

# Additive Fertigung im maritimen Bereich aus Sicht der Klassifikation

Forum „Additive Fertigung im Schiff- und Yachtbau“

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Dienstag, 14. Juni 2022

# Gliederung

Klassifikationsgesellschaften

Schiffbau als geregelter Bereich

Additive Fertigung im DNV Regelwerk

Beispielzulassungen Additive Fertigung

# Gliederung

## **Klassifikationsgesellschaften**

Schiffbau als geregelter Bereich

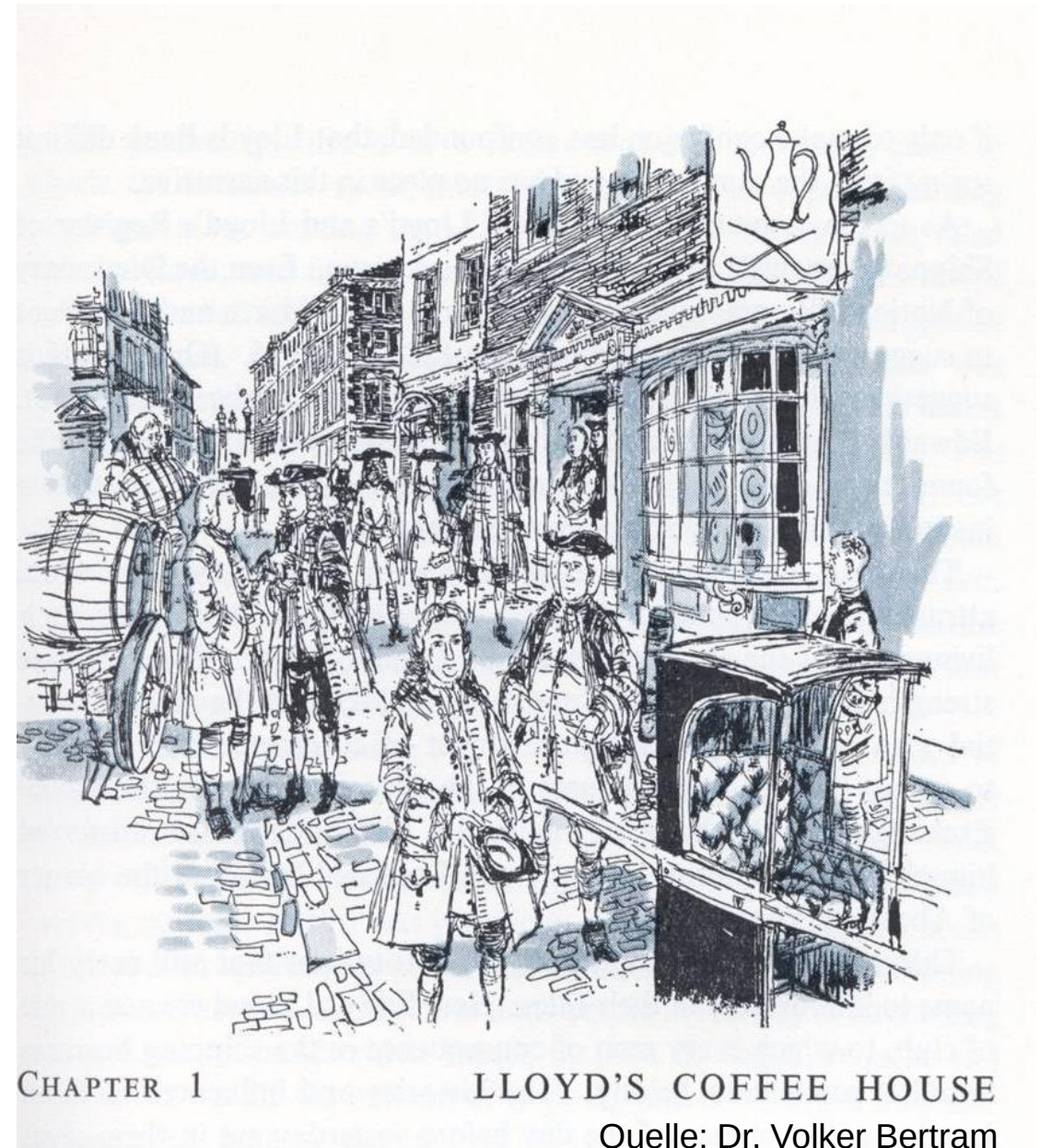
Additive Fertigung im DNV Regelwerk

Beispielzulassungen Additive Fertigung

# Klassifikationsgesellschaften

... so fing es an:

