DNV·GL

Certificate No:
TAS00001TJ

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
Dynamic Crane Service and Fabrication Inc.
Houston, TX, USA

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
ISO 10855-2:2018 Offshore containers and associated liftings sets – Part 2: Design, manufacture and testing of lifting sets
IMO/MSC Circular 860

Application :

1-, 2-, 3-, & 4-Part Lifting Sets, with Forerunner where fitted for Lifting Offshore Container and Portable Offshore Units with Maximum Gross Mass 0-25,000 kg.

Issued at **Aberdeen** on **2019-02-15**

This Certificate is valid until **2024-02-14**.
DNV GL local station: **Houston**

Approval Engineer: **Ronald Quiballo**

for **DNV GL**

for **DNV GL UK Ltd.**

This document has been digitally signed and will therefore not **have** handwritten signatures

Doig, Alex
Team Lead

Alex Doig
Team Lead

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.

Product description

This certificate covers wire rope slings, described in Appendix 1, assembled by Dynamic Crane Service and Fabrication, Inc., according to DNV GL standard DNVGL-ST-E271 – 2.7-1 Offshore Containers (DNV GL 2.7-1) and DNV GL standard DNVGL-ST-E273 – 2.7-3 Portable Offshore Units (DNV GL 2.7-3).

The wire rope slings assembled by Dynamic Crane Service and Fabrication, Inc. are to consist of components from the following sub suppliers:

Component	**Sub supplier** (DNV to be informed and review new sub suppliers)	**DNV TA Cert. number**
Master link & Quad assembly	- Gunnebo Industrier AB - Crosby Group - Yoke Industrial Group - Scaw South Africa Limited – Chain Products - Kito Chain Italia	TAS00000TE S-8016, TAS00001D6 TAS000005Z S-7732 TAS00001U6
Wire rope [1)]	- Manho Wire Rope - DSR Wire Rope - Usha Martin Limited - Kiswire - Chung Woo - Young Heung - Cosmo Wire Ltd - Celik Halat	N/A
Shackles [2)]	- Van Beest BV - Gunnebo-Anja Industrier AS - Crosby Group - Yoke Inudstrial Group	TAS000011V S-7601 S-8357, S-8378 S-8059
Ferrules [3)]	- Crosby Group - Munch Industries - ESCO - Wirop	N/A
Thimbles [4)]	- Van Beest BV - Crosby Group - GN Rope Fittings - Muncy Industries	N/A

1) Wire ropes, fore runner and bottom legs, to be used in lifting slings assembled by Dynamic Crane Service and Fabrication, Inc. to be 6x19 or 6x36, Classification Wire Rope, Bright or Drawn-Galvanized, Independent Wire Rope Core (IWRC), 1960 N/mm^2 Grade or EIPS or equivalent.
2) Only considered part of sling if captive (i.e. cannot be removed after assembly of sling).
3) Ferrules / sleeves: To be according to manufacturer's specification or equivalent.
4) Thimbles: Federal Specification FF-T-276b, Type III, 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 product certificates according to EN 10204, inspection certificate, type 3.1.
- Thimbles and ferrules: To be supplied with a material certificate to 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 mill test certificate in each sling set certificate where that wire is used.

All production testing should be done according Dynamic Crane Service and Fabrication, Inc.'s internal procedures and to be agreed with local DNV GL office.
The manufacturer shall issue product certificates according to Sec. 8.5 in DNV GL 2.7-1, using Dynamic Crane Service and Fabrication, Inc. "Dynamic Lifting Certificate for Offshore Lifting Slings" for wire rope slings.

This certificate form is only to be used for slings certified according to this Type Approval Certificate.

For slings manufactured according to DNV 2.7-1 Offshore Containers
Lifting sets shall be assembled according to the strength requirements for lifting sets on Offshore Containers as described in DNV 2.7-1 Offshore Containers, 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 can be used.

