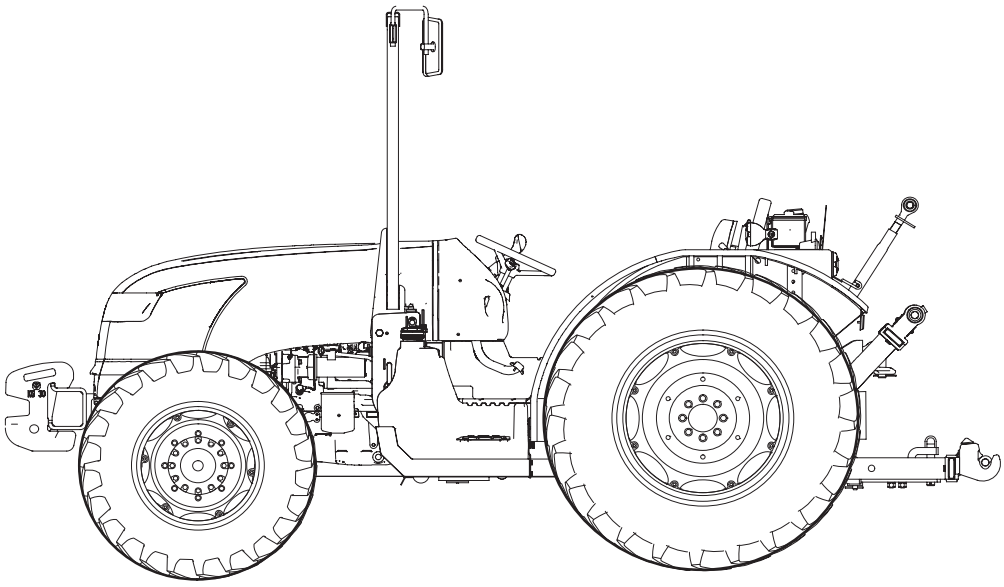
SERVICE MANUAL

TD65F / TD75F / TD85F

Tractors

Print No. 84285941



TD65F – TD75F – TD85F

MODEL TRACTORS SERVICE MANUAL

SECTIONS

S E R V I C E

84285941 – 02 - 2010

INTRODUCTION

◊ *This manual is divided into sections identified by two–figure numbers. Each section has independent page numbering.*
For ease of reference, these sections have the same numbers and names as the Repairs Rate Book sections.

◊ *The different sections can easily be found by consulting the table of contents on the following pages.*

◊ *The document number of the manual and the edition/update dates are given at the bottom of each page.*

◊ *The information contained in this manual was current on the date printed on each section. As NEW HOLLAND constantly improves its product range, some information may be out of date subsequent to modifications implemented for technical or commercial reasons or to meet legal requirements in different countries.*
In the event of conflicting information, consult the NEW HOLLAND Sales and Service Departments.

IMPORTANT WARNINGS

◊ *All maintenance and repair work described in this manual must be performed exclusively by NEW HOLLAND service technicians in strict accordance with the instructions given and using any specific tools necessary.*

◊ *Anyone who performs the operations described herein without strictly following the instructions is personally responsible for resulting injury or damage to property.*

◊ *The Manufacturer and all organisations belonging to the Manufacturer's distribution network, including but not restricted to national, regional or local distributors, will accept no responsibility for personal injury or damage to property caused by abnormal function of parts and/or components not approved by the Manufacturer, including those used for maintenance and/or repair of the product manufactured or marketed by the Manufacturer.*
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PRINTED IN TURKEY

NEW HOLLAND
SERVICE – Technical Publications & Special Tools
Part no.

84285941 – 02 –2010

NEW HOLLAND

Repair Manual – TD F Series Tractors

CONTENTS

84285941 – 02 –2010

CLUTCH — SECTION 18

Clutches — Chapter 1

GEARBOX — SECTION 21

Mechanical Transmission (12x12) — Chapter 1

Reverser — Chapter 2

Reverser and Creeper — Chapter 3

DRIVE LINES — SECTION 23

Drive Lines — Chapter 1

FRONT AXLE MECHANICAL TRANSMISSION — SECTION 25

Front Axle Mechanical Transmission — Chapter 1

REAR AXLE AND TRANSMISSION — SECTION 27

Rear Axle And Transmission — Chapter 1

POWER TAKE–OFF — SECTION 31

Mechanical Power Take – Off — Chapter 1

BRAKING SYSTEM — SECTION 33

Braking System — Chapter 1

HYDRAULIC SYSTEM — SECTION 35

Rear Mechanical Hydraulic Lift — Chapter 1

Open Centre System Auxiliary Control Valves — Chapter 2

Trailer Brake Auxiliary Control Valve — Chapter 3

STEERING — SECTION 41

Steering — Chapter 1

ELECTRICAL SYSTEM — SECTION 55

Instruments — Chapter 1

Components — Chapter 2

Starting System — Chapter 3

Charging System — Chapter 4

Battery — Chapter 5

Electrical Circuits — Chapter 6

GENERAL INSTRUCTIONS

IMPORTANT NOTICE

All maintenance and repair operations described in this manual should be carried out exclusively by the NEW HOLLAND authorised workshops. All instructions detailed should be carefully observed and special equipment indicated should be used if necessary.
Everyone who carries out service operations described without carefully observing these prescriptions will be directly responsible of deriving damages.

SHIMMING

At each adjustment, select adjusting shims, measure them individually using a micrometer and then sum up recorded values. Do not rely on measuring the whole shimming set, which may be incorrect, or on rated value indicated for each shim.

