


# Operation Manual

## TPL71-C34

|   |           |  |            |     |
|---|-----------|--|------------|-----|
|  |           | ABB Turbo Systems Ltd<br>CH 5401 Baden           |            |     |
| Type  | TPL71-C34 | HT842511   |            |     |
| $n_{Mmax}$  | 408       | <b>1/s</b>                                       | $t_{Mmax}$ | 650 |
| $n_{Bmax}$  | 389       |  | $t_{Bmax}$ | 620 |
| SFUS06  | 02040 kg  | 35   | 50         | 50  |
| Year  | 2016      | Application according to<br>the Operation Manual |            |     |
| made in Switzerland   |           |  |            |     |

HZTL2488 English  
 Original Operation Manual

ABB Turbocharging



### Operating condition and replacement intervals

The operational limits for the turbocharger  $n_{Bmax}$ ,  $t_{Bmax}$ ,  $n_{Mmax}$ ,  $t_{Mmax}$ , inspection- and replacement intervals for the components concerned on the rating plate are valid for the operational mode and compressor inlet condition, which has been agreed upon between the engine builder and ABB.



**Note:** Replacement intervals of components depends on the load profile, turbine inlet temperature, suction air temperature and turbocharger speed. In case the operation conditions differs significantly from what is considered to be normal for the current application, it is recommended to contact ABB for a re-calculation of replacement intervals. Frequent load alterations, high temperatures and high speed lower the life of components.  
Unless otherwise agreed, the application limits  $n_{Mmax}$ ,  $t_{Mmax}$  are valid for the test operation for a limited time.

# Table of contents

|          |   |
|----------|---|
| <b>1</b> | <b>Preliminary remarks</b>                        |
| 1.1      | Purpose of this manual                            |
| 1.2      | Layout and function                               |
| 1.3      | Intended use of the turbocharger                  |
| 1.4      | Storage of new turbochargers and spare parts      |
| 1.5      | Essential information                             |
| 1.6      | Symbols and definitions                           |
| 1.7      | Turbocharger rating plate                         |
| 1.8      | Contact information                               |
| <b>2</b> | <b>Safety</b>                                     |
| 2.1      | Introduction                                      |
| 2.2      | CE conformity                                     |
| 2.3      | Definition of mandatory signs                     |
| 2.4      | Definition of Safety instructions                 |
| 2.5      | Warning plates on the turbocharger                |
| 2.6      | Safe operation and maintenance                    |
| 2.7      | Hazards during operation and maintenance          |
| 2.8      | Periodic checking of the pressure vessel          |
| 2.9      | Lifting loads                                     |
| <b>3</b> | <b>Commissioning</b>                              |
| 3.1      | Oil supply  |
| 3.2      | Inspection work                                   |
| 3.3      | Commissioning after taking out of operation       |
| <b>4</b> | <b>Operation</b>                                  |
| 4.1      | Noise emissions                                   |
| 4.2      | Servicing work                                    |
| 4.3      | Replacement intervals for turbocharger components |
| 4.4      | Speed measurement                                 |
| 4.5      | Stopping the engine                               |

|          |   |
|----------|---|
| <b>5</b> | <b>Maintenance</b>  |
| 5.1      | Foreword to Maintenance   |
| 5.2      | Cleaning the filter silencer                                    |
| 5.3      | Cleaning the compressor during operation                        |
| 5.4      | Cleaning turbine blades and nozzle ring in operation            |
| <b>6</b> | <b>Troubleshooting</b>  |
| 6.1      | Malfunctions when starting                                      |
| 6.2      | Surging of the turbocharger                                     |
| 6.3      | Malfunctions during operation                                   |
| 6.4      | Malfunctions when stopping                                      |
| 6.5      | Speed measurement system  |
| <b>7</b> | <b>Removal and installation</b>                                 |
| 7.1      | Turbocharger weights  |
| 7.2      | Remove the turbocharger   |
| 7.3      | Installing the turbocharger                                     |
| <b>8</b> | <b>Disassembly and assembly</b>                                 |
| 8.1      | Introduction  |
| 8.2      | Module weights  |
| 8.3      | Removing and fitting filter silencer or air suction branch      |
| 8.4      | Axial clearance   |
| 8.5      | Removing cartridge group  |
| 8.6      | Dismantling and installing the turbine diffuser and nozzle ring |
| 8.7      | Installing cartridge group                                      |
| 8.8      | Dismantling and fitting nozzle ring at turbine end              |
| 8.9      | Table of tightening torques                                     |
| <b>9</b> | <b>Taking out of operation at short notice</b>                  |
| 9.1      | Possibilities for emergency repair                              |
| 9.2      | Locking the rotor   |
| 9.3      | Fit cover plate   |
| 9.4      | Blocking the inlets and outlets                                 |
| 9.5      | Bypass the turbocharger   |

