Workshop Manual

Technical data

TAD730G, TAD730P, TAD730V
TAD740GE, TAD741GE, TWD710G,
TWD710P, TWD710V, TWD740GE

Workshop Manual

Technical data

Industrial diesel engines

TAD730G • TAD730V • TAD730P • TAD740GE• TAD741GE
TWD710G • TWD710P • TWD710V • TWD740GE

Contents

Safety information

Introduction

The Workshop Manual contains technical data, descriptions and repair instructions for specified products or product versions from Volvo Penta. Make sure that the correct workshop literature is used.

Read the following safety information, including "General information" and "Repair instructions" carefully before beginning service work.

Important

The following special warning symbols are used in the Workshop Manual and on the product.

⚠ **WARNING!** Warns of risk of bodily injury, extensive damage to product or property, or that serious malfunctioning can occur if the instructions are not followed.

⚠ **IMPORTANT!** Used to draw attention to such things that can cause damage or malfunctioning to product or property.

NOTE! Used to draw attention to important information to simplify work procedures or handling.

To provide an overview of the risks and precautionary measures that should always be taken into consideration or implemented, we have listed them below.

⚠ Prevent the engine from starting by switching off the power with the main switch(es) and locking it (them) in disconnected position before starting the service work. Attach a warning sign to the driver's stand.

⚠ All service work should as a rule be conducted on a stationary engine. However, some work, e.g. certain adjustments, require the engine to be running. Approaching an engine that is a running is a safety risk. Remember that loosely fitting clothes or long hair can fasten in rotating parts and cause serious personal injury.

If work is conducted in the vicinity of an engine that is running, a careless movement or a dropped tool can in the worst instance lead to personal injury. Pay attention to hot surfaces (exhaust pipe, turbo, aftercooler, starter element etc.) and hot fluids in pipes and hoses on engines that are running or have just stopped. Refit all guards dismantled during service work before starting the engine.

⚠ Make sure that the warning or information decals on the product are always clearly visible. Replace decals that are damaged or have been painted over.

⚠ Never start the engine unless the air filter is fitted. The rotating compressor wheel in the turbo can cause severe personal injury. Foreign objects in the inlet pipe can also result in damage to the machine.

⚠ Never use start spray or the like to assist starting. This can lead to an explosion in the inlet pipe. Risk of personal injury.

⚠ Only start the engine in well ventilated areas. If running the engine in an enclosed area the exhaust fumes should be led out of the engine room or workshop area.

⚠ Avoid opening the filler cap for the coolant when the engine is hot. Steam or hot coolant can spray out, and the built up pressure will be lost. If necessary open the filler cap slowly and release the overpressure in the cooling system. Use extreme caution if cocks, plugs or coolant pipes must be dismantled when the engine is hot. Steam or hot coolant can flow out in an unpredicted direction.

⚠ Hot oil can cause burn injuries. Avoid skin contact with hot oil. Make sure that the oil system is not pressurised before working on it. Never start or run the engine with the oil filler cap removed in view of the risk of ejected oil.

⚠ Stop the engine before working on the cooling system.

⚠ Always use protective glasses when there is risk of splitter, grinding sparks, or splashing from acids or other chemicals. The eyes are extremely sensitive. An injury can lead to blindness!

⚠ Avoid skin contact with oil! Prolonged or frequent skin contact with oil can degrease the skin, resulting in irritation, dehydration, eczema and other skin complaints. Spent oil is more dangerous than new oil in terms of health risks. Use protective gloves and avoid oil drenched rags or clothes. Wash regularly, especially before meals. Use special cream to counteract dehydration and to simplify cleaning the skin.

⚠ The majority of chemicals for the product (e.g. engine and transmission oils, glycol and diesel oil), or chemicals for workshop use (e.g. degreasing agents, varnish and solvents) are injurious to health. Read the instructions on the packs carefully! Always follow the prescribed safety instructions (e.g. the use of breathing protection, protective glasses and gloves etc.). Make sure that other personnel are not inadvertently exposed to hazardous substances, e.g. via inhaled air. Ensure good ventilation. Handle consumed and surplus chemicals in the prescribed manner.

⚠ Use extreme caution when tracing leaks in the fuel system and testing fuel nozzles. Wear protective glasses. The jet from a fuel nozzle has a very high pressure and penetrating force; the fuel can penetrate deep into bodily tissue and cause severe injury. Risk of blood poisoning.

⚠ **WARNING!** Pressure pipes must under no circumstance be bent. Damaged pipes should be replaced.

⚠ All fuels, in similarity with many chemicals, are inflammable. Make sure that naked flames or sparks cannot lead to ignition. Certain thinners and hydrogen gas from the batteries are in specific combination with air extremely inflammable and explosive. Smoking prohibited! Ensure good ventilation and take the necessary precautionary measures before welding or grinding. Always have a fire extinguisher handy at the workplace.

⚠ Make sure that oil and fuel drenched rags, including replaced fuel and lubricating oil filters, are stored safety. Under certain circumstances oil drenched rags can self-ignite. Replaced fuel and oil filters are environmentally hazardous waste and should together with spent lubricating oil, contaminated fuel, paint residue, solvents, degreasing agents and suds, be deposited at an environmental waste treatment station for destruction.

⚠ Batteries must never be exposed to naked flames or electrical sparks. Never smoke in the vicinity of batteries. Batteries produce hydrogen gas when being charged, which in combination with air forms oxyhydrogen gas. This gas is highly inflammable and very explosive. One spark as a result of incorrect connection is sufficient to explode a battery and cause injury. Never touch the connections when attempting to start(risk for spark), or lean over the batteries.

⚠ Never interchange the plus or minus poles when fitting the batteries. This can result in serious damage to the electrical equipment. Compare with the wiring diagram.

⚠ Always use protective glasses when charging and handling batteries. The battery electrolyte contains strongly corrosive sulphuric acid. On skin contact, wash with soap and plenty of water. If battery acid has got into the eyes, rinse immediately with plenty of water and contact a doctor immediately.

⚠ Stop the engine and switch off the power with the main switch(es) before working on the electrical system.

⚠ The clutch should be adjusted when the engine is stationary.

⚠ Use the lifting eye bolts mounted on the engine when lifting the drive unit. Always check that all the lifting tackle is in good condition and has the correct lifting capacity for the lift (the weight of the engine with gearbox and extra equipment).

For safe handling and to avoid damaging components mounted on top of the engine, the engine should be lifted with an adjustable lifting beam suitable for the engine. All chains and wires should run in parallel with each other and as close to right angles as possible to the top of the engine.

If other equipment connected to the engine alters its centre of gravity it may be necessary to use special lifting devices to achieve the correct balance and safe handling.

Never conduct work on an engine only supported in a lifting device.

⚠ Never work alone when dismantling heavy components, even when safe lifting devices such as lockable block and tackle are used. Two persons are required even when lifting devices are used, one to handle the lifting device and one to make sure that components are not damaged during the lift.

Always make sure in advance that there is sufficient space to enable dismantling in place without the risk of personal injury or damage to materials.

⚠ **WARNING!** Components in the electrical system and in the fuel system on Volvo Penta products are designed and manufactured to minimise the risk of explosion and fire. The engine must not be run in areas surrounded by explosive mediums.

⚠ Always use fuel recommended by Volvo Penta. See Instruction Manual. The use of inferior quality fuel can damage the engine. Using inferior fuel in a diesel engine can lead to the control rod seizing and the engine overspeeding, with the risk of both personal injury and damage to the machine. Inferior fuel can also lead to higher maintenance costs.

⚠ When cleaning with high-pressure jets the following must be taken into consideration: Never direct the jet of water at seals, rubber hoses, electrical components or the cooler. Never use the high pressure function when washing the engine.

General Information

About the Workshop Manual

This Workshop Manual contains technical information, descriptions, and repair instructions for the standard versions of the engine units TAD730G, TAD730P, TAD730V, TAD740G, TWD710G, TWD710P, TWD710V, TWD740GE, TAD741GE.

The engine designation and number are given on the rating plate (see page 8).
The motor designation and number should always be given during all correspondence.

The Workshop Manual is primarily produced for Volvo Penta service workshops and their qualified personnel. It is therefore assumed that persons using this manual have a basic knowledge of marine drive systems, and can perform the relevant work of a mechanical and electrical nature.

Volvo Penta continuously develops its products, and therefore reserves the right to introduce modifications. All the information in this manual is based on product data available prior to publication. Any amendments or service methods of essential importance that have been introduced for the product after this date are confirmed in the form of Service Bulletins.

Spare parts

Spare parts for the electrical and fuel systems are subject to different national safety requirements. Volvo Penta Genuine Spare Parts comply with these requirements. All types of damage resulting from the use of non genuine Volvo Penta spare parts for the product in question will not be regulated by the warranty undertakings of Volvo Penta.

