Product information

Original Parts
When spending money is earning money
As a market and technology leader, ABB Turbocharging is committed to delivering high-quality turbochargers for engines with outputs over 500 kW and providing Original Service for those turbochargers meeting the highest OEM standards.

This commitment takes two complementary forms:
- Building the best turbochargers in the business
- Assisting customers to maintain those turbochargers in peak condition and at optimum performance throughout their entire life cycle

**Shared aims via Original Parts**
A machine is as good as the sum of its parts and ABB Turbocharging is committed to delivering the highest quality Original Parts for your turbocharger. Combined with a global service network equipped to rapidly deliver our high-quality Original Parts and the highest levels of OEM workmanship during all Original Service operations, including maintenance, repair and overhaul, ABB Turbocharging Service shares the same aims as the end user, i.e. delivering consistently optimized levels of:
- engine performance
- engine reliability
- engine safety
- engine availability
- engine fuel efficiency
- engine emissions
and all at economic cost.

**Original Parts from the source**
To achieve these aims ABB Turbocharging undertakes to deliver Original Parts incorporating all the technology, knowledge and experience of turbocharger design and operation available only to the OEM.

They are thus the foundation of the long-term efficiency, dependability and economy of ABB turbochargers.
ABB Turbocharging Original Parts
Designed, manufactured and installed for long life and absolute operational safety.

Painstaking production, accurate geometry and first-class materials are the cornerstones of the performance of ABB Turbocharging Original Parts.

This means producing them on the same high technology machine tools as components for new turbochargers and according to original works drawings which incorporate all the modifications introduced since the turbocharger’s launch. The third part of the ABB Original Parts quality equation is the chemical composition and physical properties of their materials. All conform to ABB’s own stringent specifications, to ensure low rates of wear for long effective life and high operational safety.

Original Service standards
Complementing the quality of ABB Turbocharging Original Parts is the quality of the ABB Turbocharging Service organization. It is based on a network of ABB-owned Service Stations with direct access to all the turbocharger expertise available at the Service Center in Switzerland and adjacent turbocharger works.

Global uniformity
All ABB Turbocharging Service Stations are equipped to the same high standards, use the same, frequently updated best practices and employ only service staff trained and qualified in-house.

Customer proximity
Original Service, whether maintenance, overhaul or repair of ABB turbochargers, is always readily accessible on a global basis. The ABB Turbocharging Service network consists of over 100 Service Stations, strategically located at major centers of engine activity.

First-class logistics
To ensure global availability, our sophisticated Original Parts stocking and transport arrangements at our Swiss Service Center underpin a 24 hour order-to-dispatch system which makes every Original Parts order a fast-track order.

ATURB product and service documentation
Backing the central inventory in Switzerland are stocks held by the regional Service Stations. Details and locations of all Original Parts are stored in the ATURB computerized management system. The ATURB database also documents full details of every component fitted to every new ABB turbocharger and tracks the service history of every turbocharger, including the Original Parts fitted over its complete lifespan.
Original Parts for ABB turbochargers are the embodiment of our company’s skill, expertise and experience. The dimensional accuracy of turbocharger components is critical in attaining thermodynamic and aerodynamic efficiency, low rates of wear and operational safety.
As the source of the original design, both new Original Parts and CPEX reconditioned Original Parts are made to precisely optimized tolerances. Likewise, great attention is paid to the surface condition of turbine and compressor blades and vanes and all air gas and air path components to avoid the turbulences which can greatly reduce aerodynamic efficiency. In this way, turbocharging efficiency is optimized over a full range of turbine and compressor operating conditions.

**Close matching**
As well as paying great attention to the dimensions of Original Parts, great efforts are made during both new product assembly and reassembly after Original Service operations to match tolerances. For example, companion parts such as turbine and compressor wheels and their casings are carefully chosen to achieve optimum fits and clearances.

