

APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM00001MK
Revision No:
3

This is to certify:

That

Doosan Heavy Ind. & Construction Co., Ltd.
22, Doosan Volvo-ro, Seongsan-gu, Changwon-si, Gyeongsangnam,
Republic of Korea

is an approved manufacturer of
Steel Castings

in accordance with
DNV GL rules for classification – Ships
DNVGL-OS-B101 – Metallic materials

and the following particulars:

Application area	Castings for hull structures and equipment Castings for machinery
Steel type(s)	Carbon and carbon-manganese, Alloy, See page 2
Casting method	Sand casting
Max. weight	350 000 kg Carbon and carbon-manganese 95 000 kg Alloy
Heat treatment condition	See page 2
Additional approval conditions	Approved as Independent Heat Treatment Company, see page 2

Manufacturer(s) approved by this certificate is/are accepted to deliver according to DNV GL, DNV and GL rules. Materials to be applied to DNV GL classed object shall fulfill the material requirements in the applicable DNV GL class rules.

Issued at **Hamburg** on **2020-09-14**

for **DNV GL**

This Certificate is valid until **2023-09-30**.

DNV GL local station: **Gimhae Station**

Approval Engineer: **Andreas Koch**

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Thorsten Lohmann
Head of Section

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Job Id: **263.11-010854-1**
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Particulars of the approval

Castings for hull structure and equipment

Steel type	Grade ³⁾	Casting method ¹⁾	Max. weight [kg]	Heat treatment condition ²⁾
C and C-Mn	VL C400UW, VL C440UW, VL C480UW	SC	350 000	N, NT, QT
Alloy	VL C550AW, VL C620AW	SC	95 000	QT

Castings for machinery

Steel type	Grade ³⁾	Casting method ¹⁾	Max. weight [kg]	Heat treatment condition ²⁾
C and C-Mn	VL C400U, VL C440U, VL C480U, VL C520U	SC	350 000	N, NT, QT
Alloy	VL C550A, VL C600A, VL C690A	SC	95 000	QT

Remarks:

- 1) SC: Sand Casting
- 2) N: Normalized
QT: Quenched and tempered
NT: Normalized and tempered
- 3) Incl. equivalent grades in acc. to other standards

Approval scope for Independent Heat Treatment Company

Item	Description
Product type	Steel Castings
Steel Type	Carbon and carbon-manganese, Alloy
Maximum Loading Weight	No. 1-4-6A: 300 ton No. 2-2-1C: 120 ton
Max. thickness	1 000 mm
Heat Treatment Type	Annealing, Normalizing, Tempering and Stress relieving
Furnace Details	Type : Car bottom type, Working zone (mm) : No. 1-4-6A: Width 11 000, Legth 12 000 x Height 3 000 No. 2-2-1C: Width 5 500, Legth 13 500 x Height 3 500
Heat Treament Procedure	Doc. No. HTF-CF1406 Rev.2 dtd. 2019-10-01
Temperature Uniformity Survey Procedure	Doc. No. HTF-CF1405 Rev.2 dtd. 2019-03-04