- Lloyd's Coffee House in London  
Treffpunkt für Reeder und Makler  
im 17. und 18. Jahrhundert
- Etwa 2.000 Schiffsverluste pro Jahr
- Lloyd's List 1734 gegründet, um  
Schiffe nach Sicherheitskategorien (Klassen)  
einzuteilen und regelmäßige Inspektionen  
einzuführen
- Ziel: Risikoabschätzung für Versicherer und  
Eigner



# Klassifikationsgesellschaften



**1760** Lloyd's Register of Shipping (LR)

**1864** Det Norske Veritas (DNV)

**1867** Germanischer Lloyd (GL)

**2013** DNV GL (VL)

**2021** DNV (NV)

# DNV in Zahlen

**158**  
years

**~12,000**  
employees

**100,000**  
customers

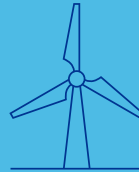
**100+**  
countries

**5% R&D**  
of annual revenue

**Ship and offshore**  
classification and advisory



**Energy advisory, certification,**  
verification, inspection and  
monitoring



**Management system certification,**  
supply chain and  
product assurance

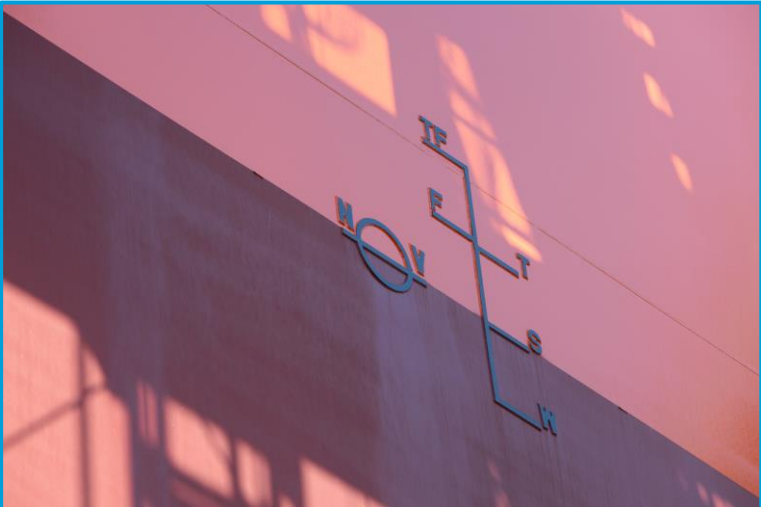


Software, platforms and **digital** solutions





# IACS – Dachverband der Klassifikationsgesellschaften



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# Schiffbau als geregelter Bereich



