DNV·GL

Certificate No:
TAM00000UZ

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Turbocharger

with type designation(s)
ST27, ST27-EP

Issued to
Kompressorenbau Bannewitz GmbH
Bannewitz, Germany

is found to comply with
DNV GL rules for classification – Ships
DNV GL rules for classification – High speed and light craft

Application :

The turbochargers are approved for use on internal combustion engines with application data as given in the certificate.
Products approved by this certificate are accepted for installation on all vessels classed by DNV GL

Issued at **Hamburg** on **2018-04-19**
This Certificate is valid until **2023-04-18**.
DNV GL local station:

Approval Engineer: **Andreas Wolf**

for **DNV GL**

Burkhard Lilienthal
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.

Product description

Exhaust driven turbochargers served by cylinder groups with maximum combined power in the range 500 kW to 6000 kW

Application/Limitation

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

	Compressor wheel	N_{max} (rpm)	T_{max} (°C)	P_{max} (kW)
ST3	CAxx	61300	650	500-1100
	CCxx	56800	650	500-1100
ST4	CAxx	51100	650	700-1600
	CCxx	47300	650	700-1600
ST5	CAxx	42600	650	1050-2300
	CCxx	39400	650	1050-2300
ST6	CZxx	36400	650	1600-3300
	CAxx	35500	650	1600-3300
	CCxx	32900	650	1600-3300
ST6-EP	CZxx	36400	650	1600-3300
	CAxx	35500	650	1600-3300
	CCxx	32900	650	1600-3300
	CExx	34500	650	2000-4000
ST7	CAxx	29600	650	2500-5000
	CCxx	26300	650	2500-5000
ST7-EP	CAxx	29600	650	2500-5000
	CCxx	26300	650	2500-5000
	CExx	27600	650	3000-6000

Maximum compressor ratio: 5.5 for ST3, ST4, ST5, ST6, ST7; 6.0 for ST6-EP, ST7-EP

ALARM LEVELS:

Overspeed, maximum alarm level: 0.97 n_{max}.
High exhaust temperature at turbine entry, maximum alarm level: T_{max} – 15 °C
Low lubrication oil pressure at turbocharger inlet, minimum alarm level: 1.25 bar (gauge pressure)
High lubrication oil outlet temperature maximum alarm level: 120°C

Application constraints

Maximum allowable vibration levels for STx turbochargers

Max. admissible value	At Turbocharger	At 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 inclination of turbocharger that may occur during operation is limited to 15° in longitudinal and 30° in lateral direction of the turbocharger.

Tests carried out

ST3: Type Test carried out at KBB on 2011-07-14
ST4: Type Test carried out at KBB on 2010-06-23
ST5: Type Test carried out at KBB on 2010-06-23
ST6: Type Test carried out at KBB on 2010-06-23
ST7: Type Test carried out at KBB on 2011-12-20

Marking of product

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

Periodical assessment

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

The objective of the Periodical Assessment is to verify that the conditions for the Type Approval are not altered since the Type Approval certificate was issued. The main scope of the Periodical Assessment will normally include:

- Verification of the Type Approval applicant's production and quality system w.r.t. ensuring continued consistent production of the Type Approved products at the Type Approval applicant's own premises and at other companies that are given the responsibility for manufacturing of the products.
- Review of the Type Approval documentation and that this is still used as basis for the production
- Review of possible changes to the design, the material and the performance of the product
- Verification of the product marking.

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) or by the class society (category C). For turbochargers of category A a certificate is not mandatory.

Welding on rotating parts such as turbine wheel/shaft assembly, may only be carried out by companies which have a welding workshop approval by DNVGL.

END OF CERTIFICATE