workshop manual for 4.2482, 4.248, T4.236, 4.236, 4.212 & T4.38 diesel engines

Perkins Engines Limited

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CONTENTS

*Operating and maintenance information can be found in the multi-lingual 4.236 Series Users Handbook.

Unified Threads and Engine No. Location

All threads used on the 4.2482, 4.248, T4.236, 4.236 and 4.212 Engines except perhaps on proprietary equipment are Unified Series, and American Pipe Series. Later engines use some metric threads.

Unified threads are not interchangeable with B.S.F. and although B.S.W. have the same number of threads per inch as Unified Coarse Series, interchanging is not recommended, due to a difference in thread form.

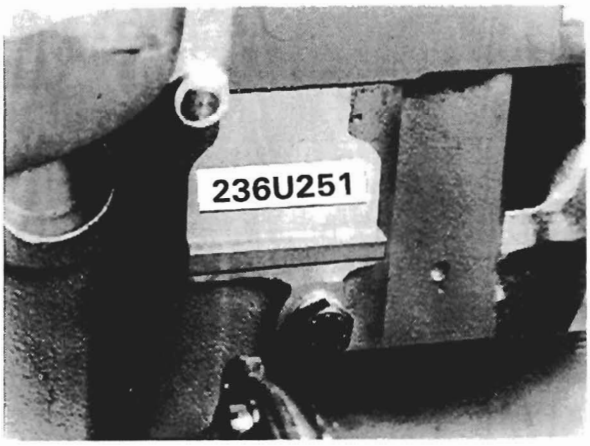
The Engine Number is stamped on the cylinder block as shown in the illustrations. The number position and composition have been changed at various times as detailed below.

Early 4.236 engines (Phase I Type) are stamped on a pad on the right hand side of the cylinder block above the rear end of the tappet cover. The number consists of 7 digits commencing with the figure '4'. Where a letter 'A' follows the engine number, the cylinder block is fitted with ½in diameter cylinder head studs.

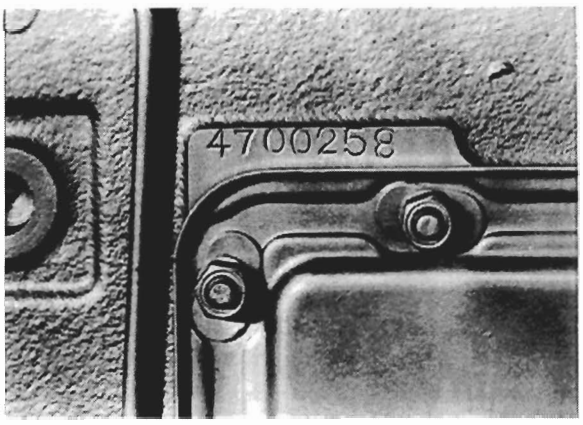
Later 4.236 engines (Phase II Type) and earlier 4.248 and 4.212 engines are stamped on a pad on the right hand side of the cylinder block above the dynamo or alternator. The number consists of a combination of figures and letters, e.g. 248U251, 236U251 or 212U251. Other letters may be included in the combination, denoting specific information, e.g. a letter 'C' at the end of the number indicates that the engine is fitted with chrome plated cylinder liners.

Current engines numbers are stamped on a label which is fitted to the left hand side of the cylinder block above the fuel injection pump. Some engines also have the engine number stamped at the top of the rear face of the cylinder block. A typical number for this latest system is LD21498U510256D.

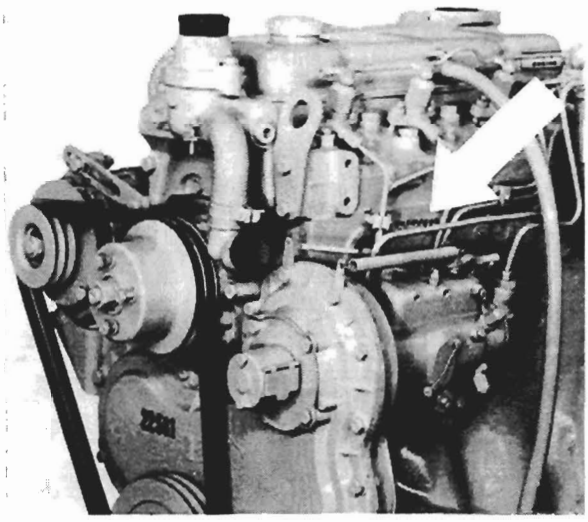
The engine number should be quoted in full and in the correct sequence, together with the type of vehicle or machine in which it is fitted, when requesting information or ordering parts.



Engine Number Location
(Earlier 4.248, Phase II 4.236 and 4.212 engines)



Engine Number Location
(4.236 Phase I Type)



Engine Number Location
(Current Engines)

FOREWORD

This Workshop Manual has been compiled for use in conjunction with normal workshop practice. Mention of certain accepted practices, therefore, has been purposely omitted in order to avoid repetition.

Reference to renewing joints and cleaning off joint faces, has to a great extent been omitted from the text, it being understood that this will be carried out where applicable.
Similarly, it is understood that in reassembly and inspection, all parts are to be thoroughly cleaned, and where present, burrs and scale are to be removed.
It follows that any open ports of high precision components, e.g. fuel injection equipment, exposed by dismantling, will be blanked off until reassembled, to prevent the ingress of foreign matter.

To give improved sealing, later engines are built with controlled swell type joints which are fitted dry.

When fitting setscrews into "through" holes into the interior of the engine, a suitable sealant should be used.

Note: Some setscrews may already have sealant coated threads. These can be identified by the colour of the threads which will be red or blue etc.

Engines built for Massey Ferguson applications are designated A4.248, A4.236, AT4.236 and A4.212. Where information specific to these engines is referred to, the appropriate engine designation is given, otherwise the information is the same as listed under standard engine types.

For T4.38 engines, the information given will apply as for T4.236 engines, unless otherwise stated.

Throughout this manual, whenever the "left" or right" hand side of the engine is referred to, it is that side of the engine when viewed from the flywheel end.

Most of the general information which is included in the multi-lingual 4.236 Series Users Handbooks has not been repeated in this workshop manual and the two publications should be used together.

Read and remember the "Safety precautions". They are given for your protection and must be used at all times.

SAFETY PRECAUTIONS

THESE SAFETY PRECAUTIONS ARE IMPORTANT. You must refer also to the local regulations in the country of use. Some items only apply to specific applications.

