DET NORSKE VERITAS

DESIGN REVIEW REPORT

Designer / Client	:	DNV Newcastle
Manufacturer	:	Mechtool Engineering Limited
User	:	P.W Adamson Engineering Services
Client Project Reference	:	EC7463
D.N.V. Project Number	:	ABD36115590
Equipment Item Numbers	:	4659-11 to 4659-20
Equipment Description	:	A60 Module
Design Codes and Standards	:	DNV Standard for Certification No. 2.7-1 "Offshore Containers" April 2006 BS EN12079 : 1999 "Offshore Containers – Design, Construction & Testing, Inspection & Marking". IMO Circular MSC / Circ. 860 "Guidelines for the Approval of Offshore Containers Handled in Open Seas" 22 May 1998.

Operational Limitations :

Rating(max.)	:	10000 kg
Payload(max.)	:	900 kg
Tare(max.)	:	9100 kg
Minimum Design temperature	:	-20 Deg C
Lifting Set WLL_{min}	:	15.01 te
Enhancement factor	:	1.501
Number of Sling Legs	:	4
Max. sling angle from vert.	:	45 Deg
Minimum Shackle size	:	8.5 te

Note: Enhancement factor and WLL_{min} are taken from Table 8-1 in DNV 2.7-1 April 2006

Lifting Set Requirements	WLL_s (te)	Fibre Core (mm)	Steel Core (mm)	Chain (mm)
Forerunner(if applicable)	15.01	40	40	23
Sling Legs	7.08	26	26	16

WLL_s=Minimum Working Load Limit for sling leg components and shackles

Note: Figures quoted above are taken from Table 8-1, Section 8 and Tables E2, E3 and E4, Appendix E in DNV 2.7-1, April 2006.

Outermost Dimensions	Length:	:	6096 mm (overall)
	Width:	:	2438 mm (overall)
	Height:	:	2748 mm (overall)

Approval Documents

Drawings

Title	Drg No.	Rev
General Arrangement	7463/0001-01	04
Module Typical Details	7463/0001-05	03
Module Floor Steelwork	7463/0100-01	04
Module Roof Steelwork	7463/0101-01	03
Module Lifting Arrangement	7463/0400-01	01

Supporting Documents

Drawings

Title	Drg No.	Rev
Typical Tranverse Section	7463/0001-02	04
Typcial Longitudinal Section	7463/0001-03	04
Typical Sectional Plan Section	7463/0001-04	04
Module Painting Details	7463/0001-06	03
Module Floor Plate	7463/0100-02	01
Module Roof Plate	7463/0101-02	01
Module North Wall	7463/0102-01	03
Module East Wall	7463/0103-01	03
Module South Wall	7463/0104-01	03
Module West Wall	7463/0105-01	03
Isolomin Wall Panels	7463/0200-01	02
EC7463 Calculations	MT-CAL-01	15/08/06
Supplementary Calculations	MT-CAL-02	1

Other Information

Primary Structure Material Specification (Fully killed as DNV 2.7-1 section 3.1.1).
Plate - BS EN10025 (1993) & AMD 8616, & Hollow Sections BS EN10210-1 (1994).

Plate - S355 J2G3	Yield Strength	= 355 N/mm2 (min) for t < 16mm
Hollow Sections – S355J2H		= 345 N/mm2 (min) for 16 <t < 40mm
(or equivalent)	Tensile strength	= 490 N/mm2 (min)
	Charpy Tests (min)	= Yield/10 J @ -10° for t < 12 mm
		= Yield/10 J @ -20° for 12 < t < 25 mm
		= Yield/10 J @ -40° for t > 25 mm
Plate & Hollow Sections – S275	Yield Strength	= 265 N/mm2 (min) for 16 <t < 40mm
(or equivalent)	Tensile strength	= 430 N/mm2 (min)
	Charpy Tests (min)	= Yield/10 J @ -10° for t < 12 mm
		= Yield/10 J @ -20° for 12 < t < 25 mm
		= Yield/10 J @ -40° for t > 25 mm

Padeye material certificate must be an endorsed 3.1C or 3.2 certificate.

Padeye base plates must be 'Z' grade material (EN10164) or have through thickness properties (Tensile test & Ultrasonic test) in accordance with DNV Rules for Ships Part 2, Chapter 2, Section 1, and E400.

