

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Turbocharger**with type designation(s)
METxxMBII

Issued to

**Mitsubishi Heavy Industries Marine Machinery
& Equipment Co., Ltd.
Nagasaki City, Nagasaki 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****Products approved by this certificate are accepted for installation on all vessels classed by
DNV GL.**Issued at **Høvik** on **2020-02-07**This Certificate is valid until **2025-02-06**.for **DNV GL**DNV GL local station: **Kobe**Approval Engineer: **Tage Olav Alexander Strøm****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 of * 3400 – 45 200 kW

Application/Limitation

Type	MET33MBII		MET37MBII	
Impeller type	2	3	2	3
Impeller tip dia.[mm]	352	373	394	418
Max rated speed (RPM)	28870		25770	
Engine power range [kW]*	3400-6000		4600-7600	
Max temperature (°C)	580			
Max. Pressure Ratio	5.0			

Type	MET42MBII		MET48MBII	
Impeller type	2	3	2	3
Impeller tip dia.[mm]	436	462	495	524
Max rated speed (RPM)	23310		20550	
Engine power range [kW]*	5600-9300		7200-11900	
Max temperature (°C)	580			
Max. Pressure Ratio	5.0			

Type	MET53MBII		MET60MBII	
Impeller type	2	3	2	3
Impeller tip dia.[mm]	553	586	615	652
Max rated speed (RPM)	18380		16520	
Engine power range [kW]*	9000-14900		11200-18400	
Max temperature (°C)	580			
Max. Pressure Ratio	5.0			

Type	MET66MBII		MET71MBII	
Impeller type	2	3	2	3
Impeller tip dia.[mm]	689	730	746	790
Max rated speed (RPM)	14750		13630	
Engine power range [kW]*	14000-23100		16400-27100	
Max temperature (°C)	580			
Max. Pressure Ratio	5.0			

Type	MET83MBII		MET90MBII
Impeller type	2	3	3
Impeller tip dia.[mm]	873	924	1020
Max rated speed (RPM)	11660		10560
Engine power range [kW]*	22500-37100		27400-45200
Max temperature (°C)	580		
Max. Pressure Ratio	5.0		

* Engine power range is the reference values subject to pressure ratio of 4.0

ALARM LEVELS:

Job Id: **262.1-031397-1**
Certificate No: **TAM000012Y**

Overspeed, maximum alarm level: 105% of maximum rated speed

High exhaust temperature at turbine entry, maximum alarm level: 550 °C.

Low lubrication oil pressure at turbocharger inlet, minimum alarm level: 0.6 bar (gauge pressure)

Maximum lubrication oil outlet temperature (alarm level): 85 °C

Application constraints:

Maximum allowed inclinations for MET turbochargers:

Static: $\pm 15^\circ$

Dynamic (momentary): $\pm 22.5^\circ$

Engine and rotor vibrations to be within Mitsubishi's specifications for MET turbochargers (ref. Tz-E002-6097, dated 2019/2/28).

Tests carried out

Type Approval test of MET-MBII

Type Approval test report: Tz-E002-6248, dated 27 september 2019

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, a DNV GL surveyor shall perform an assessment after 2 years and after 3.5 years, both referring to the issue date of the type approval certificate to verify that the conditions of the type approval are complied with. A renewal assessment will be performed at renewal of the certificate.

In cases 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