APPROVAL OF MANUFACTURER CERTIFICATE

Certificate no.:
AMMM000014N
Revision No:
5

This is to certify:

that

Georgsmarienhütte GmbH
Neue Hüttenstraße 1,
49124 Georgsmarienhütte,
Germany

is an approved manufacturer of
Steelmaking and Rolled Steel Products

in accordance with

DNV rules for classification – Ships
DNV-OS-E302 – Offshore mooring chain, Edition July 2022
DNV class programme – DNV-CP-0242 Semi-finished steel products
DNV class programme – DNV-CP-0243 Rolled steel products – non stainless steel
DNV class programme – DNV-CP-0237 Offshore mooring chain and accessories

and the following particulars:

Product	**Rolled bars intended to be machined into components,** **Round bars for chain cable,** **Semi-finished products: Ingots for chain cables**
Manufacturing method	**Electric arc furnace, continuous or ingot cast**
Max. thickness / diameter	**See page 2**
Heat treatment condition	**See page 2**
Additional approval conditions	**See page 2**
Max. thickness/diam.	**See page 2**
Additional approval conditions	**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 classed object shall fulfill the material requirements in the applicable DNV class rules.

Issued at **Hamburg** on **2026-06-29**

This Certificate is valid until **2029-07-02**.
DNV local unit: **Essen**

Approval Engineer: **Torben Schälicke**

for **DNV**

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

Christian Wildhagen

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 USD 300 000.

Particulars of the approval

Rolled bars intended to be machined into components [3)4)]

Steel type	Steelmaking [1)]	Fine grain elements	Heat treatment condition [2)]	Max. diameter [mm]
Carbon and carbon-manganese	EAF, CC	Al	*)	110
Alloy	EAF, CC	Al	*)	110

Round bars for anchor chain cables

Steel type	Steelmaking [1)]	Fine grain elements	Heat treatment condition [2)]	Max. diameter [mm]
NV K1, NV K2	EAF, CC	Al or Al+V	*)	100
NV K3	EAF, CC	Al or Al+V	*)	100

Semi-finished products: ingots for offshore mooring chain cables

Grades [5)]	Steelmaking [1)]	Fine grain elements
R3S, R4, R5	EAF, IC	Al

Remarks:
[1)] EAF: electric arc furnace; IC: ingot casting; CC: continuous casting.
[2)] *) as rolled or according standard / DNV Rules
[3)] Minimum rolling reduction ratio 6:1
[4)] Sampling, inspection and testing requirements shall be according to RU SHIP Pt.2 Ch.2 Sec.6.
[5)] For approved material specification see table S1.

Table S1 - Ingots for offshore mooring chain cables - Specification for chemical composition [1)]

Grade		C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Al	N
R3S, R4, R5	Min	.30	-	.50	-	-	1.30	1.30	.20	-	.020	-
	Max	.38	.40	.80	.025	.015	1.70	1.70	.30	.25	.040	.010
R3S, R4, R5	Min	.26	-	.50	-	-	1.80	1.80	.30	-	.020	-
	Max	.34	.40	.80	.025	.015	2.20	2.20	.50	.25	.035	.013

Remarks:
[1)] The content of Sn, Sb, As and B may be required. In such cases, the maximum content shall be 0.025% for Sn, 0.020% for Sb, 0.030% (0.040% for R3S and R4) for As and 0.001% for B.