ROTATING SHAFT SEALS

To correctly install rotating shaft seals, observe the following instructions:

- Let the seal soak into the same oil as it will seal for at least half an hour before mounting;
- Thoroughly clean the shaft and ensure that the shaft working surface is not damaged;
- Place the sealing lip towards the fluid. In case of a hydrodynamic lip, consider the shaft rotation direction and orient grooves in order that they deviate the fluid towards the inner side of the seal;
- Coat the sealing lip with a thin layer of lubricant (oil rather than grease) and fill with grease the gap between the sealing lip and the dust lip of double lip seals;
- Insert the seal into its seat and press it down using a flat punch. Do no tap the seal with a hammer or a drift;
- Take care to insert the seal perpendicularly to its seat while you are pressing it. Once the seal is settled, ensure that it contacts the thrust element if required.;
- To prevent damaging the sealing lip against the shaft, place a suitable protection during installation.

O RINGS

Lubricate the O rings before inserting them into their seats. This will prevent the O rings from rolling over and twine during mounting which will jeopardise sealing.

SEALERS

Apply one of the following sealers: RTV SILMATE, RHODORSIL CAF 1, or LOCTITE PLASTIC GASKET over the mating surfaces marked with an X.
Before applying the sealer, prepare the surface as follows:

- remove possible scales using a metal brush;
- thoroughly degrease the surfaces using one of the following cleaning agent: trichlorethylene, petrol or a water and soda solution.

BEARINGS

It is advisable to heat the bearings to 80 to 90°C before mounting them on their shafts and cool them down before inserting them into their seats with external tapping.

ROLL PINS

When fitting straight roll pins, ensure that the pin notch is oriented in the direction of the effort to stress the pin. Coil roll pins can be installed in any position.

NOTES FOR SPARE PARTS

Use exclusively **genuine NEW HOLLAND spare parts**, the only ones bearing this logo.

Only genuine parts guarantee same quality, life, safety as original components as they are the same as mounted in production.
Only the **NEW HOLLAND genuine spare parts** can offer this guarantee.
All spare parts orders should be complete with the following data:

- tractor model (commercial name) and frame number;
- engine type and number;
- part number of the ordered part, which can be found on the “Microfiches” or the “Spare Parts Catalogue”, which is the base for order processing.

NOTES FOR EQUIPMENT

Equipment which NEW HOLLAND proposes and shows in this manual are as follows:

- studied and designed expressly for use on NEW HOLLAND tractors;
- necessary to make a reliable repair;
- accurately built and strictly tested to offer efficient and long–lasting working means.

We also remind the Repair Personnel that having these equipment means:

- work in optimal technical conditions;
- obtain best results;
- save time and effort;
- work more safely.

NOTICES

Wear limits indicated for some details should be intended as advised, but not binding values. The words “front”, “rear”, “right hand”, and “left hand” referred to the different parts should be intended as seen from the operator’s seat oriented to the normal sense of movement of the tractor.

HOW TO MOVE THE TRACTOR WITH THE BATTERY REMOVED

Cables from the external power supply should be connected exclusively to the respective terminals of the tractor positive and negative cables using pliers in good condition which allow proper and steady contact.
Disconnect all services (lights, wind–shield wipers, etc.) before starting the tractor.
If it is necessary to check the tractor electrical system, check it only with the power supply connected. At check end, disconnect all services and switch the power supply off before disconnecting the cables.

SAFETY RULES

PAY ATTENTION TO THIS SYMBOL

This warning symbol points out important messages involving personal safety. Carefully read the safety rules contained herein and follow advised precautions to avoid potential hazards and safeguard your safety and personal integrity. In this manual you will find this symbol together with the following key–words:

***WARNING** – it gives warning about improper repair operations and deriving potential consequences affecting the service technician's personal safety.*

***DANGER** – it gives specific warning about potential dangers for personal safety of the operator or other persons directly or indirectly involved.*

TO PREVENT ACCIDENTS

Most accidents and personal injuries taking place in workshops are due from non–observance of some simple and essential prudential rule and safety precautions. For this reason, IN MOST CASES THEY CAN BE AVOIDED. It suffices to foresee possible causes and act consequently with necessary caution and care.

The possibility that an accident might occur with any type of machines should not be disregarded, no matter how well the machine in question was designed and built.

A wise and careful service technician is the best precautions against accidents.

Careful observance of this only basic precaution would be enough to avoid many severe accidents.

DANGER: Never carry out any cleaning, lubrication or maintenance operations when the engine is running.

SAFETY RULES

GENERALITIES

◊ Carefully follow specified repair and maintenance procedures.

◊ Do not wear rings, wristwatches, jewels, unbuttoned or flapping clothing such as ties, torn clothes, scarves, open jackets or shirts with open zips which could get hold into moving parts. We advise to use approved safety clothing such as anti–slipping footwear, gloves, safety goggles, helmets, etc.

◊ Never carry out any repair on the machine if someone is sitting on the operator's seat, except if they are certified operators to assist in the operation to be carried out.

◊ Never operate the machine or use attachments from a place other than sitting at the operator's seat.

◊ Never carry out any operation on the machine when the engine is running, except when specifically indicated.

◊ Stop the engine and ensure that all pressure is relieved from hydraulic circuits before removing caps, covers, valves, etc.

◊ All repair and maintenance operations should be carried out with the greatest care and attention.

◊ Service stairs and platforms used in a workshop or in the field should be built in compliance with the safety rules in force.

◊ Disconnect the batteries and label all controls to warn that the tractor is being serviced. Block the machine and all equipment which should be raised.

◊ Never check or fill fuel tanks and accumulator batteries, nor use starting liquid if you are smoking or near open flames as such fluids are flammable.

◊ Brakes are inoperative when they are manually released for maintenance purposes. In such cases, the machine should be kept constantly under control using blocks or similar devices.

◊ The fuel filling gun should remain always in contact with the filler neck. Maintain this contact until the fuel stops flowing into the tank to avoid possible sparks due to static electricity buildup.

◊ Use exclusively specified towing points for towing the tractor. Connect parts carefully. Ensure that foreseen pins and/or locks are steadily fixed before applying traction. Do not stop near towing bars, cables or chains working under load.

