

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Turbocharger**

with type designation(s)
IHI TPS

Issued to

IHI Rotating Machinery Engineering Co., Ltd.
Kamiina-gun Nagano Pref., Japan

is found to comply with

DNV GL rules for classification – Ships Pt.4 Ch.3 Sec.1 Reciprocating internal combustion engines

Application :

The turbochargers are approved for use on diesel engines with application data as given in the certificate.

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

Issued at **Høvik** on **2018-01-17**

This Certificate is valid until **2022-12-31**.

DNV GL local station: **Yokohama**

for **DNV GL**

Approval Engineer: **Dag Harald Williksen**

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Oddvar Deinboll
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 500 kW to 2100 kW.

The turbochargers are manufactured based on licence agreement with ABB Turbo Systems AG.

Application/Limitation

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

Turbocharger type	N_{max} (s ⁻¹)	T_{max} (° C)
TPS 48 D	1065	750 for turbine casings with 1 gas inlet. 700 for turbine casings with multiple gas inlets
TPS 48 E	1065	
TPS 48 F31	1036	
TPS 48 F32	1036	
TPS 48 F33	1028	
TPS 52 D	895	
TPS 52 E	895	
TPS 52 F31	868	
TPS 52 F32	868	
TPS 52 F33	862	
TPS 57 D	730	
TPS 57 E	730	
TPS 57 F31	709	
TPS 57 F32	709	
TPS 57 F33	704	

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: $0.97 N_{Mmax}$.

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

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).

Tests carried out

Tests carried out at license holder's premises.

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.

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

ABB 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



Job Id: **262.1-008295-7**
Certificate No: **TAM00000TG**

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 case where the Type Approved product is manufactured at other companies, the Periodical Assessment shall verify that the Type Approval applicant has a quality control system for consistent production at their licensees/subcontractors. Furthermore Periodical Assessment shall be carried out randomly at these companies.

END OF CERTIFICATE