RULES FOR CLASSIFICATION

**Ships**

Edition July 2021

**Part 2 Materials and welding**  
**Chapter 2 Metallic materials**



RULES FOR CLASSIFICATION

**Ships**

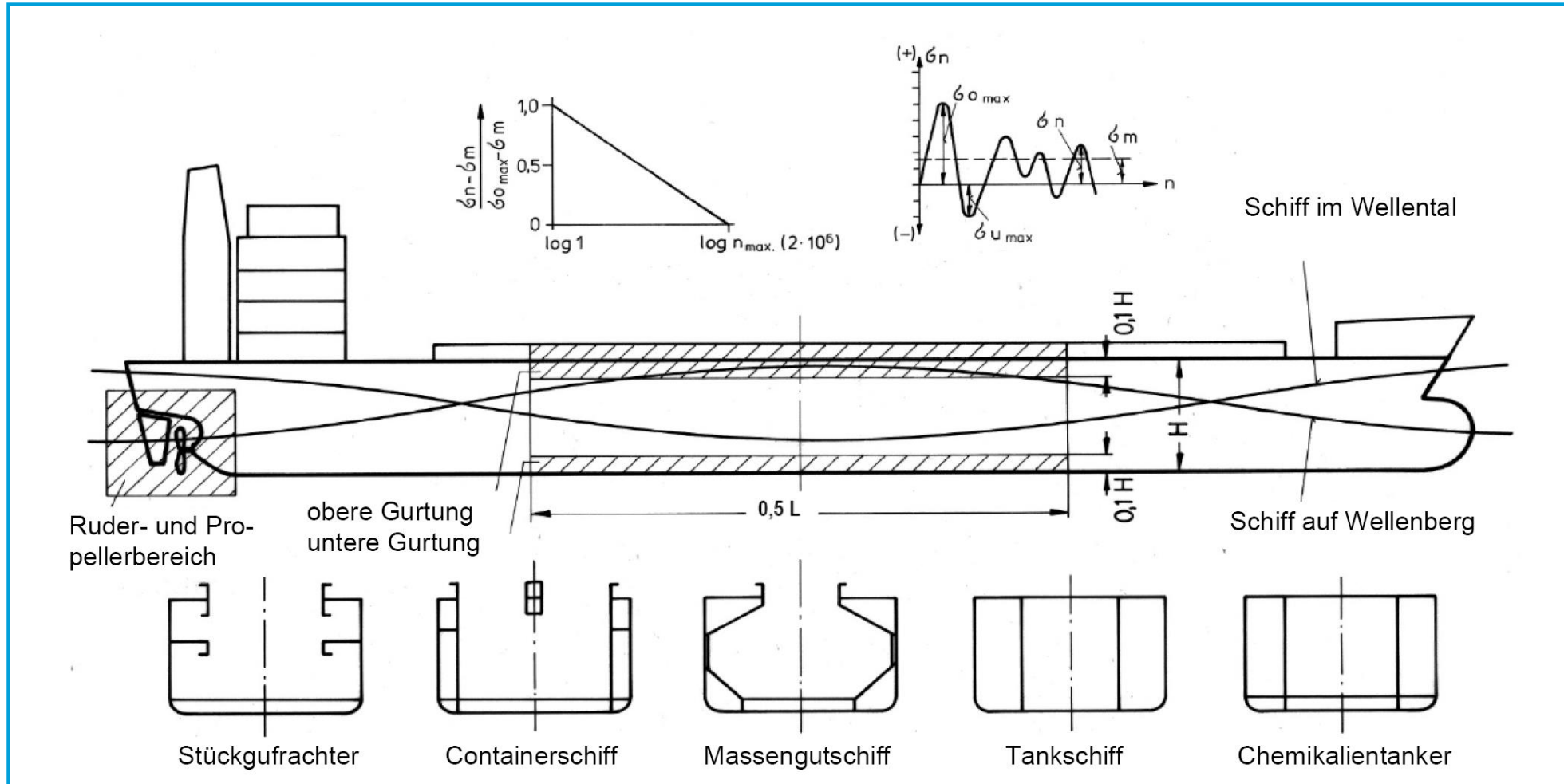
Edition July 2021

**Part 2 Materials and welding**  
**Chapter 4 Fabrication and testing**

# Schiffe in schwerer See



# Beanspruchung des Schiffskörpers





# Klassifikations- und Bauvorschriften

## Rules for classification: Ships (RU-SHIP)

- + Part 1 General regulations
- + Part 2 Materials and welding
- + Part 3 Hull
- + Part 4 Systems and components
- + Part 5 Ship types
- + Part 6 Additional class notations
- + Part 7 Fleet in service
- + CSR IACS common structural rules

Rules for classification: General (RU-GEN) >

Rules for classification: Ships (RU-SHIP) >

Rules for classification: High speed and light craft (RU-HSLC) >

Rules for classification: Inland navigation vessels (RU-INV) >

Rules for classification: Yachts (RU-YACHT) >

Rules for classification: Underwater technology (RU-UWT) >

Rules for classification: Naval vessels (RU-NAV) >

Rules for classification: Naval vessels (RU-NAVAL) >

Rules for classification: Floating docks (RU-FD) >

Rules for classification: Offshore units (RU-OU) >

Offshore standards (OS) >

Class guidelines (CG) >

Class programmes (CP) >

Statutory interpretations (SI) >

Service specifications (SE) >

Standards (ST) >

Recommended practices (RP) >

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# Additive Fertigung: DNV Strategie seit 2014