Certified engines

For engines certified for national and regional environmental legislation the manufacturer undertakes to ensure compliance with such environmental requirements for both new engines and engines is use. The product must comply with the approved example on certification. For Volvo Penta as the manufacturer to be able accept responsibility for the compliance of engines in use with the set environmental requirements, the following requirements for service and spare parts must be fulfilled:

- The service intervals and maintenance procedures recommended by Volvo Penta must be followed.
- Only Volvo Penta Genuine Spare Parts intended for the certified engine version must be used.
- Service of injection pumps, pump settings, and injectors, shall always be conducted by an authorised Volvo Penta workshop.
- The engine must not be rebuilt or modified in any way, with the exception of the accessories and service kits that Volvo Penta has developed for the engine.
- Installation adjustments on exhaust pipes and supply air channels for the engine compartment (ventilation channels) must not, without due care, be conducted since this can influence exhaust emissions.
- Seals must not be broken by unauthorised personnel.

⚠ **IMPORTANT!** Use only Volvo Penta Genuine Spare Parts.

The use of non genuine parts implies that AB Volvo Penta will no longer assume responsibility for compliance of the engine with the certified versions.

All types of damage or costs resulting from the use of non genuine Volvo Penta spare parts for the product in question will not be regulated by Volvo Penta.

Our joint responsibility

Every engine consists of a large number of co-ordinated systems and components. The deviation of one component from the technical specification can dramatically increase the impact on the environment from what is otherwise a good engine. It is therefore extremely important to maintain the given tolerances, to implement the correct adjustments where applicable, and to use Volvo Penta Genuine Parts. The time schedule in the engine's maintenance schedule must be followed.

Certain systems, e.g. components in the fuel system, may require special competence and special testing equipment. For environmental reasons certain components are sealed at the factory and must not be worked on by unauthorised persons.

Remember that most chemical products when incorrectly used can be damaging to the environment. Volvo Penta recommends the use of biologically decomposing degreasing agents for all cleaning of engine components, unless otherwise stated in the Workshop Manual. Make sure that oils and suds etc. are treated for destruction and do not unintentionally end up the nature.

Tightening torque

The tightening torque for vital unions that should be tightened with dynamometric wrenches are listed in "Technical data: Tightening torque" and indicated in the work descriptions in the Workshop Manual. All torque denotations are applicable for clean threads, screw heads, and mating surfaces. The torque denotations refer to lightly oiled or dry thread. If lubricants, locking fluids or sealant are required for screw union, then the type is indicated in the work description and in "Tightening torque". For unions where special torque denotations are not indicated, the general tightening torque is applicable according to the table below. A torque denotation is a reference value and the union therefore does not need to be tightened with a dynamometric wrench.

Size	Tightening torque	
	Nm	ft/lb
M5	6	4
M6	10	7
M8	25	18
M10	50	37
M12	80	59
M14	140	103

Angular torque

For angular tightening the screw union is first tightened with a given torque, after which tightening continues at a predetermined angle. Example: for 90° angular torque the union is tightened an additional ¼ turn after the given tightening torque has been achieved.

Lock nuts

Dismantled lock nuts should not be reused but replaced with new ones, since the locking properties become inferior or non existent after multiple use. For lock nuts with plastic inserts, e.g. Nylock®, the tightening torque indicated in the table should be reduced if the Nylock® nut has the same nut height as a standard solid metal hex nut. The tightening torque is reduced by 25 % for bolt sizes of 8 mm or more. For Nylock® nuts with higher nut size, where the solid metal thread is the same height as a standard hex nut, the tightening torque as per the table is applicable.

Strength classes

Nuts and bolts are divided into different strength classes. Their classification is indicated on the bolt head. A high number on the marking represents a stronger material, e.g. a bolt marked 10-9 is stronger than a bolt marked 8-8. It is therefore important when a bolt union is dismantled to return the bolts to their original positions. See the spare parts catalogue when replacing bolts to ensure that the correct version is used.

Sealant

A number of different types of sealant and locking fluids are used on the engine. The sealant has different properties for different union strengths, temperature ranges, resistance to oil and chemicals, and for the different materials and slot sizes in the engine.

It is therefore important to use the correct type of sealant and locking fluid for those unions that require them, in order to ensure satisfactory service work.

The Workshop Manual indicates in the relevant chapters the compounds used when the engines were manufactured.

The same compound, or a compound with equivalent properties but of other manufacture, should be used during the service work.

When using sealant and locking fluids it is important that the surfaces are free from oil, grease, paint and anti-rust agent, and that they are dry.

Always follow the manufacturer's instructions concerning application temperature and hardening times etc. for the product.

Two basic types of sealant are used on the engine, characterised by:

RTV compound (Room Temperature Vulcanising). Often used together with gaskets, e.g. sealing of gasket joints or applied on gaskets. RTV compound is clearly visible when the part has been dismantled, and old RTV compound must be removed before the union is sealed again.

The following RTV compounds are mentioned in the Workshop Manual:

Loctite® 574, Permatex® No. 3, and Permatex® No. 77. Old sealant is removed with denatured spirit.

Anaerobic compounds. These compounds harden on the absence of air. The compound is used when two solid parts, e.g. cast components, are fitted together without a gasket. A common application is also to secure and seal plugs, thread on studs, cocks, and oil pressure sensors etc. Hardened anaerobic compound is transparent and therefore the compounds are dyed to make them visible. Hardened anaerobic compounds are very resistant to solvents and old compound cannot be removed. Before refitting they are carefully degreased, after which new sealant is applied.

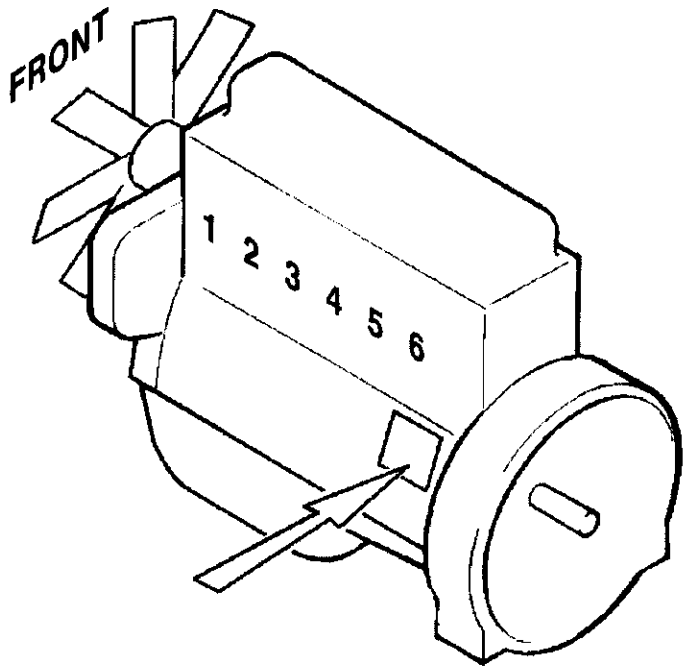
The following anaerobic compounds are mentioned in the Workshop Manual: Loctite® 572 (white coloured) and Loctite® 241 (blue).

NOTE! LoctiteÒ is a registered trademark for Loctite Corporation. PermatexÒ is a registered trademark for Permatex Corporation.

Positioning of engine plates

The engine is supplied with two engine plates, of which one is mounted on the cylinder block as per figure.

The other plate is supplied separately so that it can be mounted at a suitable place in relation to the engine.



1	VOLVO PENTA	
2	ENGINE MODEL	XXXXXXXX
3	SPEC. NO.	XXXXXX
4	SERIAL NO.	XXXXXXXXXX
5	RATED NET POWER without fan kW/hp	XXX/XXX
6	with fan kW/hp	XXX/XXX
7	SPEED AT RATED POWER rpm	XXXX
	PRELIFT mm/INJ. TIMING	X,X+X,X/XX±X,X°
	MADE IN SWEDEN 3826077	

951211-1

1. Engine designation
2. Product number
3. Serial number
4. Engine power, net (without fan)
5. Engine power, net (with fan)
6. Max. revs
7. Stroke position / injection angle (BTDC)

T – Turbo charged
A – Air-to-air, aftercooler
W – Water-to-air, aftercooler
D – Diesel engine
7 – Swept volume, litres
3 – Generation
0 – Version
P – Stationary engine (Power Pac)
G – Gen Set Engine
V – Engine for stationary and mobile operation
M – Mobile engine
E – Engine with emission control

