



TUBELOCK – TUBULAR TRANSPORT & RUNNING SYSTEM

Design Verification Report

Global Gravity ApS

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Objective:

Conduct design verification of the Global Gravity TubeLock system.

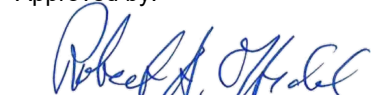
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1 EXECUTIVE SUMMARY

On request from Global Gravity ApS, DNV has performed design verification of the TubeLock Tubular Transport and Running system. The scope includes review of technical documents concerning structural design of the equipment referred to. Additionally, the equipment has previously received type approval certification. This design verification has thus been focusing on the alterations that have been conducted to the system since the type approval certificate was issued in 2021 and further reassessed in 2024. The main standard for verification is NORSOK R-002:2017+AC:2019, "Lifting Equipment", Annex C – Group R5 – Spreader and special design. The verification has been carried out by DNV in accordance with the methodology defined in DNV-SE-0480, applying the Medium Level of Verification, ref. Table B-4.

The TubeLock system is a tubular handling system, manufactured to provide means of transportation and storage of tubulars, on shore, in transit on road or at sea, from shore to vessel, vessel to platforms and onboard platforms.

Design of the TubeLock system is found to comply with the acceptance criteria listed in chapter 4, under the limitations given in chapter 3 and verification comments listed in chapter 6 of this report.

2 DESIGN SPECIFICATIONS

Manufacturer:	Global Gravity ApS
Categorization:	Annex C-Group R5 "Spreader and special design" (Annex F-group F5 "Lifted object" used in design)
Design Temperature:	-20°C
WLL lifting system:	9 tonnes
DAF:	2.056
DF (Structure):	1.48
Longitudinal sling angle:	66°
Transverse sling angle:	60°
Maximum Inclination (self supported / grounded, not suspended from crane or in any other way lifted or lashed):	25°

3 OBJECTS VERIFIED

The system can be configured from the following lifting components/accessories:

Accessory¹	Product description		Operational limitations	
	Description	Reference document	SWL^{2,3,4}	Max. DAF
Lifting poles	Length range 570 – 1270mm	DS-LP-H-Product program	2.25t	2.056
⁵Lifting beams TL-Profiles 900 - H profiles	⁵fit for pipes diameter range 273,1– 355,6mm	⁵Product Program: TL-Profile 0900	4.5t	
Lifting beams TL-Profiles 1000 - H profiles	fit for pipes diameter range 88.9- 406.4mm	Product Program: TL-Profile 1000		
Lifting beams TL-Profiles 1200 - H profiles	fit for pipes diameter range 60.3- 508,0mm	Product Program: TL-Profile 1200		

1) The above listed lifting accessories are approved as individual items. For identification of all TubeLock assemblies' configurations (combinations between the lifting poles and the lifting beams) covered by this Design verification see TL-TU-Combination-0001 Rev. 6. The accessories shall be used in according to latest version of the TubeLock user manual (TubeLock user manual (UK) Rev.10). Combined lifting accessories shall be within the measurement's tolerances stipulated on drawing T-0001-000-GG-X-0004 Rev. A.

2) SWL = Safe Working Load

3) See Lifting arrangement drawing no. T-0001-0000-GG-X-0003 Rev. B for description of the lifting configurations covered by this Design verification.

- No. of slings per lifting assembly: 4
- Max sling angle to vertical (in plane with the padeyes): 24 deg

4) The lifting system SWL = 9 t (for the TubeLock assembly as shown in the Lifting arrangement drawing no. T-0001-0000-GG-X-0003 Rev. B taking in consideration max. sling angle to vertical).

5) Range included in earlier Type approval certificate but voided as per. customer feedback for 2026 Design verification (i.e. relevant for this DVR).



