DNV·GL

Certificate No:
TAS00001BH

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Lifting set for Offshore containers and Portable Offshore Units

with type designation(s)
Wire Rope Lifting Sets for Offshore Containers and Portable Offshore Units

Issued to
Swire Oilfield Services Ltd
ABERDEEN ABERDEENSHIRE, United Kingdom

is found to comply with
DNV GL standard DNVGL-ST-E271 – 2.7-1 Offshore containers, August 2017
EN 12079-2 Offshore containers and associated lifting sets – Part 2: Lifting sets Design, manufacture and marking
DNV GL standard DNVGL-ST-E273 – 2.7-3 Portable offshore units, December 2016
EN 13414-1 Wire rope slings
IMO/MSC Circular 860

Application :

1, 2, 3 and 4 leg lifting sets, with forerunner where fitted, for lifting of:
- Offshore Containers, with Maximum Gross Mass 0 to 25000 kg,
- Portable Offshore Units.

Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.

Issued at **Aberdeen** on **2017-12-29**
This Certificate is valid until **2022-12-28**.
DNV GL local station: **Aberdeen**

Approval Engineer: **Elisabeth Legg**

for **DNV GL**

Stuart Manson
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.

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Product description

This Type Approval Certificate replaces DNV GL Type Approval Certificate No. TAS00000DE.

The Type Approval Certificate covers wire rope lifting sets from 18mm to 38mm diameter. These shall be assembled with turnback eye or Flemish Eye splice by Swire Oilfield Services Ltd, in accordance with DNVGL-ST-E271 or DNVGL-ST-E273.

The wire rope lifting sets assembled by Swire Oilfield Services Ltd consist of components from the following sub suppliers:

Component	**Sub supplier** *(DNV GL to be informed and review all new sub suppliers)*	**DNV GL TAC No.**
Master Link and Quad assembly	- Scaw South Africa (Pty) Limited - Gunnebo Industrier AB - Crosby Group LLC - Crosby Group NV - Yoke Industrial Corp.	TAS000013V TAS00000TE TAS000001V S-7895 TAS000005Z
Wire rope 1)	- Usha Martin Limited - Ropenhagen/Henrik Veder	n/a
Shackles 2)	- Van Beest BV - Crosby Group LLC - Gunnebo-Anja Industrier AS - Yoke Industrial Corp.	TAS000011V S-8357 S-8378 S-7601 S-8059
Ferrules 3)	- Talurit - Sahm Splice	n/a
Thimbles 4)	- Talurit - Sahm Splice	n/a

1) Wire ropes used in fore runner and bottom legs of lifting sets shall be 6-stranded and of type 6x19 or 6x36 and may be fibre cored or steel cored, with wire rope grades 1770 N/mm^2 or 1960 N/mm^2, in accordance to EN 12385 or equivalent.
2) Shackles are only considered part of the lifting set if captive (i.e. can not be removed after assembly of lifting set).
3) Ferrules/sleeves: According to EN 13411-3 or equivalent.
4) Thimbles: According to EN 13411-1 or equivalent.

Components should be delivered with the following certificates:

- Master Links, Quad assemblies and Shackles:	Certificates based on DNV GL Type Approval.
- Wire Ropes:	To be supplied with traceable material certificates in accordance with EN 10204, inspection certificate, type 3.1.
- Thimbles and ferrules:	To be supplied with a material certificate in accordance with EN 10204, test report, type 2.2.

Application/Limitation

For each delivered drum of wire rope, a test leg with one eye in each end to be prepared and tested to breaking. A reference should be made to the wire drum test report in each lifting set certificate where that wire is used.

All production testing should be carried out according to Swire Oilfield Services Ltd internal procedures and to be agreed with local DNV GL office.

The manufacturer shall issue product certificates in accordance with DNV GL-ST-E271 Section 8.5, using the certificate form UK-FORM-111. This certificate form is only to be used for lifting sets certified according to this Type Approval Certificate.

The WLL to be used in certificates and marked on lifting sets shall be the maximum working load limit (WLL) of the lifting set, as per the definition in DNVGL-ST-E271.

For lifting sets manufactured in accordance with DNVGL-ST-E271
Lifting sets shall be assembled according to the strength requirements described in DNVGL-ST-E271 Section 8. The angle of the sling legs from vertical should be taken into account when choosing slings. This angle should normally be 45°, but smaller angles may be used.

