Certificate number: 37273/D0 BV
File number: MAT 2395-2013
Product code: 9019I

This certificate is not valid when presented without the full attached schedule composed of 7 sections

www.veristar.com

APPROVAL CERTIFICATE for MATERIALS

This certificate is issued to

SIDENOR ACEROS ESPECIALES, S.L.U

Reinosa (Cantabria) - SPAIN

for the type of product

ROUND BARS FOR OFFSHORE MOORING CHAIN CABLE

Round bars for offshore mooring chain cables in steel grades QR3, QR3S, QR4/R4S and QR5

Requirements:
Bureau Veritas Rules on Materials and Welding for the Classification of Marine Units

This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 17 Mar 2031

For Bureau Veritas Marine & Offshore,
At BV BILBAO, on 17 Mar 2026,
Ignacio EGUILUZ BERNAL

This certificate was created electronically and is valid without signature

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION :

Hot rolled round bars for offshore mooring chain cables.

Steel grade	Delivery condition - Round bar diameter
QR3; QR3S; QR4; QR4S (1)	As rolled with thickness up to 185mm
QR3(2)	As rolled with thickness up to 203mm
QR3S (3)	As rolled with thickness up to 186,5mm
QR3S (4)	As rolled with thickness up to 210mm
QR4 (5)	As rolled with thickness up to 183mm
QR4 (34CrNiMo6) (6)	As rolled with thickness up to 230mm
QR5 (7)	As rolled with thickness up to 175mm
QR5 (8)	As rolled with thickness up to 230mm

(1) Steelmaking in Electric Arc Furnace, Ingot casting by bottom pouring. Reduction ratio is above 7.0 for steel grades QR3, QR3S, QR4, QR4S.
(2) QR3 chemical composition as per specification Ref.MPSR3 Rev.02 dated 28/03/2015. Steelmaking in Electric Arc Furnace, LF Refining and Vacuum Degassing, Continuous Casting. Blooms size 470 × 350mm are manufactured by Sidenor Basauri. Minimum Reduction ratio is 5.1;
(3) QR3S alternative chemical composition as per specification Ref.MPSR3S Rev.02 dated 05/12/2014. Steelmaking in Electric Arc Furnace, LF Refining, Continuous Casting. Blooms size 470 × 350mm are manufactured by Sidenor Basauri. Minimum Reduction ratio is 6.0;
(4) QR3S alternative chemical composition as per specification Ref.MPSR3S Rev.02 dated 05/12/2014. Steelmaking in Electric Arc Furnace, LF Refining, Ingot Casting size 464 × 464mm. Minimum Reduction ratio is 5.6;
(5)Steelmaking in Electric Arc Furnace, LF Refining, Continuous Casting. Blooms size 470 × 350mm are manufactured by Sidenor Basauri. Minimum Reduction ratio is 6:0;
(6)Steelmaking in Electric Arc Furnace, LF Refining and Vacuum Degassing, Continuous Casting. Round Blooms dia.525mm or Blooms size 470 × 350mm. Minimum Reduction ratio is 5:1.
(7) Steelmaking in Electric Arc Furnace, LF Refining and Vacuum Degassing, Continuous Casting. Blooms size 470 × 350mm are manufactured by Sidenor Basauri. Minimum Reduction ratio is 5.05.
(8) Steelmaking in Electric Arc Furnace, Ingot casting by bottom pouring. Reduction ratio is above 8 for round bar up to 185mm and above 5 for round bar 180mm/230mm.

2. DOCUMENTS AND DRAWINGS :

2.1 - Chemical composition (wt%) specification (Ref.MPSR3 Rev.01 & Ref.MPR3 Rev.13) on ladle of steel grade QR3 for chains diameter 180mm max.:

Element	C	Mn	Si	P	S	Ni (1)	Mo (2)	Cr	Al	Cu
min	0.23	1.60	0.20	-	-	-	-	-	0.010	-
max	0.27	1.90	0.35	0.020	0.020	0.40	0.08	0.35	0.040	0.25
Element	**Sn**	**V**	**Ti**	**As**	**Sb**	**B**	**N2(ppm)**	**O2 (ppm)**	**H2(ppm)**	**Others**
min	n.s.*	0.05	-	n.s.*	n.s.*	-	-	-	-	n.s.*
max		0.10	0.015			0.002(3)	150	25(4)	1.1	

(1) Ni content up to 0.55% as per Ref.MPR3 Rev.13 for chains made at Vicinay Deusto site only; (2) Mo content up to 0.13% for diameter above 140mm; (2) B content up to 0.002% for diameter above 140mm; (1) O2 content up to 25ppm as per Ref.MPR3 Rev.13 for chains made at Vicinay Deusto site only;* n.s. means not specified.

