APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM00000ZR
Revision No:
2

This is to certify:

That

SeAH Besteel Corporation
Gunsan-si, Jeollabuk-do,
Republic of Korea

is an approved manufacturer of
Steel Forgings

in accordance with
DNV GL rules for classification – Ships
DNVGL-OS-B101 – Metallic materials
DNV GL class programme CP-0351 – Manufacture of heat treated products – Heat treatment workshop

and the following particulars:

Steel type	**Carbon and carbon-manganese, Alloy**
Max. weight	**See page 2**
Max. thickness	**See page 2**
Heat treatment condition	**See page 2**
Additional approval conditions	**1. Including steelmaking** **2. Including continuous grain flow (CGF) crank throw: Max. diameter 1570 mm** **3. Including in-house heat treatment facility (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 **2019-11-18**

This Certificate is valid until **2022-11-09**.
DNV GL local station: **Mokpo**

Approval Engineer: **Christian Wildhagen**

for **DNV GL**
Digitally Signed By: Roehr, Stefan
Location: DNV GL Hamburg, Germany
Signing Date: 02.12.2019 , on behalf of

Thorsten Lohmann
Head of Section

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Particulars of the approval

Semi-finished products; Ingots and blooms		
Steel type	Heat treatment condition[1)]	Maximum thickness (mm)
Carbon and carbon-manganese	AF	600
Alloy	AF	600
Bars		
Carbon and carbon-manganese	N, QT	600
Alloy	QT	600
Components		
Grade /Steel type	Heat treatment condition	Maximum weight (kg)
Carbon and carbon-manganese	N, QT	103 000
Alloy	QT	110 000
HF601 (HHI specification)	[2)]	25 000
S34MnV (MAN B&W Material Sheet P182-1)	[3)]	37 000

Remarks
1) AF: As forged, N: Normalised, QT: Quenched and tempered
2) According to HHI specification
3) According to MAN B&W Material Sheet P182-1.

Approval details of in-house heat treatment facility:

Item	**Description**
Product type	Steel Forgings
Steel Type	Carbon and carbon-manganese, Alloy
Maximum Loading Weight	200 ton
Max. Thickness	Ø 1950 mm
Heat Treatment Type	Quenching, Normalizing, Annealing & Tempering
Furnace Details	Car bottom type, ID No : HT-3, HT-5, HT-8 & HT-9 Working zone (mm) :

F'ce I.D	length	width	height
HT-3	21000	5000	3900
HT-5	16000	5000	3900
HT-8	14000	5000	3900
HT-9	14000	5000	3900

Heat Treament Procedure	Doc. No. QA-HTPV-1511-0001 Rev. 0 dtd. 2015-11-23
Temperature Uniformity Survey Procedure	Doc. No. QA-TUSP-1511-0001 Rev.0 dtd. 2015-11-23