



APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM0000022
Revision No:
4

This is to certify:

That

SeAH Changwon Integrated Special Steel Corporation
147, Jeokhyeon-ro, Seongsan-gu, Changwon-Si,
Gyeongsangnam-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 – DNV-CP-0242 Semi-finished steel products
DNV class programme – DNV-CP-0247 Steel forgings
DNV class programme – DNV-CP-0351 Manufacture of heat treated products - heat treatment workshop

and the following particulars:

Application area	Forgings for hull structures and equipment Forgings for shafting and machinery Forgings for crankshafts Stainless steel forgings
Steel type(s)	Carbon and carbon-manganese, Austenitic stainless
Max. weight	See page 2
Remarks	1. Including steelmaking 2. Including continuous grain flow (CGF) crankshafts, see page 2 3. Approved as Independent Heat Treatment Company, see page 3

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 **2024-12-13**

This Certificate is valid until **2025-06-30**.

DNV local unit: **Busan, CMC Korea**

Approval Engineer: **Christian Wildhagen**

for **DNV**



This document has been digitally signed and will
therefore not have handwritten signature

Stefan Röhr

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

Forgings for hull structures and equipment

Steel type	Grade ³⁾	Forging method ¹⁾	Max. weight [kg]	Heat treatment condition ²⁾
C and C-Mn	NV F400UW, NV F440UW, NV F480UW, NV F520UW, NV F560UW, NV F600UW	OD	90 000	N, NT, QT

Forgings for shafting and machinery

Forgings for crankshafts

Steel type	Grade ³⁾	Forging method ¹⁾	Max. weight [kg]	Heat treatment condition ²⁾
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	90 000	N, NT, QT

Stainless steel forgings

Steel type	Grade ³⁾⁵⁾	Forging method ¹⁾	Max. weight [kg]	Max. diameter / section [mm]	Heat treatment condition ²⁾
Austenitic	CrNiMo	OD	6 000	500	SHT

Remarks:

- ¹⁾ OD: Open die forging
- ²⁾ QT: Quenched and tempered
 N: Normalized
 NT: Normalized and tempered
 SHT: Solution Heat Treated (Solution Annealing)
- ³⁾ Incl. equivalent grades in acc. to other standards

Special conditions:

- Including steelmaking.
- Including continuous grain flow (CGF) crankshafts or crank throws; according to DNV-CG-0037S.

Approval scope for Independent Heat Treatment Company

Item	Description
Product type	Steel Forgings
Steel Type	C and C-Mn Steels, Alloy
Furnace I.D. No.	HT-1
Maximum Loading Weight	200 ton
Max. Thickness	C-Mn: 980 mm Alloy: 610 mm
Heat Treatment Type	Quenching, Normalizing, Annealing, Tempering
Furnace Details	Car bottom type, Working zone (mm) : Length 114550, Width 2310, Height 2500
Heat Treatment Procedure	Doc. No. DNVGL-1705-01 Rev.0 dated 2017-05-18
Temperature Uniformity Survey Procedure	Doc. No. DNVGL-1705-02 Rev.0 dated 2017-05-17