SisuDiesel

WORKSHOP MANUAL

SISU DIESEL 645

V836841000

PARTEK

Sisudiesel

645

engine

Workshop Manual

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TO THE USER

This workshop Manual for Sisudiesel 645–diesel engines is intended to facilitate workshop operations and repair work.

645– engines are mainly the same in construction, so the same repair instructions usually apply to different engine versions. The differences between the various engine versions which affect repair work have been mentioned in technical data and repair instructions. All measurements are in millimetres and valid when the temperature of the parts is +20°C, unless otherwise stated.

Before starting the repair work read the safety instructions in the beginning of this book. Make sure that you have all necessary tools, parts and accessories at your disposal. The special tools mentioned in the work instructions are not all essential, but they speed up and facilitate the work and contribute to successful execution of work. An engine which has undergone repairs must be run in just like a new one.

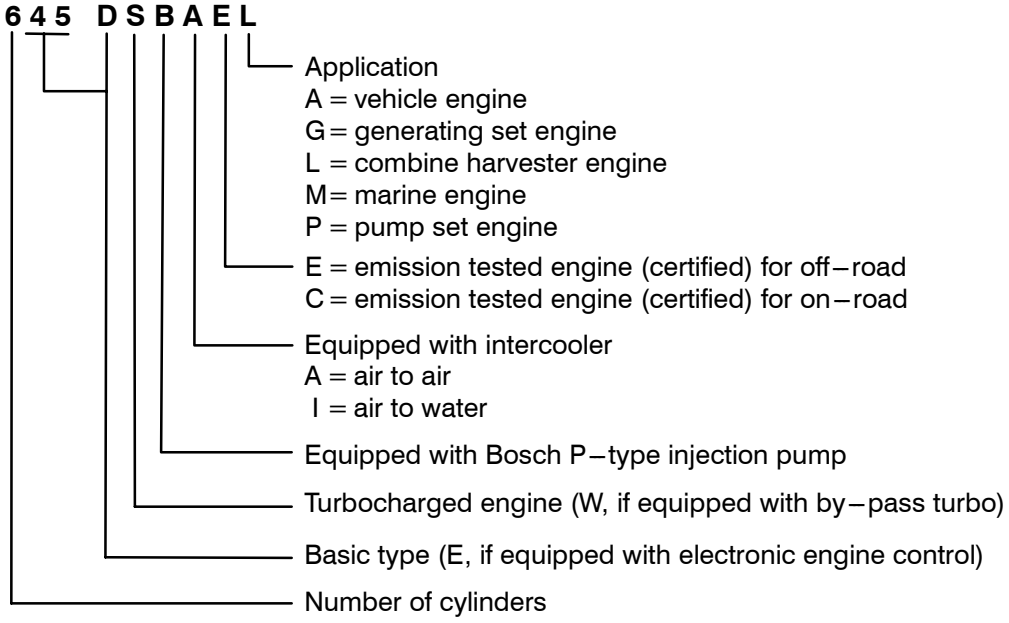
Should the engine require measures not described in this manual, please consult your local agent or the Service Department of Sisu Diesel Inc., Linnavuori, Finland. To facilitate consulting, find out the following facts about the engine before contacting us:

– engine type
– engine number
– application or equipment
– hours operated or kilometres driven.

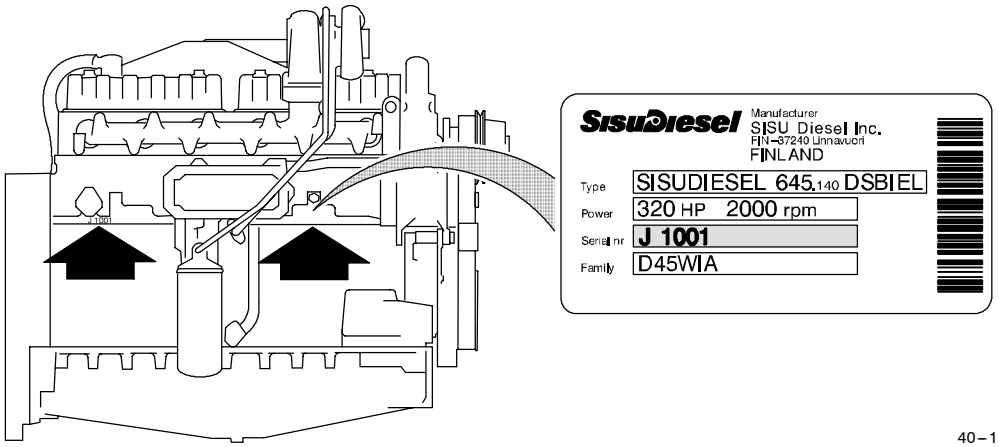
In this Workshop Manual the regular service procedure is not handled as this is explained in the 645–engines Operator's Manual.

