace pipe between silencer (muffler) and turbo-compressor
252-03	2.00	Exhaust system, replace silencer (muffler)
2511-03	1.00	Exhaust manifold, replace gasket
255-01	1.00	Turbo-compressor, remove
255-04	3.00	Turbo-compressor, recondition
255-02	1.00	Turbo-compressor, install
2562-03	0.75	Inlet, change main and safety filters
2566-03	0.50	Electric air preheater, replace preheater relay

26	Cooling system
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2611-01	2.00	Radiator, water/oil, remove
2611-02	2.00	Radiator, water/oil, install
2615-03	0.75	Radiator, replace top coolant hose
2615-03	3.00	Radiator, replace bottom coolant hose
2612-01	0.75	Expansion tank, remove
2612-02	1.00	Expansion tank, install
2621-01	2.00	Coolant pump for engine, remove
2621-04	6.00	Coolant pump for engine, recondition
2621-02	2.50	Coolant pump for engine, install
2627-03	1.00	Thermostat, replace
2634-01	1.00	V-belts, remove
2634-02	1.00	V-belts, install

27	Engine control	
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2751-05	0.50	Speed control, set throttle device
277-05	0.50	Automatic speed reduction, adjust
277-03	1.25	Automatic speed reduction, replace cylinder

3	Electrical system, warning system, information system, instruments	
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31	Battery	
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311-01	0.75	Battery, remove
311-02	0.75	Battery, install
37142-03	0.25	Battery, replace earth cable
37143-01	0.75	Battery isolator switch, remove
37143-02	0.75	Battery isolator switch, install

32	Alternator, charge regulator	
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320-08	0.25	Charging system, check charging voltage
321-01	1.25	Alternator, remove
321-02	1.50	Alternator, install
321-03	3.25	Alternator, replace carbon brushes
322-03	2.75	Alternator, replace charge regulator

33	Starting system	
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3314-01	1.00	Starter motor, remove
3314-02	1.00	Starter motor, install
3318-03	3.00	Starter motor, replace magnetic coil

37182-03	1.00	Starter motor, replace earth (ground) cable
334-01	0.25	Starting lock, remove
334-02	0.25	Starting lock, install

36	Other electrical equipment	
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3621-03	0.75	Other equipment, replace horn
3631-03	0.75	Other equipment, replace upper windscreen wiper motor
3631-03	0.75	Other equipment, replace lower windscreen wiper motor (extra)
3634-03	0.25	Other equipment, replace windscreen washer pump
9149-03	0.50	Solenoid valve, replace

37	Cable, fuse, relay	
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3721-03	1.25	Linde box, replace + learning
37211-01	2.00	Electrical distribution box A1, remove
37211-02	2.50	Electrical distribution box A1, install

38	Instrument, sensor, warning and information system	
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3864-03	1.00	Sensors and detector switches, replace operating latch
3864-03	0.75	Sensors and detector switches, replace level sensor for fuel
3864-03	0.25	Sensors and detector switches, replace temperature sensor for coolant
3864-03	1.25	Sensors and detector switches, replace temperature sensor for hydraulic oil
3864-03	0.25	Sensors and detector switches, replace temperature switch for cold starting
3864-03	1.00	Sensors and detector switches, replace pressure switch automatic speed reduction
3864-03	0.50	Sensors and detector switches, replace pressure switch for drive pedal
3864-03	0.75	Sensors and detector switches, replace position sensor for front windscreen
3864-03	0.25	Sensors and detector switches, replace pressure switch for engine oil
3864-03	0.25	Sensors and detector switches, replace pressure switch for hydraulic oil filter
3864-03	0.25	Sensors and detector switches, replace pressure switch for air filter
3864-03	0.75	Sensors and detector switches, replace pressure switch for overload
3864-03	0.25	Sensors and detector switches, replace rpm transmitter for engine
387-03	0.25	Main keyboard, replace
387-03	0.25	Keyboard for extra equipment, LH or RH, replace
366-01	1.00	Central unit A3, remove
366-02	2.00	Central unit A3, install
3872-01	0.25	Display unit A9, remove
3872-02	0.25	Display unit A9, install