◊ To transfer a failed tractor, use a trailer or a low loading platform trolley if available.

◊ To load and unload the machine from the transportation mean, select a flat area providing a firm support to the trailer or truck wheels. Firmly tie the machine to the truck or trailer platform and block wheels as required by the forwarder.

◊ For electrical heaters, battery–chargers and similar equipment use exclusive auxiliary power supplies with a efficient ground to avoid electrical shock hazard.

◊ Always use lifting equipment and similar of appropriate capacity to lift or move heavy components.

◊ Pay special attention to bystanders.

◊ Never pour gasoline or diesel oil into open, wide and low containers.

◊ Never use gasoline, diesel oil or other flammable liquids as cleaning agents. Use non–flammable non–toxic proprietary solvents.

◊ Wear protection goggles with side guards when cleaning parts using compressed air.

◊ Do not exceed a pressure of 2.1 bar, in accordance with local regulations.

◊ Do not run the engine in a closed building without proper ventilation.

◊ Do not smoke, use open flames, cause sparks in the nearby area when filling fuel or handling highly flammable liquids.

◊ Do not use flames as light sources when working on a machine or checking for leaks.

◊ Move with caution when working under a tractor, and also on or near a tractor. Wear proper safety accessories: helmets, goggles and special footwear.

◊ During checks which should be carried out with the engine running, ask an assistant to seat at the operator's seat and keep the service technician under visual control at any moment.

◊ In case of operations outside the workshop, drive the tractor to a flat area and block it. If working on an incline cannot be avoided, first block the tractor carefully. Move it to a flat area as soon as possible with a certain extent of safety.

◊ Ruined or plied cables and chains are unreliable. Do not use them for lifting or trailing. Always handle them wearing gloves of proper thickness.

◊ Chains should always be safely fastened. Ensure that fastening device is strong enough to hold the load foreseen. No persons should stop near the fastening point, trailing chains or cables.

◊ The working area should be always kept CLEAN and DRY. Immediately clean any spillage of water or oil.

◊ Do not pile up grease or oil soaked rags, as they constitute a great fire hazard. Always place them into a metal container.
Before starting the tractor or its attachments, check, adjust and block the operator's seat. Also ensure that there are no persons within the tractor or attachment operating range.

◊ Do not keep into your pockets any object which might fall unobserved into the tractor's inner compartments.

◊ Whenever there is the possibility of being reached by ejected metal parts or similar, use protection eye mask or goggles with side guards, helmets, special footwear and heavy gloves.

◊ Wear suitable protection such as tinted eye protection, helmets, special clothing, gloves and footwear whenever it is necessary to carry out welding procedures. All persons standing in the vicinity of the welding process should wear tinted eye protection. NEVER LOOK AT THE WELDING ARC IF YOUR EYES ARE NOT SUITABLY PROTECTED.

◊ Metal cables with the use get frayed. Always wear adequate protections (heavy gloves, eye protection, etc.)

◊ Handle all parts with the greatest caution. Keep your hands and fingers far from gaps, moving gears and similar. Always use approved protective equipment, such as eye protection, heavy gloves and protective footwear.

START UP

◊ Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction.

◊ Never bring your head, body, arms, legs, feet, hands, fingers near fans or rotating belts.

ENGINE

◊ Always loosen the radiator cap very slowly before removing it to allow pressure in the system to dissipate. Coolant should be topped up only when the engine is stopped or idle if hot.

◊ Do not fill up fuel tank when the engine is running, mainly if it is hot, to avoid ignition of fires in case of fuel spilling.

◊ Never check or adjust the fan belt tension when the engine is running.
Never adjust the fuel injection pump when the tractor is moving.

◊ Never lubricate the tractor when the engine is running.

ELECTRICAL SYSTEMS

◊ If it is necessary to use auxiliary batteries, cables must be connected at both sides as follows: (+) to (+) and (–) to (–). Avoid short–circuiting the terminals. GAS RELEASED FROM BATTERIES IS HIGHLY FLAMMABLE. During charging, leave the battery compartment uncovered to improve ventilation. Avoid checking the battery charge by means of “jumpers” made by placing metallic objects across the terminals. Avoid sparks or flames near the battery area. Do no smoke to prevent explosion hazards.

◊ Prior to any service, check for fuel or current leaks. Remove these leaks before going on with the work.

◊ Do not charge batteries in confined spaces. Ensure that ventilation is appropriate to prevent accidental explosion hazard due to build–up of gases releaved during charging.

◊ Always disconnect the batteries before performing any type of service on the electrical system.

HYDRAULIC SYSTEMS

◊ Some fluid slowly coming out from a very small port can be almost invisible and be strong enough to penetrate the skin. For this reason, NEVER USE YOUR HANDS TO CHECK FOR LEAKS, but use a piece of cardboard or a piece of wood to this purpose. If any fluid is injected into the skin, seek medical aid immediately. Lack of immediate medical attention, serious infections or dermatosis may result.

◊ Always take system pressure readings using the appropriate gauges.

WHEELS AND TYRES

◊ Check that the tyres are correctly inflated at the pressure specified by the manufacturer. Periodically check possible damages to the rims and tyres.

◊ Keep off and stay at the tyre side when correcting the inflation pressure.

◊ Check the pressure only when the tractor is unloaded and tyres are cold to avoid wrong readings due to over–pressure. Do not reuse parts of recovered wheels as improper welding, brazing or heating may weaken the wheel and make it fail.

◊ Never cut, nor weld a rim with the inflated tyre assembled.

◊ To remove the wheels, block both front and rear tractor wheels. Raise the tractor and install safe and stable supports under the tractor in accordance with regulations in force.

◊ Deflate the tyre before removing any object caught into the tyre tread.

