

TYPE APPROVAL CERTIFICATE

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

with type designation(s)
METxxMB

Issued to

STX Heavy Ind. Co., Ltd. (Daegu factory)
Daegu, Korea

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 **2018-04-03**

This Certificate is valid until **2020-12-31**.

for **DNV GL**

DNV GL local station: **Ulsan**

Approval Engineer: **Tage Olav Alexander Strøm**

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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.



Exhaust driven turbochargers served by cylinder groups with combined power in the range of 3800 kW – 21 000 kW

Application/Limitation

Type	MET48MB					
Impeller type	V (W,T)		U, T			
			H		S	
	2	3	2	3	2	3
Max rated speed (RPM)	19220	1810	19220	19220	18550	18550
Max temperature (°C)	580					
Max compressor ratio	4.2		5.0		4.6	

Type	MET60MB					
Impeller type	V (W,T)		U, T			
			H		S	
	2	3	2	3	2	3
Max rated speed (RPM)	15450	14550	15450	15450	14900	14900
Max temperature (°C)	580					
Max compressor ratio	4.2		5.0		4.6	

Type	MET71MB					
Impeller type	V (W,T)		U, T			
			H		S	
	2	3	2	3	2	3
Max rated speed (RPM)	12750	12010	12750	12750	12300	12300
Max temperature (°C)	580					
Max compressor ratio	4.2		5.0		4.6	

Type	MET83MB					
Impeller type	V (W,T)		U, T			
			H		S	
	2	3	2	3	2	3
Max rated speed (RPM)	10900	10270	10900	10900	10510	10510
Max temperature (°C)	580					
Max compressor ratio	4.2		5.0		4.6	

ALARM LEVELS:

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-MB turbochargers:

Static: ± 15°

Dynamic (momentary): ± 22.5°

Engine and rotor vibrations to be within Mitsubishi's specifications for MET-MB turbochargers (ref. Tz-E002-3925).

Tests carried out



Job Id: **262.1-027544-1**
Certificate No: **TAM00000V7**

Type Approval test of MET66MB August 2011 by Mitsubishi Heavy Industries Ltd.

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 after 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.

END OF CERTIFICATE