

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Lifting set for Offshore containers and Portable Offshore Units

with type designation(s)

Standard shackles type GL 834 D

Standard shackles type GL 835 D

Standard shackles type GL 854 H

Standard shackles type GL 855 H

Arctic shackles type GL 856 H

Issued to

Gunnebo-Anja Industrier AS
LONEVÅG, Norway

is found to comply with

DNV GL standard DNVGL-ST-E271 – 2.7-1 Offshore containers, August 2017

DNV GL standard DNVGL-ST-E273 – 2.7-3 Portable offshore units, December 2016

EN 12079-2 Offshore containers and associated lifting sets – Part 2: Lifting sets Design, manufacture and marking

IMO/MSC Circular 860

EN 13889 Forged steel shackles for general lifting purposes - Dee shackles and Bow shackles - Grade 6 - Safety

Application :

Shackles for Lifting Sets for Offshore Containers and Portable Offshore Units

Issued at **Høvik** on **2018-01-24**

This Certificate is valid until **2022-12-30**.

for **DNV GL**

DNV GL local station: **Bergen**

Approval Engineer: **Nina Thorvaldsen Moberg**

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Inger-Helene Hals
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.



Manufactured by

Componentets are manufactured by Gunnebo Anja Industrier AS, and in accordance with document "Overview subcontractor/ manufacturer GL shackles" dated 2017-12-18.

Gunnebo Anja Industrier AS takes responsibility that both design and production are in compliance with the Rules, Standards and/or Regulations listed on page 1 of this Type Approval Certificate.

Product description

This Type Approval Certificate replaces certificate No. S-7601.

Shackles for use in Lifting Sets for Offshore Containers certified to DNVGL-ST-E271 standard DNV GL 2.7-1 Offshore Containers (DNV GL 2.7-1) or Portable Offshore Units approved according to DNVGL-ST-E273 Standard 2.7-3 Portable Offshore Units (DNV GL 2.7-3):

- Type GL 834 (Screw pin shackle)
- Type GL 835
- Type GL 854 (Screw pin shackle)
- Type GL 855
- Type GL 856 (Grade 8)

Detailed product information and range of certified products covered by this Type Approval are listed in Appendix 1 of this Type Approval Certificate.

Application/Limitation

For application of shackles the minimum shackle working load limit (WLL_s) shall be decided according to the strength requirements for lifting sets on offshore containers as given in DNV GL 2.7-1, Section 8.

All production testing to be according to DNV GL 2.7-1 and EN 13889 in agreement with the DNV GL surveyor. Material to be impact tested by Charpy impact method according to DNV GL 2.7-1, Section 8.4.

The manufacturer shall issue product certificates according to Section 8.5 in DNV 2.7-1, using the certificate form no. GL form. TA 1-1 rev 2 as listed below. This certificate form is only to be used for slings certified according to this Type approval Certificate.

For replacing and repair of lifting sets on Offshore Containers certified according to the 1989 and 1995 editions of DNV 2.7-1, please follow the procedure as given in Appendix 2 of this Type Approval Certificate.

Screw pin shackles, Type GL 834 and Type GL 854, may only be used on existing containers where location and design of pad eyes are such that it is not possible to use shackles with nut and split pins. They should be secured to prevent unintentional withdrawal.

Application of shackles certified according to DNV 2.7-3:

Prior to selection of shackles the minimum required shackle working load limit (WLL) shall be decided according to the strength requirements for lifting sets on portable offshore units as given in DNV GL 2.7-3, Section 7.3.3. Resulting sling force (RSF) can be found in the Design Verification Report (DVR) issued by DNV GL for the Portable Offshore Unit. The DVR shall be available for the shackle manufacturer.

If a shackle can experience significant out-of-plane loading, then the shackle WLL shall be de-rated in accordance with DNV GL 2.7-3, Section 7.3.3.



Job Id: **262.1-006775-7**
Certificate No: **TAS00001B8**

Type Approval documentation



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Tests carried out

Prototype tests according to DNV GL 2.7-1 and EN 13889.

Marking of product

Marking should be according to DNV GL 2.7-1, Section 8, EN 13889 and marking documentation received from Gunnebo-Anja Industrier AS.

Periodical assessment

For retention of the Type Approval, a DNV GL surveyor shall perform a survey every 6 months and before the expiry date of this certificate to verify that the type approval is complied with.

