

APPROVAL OF MANUFACTURER CERTIFICATE

This is to certify:

That

ASFO S.p.A.
Via IV Novembre 12, 36010 Chiuppano (VI),
Italy

is an approved manufacturer of
Steel Forgings

in accordance with
DNV GL rules for classification – Ships

and the following particulars:

Application area	Forgings for hull structures and equipment Forgings for shafting and machinery Forgings for gearing Stainless steel forgings
Steel type	Carbon and carbon-manganese, Alloy, Austenitic stainless, Martensitic stainless Ferritic stainless Austenitic-ferritic (Duplex) stainless
Forging method	See page 2 Open die forging, Ring rolling, see page 2
Max. weight	See page 2
Max. diameter / section	See page 2
Heat treatment condition	See page 2

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 **2019-03-25**

This Certificate is valid until **2021-12-31**.
DNV GL local station: **Venice**

Approval Engineer: **Enno Brück**



for **DNV GL**

Digitally Signed By: Wildhagen, Christian
Location: DNV GL Hamburg, Germany
Signing Date: 2019-03-26, on behalf of

Thorsten Lohmann
Head of Section



Particulars of the approval

Forgings for hull structures and equipment

Steel type	Grade ³⁾⁴⁾	Forging method ¹⁾	Max. weight [kg]	Heat treatment condition ²⁾
C and C-Mn	VL F400UW, VL F440UW, VL F480UW, VL F520UW, VL F560UW, VL F600UW	OD, RR	9 000	N, NT, QT
Alloy	VL F550AW, VL F600AW, VL F650AW	OD, RR	9 000	QT

Forgings for shafting and machinery

Steel type	Grade ³⁾⁴⁾	Forging method ¹⁾	Max. weight [kg]	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, RR	9 000	N, NT, QT
Alloy	VL F600A, VL F700A, VL F800A, VL F900A, VL F1000A, VL F1100A	OD, RR	9 000	QT

Forgings for gearing

Steel type	Grade ³⁾⁴⁾	Forging method ¹⁾	Max. weight [kg]	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, RR	9 000	N, NT, QT
Alloy	VL F600A, VL F700A, VL F800A, VL F900A, VL F1000A, VL F1100A	OD, RR	9 000	QT

Stainless steel forgings

Job Id: **263.11-004857-2**
Certificate No: **AMMM00002F0**

Steel type ⁴⁾	Forging method ¹⁾	Max. weight [kg]	Heat treatment condition ²⁾
Austenitic	OD, RR	9 000	SHT
Ferritic	OD, RR	9 000	A
Martensitic	OD, RR	9 000	QT
22 Cr Duplex	OD, RR	9 000	SHT
25 Cr Duplex	OD, RR	9 000	SHT

Remarks:

- 1) OD: Open die forging
RR: Ring Rolling
- 2) QT: Quenched and tempered
N: Normalised
NT: Normalised and tempered
SHT: Solution Heat Treated (Solution Annealing)
- 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.

APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM00000DB
Revision No:
1

This is to certify:

That
ASFO S.p.A.
Via Stradone del Dieci, 24 Villamarzana,
Italy

is an approved manufacturer of
Steel Forgings

in accordance with
DNV GL rules for classification – Ships

and the following particulars:

Application area	Forgings for hull structures and equipment Forgings for shafting and machinery Forgings for gearing Stainless steel forgings
Steel type	Carbon and carbon-manganese, Alloy, Austenitic-ferritic (Duplex) stainless
Forging method	See page 2 Open die forging, Ring rolling, see page 2
Max. weight	See page 2
Max. diameter / section	See page 2
Heat treatment condition	See page 2

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.

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Approval Engineer: **Enno Brück**



for **DNV GL**

Digitally Signed By: Wildhagen, Christian
Location: DNV GL Hamburg, Germany
Signing Date: 2019-03-26, on behalf of

Thorsten Lohmann
Head of Section



Job Id: **263.11-005709-2**
 Certificate No: **AMMM00000DB**
 Revision No: **1**

Particulars of the approval

Forgings for hull structures and equipment

Steel type	Grade ³⁾	Forging method ¹⁾	Max. weight [kg]	Max. thickness [mm]	Heat treatment condition ²⁾	Max. Height [mm] ⁵⁾
C and C-Mn	VL F400UW, VL F440UW, VL F480UW, VL F520UW, VL F560UW, VL F600UW	OD, RR	14 000	600	N, NT, QT	1 200
Alloy	VL F550AW, VL F600AW, VL F650AW	OD, RR	14 000	600	QT	1 200

Forgings for shafting and machinery

Steel type	Grade ³⁾	Forging method ¹⁾	Max. weight [kg]	Max. thickness [mm]	Heat treatment condition ²⁾	Max. Height [mm] ⁵⁾
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, RR	14 000	600	N, NT, QT	1 200
Alloy	VL F600A, VL F700A, VL F800A, VL F900A, VL F1000A, VL F1100A	OD, RR	14 000	600	QT	1 200

Forgings for gearing

Steel type	Grade ³⁾	Forging method ¹⁾	Max. weight [kg]	Max. thickness [mm]	Heat treatment condition ²⁾	Max. Height [mm] ⁵⁾
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, RR	14 000	600	N, NT, QT	1200
Alloy	VL F600A, VL F700A, VL F800A, VL F900A, VL F1000A, VL F1100A	OD, RR	14 000	600	QT	1200

Job Id: **263.11-005709-2**
Certificate No: **AMMM00000DB**
Revision No: **1**

Stainless steel forgings

Steel type ³⁾⁴⁾	Forging method ¹⁾	Max. weight [kg]	Max. thickness [mm]	Heat treatment condition ²⁾	Max. Height [mm] ⁵⁾
22 Cr Duplex (1.4462 acc. EN 10088-3)	OD, RR	14 000	600	SHT	1 200
25 Cr Duplex (1.4460 acc. EN 10088-3)	OD, RR	14 000	600	SHT	1 200

Remarks:

- 1) OD: Open die forging
RR: Ring Rolling
- 2) QT: Quenched and tempered
N: Normalised
NT: Normalised and tempered
SHT: Solution Heat Treated (Solution Annealing)
- 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
- 5) Height of ring forging