◊ Never inflate tyres using flammable gases as they may originate explosions and cause injuries to bystanders.

REMOVAL AND INSTALLATION

◊ Lift and handle all heavy components using lifting equipment of adequate capacity. Ensure that parts are supported by appropriate slings and hooks. Use lifting eyes provided to this purpose. Take care of the persons near the loads to be lifted.

◊ Handle all parts with great care. Do not place your hands or fingers between two parts. Wear approved protective clothing such as safety goggles, gloves and footwear.

◊ Do not twine chains or metal cables. Always wear protection gloves to handle cables or chains.

CONSUMABLES

COMPONENT TO BE FILLED OR TOPPED UP	QUANTITY		RECOMMENDED PRODUCTS	INTERNATIONAL SPECIFICATION
	liters/dm^3	US gal		
Cooling system: without cab:	12	3.17	Water & liquid **AMBRA AGRIFLU** **50% + 50%** (NH 900 A)	-
Fuel tank.....	80	21.1	Decanted and filtered diesel fuel	-
Engine sump without filter: Engine sump with filter:	6.6 7.3	1.74 1.93	**AMBRA MASTERGOLD HSP 15W – 40** (NH 330H) / **10W–30** (NH 324 H)	API CH-4 ACEA E5
Brake control circuit	0.4	0.1	**AMBRA BRAKE LHM** Oil (NH 610 A)	ISO 7308
Front axle: - axle housing - final drives (each):	7.0 1.25	1.8 0.3	Oil **AMBRA MULTI G** (NH 410B)	API GL4 ISO 32/46 SAE 10W–30
Rear transmission (bevel drive and brakes), gearbox, hydraulic lift and PTO	45	11.89		
Front wheel hubs	-	-	Grease **AMBRA GR9** (NH 710A)	NLGI 2
Grease fittings	-	-		

SECTION 10 – ENGINE

Chapter 1 – Engine

CONTENTS

GENERAL SPECIFICATIONS	3 cylinders
Engine type:	
– mod. TD65F turbocharged – type TTF 8035.25F.939T (BOSCH pump)	see data pages 6
– mod. TD75F turbocharged – type TTF 8035.25G.939T (BOSCH pump)	see data pages 7
– mod. TD85F turbocharged – type TTF8035.25E.939T (BOSCH pump)	see data pages 8
Cycle	Diesel, 4–stroke
Fuel injection	Direct
Number of cylinders in line	3
Piston diameter	
– mod. TD65F	104 mm (4.0945 in.)
– mod. TD75F	104 mm (4.0945 in.)
– mod. TD85F	104 mm (4.0945 in.)
Piston stroke (All models)	115 mm (4.5276 in.)
Total displacement:	
– mod. TD65F–TD75F–TD85F	2931 cm^3 (178.8496 $in.^3$)
Compression ratio	18 to 1 turbo-charged
Maximum power to spec ECE R120:	
– mod. TD65F at 2500 rpm	51 kW (69 hp)
– mod. TD75F at 2300 rpm	56 kW (76 hp)
– mod. TD85F at 2300 rpm	62 kW (84 hp)
Maximum power ECE R 24 at 2500 rpm:	
– mod. TD65F at 2500 rpm	48 kW (65 hp)
– mod. TD75F at 2300 rpm	53 kW (72 hp)
– mod. TD85F at 2300 rpm	59 kW (80 hp)
Fast idling speed:	.
– mod. TD65F	2700 rpm
– mod. TD75F	2500 rpm
– mod. TD85F	2500 rpm
Maximum torque (Nm) at 1400 rpm: TD65F (ECE R24)	270
Maximum torque (Nm) at 1400 rpm: TD75F (ECE R24)	310
Maximum torque (Nm) at 1400 rpm: TD85F (ECE R24)	330
Number of main bearings	4
Sump	Structural, cast iron

(continued)

GENERAL SPECIFICATIONS	3 cylinders
Lubrication	forced, with gear pump
Pump drive	camshaft
Engine speed/oil pump speed ratio	2:1
Oil cleaning	mesh filter on oil intake and cartridge filter on delivery line
Normal oil pressure, with engine hot and at fast idling speed:	2.9 to 3.9 bar (42.06 to 56.56 psi)
Pressure relief valve	built into pump housing
Valve opening pressure	3.5 bar (50.76 psi)
For further lubrication data	See page 16
Cooling system	coolant circulation
Radiator on TD65F, TD75F and TD85F models	two–row vertical pipes with copper fins
Fan, attached to coolant pump pulley	ten–blade steel exhauster fan
Coolant pump	centrifugal vane–type
Engine speed/coolant pump speed ratio	1:1,403
Temperature control	Thermostat
Coolant temperature gauge	coloured scale divided into three sections
Temperature ranges corresponding to each section:	
– initial white section	from 30° to 65° C (86° to 149° F)
– middle green section	from 65° to 105° C (149° to 221° F)
– final red section	from 105° to 115° C (221° to 300.2° F)
For further cooling system data	See page 16
Rev counter	incorporated in control panel
Rev counter drive	from gear on camshaft
Hour counter calibrated for engine speed of	1800 rpm.

