



Product information

ABB Turbocharging TPS...-D/E

All-round performance

75 % of a diesel or gas engine's power relies on one vital component – the turbocharger.



The ultimate goals of turbocharged engine development are higher power and efficiency – two areas in which ABB's TPS turbochargers make a vital contribution. ABB developed the TPS...-D/E series of small turbochargers for modern high-speed diesel engines and gas engines as well as for small medium-speed diesel engines used in cogeneration power plants, as marine engines, in gensets, in locomotives and in heavy-duty mining vehicles.

The TPS concept provides a robust and reliable platform for engine applications in the range of 500 kW to 3,000 kW per turbocharger. In addition to offering high efficiency and long times between overhauls, these turbochargers have features designed to satisfy strict environmental requirements.

A simple, modular design with small number of parts makes the TPS...-D/E easy to maintain and service. Customers benefit from low life-cycle costs.

Proven reliability

Simple, rugged and compact – the TPS...-D/E combines low running costs with total reliability.



Variable turbine geometry



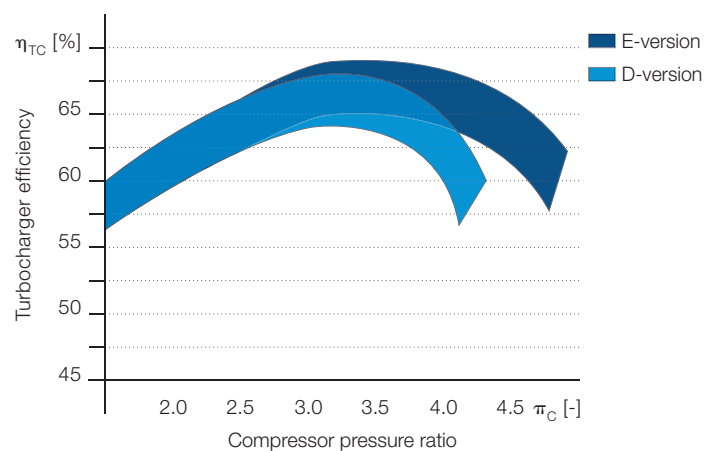
This turbocharger series is distinguished by a simple, robust and compact design, developed by ABB engineers to keep running costs down and ensure highest reliability while taking up only a minimum of space. The TPS...-D/E turbocharger has been designed for outstanding efficiency and high pressure ratios of up to 4.5. Two compressor stages are available.

Four frame sizes cover a wide range of applications. Available options include HFO and high-temperature packages as well as variable turbine geometry for applications with changing operating or ambient conditions.

Tested to the limit

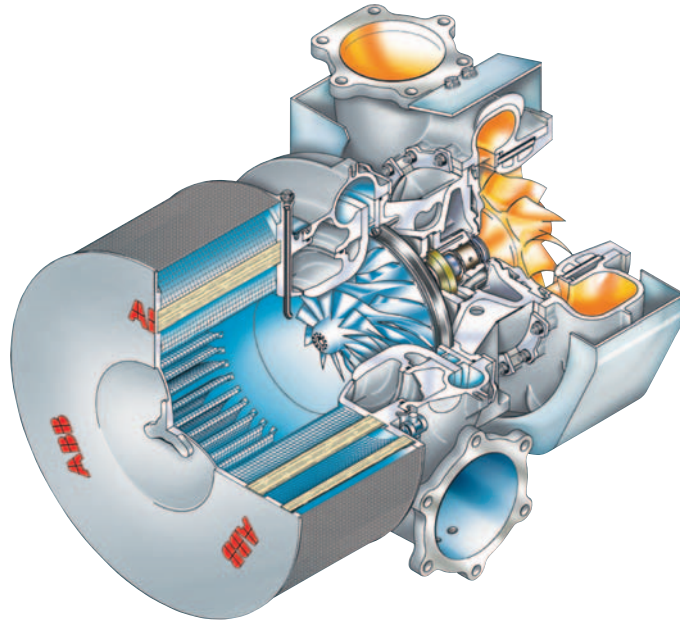
A comprehensive series of qualification tests confirms the total reliability and safety of ABB turbochargers.