39	Miscellaneous	
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3932-03	0.25	Radio or tape player, replace
3937-03	1.50	Voltage divider, replace
3939-03	0.25	Loudspeaker, replace

4		Power transmission
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44		Hydrostatic drive
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4411-01	1.50	Drive motor, remove
4411-02	2.00	Drive motor, install
4412-01	5.00	Slew motor, remove
4412-02	4.50	Slew motor, install
4431-01	4.00	Central passage, remove
4431-03	11.00	Central passage, replace seals and bearings
4431-02	5.00	Central passage, install
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49		Other, slow system
<hr/>		
4922-03	20.00	Slewing ring, replace
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5		Brake
<hr/>		
53		Track brake
<hr/>		
5311-1	1.50	Brake discs, remove
5311-2	2.00	discs, install
<hr/>		
6		Steering
<hr/>		
7		Frame, springs, damping, axle suspension, wheel/track unit
<hr/>		
71		Frame
<hr/>		
716-01	0.75	Counterweight, remove
716-02	1.00	Counterweight, install
<hr/>		
77		Wheels, tracks
<hr/>		
7751-01	1.75	Front wheel, remove
7751-03	4.00	Front wheel, replace
7751-02	2.50	Front wheel, install
7752-01	2.00	Driving wheel, remove
7752-02	2.50	Drive wheel, install
7753-01	0.75	Track, open
7753-02	1.25	Track, assemble
7753-01	0.25	Track, slacken

7753-10	0.25	Track, tighten
7753-04	6.00	Track, recondition with splice link kit
77531-01	1.50	Track chain, remove
77531-02	2.25	Track chain, install
77552-01	1.50	Slide rail, remove
77552-02	1.25	Slide rail, install
77551-01	1.25	Upper roller, remove
77551-02	1.00	Upper roller, install
7756-01	1.25	Lower roller, remove
7756-02	1.50	Lower roller, install
7757-01	1.25	Track anti-shed device, remove
7757-02	1.25	Track anti-shed device, install
77582-01	2.00	Spring pack with compression cylinder, remove
77582-04	3.50	Spring pack with compression cylinder, recondition
77582-02	2.75	Spring pack with compression cylinder, install

8	Machinery house, cab
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81	Cab without door, windows, panes, hatch
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8102-01	2.00	Cab, remove
8102-02	2.50	Cab, install

83	Doors, hatch, cover plate
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8315-01	0.75	Cab door, remove door latch
8315-02	1.00	Cab door, install door latch
8344-03	0.50	Door, replacement of door lock
837-03	1.75	Engine hood, replace
837-03	0.50	Engine hood, gas spring replace
837-03	0.50	Engine hood, lock replace
837-03	1.50	Cover over fuel tank and radiator, replace
837-03	0.50	Cover over fuel tank and radiator, replace gas spring

84	Trim part outside, glass, sealing moulding
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843-01	0.50	Window glass, remove
843-02	1.50	Window glass, install
8431-01	0.75	Upper front window, remove
8431-02	0.50	Upper front window, install

85		Cab interior/Upholstery
8521-01	0.50	Driver's seat, remove
8521-02	0.75	Driver's seat, install
87		Air conditioning unit
8735-01	1.00	Heater valve, remove
8735-02	1.00	Heater valve, install
873-01	0.75	Heater fan, removal
873-02	1.00	Heater fan, installation
8732-01	2.50	Heater element, remove
8732-02	2.50	Heater element, install
9		Hydraulic system, digging/handling equipment, miscellaneous equipment
91		Working hydraulics, servo hydraulics
910-05	3.00	Hydraulic pressure, set
9111-01	3.00	Hydraulic oil tank, remove
9111-02	3.50	Hydraulic oil tank, install
9112-03	0.50	Pipes and hoses, work hydraulic system, replace hose on head
9112-03	1.25	Pipes and hoses, work hydraulic system, replace hose in base machine
9112-03	1.50	Pipes and hoses, work hydraulic system, replace hose to centre passage
9112-03	0.75	Pipes and hoses, work hydraulic system, replace pipe on unit
91235-01	0.50	Line breakage valve (hose breakage valve) for boom cylinder, remove
91235-02	0.75	Line breakage valve (hose breakage valve) for boom cylinder, install
91236-01	0.25	Line breakage valve (hose breakage valve) for shaft cylinder, remove
91236-02	0.25	Line breakage valve (hose breakage valve) for shaft cylinder, install
9125-01	2.50	Valve block A, remove
9125-02	2.00	Valve block A, install
9125-01	3.00	Valve block B, remove
9125-02	2.75	Valve block B, install
9121-01	0.25	Directional valve, remove spring
9121-02	0.25	Directional valve, install spring
9121-03	0.50	Directional valve, replace spool
91211-01	0.25	Directional valve for slew, remove spring
91211-02	0.25	Directional valve for slew, install spring
91211-03	0.50	Directional valve for slew, replace spool

