

APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM000001U
Revision No:
1

This is to certify:

That

Breitenfeld Edelstahl AG

Breitenfeldstr. 22, 8662 St. Barbara-Mitterdorf, ST, Austria

is an approved manufacturer of
Steelmaking

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

and the following particulars:

Product Grades	Semi-finished products: Ingots for chain cables R3S, R5
Steelmaking	Electric arc furnace, Ingot casting
Deoxidation	Killed
Fine grain elements	See page 2
Remarks	See page 2

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 **2019-03-04**

for **DNV GL**

This Certificate is valid until **2022-03-03**.

DNV GL local station: **Augsburg**

Approval Engineer: **Dechun Lou**

Hanne Anita Hjerpetjønn
Head of Section



Job Id: **263.11-004715-2**
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Particulars of the approval

Ingots for chain cables		
Grade ¹⁾	Steelmaking ²⁾	Fine grain elements
R3S	EAF, VD, IC	Al+V
R3S, R5	EAF, VD, IC	Al

Remarks:

- 1) Specification for chemical composition according to table S1
- 2) EAF: Electric Arc Furnace; VD: Vacuum degassing; IC: Ingot Casting;

Table S1 - Specification for chemical composition- Ingots for chain cables													
Grade		C	Mn	Si	P	S	Cr	Ni	Mo	Cu	Al	V	N
R3S	Min.	.10	.30	-	-	-	2.00	-	.90	-	.020	.030	-
	Max.	.20	.90	.50	.025	.015	2.50	.50	1.20	.35	.025	.050	.010
R3S	Min.	.30	.50	-	-	-	1.30	1.30	.15	-	.020	.020	.004
	Max.	.38	.80	.40	.010	.005	1.70	1.70	.30	.20	.035	.030	.010
R5	Min.	.26	.30	-	-	-	1.80	1.80	.30	-	.020	.020	.004
	Max.	.34	.60	.40	.01	.005	2.20	2.20	.50	.20	.035	.030	.010

Remarks:

The content of Sn, Sb, As and B may be required. In such cases, the maximum content shall be 0.025 % for Sn, 0.0025 % for Sb, 0.010% As and 0.0005% for B.