



# APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:  
**AMMM00000ZR**  
Revision No:  
**3**

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 rules for classification – Ships**  
**DNV-OS-B101 – Metallic materials**  
**DNV class programme CP-0351 – Manufacture of heat treated products – Heat treatment workshop**

and the following particulars:

<b>Application area</b>	<b>Forgings for hull structures and equipment, Forgings for shafting and machinery, Forgings for crankshafts</b>
<b>Steel type</b>	<b>Carbon and carbon-manganese, Alloy</b>
<b>Max. weight</b>	<b>See page 2</b>
<b>Max. thickness</b>	<b>See page 2</b>
<b>Heat treatment condition</b>	<b>See page 2</b>
<b>Additional approval conditions</b>	<b>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)</b>

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 classed object shall fulfill the material requirements in the applicable DNV class rules.

Issued at **Hamburg** on **2022-11-17**

for **DNV**

This Certificate is valid until **2025-11-09**.

DNV local unit: **Mokpo**

Approval Engineer: **Christian Wildhagen**

**Thorsten Lohmann**  
**Head of Section**

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



## Particulars of the approval

### Semi-finished products; Ingots and blooms

Steel type	Maximum thickness (mm)	Heat treatment condition <sup>1)</sup>
Carbon and carbon-manganese	1 950	AF
Alloy	1 950	AF

### Bars

Steel type	Forging method <sup>1)</sup>	Maximum thickness (mm)	Heat treatment condition <sup>1)</sup>
Carbon and carbon-manganese	OD	1 950	N, QT
Alloy	OD	1 950	QT

### Forgings for hull structures and equipment

Steel type	Grade <sup>3)</sup>	Forging method <sup>1)</sup>	Max. weight [kg]	Heat treatment condition <sup>1)</sup>
C and C-Mn	NV F400UW, NV F440UW, NV F480UW, NV F520UW, NV F560UW, NV F600UW	OD	103 000	N, QT
Alloy	NV F550AW, NV F600AW, NV F650AW	OD	110 000	QT

### Forgings for shafting and machinery Forgings for crankshafts

Steel type	Grade <sup>3)</sup>	Forging method <sup>1)</sup>	Max. weight [kg]	Heat treatment condition <sup>1)</sup>
C and C-Mn	NV F400U, NV F440U, NV F480U, NV F520U, NV F560U, NV F600U, NV F640U, NV F680U, NV F720U, NV F760U	OD	103 000	N, QT
Alloy	NV F600A, NV F700A, NV F800A, NV F900A, NV F1000A, NV F1100A	OD	110 000	QT

### Steels acc. other standards

Grade	Forging method <sup>1)</sup>	Max. weight [kg]	Heat treatment condition <sup>2)</sup>
HF601 (HHI specification)	OD	60 000	<sup>3)</sup>
S34MnV (MAN B&W Material Sheet P182-1)	OD	60 000	<sup>4)</sup>

#### Remarks:

- <sup>1)</sup> OD: Open die forging
- <sup>2)</sup> QT: Quenched and tempered  
 N: Normalised  
 AF: As forged
- <sup>3)</sup> According to HHI specification
- <sup>4)</sup> 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) :																				
	<table border="1"> <thead> <tr> <th>Face I.D</th> <th>length</th> <th>width</th> <th>height</th> </tr> </thead> <tbody> <tr> <td>HT-3</td> <td>21000</td> <td>5000</td> <td>3900</td> </tr> <tr> <td>HT-5</td> <td>16000</td> <td>5000</td> <td>3900</td> </tr> <tr> <td>HT-8</td> <td>14000</td> <td>5000</td> <td>3900</td> </tr> <tr> <td>HT-9</td> <td>14000</td> <td>5000</td> <td>3900</td> </tr> </tbody> </table>	Face 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
	Face 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 Treatment 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																				