- Only use these engines in the type of application for which they have been designed.
- Do not change the specification of the engine.
- Do not smoke when you put fuel in the tank.
- Clean away fuel which has been spilt. Material which has been contaminated by fuel must be moved to a safe place.
- Do not put fuel in the tank while the engine runs (unless it is absolutely necessary).
- Do not clean, add lubricating oil, or adjust the engine while it runs (unless you have the correct training; even then extreme caution must be used to prevent injury).
- Do not make adjustments that you do not understand.
- Ensure that the engine does not run in a location where it can cause a concentration of toxic emissions.
- Other persons must be kept at a safe distance while the engine, or equipment, is in operation.
- Do not permit loose clothing or long hair near moving parts.
- Keep away from moving parts during engine operation. **Attention:** Some moving parts cannot be seen clearly while the engine runs.
- Do not operate the engine if a safety guard has been removed.
- Do not remove the filler cap of the cooling system while the engine is hot and while the coolant is under pressure, because dangerous hot coolant can be discharged.
- Do not use salt water or any other coolant which can cause corrosion in the closed coolant circuit.
- Do not allow sparks or fire near the batteries (especially when the batteries are on charge) because the gases from the electrolyte are highly flammable. The battery fluid is dangerous to the skin and especially to the eyes.
- Disconnect the battery terminals before a repair is made to the electrical system.
- Only one person must control the engine.
- Ensure that the engine is operated only from the control panel or from the operator's position.
- If your skin comes into contact with high-pressure fuel, obtain medical assistance immediately.
- Diesel fuel and lubricating oil (especially used lubricating oil) can damage the skin of certain persons. Protect your hands with gloves or a special solution to protect the skin.
- Do not wear clothing which is contaminated by lubricating oil. Do not put material which is contaminated with oil into the pockets.
- Discard used lubricating oil in a safe place to prevent contamination.
- Do not move mobile equipment if the brakes are not in good condition.
- Ensure that the control level of the transmission drive is in the "out-of-drive" position before the engine is started.
- Use extreme care if emergency repairs must be made at sea or in adverse conditions.
- The combustible material of some components of the engine (for example certain seals) can become extremely dangerous if it is burned. Never allow this burnt material to come into contact with the skin or with the eyes.
- Read and use the instructions relevant to asbestos joints given on this page.
- Fit only genuine Perkins parts.

Asbestos Joints

Some joints and gaskets contain compressed asbestos fibres in a rubber compound or in a metal outer cover. The "white" asbestos (Chrysotile) which is used is a safer type of asbestos and the risk of damage to health is extremely small.

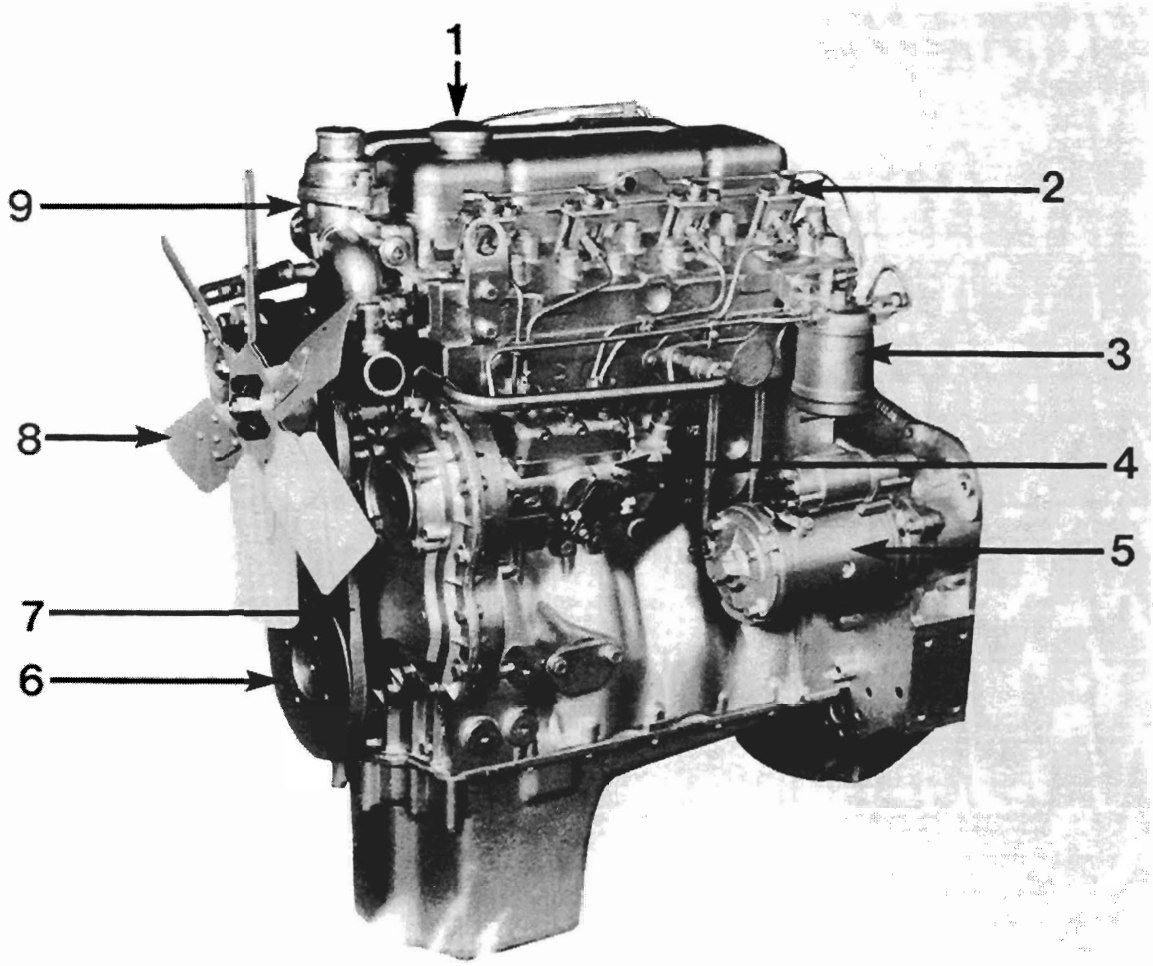
The risk of asbestos from joints occurs at their edges or if a joint is damaged when a component is removed or if a joint is removed by abrasion.

To ensure that the risk is kept to a minimum, the procedures given below must be applied when an engine which has asbestos joints is dismantled or assembled.

- Work in an area with good ventilation.
- Do not smoke.
- Use a hand scraper to remove the joints – do not use a rotary wire brush.
- Ensure that the joint to be removed is wet with oil or water to contain loose particles.
- Spray all loose asbestos debris with water and put it in a closed container which can be sealed for safe disposal.

