

APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM00000EJ
Revision No:
1

This is to certify:

That

**GROUP KARL DIEDERICHS
Plant Karl Diederichs KG - Dirostahl
Remscheid, Germany**

is an approved manufacturer of
Steel Forgings

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

and the following particulars:

Application area	Forgings for hull structures and equipment Forgings for shafting and machinery Forgings for gearing Forgings for boilers, pressure vessels and piping systems Ferritic steel forgings for low temperature service Stainless steel forgings
Steel type(s)	Carbon and Carbon-Manganese, Alloy, Austenitic stainless, Martensitic stainless, Austenitic-ferritic (Duplex) stainless
Manufacturing method	Open die forging, ring rolling
Max. weight	See page 2 ff.
Max. diameter/section	See page 2 ff.
Heat treatment condition	See page 2 ff.
Additional approval condition	See page 2 ff.

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 GL classed object shall fulfill the material requirements in the applicable DNV GL class rules.

Issued at **Hamburg** on **2019-02-12**

for **DNV GL**

This Certificate is valid until **2022-03-07**.

DNV GL local station: **Essen**

Approval Engineer: **Stefan Röhr**

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**Thorsten Lohmann
Head of Section**



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Particulars of the approval

Forgings for hull structures and equipment

Steel type	Grade ³⁾⁴⁾	Forging method ¹⁾	Max. weight [kg]	Max. thickness / height [mm]	Outer diameter [mm]	Heat treatment condition ²⁾
C and C-Mn	VL F400UW, VL F440UW, VL F480UW, VL F520UW, VL F560UW, VL F600UW	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
Alloy	VL F550AW, VL F600AW, VL F650AW	OD	36 000	1 600	-	QT
		RR	8 000	800	3 500	

Forgings for shafting and machinery

Steel type	Grade ³⁾⁴⁾	Forging method ¹⁾	Max. weight [kg]	Max. thickness / height [mm]	Outer diameter [mm]	Heat treatment condition ²⁾
C and C-Mn	VL F400U, VL F440U, VL F480U, VL F520U, VL F560U, VL F600U, VL F640U, VL F680U, VL F720U, VL F760U	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
Alloy	VL F600A, VL F700A, VL F800A, VL F900A, VL F1000A, VL F1100A	OD	36 000	1 600	-	QT
		RR	8 000	800	3 500	

Forgings for boilers, pressure vessels and piping systems

Steel type	Grade ³⁾⁴⁾	Forging method ¹⁾	Max. weight [kg]	Max. thickness / height [mm]	Outer diameter [mm]	Heat treatment condition ²⁾
C and C-Mn	VL F450H, VL F490H	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
Alloy	VL F0.5Mo, VL F1Cr0.5Mo, VL F2.25Cr1MoN, VL F2.25Cr1MoQT	OD	36 000	1 600	-	NT, QT
		RR	8 000	800	3 500	

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Ferritic steel forgings for low temperature service

Steel type	Grade ³⁾⁴⁾	Forging method ¹⁾	Max. weight [kg]	Max. thickness / height [mm]	Outer diameter [mm]	Heat treatment condition ²⁾
C and C-Mn	VL F450L, VL F490L	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
Alloy	VL F3.5Ni, VL F5Ni, VL F9Ni*	OD	36 000	1 600	-	NT, QT (*NNT)
		RR	8 000	800	3 500	

Stainless steel forgings

Steel type / grade ³⁾⁵⁾	Forging method ¹⁾	Max. weight [kg]	Max. thickness / height [mm]	Outer diameter [mm]	Heat treatment condition ²⁾
Austenitic	OD	36 000	1 600	-	SHT
	RR	8 000	800	3 500	
Martensitic	OD	36 000	1 600	-	QT
	RR	8 000	800	3 500	
Ferritic	OD	36 000	1 600	-	SHT
	RR	8 000	800	3 500	
Austenitic-ferritic (Duplex)	OD	36 000	1 600	-	SHT
	RR	8 000	800	3 500	

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Steels acc. other standards

Steel type	Grade ³⁾	Forging method ¹⁾	Max. weight [kg]	Max. thickness / height [mm]	Outer diameter [mm]	Heat treatment condition ²⁾
C and C-Mn	Acc. to EN 10083-2	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
	Acc. to EN 10250-2	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
	Acc. to SEW 550	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
	Acc. to EN 10084	OD	36 000	1 600	-	NT, QT
		RR	8 000	800	3 500	QT
	Acc. to EN 10222-2	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	NT, QT
	Acc. to EN 10222-4	OD	36 000	1 600	-	N, QT
		RR	8 000	800	3 500	N, NT, QT
	Acc. to EN 10269	OD	36 000	1 000	-	N, QT
	Alloy	Acc. to EN 10083-3	OD	36 000	1 600	-
RR			8 000	800	3 500	
Acc. to EN 10250-3		OD	36 000	1 600	-	QT
		RR	8 000	800	3 500	
Acc. to SEW 550		OD	36 000	1 600	-	QT
		RR	8 000	800	3 500	
Acc. to EN 10084		OD	36 000	1 600	-	QT
		RR	8 000	800	3 500	
18CrNiMo7-6 acc. to EN 10084 ⁶⁾⁷⁾		OD	36 000	1 600	-	QT
		RR	8 000	800	3 500	
Acc. to EN 10222-2		OD	36 000	1 600	-	NT, QT
		RR	8 000	800	3 500	
Nickel steel acc. to EN 10222-3		OD	36 000	1 600	-	NT, NNT, QT
		RR	8 000	800	3 500	
Martensitic	Steel acc. to EN 10088-3	OD	36 000	1 600	-	QT
		RR	8 000	800	3 500	

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Remarks:

- 1) OD: Open die forging; RR: Ring Rolling
- 2) QT: Quenched and tempered; N: Normalised; NNT: double normalised and tempered
NT: Normalised and tempered
- 3) Certification of any material applied to classed object shall fulfill the applicable material requirements in the DNV GL class rules
- 4) Incl. equivalent grades in acc. to other standards
- 5) Stainless steel forgings shall be in accordance with recognized standards, e.g. EN 10222, ASTM A473/A965/A1049 and JIS G 3214, provided that supplementary requirements contained herein are also met. Recognition of other standards is subject to submission to the Society for evaluation.

Additional approval conditions:

- 6) Clean steel forgings of grade 18CrNiMo7-6 acc. to EN 10084 are qualified for approved applications (see pt. 2). Special requirements for clean steel forgings are given in DNV GL rules Pt. 2, Ch. 2, Sec.6, [1.6.10].
- 7) Subject to special approval, clean steel forgings of grade 18CrNiMo7-6 acc. to EN 10084 are approved for further processing to gears acc. to DNV GL Class Guideline No. DNVGL-CG-0036 and classed to "high grade".