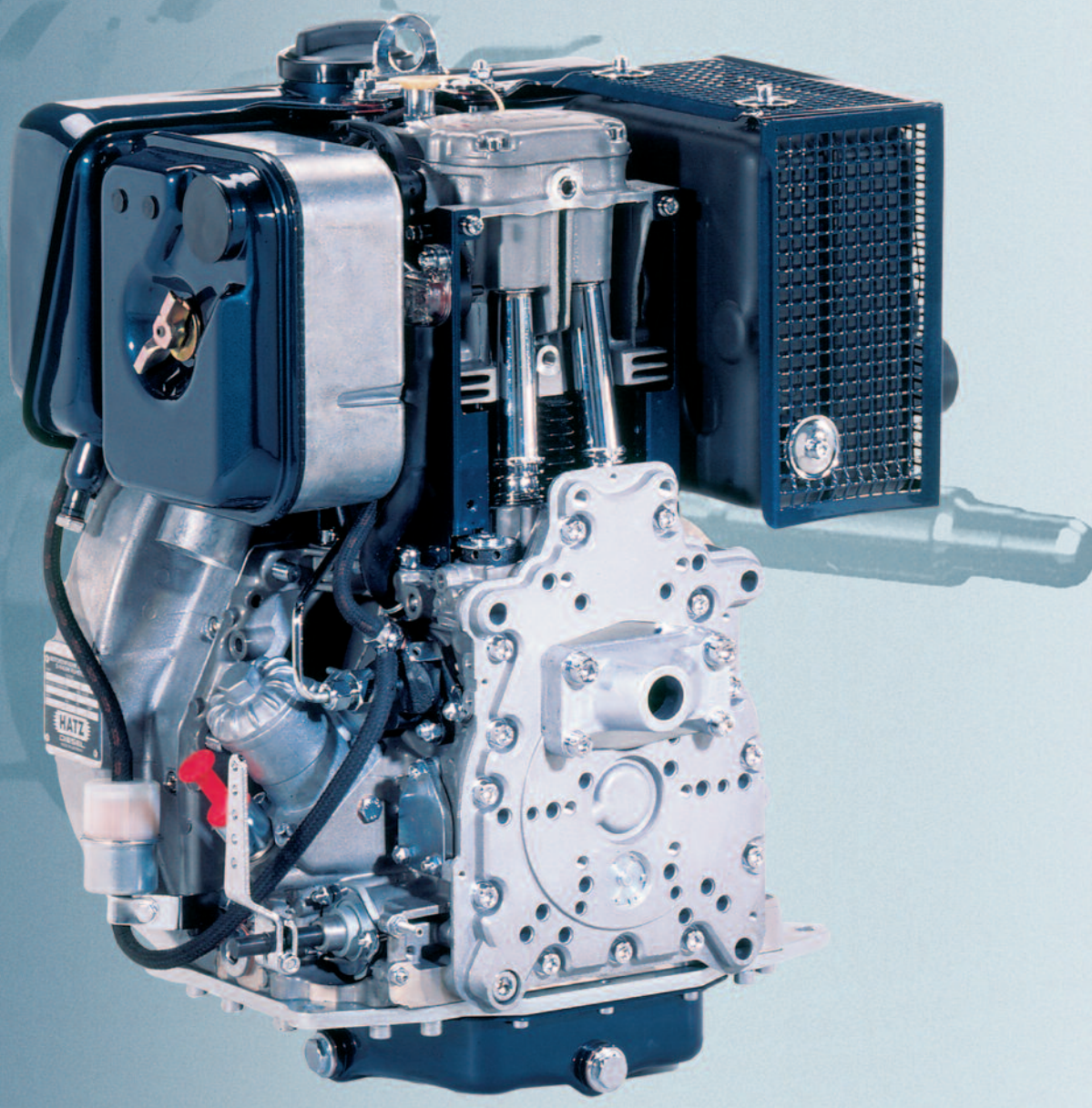
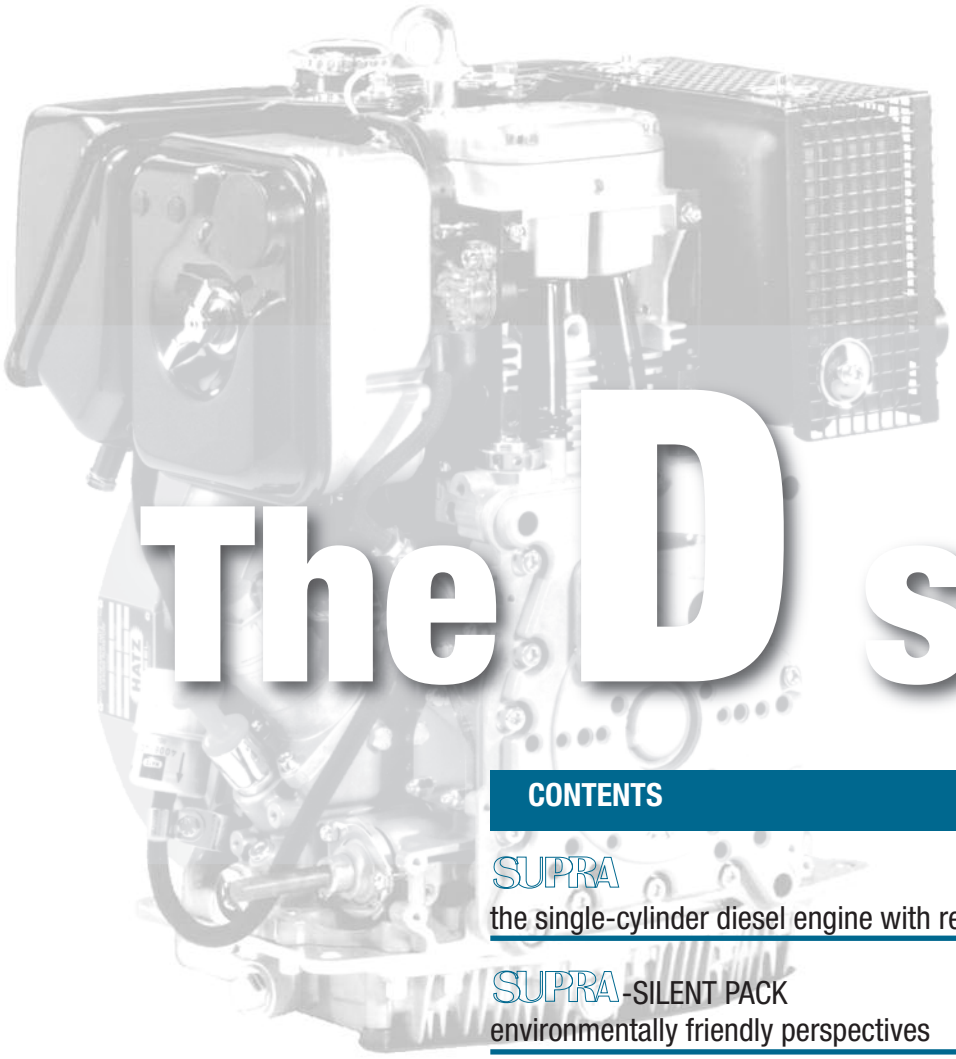
HATZ DIESEL