Engine Photographs
SECTION A

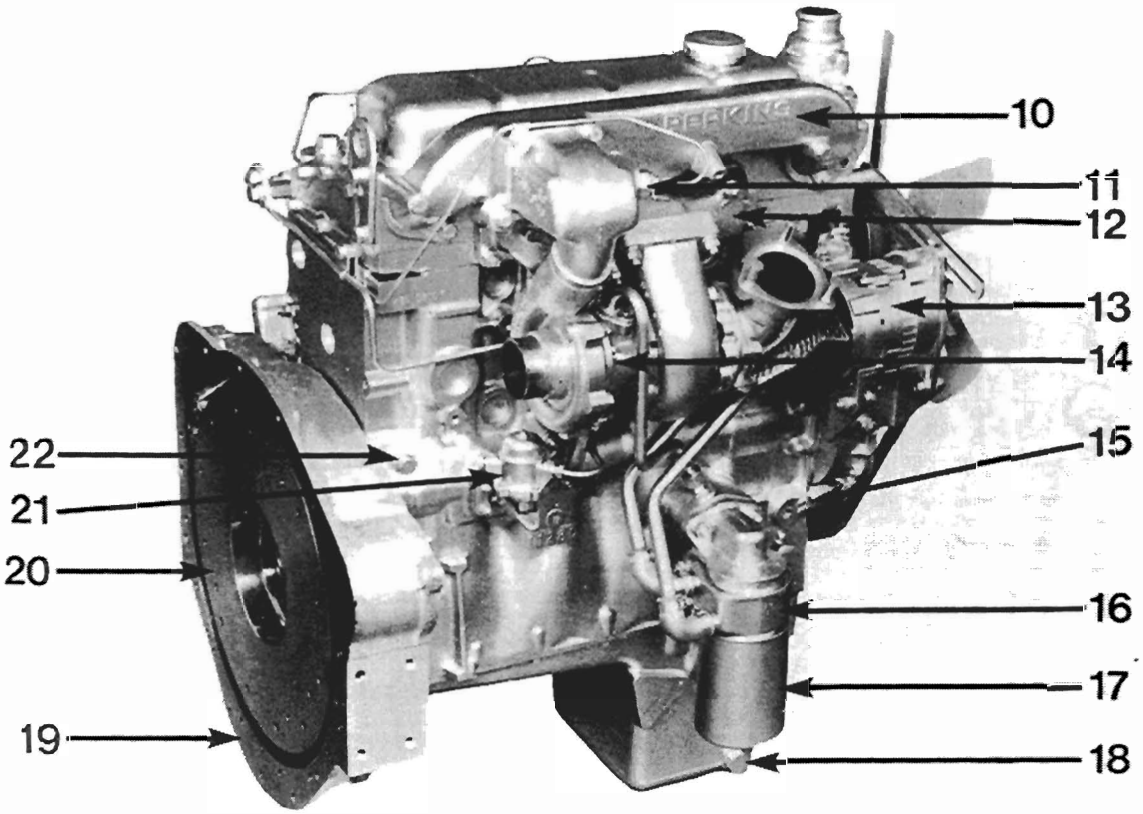
Perkins Engines are built to individual requirements to suit the applications for which they are intended and the following engine views do not necessarily typify any particular specification.



A1

VIEW OF FUEL PUMP SIDE OF T4.236 ENGINE

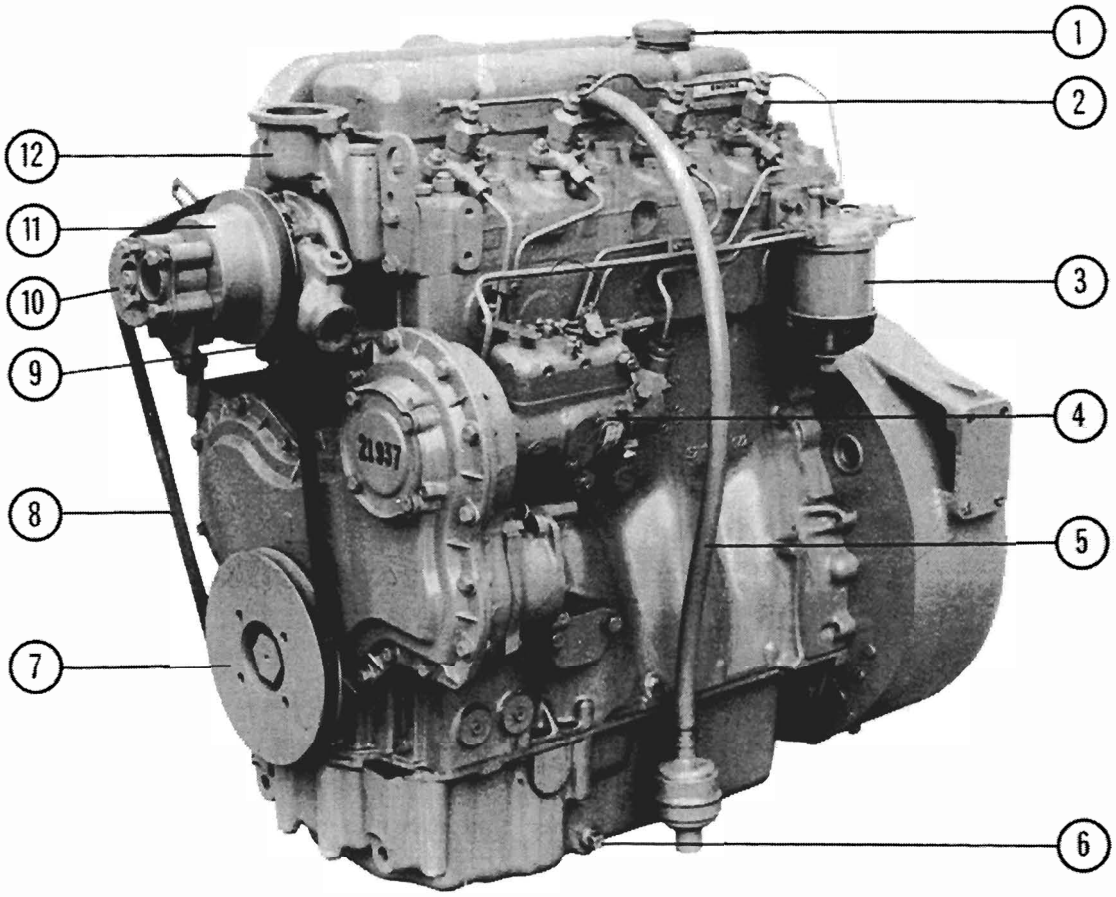
1. Lubricating Oil Filler Cap
2. Atomiser
3. Fuel Filter
4. Fuel Injection Pump
5. Starter Motor
6. Crankshaft Pulley
7. Fan Belt
8. Fan
9. Thermostat Housing