2.2 - Chemical composition (wt%) specification (Ref.MPSR3 Rev.02) on ladle of steel grade QR3 for chains diameter 195mm max.:

Element	C	Mn	Si	P	S	Ni	Mo (1)	Cr	Al	Cu
min	0.23	1.60	0.20	-	-	-	-	-	0.010	-
max	0.27	1.90	0.35	0.020	0.020	0.55	0.13	0.35	0.040	0.25
Element	**Sn**	**V**	**Ti**	**As**	**Sb**	**B (2)**	**N2(ppm)**	**O2 (ppm)**	**H2(ppm)**	**Others**
min	n.s.*	0.05	-	n.s.*	n.s.*	-	-	-	-	n.s.*
max		0.10	0.015			0.0015	150	25	1.1	

(1) Mo content: 0.08max. for Ø <140mm, 0.13max. for Ø>140mm; (2) B content: 0.0015max. only for Ø>140mm;* n.s. means not specified.

2.3 - Chemical composition (wt%) specification (Ref.MPSR3S Rev.01&Ref.MPR3S Rev.13) on ladle of steel grade QR3S for chains diameter 180mm max.:

Element	C	Mn	Si	P	S	Ni	Mo	Cr	Al	Cu
min	0.23	1.60	0.20	-	-	0.40	0.08	0.20	0.010	-
max	0.27	1.90	0.35	0.020	0.020	0.55	0.13	0.35	0.040	0.25
Element	**Sn**	**V**	**Ti**	**As**	**Sb**	**B (1)**	**N2(ppm)**	**O2 (ppm)**	**H2(ppm)**	**Others**
min	n.s.*	0.08	-	n.s.*	n.s.*	-	-	-	-	
max		0.10	0.015			0.0015	150	25(2)	1.1	n.s.*

(1) B content up to 0.0015% as per Ref.MPR3S Rev.13 for chains made at Vicinay Deusto site only; (2) O2 content up to 25ppm as per Ref.MPR3S Rev.13 for chains made at Vicinay Deusto site only;* n.s. means not specified.

2.4 - Alternative chemical composition(wt%) specification (Ref.MPSR3S Rev.02) on ladle of steel grade QR3S for chain diameter 180mm max.:

Element	C	Mn	Si	P	S	Ni	Mo	Cr	Al	Cu
min	0.22	1.00	0.20	-	-	0.40	0.08	0.20	0.010	-
max	0.27	1.90	0.35	0.020	0.020	0.60	0.20	1.20	0.040	0.25
Element	**Sn**	**V**	**Ti**	**As**	**Sb**	**B**	**N2(ppm)**	**O2 (ppm)**	**H2(ppm)**	**Others**
min	n.s.*	-	-	n.s.*	n.s.*	n.s.*	-	-	-	
max		0.10	0.015				150	25	1.1	n.s.*

* n.s. means not specified.

2.5 - Chemical composition (wt%) specification (Ref.MPSR4 Rev.01 & Ref.MPR4 Rev.15) on ladle of steel grade QR4 for chains diameter 180mm max.:

Element	C (1), (2)	Mn (3)	Si	P	S	Ni	Mo	Cr	Al	Cu
min	0.18	0.85	0.15	-	-	0.50	0.20	0.90	0.015	-
max	0.24	1.20	0.35	0.020	0.015	0.80	0.40	1.25	0.040	0.25
Element	**Sn**	**V**	**Ti**	**As**	**Sb**	**B**	**N2(ppm)**	**O2 (ppm)**	**H2(ppm)**	**Others**
min	-	-	-	-	-	-	-	-	-	
max	0.030	0.10	0.015	0.025	0.005	0.0015	150	25	1.1	n.s.*

(1) C content as per Ref.MPSR4 Rev.01 for chains made at Vicinay Sestao site only: 0.18-0.21% for Ø<80mm, 0.21-0.24 for 80mm<Ø<120mm, 0.22-0.24 for Ø>119mm; (2) C content as per Ref.MPR4 Rev.15 for chains made at Vicinay Deusto site only: 0.18-0.21% for Ø<81mm, 0.21-0.24% for Ø>80mm; (3) Mn content: 0.85-0.95% for Ø<80mm, 0.95-1.10 for 80mm<Ø<120mm, 1.10-1.20 for Ø>119mm;* n.s. means not specified.