Technical Data

General

Type designation	**TAD730G, TAD730P, TAD730V, TAD740GE, TAD741GE TWD710G, TWD710P, TWD710V, TWD740GE**
In-line, four-stroke diesel engine with direct injection	
Turbo charged, air-to-air cooling of charge air (TAD)	
Turbo charged, water-to-air cooling of the charge air (TWD)	
Number of cylinders	6
Swept volume, TAD740G/TWD740GE	7.28 L (1.92 US gals.) TAD741GE
Swept volume , TAD730G/P/V, TWD710G/P/V	6.73 L (1.78 US gals.)
Firing sequence	1–5–3–6–2–4
Direction of rotation (seen from front)	Clockwise
Cylinder diameter, TAD740G/TWD740GE	107.00 mm (4.2126") TAD741GE
Cylinder diameter, TAD730G/P/V, TWD710G/P/V	104.77 mm (4.1248")
Stroke length, TAD740G/TWD740GE	135 mm (5.31") TAD741GE
Stroke length, TAD730G/P/V, TWD710G/P/V	130 mm (5.12")
Compression ratio, TAD730G/P/V	15.6:1
TWD710G/P/V	14.5:1
TAD740G/TWD740GE	17.2:1
Compression pressure at start engine speed	2300 kPa (333.6 lb/in²) TAD741GE 19,5:1
Weight, dry:	
TAD730G/TAD740G, engine only	901 kg (1986 lb) TAD741GE
TAD730P/V, engine only	876 kg (1931 lb)
TWD710G/TWD740GE, engine only	795 kg (1753 lb)
TWD710P/V, engine only	770 kg (1698 lb)
Idle speed, low (approx.), TAD730G	1300 rpm
TAD730P/V	600 rpm
TWD710G	1300 rpm
TWD710P/V	600 rpm

Performance

Max. power	See relevant engine diagram
Max. torque	See relevant engine diagram

Electrical system

Voltage and type	24 V, insulated from earth
Alternator:	
amperage	60 A
voltage	28 V
power	1700 W
manufacture	Valeo
Battery capacity:	
max.	2 x 143 Ah
min. at > +5°C (41°F)	2 x 88 Ah
Battery electrolyte density at +25°C (77°F)	
fully charged battery	1.28 g/cm³ (0.0462 lb/in³)
battery recharged at	1.24 g/cm³ (0.0448 lb/in³)
Starter motor:	
type	Bosch 5.4 kW/24 V
Starter element	24 V

Short block

Cylinder head

Type	3-cylinder head
Length	421 mm (16.57")
Width	233 mm (9.17")
Height	109.0–109.5 mm (4.291–4.311")
Flame edge groove*	2.8 (+0.1 à -0.2) mm (0.110 (+0.004 à -0.008)")

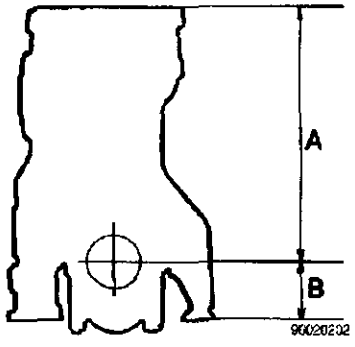
* Must only be machined with tool 9996842.

Cylinder head bolts

Number/cylinder head	20
Thread size	M11
Length	150 mm (5.90")

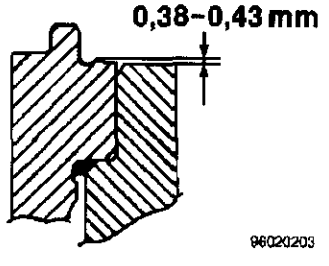
Cylinder block

Length	859 mm (33.82")
Height, upper block plane – crankshaft centre (A) min.	403 mm (15.87")
Height, lower block plane – crankshaft centre (B)	90 mm (3.54")



Cylinder liners

Type	Wet, replaceable
Height, total	259.7 mm (10.224")
Height, total, TAD740G/TWD740GE	256.8 mm (10.110")
Cylinder diameter (no oversize)	104.77 mm (4.1248")
Cylinder diameter (no oversize), TAD740G/TWD740GE	107.00 mm (4.2126")
Step height over block plane	0.38–0.43 mm (0.0150–0.0169")
Step height over block plane, TAD740G/TWD740GE	0.13–0.18 mm (0.0051–0.0071")
Max. difference between 1, 2, 3 and 4, 5, 6	0.02 mm (0.0008")



Pistons, TAD730/TAD740

Height, total	134.45 mm (5.2933")
Centre, gudgeon pins – top of piston	88.40–88.50 mm (3.4803–3.4842")
Number of ring grooves	3
Front marking	Arrow facing forward
Combustion chamber (piston ball)	
Diameter TAD730	67.00 mm (2.6378")
Diameter TAD740	73.00 mm (2.8740")
Depth TAD 730	23.9–24.1 mm (0.941–0.949")
Depth TAD740/TAD741GE	20 mm (0.79")
Piston height over block plane	max. 0.70 mm (0.0276")
Diam. TAD741	69.0 (2.716")

Piston rings TAD730/TAD740/TAD741GE

Compression rings	
Number	2
Top compression ring, molybdenum coated, height TAD730	2.478–2.500 mm (0.09756–0.09842")
Top compression ring, molybdenum coated, height TAD740/TAD741GE	0.30–0.50 mm (0.0118–0.0197")
2nd compression ring, chromium-plated twist ring, height TAD730	3.308–3.330 mm (0.13024–0.13110")
2nd compression ring, chromium-plated twist ring, height TAD740/TAD741GE	0.60–0.80 mm (0.0236–0.0315")
Piston ring gap measured in ring opening	0.30 mm (0.0118")
Oil rings	
Number	1
Height	3.978–4.000 mm (0.15661–0.15748")
Piston ring gap measured in ring opening	0.30 mm (0.0118")

Gudgeon pins

Length	77.300 mm (3.04330")
Clearance gudgeon pin – bushing TAD730	0.016–0.024 mm (0.00062–0.00094")
Clearance gudgeon pin – bushing TAD740/TAD741GE	0.020–0.030 mm (0.00079–0.00118")
Gudgeon pin diameter, standard TAD730	45.000–45.004 mm (1.77165–1.77181")
Gudgeon pin diameter, standard TAD740/TAD741GE	46.996–47.000 mm (1.85023–1.85039")
Gudgeon pin hole diameter in piston TAD730/TAD741GE	45.000–45.008 mm (1.77165–1.77196")
Gudgeon pin hole diameter in piston TAD740/TAD741GE	47.005–47.012 mm (1.85058–1.85086")

Pistons, TWD710/TWD740

Height, total	134.45 mm (5.2933")
Centre, gudgeon pins – top of piston	88.40–88.50 mm (3.4803–3.4842")
Number of ring grooves	3
Front marking	Arrow facing forward
Combustion chamber (piston ball)	
Diameter TWD710	65.00 mm (2.5590")
Diameter TWD740	73.00 mm (2.8740")
Depth TWD710	22.9 mm (0.902")
Depth TWD740	20 mm (0.79")
Piston height over block plane	max. 0.70 mm (0.0276")

Piston rings TWD710/TWD740

Compression rings

Number	2
Top compression ring, molybdenum coated, height TWD710	3.00 mm (0.1181")
Top compression ring, molybdenum coated, height TWD740	0.30–0.50 mm (0.0118–0.0197")
2nd compression ring, chromium-plated twist ring, height TWD710	2.478–2.490 mm (0.09756–0.09803")
2nd compression ring, chromium-plated twist ring, height TWD740	0.60–0.80 mm (0.0236–0.0315")
Piston ring gap measured in ring opening	0.30–0.50 mm (0.0118–0.0197")

Oil rings

Number	1
Height	3.978–3.999 mm (0.15661–0.15744")
Piston ring gap measured in ring opening	0.30–0.55 mm (0.0118–0.0216")

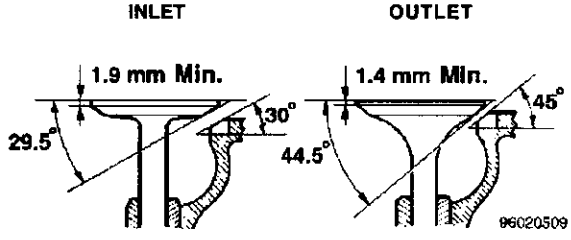
Gudgeon pins

Clearance gudgeon pin – bushing TWD710	0.016–0.024 mm (0.00063–0.00094")
Clearance gudgeon pin – bushing TWD740	0.020–0.030 mm (0.00079–0.00118")
Gudgeon pin diameter, standard TWD710	45.000–45.004 mm (1.77165–1.77181")
Gudgeon pin diameter, standard TWD740	46.996–47.000 mm (1.85023–1.85039")
Gudgeon pin hole diameter in piston TWD710	45.000–45.008 mm (1.77165–1.77196")
Gudgeon pin hole diameter in piston TWD740	47.005–47.012 mm (1.85058–1.85086")