9122-01	0.25	Pressure limiting valve, remove
9122-02	0.25	Pressure limiting valve, install
9127-01	0.25	Refilling valve, remove
9127-02	0.25	Refilling valve, install
912-01	0.25	Shock and refilling valve, remove
912-02	0.25	Shock and refilling valve, install
913-01	1.75	Working pump, remove
913-02	2.25	Working pump, install
9145-01	0.25	Accumulator for servo pressure, remove
9145-02	0.25	Accumulator for servo pressure, install
9148-03	0.25	Control pressure valve, pedal, adjust
9143-01	0.75	Servo pump, remove
9143-02	0.75	Servo pump, install
9147-03	1.00	Pipes and hoses, servo hydraulic system, replace hose on head
9147-03	1.00	Pipes and hoses, servo hydraulic system, replace hose in base machine
9147-03	0.75	Pipes and hoses, servo hydraulic system, replace pipe on unit

92	Mechanical equipment/attachment	
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924-03	2.00	Tool attachment, replace
9243-01	1.00	Cylinder for hydraulic tool attachment (quick-release), remove
9243-02	1.50	Cylinder for hydraulic tool attachment (quick-release), install

97	Unit, digging	
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9741-01	5.00	Boom, remove
9741-02	6.00	Boom, install
9743-01	1.75	Boom cylinder LH, remove
9743-02	1.75	Boom cylinder LH, install
9743-01	1.75	Boom cylinder RH, remove
9743-02	1.75	Boom cylinder RH, install
9743-03	1.50	Boom cylinder, replace upper shaft
9743-03	1.50	Boom cylinder, replace lower shaft
9751-01	1.75	Shank, remove
9751-02	2.25	Shank, install
9751-03	1.25	Shank, replace shaft between shank and boom
9752-03	1.50	Link system, replace lever arm
9752-03	2.25	Link system, replace links

9753-01	1.25	Shank cylinder, remove
9753-02	1.50	Shank cylinder, install
9753-03	1.00	Shank cylinder, replace upper shaft
9753-03	0.75	Shank cylinder, replace lower shaft
9755-01	1.00	Bucket cylinder, remove
9755-02	1.00	Bucket cylinder, install
9755-03	0.75	Bucket cylinder, replace upper shaft
9755-03	0.75	Bucket cylinder, replace lower shaft

Document Title: Hydraulic oil, cleaning	Function Group: 160	Information Type: Service Information	Date: 7/26/2025
Profile:			

Hydraulic oil, cleaning

Op nbr 160-03

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NOTE!

Thoroughly clean the area around the filter before changing the filter.

Clean the oil:

- Following larger repairs on the hydraulic system, for example, changing valve block or hydraulic oil tank.
- After oil tests have shown that oil is contaminated.
- On machines with repeated malfunctions of the hydraulic system.

Cleaning can be performed as follows using the hydraulic system internal filtering device:

1. Operate the machine until the hydraulic oil temperature reaches minimum 35 °C.
2. Thoroughly clean the filter canister in the hydraulic oil tank and change filters.
3. Clean the oil for 3 hours during normal operation of the machine.
4. Change the filters.

Document Title: Hydraulic oil, description	Function Group: 160	Information Type: Service Information	Date: 7/26/2025
Profile:			

Hydraulic oil, description

The oil contains selected additives that provide good oxidation stability, corrosion protection and good lubricating characteristics as well as compatibility with bearings containing lead alloys.