2.6 - Chemical composition(wt%) specification on ladle of steel grade 34CrNiMo6 (QR4) for mooring chains equipment:

Element	C	Mn	Si	P	S	Ni	Mo	Cr	Cu	Al	N
min	0.30	0.50	0.10	-	-	1.30	0.22	1.30	-	0.020	-
max	0.38	0.80	0.40	0.025	0.035	1.70	0.30	1.70	0.40	0.060	0.015

2.7 - Chemical composition(wt%) specification (Ref.MPSR4S Rev.01 & Ref.MPR4S Rev.10) on ladle of steel grade QR4S for chains diameter 173mm max.:

Element	C (1)	Mn	Si	P	S	Ni	Mo(2)	Cr	Al	Cu
min	0.21	1.20	0.20	-	-	0.95	0.40	1.00	0.015	-
max	0.24	1.40	0.35	0.020	0.008	1.15	0.55	1.10	0.040	0.25
Element	**Sn**	**V**	**Ti**	**As**	**Sb**	**B**	**N2(ppm)**	**O2 (ppm)**	**H2(ppm)**	**Others**
min	-	0.09	-	-	-	-	-	-	-	
max	0.030	0.12	0.015	0.025	0.005	0.0015	150	25	1.1	n.s.*

(1) C content: 0.18-0.24% for Ø<120mm; (2) Mo content: 0.50-0.65% for Ø>150mm;* n.s. means not specified.

2.8 - Chemical composition(wt%) specification (Ref.MPS R5 Rev.03 & Ref.MPR5 Rev.05) on ladle of steel grade QR5 for chains diameter 220mm max.:

Element	C (1)	Mn	Si	P	S	Ni (2)	Mo	Cr	Al	Cu
min	0.18	1.20	0.20	-	-	0.95	0.50	1.00	0.015	-
max	0.26	1.40	0.35	0.020	0.008	1.40	0.65	1.10	0.040	0.25
Element	**Sn**	**V**	**Ti**	**As**	**Sb**	**B**	**N2(ppm)**	**O2 (ppm)**	**H2(ppm)**	**Others**
min	-	0.09	-	-	-	n.s.*	-	-	-	
max	0.030	0.12	0.015	0.025	0.005		150	25	1.1	n.s.*

(1) C content: 0.21-0.24% for 181mm>Ø>120mm, 0.22-0.26% for Ø>180mm;(2) Ni content: 0.95-1.15% for 181mm>Ø, 1.00-1.40% for Ø>180mm; * n.s. means not specified.

2.9 - Documents issued by Sidenor Aceros Especiales, S.L. (Reinosa):
- Specification for the manufacturing of R5 quality material - MPR5 Rev.05 dated 03/01/2012 issued by Vicinay Cadenas S.A. (Bilbao)-Deusto site,
- Magnetic particle inspection procedure Ref.PM-40000 Rev.12 dated 04/08/2011 and Ref.PM-40000 Rev.14 dated 08/04/2013 issued by Gerdau Sidenor,
- Ultrasonic examination procedure Ref. US-40001 Rev.03 dated 08/05/2011 issued by Gerdau Sidenor and Ref.US-40002 Rev.0 dated 28/11/2014.
- Sidenor Reinosa - GN Rope fittings - BV approval dated 31/03/2025.