A2

VIEW OF CAMSHAFT SIDE OF T4.236 ENGINE

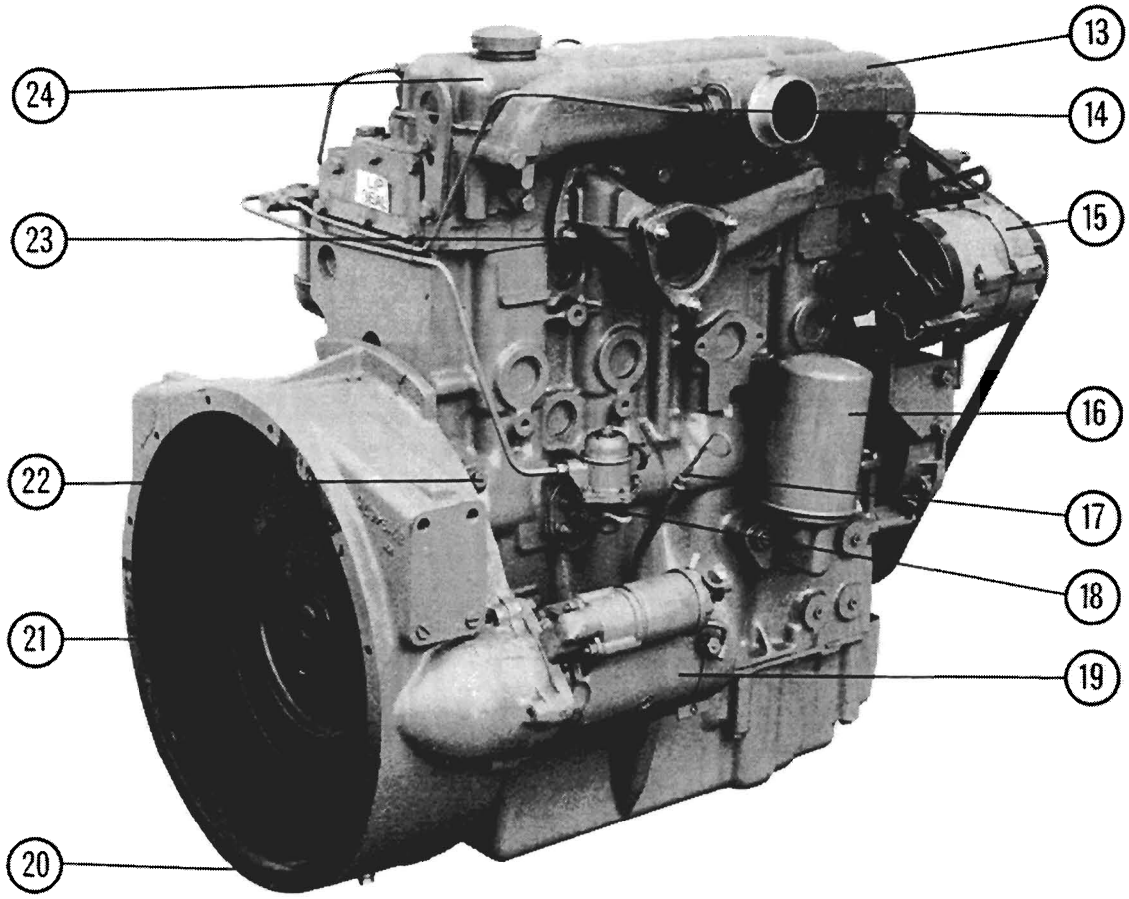
10. Induction Manifold
11. Thermostart
12. Exhaust Manifold
13. Alternator
14. Turbocharger
15. Lubricating Oil Dipstick
16. Lubricating Oil Cooler
17. Lubricating Oil Filter
18. Lubricating Oil Sump Drain Plug
19. Flywheel Housing
20. Flywheel
21. Fuel Lift Pump
22. Cylinder Block Drain Plug



A3

VIEW OF FUEL PUMP SIDE OF 4.248, 4.236 AND 4.212 ENGINES

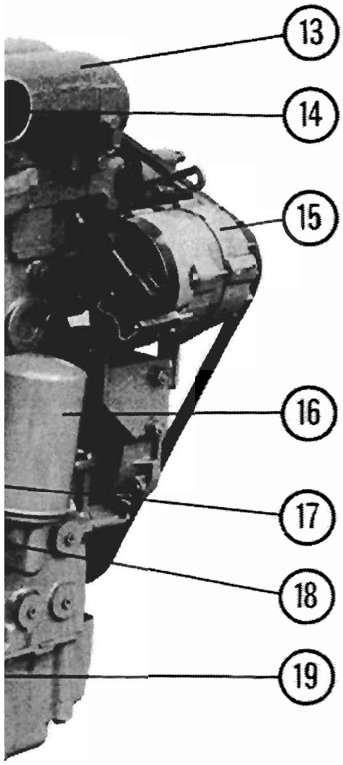
1. Lubricating Oil Filler Cap
2. Atomiser
3. Fuel Filter
4. Fuel Injection Pump
5. Breather Pipe
6. Sump Drain Plug
7. Crankshaft Pulley
8. Fan Belt
9. Water Inlet
10. Alternator Pulley
11. Water Pump Pulley
12. Thermostat Housing



A4

VIEW OF CAMSHAFT SIDE OF 4.248, 4.236 AND 4.212 ENGINES

13. Induction Manifold
14. Thermostart
15. Alternator
16. Lubricating Oil Filter
17. Dipstick
18. Fuel Lift Pump
19. Starter Motor
20. Flywheel Housing
21. Flywheel
22. Cylinder Block Drain Plug (Right Hand Side)
23. Exhaust Manifold
24. Cylinder Head Cover



.212 ENGINES

ıg (Right Hand Side)

SECTION B
Technical data

Nominal Bore (4.2482 and 4.248)	3.975 in (100,96 mm)*
Nominal Bore (T4.236, 4.236 and 4.212)	3.875 in (98,43 mm)*
Stroke (4.2482, 4.248, T4.236 and 4.236)	5 in (127 mm)
Stroke (4.212)	4.5 in (114,3 mm)
No. of Cylinders	Four
Cubic Capacity (4.2482 and 4.248)	248 in³ (4,06 litres)
Cubic Capacity (T4.236 and 4.236)	236 in³ (3,86 litres)
Cubic Capacity (4.212)	212 in³ (3,47) litres)
Compression Ratio (4.2482)	18 : 1
Compression Ratio (4.236 and 4.248)	16 : 1
Compression Ratio (T4.236)	15.5 : 1
Compression Ratio (4.212 - HC Piston with 3 rings)	17.5 : 1
Compression Ratio (A4.212 - LC Piston with 4 rings)	15.5 : 1
Direction of Engine Rotation	Clockwise from the Front
Firing Order	1, 3, 4, 2
Cycle	Four-Stroke
Combustion System	Direct Injection
Lubricating Oil Pressure	Minimum 30 lbf/in² (2,1 kgf/cm²) 207 kN/m² at rated engine speed and normal working temperature. For T4.236 engines fitted with piston cooling jets, 37 lbf/in³ (2,6 kgf/cm³) 255 kN/m².

*Nominal —for actual bore size, see pages B.3 and B.4.

On A4.212 engines, the HC piston with 3 rings was fitted to MF engines from Nos. 212UA87001 to 212UA147672.