Ranges of turbocharger efficiency



Benefits that stand out

The TPS...-D/E – design features with benefits in every area.

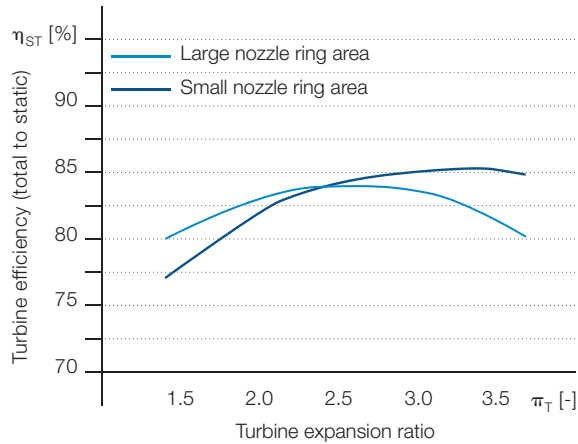


Features	Benefits
Radial compressor with backswept blades; different trims available	Wide compressor maps; optimal matching in all applications
High-efficiency, mixed-flow turbine, fully capable of pulse turbocharging	Highest performance; high part-load efficiency ensured
Internal plain bearings lubricated by engine lube oil; oil connections at bottom	“Internal” oil supply; simplified interface; no piping
Highly compact design	Small engine footprint
Oil-cooled bearing casing; water-cooled version for gas engines	Optimized turbocharger cooling for all applications
HFO compatible turbine stage; wet cleaning of turbine and compressor	Improved operation in harsh conditions
Radial bearing bushes with squeeze oil damper	Outstanding operational reliability and longer times between overhauls
Air intake and gas outlet variants available; variable positioning of casings and flanges	Optimized installation on engine
Variable turbine geometry as option	Increased operational flexibility
Comprehensive qualification test program, including containment test	Highest operational safety