Valve mechanism

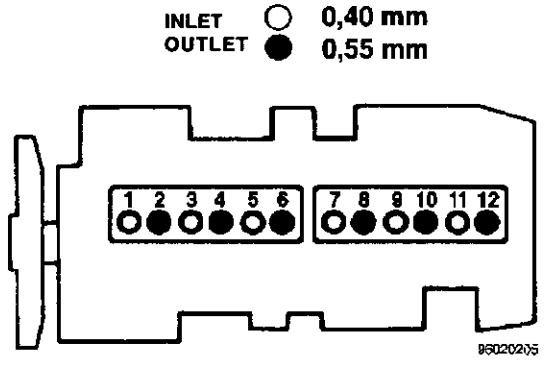
Valves, TAD730/TAD740

Disc diameter:	
Inlet TAD730	43 mm (1.69")
Inlet TAD740/TAD741GE	43 mm (1.69")
Outlet TAD730	37 mm (1.46")
Outlet TAD740/TAD741GE	39 mm (1.53")
Stem diameter:	
Inlet TAD730	10.991–11.000 mm (0.43271–0.43307")
Inlet TAD740/TAD741GE	7.965–7.975 mm (0.31358–0.31398")
Outlet TAD730	10.995–10.997 mm (0.43287–0.43295")
Outlet TAD740/TAD741GE	7.951–7.962 mm (0.31303–0.31346")
Valve seat angle and minimum measurement for edge of valve disc:	
Inlet TAD730/ TAD740/TAD741GE	29.5° min. 1.9 mm (0.075")
Outlet TAD730/TAD740/TAD741GE	44.5° min. 1.4 mm (0.055")



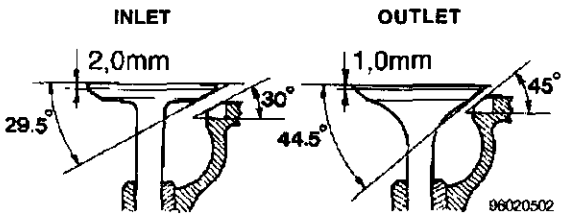
Valve seat angle in cylinder head:	
Inlet TAD730/TAD740	30°
Outlet TAD730/TAD740	45°

Valve clearance, cold engine or normal working temperature

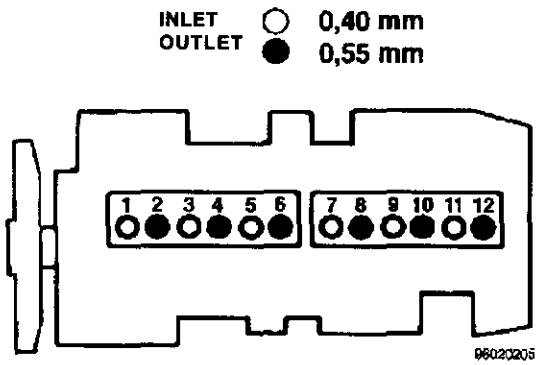


Valves, TWD710/TWD740

Disc diameter:	
Inlet TWD710	43 mm (1.69")
Inlet TWD740	43 mm (1.69")
Outlet TWD710	37 mm (1.46")
Outlet TWD740	39 mm (1.53")
Stem diameter:	
Inlet TWD710	10.982–11.000 mm (0.43236–0.43307")
Inlet TWD740	7.965–7.975 mm (0.31358–0.31398")
Outlet TWD710	10.950–10.968 mm (0.43110–0.43181")
Outlet TWD710	7.951–7.962 mm (0.31303–0.31346")
Valve seat angle and minimum measurement for edge of valve disc:	
Inlet	29.5° mini. 2.0 mm (0.08")
Outlet	44.5° mini. 1.0 mm (0.04")
Valve seat angle in cylinder head:	
Inlet	30°
Outlet	45°

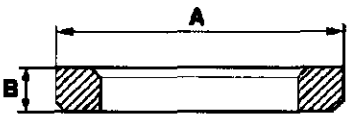


Valve clearance, cold engine or normal working temperature	
Inlet	0.40 mm (0.0157")
Outlet	0.55 mm (0.0216")



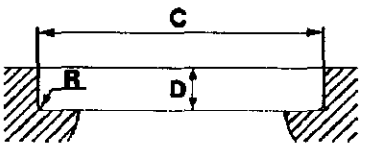
Valve seats, TAD730/TAD740

Outer diameter **(measurement A)** Standard:	
Inlet TAD730	44.564–44.580 mm (1.75448–1.75513")
Inlet TAD740	46.08 mm (1.8142")
Outlet TAD730	44.056–44.082 mm (1.73448–1.73551")
Outlet TAD740	42.07 mm (1.6563")
Oversize:	
Inlet TAD730	44.764–44.780 mm (1.76236–1.76299")
Inlet TAD740	46.28 mm (1.8220")
Outlet TAD730	44.256–44.282 mm (1.74236–1.74338")
Outlet TAD740	42.27 mm (1.6642")
Height **(measurement B)**:	
Inlet TAD730	7.8–7.9 mm (0.307–0.311")
Inlet TAD740	8.15 mm (0.3209")
Outlet TAD730	9.7–9.8 mm (0.382–0.386")
Outlet TAD740	8.65 mm (0.3406")



Position of valve seats, TAD730/TAD740/ TAD741GE

Diameter **(measurement C)**, standard:	
Inlet TAD730	44.500–44.525 mm (1.75196–1.75295")
Inlet TAD740/TAD741GE	46.000–46.025 mm (1.81102–1.81200")
Outlet TAD730	44.000–44.025 mm (1.73228–1.73326")
Outlet TAD740/TAD741GE	42.000–42.025 mm (1.65354–1.65452")
Diameter **(measurement C)**, oversize:	
Inlet TAD730	44.700–44.725 mm (1.75984–1.76082")
Inlet TAD740/TAD741GE	46.200–46.225 mm (1.81890–1.81988")
Outlet TAD730	44.200–44.225 mm (1.74015–1.74114")
Outlet TAD740/TAD741GE	42.200–42.225 mm (1.66141–1.66240")
Depth **(measurement D)**:	
Inlet TAD730	10.00–10.10 mm (0.3937–0.3976")
Inlet TAD740/TAD741GE	9.95–10.05 mm (0.3917–0.3957")
Outlet TAD730	10.00–10.10 mm (0.3937–0.3976")
Outlet TAD740/TAD741GE	9.80–9.90 mm (0.3858–0.3898")
Bottom radius of seat **(measurement R)**:	
Inlet TAD730	0.40–0.70 mm (0.0157–0.0276")
Inlet TAD740/TAD741GE	0.5 mm (0.0197")
Outlet TAD730	0.40–0.70 mm (0.0157–0.0276")
Outlet TAD730/TAD741GE	0.5 mm (0.0197")
Measurement valve disc – cylinder head plane:	
Inlet	0 ±0.2 mm (0 ±0.0079")
Outlet	0 ±0.2 mm (0 ±0.0079")



Valve seats, TWD710/TWD740

Outer diameter **(measurement A)**
Standard:

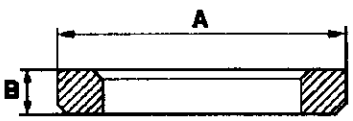
Inlet TWD710	46.064–46.080 mm (1.81354–1.81419")
Inlet TWD740	46.08 mm (1.8142")
Outlet TWD710	44.056–44.092 mm (1.73440–1.73590")
Outlet TWD740	42.07 mm (1.6563")

Oversize:

Inlet TWD710	46.264–46.280 mm (1.82141–1.82204")
Inlet TWD710	46.28 mm (1.8220")
Outlet TWD710	44.256–44.282 mm (1.74236–1.74338")
Outlet TWD710	42.27 mm (1.6642")

Height **(measurement B)**:

Inlet TWD710	6.1–6.2 mm (0.240–0.244")
Inlet TWD740	8.15 mm (0.3209")
Outlet TWD710	8.8–9.0 mm (0.346–0.354")
Outlet TWD740	8.65 mm (0.340")



Position of valve seats, TWD710/TWD740

Diameter **(measurement C)**, standard:

Inlet TWD710	46.000–46.025 mm (1.81102–1.81200")
Inlet TWD740	46.000–46.025 mm (1.81102–1.81200")
Outlet TWD710	44.000–44.025 mm (1.73228–1.73326")
Outlet TWD740	42.000–42.225 mm (1.65354–1.65452")

Diameter **(measurement C)**, oversize:

Inlet TWD710	46.200–46.225 mm (1.81890–1.81988")
Inlet TWD740	46.200–46.225mm (1.81890–1.81988")
Outlet TWD710	44.200–44.225 mm (1.74015–1.74114")
Outlet TWD740	42.200–42.225 mm (1.66141–1.66240")

Depth **(measurement D)**:

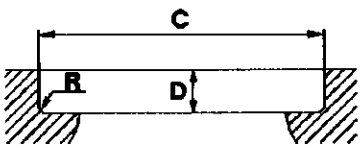
Inlet TWD710	9.995–10.050 mm (0.39350–0.39567")
Inlet TWD740	9.95–10.05 mm (0.3917–0.3957")
Outlet TWD710	9.800–9.900 mm (0.38582–0.38976")
Outlet TWD740	9.80–9.90 mm (0.3858–0.3898")