- 10**      **Mothballing turbocharger**
- 10.1      Taking out of operation for up to 12 months
- 10.2      Taking out of operation for more than 12 months
- 11**      **Disposing of turbocharger components**
- 12**      **Spare parts**
- 12.1      Ordering spare parts
- 12.2      View of turbocharger with part numbers
- 12.3      View of turbine cleaning system with part numbers (optional)

April 2016

HZTL2488\_EN

Revision C



## 5 Maintenance

### 5.1 Foreword to Maintenance

Maintenance and servicing work involves regular visual checks and cleaning to ensure that the turbocharger and its attached units function trouble-free.

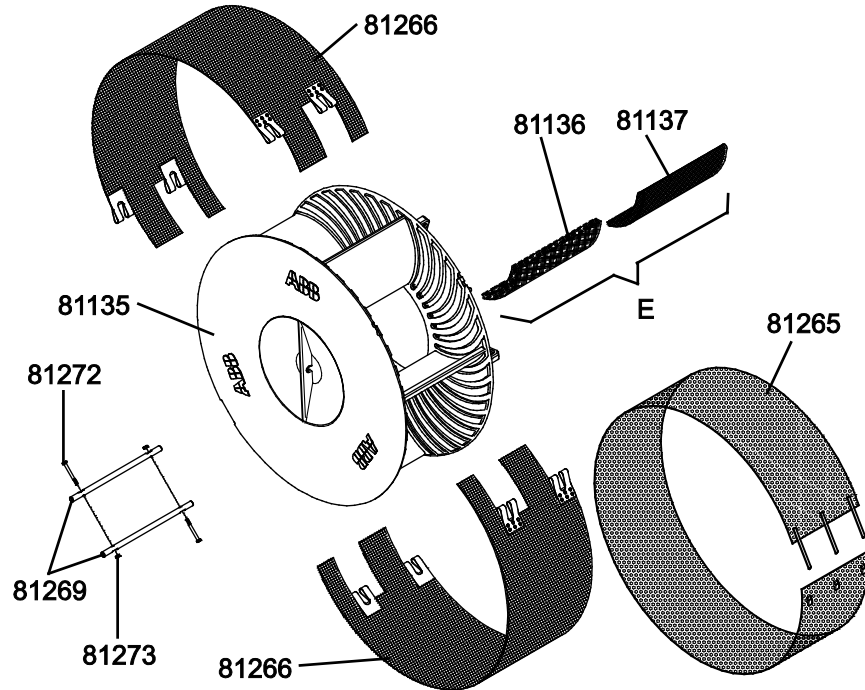
- The external condition and how dirty the cleaning points specified in this chapter are, must be established by visual checks at the specified intervals.
- The safety precautions must be observed during all maintenance and servicing work.

The cleaning points described in the following are:

- Filter silencer
- Compressor
- Turbine and nozzle ring

## 5.2 Cleaning the filter silencer

### 5.2.1 Filter silencer and connecting rod



|       |   |       |                      |
|-------|---|-------|----------------------|
| 81265 | Filter ring (if provided)                               | 81136 | Absorption segment   |
| 81269 | Connecting rods   | 81137 | Sheet-metal covering |
| 81266 | Cover grid  | 81135 | Filter silencer body |
| 81272 | Screwdriver   | 81273 | Lock nut             |
| E     | Insert unit = absorption segment + sheet-metal covering |       |                      |



**Removing and cleaning filter silencer****If provided**

- ▶ Remove filter strip (81265).
- ▶ Rinse filter strip (81265) using water with detergent additive or, if very dirty, soak it and squeeze out carefully. Rinse it in cold water. Avoid rough treatment (not a jet of water).