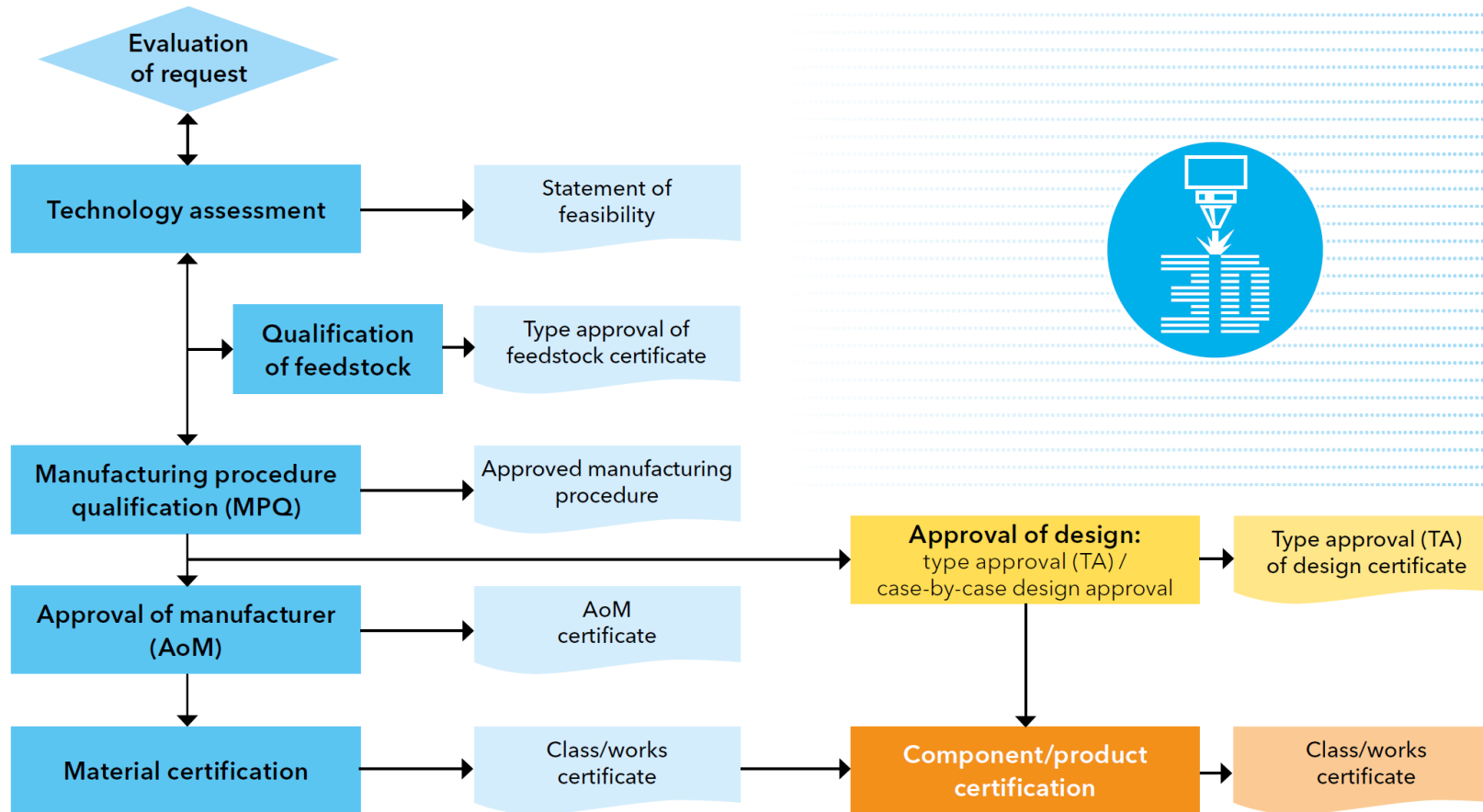


# Additive Fertigung in der Klassifikation (Maritime)

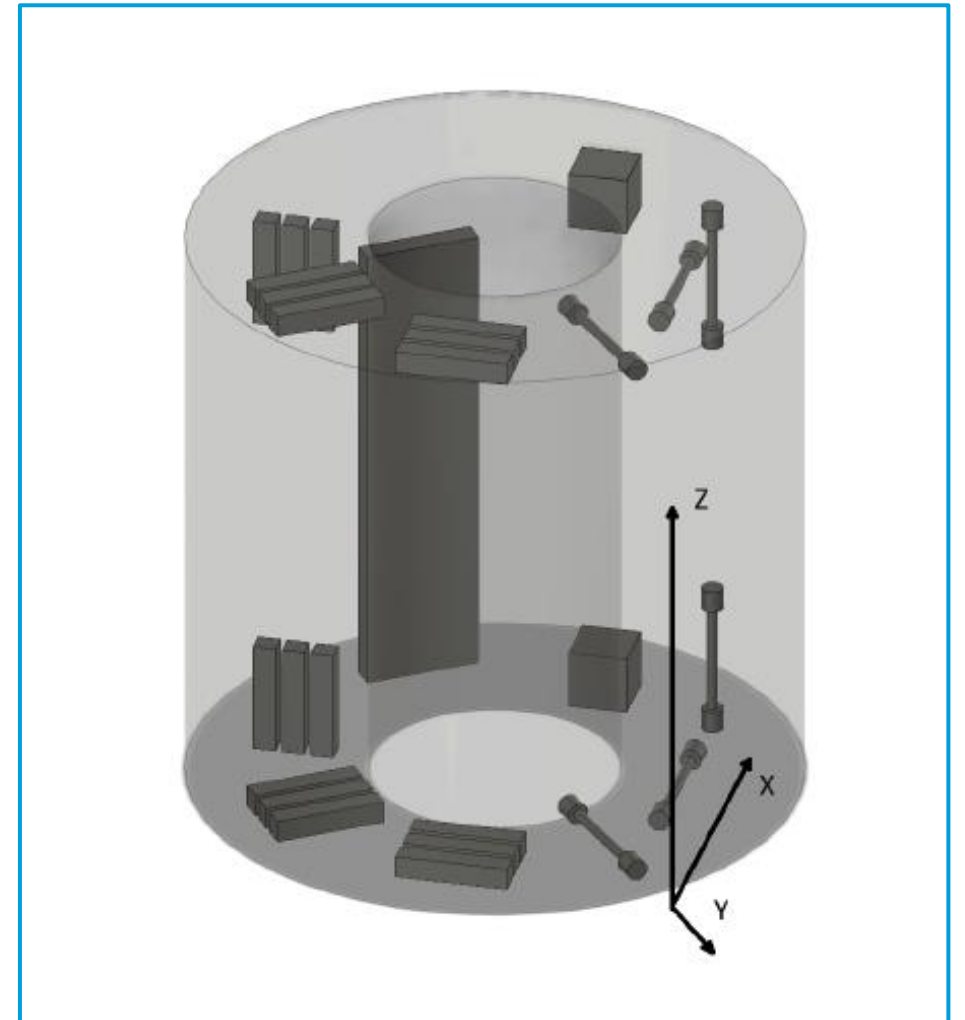
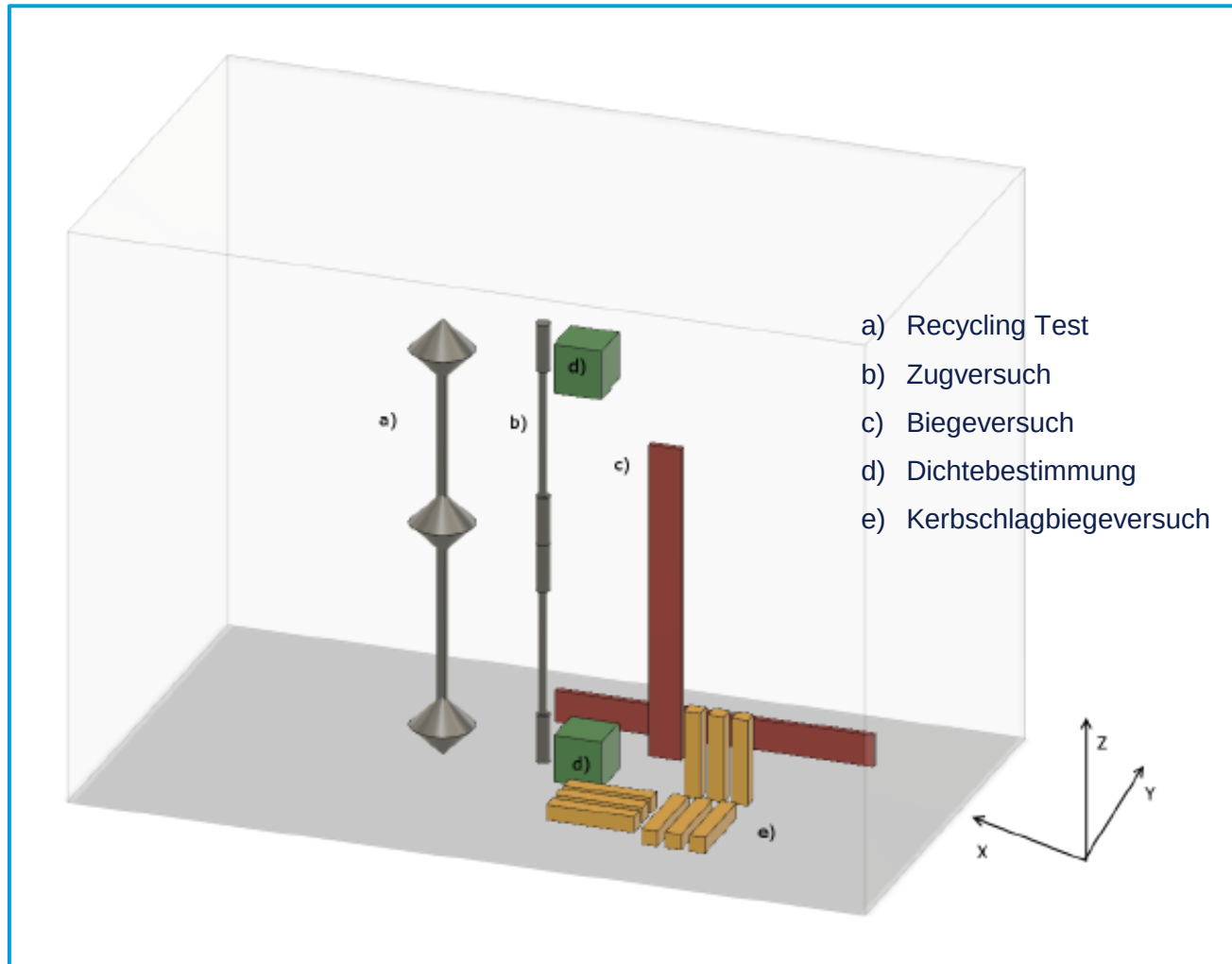