The ester base gives the oil a very high viscosity index and good characteristics at low temperatures.

Document Title: Hydraulic oil, specifications	Function Group: 160	Information Type: Service Information	Date: 7/26/2025
Profile:			

Hydraulic oil, specifications

Oil type	Viscosity	Ambient-temperature	Miscibility	Comment
Mineral oil *)	ISO VG 32	-30 to +35°C	Can be mixed with mineral oil ISO VG 46	
Mineral oil *)	ISO VG 46	-15 to +50°C	Can be mixed with mineral oil ISO VG 32	
PANOLIN HLP SYNTH 46 Biologically degradable synthetic oil	Same as for mineral oil ISO VG 46	-15 to +50°C		When changing from mineral oil to synthetic oil, contact VCE service
BP BIOHYD SE-S 46 biologically degradable synthetic oil	Same as for mineral oil ISO VG 46	-15 to +50°C		When changing from mineral oil to synthetic oil, contact VCE service
*) SS 155 434 AV Hydrauliköl DIN 51 524-HVLP ISO 6743/4 HV Volvo Standard Hydraulic oil/Hydraulic fluid 98 601				

Document Title: Hydraulic oil, storage and handling	Function Group: 160	Information Type: Service Information	Date: 7/26/2025
Profile:			

Hydraulic oil, storage and handling

- The hydraulic oil must be stored either in tanks or barrels that are well sealed.
- Containers used for transporting hydraulic oil must only be used for this purpose.
- Oil should be stored under cover or in temperature-controlled rooms. If the oil is stored outdoors, the barrels should be stored horizontally to prevent water from entering and barrel markings from being eradicated.

Document Title: Jump starting of machine, removal of cables	Function Group: 1763	Information Type: Service Information	Date: 7/26/2025
Profile:			

Jump starting of machine, removal of cables

Op nbr 1763-01

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1. Remove the cable **3** between the free minus terminal of the jump start battery unit and the chassis.
2. Remove the cable **2** between the free plus terminal of the jump start battery unit and the plus cable terminal on the machine batteries.
3. Remove the cable **1** between the two jump start batteries.
4. Fit the cover over the battery compartment.

⚠ CAUTION

Make sure that the cover does not contact the battery terminals.

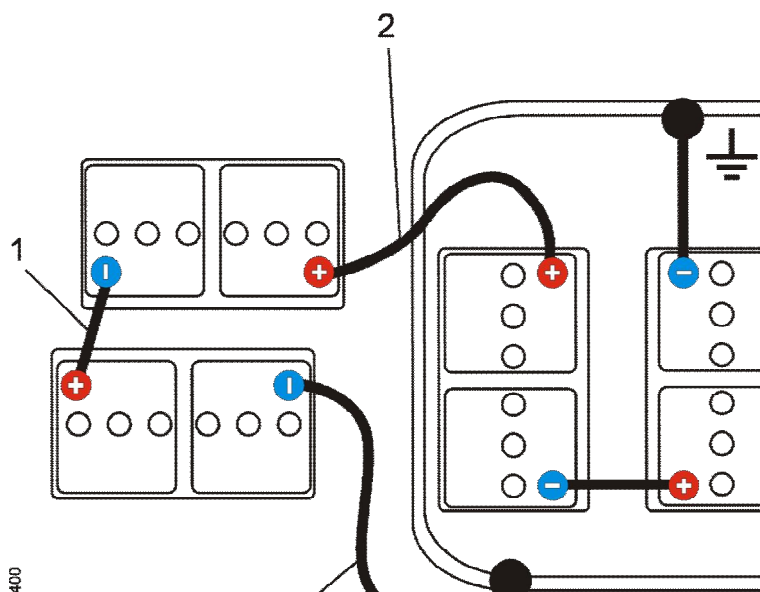


Figure 1
Jump starting of machine

1. Cable between jump start batteries
2. Positive cable
3. Ground cable

Document Title: Jump starting of machine, description	Function Group: 1763	Information Type: Service Information	Date: 7/26/2025
Profile:			

Jump starting of machine, description

If the batteries are discharged, separate jump start batteries or the batteries in another machine can be used. The jump start machine's engine must be turned off and the ignition key removed.



