

# APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:  
**AMMM0000174**  
Revision No:  
**1**

**This is to certify:**

**That**

**Deutsche Edelstahlwerke Specialty Steel GmbH & Co. KG**  
**Oberschlesienstrasse 16, 47807 Krefeld, Germany**

is an approved manufacturer of  
**Steelmaking**

in accordance with  
**DNVGL-OS-E302 – Offshore mooring chain, Edition July 2018**

and the following particulars:

<b>Product</b>	<b>Semi-finished products; Ingots, blooms and billets for chain cables</b>
<b>Grades</b>	<b>R3, R3S, R4, R4S and R5</b>
<b>Steelmaking</b>	<b>Electric arc furnace, Ingot casting or continuous casting</b>
<b>Deoxidation</b>	<b>Killed</b>
<b>Fine grain elements</b>	<b>See page 2</b>
<b>Remarks</b>	<b>See particulars of the approval</b>

Manufacturer approved by this certificate is 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 **Høvik** on **2020-10-26**

for **DNV GL**

This Certificate is valid until **2023-06-19**.

DNV GL local station: **Essen**

Approval Engineer: **Dechun Lou**

**Sondre Løken**  
**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 GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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.



Job Id: **263.11-004410-7**  
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**Particulars of the approval**

<b>Ingots, blooms and billets for chain cables</b>		
<b>Grade <sup>1)</sup></b>	<b>Steelmaking <sup>2)</sup></b>	<b>Fine grain elements</b>
<b>R3</b>	EAF, VD, IC or CC	Al
<b>R3S</b>		
<b>R4</b>		
<b>R4S</b>		
<b>R5</b>		

Remarks:

<sup>1)</sup> Specification for chemical composition according to table S1

<sup>2)</sup> EAF: Electric Arc Furnace; VD: Vacuum degassing; IC: Ingot Casting; CC: Continuous Casting.

<b>Table S1 - Specification for chemical composition <sup>1)</sup> – Ingots, blooms and billets for chain cables</b>												
<b>Grade</b>		<b>C</b>	<b>Si</b>	<b>Mn</b>	<b>P</b>	<b>S</b>	<b>Cr</b>	<b>Ni</b>	<b>Mo</b>	<b>Cu</b>	<b>Al</b>	<b>N</b>
<b>R3, R3S</b>	Min.	.30	-	.50	-	-	1.50	1.50	.20	-	.020	-
<b>R4, R4S</b>												
<b>R5</b>	Max.	.38	.40	.80	.025	.015	1.70	1.70	.30	.25	.050	.015
<b>R3, R3S</b>	Min.	.26	-	.50	-	-	1.80	1.80	.30	-	.020	-
<b>R4, R4S</b>												
<b>R5</b>	Max.	.34	.40	.80	.025	.015	2.20	2.20	.50	.25	.050	.015

Remarks:

<sup>1)</sup>The content of Sn, Sb, As and B may be required determined. In such cases, the maximum content shall be 0.030 % for Sn, 0.030% for As, 0.020 % for Sb and 0.0007 % for B.