

APPROVAL OF MANUFACTURER CERTIFICATE

This is to certify:

That

Stahlhammer Bommern GmbH
Carl-Zeiss-Strabe 7, 59077 Hamm, Nordrhein-Westfalen, Germany

is an approved manufacturer of
Steel Forgings

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

and the following particulars:

Product	Forgings for chain cable accessories
Steel grade	R3, R4, and R5
Max. diameter	See page 2
Delivery condition	See page 2
Remarks	See particulars of the approval

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 **2020-08-27**

for **DNV GL**

This Certificate is valid until **2023-08-26**.

DNV GL local station: **Essen**

Approval Engineer: **Dechun Lou**

Sondre Løken
Head of Section

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Job Id: **263.11-010826-1**
Certificate No: **AMMM00002SJ**

Particulars of the approval

Forgings for mooring chain cable accessories			
Grade ¹⁾	Delivery conditions ^{2),5)}	Max. diameter or thickness (mm) ³⁾	Material manufacturer ⁴⁾
R3, R4, R5	NQT	89	Buderus Edelstahl GmbH

Remarks:

¹⁾ For approved material specification see table S1.

²⁾ NQT: Normalized, Quenched and Tempered.

³⁾ For nominal diameter of chain cable.

⁴⁾ The approval is limited to the listed raw material manufacturer.

⁵⁾ Heat treatment is performed by STB from outsource at Hartereier Fischer GmbH. Heat Treatment procedures is the responsibility of De Haan Special Equipment B.V.

Table S1 - Specification for chemical composition ¹⁾													
Grade, thickness (mm)		C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Al	N	
R3, R4, R5	89	Min	.30	-	.50	-	-	1.30	1.30	.20	-	.020	-
		Max	.38	.40	.80	.025	.015	1.70	1.70	.30	.25	.050	.012

Remarks:

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