END OF CERTIFICATE

Appendix 1

Product description and details

Dee shackle with screw pin

T_D= -20°C Grade 6				
Type	Nom. Size bow	WLL [t]	MPF *) [kN]	Min. BF*) [kN]
834	5/8"	3,25	65	195
834	3/4"	4,75	95	285
834	7/8"	6,5	130	390
834	1"	8,5	170	510
834	1 1/8"	9,5	190	570
834	1 1/4"	12,0	240	720
834	1 3/8"	13,5	270	810
834	1 1/2"	17,0	340	1020
834	1 3/4"	25,0	500	1500
834	2"	35,0	686,8	1717
834	2 1/4"	42,5	834,0	2085
834	2 1/2"	55,0	1079,2	2698

Dee shackle with safety bolt

T_D= -20°C Grade 6				
Type	Nom. size bow	WLL [t]	MPF *) [kN]	Min. BF*) [kN]
835	5/8"	3,25	65	195
835	3/4"	4,75	95	285
835	7/8"	6,5	130	390
835	1"	8,5	170	510
835	1 1/8"	9,5	190	570
835	1 1/4"	12,0	240	720
835	1 3/8"	13,5	270	810
835	1 1/2"	17,0	340	1020
835	1 3/4"	25,0	500	1500
835	2"	35,0	686,8	1717
835	2 1/4"	42,5	834,0	2085
835	2 1/2"	55,0	1079,2	2698

Bow shackles with screw pin

T_D= -20°C Grade 6				
Type	Nom. Size bow	WLL [t]	MPF *) [kN]	Min. BF*) [kN]
854	5/8"	3,25	65	195
854	3/4"	4,75	95	285
854	7/8"	6,5	130	390
854	1"	8,5	170	510
854	1 1/8"	9,5	190	570
854	1 1/4"	12,0	240	720
854	1 3/8"	13,5	270	810
854	1 1/2"	17,0	340	1020
854	1 3/4"	25,0	500	1500
854	2"	35,0	686,8	1717
854	2 1/4"	42,5	834,0	2085
854	2 1/2"	55,0	1079,2	2698

Bow shackle with safety bolt

T_D= -20°C Grade 6				
Type	Nom. size bow	WLL [t]	MPF *) [kN]	Min. BF*) [kN]
855	1/2"	2,0	40	120
855	5/8"	3,25	65	195
855	3/4"	4,75	95	285
855	7/8"	6,5	130	390
855	1"	8,5	170	510
855	1 1/8"	9,5	190	570
855	1 1/4"	12,0	240	720
855	1 3/8"	13,5	270	810
855	1 1/2"	17,0	340	1020
855	1 3/4"	25,0	500	1500
855	2"	35,0	686,8	1717
855	2 1/4"	42,5	834,0	2085
855	2 1/2"	55,0	1079,2	2698
855	3	85,0	1667,7	4169

Bow shackle with safety bolt

T_D= -40°C Grade 8				
Type	Nom. size bow	WLL [t]	MPF *) [kN]	Min. BF*) [kN]
856	1/2"	2,0	40	160
856	5/8"	3,25	65	260
856	3/4"	4,75	95	380
856	7/8"	6,5	130	510
856	1"	8,5	170	616
856	1 1/8"	9,5	190	659
856	1 1/4"	12,0	240	768
856	1 3/8"	13,5	270	824
856	1 1/2"	17,0	340	1020
856	1 3/4"	25,0	500	1500
856	2"	35,0	686,8	1717
856	2 1/2"	55,0	1079,2	2698
856	3	85,0	1667,7	4169

*) Manufacturing Proof Force and Minimum Breaking Force as tested by Gunnebo Anja Industrier AS.

Appendix 2

On offshore containers certified according to the 1989 and 1995 editions of DNV 2.7-1 the dimensioning of shackles was based on the breaking strength. On some containers both the diameter of the shackle pin hole and the location of the padeye may not allow the use of larger shackles.

Where existing pad eye on the Offshore Container does not fit with the required shackle dimension, application of shackles should be as follows:

Minimum required breaking force, BF_{min} (kN), for shackles should be calculated according to the following formula:

$$BF_{min} = \frac{R \cdot g}{1000 \cdot (n - 1) \cdot \cos(v)} \cdot SF$$

where:

R = Rating

g = Standard acceleration of gravity ($\sim 9,81 \text{ m/s}^2$)

n = Number of legs

v = The angle of sling leg from vertical

SF = Safety Factor (table 2), between given values the SF can be found by linear interpolation

The shackle should have a $BF \geq BF_{min}$. The applicable BF for shackle type 856 according to DNV 2.7-1 (1995), can be found in table 1.

For wire rope lifting sets, if not possible to fit the shackle in the wire leg eye, it is acceptable to fit an intermediate link between the leg and the shackle, with a $WLL \geq WLL_{min}$ as calculated for the leg according to DNV 2.7-1 Offshore Containers, chapter 8, see figure 1.

Table 1

Nom. size bow	MPF*) [kN]	BF*) [kN]
1/2"	62,8	157,0
5/8"	102,0	255,1
3/4"	149,1	372,8
7/8"	200,1	500,3
1"	242,3	604,3
1 1/8"	259,0	646,5
1 1/4"	301,2	753,4
1 3/8"	322,7	808,3
1 1/2"	400,2	1000,6
1 3/4"	588,6	1471,5

Table 2

Rating, R (kg)	Safety Factor (SF)
≤ 6000	8,0
10000	6,8
15000	5,8
20000	5,2
25000	5,0

*) Tested Breaking Force and Manufacturing Proof Force based on manufacturer's factor of safety, for Gunnebo-Anja shackles Type 856.

Figure 1