As Sisu Diesel Inc. is continuously developing the products, all rights are reserved without separate notice to change the adjustments, accessories and service– and repair procedure.

Engine type designations



Location of the engine serial no.



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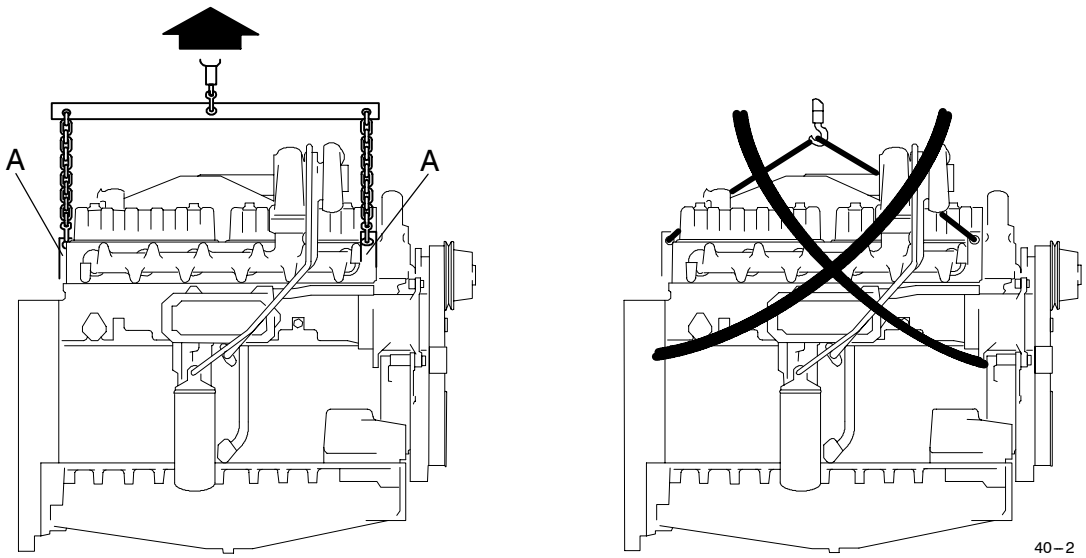
Lifting the engine

Safe lifting of the engine is done with a lifting device where the lifting force effects the lifting ears vertically.

WARNING



40–2

A = Engine lifting ears

Engine weight (dry, without flywheel and electrical equipment).

- self carrying and casted oil sump **826 kg**
- normal oil sump **690 kg**

SAFETY INSTRUCTIONS

In the service– and repair work of the engine there is always the possibility of injury. Before starting the work read and understand the following safety instructions and remarks!

Do not start a repair work that you do not fully handle.

Make sure that the place of the repair and the surrounding gives the possibility for safe working.

Always be sure of the cleanness and the good order of the repairing place.

Do not use faulty or otherwise useless tools.

Remove all finger rings, chains and watch before starting work.

Use up–todate protection equipment when you work. For example eye protection as working with compressed air for cleaning, grinding, hammering or other work.

Use lifting device for lifting and transporting heavy (over 20 kg) pieces. make sure of good condition of lifting hooks and chains. The lifting ears on the engine must not be applied by side forces when lifting.

Never work under an engine that is left handling under a lifting device or lifted up by a jack. Always use strong supports before starting the work.

Use only genuine **Sisudiesel** spare parts.

Start the engine only by using the starting switch in the cabin.

Do not start an engine if the protection covers are removed. **NOTE!** The fan is difficult to see as the engine is running! Make sure that wide clothes or long hear is not caught in the rotating parts of the engine.

If you start the engine indoors, be sure you have proper ventilation.

Never use aerosol type of starting aid while operating the thermostart device (risk for explosion).

When you are operating the engine or working near it, use hearing protectors to avoid noise injuries.

Stop the engine always before service– or repair work.

Avoid touching the exhaust manifold, turbocharger and the other hot parts of the engine.

Open the radiator cap with care when the engine is hot as the cooling system is pressurised. The cooling liquid and lubrication oil of a hot engine causes injuries when touching the skin.

