APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM000000A
Revision No:
12

This is to certify:

That

SIDENOR ACEROS ESPECIALES, S.L.
Basauri, Reinosa and Azkoitia plants,
Basauri, Vizcaya,
Spain

is an approved manufacturer of
Steelmaking and Rolled Steel Products

in accordance with
DNV-OS-E302 – Offshore mooring chain, Edition July 2022
DNV class programme – DNV-CP-0237 Offshore mooring chain and accessories
DNV rules for classification – Ships
DNV-OS-B101 – Metallic materials
DNV class programme – DNV-CP-0243 Rolled steel products – non stainless steel

and the following particulars:

Product	**Round bars for chain cables,** **Rolled round bars intended to be machined into components,** **Semi-finished products; ingots, blooms and billets for forging and rolling stock**
Steel type/grades	**See page 2 and 3**
Manufacturing method	**See page 2 and 3**
Deoxidation	**Killed**
Fine grain elements	**See pages 2, 3 and 4**
Heat treatment conditions	**See page 2**
Max. thickness/diam.	**See page 2**
Remarks	**See pages 2, 3 and 4**

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 **2025-05-26**

This Certificate is valid until **2025-11-15**.

for **DNV**

DNV local unit: **Area NB/CMC Iberia**

Approval Engineer: **Dechun Lou**

Particular of the approval:

Rolled round bars[1)2)6)] intended to be machined into components (as a substitute for forged bars), Semi-finished products for forging or rolling stock.				
Steel types	**Steelmaking [3)]**	**Fine grain elements**	**Delivery conditions [4)]**	**Max. diameter (mm)**
Carbon and carbon-manganese	EAF, IC or CC	Al or Al+V	N [5)]	220 [5)]
Alloy [6)]	EAF, IC or CC	Al or Al+V	QT [5)]	220 [5)]

Remarks:
[1)] Minimum rolling reduction ratio 6:1
[2)] Sampling, inspection and testing requirements shall be according to RU-SHIP Pt.2 Ch.2 Sec. 6
[3)] EAF: Electric Arc Furnace; IC: Ingot Casting; CC: Continuous Casting.
[4)] N: Normalised; QT: Quenched and Tempered.
[5)] Not applicable for semi-finished products.
[6)] Including clean steel of grade 18CrNiMo7-6 according to EN 10084, DNV RU-SHIP Pt.2 Sec.6 and DNV-CP-0247 Sec.3 [2.1].

Round bars for chain cables acc. to DNV-OS-E302 and DNV-CP-0237				
Grade	**Max. diameter (mm)**	**Steelmaking [1)]**	**Fine grain elements**	**Delivery condition [2)]**
R3	185	EAF, VD, IC	Al+V	AR
	78	EAF, VD, CC [3)]		
	105	EAF, VD, CC [4)]		
	150	EAF, VD, CC [5)]		
	203	EAF, VD, CC [5)]	Al+V	HA
R3S	185	EAF, VD, IC	Al+V	AR
	78	EAF, VD, CC [3)]		
	96	EAF, VD, CC [4)]		
	150	EAF, VD, CC [5)]		
	186.5	EAF, VD, CC [5)]	Al+V	HA
R3S	185	EAF, VD, CC [7)]	Al	AR/HA
R4	110	EAF, VD, CC [4)]	Al	AR/HA
R4	204	EAF, VD, CC [5)]	Al	AR/HA
R4 [6)]	185	EAF, VD, IC	Al+V	AR
	78	EAF, VD, CC [3)]		
	88	EAF, VD, CC [4)]		
	191	EAF, VD, CC [5)]		
R4S [6)]	185	EAF, VD, IC	Al+V	AR
	78	EAF, VD, CC [3)]		
	88	EAF, VD, CC [4)]		
	174	EAF, VD, CC [5)]		
R5 [6)]	230	EAF, VD, IC	Al+V	AR
	78	EAF, VD, CC [3)]		
	88	EAF, VD, CC [4)]		
	174	EAF, VD, CC [5)]		
R6 [8)]	165	EAF, VD, CC [7)]	Al+V	AR

Remarks:
[1)] EAF: Electric Arc Furnace; VD: Vacuum Degassing; IC: Ingot Casting; CC: Continuous Casting.
[2)] AR: As Rolled; HA: Annealed at 680°C x 8h for Hydrogen diffusion only if it is necessary.
[3)] Dimensions of billet: 185 mm x 185 mm.
[4)] Dimensions of billet: 240 mm x 240 mm.
[5)] Dimensions of bloom: 300 mm x 400 mm or 350 mm x 470 mm.
[6)] Minimum tempering temperature shall be 610°C for quenching and tempering condition.

[7] Dimension of bloom: 350 mm x 470 mm.
[8] Minimum tempering temperature shall be 580°C for quenching and tempering condition.
[9] Specification for chemical composition according to table S1.

Ingots, blooms and billets for chain cables		
Grade [2]	**Steelmaking [1]**	**Fine grain elements**
R3S	EAF, VD, CC	Al
R4	EAF, VD, CC	Al
R3, R3S **R4, R4S** **R5**	EAF, VD, IC or CC	Al+V
R6 [3]	EAF, VD, CC	Al+V

Remarks:
[1] EAF: Electric Arc Furnace; VD: Vacuum Degassing; IC: Ingot Casting; CC: Continuous Casting.
[2] Specification for chemical composition according to table S2
[3] Specification for chemical composition as per table S1.