Special lifting sets, assembled according to the principles described in DNVGL-ST-E271 Section 8 and Appendix E, are also covered by this Type Approval. If unsymmetrical slings are to be assembled, the local DNV GL office shall be contacted for reviewing each case, unless otherwise agreed in advance.

> *Note: The sling leg is not necessarily the weakest part of the lifting set. Master Link assemblies selected for lifting sets with legs at 45° may not be suitable for lifting sets with a smaller angle.*

For lifting sets manufactured in accordance with DNVGL-ST-E273
Prior to selection of the lifting set, the minimum required working load limit (WLL) shall be calculated in accordance with the strength requirements in DNVGL-ST-E273 Section 7.3. The Resulting Sling Force (RSF) is provided in the DNV GL Design Verification Report (DVR) for the Portable Offshore Unit. The DVR should be made available for the lifting set manufacturer.

Type Approval documentation

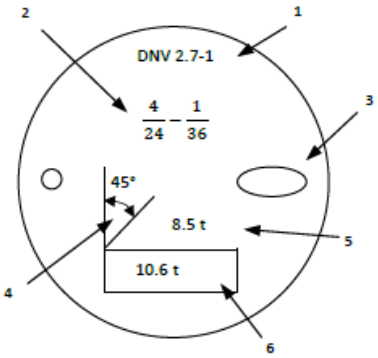
Tests carried out

Prototype breaking load test of assembled wire rope sling leg.

Marking of product

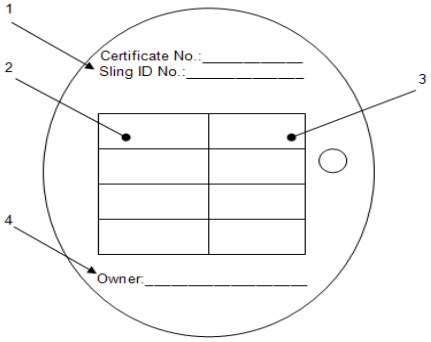
For lifting sets manufactured in accordance with DNVGL-ST-E271

Lifting sets are to be marked with certification tag, or otherwise, in accordance with DNVGL-ST-E271 Section 8, as shown below:



Example of identification tag for a wire rope sling – Front

1) Reference to DNV GL 2.7-1
2) 4 legs of 24 mm, 1 forerunner of 36 mm (example)
3) Manufacturer's mark
4) Sling angle
5) Shackle size (assemby secured)
6) WLL



Example of identification tag for a wire rope sling – Back

1) Certificate number (and unique identification number if applicable)
2) Column 1: inspector's mark, inspection suffix and date of periodic inspections (shall be of format (DD-MM-YY)
3) Column 2: shackle ID number (assembly secured)
4) Owner's name may be included, optional

For lifting sets manufactured in accordance with DNVGL-ST-E273

Each item to be marked in accordance with DNVGL-ST-E273 Section 7.6.

Periodical assessment

In order to maintain the validity of the type approval certificate, periodical assessments should be carried out every 12 months.

Appendix 1

Wire rope lifting sets with aluminium or steel ferrules assembled by Swire Oilfield Services Ltd, covered by this Type Approval Certificate:

Product Name	Applicable Standards	Material Grades	Parameter range (Multi-leg)			
			SIZE(Ø) [mm]	WLL [t]	PL [kN]	BL [kN]
Steel wire rope	EN12385-4	1960 N/mm^2	56 max for forerunner	25.0	876	2190
Link assemblies	EN1677-4	Grade 8 or 10	22/20~40/32 or equivalent	~29.2	~717	~1146
Shackles	EN13889	Grade 6 or 8	~35	~13.5	~265	~662

For any **Portable Offshore Unit** with a maximum gross weight of **over 25t**, the lifting set should be sized according to the requirements of DNVGL-ST-E273. The design of the lifting set should be approved by DNV GL.

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

Minimum required Breaking Force, BFmin (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 (~9,81 m/s^2)
n	=	Number of legs
v	=	The angle of sling leg from vertical
SF	=	Safety Factor (table 1), between given values the SF can be found by linear interpolation

The shackle should have a BF ≥ BFmin, where the applicable BF, according to DNV 2.7-1 (1995), can be found in Appendix 2 in DNV GL Type Approval Certificates for shackles, where applicable.

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 ≥ WLLmin as calculated for the leg in accordance with DNVGL-ST-E271 Section 8, see Figure 1 below.

Table 1

Rating, R (kg)	Safety Factor (SF)
≤ 6000	8.0
10000	6.8
15000	5.8
20000	5.2
25000	5.0

Figure 1