(Continued)

(continued)

GENERAL SPECIFICATIONS	3 cylinders
Timing	overhead valves operated by a camshaft located in the engine block through tappets, pushrods and rockers. Camshaft is driven by the crankshaft through helical gears.
Intake:	
– start: before T.D.C	12°
– end: after B.D.C	31°
Exhaust:	
– start: before B.D.C	50°
– end: after T.D.C	16°
Valve clearance for timing check	0.45 mm (0.0177 in.)
Valve clearance for normal running (engine cold):	
– intake	0.30 ± 0.05 mm (0.0118 ± 0.0020 in.)
– exhaust	0.30 ± 0.05 mm (0.0118 ± 0.0020 in.)
For further timing data	See page 13
Fuel System	
Air cleaning	dual cartridge dry air filter, with clogged filter indicator with centrifugal pre–filter and automatic dust ejector.
Fuel pump	with double diaphragm
Fuel filter	mesh filter in fuel supply pump, and replaceable cartridge on delivery line to injection pump.
Minimum fuel flow rate with pump shaft rotating at 1600 rev/min.	100 litres/hour
Operated by eccentric cam	on camshaft
BOSCH Injection pump	rotary distributor type
All–speed governor, incorporated in pump: BOSCH	centrifugal counterweights
Automatic advance regulator, incorporated in pump: BOSCH	hydraulic
For further fuel system data:	see pages 5 to 8
For fixed advance (pump setting for start of delivery before TDC) – Pressure setting – Injection order, and other information regarding the BOSCH pump	refer to the data for the relevant engine type in the tables from page 6 to page 8.

DATA

Fuel injection pump	distributor type with incorporated speed governor and automatic advance regulator
BOSCH pump:	
– TD65F model	VE 3/12 F 1150 L-1118
– TD75F model	VE 3/12 F 1150 L 1089
– TD85F model	VE 3/12 F 1150 L 1089–1
Direction of rotation	anticlockwise
Injection order	1–2–3

Fuel injectors:	
BOSCH	
– Nozzle holder type	
– Nozzle type	
Number of nozzle holes	5
Diameter of nozzle orifices	
Pressure setting	248–272 bar (3596.9176–3945.0064 psi)

TD65F Model – VE 3/12 F 1150 L–1118
TEST SPECIFICATIONS FOR MECHANICALLY–GOVERNED DISTRIBUTOR PUMP

ASSEMBLY DATA and DIMENSIONS

Pump timing on engine : Delivery start 0 □ □□□0 before TDC of cylinder 1 compression stroke.
Plunger pre–lift for timing on engine: 1 mm from BDC
Cyl. # 1 delivery line union on pump : marked by “A”.

				Control lever shift spacing	
SYMBOL	SVS (max)	KF	MS	Y_a (mm)/–(^{o})	Y_b (mm)/–(^{o})
mm		–	–	37,5 ± 2,0	43,0 ± 4,0

TEST CONDITIONS

Calibration nozzle and holder assy. : 1 688 901 027
Test fuel–injection tubing size : $Ø_a$ 6.0 x $Ø_i$ 2.0 x 450 mm . . . . . .
Calibrating–oil supply : ISONORM . . . . . .
Calibration–oil inlet pressure : 35.0 □ 5.0 kPa (0.35 +0.05 bar)
Calibration–oil overflow temperature : 55.0 □ 1.0 ^{o}C
Injector opening pressure: 250 □ □ bar (25.0 □ 0.3 MPa or 254.93 □ 3.06 kgf/cm^2).
Overflow restriction (Ø): 0.55 mm

Test Point	Speed (min^{-1})	Tolerance	Delivery	LDA	ELAB (V)
Pump overflow rate (litre / h)					
USMO	**1150**	32,0 ± 20,0		**1000**	**12**
Supply–pump pressure (MPa)					
PSU	**500**	0,37 ± 0,08		**1000**	**12**
PSEP	**1000**	0,63 ± 0,08		**1000**	**12**
Travel distance of plunger (mm) micrometer					
SVEP	**1000**	1,3 ± 0,6		**1000**	**12**
SVO	**1150**	2,1 ± 0,5		**1000**	**12**
SVU	**900**	0,6 ± 0,5		**1000**	
Full–load starting rate (mm^3/h)					
STAM	**100**	112,0 ± 20,0		**0**	**12**
Full–load (mm^3/h)					
VEP	**700**	83,5 ± 2,5	$\leq$ 2,5	**1000**	**12**
VEPM	**600**	80,5 ± 3,0		**275**	**12**
VEPU	**600**	73,0 ± 3,0		**0**	**12**
VO	**1150**	71,0 ± 3,5		**1000**	**12**
Speed regulation breakaway (mm^3/h)					
AB1	**1320**	1,5 ± 1,5		**1000**	
Idling speed (mm^3/h)					
LEP	**300**	10,0 ± 7,0	$\leq$ 5,0	**0**	**12**
LK	**400**	1,5 ± 1,5		**0**	**12**
Electric shut–off (mm^3/h)					
SPE1	**300**	1,5 ± 1,5	$\leq$ 5,0	**0**	**0**
LFB rate (mm^3/h)					
Q3	**1000**	45,0 ± 1,0		**1000**	**12**
Q4	**1000**	15,0 ± 1,0		**1000**	**12**
DQ2	**1000**	–13,5 ± 5,0		**1000**	**12**
LFB travel distance of plunger (mm) micrometer					
DS2	**1000**	–0,5 ± 0,1		**1000**	**12**
DS3	**1000**	–0,8 ± 0,4		**1000**	**12**
S4	**1000**	1,3 ± 0,6		**1000**	**12**

TD75F Model – VE 3/12 F 1150 L 1089
TEST SPECIFICATIONS FOR MECHANICALLY–GOVERNED DISTRIBUTOR PUMP

ASSEMBLY DATA and DIMENSIONS

Pump timing on engine : Delivery start 0□ □□□0 before TDC of cylinder 1 compression stroke.
Plunger pre–lift for timing on engine: 1 mm from BDC
Cyl. # 1 delivery line union on pump : marked by “A”.