Open fire, smoking and sparks should not be allowed near the fuel system and batteries. (Specially when loading batteries, explosive.)

Always disconnect the minus (–) wire of the battery when doing service or repair of the electric system.

At temperatures on excess of 300˚C, e.g. if the engine is burnt by a fire, the viton seals of the engine (e.g. the undermost o–ring of the oil pressure regulating valve) produce very highly corrosive hydrofluoric acid. Do not touch with bare hands, viton seals subjected to abnormally high temperatures. Always use neoprene rubber or heavy duty gloves and safety glasses when decontaminating. Wash the seals and the contaminated area with a 10% calcium hydroxide or other alkali solution. Put all removed material in sealed plastic bags and deliver them to the point stated by the Authorities concerned. **NOTE!** Never destroy viton–seals by burning!

When checking fuel injectors do not let the jet of high pressure fuel contact your skin. The fuel penetrates the skin causing severe injuries. Contact your doctor immediately!

The fuel, lubricating oil and coolant cause irritation in skin contact for long time.

Avoid unnecessary idling of the engine.

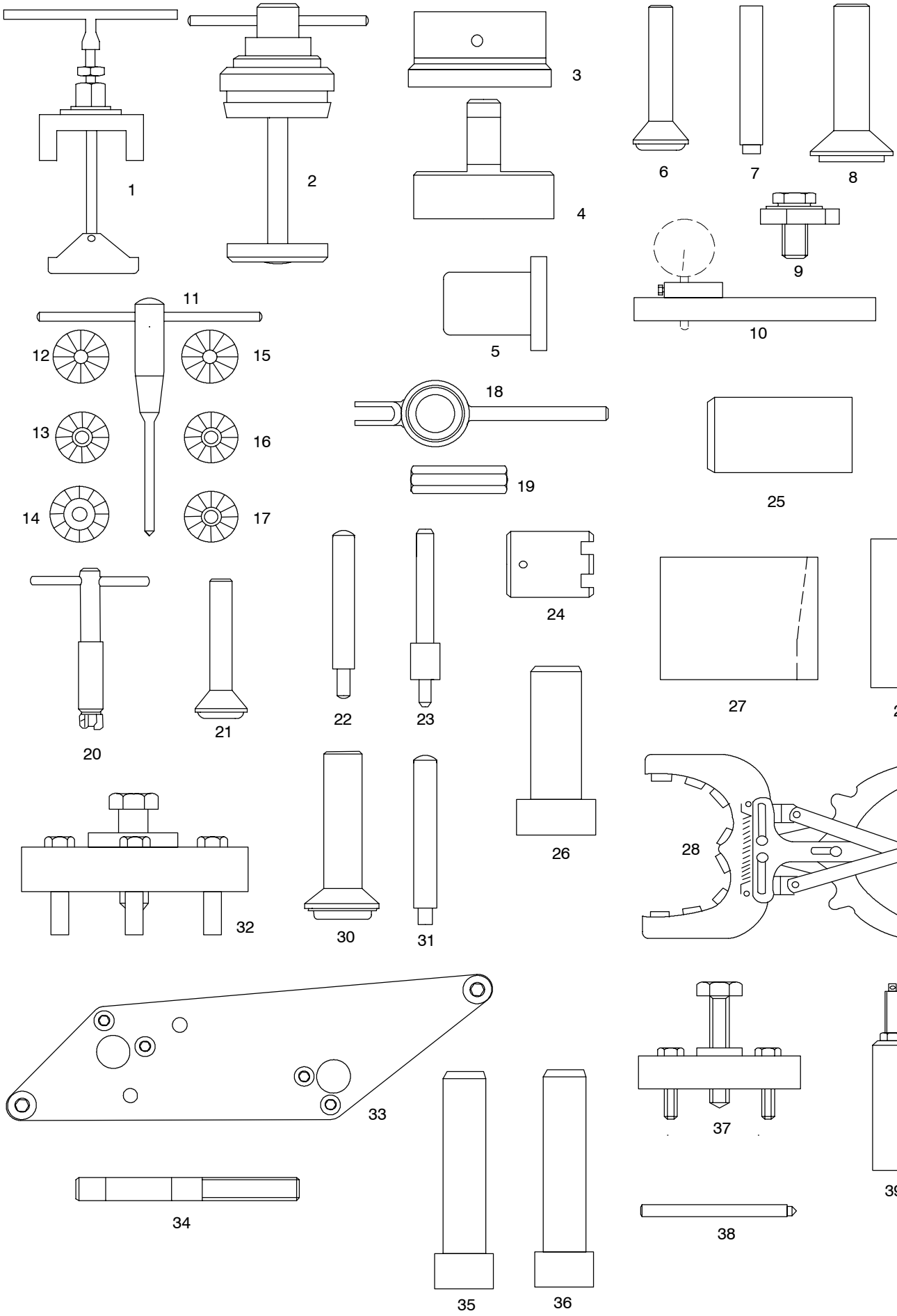
Do not let oil and other liquids drop into the soil when servicing the engine.