3. TEST REPORTS :

3.1 - Documents issued by Sidenor Aceros Especiales, S.L. (Reinosa):
- R4 Steel Approval Report Nº R4/0198 dated 09/01/1998,
- R3S Steel Approval Report NºR3S/0298 dated 09/01/1998 (up to 139 mm diameter), R3S Steel Approval Report Nº R3S/0398 dated 4/05/1998 (up to 185 mm diameter),
- R3S Steel alternative specification Ref.MPSR3S Rev.02, Approval Report Nº R3S/0315 dated 13/03/2015 (up to 186,5 mm diameter),
- R4/R4S Steel Approval Report N°R4/0201 dated November 2001, No.R4/0314 dated 13/03/2014 and Test certificate Ref.1708396 dated 12/02/2014,
- Inspection certificates referenced in document named "R4 chain historical data" dated March 2015 issued by Vicinay Sestao,
- Inspection certificates referenced in document named "R4S chain historical data" dated March 2015 issued by Vicinay Cadenas S.A.- Deusto site,
- R5 steel approval report No. R5/0112 dated 25/01/2012 issued by Gerdau Sidenor-Reinosa Plant and report No.VS-2013-001 dated May 2014, Mill test certificate Ref. PD2011 238 CO44068 dated 26/03/2012 issued by Gerdau Sidenor - Reinosa Plant, Test certificates No.1683323and No.1684334 dated 15/11/2013,Mill test certificate Ref.PS2015 615/1 CO4406815 dated 10/09/2015, Test report No.R5/0915 dated September 2015,
- As per NDT reports issued by Gerdau Sidenor - Reinosa Plant and dated years 2012 and 2013,
- R3 steel approval report N°R3/0615 dated June 2015 issued by Gerdau Sidenor - Reinosa Plant, test certificate No.1806453 dated 21/04/2015.
- Ref.VS-2019-002 dated February 2019 for enlarged link (187mm diameter) and end link (204mm diameter) (Gerdau Reinosa Steel & Rolling mill - Ingot casting - Bar 210 mm), Ref.VS-2020-006 dated May 2020.
- Ref.VS-2021-002 dated May 2020, QR4 grade with no restriction in Vanadium.
- Report Ref.B0160-STD-2025 dated 15/01/2026.

4. APPLICATION / LIMITATION :

4.1 - As per Bureau Veritas Rules on Materials and Welding for the Classification of Marine Units.
4.2 - Chemical composition and mechanical properties requirements are to be as per Bureau Veritas Rules on Materials and Welding for the Classification of Marine Units, and/or alternative specification mentioned on reviewed drawings, as applicable.
4.3 - Round bars made of steel grades QR3; QR3S; QR4; QR4S and QR5 are used for the manufacture of mooring chain cables manufactured by Vicinay Sestao.
4.4 - Round bars made of steel grade QR4(34CrNiMo6) is used for the manufacture of mooring chain cables manufactured by GN Rope Fittings - Grofsmederij Nieuwkoop B.V.

5. PRODUCTION SURVEY REQUIREMENTS :

5.1 - The round bars for offshore mooring chain cables are to be supplied by Sidenor Aceros Especiales, S.L. (Reinosa) in compliance with the type and the requirements described in this certificate.
5.2 - This type of product is within the category IBV of Bureau Veritas Rule Note NR320.
5.3 - BV product certificate is required.
5.4 - Sidenor Aceros Especiales, S.L. (Reinosa) has to make the necessary arrangements to have its works recognized by Bureau Veritas in compliance with the requirements of NR320.

5.5 - For information, Sidenor Aceros Especiales, S.L. (Reinosa) has declared to Bureau Veritas the following production site:

Sidenor Aceros Especiales, S.L. (Reinosa)
Paseo de Alejandro Calonje, 2
39200 Reinosa (Cantabria)
SPAIN

6. MARKING OF PRODUCT :

6.1 - Each round bar for offshore mooring chain cables that has been tested with satisfactory results are to be marked with the following information:
- Manufacturer’s name or trademark
- Bureau Veritas’ Mark
- Identification marking enabling traceability, such as cast number, heat number, or batch number
- Material grade and classification
- Additional markings where applicable, such as test pressure or specific inspection references

Additional marking requirements specific to round bar for offshore mooring chain cables shall be in accordance with the “Marking” article in the relevant section of Bureau Veritas NR216 Rules on Materials and Welding for the Classification of Marine Units.

7. OTHERS :

7.1 - It is Sidenor Aceros Especiales, S.L. (Reinosa) 's responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.
7.2 - This certificate supersedes the Type Approval Certificate N° 37273/C0 BV issued by the Society.

***** END OF CERTIFICATE *****