SUPRA D series





The D series

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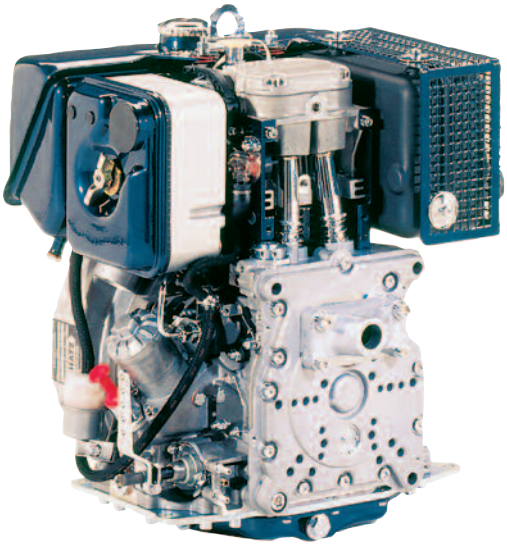


SUPRA

Many have looked for the answer to all the questions regarding the small diesel engine, here it is: SUPRA

Yet, the margin between the minimum and maximum requirements a diesel motor has to satisfy has increased continuously over the past few years.

On the one hand, the Third World farmer whose demand for technology can be met by a turning shaft stub; on the other hand, the mechanical engineer who is looking for an engine with several power take-off facilities, an integrated hydraulic pump drive, a "high-tech" regulation, which, in addition, is silent, non-polluting, smooth, compact and light-weight.

Can all these features be combined?

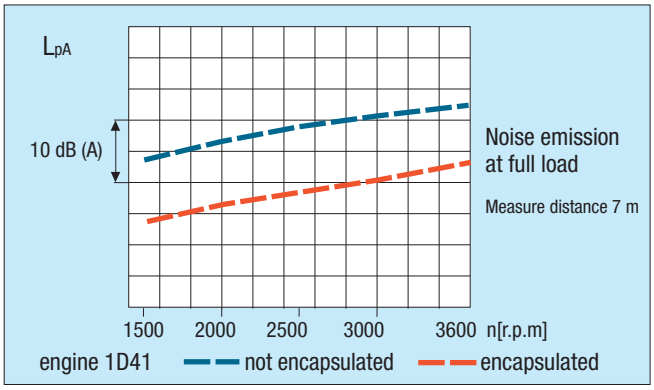
Yes they can! With an engine which can be "dressed up or dressed down", which transforms itself into a high-tech product by adding modular components and which limits itself to the essentials by omitting the superfluous, which can be manufactured in such a cost-efficient manner – thanks to sophisticated production technology -, that it is also attractive for the user who only needs basic technology.
It goes without saying that the demands on all levels share a lot of common features. In any case, the drive engine is to be robust, durable, easy to service and operate. Those who are looking for these characteristics have always been well-served with HATZ engines.

The SUPRA engine continues this tradition.

SUPRA is a "noise-reduced" series – due to many measures - which remains below the noise levels of older engines.
Moreover, SUPRA is the first single-cylinder diesel series world-wide which can be equipped with organically adapted, noise-reducing encapsulation.

The result: SUPRA **SILENT PACK**

The encapsulation consists of sheet steel. It is mounted to the engine itself in a structure-borne sound insulated manner. All servicing and maintenance points can be accessed from the outside. The exhaust silencer is installed above the flywheel in a separate encapsulation.
The noise reduction amounts to 12 dBA over the entire operating range!