Design features

Turbine and compressor

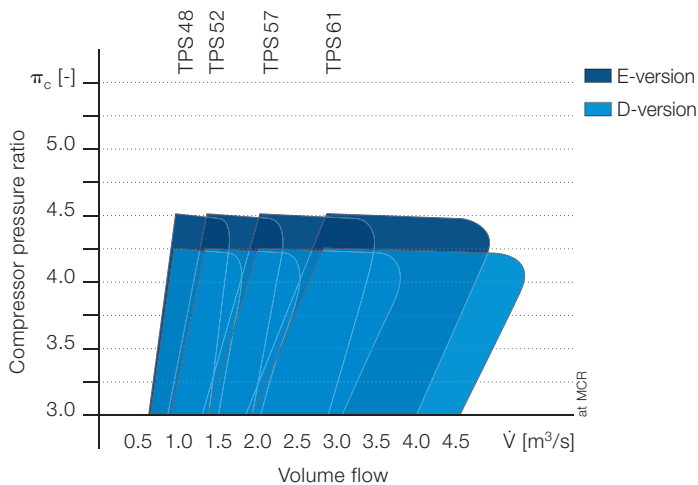
Range of turbine efficiency



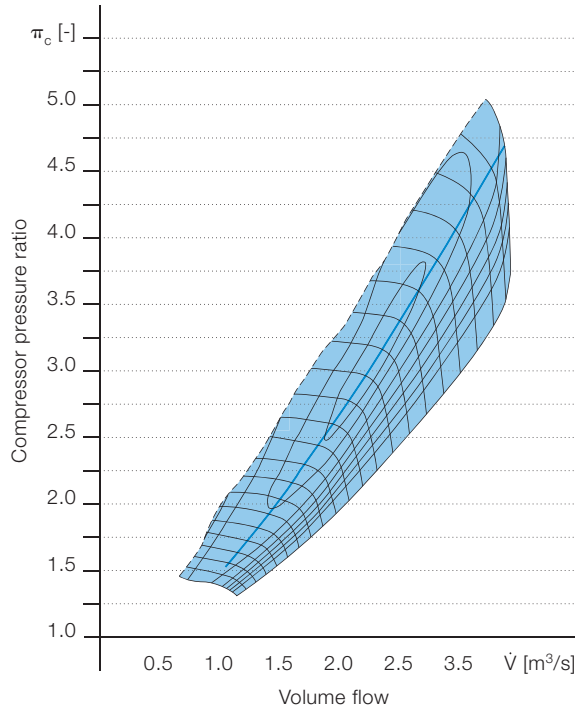
Turbine

The mixed flow turbine with nozzle ring ensures the very high efficiency and large volume flows users expect of turbochargers for 4-stroke diesel and gas engines. A key feature of this turbine is its different nozzle ring area per trim for part-load and full-load optimization. The TPS...-D/E turbine concept is suitable for both constant pressure and pulse turbocharging.

Volume flow range of TPS...-D/E turbochargers



Example of compressor map for TPS 57-D



Compressor

Two different compressor stages cover the complete range of required pressure ratios: one stage is designed for pressure ratios of up to 4.2 (TPS...-D), and the other for pressure ratios of up to 4.5 (TPS...-E). These pressure ratios are achieved for a wide range of applications with an optimized single-piece aluminium alloy compressor wheel. The compressor stages have a splitter bladed wheel with backswept blades and an optimized diffuser and scroll for highest efficiency and a wide compressor map. Peak efficiencies of more than 84 % can be achieved.

Design features

Bearings and casings

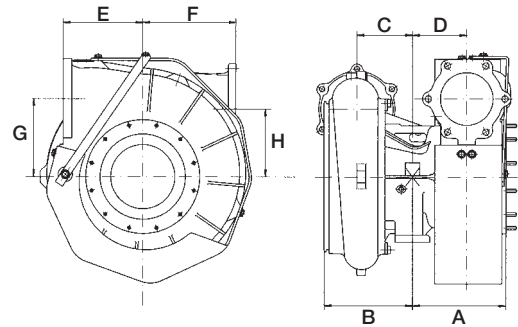
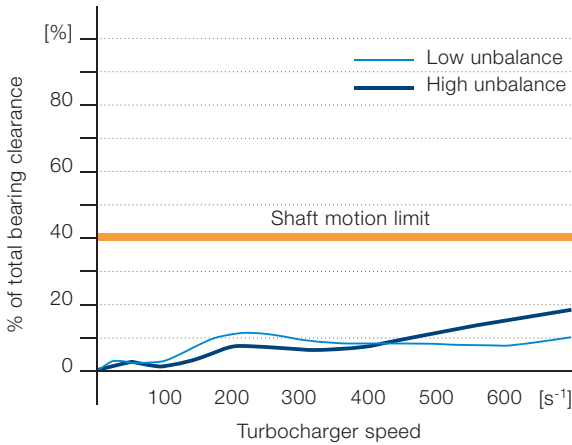
Stability and compactness

Over 50,000 ABB turbochargers with plain bearings in operation around the world provide an unrivalled experience base for TPS plain bearing technology. The axial thrust bearing is positioned between the radial bearings – a feature that also contributes to the compact rotor design. The radial bearing bushes run on a squeeze oil damper. This proven bearing technology guarantees long-term reliability for the TPS...-D/E turbocharger under all working conditions.

Burst protection

The increased brake mean effective pressures of diesel and gas engines have led to considerably higher power densities for the turbocharger rotors. Burst tests have shown that even in a worst-case scenario, e.g. a fire in the exhaust system (which can cause the compressor or turbine wheel to burst), all the parts are contained by specially designed compressor and turbine casings.

Radial shaft motion vs. turbocharger speed (TPS 57)



Type	A	B	C	D	E	F	G	H	Weight kg*
TPS 48	184	184	112	106	163	195	155	134	110
TPS 52	221	214	132	128	188	225	185	160	160
TPS 57	271	258	161	157	230	270	226	196	260
TPS 61	323	305	192	187	274	321	269	233	450

*without options

Optimized casings and interfaces

TPS . . -D/E casings have been optimized for applications on 4-stroke engines, with an emphasis on best possible fluid dynamics, minimized thermal stress and total containment. Turbine and compressor washing are catered for. All casings, including suction branches and the gas outlet elbow, are also prepared for the connection of temperature and pressure measurement sensors.

