APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM00000EJ
Revision No:
3

This is to certify:

That

Karl Diederichs GmbH & Co. KG
Plant Karl Diederichs GmbH & Co. KG - Dirostahl
Luckhauser Strasse 1-5, 42899 Remscheid,
Germany

is an approved manufacturer of
Steel Forgings

in accordance with
DNV rules for classification – Ships
DNV-OS-B101 – Metallic materials

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

Issued at **Hamburg** on **2022-06-14**

This Certificate is valid until **2025-03-07**.
DNV local station: **Essen**

Approval Engineer: **Christian Wildhagen**

for **DNV**
Digitally Signed By: Roehr, Stefan
Location: DNV Hamburg, Germany
Signing Date: 14.06.2022 , on behalf of

Thorsten Lohmann
Head of Section

Particulars of the approval

Forgings for hull structures and equipment

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	NV F400UW, NV F440UW, NV F480UW, NV F520UW, NV F560UW, NV F600UW	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
Alloy	NV F550AW, NV F600AW, NV F650AW	OD	36 000	1 600	-	QT
		RR	8 000	800	3 500	

Forgings for shafting and machinery

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	NV F400U, NV F440U, NV F480U, NV F520U, NV F560U, NV F600U, NV F640U, NV F680U, NV F720U, NV F760U	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
Alloy	NV F600A, NV F700A, NV F800A, NV F900A, NV F1000A, NV 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]	Forging method [1]	Max. weight [kg]	Max. thickness / height [mm]	Outer diameter [mm]	Heat treatment condition[2]
C and C-Mn	NV F450H, NV F490H	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
Alloy	NV F0.5Mo, NV F1Cr0.5Mo, NV F2.25Cr1MoN, NV F2.25Cr1MoQT	OD	36 000	1 600		NT, QT
		RR	8 000	800	3 500	

Ferritic steel forgings for low temperature service

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	NV F450L, NV F490L	OD	36 000	1 600	-	N, NT, QT
		RR	8 000	800	3 500	
Alloy	NV F3.5Ni, NV F5Ni, NV F9Ni	OD	36 000	1 600	-	NT, QT (*NNT)
		RR	8 000	800	3 500	

Stainless steel forgings

Steel type / grade[4]	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	

Steels acc. other standards

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	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	-	QT
		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 [5)6)]	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	

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) Incl. equivalent grades in acc. to other standards
4) 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:

5) 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 Rules Pt. 2, Ch. 2, Sec.6, [1.6.10].
6) 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 Class Guideline No. DNV-CG-0036 and classed to "high grade".