

APPROVAL OF MANUFACTURER CERTIFICATE

This is to certify:

That
ThyssenKrupp Steel Europe AG
Plant Beeckerwerth
Duisburg, Germany

is an approved manufacturer of
Steelmaking and Rolled Steel Products

in accordance with
DNV GL rules for classification – Ships
DNV GL rules for classification – Naval vessels
DNV GL offshore standards

and the following particulars:

Product	Hot rolled wide steel strip in coils Semi-finished products used for construction of (naval) vessels and for fabrication of offshore structures incl. their equipment
Grade(s)	Rolled steel for structural application Rolled steel for boilers, pressure vessels and special applications Special materials for naval ships
Steelmaking	Basic oxygen furnace and continuous casting
Deoxidation	Killed
Fine grain elements	Aluminium (either single or in combination with Nb, Ti and/or N)
Delivery conditions	As cast, as rolled, normalized, normalized rolled, thermo-mechanically rolled, normalized + tempered, quenched + tempered
Max. thickness/diam.	20 mm (rolled) / 257 mm (semi-finished)
Remarks	See particulars of the approval

Manufacturer(s) approved by this certificate is/are accepted to deliver according to DNV GL, DNV and GL rules.

This Certificate is valid until **2019-06-30**.

Issued at **Hamburg** on **2016-06-29**

DNV GL local station: **Essen**

Approval Engineer: **Christian Wildhagen**

for **DNV GL**

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Thorsten Lohmann
Head of Section

Job Id: **263.11-006315-1**
Certificate No: **AMMM00000S1**

Particulars of the approval

Semi-finished products:

Grade ¹⁾	Product	Supply Condition	Thickness [mm], max.	Width [mm], max.	Deoxidation	Microalloy
C and C-Mn Steels	HZ	AC	257	2400	killed	acc. to standard
Alloy Steels	HZ	AC	257	2400	killed	acc. to standard
Hull Structural Steels	HZ	AC	257	2400	killed	acc. to standard

HZ: slabs

AC: as cast

Remarks:

- ¹⁾ Grades of non-alloy and alloy steels (incl. with specified elevated and low temperature properties) as well as hull structural steels (normal, high and extra high strength) cover the supply of semi-finished products for materials used for construction of (naval) vessels and for fabrication of offshore structures incl. their equipment. The final processing mill is responsible for ordering steel which complies with their approved chemical composition and enables them to achieve the required mechanical properties.

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Rolled products:

Grade	Product	Supply Condition	Thickness [mm], max.	Microalloy	Z-Quality
Normal strength steels					
VL A, VL B, VL D	BD	AR	20	Al	Z25 / Z35
			15	Al+N, Al+Nb	-
VL A, VL B, VL D	BD	NR	20	Al	Z25 / Z35
VL A, VL B, VL D, VL E	BD	N ¹⁾	20	Al	Z25 / Z35
			15	Al+N, Al+Nb	-
High strength steels					
VL A27S, VL D27S	BD	AR	15	Al, Al+N, Al+Nb	-
VL A27S, VL D27S, VL E27S	BD	N ¹⁾	15	Al, Al+N, Al+Nb	-
VL A32, VL D32	BD	AR, NR	20	Al+Nb	Z25 / Z35
VL A36, VL D36		AR	15	Al, Al+N	-
VL A32, VL D32, VL E32	BD	N ¹⁾	20	Al+Nb	Z25 / Z35
VL A36, VL D36, VL E36			15	Al, Al+N	-
Steels for boilers and pressure vessels					
VL 360-0NR, VL 360-1FNR VL 410-0NR, VL 410-1FNR	BD	NR	20	Al	-
VL 460-0NR, VL 460-1FNR VL 490-0NR, VL 490-1FNR VL 510-1FNR	BD	NR	20	Al+Nb	-
VL 360-0N, VL 360-1FN, VL 360S-1FN VL 410-0N, VL 410-1FN, VL 410S-1FN	BD	N ¹⁾	20	Al	-
VL 460-0N, VL 460-1FN, VL 460S-1FN VL 490-0N, VL 490-1FN VL 510-1FN, VL 510S-1FN	BD	N ¹⁾	20	Al+Nb	-
VL 0.3Mo, VL 0.3MoS	BD	N ¹⁾	20	-	-
VL 1Cr0.5Mo, VL 1Cr0.5MoS	BD	N+T ¹⁾	20	-	-
VL 2.25Cr1Mo	BD	N+T ¹⁾	20	-	-
VL 2.25Cr1MoS	BD	N+T ¹⁾ , Q+T ¹⁾	20	-	-
Non-alloy structural steels acc. to EN 10025-2					
S235JR, S235J0, S235J2 S275JR, S275J0, S275J2 S355JR, S355J0, S355J2, S355K2	BD	AR, N ¹⁾ , NR	20	acc. to standard	-

