

APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM000000S
Revision No:
1

This is to certify:

That

Gustav Grimm Edelstahlwerk GmbH & Co. KG
Ronsdorfer Str. 172-174, 42828 Remscheid,
Germany

is an approved manufacturer of
Steel Forgings

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

and the following particulars:

| | |
|---------------------------------------|--|
| Application area | Forgings for hull structures and equipment Forgings for shafting and machinery Forgings for boilers, pressure vessels and piping systems Ferritic steel forgings for low temperature service Stainless steel forgings |
| Steel type | Carbon and carbon-manganese, Austenitic stainless, Martensitic stainless, Ferritic stainless, Ferritic-austenitic (duplex) stainless |
| Forging method | See page 2 |
| Max. weight | Open die forging 10 000 kg |
| Heat treatment condition | See page 2 |
| Additional approval conditions | 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 **2019-05-09**

This Certificate is valid until **2022-06-30**.
DNV GL local station: **Essen**

Approval Engineer: **Christian Wildhagen**



for **DNV GL**
Digitally Signed By: Roehr, Stefan
Location: DNV GL Hamburg, Germany
Signing Date: 2019-05-09 , on behalf of

Thorsten Lohmann
Head of Section



Job Id: 263.11-002788-4
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Particulars of the approval

Forgings for hull structures and equipment

| Steel type | Grade ³⁾ | 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 | 10 000 | N, NT, QT |

Forgings for shafting and machinery

| Steel type | Grade ³⁾ | 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 | 10 000 | N, NT, QT |

Forgings for boilers, pressure vessels and piping systems

| Steel type | Grade ³⁾ | Forging method ¹⁾ | Max. weight [kg] | Heat treatment condition ²⁾ |
|------------|---------------------|------------------------------|------------------|--|
| C and C-Mn | VL F450H, VL F490H | OD | 10 000 | N, NT, QT |

Ferritic steel forgings for low temperature service

| Steel type | Grade ³⁾ | Forging method ¹⁾ | Max. weight [kg] | Heat treatment condition ²⁾ |
|------------|---------------------|------------------------------|------------------|--|
| C and C-Mn | VL F450L, VL F490L | OD | 10 000 | N, NT, QT |

Stainless steel forgings

| Steel type / grade | Forging method ¹⁾ | Max. weight [kg] | Heat treatment condition ²⁾ |
|-----------------------|------------------------------|------------------|--|
| Austenitic stainless | OD | 10 000 | SHT |
| Martensitic stainless | OD | 10 000 | QT |
| Ferritic stainless | OD | 10 000 | A |
| 22Cr-duplex stainless | OD | 10 000 | SHT |
| 25Cr-duplex stainless | OD | 10 000 | SHT |

Remarks:

- 1) OD: Open die forging
- 2) QT: Quenched and tempered; N: Normalized; NT: Normalized and tempered
SHT: Solution Heat Treated (Solution Annealing); A: Annealed
- 3) Incl. equivalent grades in acc. to other standards