Ventilation of the crankcase is effected via the bumper protection tubes, ventilation of the rocker arm case via a rubber membrane in the intake port.
The advantage: pollutant gases are burnt without passing through the air cleaner and contaminating the environment.
The combustion procedure developed by HATZ and the shape of the combustion chamber of the SUPRA result in extremely low emission values.

All SUPRA 1D.. engines have been awarded the exhaust emission certificate by the US-Environmental Protection Agency EPA and CARB.

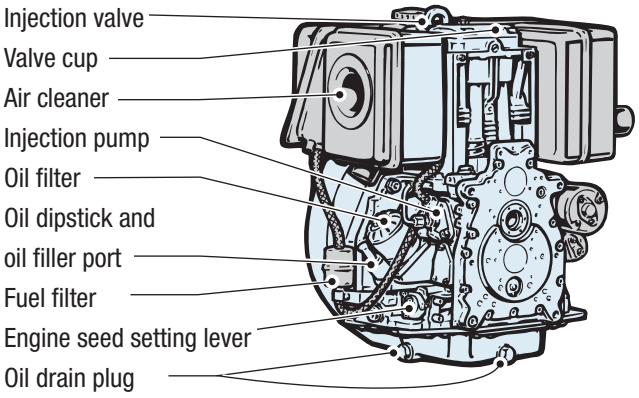
Engine data, installation data

Engine data		1D41.	1D50.	1D81.	1D90.	1D41C	1D81C
Number of cylinders		1	1	1	1	1	1
Bore x stroke	mm	90 x 65	97 x 70	100 x 85	104 x 85	90 x 65	100 x 85
	inches	3.54 x 2.56	3.82 x 2.76	3.94 x 3.35	4.09 x 3.35	3.54 x 2.56	3.94 x 3.35
Piston displacement	l	0.413	0.517	0.667	0.722	0.413	0.667
	cu.in.	25.2	31.5	40.7	44.0	25.2	40.7
Medium piston speed at 3000 r.p.m.	m/s	6.5	7.0	8.5	8.5	6.5	8.5
	ft/min	1280	1378	1673	1673	1280	1673
Compression ratio		21.0	20.5	20.5	20.5	21.0	20.5
Lubricating-oil capacity max./min.	l	1.2 / 0.8	1.5 / 1.0	1.9 / 1.0	1.9 / 1.0	1.2 / 0.8	1.9 / 1.0
	US qts	1.14 / 0.76	1.42 / 0.95	2.0 / 1.06	2.0 / 1.06	1.14 / 0.76	2.0 / 1.06
Engine speed control	Low idle speed	approx. 800 r.p.m.				approx. 800 r.p.m.	
	Stat. speed deviation	approx. 5% at 3000 r.p.m.				approx. 5% at 3000 r.p.m.	

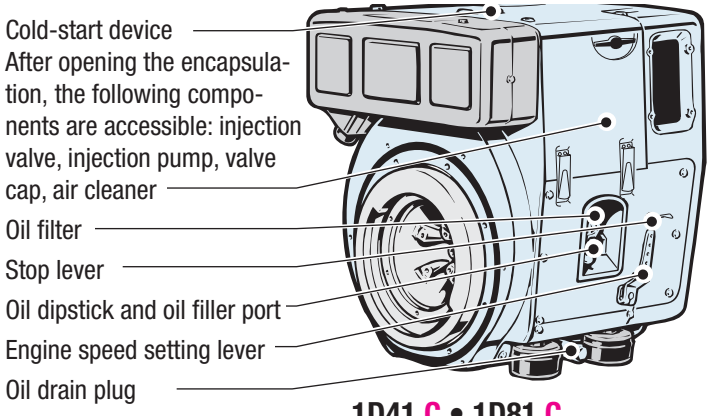
Installation data		1D41.	1D50.	1D81.	1D90.	1D41C	1D81C
Combustion air volume at 3000 r.p.m. approx. [1]	m^3 / min	0.61	0.78	1.0	1.1	0.61	1.0
	cu.ft./min	21.6	27.6	35	39	21.6	35
Cooling-air volume at 3,000 r.p.m. approx. [1]	m^3 / min	4.5	5.5	10.8	10.8	3.8	8.4
	cu.ft./min	159	195	382	382	135	297
Moment of inertia	kgm^2	0.24 (0.28)[2]	0.41	0.51	0.51	0.24 (0.28)[2]	0.51 (0.63)[2]
	$lb.ft^2$	5.67 (7.08)[2]	9.7	12.05	12.05	5.67 (7.08)[2]	12.05 (7.08)[2]
Permanently inclined position	max. Grad	30		25		30	25
Starter motor		12 V · 24 V				12 V · 24 V	
Battery capacity	min / max Ah	12 V - 45 / 88 Ah · 24 V - 36 / 55 Ah				12 V - 45 / 88 Ah · 24 V - 36 / 55 Ah	

[1] The indicated air volume must be calculated analogously in a linear manner for other speeds [2] Variant I (Heavy flywheel)