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Grade	Product	Supply Condition	Thickness [mm], max.	Microalloy	Z-Quality
Normalized/normalized rolled weldable fine grain structural steels acc. to EN 10025-3					
S275N, S355N, S420N, S460N S275NL, S355NL, S420NL, S460NL	BD	N ¹⁾ , NR	20	acc. to standard	-
Thermomechanical rolled weldable fine grain structural steels acc. to EN 10025-4					
S275M, S355M, S420M, S460M S275ML, S355ML, S420ML, S460ML	BD	TM	20	acc. to standard	-
Structural steels with improved atmospheric corrosion resistance acc. to EN 10025-5					
S235J0W, S235J2W S355J0W, S355J2W, S355K2W	BD	AR, N ¹⁾ , NR	20	acc. to standard	-
S355J0WP, S355J2WP	BD	AR, N ¹⁾ , NR	12	acc. to standard	-
High yield strength structural steels acc. to EN 10025-6					
S460Q, S460QL, S460QL1 S500Q, S500QL, S500QL1 S550Q, S550QL, S550QL1 S620Q, S620QL, S620QL1 S690Q, S690QL, S690QL1 S890Q, S890QL, S890QL1 S960Q, S960QL	BD	Q+T ¹⁾	20	acc. to standard	-
Non-alloy and alloy steels with specified elevated temperature properties acc. to EN 10028-2					
P235GH, P265GH, P295GH, P355GH	BD	N ¹⁾ , NR	20	acc. to standard	-
16Mo3	BD	N ¹⁾ , N+T ¹⁾	20	-	-
13CrMo4-5	BD	N+T ¹⁾	20	-	-
10CrMo9-10	BD	N+T ¹⁾	20	-	-
18MnMo4-5, 15NiCuMoNb5-6-4, 13CrMoSi5-5, X12CrMo5, 13CrMoV9-10, 12CrMoV12-10, X10CrMoVNb9-1	BD	N+T ¹⁾	20	-	-
Weldable fine grain steels, normalized acc. to EN 10028-3					
P275NH, P275NL1, P275NL2 P355N, P355NH, P355NL1, P355NL2	BD	N ¹⁾ , NR	20	acc. to standard	-
P460NH, P460NL1, P460NL2	BD	N ¹⁾	20	acc. to standard	-

Grade	Product	Supply Condition	Thickness [mm], max.	Microalloy	Z-Quality
Nickel alloy steels with specified low temperature properties acc. to EN 10028-4					
11MnNi5-3, 13MnNi6-3	BD	N ¹⁾ , N+T ¹⁾	20	acc. to standard	-
15NiMn6, 12Ni14	BD	N ¹⁾ , N+T ¹⁾ , Q+T ¹⁾	20	acc. to standard	-
X12Ni5, X8Ni9	BD	N ¹⁾ , N+T ¹⁾ , Q+T ¹⁾	20	acc. to standard	-
X7Ni9	BD	Q+T ¹⁾	20	acc. to standard	-
Weldable fine grain steels, thermomechanically rolled acc. to EN 10028-5					
P355M, P355ML1, P355ML2 P420M, P420ML1, P420ML2 P460M, P460ML1, P460ML2	BD	TM	20	acc. to standard	-
Weldable fine grain steels, quenched and tempered acc. to EN 10028-6					
P355Q, P355QH, P355QL1, P355QL2 P460Q, P460QH, P460QL1, P460QL2 P500Q, P500QH, P500QL1, P500QL2 P690Q, P690QH, P690QL1, P690QL2	BD	Q+T ¹⁾	20	acc. to standard	-
Steels used for pipes for pipelines for combustible fluids acc. to EN 10208-2					
L 245NB, L 290NB, L 360NB, L 415NB	BD	AR, N ¹⁾ , NR	20	acc. to standard	-
L 245MB, L 290MB, L 360MB, L 415MB, L 450MB, L 485MB, L 555MB	BD	TM	20	acc. to standard	-
Non-alloy steels for quenching and tempering acc. to EN 10083-2					
C22E, C22R, C35, C35E, C35R, C40, C40E, C40R, C45, C45E, C45R, C50E, C50R, C55, C55E, C55R, C60, C60E, C60R	BD	acc. to standard	20	-	-
34CrMo4, 34CrMoS4, 42CrMo4, 42CrMoS4, 50CrMo4, 51CrV4	BD	acc. to standard	20	-	-

BD: wide strip in coils AR: as rolled NR: normalized rolled N: normalized TM: thermo-mechanically rolled
 N+T: normalized + tempered Q+T: quenched + tempered CC: continuous casting

Remark:

1) The supply conditions N, N+T and Q+T are not applicable at the rolling mill. All grades tabulated in these supply conditions are foreseen for the production of plates cut from wide strip, followed by a subsequent heat treatment in plant Hüttenheim/Duisburg (DNV GL-manufacturer approval AMMM00000RY).