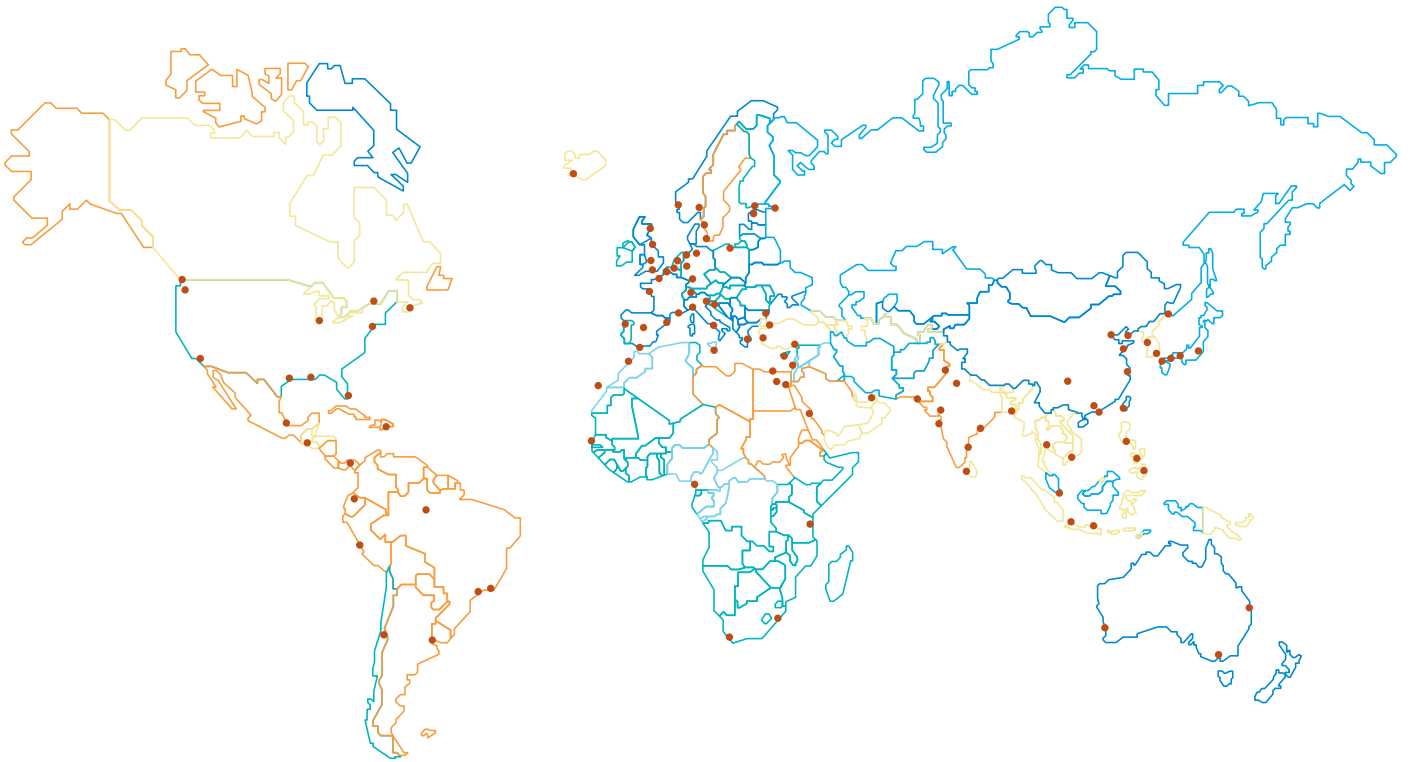
ABB turbocharger qualification tests

Tests include:

- Resonance endurance
- Low cycle fatigue
- Temperature cycle
- Hot shutdown
- Oil tightness
- Compressor containment
- Turbine containment
- Blade vibration
- Thrust bearing
- Noise



ABB Turbocharging Service network



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