



# DET NORSKE VERITAS

## TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. S-5623

This Certificate consists of 5 pages

*This is to certify that the*  
**Lifting Sets for Offshore Containers**

*with type designation(s)*  
**Green Pin Standard and Green Pin Polar shackles**

*Manufactured by*  
**Van Beest B.V.**  
SLIEDRECHT, Netherlands

*is found to comply with*  
*DNV 2.7-1 Offshore Containers*  
*EN 12079-2 Offshore containers and associated lifting sets Part 2:*  
*Lifting sets Design, manufacture and marking*  
*EN 13889 Forged steel shackles for general lifting purposes -*  
*- Dee shackles and Bow shackles - Grade 6 - Safety*  
*IMO/MSC Circular 860*  
*Federal Specification Chains and Attachments, welded and weldless, RR-C-271D*

*Application*  
Shackles for Lifting Sets for Offshore Containers

*Place and date*  
Høvik, 2009-03-25  
for DET NORSKE VERITAS AS



*This Certificate is valid until*  
2013-06-30

*Dag Steens*  
for Marianne Strand Valderhaug  
Head of Section

*Local Office*  
DNV Rotterdam

*Tomasz Sarnowski*  
Tomasz Sarnowski  
Surveyor

**Notice: 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.**

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



Cert. No.: S-4208  
File No.: 911.53  
Case No.: 262.1-006591-1

## Product description

Shackles for use in Lifting Sets for Offshore Containers certified to DNV 2.7-1 Offshore Containers:

- Green Pin Standard dee and bow shackles with screw collar pin, Type G-4151 and G-4161
- Green Pin Standard dee and bow shackles with safety bolt, Type G-4153 and G-4163
- Green Pin Polar dee and bow shackles with safety bolt, Type G-5153 and G-5163

With the following exemptions from the EN13889 for the Green Pin Polar shackles, dee and bow shackles with safety bolt, Type G-5153 and G-5163:

- Green Pin Polar shackles, Type G-5153 and G-5163 are manufactured to Grade 8 strength.
- Green Pin Polar shackles, Type G-5153 and G-5163 are approved for use up to  $-40^{\circ}\text{C}$ .

Dimensions of shackles are in compliance with Federal Specification Chains and Attachments, welded and weldless, RR-C-271D.

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 2.7-1 Offshore Containers, Chapter 8.

Shackles shall be of bolt type with hexagon nut and split pin. Screw pin shackles shall not be used. However, 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, screw pin shackles may be used. They should be secured to prevent unintentional withdrawal.

Tests to be carried out:

- Production testing: According to DNV 2.7-1 Offshore Containers and EN standard EN 13889 "Forged steel shackles for general lifting purposes - Dee shackles and Bow shackles - Grade 6 - Safety" in agreement with the DNV surveyor.
- Material to be impact tested by Charpy impact method according to DNV 2.7-1 Offshore Containers, Chapter 8.4.

Products manufactured according to this TA shall be inspected by a DNV surveyor, and in addition the DNV surveyor shall witness the production testing and issue DNV certificates for each batch, according to DNV 2.7-1 Offshore Containers, Chapter 8 and Appendix K. Alternatively, based on a Manufacturing Survey Arrangement (MSA) with DNV, the certificates may be issued by the manufacturer according to DNV 2.7-1 Offshore Containers, Annex 1.





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

### **Type Approval documentation**

This Type Approval Certificate is the renewal of TAC S-4208.

Booklet with reference Memo\_DNV\_08, dated 2008-09-30, including:

- Quality assurance code KS-06-15A, dated 2007-10-31
- Quality assurance code KP-09-01CA, dated 2008-05-27
- Quality assurance code KS-06-05M, dated 2007-03-10
- Quality assurance code KS-06-06 L, dated 2005-12-23
- Quality assurance code KS-06-08G, dated 2007-12-10
- Quality assurance code KS-06-14E, dated 2004-04-20
- Kwaliteitszorg systeem code KS-06-106A, dated 2008-02-14
- Drawings no. 2255 Rev B, 2256 Rev C, 2257 Rev B, 2258 Rev. B "Overall max. shackle dimensions"
- Drawings no. 2218 – 2219 Rev. C, "Dimensions of hexagon nuts"
- Quality Management System Certificate

Test report No. ROT 04.4133.1 endorsed by DNV Rotterdam dated 2004-09-28.