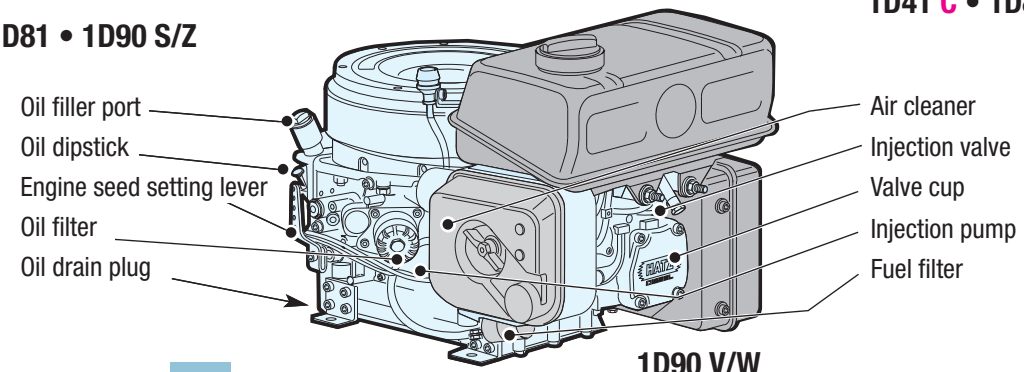
Maintenance and servicing points



1D41 • 1D50 • 1D81 • 1D90 S/Z



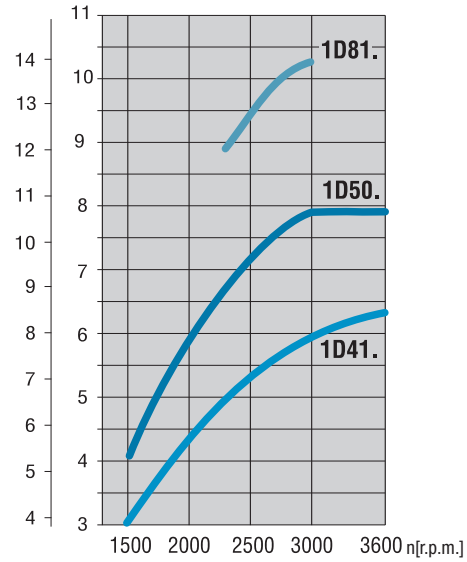
1D41 C • 1D81 C



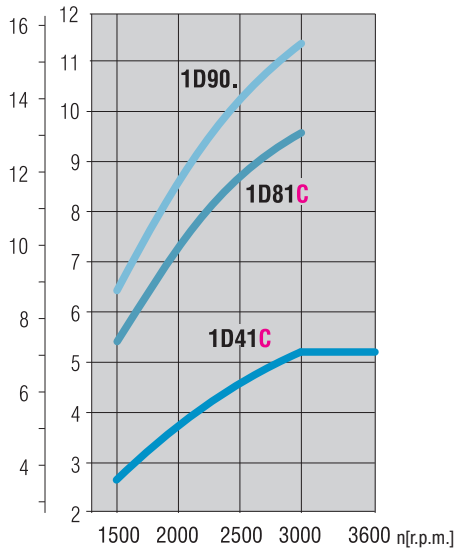
1D90 V/W

Power output, torque, fuel consumption

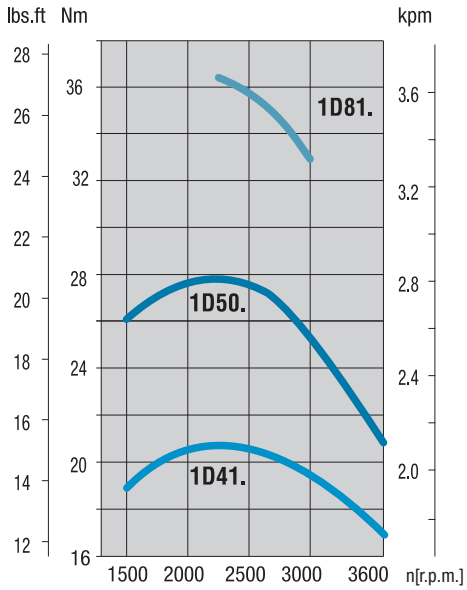
Vehicle power
HP kW according to **DIN ISO 1585**



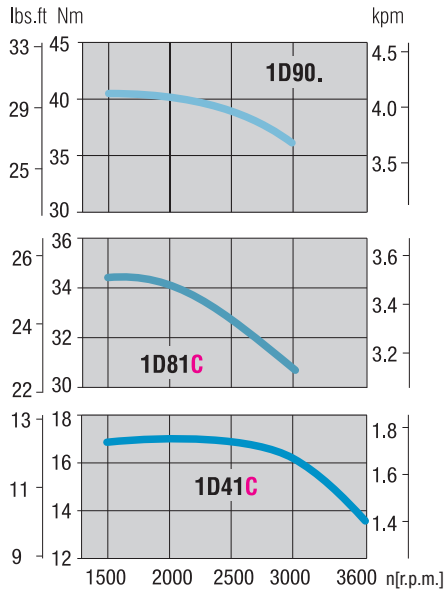
Power
HP kW for intermittent load acc. to **ISO 3046-1**



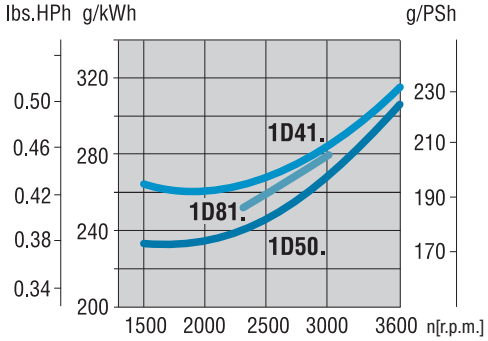
Torque
at vehicle power according to **DIN ISO 1585**