4 LIMITATIONS

1. This Design verification has a restricted validity of five – 5 – years, from the date of issuance of this report.
2. This Design verification only covers the design of the equipment.
3. This Design verification is based on the assumption that the lateral load (which attempts to close the distance between the tubular frames) is resisted by the friction developed between the frames and the tubular payload. This verification is based on a min coefficient of friction 0.3 (this has been provided by the manufacturer and has not been assessed by DNV).
4. The structural integrity of the tubular payload has not been part of this verification.
5. The design of lifting set (hook, slings, shackle) is not covered by this verification.
6. Verification is based on existing Type Approval Certificate no. BGN21-9488 and TAS00002TR Rev.2
7. The system is valid for tube size covered by existing Type Approval Certificate no. BGN21-9488 and TAS00002TR Rev.2. Design not covered by these 2 Type Approval Certificates shall be subject of new Design verification.
8. Should the product be altered or should a new edition of the standard referenced in chapter 7 be published that requires changes to the product, this DVR shall be considered invalid.
9. This piece of work is conducted as a design verification only and no field work or surveys have been conducted as a part of this work. Further certification depends on the intended area and location of use. For ILO and NORSOK certification, the applicable standards, requirements, and local regulations shall be followed. If the lifting equipment is to be used in accordance with NORSOK R-003N:2017, NORSOK R-005, or in areas subject to these standards, additional certification by Enterprise of Competence shall be carried out. See also chapter 5, item 4 and 5.

5 FINDINGS

1. Each pipe size can be delivered with different wall thickness; hence weight of elementary pipe cannot be exactly defined. The operator is responsible to check that the total weight of the system in assembly will not be higher than WLL. This may require limiting the number of pipes.
2. Position of COG shall be right below the lifting point. The operator is to ensure that no transverse COG repositioning occurs due to payload positioning within the system.
3. Any components attached to lifting accessories which may be subjected to vibrations or impacts from contact with other objects during operation, shall be analyzed with respect to the hazard of falling objects. If such hazard is unacceptable, the components shall be secured with a double physical barrier against detachment as required by NORSOK R-002, 5.4.8. Pins which can be easily detached shall not be used (for example Safety Pin Ø4mm, 7.2 Assembly Frame component overview - TubeLock® User manual, Rev. 10).
4. As no survey or field work was conducted during this piece of work, the FAT procedure for the equipment and relevant vendor documentation, ref. DNV-SE-0480, table B-4, items 22 and 24, were not reviewed. See also chapter 4, item 9.
5. Maintenance instructions shall be supplied with every supplied product unit, as per NORSOK R-002 chapter 5.25.3 and 4.9. DNV has not reviewed the maintenance instructions as they have not been included in the information reviewed. See also chapter 4, item 9.

6 COMMENTS

1. It is the responsibility of the manufacturer to ensure that both design and production are in compliance with Rules, Standards and/or Regulations listed in chapter 7 of this Design verification.
2. It is the end user's responsibility to ensure that the systems are assembled and used as per manufacturer's user instructions in the TubeLock - User manual Rev. 10 and Lifting arrangement drawing no. T-0001-0000-GG-X-0003 Rev. B.
3. The testing of the TubeLock accessory and assembly shall be performed in accordance with Norsok R-002:2017 Annex C, group R5 - Table C.1, Table C.3, Table C.4 and the requirements in C.7.
4. The documentation issued for the product shall be in accordance with Norsok R-002:2017, Norsok R-003 N:2017 Annex E and Machinery Directive (if applicable). Each TubeLock accessory and assembly shall be marked according to Norsok R-002:2017 5.26, Annex C.4 and Norsok R-003 N:2017 Annex E.

7 ACCEPTANCE CRITERIA

The design verification has been performed as per the following standards:

Main design standard: Norsok R-002:2017+AC:2019/AC2023, "Lifting Equipment".