Bottom radius of seat **(measurement R)**:

Inlet TWD710	0.40–0.70 mm (0.0157–0.0276")
Inlet TWD740	0.5 mm (0.0197")
Outlet TWD710	0.40–0.70 mm (0.0157–0.0276")
Outlet TWD740	0.5 mm (0.0197")

Measurement valve disc – cylinder head plane:

Inlet	2.0–2.4 mm
Outlet	1.0–1.4 mm



Valve guides

Length:

Inlet TWD710	66 mm (2.60")
Inlet TWD740	64.5 mm (2.539")
Outlet TWD710	66 mm (2.60")
Outlet TWD740	-

Inner diameter:

Inlet TWD710	11.032–11.050 mm (0.43433–0.43504")
Inlet TWD740	8.000–8.015 mm (0.31496–0.31555")
Outlet TWD710	11.032–11.050 mm (0.43433–0.43504")
Outlet TWD740	-

Height over cylinder head spring plane:

Inlet TWD710	22 mm (0.87")
Inlet TWD740	19.5 mm (0.768")
Outlet TWD710	22 mm (0.87")
Outlet TWD740	-

Clearance valve guide – guide:

Inlet TWD710	0.032–0.068 mm (0.00126–0.00268")
Inlet TWD740	0.025–0.050 mm (0.00098–0.00197")
Outlet TWD710	0.048–0.084 mm (0.00189–0.00331")
Outlet TWD740	0.038–0.064 mm (0.00150–0.00252")

Valve springs

Outer valve springs

Length, unloaded	64.1 mm (2.542")
Loaded with 250–330 N (25–33 kPa) (56.2–74.2 lbf)	48.6 mm (1.913")

Inner valve springs

Length, unloaded	60.1 mm (2.366")
Loaded with 90–150 N (9–15 kPa) (20.2–33.7 lbf)	44.6 mm (1.756")

Camshaft

Drive	Gear
Number of bearings	7
Diameter, front bearing journal	68.996–69.015 mm (2.71637–2.71712")
2nd bearing journal	66.621–66.640 mm (2.62287–2.62361")
3rd bearing journal	64.223–64.252 mm (2.52846–2.52960")
4th bearing journal	63.446–63.465 mm (2.49787–2.49862")
5th bearing journal	61.058–61.077 mm (2.40385–2.40460")
6th bearing journal	60.271–60.290 mm (2.37287–2.37362")
7th bearing journal	56.296–56.315 mm (2.21637–2.21712")
Axial clearance	0.05–0.13 mm (0.0020–0.0051")
Radial clearance	0.03–0.08 mm (0.0012–0.0031")

From engine No. xxxx/97293

Diameter, front bearing journal	68.985–69.015 mm (2.71594–2.71712")
2nd bearing journal	68.420–68.450 mm (2.69370–2.69488")
3rd bearing journal	67.835–67.865 mm (2.67067–2.67184")
4th bearing journal	67.235–67.265 mm (2.64704–2.64822")
5th bearing journal	66.610–66.640 mm (2.62243–2.62361")
6th bearing journal	66.010–66.040 mm (2.59881–2.59999")
7th bearing journal	56.285–56.315 mm (2.21594–2.21712")
Axial clearance	0.05–0.13 mm (0.0020–0.0051")
Radial clearance	0.035–0.079 mm (0.00138–0.00311")

Inspection of camshaft setting (cold engine and valve clearance = 0) The Inlet valve for cylinder No. 1 should at flywheel position 10° after TDC have opened	3.0±0.25 mm (0.118±0.0098")

Camshaft bearings

Diameter, front bearing	69.050–69.075 mm (2.71850–2.71948")
2nd bearing	66.675–66.700 mm (2.62500–2.62598")
3rd bearing	64.287–64.312 mm (2.53098–2.53196")
4th bearing	63.500–63.525 mm (2.49999–2.50098")
5th bearing	61.112–61.137 mm (2.40598–2.40696")
6th bearing	60.325–60.350 mm (2.37499–2.37598")
7th bearing	56.350–56.375 mm (2.21850–2.21948")

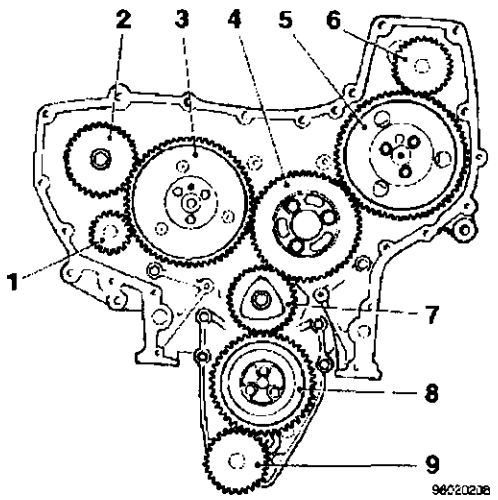
From engine No. xxxx/97293

Diameter, front bearing	69.050–69.075 mm (2.71850–2.71948")
2nd bearing	68.485–68.510 mm (2.69625–2.69724")
3rd bearing	67.900–67.925 mm (2.67322–2.67420")
4th bearing	67.300–67.325 mm (2.64960–2.65058")
5th bearing	66.675–66.700 mm (2.62499–2.62598")
6th bearing	66.075–66.100 mm (2.60137–2.60235")
7th bearing	56.350–56.375 mm (2.21850–2.21948")

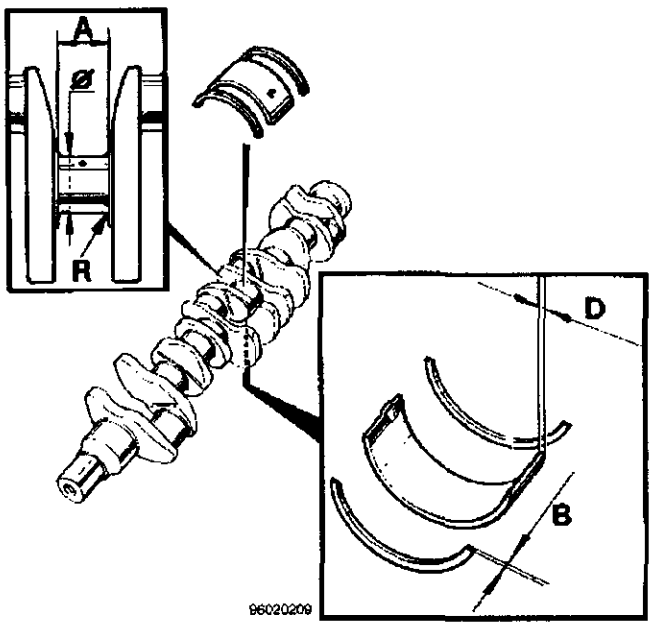
Timing gears

Number of teeth:

Drive gear to servo pump **(1)**	19
Drive gear to compressor **(2)**	33
Camshaft gear **(3)**	60
Intermediate gear **(4)**	51
Drive gear to injection pump **(5)**	60
Drive gear to coolant pump **(6)**	23
Crankshaft gear **(7)**	30
Intermediate gear to oil pump **(8)**	48
Drive gear to oil pump **(9)**	27



Crank action



Crankshaft

Length	950 mm (37.40")
From engine No. xxxx/97293	
Length	1013 mm (39.88")
Crankshaft, axial clearance	0.068–0.268 mm (0.00268–0.01055")
Main bearing, radial clearance	0.065–0.119 mm (0.00256–0.00468")

The crankshaft is nitrocarburised.
Note: A nitrocarburised crankshaft can only be surface ground to max. 2 undersizes, otherwise it must be nitrocarburised again.