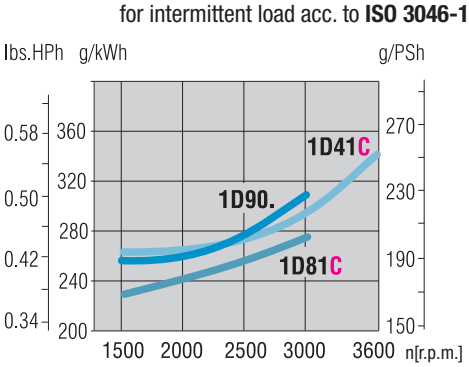
Torque
for intermittent load acc. to **ISO 3046-1**



Specific fuel consumption
at vehicle power according to **DIN ISO 1585**



Specific fuel consumption
for intermittent load acc. to **ISO 3046-1**

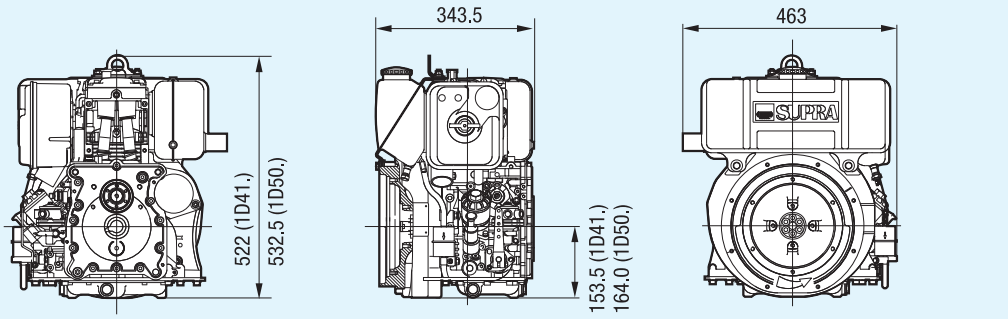


The power ratings refer to the reference location according to the power standard ISO 3046-1: +25 °C, 100 kPa, 30 % relative humidity. The indicated power is reached by the engine during the running-in period; on delivery, it may be 5% below. Power reduction according to ISO 3046-1. Approximate values: over 100 m above sea level, approx. 1 % per 100 m, above 25 °C approx. 4 % per 10 °C.
To be considered on calculating the power output: alternator output: max. 0.2 kW.

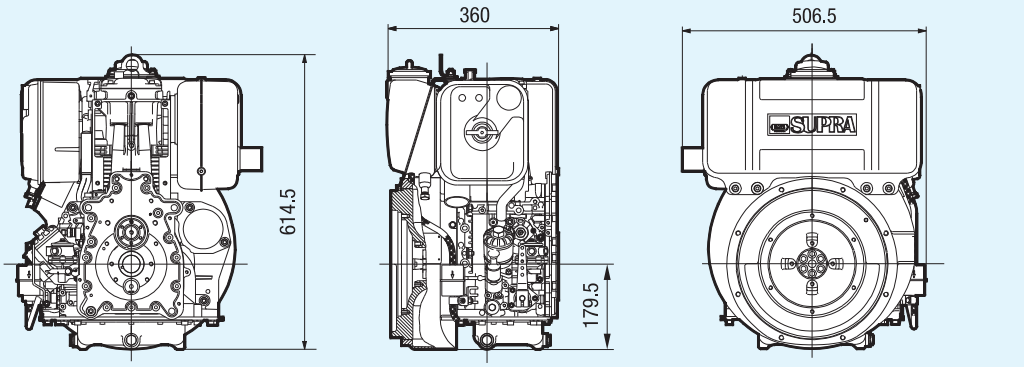
Dimensions

SUPRA

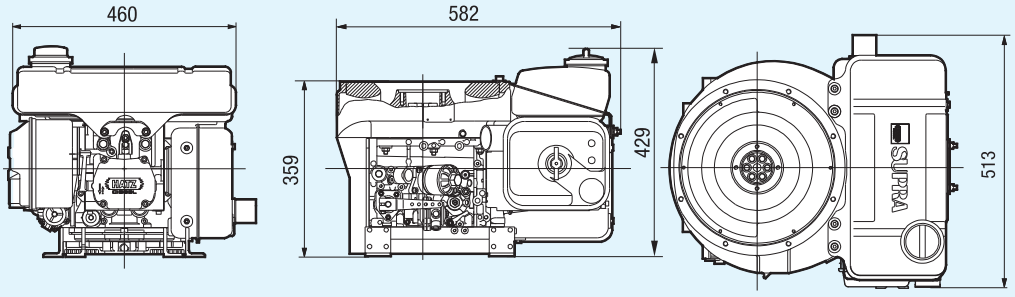
1D41. / 1D50.



1D81. / 1D90.

