

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Turbocharger

with type designation(s)
TPSxx-B, C, D, E, Fxx, DVx, EVx, FVxx

Issued to

ABB Turbo Systems AG
Baden AG, Switzerland

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 internal combustion engines with application data as given in the certificate.
Product approved by this certificate is accepted for installation on all vessels classed by DNV GL.

Issued at **Hamburg** on **2017-03-31**

This Certificate is valid until **2022-03-30**.

DNV GL local station: **Augsburg**

Approval Engineer: **Andreas Wolf**

for **DNV GL**

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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.



Product description

Exhaust driven turbochargers served by cylinder groups with combined power in the range up to 3300 kW

Alternative place of production

ABB Turbo Systems Ltd
Bruggerstrasse 71a
CH-5401 Baden
Switzerland

ABB Jiangjin Turbo Systems Co., Ltd.
No. 23 Dong Jiang Lu, Degan Jie Dao
Degan Industrial Zone, Jiangjin
Chongqing 402284
P.R. China

Application/Limitation

Maximum operating speed and exhaust gas temperature (AI – Compressor):

Turbocharger type	Compressor wheel diameter (mm)	$N_{\max}$ (s ⁻¹)	$T_{\max}$ (° C)
			750 for turbine casings with one gas inlet. 700 for turbine casings with multiple gas inlets
TPS 48 D CV01	176	1036	
TPS 48 E CV10	167	1065	
TPS 48 E	176	1065	
TPS 50 B	188	890	
TPS 50 C	288	830	
TPS 52 D	200	895	
TPS 52 E	210	895	
TPS 57 D	245	730	
TPS 57 E	257	730	
TPS 61 D	291	615	
TPS 61 E	306	615	
TPS 44 F31	148	1232	
TPS 44 F32	148	1232	
TPS 44 F33	148	1224	
TPS 48 F31	176	1036	
TPS 48 F32	176	1036	
TPS 48 F33/VTG	176	1028	
TPS 52 F31	210	868	
TPS 52 F32	210	868	
TPS 52 F33/VTG	210	862	
TPS 57 F31	257	709	
TPS 57 F32	257	709	
TPS 57 F33/VTG	257	704	
TPS 61 F31	306	596	
TPS 61 F32	306	596	
TPS 61 F33/VTG	306	592	
TPS 57 DV2	345	730	710
TPS 57 EV2	257	730	710
TPS 57 FV31	257	709	710

TPS 57 FV32	257	709	710
TPS 57 FV33	257	704	710
TPS 61 DV2	291	615	710
TPS 61 EV2	306	615	710
TPS 61 FV31	306	596	710
TPS 61 FV32	306	596	710
TPS 61 FV33	306	592	710

The stated speeds and temperatures are the highest allowed values and should not be exceeded at any time, nor at engine overload (110%). For each specific application, the ratings shall be corrected according to ABB's SiKo instructions.

ALARM LEVELS:

Overspeed	
Condition:	Alarm level:
$N_{Mmax} \geq 1.02 \times N_{Bmax}$	$N_{Alarm} \geq 1.02 \times N_{Bmax}$
$1.01 \times N_{Bmax} \leq N_{Mmax} < 1.02 \times N_{Bmax}$	$N_{Alarm} = N_{Bmax}$
$N_{Bmax} \leq N_{Mmax} < 1.01 \times N_{Bmax}$	$N_{Alarm} \geq 0.99 \times N_{Bmax}$

N_{Mmax} is the turbocharger operational limit at 110% short duration engine load as stated on the rating plate.

N_{Bmax} is the turbocharger operational limit at 100% engine load, as stated on the rating plate.

N_{Alarm} is the application dependent alarm level value based on ABB's SiKo and HCF safety concept.

The overspeed alarm value shall be specified in the individual turbocharger DNV Product Certificate.

High exhaust temperature at turbine entry, maximum alarm level: $T_{Mmax} - 15^{\circ}\text{C}$.

T_{Mmax} is the turbocharger operational limit at engine overload (110%), as stated on the rating plate.

Low lubrication oil pressure at turbocharger inlet, minimum alarm level: 1.25 bar (gauge pressure).

High temperature increase from oil inlet to oil outlet, maximum alarm level¹⁾: 50°C

¹⁾ Alarm only required for turbochargers served by cylinder groups with combined power > 2500 kW

Application constraints

Engine induced vibration and ship inclinations to be within the permissible limits given in Manual of Turbocharger – Mounting the turbocharger, HZTL 90595.

Type Approval documentation

Tests carried out

The Type Tests for the TPS 57 D model and TPS 57 F33/VTG are considered valid also for the other TPS models of the D, E and F series due to similarity.

Type Test report for TPS 57 D dated 1997-02-19

Type Test report for TPS57-F33/VTG dated 2000-10-25.

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.

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