Main bearing journals

Diameter **(Ø)**, standard		82.535–82.550 mm (3.24940–3.24999")
undersize	0.25 mm (0.0098")	82.281–82.296 mm (3.23940–3.23999")
	0.50 mm (0.0197")	82.027–82.042 mm (3.22940–3.22999")
	0.75 mm (0.0295")	81.773–81.788 mm (3.21940–3.21999")
	1.00 mm (0.0394")	81.519–81.534 mm (3.20940–3.20999")
	1.25 mm (0.0492")	81.265–81.280 mm (3.19940–3.1999")
From engine No. xxxx/97293		
Diameter **(Ø)**, standard		90.528–90.550 mm (3.56408–3.56495")
undersize	0.25 mm (0.0098")	90.274–90.296 mm (3.55408–3.55495")
	0.50 mm (0.0197")	90.020–90.042 mm (3.54408–3.54495")
	0.75 mm (0.0295")	89.766–89.788 mm (3.53408–3.53495")
	1.00 mm (0.0394")	89.512–89.534 mm (3.52408–3.52495")
	1.25 mm (0.0492")	89.258–89.280 mm (3.51408–3.51495")

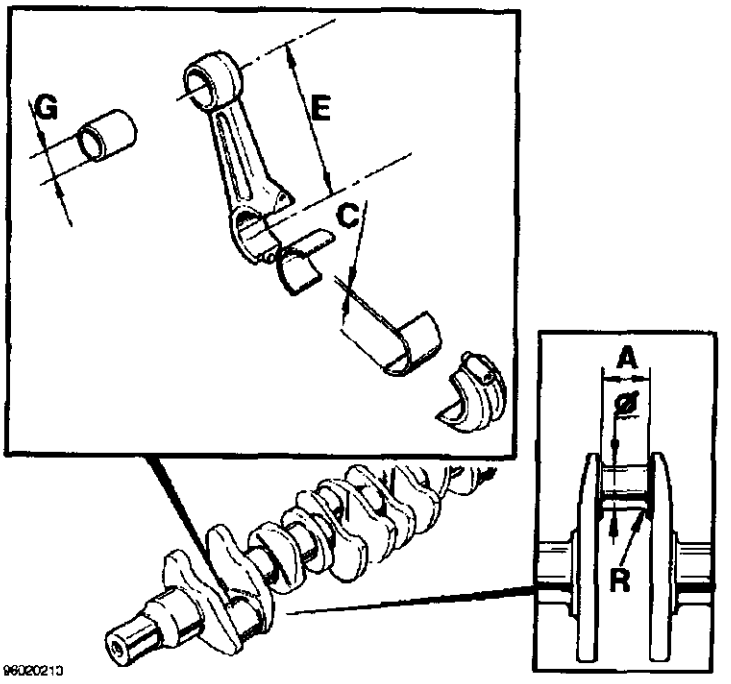
Width, axial bearing journal **(A)**, standard	45.975–46.025 mm (1.81003–1.81200")
Oversize:	
0.2 mm (0.008") (axial bearing 0.1 mm (0.004"))	46.175–46.225 mm (1.81791–1.81988")
0.4 mm (0.002") (axial bearing 0.2 mm (0.008"))	46.375–46.425 mm (1.82578–1.82775")
0.6 mm (0.024") (axial bearing 0.3 mm (0.012"))	46.575–46.625 mm (1.83366–1.83562")
Hole fillet radius **(R)**	3.75–4.0 mm (0.1476–0.1575")

Thrust washers (axial bearings)

Width **(B)**, standard		2.312–2.362 mm (0.09102–0.09299")
oversize	0.1 mm (0.004")	2.412–2.462 mm (0.09496–0.09693")
	0.2 mm (0.008")	2.512–2.562 mm (0.09890–0.10087")
	0.3 mm (0.012")	2.612–2.662 mm (0.10283–0.10480")

Main bearing shells

Type		Amovible
Thickness **(D)**, standard		2.931 mm (0.11539")
oversize	0.25 mm (0.0098")	3.058 mm (0.12039")
	0.50 mm (0.0197")	3.185 mm (0.12539")
	0.75 mm (0.0295")	3.312 mm (0.13039")
	1.00 mm (0.0394")	3.439 mm (0.13539")
	1.25 mm (0.0492")	3.566 mm (0.14039")



Big end bearing journals

Diameter (Ø), standard	69.837–69.850 mm (2.74948–2.74999")
undersize 0.25 mm (0.0098")	69.583–69.596 mm (2.73948–2.73999")
0.50 mm (0.0197")	69.329–69.342 mm (2.72948–2.72999")
0.75 mm (0.0295")	69.075–69.088 mm (2.71948–2.71999")
1.00 mm (0.0394")	68.821–68.834 mm (2.70948–2.70999")
1.25 mm (0.0492")	68.567–68.580 mm (2.69948–2.69999")
Width (A) big end bearing journal	43.900–44.000 mm (1.72834–1.73228")
Hole fillet radius (R)	3.75–4.0 mm (0.1476–0.1575")

Big end bearing shells

Thickness (C), standard	1.908 mm (0.07512")
oversize 0.25 mm (0.0098")	2.035 mm (0.08012")
0.50 mm (0.0197")	2.162 mm (0.08512")
0.75 mm (0.0295")	2.289 mm (0.09012")
1.00 mm (0.0394")	2.416 mm (0.09512")
1.25 mm (0.0492")	2.543 mm (0.10012")

Connecting rods

Length, centre – centre (E)	230 mm (9.06")
Marking:	
Connecting rod and cap	1 to 6
"FRONT" on shaft, facing	Forward
Gudgeon pin's internal diameter (G)	45.020–45.024 mm (1.77244–1.77260")
Axial clearance, connecting rod – crankshaft	0.250 mm (0.00984")
Radial clearance, big end	0.087 mm (0.00342")

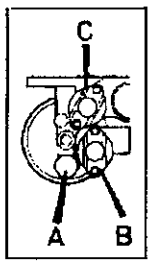
Flywheel, fitted

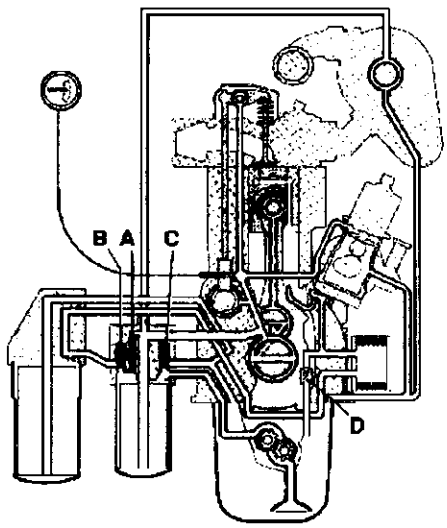
Max. permitted axial runout measured radius 150 mm	0,15 mm (0.0059")
Gear ring on flywheel	140 teeth

Flywheel casing, fitted

Max. permitted axial runout for rear mating plane, flywheel casing	0.15 mm (0.0059")
Max. permitted radial runout inner guide edge, flywheel casing	0.25 mm (0.0098")

Lubricating system



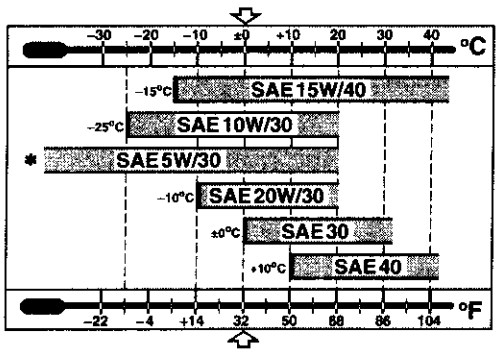


Lubricating system, general

Oil capacity:	
incl. filter	29 L (7.66 US gals.)
excl. filter	24 L (6.34 US gals.)
Difference between MIN – MAX	8 L (2.11 US gals.)
Oil change interval	See manual
Oil pressure:	
operating speed	250–550 kPa (36.3–79.8 lb/in²)
idle (min.)	150 kPa (21.8 lb/in²)
Oil temperature:	
normal	110°C (230°F)
max.	120°C (248°F)
Oil filter, mesh size	0.040 mm (0.00157")

Lubricanting oil, engine

Oilgrade	Sulfur content in fuel, by weight		
	< 0,5 %	0,5 – 1,0 %	> 1,0 %[1]
	Oil change interval, reached first in operation		
VDS-3 VDS-2 **and** ACEA: E7 [2] VDS-2 **and** ACEA: E5 [2] VDS-2 **and** Global DHD-1 [2] VDS-2 **and** API: CI-4 [2] VDS-2 **and** API: CH-4 [2]	**400** h / 12 months	**200** h / 12 months	**100** h / 12 months
VDS **and** ACEA: E3 [2]	**300** h / 12 months	**150** h / 12 months	**75** h / 12 months
ACEA: E7, E5, E4 API: CI-4, CH-4, CG-4	**150** h / 12 months	**75** h / 12 months	**40** h / 12 months



The viscosity is selected as per the table below.
Temperatures refer to stable outdoor temperatures.

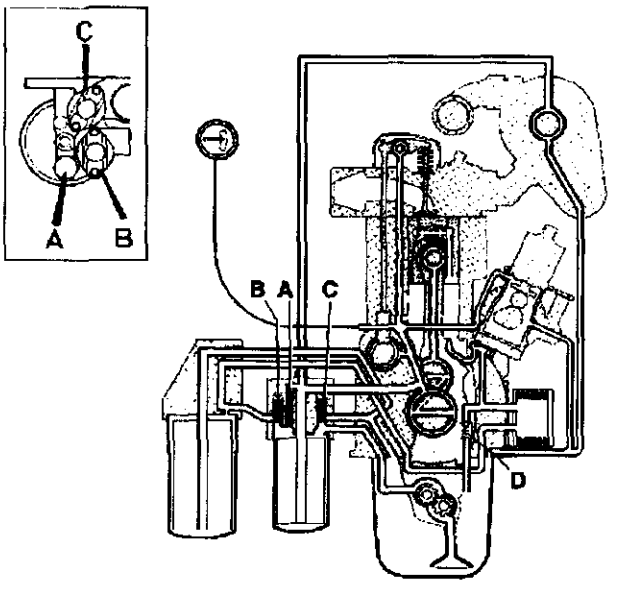
* Refers to synthetic or semi-synthetic oil.