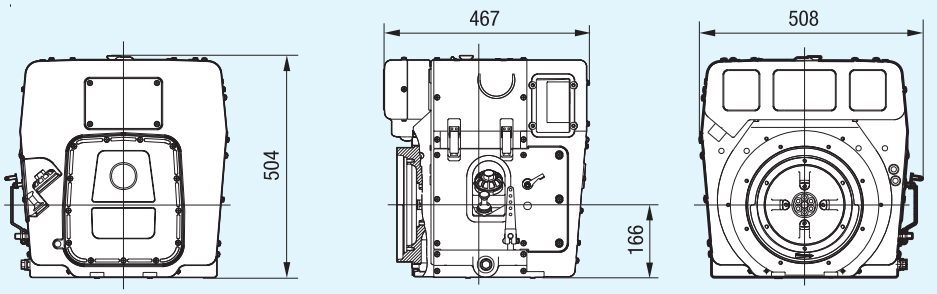


1D90V/W

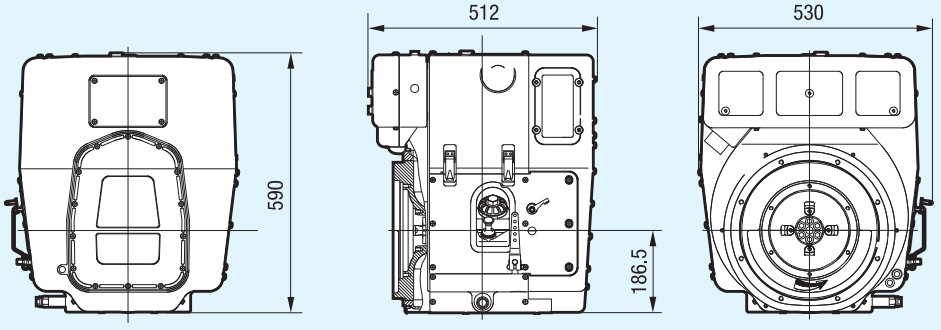


SUPRA SILENT PACK

1D41C

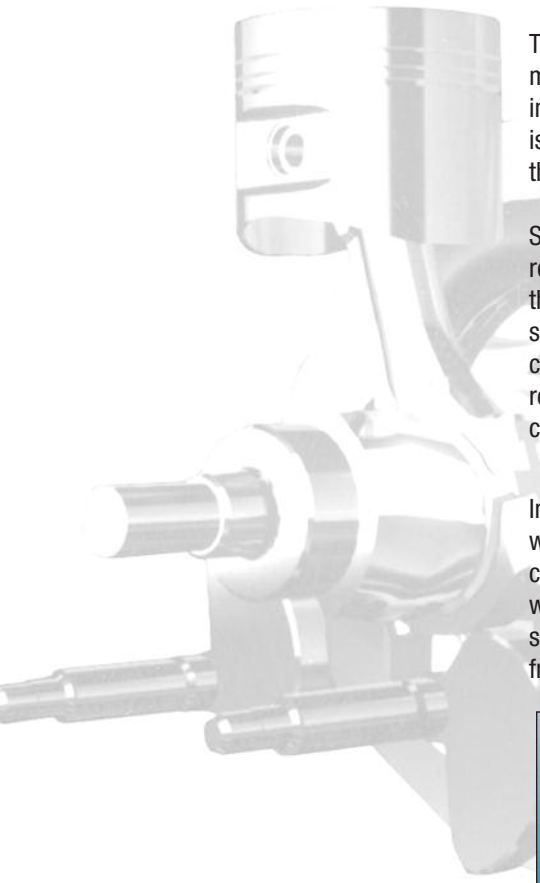


1D81C



Spread at outlines ± 3 mm due to tolerance.

Extraordinary smoothness thanks to new mass balancing



The SUPRA-series has an absolutely new mass or weight distribution on the crankshaft, including the flywheel. The most striking feature is a small counterweight on the flywheel side of the crankshaft web.

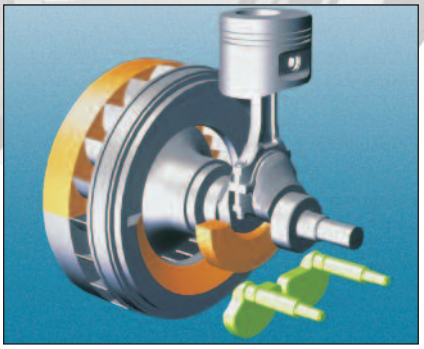
So far, the fact that it was not possible to further reduce the engine design heights was due to the counterweights which are normally installed symmetrically on the left and right sides of the crank, as the length of the connecting rod corresponds directly to the working radius of the conventional counterweight designs.

In the SUPRA-series, the counterweight which is installed on the flywheel side of the crankshaft web disposes of the desired reduced working radius. On the timing side of the crankshaft web, there is no counterweight at all. The freely available space thus created allows for the operation of an opposed balancing shaft system in an almost ideal position, which results in a 100% balancing of first-order inertia forces.

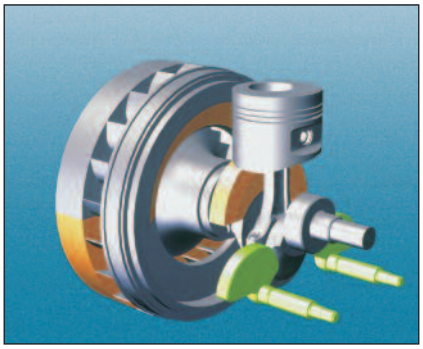
The counterweight, which interfered with the construction space, has been transferred to the flywheel. The major part of the counterweight is cast-mounted on the internal face of the flywheel. A second weight mounted onto the external face balances the moments.

This allows for obtaining the classic 50% balancing without interfering inertia moments.