**NOTICE**

How dirty the filter strip (81265) is, depends on how clean the drawn-in air is. Clean filter strip every 500 hours of service or more frequently if necessary.

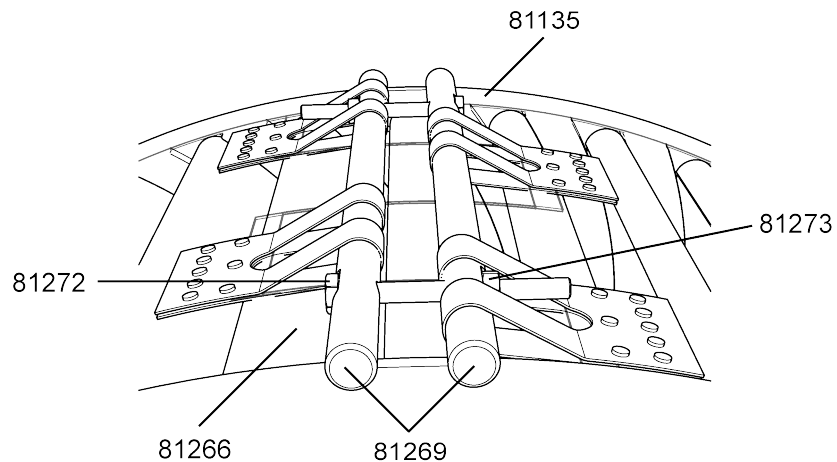
- ▶ Unscrew and remove lock nuts (81273).
- ▶ Unscrew and remove screws (81272) for connecting rods (81269).
- ▶ Remove connecting rods (81269).
- ▶ Carefully remove cover grids (81266).
- ▶ Pull out insert units (E), bend open sheet-metal coverings (81137) and then remove absorption segments (81136).
- ▶ Clean the absorption segments (81136).  
During cleaning, ensure that the absorption segments (81136) are only cleaned with a mild jet of compressed air, soft brush or a damp cloth. Otherwise there is a risk of damage or deformation.

**NOTICE**

Replace heavily contaminated or damaged parts with original parts from ABB Turbo Systems.

**Fitting the filter silencer**

- ▶ Assemble the insert units (E) by inserting the absorption segments (81136) into the sheet metal coverings (81137).
- ▶ Bend sheet metal coverings (81137) back to original shape.
- ▶ Insert the insert units (E) into slot guides in filter silencer unit (81135).



- ▶ Uniformly place cover grids (81266) in correct position.
- ▶ Push connecting rods (81269) through lugs of cover grids (81266).



**CAUTION**

If the connecting rods (81269) are not correctly positioned in their recesses on the filter silencer unit (81135), the cover grid (81266) can twist and shift. There is then a risk of foreign matter and contamination getting into the compressor.

- ▶ Join connecting rods (81269) using screws (81272). When tightening the screws (81272), ensure that connecting rods (81269) are located correctly in recesses in filter silencer body (81135). Now tighten screws (81272) alternately until the following maximum torque is reached:

| Screw | Tightening torque [Nm] |
|-------|------------------------|
| 81272 | 20                     |

- ▶ Screw lock nuts (81273) onto screw (81272) and tighten to following torque:

April 2016

HZTL2488\_EN

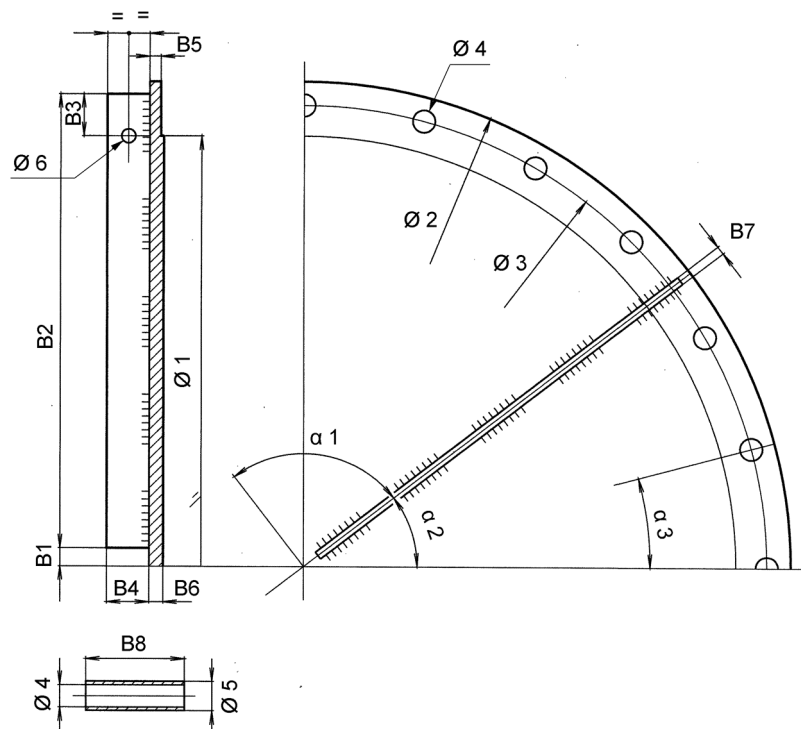
Revision C

### 9.3 Fit cover plate



NOTICE

The cover plate (material: General structural steel, in accordance with DIN EN 10025-2) must be manufactured in-house according to the drawing.



Cover plate dimensions [mm]

| Product | B1 | B2  | B3 | B4 | B5 | B6 | B7 | B8 |
|---------|----|-----|----|----|----|----|----|----|
| TPL67-C | 13 | 325 | 30 | 30 | 8  | 10 | 6  | 70 |
| TPL71-C | 13 | 385 | 30 | 30 | 8  | 10 | 6  | 84 |

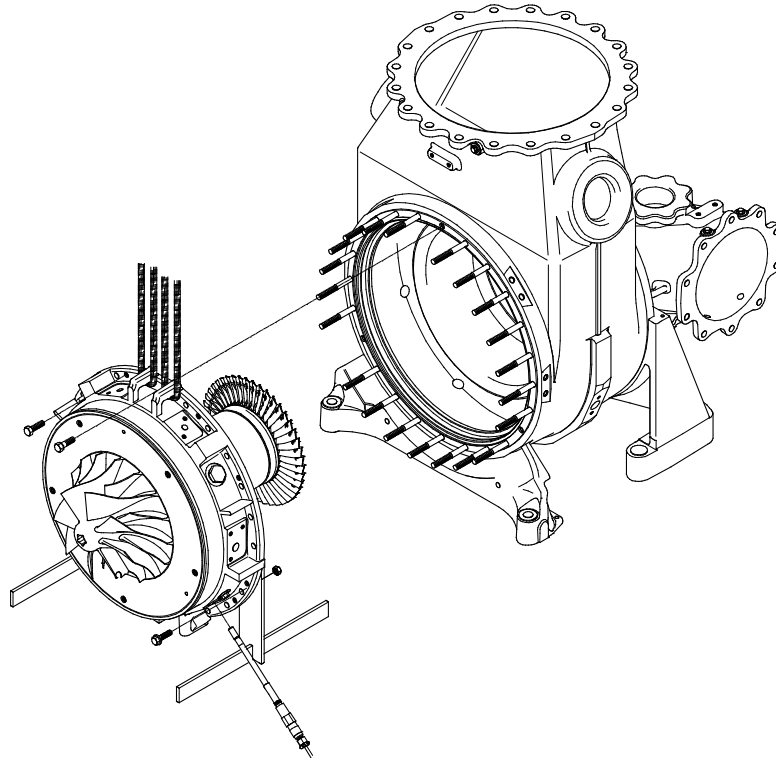
| Product | Ø 1 | Ø 2 | Ø 3 | Ø 4 | Ø 5 min. | Ø 6 min. |
|---------|-----|-----|-----|-----|----------|----------|
| TPL67-C | 616 | 694 | 660 | 16  | 22       | 15       |
| TPL71-C | 726 | 818 | 779 | 18  | 25       | 15       |

| Product | α 1     | α 2   | α 3      |
|---------|---------|-------|----------|
| TPL67-C | 4 x 90° | 37.5° | 24 x 15° |
| TPL71-C | 4 x 90° | 37.5° | 24 x 15° |