Lubricating oil pump

Type	Gear
Number of teeth:	
drive gear	27
intermediate gear	48
Diameter:	
intermediate gear journal	63.99 mm (2.5193")
bushing, intermediate gear	64.05 mm (2.5216")
Axial clearance:	
pump gear	0.07–0.15 mm (0.0028–0.0059")
intermediate gear	0.10–0.18 mm (0.0039–0.0071")
Distance drive gear – oil housing bracket	1.0–1.5 mm (0.0393–0.0590")

Oil filter

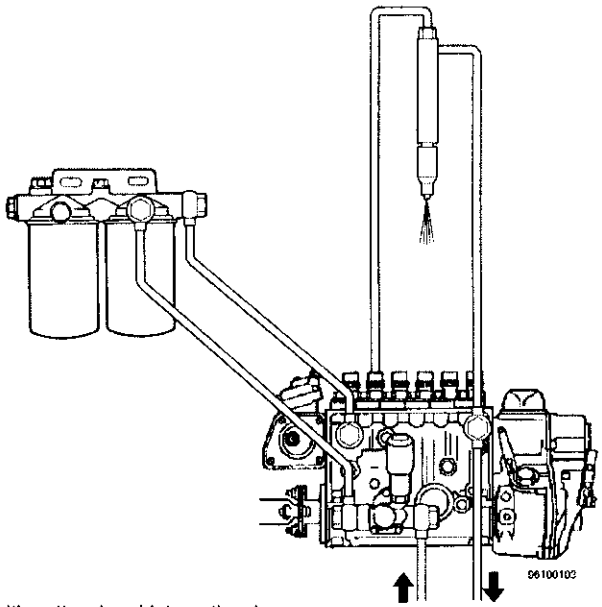
Bypass	1
Full flow	1
Mesh size	0.04 mm (0.0016")



Oil valves

A. Overflow valve:	
Type	Compression spring
Spring length:	
unloaded	68.8 mm (2.709")
loaded (max.)	30.0 mm (1.181")
B. Piston cooling valve:	
marking:	White
C. Reducing valve:	
marking: TWD710/TWD740	Black
TAD730/TAD740/TAD741GE	Yellow
D. Bypass valve for piston cooling, TAD730G/P/V only:	
marking	–

Fuel system



The fuel should as a minimum comply with national and international standards for market fuel, e.g.

EN 590 (with nationally adjusted environmental and temperature requirements).

ASTMD D 975 No. 1-D and 2-D

JIS KK 2204

Sulphur content: As per applicable legislation in resp. country.

There are significant variations in the specifications for commercial fuel, which influence engine power and fuel consumption. The reported engine powers are measured with fuel as per ISO 3046 with a lowest calorie value of 42700 kJ/kg and a density of 840 g/L + 15° C. (59°F).

Feed pump

Type	FP/KG 24 P 200
Pressure, feed pump	150 kPa (21.8 lb/in²)
Max. induction height	2.0 m (6.152 ft)

Injection pump

Manufacture, type:	
TAD730G	Bosch PE6P 120A 300 RS3315
TAD740G/TWD740GE/TAD741GE	Bosch PES6P 120B 300 RS3393
TAD730P/V	Bosch PE6P 120A 320 RS3206
TWD710G	Bosch PE6P 120A 320 RS3189 ou Bosch PE6P 120A 300 RS3075 (avec GAC)
TWD710P/V	Bosch PE6P 120A 320 RS3189
Regulator, manufacture, type:	
TAD730G	electronic/GAC
TAD740G/TWD740GE/TAD741GE	electronic/GAC 175
TWD710G	RSV 650–750 P4A421 alt. GAC
TAD730P/V	RSV 250–1100 P1A560
TWD710P/V	RSV 250–900 P1A
Pump element, diameter:	12 mm (0.04")
Timing: TAD741GE (1800 rpm)	9°± 0.5°BTDC
TAD740GE (1500 rpm)	10° ± 0.5° BTDC
TAD740GE (1800 rpm)	12° ± 0.5° BTDC
TWD740GE	10° ± 0.5° BTDC
TWD710G/P/V	17° ± 0.5° BTDC
Lift from basic circle (stroke position):	
TAD730G	3.55 (+0.05) mm (0.0116 (+0.0002)")
TAD730P/V	3.65 (+0.05) mm (0.0120 (+0.0002)")
TWD710G/P/V	2.65 (+0.05) mm (0.0087 (+0.0002)")
TAD740G/TWD740GE/TAD741GE	3.55 (+0.05) mm (0.0116 (+0.0002)")

Injectors

Designation, nozzle retainer, TAD730G/P/V	KBEL 98 P74
nozzle retainer, TAD740G/TWD740GE/TAD741GE	KBEL 98 P74
nozzle retainer, TWD710G/P/V	KBEL 98 P27
nozzle, TAD730G	DLLA 145 P393
nozzle, TAD730P/V	DLLA 145 P392
nozzle, TWD710G/P/V	DLLA 143 P123
nozzle, TAD741GE	DSLA 143 P1099
Marking, complete injector	
TAD730G	686
TAD730P/V	685
TAD740G/TWD740GE	3827030
TWD710G/P/V	805
TAD741GE	3830947
Opening pressure, TAD730G/P/V	30.0 MPa (306 kp/cm²) (4351.1 lb/in²)
TWD710G/P/V	25.0 MPa (255 kp/cm²) (3625.9 lb/in²)
TAD740G/TWD740GE/TAD741GE	29.0 MPa (296 kp/cm²) (4206.1 lb/in²)
Adjustment pressure, new spring,	
TAD730G/P/V	30.5 (+0.8) MPa (311 (+8) kp/cm²) (4423.6 (+116.0) lb/in²)
TWAD740G/TWD740GE/TAD741GE	29.5 (+0.8) MPa (301 (+8) kp/cm²) (4278.6 (+116.0) lb/in²)
TWD710G/P/V	25.5 (+0.8) MPa (260 (+8) kp/cm²) (3698.5 (+116.0) lb/in²)
Hole diameter:	
TAD730G	5 x 0.32 mm (0.00105")
TAD730P/V	5 x 0.35 mm (0.00115")
TAD740GE/TWD740GE	6 x 0.29 mm (0.00095")
TWD710G/P/V	4 x 0.38 mm (0.00124")
TAD741GE	6 x 0.29 mm (0.00095")

Cooling system

Type	Overpressure, closed
Pressure valve in cooler opens at	70 kPa (0.7 kp/cm²) (10.1 lb/in²)
Recommended coolant:	
Volvo Penta ethylene glycol or Volvo Penta anticorrosion agent together with fresh water	
Coolant volume, TAD730G/P/V/TAD740GE/TAD741GE:	
engine	16 litres (4.23 US gals.)
engine, incl. standard cooler and hoses	37 litres (9.77 US gals.)
Coolant volume, TWD710G/P/V:	
engine	16 litres (4.23 US gals.)
engine, incl. standard cooler and hoses	34 litres (8.98 US gals.)
Thermostat:	
marking	Blue
starts opening at	75°C (167°F)
fully open at	88°C (190°F)

Intake and exhaust system

Turbocharger

Type, TAD730G/P/V	Schwitzer S2B 83.27 AHCR/1.00D11
TWD710G	Holset H2A 8253AB/H16JA8
TWD710P (old version)	Holset H1E 8243AB/H16JA8
TWD710P (new version), TWD710V	Holset H2A 8253AB/H16JA8
TAD740GE/TAD741GE	S200/80H27BECRM/1,0DA7
TWD740GE	S200/80H27BEDAM/0,84DA7
Lubricating system	Pressure lubricating

Charge pressure, TAD730G

	1500 rpm	1800 rpm
Prime power, kPa (lb/in²)	132 (19.1)	155 (22.5)

Charge pressure, TAD740GE

	1500 rpm	1800 rpm
Prime power, kPa (lb/in²)	165 (23.9)	170 (24.6)

Charge pressure, TAD741GE

	1500 rpm	1800 rpm
Prime power, kPa (lb/in²)	–	190 (27.5)

Charge pressure, TWD710G

	1500 rpm	1800 rpm
Prime power, kPa (lb/in²)	129 (18.7)	157 (22.8)