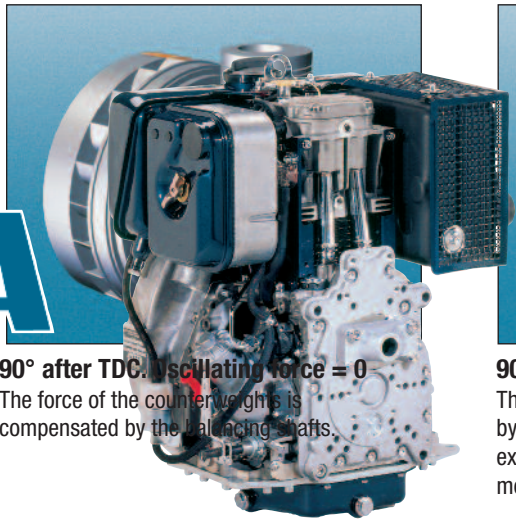
In the SUPRA series, the 100% balancing of first-order inertia forces, free of moments, is reached by adding simply two balancing shafts without having to interfere with the mass distribution system.



Top dead centre (TDC)
The maximum oscillating force is compensated by 50% by the counterweights integrated in the flywheel and on the internal crankshaft web and by another 50% by the opposite balancing shafts.



Bottom dead centre (BDC)
The maximum oscillating force is compensated by 50% by the counterweights and by another 50% by the balancing shafts.



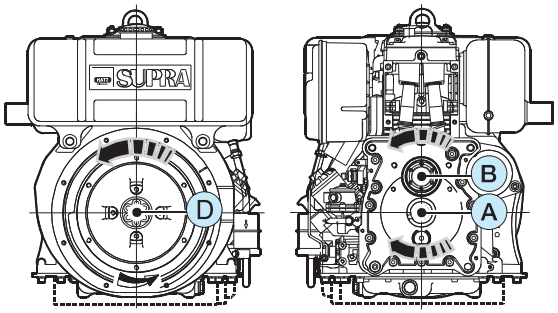
90° after TDC. Oscillating force = 0
The force of the counterweights is compensated by the balancing shafts.

90° after BDC. Oscillating force = 0
The force of the counterweights is compensated by the balancing shafts. The weight on the external face of the flywheel balances the moments.

SUPRA

Power take-off variants

1D41. • 1D50.

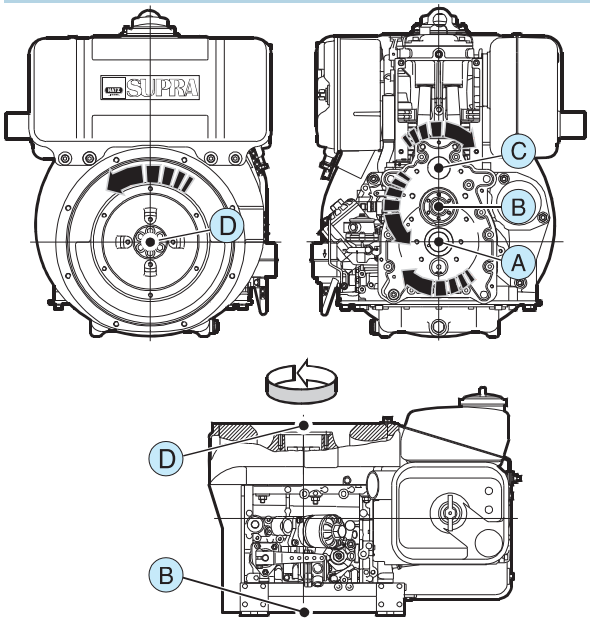


A = Power take-off 100 %
(at engine speed)

B = Power take-off 100 %
(at half the engine speed)

D = Power take-off 100 %
(at engine speed)

1D81. • 1D90.



A = Power take-off 100 %
(at engine speed)

B = Power take-off 43 Nm
(at half the engine speed)

C = Power take-off 21.5 Nm
(at engine speed)

A = Power take-off 100 %
(at engine speed)*

* The indicated moments apply for axial power take-off; in case of radial power take-off, the conditions indicated in the specification sheet must be taken into consideration.

Engine types

1D .. **S** = noise-reduced engine, left-hand rotation, with 50% balancing of the free first-order inertia forces

1D .. **Z** = noise-reduced engine, left-hand rotation, with 100% balancing of the free first-order inertia forces

1D90**V** = noise-reduced engine, left-hand rotation, vertical shaft, with 50% balancing of the free first-order inertia forces

1D90**W** = noise-reduced engine, left-hand rotation, vertical shaft, with 100% balancing of the free first-order inertia forces

Encapsulated engine types

1D .. **C** = with soundproofing encapsulation, left-hand rotation, with 100% balancing of the free first-order inertia forces

The alternator

A new invention developed by our specialists helps save space.
On the internal face of the flywheel, very close to the ring gear, permanent-magnet segments have been inserted axially over the circumference of the flywheel; together they form a pole ring.

Induction coils have been mounted to the casing within the working radius of these magnets. The resulting alternating current is supplied to a governor installed on the outside of the engine and rectified.

Universal application

Enormous flexibility regarding equipment and fields of application.
A wide range of application starting from Third World use up to a high-tech product used in modern industrialized countries.
Optionally 50 % and 100% balancing of the first-order inertia forces.

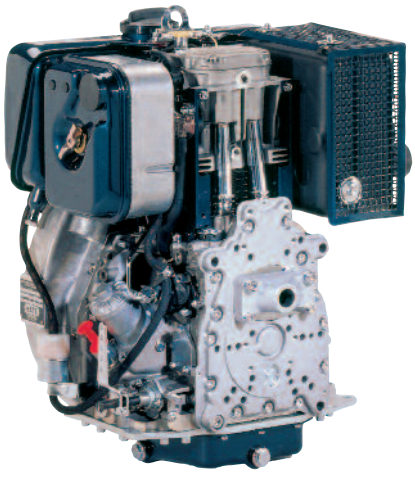
For flange-mounting in self-supporting condition, either on the flywheel side or the timing end.
9 possible hole patterns and centerings on the timing cover.
Start types: via manual crank or 12 V or 24 V electric starter.