				Control lever shift spacing	
SYMBOL	SVS (max)	KF	MS	Y_a (mm)/–(^{o})	Y_b (mm)/–(^{o})
mm		–	–	37.5±2.0	42.5±4.0

TEST CONDITIONS

Calibration nozzle and holder assy. : 1 688 901 027
Test fuel–injection tubing size : $Ø_a$ 6.0 x $Ø_i$ 2.0 x 450 mm . . . . . .
Calibrating–oil supply : ISONORM . . . . . .
Calibration–oil inlet pressure : 35.0 □ 5.0 kPa (0.35 +0.05 bar)
Calibration–oil overflow temperature : 55.0 □ 1.0 °C
Injector opening pressure: 250 □ □ bar (25.0 □ 0.3 MPa or 254.93 □ 3.06 kgf/cm^2).
Overflow restriction (Ø): 0.75 mm

Test Point	Speed (min^{-1})	Tolerance	Delivery	LDA	ELAB (V)
Pump overflow rate (litre / h)					
USMO	1150	59.0 ± 12.0		1000	12
Supply–pump pressure (MPa)					
PSU	500	0.50 ± 0.08		1000	12
PSEP	1150	0.84 ± 0.08		1000	12
Travel distance of plunger (mm) micrometer					
SVEP	1150	1.4 ± 0.6		1000	12
SVU	1030	0.6 ± 0.5		1000	12
Full–load starting rate (mm^3/h)					
STAM	100	85.0 ± 20.0		0	12
Full–load (mm^3/h)					
VEP	700	88.0 ± 2.5	≤ 3.5	1000	12
VEPM	600	76.0± 3.0		300	12
VEPU	600	64.5± 3.0		0	12
VO	1150	74.5 ± 3.0		1000	12
Speed regulation breakaway (mm^3/h)					
AB1	1280	1.5 ± 1.5		1000	12
Idling speed (mm^3/h)					
LEP	300	17.5 ± 7.0	≤ 5.0	0	12
LK	375	1.5 ± 1.5		0	12
Electric shut–off (mm^3/h)					
SPE1	300	1.5 ± 1.5	≤ 5.0	0	0
LFB rate (mm^3/h)					
Q3	1150	42.5 ± 1.0		1000	12
Q4	1150	25.0 ± 1.0		1000	12
DQ2	1150	–11.0 ± 5.0		1000	12
LFB travel distance of plunger (mm) micrometer					
DS2	1150	–0.4 ± 0.1		1000	12
DS3	1150	–0.8± 0.4		1000	12
S4	1150	1.6 ± 0.6		1000	12

TD85F Model – VE 3/12 F 1150 L 1089–1
TEST SPECIFICATIONS FOR MECHANICALLY–GOVERNED DISTRIBUTOR PUMP

ASSEMBLY DATA and DIMENSIONS

Pump timing on engine : Delivery start 0 □ □□^{0} before TDC of cylinder 1 compression stroke.
Plunger pre–lift for timing on engine: 1 mm from BDC
Cyl. # 1 delivery line union on pump : marked by "A".

				Control lever shift spacing	
SYMBOL	SVS (max)	KF	MS	Y_a (mm)/–(^{o})	Y_b (mm)/–(^{o})
mm		–	–	37,5 ± 2,0	43,0 ± 4,0

TEST CONDITIONS

Calibration nozzle and holder assy. : 1 688 901 027
Test fuel–injection tubing size : $Ø_a$ 6.0 x $Ø_i$ 2.0 x 450 mm . . . . . .
Calibrating–oil supply : ISONORM . . . . . .
Calibration–oil inlet pressure : 35.0 □ 5.0 kPa (0.35 +0.05 bar)
Calibration–oil overflow temperature : 55.0 □ 1.0 ^{o}C
Injector opening pressure: 250 □ □ bar (25.0 □ 0.3 MPa or 254.93 □ 3.06 kgf/cm^2).
Overflow restriction (Ø): 0.75 mm

Test Point	Speed (min^{-1})	Tolerance	Delivery	LDA	ELAB (V)
Pump overflow rate (litre / h)					
USMO	1050	59,0 ± 12,0		1000	12
Supply–pump pressure (MPa)					
PSU	500	0,81 ± 00,8		1000	12
PSEP	1050	0,53 ± 0,08		1000	12
Travel distance of plunger (mm) micrometer					
SVEP	**1050**	1,0 ± 0,6		1000	12
SVU	**1150**	2,0 ± 0,5		1000	12
Full–load starting rate (mm^3/h)					
STAM	**100**	110,0 ± 20,0		0	12
Full–load (mm^3/h)					
VEP	**700**	95,0 ± 2,5	$\leq$ 3,5	1000	12
VEPM	**600**	84,5 ± 3,0		300	12
VEPU	**600**	73,0 ± 3,0		0	12
VO	**1150**	81,0 ± 3,0		1000	12
Speed regulation breakaway (mm^3/h)					
AB1	**1320**	1,5 ± 1,5		1000	12
Idling speed (mm^3/h)					
LEP	**325**	12,5 ± 7,0	$\leq$ 5,0	0	12
LK	**380**	1,5 ± 1,5		0	12
Electric shut–off (mm^3/h)					
SPE1	**325**	1,5 ± 1,5	$\leq$ 5,0	0	0
LFB rate (mm^3/h)					
Q3	**1050**	55,0 ± 1,0		1000	12
Q4	**1050**	30,0 ± 1,0		1000	12
DQ2	**1050**	–11,0 ± 5,0		1000	12
LFB travel distance of plunger (mm) micrometer					
DS2	**1050**	–0,4 ± 0,1		1000	12
DS3	**1050**	–0,8 ± 0,4		1000	12
S4	**1050**	1,3 ± 0,6		1000	12

FUEL SUPPLY PUMP DATA	mm (in.)
Eccentricity of drive shaft	3 (0.1181)
Diameter of drive shaft at bushings	31.975 to 32.000 (1.1049 to 1.1050)
Internal diameter of installed and reamed bushings	32.050 to 32.075 (1.2589 to 1.2628)
Interference between bushings and seats	0.063 to 0.140 (0.0025 to 0.0055)
Assembly clearance between shaft and bushings	0.050 to 0.100 (0.0020 to 0.0039)
Thickness of internal washer	1.45 to 1.50 (0.0571 to 0.0591)
Thickness of external washer	2.93 to 3.00 (0.1154 to 0.1181)