Charge pressure, TWD740G

	1500 rpm	1800 rpm
Continuous power, kPa (lb/in²)	135 (19.6)	175 (25.4)

Charge pressure, TAD730P/V

	1500 rpm	1800 rpm	2000 rpm	2200 rpm
Continuous power, kPa (lb/in²)	130 (18.8)	150 (21.8)	152 (22.0)	150 (21.8)

Charge pressure, TAD710P/V

	1500 rpm	1800 rpm	2000 rpm	2200 rpm
Continuous power, kPa (lb/in²)	105 (15.2)	127 (18.4)	143 (20.7)	148 (21.5)

Exhaust system

	1500 rpm	1800 rpm	2000 rpm	2200 rpm
Exhaust temperature after turbine wheel (°C) (°F):				
TAD730G, prime power	558 (1036)	497 (927)		
standby power (without fan)	596 (1104)	550 (1022)		
TAD740GE, prime power	540 (1004)	525 (977)		
standby power (without fan)	485 (905)	465 (869)		
TWD710G, prime power	525 (977)	490 (914)		
standby power (without fan)	560 (1040)	525 (977)		
TWD740GE, prime power	525 (977)	465 (869)		
standby power (without fan)	540 (1004)	480 (896)		
TAD730P/V, continuous power	580 (1076)	540 (1004)	540 (1004)	530 (986)
TWD710P/V, continuous power	550 (1022)	520 (968)	500 (932)	510 (950)
TAD741GE, prime power		480 (896)		
standby power (without fan)		490 (914)		
Max. permitted back-pressure in exhaust pipe (kPa) (lb/in²):				
TAD730G	5.0 (0.725)	7.0 (1.015)		
TAD740GE	10 (1.45)	10 (1.45)		
TAD730P/V	5.6 (0.812)	6.6 (0.957)	9.9 (1.436)	12.0 (1.740)
TWD710G	5.0 (0.725)	7.0 (1.015)		
TWD740GE	10 (1.45)	10 (1.45)		
TWD710P/V	5.6 (0.812)	8.0 (1.160)	9.9 (1.436)	12.0 (1.740)
TAD741GE		10 (1.45)		

	TAD730G 1500 rpm	1800 rpm
Max. combustion pressure (MPa) (lb/in²):		
prime power	14.0 (2030.5)	13.8 (2001.5)

	TAD740GE 1500 rpm	1800 rpm
Max. combustion pressure (MPa) (lb/in²):		
prime power	16.0 (2320.6)	15.5 (2248.1)

	TAD730P/V 1800 rpm	2200 rpm
Max. combustion pressure (MPa) (lb/in²):		
continuous power	13.1 (1900.0)	12.0 (1740.4)

	TWD710G 1500 rpm	1800 rpm
Max. combustion pressure (MPa) (lb/in²):		
prime power	12.6 (1827.5)	12.5 (1813.0)

	TWD740GE 1500 rpm	1800 rpm
Max. combustion pressure (MPa) (lb/in²):		
prime power	14.0 (2030.5)	14.1 (2045.0)

	TWD710P/V 1800 rpm	2200 rpm
Max. combustion pressure (MPa) (lb/in²):		
continuous power	12.8 (1856.5)	12.2 (1769.5)

	TAD741GE 1500 rpm	1800 rpm
Max. combustion pressure (MPa) (lb/in²):		
prime power		16.2 (2350.0)

Wear tolerances

The wear tolerances are only applicable for engines: TAD730G/P/V, T WD710G/P/V (TAD740GE, TWD740GE not available)

Cylinder liners

Cylinder liners (pistons and piston rings) should be replaced after 0.35 – 0.40 mm (0.0011–0.0013") of wear, or if the oil consumption is abnormally high.

Crankshaft

Max. permitted ovality on main and big end bearing journals	0.08 mm (0.0003")
Max. permitted conicity on main and big end bearing journals	0.05 mm (0.0002")
Max. axial clearance on crankshaft	0.40 mm (0.0013")

Connecting rods

Linearity, max. permitted wear	0.05 mm (0.0002")
Distortion, max. deviation on 100 mm of measured length	0.10 mm (0.0003")

Valves

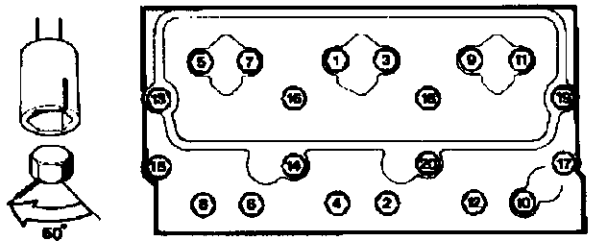
Valve stem, max. permitted wear		0.02 mm (0.0008")
Max. permitted clearance between valve stem and valve guide:		
Inlet		0.33 mm (0.0130")
Outlet		0.38 mm (0.0150")
The edge of the valve disc should be at least:		
Inlet	TAD730G/P/V	1.9 mm (0.075")
Outlet	TAD730G/P/V	1.4 mm (0.055")
Inlet	TWD710G/P/V	2.0 mm (0.079")
Outlet	TWD710G/P/V	1.0 mm (0.039")
The valve seat may be ground down until the distance from the valve disc (new valve) to the cylinder head plane is max:		
Inlet	TAD730G/P/V	0.2 mm (0.008")
Outlet	TAD730G/P/V	0.2 mm (0.008")
Inlet	TWD710G/P/V	3.0 mm (0.118")
Outlet	TWD710G/P/V	2.0 mm (0.079")

Camshaft

Max. permitted ovality (with new bearings)	0.05 mm (0.0002")
Bearing, max. permitted wear	0.05 mm (0.0002")
Lift height, min.:	
Inlet	7.8 mm (0.307")
Outlet	8.0 mm (0.315")
Valve lifter, max. permitted radial clearance	0.08 mm (0.0003")

Tightening torque

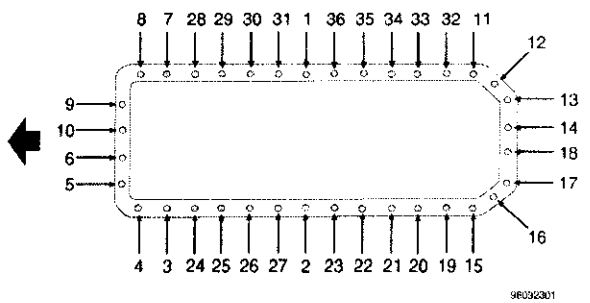
	Nm	ft/lb
Cylinder head (tightened in four steps)*		
First tightening	30	22
Second tightening	90	66
Third tightening	90	66
Final tightening (angle tightening) *(see diagram above)*	60°	



Angular tightening	Tightening sequence	
Main bearing	150 ±10	111 ±7
As from engine No. xxxx/097293:		
step 1	150 ±15	(111 lbf.ft)
step 2, angle tightening	90° ±5°	
Axial bearing, camshaft	65 ±7	48 ±5
Timing gear casing	33 ±4	24 ±3
Drive gear, camshaft	60 ±6	44 ±4
Drive gear, injection pump,		
TAD730G/P/V	33 ±4	24 ±3
TWD710G/P/V	60 ±6	44 ±4
Gear, injection pump, TAD740G, TWD740GE	60 ±6	44 ±4
Intermediate gear bearing	90 ±9	66 ±7
Bearing block, rocker arm mechanism	65 ±7	48 ±5
Oil pan:		
gasket with inserted silicon string	16 ±2	12 ±1
other gaskets	24 ±3	18 ±2
(tightening as per separate sequence, see figure below)		
Drain plug, oil pan	80 ±8	59 ±6
Bracket, oil pump	65 ±7	48 ±5
Intermediate gear, oil pump	33 ±4	24 ±3
Connecting rod		
TAD730G/P/V, TWD710G/P/V	190 ±10	140 ±7
TAD740G, TWD740GE	35 ±5	26 ±4
	90° angular tightening	
Flywheel	190 ±10	140 ±7
Pulley, crankshaft	90 ±9	66 ±7
Flywheel casing	140 ±14	103 ±10
Centre bolt, crankshaft	260 ±25	192 ±18
Pressure valve retainer, injection pump	85 ±9	63 ±7
Nut for attachment yoke, injector	50 ±5	37 ±4
Clamp bolt, coupling, injection pump,		
TAD730G/P/V	90 ±9	66 ±7
TAD740G	–	
TWD710G/P/V	60 ±6	44 ±4
TWD740GE	–	
Pump coupling, companion flange,		
TAD730G/P/V	62 ±5	46 ±4
TAD740G	–	
TWD710G/P/V	30 ±3	22 ±2
TWD740GE	–	
Cleaning plugs in cylinder block	70 ±7	52 ±5
Collector pipe	48 ±5	35 ±4

* Before fitting the bolts dip completely in antirust agent 282036. The third step is to check the torque.

Tightening sequence, oil pan



Notes