April 2016

HZTL2488\_EN

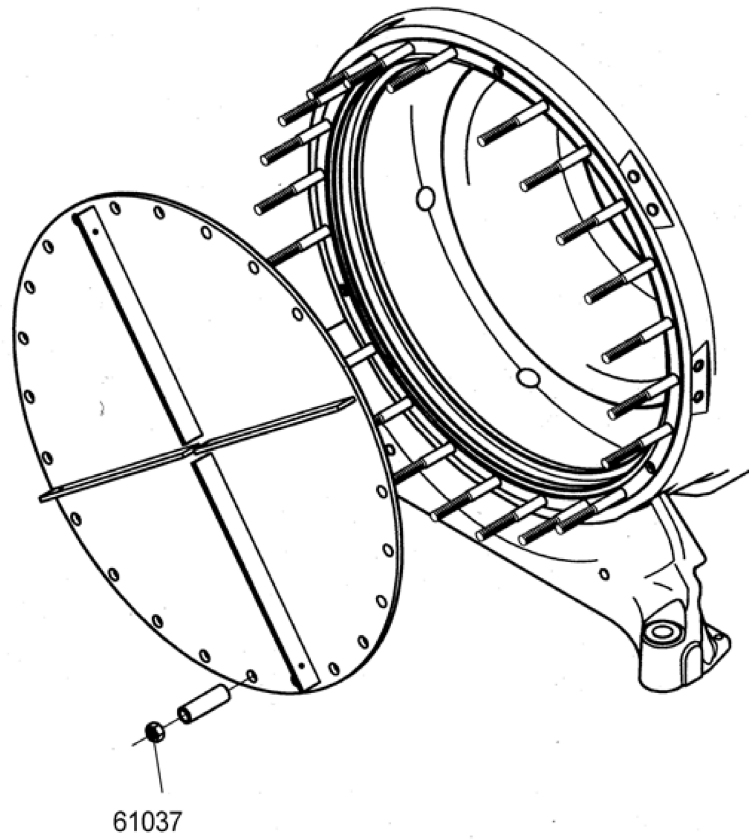
Revision C



NOTICE

Carry out the work as described in the chapter **Disassembly and Assembly**.

- ▶ Removing the cartridge group



- ▶ Close opening in gas outlet casing using cover plate.
- ▶ Fasten cover plate using spacer sleeves and nuts (61037).



CAUTION

Shut off the supply of lubricating oil to the turbocharger.

**Further measures and information for operation with a turbocharger with cover plate on 4-stroke engines**

**4-stroke engine with one turbocharger**

No further measures are necessary. The engine can be operated as a naturally-aspirated engine according to the engine builder's instructions.

**4-stroke engine with several turbochargers**

**Separate receivers**

No further measures are necessary on engines with separate air and exhaust gas receivers. The engine can be operated as a naturally-aspirated engine according to the engine builder's instructions.

