

# DESIGN VERIFICATION REPORT

Report No.:  
**PP098771-18U5NCA-5**  
 Rev.: 0

DNV GL PROJECT NO.: **PP098771**  
 VERIFICATION OBJECTS: **20 UNITS OF 16 CYLINDER GAS BOTTLE RACKS  
 (SERIAL NOS.: WSS10015073 – WSS10015092)**  
 OWNER: **VG OFFSHORE CONTAINERS INTERNATIONAL (M) SDN BHD**  
 MANUFACTURER: **VG OFFSHORE CONTAINERS INTERNATIONAL (M) SDN BHD**

This is to state that the above stated structures as detailed in the structural design drawings listed below have been verified. The design of the structures is regarded to be in accordance with the applicable design code/standard listed below, including meeting the minimum requirements for lifting set given in "Verification Limitations".

This design verification was based on design review of the drawings prepared and submitted by the manufacturer as well as independent checks carried out by DNV GL. The structural drawings submitted by the manufacturer are listed in this Design Verification Report.

## Applicable Codes and Standards:

- DNV Standard For Certification No. 2.7-1 Offshore Containers, June 2013.
- EN 12079-1:2006 Offshore Containers And Associated Lifting Sets.
- IMO MSC/Circ.860 Guidelines For The Approval Of Offshore Containers Handled In Open Seas.

## Design Documents Submitted for Review:

Document No.	Document Title	Rev. No.	Review Status
VG/DWG/GBR-16	General Assembly (Sheet 1 of Sheet 6)	3	Approved
VG/DWG/GBR-16	Base Assembly (Sheet 2 of Sheet 6)	3	Approved
VG/DWG/GBR-16	Side Wall Assembly (Sheet 3 of Sheet 6)	3	Approved
VG/DWG/GBR-16	Front Wall Assembly (Sheet 4 of Sheet 6)	3	Approved
VG/DWG/GBR-16	Top Assembly (Sheet 5 of Sheet 6)	3	Approved
VG/DWG/GBR-16	Sling Requirement (Sheet 6 of Sheet 6)	3	Approved

## Verification Limitations

- Dimension: 1,170 mm (L) x 1,160 mm (W) x 2,080 mm (H).
- Gross Mass = 2,500 kg.
- Tare Mass = 450 kg.
- Payload = 2,050 kg.
- Steel Materials:
  - S355J2H & EH36 (SMYS: 355MPa) or equivalent, for primary members including padeyes.
  - SS400 (SMYS: 245MPa) for secondary members.

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- The unit must be lifted with a certified lifting set with the required minimum working load limits (WLLs) listed below:
  - Required WLL of the lifting set = 7.20 tonnes (with enhancement factor = 2.880)
  - Required WLL of each of the four-leg wire rope slings at 30 deg = 2.77 tonnes
  - Required WLL of shackles = 2.77 tonnes
  - Required WLL of master link, quad assembly and forerunner = 7.20 tonnes
- The clearance between shackle pin and padeye hole should not exceed 6% of the shackle pin diameter (Minimum diameter of shackle pin = 18.8 mm).
- The padeye thickness at the hole should not be less than 75% of the inside width of the joining shackle (Maximum inside width of shackle = 33.3 mm).
- The maximum angle of sling leg from vertical is 30 degrees.
- Design temperature = -20 °C (negative 20 °C).
- NDT requirements, material requirements, testing procedures, welding procedures, steel wire ropes, shackles, master link, etc. shall be in accordance to DNV Standard for Certification No. 2.7-1; documents and records showing compliance to the code shall be submitted and reviewed by DNV GL surveyors.
- Steel for primary structures with thickness not less than 6 mm shall be tested by the Charpy Impact (V-notch) method according to DNV Rules for Classification of Ships, Part 2, Chapter 1 (or EN 10045-1) and meet the requirements stipulated in Section 3 of DNV Standard for Certification No. 2.7-1. Test temperature shall follow Table 3-1 of DNV Standard for Certification No. 2.7-1.
- Structural design verification scope covers the proposed structure(s) for compliance with the applicable codes only. Other aspects including in-place structural strength etc. were not covered and it is assumed that these and other such requirements are/will be reviewed and checked by other competent parties.

Issued in **Singapore** on **2015-09-23**  
for **DNV GL**

  
f **Chia Chor Yew**  
**Manager**

**Subsea, Structures and Pipelines**



  
**Chia Khoo Sheng**  
**Senior Engineer**  
**Subsea, Structures and Pipelines**