**No pain, no gain**
The painstaking pursuit of precision typical of ABB Turbocharging Service engineers and technicians using Original Parts during Original Service work pays dividends in terms of turbocharger performance and efficiency. In terms of engine performance these translate directly into:
- optimized engine power
- minimized fuel consumption
- maximized availability

**The effects of poorly fitting non original parts**
At the heart of the imperative for accurate geometry is the fact that the efficiency of a turbocharger turbine or compressor decreases in logarithmic progression to the clearances between its rotor wheels and adjacent stationary parts like casings, diffusers, etc. Thus, excessive tolerances can quickly result in dramatic increases in fuel consumption.

In extreme cases, the turbocharger will be subject to surge and/or vibration with the risk of accelerated wear. The engine may be unable to run smoothly or get even close to its rated output.

Further examples from turbochargers in the field where turbocharger efficiency, safety and smooth operation have been severely affected by the geometry of non original parts deviating from ABB Turbocharging’s rigorous specifications include:
- radial turbine vanes
- axial turbine blades
- diffusers
- nozzle ring vanes
Certificated high-duty materials
The stuff of safety and longevity.

Like all aspects of the production of ABB turbochargers and their Original Parts, material specifications are fully documented in tests certificates and type approvals from Classification Societies.

Proprietary specifications
Many materials in ABB Turbocharging Original Parts are either patented or made to an ABB in-house specification. These define chemical composition, heat treatment, surface quality and required mechanical properties. They ensure the right choice of material characteristics to achieve low wear rates and safe turbocharger operation under conditions like high temperatures and abrasive residues in the exhausts of diesels burning heavy fuel oil (HFO).

Operational safety
The operational safety of the turbocharger is paramount since it also affects the reliable operation of the engine and hence the propulsion of ships and the dependable availability of electrical power from diesel and gas engine power plants. In the extreme, lives can depend on both. As well as tribological characteristics, materials for ABB Original Parts are chosen for their sheer strength and ability to resist shock loading.

Facts and figures
Consider: the blade tips of a turbocharger can rotate at up to around 600 meters per second, i.e. around 2100 km/h; the centrifugal force exerted by a turbine blade on its fixation can be almost 100 tons, i.e. the weight of a big locomotive; the centrifugal force of all blades can amount to 3200 tons, i.e. near the maximum take-off weight of ten Jumbo Jets. Components are also subject to extremely high loads – both mechanical and thermal – and there is always a risk, however remote, of exceptional circumstances, such as rotor overspeed or material fatigue when specified exchange intervals are not observed.

Containment
One of the most vital factors for turbocharger components is the capability to withstand a worst case scenario where parts rotating at very high speeds lose their integrity, fragment and are hurled with immense force at turbine and compressor casings. ABB Turbocharging goes to great lengths to design its compressor and turbine casings in high grade materials with the necessary strength to promote absolute safety. As well as tensile strength, a major precondition of satisfactory fragment containment is high ductility in turbine and compressor housing materials. ABB is one of the turbocharger manufacturers that carries out containment qualification tests on the rotor casings of every new turbocharger type under conditions as near to reality as possible. The result is justified confidence in the components’ fitness for purpose and an unrivaled record of operational safety.
Fitting Original Parts from ABB Turbocharging is a strong safeguard of hazard-free turbocharger operation. Aboard ships, in power plants, on mobile equipment and locomotives.
Non original parts and non original service – worth the money?
Rectifying turbocharger faults arising from non original parts fitted during non original service has become a core competence of ABB Turbocharging Service Stations.

Geometry
Turbocharging efficiency depends on tight clearances between the rotor and its housings. They are in the region of 0.66 mm – the thickness of about 5 human hairs. In a logarithmic progression, an increase of only 0.1 mm would mean a turbocharging efficiency loss of over 1%. Similarly, aerodynamic efficiency can be severely affected by turbulences caused by rough internal surfaces and steps at joints.

Double trouble
These potentials apply to both the turbine and compressor. Their cumulative effect could lead to an appreciable deterioration in fuel consumption. Consider: just 1% lower fuel efficiency on a 10 MW medium- or high-speed engine equates to 140 tons of fuel worth USD 70,000* per year.