All the gaskets of the engine are of non–asbestos material.

Be careful when washing the engine with a high pressure washing machine. Do not use high pressure to wash e.g. the electric and fuel equipment or the radiator because they can easily be damaged.

SPECIAL TOOLS

	Order no	Description
1	9104 51500	Puller for cylinder liner
2	9104 52000	Milling cutter for cylinder liner seat
3	9104 52700	Centring tool for flywheel housing
4	9104 52600	Drift for fitting rear crankshaft seal
5	9103 94600	Drift for fitting front crankshaft seal
6	9052 46620	Drift for 40 mm cup plug
7	9052 46650	Drift for 16 mm cup plug
8	9025 87400	Drift for fitting camshaft cup plug
9	9101 66300	Press tool for cylinder liner
10	9025 79200	Holder for dial gauge
11	9101 66100	T–handle for valve seat milling cutter
12	9101 71100	Milling cutter for facing exhaust valve seat
13	9101 65502	Milling cutter for exhaust valve seat
14	9101 65503	Inner milling cutter for exhaust valve seat
15	9101 75800	Milling cutter for facing inlet valve seat
16	9101 65505	Milling cutter for inlet valve seat
17	9101 65506	Inner milling cutter for inlet valve seat
18	9101 66200	Lever for compressing valve spring
19	9052 47200	Counter nut for lever above
20	9101 66000	Milling tool for injector seat
21	9052 46660	Drift for 36 mm cup plug
22	9101 65800	Drift for removing valve guide
23	9101 65900	Drift for fitting valve guide
24	9024 55800	Spanner for crankshaft nut
25	9103 94700	Drift for fitting crankshaft gears
26	9103 41300	Drift for fitting coolant pump bearings
27	9105 18700	Conical sleeve for fitting pistons
28	9052 46900	Piston ring pliers
29	9103 94900	Drift for fitting oil deflector ring, crankshaft front end
30	9103 94800	Drift for 45 mm cup plug
31	9025 98700	Drift for fitting tension pins in timing gear casing and flywheel housing
32	9104 53300	Puller for crankshaft hub
33	9104 05400	Centring tool for idler gear, broad timing gear casing
34	9104 34600	Centring pin for idler gear, narrow timing gear casing
35	9103 41000	Fitting tool for coolant pump shaft seal
36	9103 41100	Fitting tool for coolant pump water seal
37	9052 48900	Extractor for injection pump gear
38	9104 52800	Injection timing check pin
39	9104 53700	Extractor for injector



ENGINE SPECIFICATIONS

PRINCIPAL DIMENSIONS AND DATA

Motor type	**645**
Number of cylinders	6
Displacement (ltr)	8,4
Cylinder bore (mm)	111
Stroke (mm)	145
Combustion	Direct injection
Compression ratio	16/17:1
Injection timing (B.T.D.C.)	Marked on the flywheel or damber
Valve clearance, intake and exhaust (mm)	0,35 (cold or hot)
Direction of rotation from the engine front	Clockwise
Compression pressure (bar)[1]	24

[1]) Minimum value at operating temperature and starting revs. Max permitted difference between cylinders 3,0 bar.

FUELSYSTEM

Injection pump	Bosch, in –line type
Fuel	Gas oil, see page 13–13
Feed pressure	
– overflow valve opening pressure	0,6–1,0 bar
– static	2,7 bar
Injection order	1–5–3–6–2–4
Injector	Four/five hole nozzle
Opening pressure of the nozzle	See page 14–3
Adjusting pressure of the nozzle	See page 14–3
Fuel filter	CAV

LUBRICATION SYSTEM

Oil pressure in hot engine at running speed	2,5–5,0 bar
Oil pressure at idle speed, min.	1,0 bar
Oil capacity (ltr)	See page 10–4

COOLING SYSTEM

Numbers of thermostats	2
Opening temperature ˚C	∅54 mm = 79 ∅67 mm = 83
Coolant liquid	See page 11–1