CRANKCASE/CYLINDER BLOCK DATA	mm (in.)
Diameter of main shell bearing seats	84.200 to 84.230 (3.3150 to 3.3161)
Diameter of camshaft bearing seats:	
– front	54.780 to 54.805 (2.1567 to 2.1577)
– middle	54.280 to 54.305 (2.1370 to 2.1380)
– rear	53.780 to 53.805 (2.1173 to 2.1183)
Diameter of standard tappet bores in crankcase	15.000 to 15.018 (0.5906 to 0.5913)
Spare tappet oversizes	0.1–0.2–0.3 (0.0039–0.0079–0.0118)

(1) Measured after press–fitting and reaming.
(2) Measure in the area swept by piston rings, both parallel and perpendicular to the crankshaft axis.

CRANKSHAFT AND BEARINGS DATA	mm (in.)
Crankshaft	balanced with integral counterweights
Standard journal diameter	79.791 to 79.810 (3.1414 to 3.1421) (1)
Journal undersizes	0.254 – 0.508 – 0.762 – 1.016 (0.01 – 0.02 – 0.03 – 0.04)
Standard main bearing shell thickness	2.168 to 2.178 (0.0854 to 0.0857)
Main bearing shell undersizes (internal diameter)	0.254 – 0.508 – 0.762 – 1.016 (0.01 – 0.02 – 0.03 – 0.04)
Bearing shell to journal clearance	0.034 to 0.103 (0.0013 to 0.0041)
Maximum permitted wear clearance	0.180 (0.0071)
Standard crankpin diameter	63.725 to 63.744 (2.5089 to 2.5096) (1)
Crankpin undersizes	0.254 – 0.508 – 0.762 – 1.016 (0.01 – 0.02 – 0.03 – 0.04)
Standard big–end bearing shell thickness	1.805 to 1.815 (0.0711 to 0.0715)
Big–end bearing shell undersizes (internal diameter)	0.254 – 0.508 – 0.762 – 1.016 (0.01 – 0.02 – 0.03 – 0.04)
Big–end bearing shell to crankpin clearance	0.033 to 0.087 (0.0013 to 0.0034)
Maximum permitted wear clearance	0.180 (0.0071)
Standard crankshaft thrust washer thickness	3.378 to 3.429 (0.133 to 0.135)
Thrust washer oversizes (thickness)	0.127 – 0.254 – 0.381 – 0.508 (0.005 – 0.010 – 0.015 – 0.020)
Width of main bearing including thrust washers	31.766 to 31.918 (1.2506 to 1.2566)
Width of corresponding crankshaft journal	32.000 to 32.100 (1.2598 to 1.2638)
Crankshaft assembly endfloat	0.082 to 0.334 (0.0032 to 0.0131)
Maximum permitted wear endfloat	0.40 (0.0157)
Maximum ovality or taper of journals and crankpin after regrinding	0.01 (0.0004)
Maximum ovality or taper of journals and crankpin	0.05 (0.002)
Maximum tolerance for alignment of crankshaft journals with crankshaft supported on the two outer journals	0.10 (0.0039)
Maximum tolerance for alignment, in both directions, of crankpins (3–cylinder engines)	0.25 (0.0098)
Maximum tolerance for run–out between the outer surfaces of the crankshaft journals and the crankshaft centreline	± 0.10 (0.004)

(continued)

(1) Crankshafts with 0.1 mm (0.0039 in.) undersize journals and crankpins and consequently undersize bearing shells may be fitted in factory production.

(continued)

BENCH TEST PERFORMANCE DATA	mm (in.)
Maximum permitted tolerance on run–out of flywheel mounting flange surface relative to the crankshaft centreline, measured with 1/100 mm (0.0394/3.94 in.) scale dial gauge resting on front flange surface at a diameter of 108 mm (4.252 in.) (total gauge reading).	0.025 (0.001)
Maximum permitted tolerance on co–axial alignment of flywheel centering seat relative to the crankshaft journals (total gauge reading)	0.04 (0.0016)

CONNECTING ROD DATA	mm (in.)
Connecting Rods	cast–iron with oil way
Diameter of small end bushing seat	41.846 to 41.884 (1.6475 to 1.6490)
Outside diameter of small end bushing	41.979 to 42.017 (1.6527 to 1.6542)
Interference between small end bushing and seat	0.095 to 0.171 (0.0037 to 0.0067)
Inside diameter of small end bushing (measured after fitting)	38.004 to 38.014 (1.4962 to 1.4966)
Diameter of big end shell bearing seats	67.407 to 67.422 (2.6538 to 2.6544)
Maximum tolerance for parallelism between the small end and big end axes measured at 25 mm (0.9843 in.)	± 0.07 (0.0028)
Maximum weight difference between con rods in same engine	25 grams (0.0551 lb)

PISTON DATA	mm (in.)
	TD65F, TD75F, TD85F
Pistons	Light alloy with two compression and one oil control rings
Standard piston diameter, measured at 57 mm (2.2441 in.) from base and perpendicularly to the gudgeon pin axis	103.852 to 103.870 (4.0886 to 4.0893)
Piston clearance in cylinder liner	0.130 to 0.172 (0.0051 to 0.0067)
Maximum permitted wear clearance	0.30 (0.0118)
Piston oversizes	0.6 (0.0236)
Piston protrusion at TDC from cylinder block face	0.355 to 0.761 (0.014 to 0.030)
Gudgeon Pin Diameter	37.983 to 37.990 (1.4954 to 1.4957)
Diameter of gudgeon pin seat in piston	37.994 to 38.000 (1.4958 to 1.4960)
Gudgeon pin to seat clearance	0.004 to 0.017 (0.0001 to 0.0007)
Gudgeon pin to small end bearing clearance	0.014 to 0.031 (0.0006 to 0.0012)
Maximum permitted wear clearance	0.06 (0.0024)
Maximum weight difference between pistons in same engine	20 grams (0.00441 lb)
Maximum permissible clearance (wear limit):	
– Top	0.50 (0.0197)
– Second and bottom	0.20 (0.0079)
Piston ring end gap (fitted):	
– Top	0.40 to 0.65 (0.0157 to 0.0256)
– Second	0.30 to 0.55 (0.0118 to 0.0217)
– Bottom	0.30 to 0.55 (0.0118 to 0.0217)
Maximum permissible gap (wear limit)	1.20 (0.0472)