Welding

Welding of Primary structure to be (in accordance with the relevant parts of EN ISO 15614-1 and DNV Rules for Classification of Ships Pt. 2 Ch. 3 Sec. 5) performed with approved Welders to approved Weld Procedures in accordance with section 5.2.2 of DNV 2.7-1 April 2006. (Weld Procedure Impact tests should be carried out in WCL, FL, FL+2, and FL+5). Welding of Secondary structure should be according to a recognised standard in accordance with section 5.3 of DNV 2.7-1, April 2006.

N.D.T. (DNV 2.7-1 Table 5.1)

All welds	: 100% Visual
Padeye attachment welds	: 100% MPI and 100% UT (where applicable/possible)
All primary non-redundant structural welds	: 100% MPI and 100% UT (where applicable/possible)
Primary structure Butt welds	: 10% Radiography
Secondary structural welds	: Random examination at Surveyors discretion.

N.D.T. is to be carried out by others and reviewed for compliance with DNV 2.7-1 Sections 4.6 and 5.2.

Load Testing

To be carried out in accordance with DNV 2.7-1 Section 4.6 as follows:

4 point lift - Hook load of 2.5 x Rating	All units
2 point lift - Hook load of 1.5 x Rating	Prototype only
Drop Test - Hook load of 1.0 x Rating	Prototype only

The following table lists the number of load tests per batch that have to be witnessed by DNV. The number of container load tests to be witnessed is to include the Prototype.

Table 5-4 Containers to be production tested

Total number in series	Number to be tested[1)]
1-5	1
6-10	2
11-20	3
21-40	4
≥40	10%

1) This may include the prototype test

Slings (DNV 2.7-1 section 8)

In order to take into account the additional dynamic loads that may occur when lifting containers to and from offshore installations, the safety factors for lifting sets include a Dynamic Amplification Factor in addition to the standard safety factor for lifting sets.

The design of this container is approved without lifting set, however for compliance with DNV 2.7-1 the lifting set should be verified by either type approval or case-by-case approval. Certification in accordance with EN10204, type 3.1B for the components must demonstrate the correct relationship between 'Manufacturing proof force' (MPF) and 'Breaking force' (BF). In the event that this is not the case then appropriate mechanical tests shall be carried out, and verified by the Society. The components must meet the requirements of DNV 2.7-1 and the following standards (or equivalent).

Standard	Sling component	MPF / BF relationship
EN 1677–4 (2000)	Master and intermediate links	MPF ≥ 0.625 BF
EN 13889	Shackles	MPF ≥ 0.4 BF
EN 818-4	Chain slings	MPF ≥ 0.625 BF
EN 13414-1	Wire rope slings	MPF ≥ 0.4 BF

Slings should be sized to ensure a horizontal lift and the master link shall be no higher than 1300mm from ground level.

Comments

1. Markings are to be in accordance with Sections 6 & 7 of DNV 2.7-1.
2. This Design Review has not considered the carriage of dangerous goods. It is the Owner's responsibility to ensure that all relevant IMDG requirements for transportation of dangerous goods are fully complied with.
3. All primary structure to be full penetration welded.
4. This approval is limited to a production batch of 10 units with the following decal numbers:

Item No.	Decal No.	Item No.	Decal No.
4659-11	64063	4659-16	64068
4659-12	64064	4659-17	64069
4659-13	64065	4659-18	64070
4659-14	64066	4659-19	64071
4659-15	64067	4659-20	64072

5. Lifting slings are to be in accordance with DNV 2.7-1 Section 8.
6. This container is approved without a lifting set. Before the container is taken into use offshore the lifting set should be verified by a DNV surveyor.
7. Doors should have locking devices to ensure they are secure against opening during transportation and lifting.
8. A fifth leg should be fitted to the sling to ensure the master link is reachable from ground level.
9. The design of this container is only approved with the roof fitted.

The design of the above container has been reviewed and is considered to comply with DNV's Codes and Standards referenced above.

Signed for **Det Norske Veritas B.V.**

Name:

~~Keith McLean~~
Engineer

Martin Stone
Engineer

Date : 28th November 2006
Place: Aberdeen