Details of Maximum Gross Ratings

4.2482 Engines

General	60 kW (80 bhp) at 2,600 rev/min
Maximum Torque	278 Nm (201 lbf ft) at 1,400 rev/min
Heavy Duty	54 kW (72.5 bhp) at 2,600 rev/min
Maximum Torque	238 Nm (176 lbf ft) at 1,400 rev/min

4.248 Engines

General Agricultural and Industrial	62 kW (84 bhp) at 2500 rev/min
Maximum Torque	263 Nm (194 lbf ft) at 1400 rev/min
Heavy Duty Agricultural and Industrial	59 kW (80 bhp) at 2200 rev/min
Maximum Torque	285 Nm (210 lbf ft) at 1400 rev/min

T4.236 Engines

General	76 kw (102 bhp) at 2,600 rev/min
Maximum Torque	340 Nm (250 lbf ft) at 1,600 rev/min
Heavy Duty	67 kW (90 bhp) at 2,500 rev/min
Maximum Torque	330 Nm (243 lbf ft) at 1,400 rev/min

T4.38 Engines

Vehicle	69,5 kW (93 bhp) at 2,600 rev/min
Maximum Torque	296 Nm (218 lbf ft) at 1600 rev/min

4.236 Engines

Vehicle	61 kW (82 bhp) at 2800 rev/min
Maximum Torque	256 Nm (194 lbf ft) at 1450 rev/min
General Agricultural and Industrial	60 kW (81 bhp at 2600 rev/min
Maximum Torque	267 Nm (197 lbf ft) at 1350 rev/min
Heavy Duty Agricultural and Industrial	54 kW (72 bhp) at 2200 rev/min
Maximum Torque	272 Nm (201 lbf ft) at 1400 rev/min

4.212 Engines

Agricultural	46 kW (62 bhp) at 2200 rev/min
Maximum Torque	229 Nm (169 lbf ft) at 1350 rev/min

All the above ratings are maximum and can vary according to application.
For details of individual ratings, apply to your nearest Perkins Distributor.

Recommended Torque Tensions

The following figures will apply with the components lightly oiled before assembly.

All engines except T4.236 (hot or cold)	
Cylinder Head Nuts/Setscrews (1/2 in)	100 lbf ft (13,8 kgf m) – 136 Nm
Cylinder Head Nuts (7/16 in early 4.236 engines) ...	**60 lbf ft (8,3 kgf m) — 81 Nm**
Cylinder Head Nuts/Setscrews (1/2 in) (T4.236 cold) ...	100 lbf ft (13,8 kgf m) – 136 Nm
Cylinder Head Setscrews (1/2 in) with Integral Head Washer (cold)	88 lbf ft (11,8 kgf m) – 120 Nm
Connecting Rod Nuts* – Cadmium	70 lbf ft (9,7 kgf m) - 95 Nm
Connecting Rod Nuts* – Phosphated	90 lbf ft (12,4 kgf m) – 122 Nm
Connecting Rod Nuts†	
Cadmium Plated (silver finish)	75 lbf ft (10,4 kgf m) — 102 Nm
Phosphated (black finish)	95 lbf ft (13,2 kgf m) — 129 Nm
Main Bearing Setscrews**	150 lbf ft (20,7 kgf m) — 203 Nm
Main Bearing Setscrews††	180 lbf ft (24,9 kgf m) — 244 Nm
Idler Gear Hub Setscrews	30 lbf ft (4,1 kgf m) — 41 Nm
Fuel Injection Pump Gear Retaining Setscrews (3) ...	20 lbf ft (2,8 kgf m) - 27 Nm
D.P.S. Fuel Injection Pump Gear Retaining Nut	60 lbf ft (8,3 kgf m) - 81 Nm
Flywheel Setscrews	80 lbf ft (11 kgf m) — 108 Nm
Flywheel Place Bolts	90 lbf ft (12,4 kgf m) — 122 Nm
Flywheel Housing Setscrews 3/8 UNF (Standard) ...	36 lbf ft (5,0 kgf m) – 49 Nm
Flywheel Housing Setscrews 3/8 UNF (Durlock) ...	67 lbf ft (9,3 kgf m) – 91 Nm
Flywheel Housing Setscrews 3/8 UNF (4.2482 engines) ..	42 lbf ft (5,7 kgf m) – 57 Nm
Camshaft Gear Retaining Setscrews	50 lbf ft (6,9 kgf m) — 68 Nm
Crankshaft Pulley Retaining Setscrew (1) 1.67 in (42,4 mm) A/F	300 lbf ft (42 kgf m) — 406 Nm
Crankshaft Pulley Retaining Setscrew (1) 1.5 in (38,1 mm) A/F	
Cadmium Plated (silver finish)	240 lbf ft (33kgf m) — 325 Nm
Phosphated (black finish)	285 lbf ft (39 kgf m) — 390 Nm
Crankshaft Pulley Retaining Setscews (3)	70 lbf ft (9,7 kgf m) - 95 Nm
Lub. Oil Filter Setscrews/Nuts	30 lbf ft (4,2 kgf m) - 41 Nm
Atomiser Securing Nuts	14 lbf ft (1,9 kgf m) - 18 Nm
Atomiser Clamp Nuts	9 lbf ft (1,2 kgf m) – 12 Nm
Rockershaft Support Brackets (Aluminium)	30 lbf ft (4.1 kgf m) - 41 Nm
Rockershaft Support Brackets (Cast Iron)	54 lbf ft (7,4 kgf m) - 74 Nm
High Pressure Fuel Pipe Nuts	15 lbf ft (2,1 kgf m) — 20 Nm
Dynamo Pulley Retaining Nut	20 lbf ft (2,8 kgf m) — 27 Nm
Alternator Pulley Retaining Nut (7/16 in)	30 lbf ft (4,1 kgf m) — 41 Nm
Alternator Pulley Retaining Nut (7/16 in)	30 lbf ft (4,1 kgf m) — 41 Nm
Alternator Pulley Retaining Nut (1/2 in)	42 lbf ft (5,8 kgf m) — 57 Nm
Alternator Pulley Retaining Nut (M27)	44 lbf ft (6,1 kgf m) – 60 Nm
Balancer Retaining Setscrews	40 lbf ft (5,6 kgf m) – 50 Nm
Thermostart with Adaptor	10 lbf ft (1,4 kgf m) — 13 Nm
Piston Cooling valve assembly (T4.236)	20 lbf ft (2,8 kgf m) – 27 Nm

*For engines preceding the following Engine Nos:

212U901	236UA59562	236UH262
212UA140419	236UA1660A	236US16138
212UA4393A	236UC22005	248U9045
236U96087	236UE5408	248UA78127

†For engines commencing at the following Engine Nos:

212U901	236UA59562	236UH262
212UA140419	236UA1660A	236US16138
212UA4393A	236UC22005	248U9045
236U96087	236UE5408	248UA78127

**For engines preceding the following Engine Nos:

212U582	236UA50507	236US12129
212UA119095	236UC19949	248U6330
236U82408	236UE4404	248UA58746

††For engines commencing at the following Engine Nos:

212U582	236UA50507	236US12129
212UA119095	236UC19949	248U6330
236U82408	236UE4404	248UA58746

Note: The engine numbers shown above include a new engine number series which start LD, LF, LG, LM and LJ.

SERVICE WEAR LIMITS

The following "wear limits" indicate the condition when it is recommended that the respective items should be serviced or replaced.

