

TYPE APPROVAL CERTIFICATE

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

with type designation(s)
A1xx-L & A2xx-L

Issued to

Hyundai Heavy Ind. Co., Ltd. Engine & Machinery Division
Ulsan, Republic of 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 **2018-08-24**

This Certificate is valid until **2023-06-30**.

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.



Product description

Exhaust driven turbochargers served by cylinder groups with combined power in the range up to 30000 kW

Application/Limitation

Max. operation speed and exhaust gas temperature for A1xx-L turbochargers:

Turbocharger Type		Turbine Type	Compressor Type	Nmax (1/s)	Tmax (C°)
A165-L	-32	TV08	CV06	410	550
	-34		CV07	382	
	-35		CV08	382	
	-37		CV09	374	
	-32	TV09	CV06	395	550
	-34		CV07	382	
	-35		CV08	382	
	-37		CV09	374	
A170-L	-32	TV08	CV06	355	550
	-34		CV07	331	
	-35		CV08	331	
	-37		CV09	324	
	-32	TV09	CV06	343	550
	-34		CV07	331	
	-35		CV08	331	
	-37		CV09	324	
A175-L	-32	TV08	CV06	295	550
	-34		CV07	275	
	-35		CV08	275	
	-37		CV09	269	
	-32	TV09	CV06	285	550
	-34		CV07	275	
	-35		CV08	275	
	-37		CV09	269	
A180-L	-32	TV08	CV06	261	550
	-34		CV07	243	
	-35		CV08	243	
	-37		CV09	238	
	-32	TV09	CV06	252	550
	-34		CV07	243	
	-35		CV08	243	
	-37		CV09	238	
A185-L	-32	TV08	CV06	234	550
	-34		CV07	218	
	-35		CV08	218	
	-37		CV09	213	
	-32	TV09	CV06	226	550
	-34		CV07	218	
	-35		CV08	218	
	-37		CV09	213	

Turbocharger	Turbine Type	Compressor	Nmax	Tmax
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Type		Type	(1/s)	(C°)
A190-L	-32	TV08	CV06	550
	-34		CV07	
	-35		CV08	
	-37		CV09	
	-32	TV09	CV06	550
	-34		CV07	
	-35		CV08	
	-37		CV09	
A265-L	TV08	CV21	361	550
	TV09	CV21	361	550
A270-L	TV08	CV21	313	550
	TV09	CV21	313	550
A275-L	TV08	CV21	260	550
	TV09	CV21	260	550
A280-L	TV08	CV21	230	550
	TV09	CV21	230	550

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.

Maximum allowable compressor ratio:

Full load continuous at N_{Bmax} : 5.1

Short duration at N_{Mmax} : 5.6

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, as stated on the rating plate.

Minimum lubrication oil pressure at turbocharger inlet (alarm level):
0.8 bar (gauge pressure)

Maximum lubrication oil outlet temperature (alarm level):
100°C (45°C lubrication oil temperature at inlet)
120°C (85°C lubrication oil temperature at inlet)

Application constraints



Job Id: **262.1-016935-2**
Certificate No: **TAM00000YU**

Maximum allowable vibration level (both self- and externally induced) to be within the specified limits given in ABB's "Manual for Engine Builder"

Allowable inclination of turbocharger that may occur during operation is limited to $\pm 15^\circ$ in lateral and $\pm 15^\circ$ in longitudinal directions.

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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.

Other conditions

This Type Approval covers the mechanical parts of the A1xx-L turbochargers. For A1xx-L turbochargers with electronically controlled VTG (Variable Turbine Geometry) system, the Type Approval shall be used together with the corresponding and valid DNVGL Type Approval Certificate for the control system of the VTG system, or a separate approval of this control system on a case-by-case basis.

END OF CERTIFICATE