If using wire rope manufactured in US Customary Units sizes (inch) for DNV GL Type Approved lifting sets, care should be taken to ensure that the correct minimum breaking load is applied during the selection process.

Special slings, assembled according to the principles described in DNV 2.7-1 Offshore Containers, Section 8 and Appendix E, are also covered by this Type Approval. However, if unsymmetrical slings are to be assembled, local DNV GL office has to be contacted for reviewing in each case, unless otherwise is agreed with local DNV GL office.

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

The WLL to be used in certificates and marked on lifting sets shall be the maximum rating of an offshore container on which the sling can be used, at the given sling leg angle.

For slings manufactured according to DNV GL 2.7-3
Prior to selection of sling set the minimum required 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 7.3.2. The resulting sling force (RSF) can be found in the Design Verification Report (DVR) issued by DNV for the Portable Offshore Unit. The DVR shall be available for the sling manufacturer.

Type Approval documentation

Drawing No.	Rev.	Title
DNV Sling Calculator	2	DNV Sling Calculator
-	-	Dynamic Lifting Certificate for Offshore Lifting Slings
WI-810-001-A	A	Manufacturing Wire Rope Slings
WI-810-002-A	A	Proof Testing

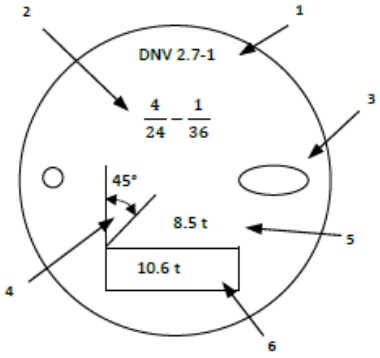
In addition the following documents are used as information for the Type Approval:
- ISO 9001 Management System Certificate No. 246083-2017-AQ-USA-ANAB, dated 24th August 2017 issued by DNV GL.

Tests carried out

Prototype tests on single leg wire rope slings, witnessed by DNV GL.

Marking of product

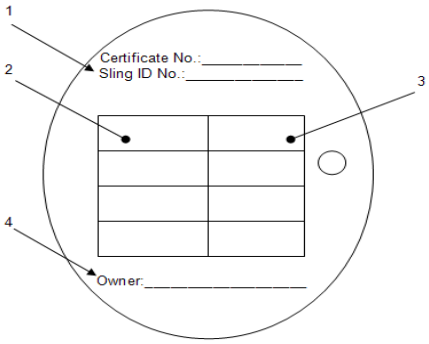
For slings manufactured according to DNV GL 2.7-1
Slings are to be marked with certification tag according to DNV GL 2.7-1 Section 8, as shown below:



Example of identification tag for a
wire rope sling – Front

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

Note 1. CE marking is only required for lifting sets supplied to the European Union market



Example of identification tag for a
wire rope sling – Back

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

For slings manufactured according to DNV GL 2.7-3
Each item to be marked according to DNV GL 2.7-3, Chapter 7.6.

Periodical assessment

In order to maintain the validity of the type approval, certificate retention surveys are to be carried out according to DNV 2.7-1. Intervals are not to exceed 6 months.

END OF CERTIFICATE

Appendix 1

Wire rope slings with steel ferrules assembled by Dynamic Crane Service and Fabrication, Inc., covered by this Type Approval Certificate:

Product Name	Applicable Standards	Material Grades	Parameter range			
			SIZE(Ø) [mm]	WLL [t]	PL [kN]	BL [kN]
Steel wire rope	API 9A or equivalent	1960/EIPS	48 max (forerunner)	25.0	620	1550
Steel wire rope	API 9A or equivalent	1960/EIPS	32 max (4-leg bridle)	25.0	285	711
Link assemblies	EN 1677-4	Grade 8	22/20~40/32 or equivalent	~28.1	~71	~112
Shackles	EN 13889	Grade 6	~35	~13.5	~27	~67.5