Cylinder Head Bow		
	Transverse	0.003 in (0,08 mm)
	Longitudinal	0.006 in (0,15 mm)
Maximum Bore Wear (when reboring or new liners are necessary)		0.008 in (0,2 mm)
Crankshaft Main and Big End Journal Wear. Ovality .		0.0015 in (0,04 mm)
Maximum Crankshaft End Float		0.015 in (0,38 mm)
Valve Stem to Bore/Guide Clearance	inlet	0.005 in (0,13 mm)
	exhaust	0.006 in (0,15 mm)

Service Wear Limits (Continued)

Valve Head Thickness between run-out of valve seat and face of valve	1/32 in (0,79 mm)
Rocker Clearance on Rocker Shaft	0.005 in (0,13 mm)
Camshaft Journals—Ovality and Wear	0.002 in (0,05 mm)
Camshaft End Float	0.020 in (0,51 mm)
Idler Gear End Float	0.010 in (0,25 mm)
Valve Head Depth below Cylinder Head Face exhaust (Earlier)	0.055 in (1,40 mm) maximum
Valve Head Depth below Cylinder Head Face exhaust (Current)	0.073 in (1,85 mm) maximum
Valve Head Depth below Cylinder Head Face inlet	0.061 in (1,55 mm) maximum

MANUFACTURING DATA & DIMENSIONS

The following data of clearances and tolerances are given as a guide for personnel engaged upon major overhauls and the figures are those used in the factory for production purposes.

Cylinder Block

Total Height of Cylinder Block between Top and Bottom Faces	17.367/17.375 in (441,12/441,33 mm)
Parent Bore Dia. for Cylinder Liner (Chrome Thin Wall)	3.9625/3.9635 in (100,65/100,67 mm)
Parent Bore Dia. for Cylinder Liner (Chrome Thick Wall)	4.0625/4.0635 in (103,19/103,22 mm)
Parent Bore Dia. for Flangeless Cylinder Liner (Cast Iron)	4.0615/4.0625 in (103,16/103,19 mm)
Parent Bore Dia. for Flanged Cylinder Liner (Cast Iron) (T4.236, 4.236 and 4.212 earlier)	4.0625/4.0635 in (103,19/103,22 mm)
Parent Bore Dia. for Flanged Cylinder Liner (Cast Iron) (4.2482 and 4.248) and later, all engines*	4.1025/4.1035 in (104,20/104,23 mm)
Depth of Recess for Liner Flange (Cast Iron)	0.150/0.154 in (3,81/3,91 mm)
Depth of Recess for Liner Flange (Chrome Thin Wall) early type	0.046/0.049 in (1,17/1,25 mm)
Depth of Recess for Liner Flange (Chrome Thin Wall) later type	0.049/0.051 in (1,25/1,30 mm)
Depth of Recess for Liner Flange (Chrome) Thick Wall	0.150/0.152 in (3,81/3,86 mm)
Main Bearing Parent Bore Dia.	3.166/3.167 in (80,42/80,44 mm)
Camshaft Bore Dia. No. 1 for Bush (where fitted)	2.1875/2.1887 in (55,56/55,59 mm)
Camshaft Bearing Bush Internal Dia. fitted	2.0000/2.0017 in (50,8/50,84 mm)
Camshaft Bore Dia. No. 1	2.000/2.001 in (50,80/50,83 mm)
Camshaft Bore Dia. No. 2	1.990/1.9918 in (50,55/50,59 mm)
Camshaft Bore Dia. No. 3	1.970/1.9718 in (50,04/50,08 mm)

*All later cylinder blocks bored out to 4.1025/4.1035 in (104,20/104,23 mm) as standard.

Cylinder Liners Cast Iron
(4.2482, 4.248, T4.236, 4.236 and 4.212 engines)

Types	Dry—Interference Fit (Production) Dry-Transition Fit (Pre-finished Service)
Outside Dia. of Production Liner	
Flangeless — 4.248, 4.236 and 4.212 engines	4.0660/4.0670 in (103,27/103,30 mm)
Flanged — 4.2482 and 4.248 engines	4.1045/4.1055 in (104,25/104,28)
Flanged - T4.236, 4.236 and 4.212 engines (earlier)	4.0645/4.0655 in (103,24/103.26 mm)
Flanged - non-Flame Ring - all engines (later)	4.1045/4.1055 in (104,25/104,28 mm)
Outside Dia of Flanged Pre-Finished Service Liner	
4.2482 and 4.248 engines	4.1025/4.1035 in (104,20/104,23 mm)
4.236 and 4.212 engines	4.0625/4.0635 in (103,19/103,21 mm)
All Engines - non-Flame Ring	4.1025/4.1035 (104,20/104,23 mm)
Interference Fit of Production Liner in Cylinder Block	
Flangeless — 4.248, 4.236 and 4.212 engines	0.003/0.005 in (0,08/0,13 mm)
Flanged - Flame Ring 4.2482 and 4.248 engines	0.001/0.003 in (0,03/0,08 mm)
Flanged - Flame Ring T4.236, 4.236 and 4.212 engines	0.0007/0.002 in (0,02/0,07 mm)
Flanged - non-Flame Ring - All engines	0.001/0.003 in (0,03/0,38 mm)
Transition Fit of Pre-Finished Service Liner	±0.001 in (±0,03 mm)
Finished Bore Dia. of Production Liners	
4.2482 and 4.248 engines	3.9785/3.9795 in (101,05/101,07 mm)
T4.236, 4.236 and 4.212 engines	3.877/3.878 in (98,48/98,50 mm)

(Cylinder Liners Cast Iron continued)

Bore Dia. of Pre-Finished Service Liner in Block	
4.2482 and 4.248 engines	3.980/3.981 in (101,09/101,12 mm)
T4.236, 4.236 and 4.212 engines	3.878/3.879 in (98,50/98,52 mm)
Height of Top of Liners above Cylinder Block Face ...	
Flangeless/Flanged with Flame Ring	0.028/0.037 in (0,71/0,94 mm)
Flange Thickness of Liner	
Earlier 4.236 and 4.212 engines	0.144/0.146 in (3,66/3,71 mm)
4.2482, 4.248, T4.236 and current 4.236 and 4.212 engines	0.150/0.152 in (3,81/3,86 mm)
Relationship of Liner Flange to Cylinder Block Face	
Earlier 4.236 and 4.212 engines	0.004/0.010 in (0,10/0,25 mm) Below
4.2482, 4.248, T4.236 and current 4.236 and 4.212 engines	0.002 in (0,03 mm) Above to 0.004 in (0,10 mm) Below
Maximum Oversize (Rebore) Flangeless Liner (4.236 and 4.212 engines only)	+0.030 in (+0,76 mm)
Overall Length of Liner (Flangeless - 4.212 and 4.236) ...	9.005/9.015 in (228,7/229 mm)
Overall Length of Liner (Flangeless - 4.248)	8.805/8.815 in (223,65/223,90 mm)
Overall Length of Liner (Flanged) - earlier	8.941/8.954 in (227,10/227,43 mm)
Overall Length of Liner (Flanged) non-Flame Ring All Engines - later	8.899/8.930 in (226,04/226,84 mm)

Cylinder Liners Chrome — Thin Wall (4.236 engines)

Type	Dry—Transition Fit
Outside Dia. of Liner	3.9625/3.9635 in (100,65/100,67 mm)
Depth of Liner below Cylinder Block Top Face (Early Type)	0.001/0.009 in (0,025/0,23 mm)
Depth of Liner below Cylinder Block Top Face (Later Type)	0.004/0.008 in (0,102/0,203 mm)
Flange Thickness (Early Type)	0.040/0.045 in (1,016/1,143 mm)
Flange Thickness (Later Type)	0.043/0.045 in (1,092/1,143 mm)
Inside Dia. of Liner after fitting	3.8765/3.879 in (98,47/98,53 mm)
Overall Length of Liner	8.9212/8.8912 in (226,6/225.8 mm)