**Common receiver**

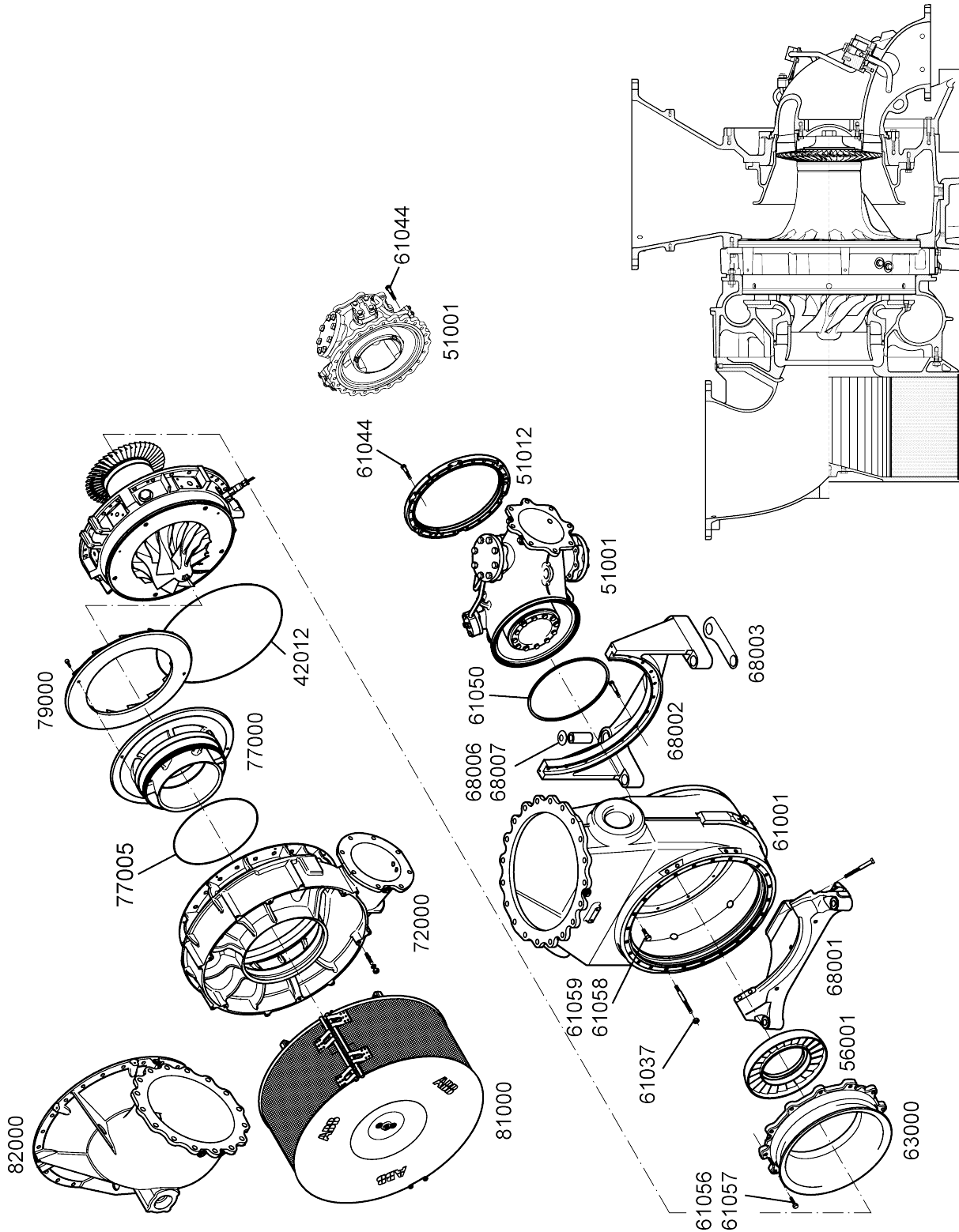
The air line must be closed off at the engine end because the undamaged turbochargers build up a receiver pressure.



**CAUTION**

The engine can be operated according to the engine builder's instructions. Attention must always be paid to the speed of the undamaged turbocharger. The speed limit  $n_{Bmax}$  given on the rating plate must not be exceeded.

## 12.2 View of turbocharger with part numbers



April 2016

HZTL2488\_EN

Revision C

| Part number                        | Description               |
|------------------------------------|---------------------------|
| 42012 (in customer spare part set) | O-ring                    |
| 51001                              | Gas inlet casing          |
| 51012                              | Segment                   |
| 56001                              | Nozzle ring               |
| 61001                              | Gas outlet casing         |
| 61037 (in customer spare part set) | Hexagon nut               |
| 61044                              | Hexagon-head screw        |
| 61050 (if provided)                | Gasket                    |
| 61056 (in customer spare part set) | Hexagon-head screw        |
| 61057 (in customer spare part set) | Verbus Ripp® Washer       |
| 61058 (in customer spare part set) | Verbus Ripp® Washer       |
| 61059 (in customer spare part set) | Hexagon-head screw        |
| 63000                              | Turbine diffuser          |
| 68001                              | Foot at compressor end    |
| 68002                              | Foot at turbine end       |
| 68003                              | Slide plate               |
| 68006                              | Cup spring                |
| 68007                              | Bush                      |
| 72000                              | Compressor casing         |
| 77000                              | Wall insert               |
| 77005 (in customer spare part set) | O-ring                    |
| 79000                              | Diffuser                  |
| 81000                              | Filter silencer           |
| 82000                              | Radial air suction branch |