Never use a charging unit connected to the general supply of electricity.

Document Title: Jump starting of machine, connection of cables	Function Group: 1763	Information Type: Service Information	Date: 7/26/2025
Profile:			

Jump starting of machine, connection of cables

Op nbr 1763-02

=

Tools:

Jump start battery, 2 pcs., 12 V 100 Ah

Cables, 3 pcs.

WARNING

The jump start battery negative terminal must not under any circumstances be connected directly to the negative terminal of the discharged batteries.

A discharged or frozen battery can explode due to the current surge if directly connected to a fully charged battery. This may cause personal injuries.

In order to reduce the risk of a current surge, the electrical resistance in the jump start circuit should be increased. This is done by always connecting the jump start package negative terminal to a suitable ground connection on the machine frame.

1. Remove the cover above the batteries.

CAUTION

Make sure that the cover does not contact the battery terminals.

2. Connect a cable **1** between the two jump start batteries.
3. Connect a cable **2** between the free plus terminal on the jump start battery unit and the plus cable terminal on the machines batteries.
4. Connect a cable **3** between the free negative terminal on the jump start battery unit and a suitable chassis connection on the machine superstructure.
5. Start the diesel engine.

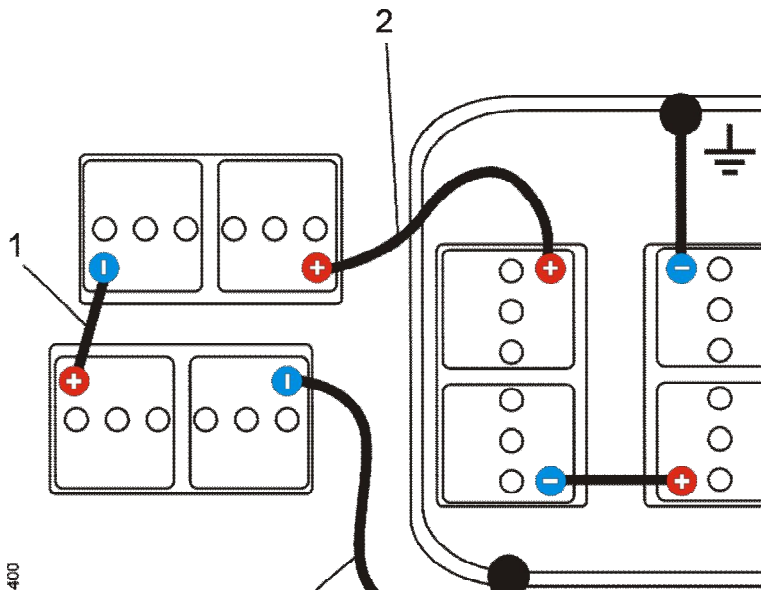


Figure 1
Jump starting of machine

1. Cable between jump start batteries
2. Positive cable
3. Ground cable

Document Title: Vacuum disconnection	Function Group: pump, 1791	Information Type: Service Information	Date: 7/26/2025
Profile:			

Vacuum pump, disconnection

Op nbr 1791-01

[14 360 000 Vacuum pump](#)

[14 360 112 Adapter](#)

1. Turn off the electric power to the vacuum pump.
2. Remove the plug from the 24V socket.
3. Remove the hose from the adapter.
4. Remove the adapter and immediately fit the air filter.

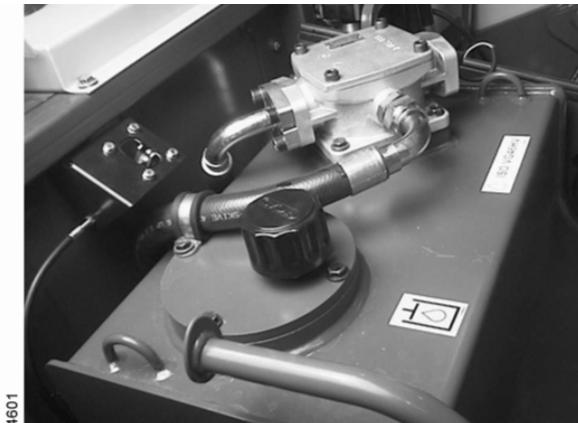


Figure 1

Hydraulic oil tank, restored to operating state

Document Title: Vacuum pump, connection	Function Group: 1791	Information Type: Service Information	Date: 7/26/2025
Profile:			