Cylinder Liners Chrome — Thick Wall (4.236 engines)

Type	Dry—Transition Fit
Outside Dia. of Liner	4.0625/4.0635 in (103,19/103.21 mm)
Depth of Liner Flange below Cylinder Block Top Face	0.004/0.008 in (0,102/0,203 mm)
Height of Liner above Cylinder Block Top Face	0.028/0.035 in (0,71/0,89 mm)
Flange Thickness	0.144/0.146 in (3,66/3,71 mm)
Inside Dia. of Liner after fitting . ..	3.877/3.8795 in (98,48/98,54 mm)
Overall Length of Liner	8.939/8.954 in (227.05/227.43 mm)

Pistons (4.2482 Engines) - 3 Ring

Type	Squish Lip — Re-entrant Bowl
Piston Height in relation to Cylinder Block Top Face	0.016/0.023 in (0,41/0,59 mm) above
Bore Dia. for Gudgeon Pin	1.37485/1.37505 in (34,92/34,93 mm)
Compression Ring Groove Width, Number 1	0.1015/0.1024 in (2,58/2,60 mm)
Compression Ring Groove Width, Number 2	0.1008/0.1015 in (2,56/2,58 mm)
Scraper Ring Groove Width, Number 3	0.1984/0.1992 in (5,04/5,06 mm)

(Pistons have hard anodised crowns and must not be topped).

Pistons (4.248 engines)-4 Ring

Type .	Cavity in Crown
Piston Height in relation to Cylinder Block	0.002/0.010 in (0.05/0.26 mm) above
Bore Dia. for Gudgeon Pin . .	1.37485/1.37505 in (34.92/34.93 mm)
Compression Ring Groove Width, Numbers 1, 2 & 3 ..	0.0957/0.0967 in (2.43/2.46 mm)
Scraper Ring Groove Width, Number 4 (plain piston) ..	0.2525/0.2535 in (6,41/6.44 mm)
Scraper Ring Groove Width — No. 4 (inserted piston)	0.189/0.190 in (4,80/4,83 mm)

Pistons (4.248 Engines) — 3 Ring

Type	Cavity in Crown
Piston Height in relation to Cylinder Block Top Face	0.002/0.010 in (0,05/0,26 mm) above
Bore Dia. for Gudgeon Pin	1.37485/1.37505 in (34,92/34,93mm)
Compression Ring Groove Width, Numbers 1 and 2	0.1015/0.1024 in (2,58/2,60 mm)
Scraper Ring Groove Width, No. 3	0.1984/0.1992 in (5,04/5,06 mm)

Pistons (T4.236 Engines) - 3 Ring

Type	Cavity in Crown
Piston Height in relation to Cylinder Block Top Face (at 2600 rev/min engine rated speed)	0.014/0.023 in (0,35/0,58 mm) above
Bore Dia. for Gudgeon Pin	1.5000/1.50002 in (38,10/38,106 mm)
Compression Ring Groove Width, Number 1	Tapered
Compression Ring Groove Width, Number 2	0.0955/0.0963 in (2,43/2,45 mm)
Scraper Ring Groove Width, Number 3	0.1885/0.1893 in (4,79/4,81 mm)

Pistons (4.236 engines) - 5 Ring

Type	Cavity in Crown
Piston Height in relation to Cylinder Block* (at 2600 rev/min engine rated speed and below)	0.003/0.010 in (0,08/0,25 mm) above
Piston Height in relation to Cylinder Block** (at 2600 rev/min engine rated speed and below)	0.014/0.023 in (0,35/0,58 mm)
Piston Height in relation to Cylinder Block (at 2800 rev /min engine rated speed)	0.011/0.019 in (0,28/0,48 mm) above
Bore Dia. for Gudgeon Pin	1.37485/1.37505 in (34,92/34,93 mm)
Compression Ring Groove Width - Numbers 1, 2, 3	0.0957/0.0967 in (2,43/2,46 mm)
Scraper Ring Groove Width - Numbers 4 and 5	0.2525/0.2535 in (6,41/6,44 mm)

Pistons (4.236 engines) — 3 Ring

Type	Cavity in Crown — Controlled Expansion - Inserted Top Groove
Piston Height in relation to Cylinder Block Face (at 2800 rev/min engine rated speed)	0.011/0.019 in (0,28/0,48 mm) above
Piston Height in relation to Cylinder Block Face (at 2600 rev/min engine rated speed)	0.014/0.023 in (0,35/0,58 mm) above
Bore Dia. for Gudgeon Pin	1.37485/1.37505 in (34,928/35,934 mm)
Compression Ring Groove Width, No. 1	0.097/0.098 in (2,47/2,49 mm)
Compression Ring Groove Width, No. 2	0.096/0.097 in (2,45/2,47 mm)
Scraper Ring Groove Width, No. 3	0.1885/0.1892 in (4,79/4,81 mm)

Pistons (4.212 engines) - 4 Ring

Type	Cavity in Crown
Piston Height in Relation to Cylinder Block	0.015/0.021 in (0,38/0,53 mm) above
Bore Dia. for Gudgeon Pin	1.37485/1.37505 in (34,92/34,93 mm)
Compression Ring Groove Width, Numbers 1, 2 & 3	0.0957/0.0967 in (2,43/2,46 mm)
Scraper Ring Groove Width, Number 4	0.2525/0.2535 in (6,41/6,44 mm)

*Before engine number 236U147150L, 236UA110048L, 236U135765, 236US24721L
**From engine number 236U147150L, 236UA110048L, 236U135765, 236US24721L

Note: The engine numbers shown above include a new series of engine numbers which start LD, LF, LG, LM and LJ.

TECHNICAL DATA—B.6

Piston Rings (4.2482 Engines)

Top Compression	Molybdenum Faced—Internally Stepped—Barrel Faced
Second Compression	Internally Stepped—Taper Faced
Third Scraper	Chrome Faced—Spring Loaded Conformable
Compression Ring Width	0.097/0.098 in (2,46/2,49 mm)
No. 1 Clearance in Groove	0.0035/0.0054 in (0,09/0,14 mm)
No. 2 Clearance in Groove	0.0028/0.0045 in (0,07/0,11 mm)
No. 3 Scraper Ring Width	0.1954/0.1964 in (4,96/4,99 mm)
No. 3 Clearance in Groove	0.002/0.0042 in (0,05/0,11 mm)
Ring Gap, No. 1	0.016/0.034 in (0,41/0,86 mm)
Ring Gap, No. 2	0.012/0.030 in (0,30/0,76 mm)
Ring Gap, No. 3	0.012/0.036 in (0,30/0,91 mm)

Piston Rings (4.248 Engines) — 4 Ring

Top Compression	Chrome Insert — Parallel Face/Barrel Face
*2nd and 3rd Compression	Internally Stepped
†4th Scraper	Spring Loaded Conformable.
Compression Ring Width,	0.0928/0.0938 in (2,36/2,38 mm)
Ring Clearance in Groove, Numbers 1, 2 & 3	0.0019/0.0039 in (0,05/0,10 mm)
Ring Gap — Chrome	0.016/0.034 in (0,41/0,86 mm)
Ring Gap — Cast Iron	0.012/0.030 in (0,30/0,76 mm)
Ring Gap — Scraper	0.012/0.036 in (0,30/0,91 mm) varies according to type of ring.