Engine operation
Out-of-spec parts can prevent steady state turbocharger operation (surging) or make it only achievable at reduced engine power and fuel efficiency. This leads to:
- Enforced slow steaming/slippage in vessel schedules
- Reduced electrical power generation
- Reduced transient response
- Excessive vibration leading to accelerated wear and reduced safety

Safety
The failure of turbocharger casings to contain rotor fragments could lead to consequential losses, including severe personal injuries. Turbocharger failure leading to complete loss of engine power could leave a vessel “dead-in-the-water” on the high seas or a town without electrical power.

Operating economics
Rectification of non original service work using non original parts leads to:
- Duplication of repair costs
- Delayed departure/extra harbor dues as high as USD 15,000** per day
- Possible cost of additional sea trials
- Possible cost of new turbocharger

Environmental impact
Higher fuel consumption leads to higher emissions of greenhouse gases. Increased harmful emissions – especially NOx and visible particulates – can lead to:
- Loss of incentives, e.g. Norway
- Prohibition from port entry
- Fines
- Unpleasant environment for cruise or ferry passengers

* assumes SFC 200 g/kWh, 7000 running hours, fuel 500 USD per ton.
** 70,000 GT container ship overstaying 5 day fee period, Hamburg.

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<th>Deviation from ABB specification</th>
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<th>Safe operation interval</th>
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The table shows major areas where inaccurate machining, out-of-specification materials and poor surface finish on gas and air path components can affect turbocharger performance.
ABB is often called in to correct turbochargers where the poor dimensional tolerances of non original parts have prevented an overhauled or repaired turbocharger from functioning properly. Almost every ABB Turbocharging Service Station has its own particular story of a “white knight” emergency call out. Typically an ABB Service Station rapidly diagnoses problems due to non original parts, quickly obtains ABB Turbocharging Original Parts, fits them and returns the turbocharger to full working order with the shortest possible downtime.

Dateline Singapore
The ABB Turbocharger Service Station in Singapore was called in to diagnose problems with a repaired turbocharger aboard a bulk carrier. The rotor, nozzle ring, cover ring and diffuser had been replaced with non original parts, but on completion of the repair the turbocharger was subject to serious “surging”. This put the rotor bearings at serious risk of failure as well as preventing the engine from reaching its design output and design fuel consumption. As a result, the ship’s departure from Singapore was delayed for 5 days, incurring unnecessary harbor fees.

After dismantling the turbocharger, the ABB Turbocharging technicians established out-of-tolerance dimensions on the non original parts. Among other things, the rotor shaft was not machined in accordance with ABB specifications. Following exchange of these non original parts for ABB Turbocharging Original Parts, the engine immediately ran normally, without surging during a 10 hour sea trial and its performance was back to rated output.

Dateline South Coast UK
An engine user purchased a second-hand nozzle ring for his older turbocharger on the “gray market”. While an ABB Original Part, after basic cleaning the nozzle ring had been marked with the wrong part designation. After only a few hours the vessel reported performance problems and asked ABB Turbocharging to investigate. Measurements established the nozzle ring to be a different version to the designation shown on the specification.

ABB supplied and fitted the correct size of nozzle ring as a new Original Part – unfortunately incurring duplicated parts and labor costs for the owner – as well as engine downtime and a considerable delay in the vessel’s schedule.

Dateline Florida USA
During a standard overhaul on a TPL 77-A30 turbocharger, radial bearing bushes showed signs of severe wear on all 3 segments after just a short time in operation.

Close investigation revealed they were non original parts with serious deviations in geometry from the ABB Original Parts specification. The bushes were replaced with ABB Turbocharging Original Parts and gave excellent service with low wear.

Damage limitation: the non original parts were detected before the bearings could fail and cause damage to the shaft or a complete breakdown of the turbocharger with the vessel at sea.
Rogues gallery
Non original parts have caused turbocharger end users untold problems and expense. Duplicated purchases, duplicated efforts, vessel downtime, additional harbor fees and unnecessary sea trials to name but a few.