8 DOCUMENTATION

No	Document No	Rev.	Document title	Comment*
1	AD-0658-1200-GG-P-0001	3	TubeLock®, MODEL 1200 - 6 5/8", H-PROFILE, ASSEMBLY DRAWING	Ex
2	B-0001-0000-GG-P-0009	3	TubeLock®, PADEYE, PART DRAWING	Ex
3	DS-0000-0000-GG-X-0001	7	TubeLock - Product overview	Ec
4	DS-1000-H-PRODUCT PROGRAM	1	PRODUCT PROGRAM: TL-PROFILE - 1000	Ex
5	DS-1200-H-PRODUCT PROGRAM	2	PRODUCT PROGRAM: TL-PROFILE - 1200	Ex
6	DS-LP-H-PRODUCT PROGRAM	1	PRODUCT PROGRAM: LIFTING POLE	Ex
7	GG-01-RA-00005	B	Calculation Documentation – DNVGL	Fi
8	GG-01-RA-00007	A	Calculation documentation – DNV	Fi

9	GG-01-RA-00006	A	Calculation documentation – NORSOK	Fi
10	T-0001-0000-GG-X-0001	A	TubeLock®, H-PROFILE, DESIGN RULES	Ex
11	T-0001-0000-GG-X-0002	A	TubeLock®, LIFTING POLE, DESIGN RULES	Ex
12	T-0001-0000-GG-X-0003	B	TubeLock®, SLING AND PROFILE PLACEMENT, DESIGN RULES	Ex
13	T-0001-0000-GG-X-0004	A	TubeLock®, PACKAGE DIMENSIONS, DESIGN RULES	Ex
14	T-0001-0000-GG-X-0005	B	TubeLock®, PACKAGES WITH EMPTY SPACES, DESIGN RULES	Ex
15	T-0001-0000-GG-X-0006	B	TubeLock®, TRANSPORTATION OF SHORT PIPES, DESIGN RULES	Ex
16	T-0001-0000-GG-X-0007	C	TubeLock®, BOLT PLACEMENT, DESIGN RULES	Ex
17	T-0001-0000-GG-X-0008	B	TUBELOCK®, INFO DRAWING, NDT DRAWING	Ex
18	T-0001-0000-GG-X-0009	A	LOADTEST PROCEDURE	Ex
19	T-0001-0000-GG-X-0010	A	LOAD TEST PROCEDURE	Ex
20	TAC BGN21-9488 Signed	2	TYPE APPROVAL CERTIFICATE	Fi
21	TAS00002TR	2	TYPE APPROVAL CERTIFICATE	Fi
22	TL Type approval TAC BGN21-9488_MDR	A	Manufacturers Document Records	Ex
23	TL-0658-1200-GG-P-0001	B	TubeLock®, PRODUCT, 0658TU-1200	Ex
24	TubeLock® - User manual (UK)	09	TUBELOCK® USER MANUAL	Ex
25	TubeLock® - User manual	10	TUBELOCK® USER MANUAL	Ex
26	WD-000F-00AG-GG-P-0001	5	TubeLock®, LIFTING POLE – SILVER, TYPE F, WELDING DRAWING	Ex



27	WD-0658-1200-GG-P-0001	2	TubeLock®, MODEL 1200 - 6 5/8", H-PROFILE, WELDING DRAWING	Ex
28	GLOBAL GRAVITY Tubelock® Risk Assessment	1	MD Risk Assessment 06-03-2026	Ex
29	GG 131-01	0	Welding Procedure Specification	Fi
30	GG 131-02	0	Welding Procedure Specification	Fi
31	GG 135-01	0	Welding Procedure Specification	Fi
32	GG 141-01	0	Welding Procedure Specification	Fi
33	GG 141-02	0	Welding Procedure Specification	Fi

* FI – For information, Ex – Examined

9 CONCLUSION

The design of the TubeLock system, as specified in chapter 3 of this report, is found to comply with the acceptance criteria listed in chapter 7, under the limitations given in chapter 4, provided that the findings and comments in chapters 5 and 6 are adhered to.



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