Product information

VTR...4
Caring for a workhorse of world trade
Caring for a classic workhorse
ABB Original Service for all VTR..4 maintenance, repair and overhaul work.

The VTR..4 turbocharger from ABB Turbocharging featured market leading efficiencies at its 1978 launch, and regular updates and uprates have helped it remain a workhorse of world trade. With ABB Original Service it can stay that way for years to come.
A very popular market leading turbocharger choice when it was introduced and still in production, over 20,000 VTR..4s have been sold. They continue to give excellent service on many low- and medium-speed engines aboard vessels from fishing boats to large container ships and in stationary engine applications. With their distinguished pedigree, VTR..4s are among the true workhorses of world shipping and stationary power – and can stay that way for years to come.

Service from the source: rejuvenating your VTR..4
As a matter of policy, ABB Turbocharging provides Original Parts for all ABB turbochargers in the field. Our well equipped and globally organized Service network can still provide Original Parts for your VTR..4. Original Parts from ABB Turbocharging:
- Incorporate all the technical modifications and enhancements made over the life of the VTR..4 to date.
- Are produced using the same high-tech processes on the same sophisticated machine tools as parts for current turbocharger series.
- Use only the highest duty ABB material specifications.
- Replicate precisely the dimensions and tolerances of components for new turbochargers.

Restoring excellence
Together with our highly trained service engineers and SIKO Safety Design Concept for service scheduling, maintenance repair and overhaul events are your chance to let your local ABB Turbocharging Service Station apply its OEM technology, knowledge and experience to your turbocharger.

With our “Original Service from the Source” we are capable of restoring the pressure ratio and efficiency of your VTR..4, leading to
- Maximized engine output
- Optimized fuel consumption
- Minimized emissions

while also ensuring
- Minimized downtime
- Maximized reliability and availability
- Optimum operational safety

First class logistics
Our sophisticated spares stocking, transport and forwarding arrangements at our Swiss Service Center underpin a 24 hour order-to-dispatch commitment which makes every Original Parts order a fast track parts order.

Located right next door to our main turbocharger works, in the unlikely event that complete VTR..4 machines, components and assemblies are not available from stock, they can be obtained at short notice from the factory and rapidly prepared for shipment.

ATURB spares tracking
Backing the central inventory at the Service Center are stocks held by the regional Service Stations and stored in the ATURB Original Parts management system. All ABB Turbocharging Service Stations have full access to ATURB to facilitate optimum locating and sourcing of spares.

ATURB product documentation
The ATURB database also contains the original specification of every component fitted to every ABB turbocharger ever sold and tracks the service history of every turbocharger, including the components fitted over its lifespan.
ABB Original Parts
The cornerstone of turbocharger reliability, efficiency and availability.

High technology design and accurate manufacture of ABB turbochargers are the foundation of your engine’s efficiency, safety, availability and economy. They incorporate all the technology, knowledge and experience of turbocharger design and operation available only to the OEM.

By choosing only ABB Turbocharging Original Parts and OEM workmanship for your VTR..4, you ensure the high power, low emissions, low fuel consumption, availability and economic life cycle costs you expect from your engine.

OEM advantage
As well as producing Original Parts according to original works drawings, the composition and properties of their materials must all conform to ABB Turbocharging’s own stringent specifications. Indeed, many designs and materials are patented and many materials were developed specifically for ABB Turbocharging to ensure low rates of wear. This translates into long effective life and high operational safety.

Component geometry – the shape of efficiency
As in all turbomachinery, the dimensional accuracy of turbocharger parts is critical in attaining thermodynamic and aerodynamic efficiency. Make no mistake – inaccurate parts geometry can translate directly into impaired turbocharger efficiency, vibrations, surging and wear, leading to loss of engine power, increased harmful exhaust emissions and increased fuel consumption. For example, only the slightest variance in the clearances between the compressor and turbine wheels and the compressor and turbine casings of a turbocharger can cause a major deterioration in turbocharger efficiency and pressure ratio.

For this reason, accurate component geometry is paramount in the production of both new Original Parts and our “CPEX” guaranteed reconditioned parts.

Likewise, during a repair or overhaul, our service engineers take great care to ensure the best match of tolerances between adjacent components like turbine and compressor wheels and the casings they run in.

Material specifications – the stuff of longevity
The chemical composition, heat treatment and surface condition of all ABB turbocharger materials is closely controlled to ensure that each part will perform to the highest standards over its assigned SIKO lifetime. For components like turbines, compressor impellers, shafts and casings, the materials of these vital rotating and gas path parts are chosen to withstand both extreme heat and abrasive particles as well as the highest mechanical stresses. To avoid efficiency losses due to turbulence in the moving gas and air, great attention is also paid to the surface condition of all gas and air path components.
In the past five years ABB Turbocharging has invested heavily in its network of wholly owned turbocharger Service Stations. The current count is over 100 Service Stations, strategically located at major centers of large engine activity.

Where engines are built, used and maintained
Typical ABB Turbocharging sites include major seagoing and inland waterway ports; centers of shipbuilding; areas of oil and gas exploration and production; clusters of diesel and gas engined power and cogeneration plants; mineral rich regions with open cast mining; major locomotive builders and rail maintenance depots; and, naturally, centers of engine building.

Direct access to service and technology
As well as being readily accessible geographically, the fact that all ABB Turbocharging Service facilities are wholly ABB-owned and under the direct control of the Swiss Service Center means that service customers have direct access to all the product know-how and application experience of a market and technology leading OEM of turbochargers for large 2- and 4-stroke diesel and gas engines.