Quality and service life

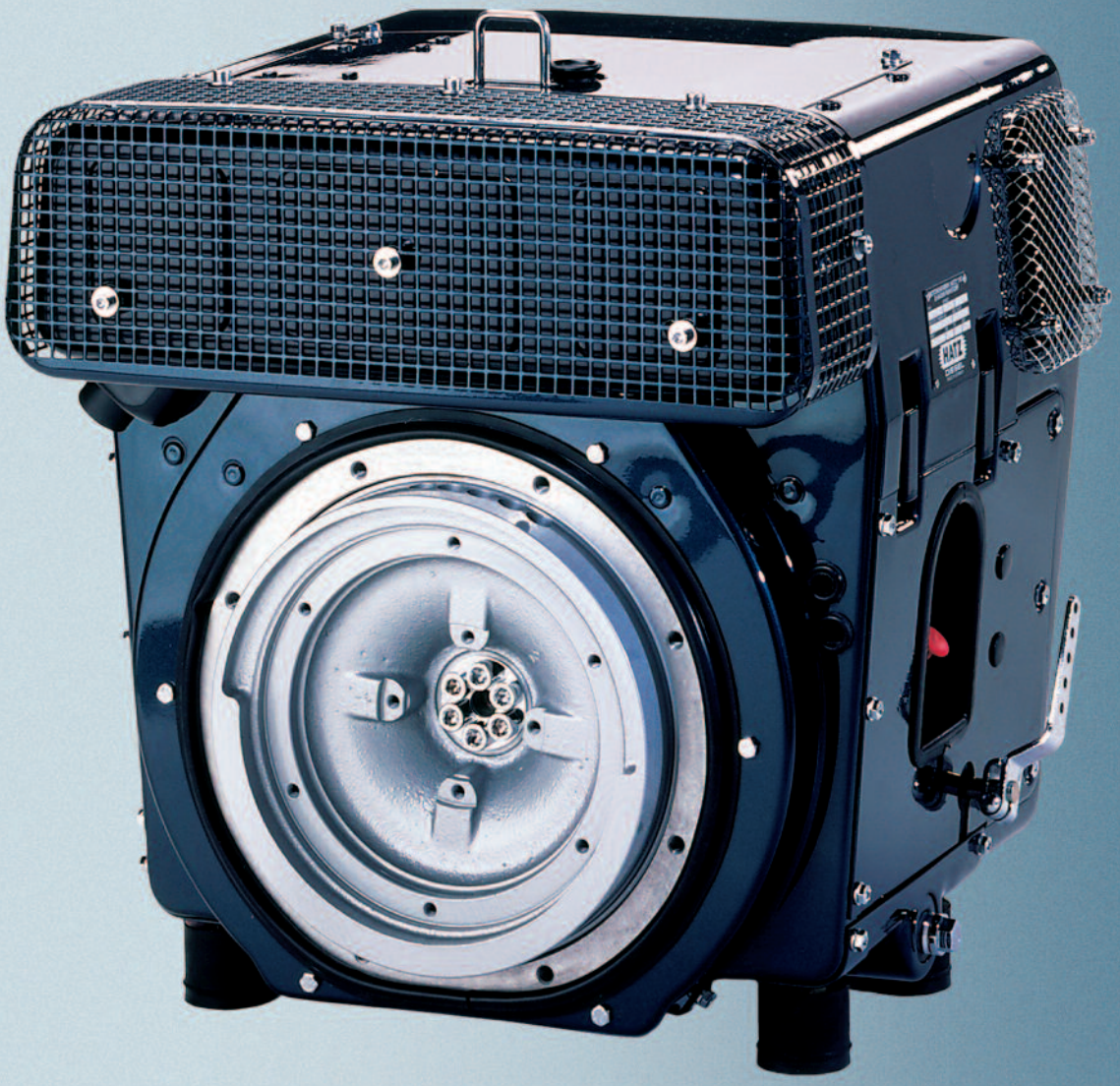
HATZ engines have been designed for a long service life.
Top quality materials and components, state-of-the-art production facilities and a rigorous quality assurance system make Athe SUPRA a product which serves as a model of durability and robustness. Besides, "designed for a long service life" also means that fault-prone components are avoided. So, you will not find e.g. any V-belts in the SUPRA series. The cooling fan is integrated into the flywheel, the AC alternator does not feature any movable parts.
And another target was considered by the engineers designing the SUPRA series: good maintenance characteristics.

That is why we assume that maintenance work will actually be performed and the SUPRA will pay off due to its long service life. In case an engine from the SUPRA series is operated without any supervision, an automatic shut-off feature stops the engine before damage has occurred, if lower or higher limits are exceeded, such as an excessive cylinder head temperature, insufficient oil pressure, clogging of the air cleaner or insufficient battery charge. This extra is there an enormous asset when it comes to a long service life.

SUPRA



SUPRA SILENT PACK



MOTORENFABRIK HATZ · D-94099 RUHSTORF · GERMANY
Tel.: +49 (0) 85 31 / 3 19-0 · Fax: +49 (0) 85 31 / 319-418
www.hatz-diesel.com · e-Mail: marketing@hatz-diesel.de

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