DNV·GL

Certificate No:
**TAM00000RV**

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the Turbocharger**

with type designation(s)
**TPLxx-VAxx,-BAxx,-Axx**

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 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 **2017-11-14**
This Certificate is valid until **2022-11-13**.
DNV GL local station: **Augsburg**

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.


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Job Id: **262.1-001439-18**
Certificate No: **TAM00000RV**

## Product description

Exhaust driven turbochargers served by cylinder groups with combined power in the range up to 20,000 kW

## Alternative place of production

ABB Turbo Systems Ltd
Weierstrasse 5
CH-5313 Klingnau
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

Max. operation speed and exhaust gas temperature for turbochargers:

| Turbocharger | Compressor wheel diameter (mm) | Aluminium Compressor | | | | | |
|---|---|---|---|---|---|---|---|
| | | IN 713LC shaft | | Nimonic 901 shaft | | St 13T shaft | |
| | | Nmax (1/s) | Tmax (C°) | Nmax (1/s) | Tmax (C°) | Nmax (1/s) | Tmax (C°) |
| **TPL61-A10** | 291 | 615 | 750 | | | | |
| **TPL61-A30** | 306 | 585 | 750 | | | | |
| | | | | | | | |
| **TPL65-A10** | 339 | 530 | 750 | | | | |
| **TPL65VA10** | 339 | 530 | 750 | | | | |
| **TPL65-A30** | 356 | 505 | 750 | | | | |
| **TPL65VA30** | 356 | 505 | 750 | | | | |
| **TPL65-A32** | 356 | 510 | 750 | | | | |
| **TPL65-VA32** | 356 | 510 | 750 | | | | |
| **TPL65-A33** | 356 | 510 | 750 | | | | |
| **TPL65-VA33** | 356 | 510 | 750 | | | | |
| **TPL65BA10** | 339 | 530 | 750 | | | | |
| **TPL65-A36** | 381 | 477 | 750 | | | | |
| | | | | | | | |
| **TPL69-A10** | 400 | | | 440 | 750 | 440 | 580 |
| **TPL69BA10** | 400 | | | 440 | 750 | 440 | 580 |
| **TPL69-A30** | 420 | | | 428 | 750 | 428 | 580 |
| **TPL69-A32** | 420 | | | 432 | 750 | 432 | 580 |
| **TPL69-A33** | 420 | | | 432 | 750 | 432 | 580 |
| | | | | | | | |
| **TPL73-A10** | 465 | | | 379 | 750 | 379 | 580 |
| **TPL73-A30** | 488 | | | 368 | 750 | 368 | 580 |
| **TPL73-A32** | 488 | | | 372 | 750 | | |
| | | | | | | | |
| | | | | | | | |
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| Turbocharger | Compressor wheel diameter (mm) | Aluminium Compressor | | | | | |
|---|---|---|---|---|---|---|---|
| | | IN 713LC shaft | | Nimonic 901 shaft | | St 13T shaft | |
| | | Nmax (1/s) | Tmax (C°) | Nmax (1/s) | Tmax (C°) | Nmax (1/s) | Tmax (C°) |
| **TPL77-A10** | 552 | | | 319 | 680 | 319 | 580 |
| **TPL77-A30** | 580 | | | 310 | 680 | 310 | 580 |
| **TPL77-A32** | 580 | | | 313 | 680 | | |
| | | | | | | | |
| **TPL80-A10** | 641 | | | 275 | 680 | 275 | 580 |
| **TPL80-A30** | 673 | | | 267 | 680 | 267 | 580 |

| Turbocharger | Compressor wheel diameter (mm) | Titanium Compressor | | | |
|---|---|---|---|---|---|
| | | IN 713LC shaft | | St 13T shaft 1) | |
| | | Nmax(1/s) | Tmax(C°) | Nmax(1/s) | Tmax(C°) |
| **TPL65-A10** | 339 | 530 | 750 | | |
| **TPL65VA10** | 339 | 530 | 750 | | |
| **TPL65-A30** | 356 | 530 | 750 | | |
| **TPL65VA30** | 356 | 530 | 750 | | |
| **TPL65BA10** | 356 | 530 | 750 | | |
| | | | | | |
| **TPL69-A10** | 400 | | | 440 | 750 |
| **TPL69BA10** | 400 | | | 440 | 750 |
| **TPL69-A30** | 420 | | | 440 | 750 |
| | | | | | |
| **TPL73-A10** | 465 | | | 379 | 750 |
| **TPL73-A30** | 488 | | | 379 | 750 |
| | | | | | |
| **TPL77-A10** | 552 | | | 319 | 680 |
| **TPL77-A30** | 580 | | | 319 | 680 |
| | | | | | |
| **TPL80-A10** | 641 | | | 275 | 680 |
| **TPL80-A30** | 673 | | | 275 | 680 |

Max. operation speed and exhaust gas temperature for turbochargers with Ti compressor:
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, maximum alarm level: $N_{Alarm} \leq 0.99\ N_{Mmax}$
*$N_{Mmax}$ is the turbocharger operational limit at engine overload, as stated on the rating plate.*
*$N_{Alarm}$ is the application dependent alarm level value based on ABB's SiKo and HCF safety concept.*

High exhaust temperature at turbine entry, maximum alarm level: $T_{Mmax}$ -15°C.
*$T_{Mmax}$ is the turbocharger operational limit at engine overload, as stated on the rating plate.*

Low lubrication oil pressure at turbocharger inlet, minimum alarm level: 1.3 bar (gauge pressure).

Alarm level for high lubrication oil temperature at turbocharger outlet to be set in accordance with "Manual of Turbocharger TPL..-A.., Chap. 4-1 Oil Supply".

Application constraints

Allowable inclination of turbocharger that may occur during operation is limited to 35° both in longitudinal and lateral direction.

Engine induced vibration to be within the specified limits given in "Manual of Turbocharger TPL-A /VA, Chapter 4, Turbocharger installation"

## Type Approval documentation

## Tests carried out

| | TPL65 | TPL69 | TPL80 |
|---|---|---|---|
| Date: | 1996-11-14 | 1997-01-19 | 1999-03-10 |

TPL73 tested in connection with type testing of Wärtsilä NSD diesel engine model ZA50S tested in Winterthur 98-01-20/22. Type test for TPL65 is valid also for TPL61.

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

This certificate replaces DNV TAC M-125397 and GL TAC 95145-96HH.

END OF CERTIFICATE