### **Tests carried out**

Prototype tests according to test reports.

### **Marking of product**

Marking should be according to DNV 2.7-1 Offshore Containers, Chapter 8, EN 13889 "Forged steel shackles for general lifting purposes - Dee shackles and Bow shackles - Grade 6 – Safety" and VanBeest Booklet (Memo\_DNV\_08) Section f.

### **Certificate retention survey**

As agreed with the local DNV office, but intervals not to exceed 4 years.

END OF CERTIFICATE





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## Appendix 1

### Product description and details

#### Grade 6 Green Pin Standard dee and bow shackles with screw collar pin:\*)

Type	Nom. size [mm]	SF <sup>**)</sup>	WLL [t]	MPF <sup>***)</sup> [kN]	Min. BF <sup>***)</sup> [kN]
G-4151 and G-4161	13,5	6	2,0	39,2	98,1
G-4151 and G-4161	16	6	3,25	63,8	160
G-4151 and G-4161	19	6	4,75	93,2	233
G-4151 and G-4161	22	6	6,5	127,5	319
G-4151 and G-4161	25	6	8,5	166,8	417
G-4151 and G-4161	28	6	9,5	186,4	466
G-4151 and G-4161	32	6	12,0	235,4	589
G-4151 and G-4161	35	6	13,5	264,9	662
G-4151 and G-4161	38	6	17,0	333,5	834
G-4151 and G-4161	45	6	25,0	490,5	1226
G-4151 and G-4161	50	6	35,0	686,8	1717
G-4151 and G-4161	57	6	42,5	834,0	2085
G-4151 and G-4161	65	6	55,0	1079,2	2698

#### Grade 6 Green Pin Standard and Grade 8 Green Pin Polar Shackles, dee and bow with safety bolt:

Type	Nom. size [mm]	SF <sup>**)</sup>	WLL [t]	MPF <sup>***)</sup> [kN]	Min. BF <sup>***)</sup> [kN]
G-4153, G-4163, G-5153 and G-5163	13,5	6	2,0	39,2	98,1
G-4153, G-4163, G-5153 and G-5163	16	6	3,25	63,8	160
G-4153, G-4163, G-5153 and G-5163	19	6	4,75	93,2	233
G-4153, G-4163, G-5153 and G-5163	22	6	6,5	127,5	319
G-4153, G-4163, G-5153 and G-5163	25	6	8,5	166,8	417
G-4153, G-4163, G-5153 and G-5163	28	6	9,5	186,4	466
G-4153, G-4163, G-5153 and G-5163	32	6	12,0	235,4	589
G-4153, G-4163, G-5153 and G-5163	35	6	13,5	264,9	662
G-4153, G-4163, G-5153 and G-5163	38	6	17,0	333,5	834
G-4153, G-4163, G-5153 and G-5163	45	6	25,0	490,5	1226
G-4153, G-4163, G-5153 and G-5163	50	6	35,0	686,8	1717
G-4153 and G-4163	57	6	42,5	834,0	2085
G-4153, G-4163, G-5153 and G-5163	65	6	55,0	1079,2	2698
G-4153, G-4163, G-5153 and G-5163	75	6	85,0	1667,7	4169

\*) Regarding screw pin shackles, see Application/Limitations

\*\*\*) Manufacturers factor of safety against breaking

\*\*\*\*) Manufacturing Proof Force and Minimum Breaking Force according to EN 13889





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## 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  $BF \geq BF_{min}$ , where the applicable BF, 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 [mm]	MPF <sup>*)</sup> [kN]	BF <sup>*)</sup> [kN]
13,5	47,1	117,7
16	76,5	191,3
19	111,8	279,6
22	153,0	382,6
25	200,1	500,3
28	223,7	559,2
32	282,5	706,3
35	317,8	794,6
38	400,2	1000,6
45	588,6	1471,5
50	824,0	2060,1
57	1000,6	2501,6
65	1295,0	3237,3
75	2001,2	5003,1

\*) Tested Breaking Force and Manufacturing Proof Force based on manufacturers factor of safety, for

Green Pin Standard and Polar shackles Type G-4151, G-4161, G-4153, G-4163, G-5153 and G-5163.

Table 2

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

Figure 1

