DNV·GL

Certificate No:
TAM00000A3

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Turbocharger

with type designation(s)
M40,

Issued to
Kompressorenbau Bannewitz GmbH
Bannewitz, Germany

is found to comply with
DNV GL rules for classification – Ships

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

This Certificate is valid until **2021-07-04**.

Issued at **Hamburg** on **2016-07-05**

for **DNV GL**

DNV GL local station: **Magdeburg**

Approval Engineer: **Andreas Wolf**

Frank Lutz
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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Job Id: **262.1-003622-3**
Certificate No: **TAM00000A3**

Product description

Exhaust driven turbochargers served by cylinder groups with maximum combined power in the range 950 kW to 1700 kW

Application/Limitation

Maximum allowed operating speed, exhaust gas temperature at turbine entry and power rating:

Type	Compressor wheel diameter (mm)	Maximum allowable operating speed (min^1)	Maximum allowable exhaust gas temperature before turbine (°C)	Served power per cylinder group (kW)
M40	270	39,000	650	950-1700

Maximum compressor ratio: 4.0

ALARM LEVELS:

Alarm level for over speed : 0.97 n_{max}
Alarm level for exhaust gas temperature before turbine : T_{max} – 15°C
Minimum lubrication oil inlet pressure (design level) : 150 kPa
Alarm level for minimum lubrication oil inlet pressure : 125 kPa
Maximum lubrication oil outlet temperature and alarm level : ≤ 120°C

Application constraints:

Maximum allowable vibration loads at engine for 2 …250Hz for M40 turbochargers

Max. admissible value	At the-exhaust gas turbocharger (measured at bearing housing)	At the silencer (measured at the silencer)
Velocity V_{RMS} (mm/s)	45	71
Amplitude S_{RMS} (mm)	0.7	1.1
Acceleration a_{RMS} (m/s^2)	70	111

Allowable statical inclination of turbocharger that may occur during operation is limited to ±30° in longitudinal and ±15° for in lateral direction of the turbocharger.
Allowable dynamical inclination of turbocharger that may occur during operation is limited to ±45° in longitudinal and ±25° for in lateral direction of the turbocharger.

Tests carried out

Type Approval test carried out at KBB on 1994-04-26 for turbocharger type M40
Type Approval test report M40 (no. 2.340-21315), dated 1994-04-26

Marking of product

The product to be marked with manufacturer's name or trademark and type number identification.

Periodical assessment

For retention of the Type Approval, DNV GL shall perform a survey every second year and before the expiry date of this certificate to verify that the conditions of the type approval are complied with.

In cases where the type approved product is manufactured at other companies, periodical assessments shall be carried out randomly at these companies. All companies shall be assessed at least once in the period of validity of the TA certificate.

This will be according to Class Guideline DNVGL-CG-0338, Section 4.

Other conditions

Turbochargers are categorized in three categories depending on power served by each turbocharger: Category A = ≤ 1000 kW, Category B = > 1000 kW and ≤ 2500 kW, Category C = >2500 kW.

Turbochargers shall be delivered with a product certificate issued by the manufacturer (category B) and by the class society (category C). For turbochargers of category A an certificate is not mandatory.

END OF CERTIFICATE