VALVE TIMING GEAR DATA	mm (in.)
Timing gear tooth backlash	0.160 (0.0063)
Inside diameter of intermediate gear bushings (fitted and reamed)	37.050 to 37.075 (1.4578 to 1.4596)
Diameter of intermediate gear journal	36.975 to 37.000 (1.4557 to 1.4567)
Journal to bushing clearance	0.050 to 0.100 (0.0020 to 0.0039)
Maximum permissible clearance (wear limit)	0.15 (0.0059)
Bushing interference fit in seat in intermediate gear	0.063 to 0.140 (0.0025 to 0.0055)
Outside diameter of camshaft bearings:	
– front	54.875 to 54.930 (2.1604 to 2.1626)
– middle	54.375 to 54.430 (2.1407 to 2.1429)
– rear	53.875 to 53.930 (2.1175 to 2.1232)
Interference between bearings and seats in cylinder block	0.070 to 0.150 (0.0028 to 0.0059)
Inside diameter of camshaft bearings (fitted and reamed):	
– front	51.080 to 51.130 (2.0110 to 2.0130)
– middle	50.580 to 50.630 (1.9913 to 1.9933)
– rear	50.080 to 50.130 (1.9716 to 1.9736)
Diameter of camshaft journals:	
– front	50.970 to 51.000 (2.0067 to 2.0079)
– middle	50.470 to 50.500 (1.9870 to 1.9882)
– rear	49.970 to 50.000 (1.9913 to 1.9933)
Clearance between camshaft journals and bearings	0.080 to 0.160 (0.0031 to 0.0063)
Maximum permissible clearance (wear limit)	0.20 (0.0079)
Camshaft endfloat between thrust plate and seat on camshaft	0.070 to 0.220 (0.0028 to 0.0087)
For further valve timing gear data	See page 4

TAPPET DATA	mm (in.)
Tappet bore in crankcase	15.000 to 15.018 (0.5906 to 0.5913)
Outside diameter of standard tappet	14.950 to 14.970 (0.5886 to 0.5894)
Tappet running clearance	0.030 to 0.068 (0.0012 to 0.0027)
Maximum permissible clearance (wear limit)	0.15 (0.0059)
Spare tappet oversizes	0.1 – 0.2 – 0.3 (0.0039–0.0079–0.0118)

ROCKER ARM – VALVE DATA	mm (in.)
Diameter of shaft bores in rocker arms	18.016 to 18.034 (0.7093 to 0.71)
Rocker–arm shaft diameter	17.982 to 18.000 (0.708 to 0.7087)
Rocker shaft to rocker arm bore clearance	0.016 to 0.052 (0.0006 to 0.0020)
Maximum permissible clearance (wear limit)	0.15 (0.0059)
Rocker arm spacing springs:	
– free spring length	59.5 (2.3425)
– length under load of 46 to 52 N (10.4 to 11.7 lb)	44 (1.7323)
Valve clearance for timing check	0.45 (0.0177)
Cam lift:	
– inlet valve	5.97 (0.2350)
– exhaust valve	6.25 (0.2460)

CYLINDER HEAD DATA	mm (in.)
Cylinder Head	with valve seats cut directly in the casting and press–fitted steel valve guides.
Original height of cylinder head	92 (3.622)
Maximum surface regrinding depth	0.5 (0.0197)
Diameter of standard valve guide bores in head	13.950 to 13.983 (0.5492 to 0.5505)
Outside diameter of standard valve guides	13.993 to 14.016 (0.5509 to 0.5518)
Guide interference fit in bores	0.010 to 0.066 (0.0004 to 0.0026)
Inside diameter of valve guide (fitted in head)	8.023 to 8.043 (0.3159 to 0.3167)
Valve stem diameter	7. 985 to 8.000 (0.3144 to 0.3150)
Assembly clearance between valve stem and guide	0.023 to 0.058 (0.0009 to 0.0023)
Maximum permissible clearance (wear limit)	0.13 (0.0051)
Maximum run–out of valve guide on its stem measured through 360° with dial gauge contact point resting on valve head contact band	0.03 (0.0012)
Valve guide oversizes	0.2 (0.0079)
Valve seat angle in head:	
– inlet valve	60° ± 5’
– exhaust valve	45° ± 5’
Valve face angle:	
– inlet valve	60° 30’ ± 7’
– exhaust valve	45° 30’ ± 7’
Valve head diameter:	
– inlet valve	45.300 to 45.500 (1.7835 to 1.7913)
– exhaust valve	37.500 to 37.750 (1.4764 to 1.4862)
Valve stand–in relative to cylinder head face	0.7 to 1.0 (0.0276 to 0.0394)
Maximum permissible valve stand–in	1.3 (0.0512)
Inlet and exhaust valve springs:	
– free spring length	4.6 (1.7559)
– length with valve closed, under load of 256 to 284 N (57.54 to 63.71 lb)	34 (1.3386)
– length with valve open, under load of 502 to 544 N (112.87 to 124.78 lb)	23.8 (0.9370)
Injector protrusion relative to head face:	
● BOSCH injector	0.3 to 1.1 (0.0118 to 0.0433)