# Qualifizierung eines Herstellers (DNV-CP-0267)

Certification pathway for AM (3D printing)



# Testblock Beispiel-Konfigurationen (DNV-CP-0291)



# Additive Fertigung in der Industrie (Energy sector)



## STANDARD

DNV-ST-B203

Edition May 2020  
Amended September 2021

**Additive manufacturing of metallic parts**



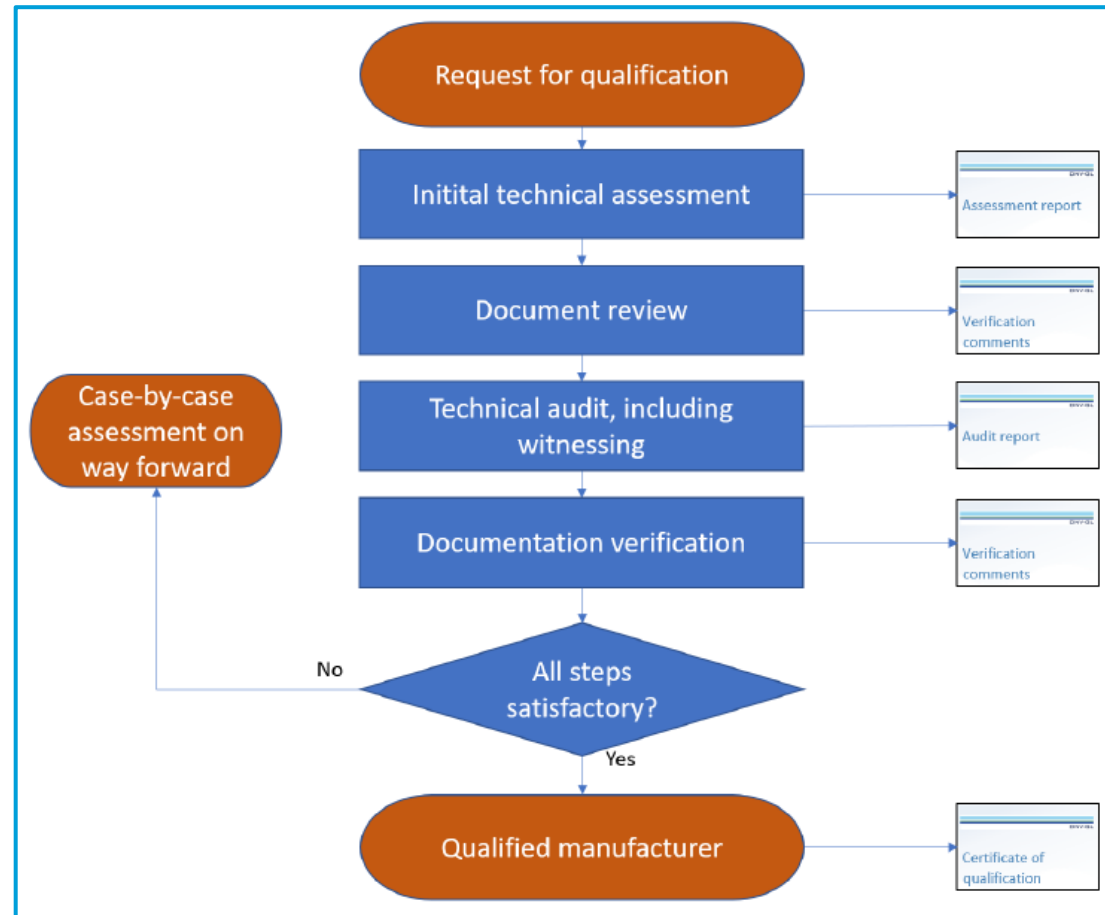
## SERVICE SPECIFICATION

DNV-SE-0568

Edition January 2021  
Amended September 2021

**Qualification of additive manufacturing  
service providers, manufacturers and parts**

# Qualifizierung eines Herstellers (DNV-SE-0568)





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# Additive Fertigung – Maritime (DNV-CP-0267)

**DNV·GL**

## APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:  
**AMMM0000239**  
Revision No:  
**1**

This is to certify:

That  
**thyssenkrupp Marine Systems GmbH,**  
**TechCenter Additive Manufacturing**  
**Sommerfeld 22-28,**  
**45481 Mülheim an der Ruhr, Germany**

is an approved manufacturer of

**Additive Manufactured Metallic Materials**

in accordance with

**DNV GL rules for classification: Ships (RU-SHIP) Pt.2**

**Class guideline DNV GL-CG-0197 – Additive manufacturing – qualification and certification  
process for materials and components**

**Class programme DNV GL-CP-0267 – Approval of manufacturers – Additive manufacturing**

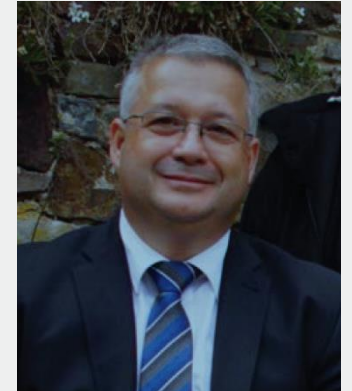
**Class programme DNV GL-CP-0346 – Approval of manufacturers – DNV GL approval of  
manufacturer scheme**

and the following particulars:

# Additive Fertigung – Maritime (DNV-CP-0291)

|                                                                                                                                                               |                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
|                                                                              | Certificate No:<br><b>TAW00004ZZ</b>                          |
| <b>TYPE APPROVAL CERTIFICATE</b>                                                                                                                              |                                                               |
| <hr/>                                                                                                                                                         |                                                               |
| This is to certify:                                                                                                                                           |                                                               |
| <hr/>                                                                                                                                                         |                                                               |
| That the feedstock / gas combination                                                                                                                          |                                                               |
| with trade name<br>3Dprint AM 70 / I1                                                                                                                         |                                                               |
| Manufacturer<br><b>voestalpine Böhler Welding Germany GmbH</b><br>Hamm, Germany                                                                               |                                                               |
| is found to comply with<br>DNV GL rules for classification – Ships<br>DNV GL class programme DNVGL-CP-0291 – Type approval – Additive manufacturing feedstock |                                                               |
| with this approval                                                                                                                                            |                                                               |
| Grade                                                                                                                                                         | VL F-AM-SR-D690                                               |
| Current                                                                                                                                                       | DC (-)                                                        |
| Approved diameter                                                                                                                                             | 1,0 - 1,2 mm                                                  |
| Positions                                                                                                                                                     | PA (1G)                                                       |
| Remarks                                                                                                                                                       | Plasma WAAM of solid wire, deposited metal min. 47J at -20°C. |
| Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.                                                       |                                                               |

# Vielen Dank für Ihre Aufmerksamkeit!



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