Our mission
We see it as our mission to make available to end users of VTR...4 turbochargers the full benefit of our unique fund of expertise in turbocharger manufacturing and service.
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.

**Containment**

In the case of VTR-.4 compressor and turbine housings, this includes the selection and testing of materials with the strength and ductility to withstand intense shock loading. In the worst-case "containment" scenario, it involves making certain that casings hit by compressor impellers and turbine wheels and blades that fragment due to rotor shaft overspeed will distort but not break. In this way, debris remains within the structure of the turbocharger and is prevented from flying under great force into the engine or engine room, where it can endanger human life and property.

**Facts and figures**

To get an idea of the forces at play in a turbocharger: the blade tips of the rotor can turn at up to around 600 meters per second, i.e. almost 2100 km/h; the centrifugal force exerted by a turbine blade on its fixation can be almost 100 tons per blade, i.e. the weight of a locomotive; the centrifugal force of all blades can amount to 3200 tons, i.e. around maximum take-off weight of ten Jumbo Jets.
As your turbocharger service partner of choice for your VTR..4, ABB Turbocharging is continuously developing and improving proactive Original Service solutions, including our:
– SIKO Safety Design Concept
– OPAC Turbocharger Operation Performance Package
– MMA Maintenance Management Agreements

Recognizing that your engine is valuable and downtime expensive, these innovative offerings aim to shift the burden of preparing and administering service events from you, the end user, to us, the OEM. We can simplify planning and monitoring of Original Service and Original Parts procurement and ensure that servicing is precisely coordinated with engine operating schedules.

**SIKO**
An integral, vital element of ABB Turbocharging’s Original Service philosophy, the SIKO Safety Design Concept is our central tool for establishing maximum running time parameters for vital turbocharger components. It involves the definition of the optimum number of safe running hours for a given component before its replacement. This is based on a powerful combination of extensive turbocharger testing, our experience of safe turbocharger operation and precise statistical and fatigue analysis. It results in the assignment of an effective lifetime for that component as the basis for the planning of turbocharger inspection, maintenance and overhaul. With service scheduling based on ABB Turbocharging’s SIKO Safety Design Concept, we can help you keep your turbocharger in top condition. The benefits of components which are always within our exacting OEM specifications are sustained power, fuel economy, reliability, availability and operational safety.

**OPAC**
With OPAC, engine operators can delegate maintenance, repair and planned overhauls of turbochargers entirely to the global ABB Turbocharging Service network. Eligible for OPAC delegated servicing are 2- and 4-stroke diesel engines in all marine, stationary, mobile and rail traction applications. For a fixed price per operating hour and an agreed number of operating hours – for example 20,000 or 60,000 – ABB Turbocharging Service takes over responsibility for the reliable, economic operation of the turbocharger, ensuring prompt, well planned servicing and preventive maintenance. All work is carried out by ABB Turbocharging’s highly qualified technicians using only Original Parts. All OPAC agreements are customized to the specific service requirements of the customer and the engine application based on detailed assessment of the turbocharger operating profile.

**MMA**
MMAs target turbocharger end users wanting close support of servicing rather than complete delegation. ABB Turbocharging proactively informs the turbocharger user of an approaching service event well in advance and prepares a quotation in the form of standardized, predefined packages, including negotiated fixed labor rates. MMAs give the turbocharger end user the benefits of early ordering while allowing ABB Turbocharging to support the management of the equipment.
Network standards

Global uniformity
To ensure a uniform, rapid response to the needs of VTR...4 turbocharger end users and consistent standards of workmanship, all ABB Turbocharging Service Stations:
- Are equipped to the same high technical standards
- Use the same, frequently updated turbocharger servicing practices

A single point of contact for the whole world
Customers of ABB Turbocharging Service can enjoy full global access to our extensive Original Service network from their local Service Station. Inform your local Service Station in your local language of your service needs and place an order for maintenance, repair or overhaul of your VTR...4. This can be on the other side of the world, but you deal via an identifiable, familiar contact person, pay in your local currency and do business subject to your local legal system.

Taking over all tasks from the end user, we will immediately pass the order on to our OEM qualified specialists at the nearest Service Station to your VTR...4’s current location. Work will be carried out to identical global standards. You can rest assured that every ABB Turbocharging Service Station will provide efficient handling of Original Parts supply and OEM standard workmanship.

Technical qualification
Having Original Parts and the very best equipment is only part of the equation. The benefits of OEM know-how that apply to Original Parts apply equally to the workmanship of our service engineers and technicians.

ABB Turbocharging ensures the highest quality in a finished maintenance, repair or overhaul job via the continuous qualification of our staff.

Siting our Training Center next to our main producing works in Switzerland ensures ready access to the latest turbocharger technology and the immediate transfer of works know-how to service staff.

Right first time
A very tangible benefit of using OEM parts with an OEM warranty, fitted by ABB Turbocharging’s OEM qualified technicians, is the assurance that maintenance, repairs and overhauls will be right at the first time of asking.

Minimal downtime
This ensures minimal downtime, while the quality of OEM components and workmanship assures maximized long term turbocharger efficiency and reliability, translating into longer times between overhauls.
Non original spares and repairs – worth the money?
Rectifying turbocharger faults arising from non original parts and non-OEM workmanship 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
OEM rectification of non OEM maintenance, overhauls and repairs 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

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<th>Deviation from ABB specification</th>
<th>Efficiency</th>
<th>Stability</th>
<th>Vibration</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.

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