*On A4.248 engines rated up to 2,000 rev/min, the 2nd compression ring is plain cast iron.
†On some earlier A4.248 engines, the 4th ring was a sealed power scraper.

On some later engines, the 2nd and 3rd compression rings, internally stepped, are chrome plated.

Piston Rings (4.248 Engines) — 3 Ring

Top Compression	Molybdenum Faced—Internally Stepped—Barrel Faced
Second Compression	Internally Stepped—Taper Faced
Third Scraper	Chrome Faced—Spring Loaded Conformable
Compression Ring Width	0.097/0.098 in (2,46/2,49 mm)
Nos. 1 and 2 Compression Ring Clearance in Groove	0.0017/0.0027 in (0,04/0,07 mm)
No. 3 Scraper Ring Width	0.1954/0.1964 in (4,96/4,99 mm)
No. 3 Clearance in Groove	0.002/0.0038 in (0,05/0,10 mm)
Ring Gap, No. 1	0.016/0.034 in (0,41/0,86 mm)
Ring Gap, No. 2	0.016/0.034 in (0,41/0,86 mm)
Ring Gap, No. 3	0.016/0.034 in (0,41/0,86 mm)

Piston Rings (T4.236 Engines)

No. 1 Compression	Molybdenum Faced Wedge
No. 2 Compression	Chrome Taper Faced
No. 3 Scraper	Chrome Faced Spring Loaded Conformable
No. 1 Compression Width	Wedge Shaped
No. 2 Compression Width	0.093/0.0935 in (2,36/2,37 mm)
No. 2 Clearance in Groove	0.002/0.0033 in (0,05/0,08 mm)
No. 3 Scraper Width	0.186/0.1875 in (4,72/4,76 mm)
No. 3 Clearance in Groove	0.001/0.0033 in (0,03/0,08 mm)
Ring Gap, No. 1	0.010/0.024 in (0,25/0,61 mm)
Ring Gap, No. 2	0.010/0.027 in (0,25/0,66 mm)
Ring Gap, No. 3	0.010/0.031 in (0,25/0,79 mm)

Piston Rings (4.236 engines) – 5 Ring

*Top Compression	Chrome Faced — Parallel Face
Second and Third — Compression	Internally Stepped
†Fourth — Scraper	Spring Loaded Conformable
Fifth — Scraper	Maxigroove

*A cast iron compression ring is fitted when a chrome liner is used or on certain Agricultural applications.

†With earlier engines, the fourth ring was a maxigroove and where combine harvester engines used a four ring kit in a five groove piston, a maxigroove has been added to the fifth groove.

Compression Ring Width Numbers 1, 2 and 3 ...	0.0928/0.0938 in (2,36/2,38 mm)
Ring Clearance in Groove	0.0019/0.0039 in (0,05/0,10 mm)
Scraper Ring Width — Fourth and Fifth	0.249/0.250 in (6,33/6,35 mm)
Ring Clearance in Groove	0.0025/0.0045 in (0,06/0,11 mm)
Ring Gap — Chrome Compression	0.016/0.034 in (0,41/0,86 mm)
Ring Gap — Internally Stepped Compression ...	0.012/0.030 in (0,30/0,76 mm)
Ring Gap — Maxigroove Scraper	0.012/0.030 in (0,30/0,76 mm)

Piston Rings (4.236 engines) – 3 Ring

Top Compression	Chrome Barrel Face, Internal Chamfer
Second Compression	Chrome Taper Face
Third Scraper	Chrome Face – Spring Loaded Conformable
Top Compression Ring Width	0.0930/0.0935 in (2,36/2,37 mm)
Clearance in Groove	0.0035/0.005 in (0,09/0,13 mm)
Second Compression Ring Width	0.0930/0.0935 in (2,36/2,37 mm)
Clearance in Groove	0.0025/0.004 in (0,06/0,11 mm)
Scraper Ring Width	0.1860/0.1865 in (4,73/4,74 mm)
Clearance in Groove	0.0020/0.0032 in (0,06/0,08 mm)
Ring Gap, No. 1	0.010/0.022 in (0,25/0,55 mm)
Ring Gap, No. 2	0.008/0.022 in (0,20/0,55 mm)
Ring Gap, No. 3	0.010/0.032 in (0,25/0,81 mm)

Piston Rings (4.212 engines)

High Compression Piston

Top Compression	Chrome Faced
Second Compression	Chrome Faced Internally Stepped
Third Scraper	Spring Loaded Conformable

Low Compression Piston

Top Compression	Chrome Plated
Second Compression	Cast Iron—Plain
Third Compression	Internally Stepped
*Fourth Scraper	Spring Loaded Conformable
Compression Ring Width—Number 1	0.0927/0.0937 in (2,35/2,38 mm)
Compression Ring Widths—Numbers 2 and 3 ...	0.0928/0.0938 in (2,36/2,38 mm)
Ring Clearance in Groove—Number 1	0.002/0.004 in (0,05/0,10 mm)
Ring Clearance in Groove—Numbers 2 and 3 ...	0.0019/0.0039 in (0,05/0,10 mm)
Ring Gap — Chromed	0.016/0.034 in (0,41/0,86 mm)
Ring Gap — Cast Iron	0.012/0.030 in (0,30/0,76 mm)

*On some earlier 4.212 engines, the 4th ring was a sealed power scraper.

Gudgeon Pin (4.2432, 4.248, 4.236 and 4.212 Engines)

Type	Fully Floating
Outside Dia. of Gudgeon Pin	1.3748/1.375 in (34,92/34,93 mm)
Length of Gudgeon Pin	3.297/3.312 in (83,74/84,12 mm)
Fit in Piston Boss	Transition

Gudgeon Pin (T4.236 Engines)

Type	Fully Floating
Outside Dia. of Gudgeon Pin	1.4998/1.5000 in (38,095/38,100 mm)
Length of Gudgeon Pin	3.244/3.260 in (82,40/82,80 mm)
Clearance Fit in Piston Boss	0.000/0.0004 in (0,000/0,010 mm)

Small End Bush (4.2482, 4.248, 4.236 and 4.212 Engines)

Type	Steel Backed, Lead Bronze Lined
Outside Dia. of Small End Bush	1.535/1.5365 in (38,99/39,03 mm)
Length of Small End Bush	1.316/1.336 in (33,43/33,93 mm)
Inside Dia. before Reaming	1.359/1.363 in (34,52/34,62 mm)
Inside Dia. after Reaming	1.37575/1.3765 in (34,94/34,96 mm)
Clearance between Small End Bush and Gudgeon Pin	0.00075/0.0017 in (0,019/0,043 mm)