Vacuum pump, connection

Op nbr 1791-02

[14 360 000 Vacuum pump](#)

[14 360 112 Adapter](#)

CAUTION

The air filter is located above the filtered hydraulic oil. Therefore, thoroughly clean the surfaces closest to the filter. Do not leave the connection for the filter open for longer time than it takes to fit the adapter.

1. Place the vacuum pump on the hydraulic oil tank.
2. Remove the air filter **3** and immediately fit the adapter **1**.
3. Connect the hose **2** to the adapter **1**.

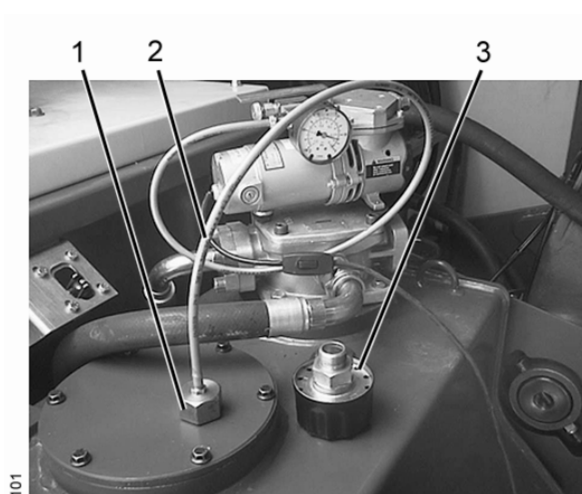


Figure 1
Connecting the vacuum pump

- | | | | |
|---|---------|---|------------|
| 1 | Adapter | 3 | Air filter |
| 2 | Hose | | |

4. Connect the plug to the 24V socket on the left panel in the operator's cab.
5. Start the vacuum pump.
6. Adjust the vacuum pump by using the adjusting knob **1**.

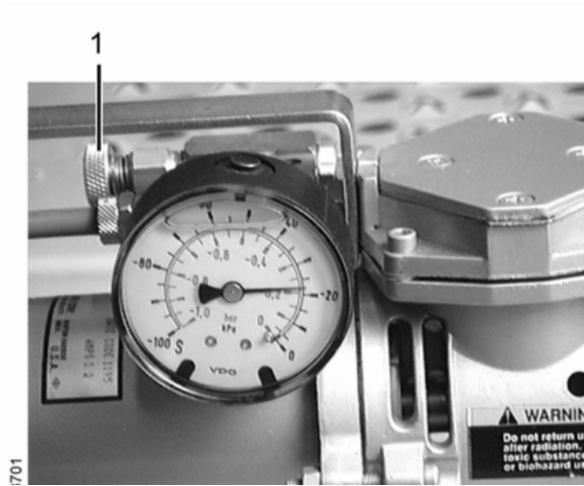


Figure 2
Vacuum pump

1. Adjusting knob
7. Let the pump work for 2 – 3 minutes so that the value is -300 mbar.
8. Adjust the vacuum so that leaks will not occur during work on the hydraulic system.

CAUTION

The vacuum pressure must not drop below -300 mbar as there is a risk that the hydraulic oil tank will be damaged.

Document Title: Hydraulic system, cleanliness when handling hydraulic components	Function Group: 179	Information Type: Service Information	Date: 7/26/2025
Profile:			

Hydraulic system, cleanliness when handling hydraulic components

WARNING

Hydraulic oil under pressure and hot hydraulic oil can cause severe injuries.

WARNING

It is very important to keep the hydraulic system free from contaminants as these can cause considerable wear and can lead to expensive malfunctions and downtime. Extreme cleanliness must be observed when handling all hydraulic components and hydraulic oil.

NOTE!

A vacuum pump should be used when servicing the hydraulic system, see *Vacuum pump, connection*.