NATO STANDARD

ANEP-99

DESIGN AND INTERFACE STANDARDS FOR CONTAINERISED MISSION MODULES

Edition A, Version 1

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NATO LETTER OF PROMULGATION

3 December 2020

1. The enclosed Allied Naval Engineering Publication ANEP-99, Edition A, Version 1, DESIGN AND INTERFACE STANDARDS FOR CONTAINERISED MISSION MODULES, which has been approved by the nations in the NATO Naval Armaments Group, Integrated Capability Group Indirect Fire, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 4830.

2. ANEP-99, Edition A, Version 1, is effective upon receipt.

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4. This publication shall be handled in accordance with C-M(2002)60.

Zoltán GULYÁS
Brigadier General, HUNAF
Director, NATO Standardization Office

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS

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RECORD OF SPECIFIC RESERVATIONS

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CHAPTER 1 INTRODUCTION

1.1 GENERAL

1.1.1 This ANEP has been issued to provide a minimum set of requirements to facilitate interoperability of containerised modules across NATO navies, by:

1. Providing a uniform set of safety related construction requirements;
2. Providing a set of standardised interfaces;
3. Providing a set of requirements applicable to the construction of new platforms to enable the deployment of modules.

1.2 RELATIONSHIP WITH OTHER STANDARDS, CODES AND REGULATIONS

ANEP-77 NAVAL SHIP CODE

1.2.1 The guiding principle in the production of this standard has been to treat the containerised modules as functionally indistinguishable from ship compartments containing the same equipment, and therefore all requirements in ANEP-77 that apply to the equivalent compartment and/or the specific equipment or function in the ship are to be applied to a containerised module.

ANEP-91 – STANDARD INTERFACES FOR MISSION MODULES

1.2.2 ANEP-91 is an advisory document, which describes development work on interfaces, discussed shock, survivability and module use cases.

DNV GL 2.7-2 – OFFSHORE SERVICE MODULES

1.2.3 DNV GL 2.7-2 is a standard applicable to the design and installation of offshore service modules, and as such the structure and many of the requirements can be transferred directly to a naval environment.

DEFSTAN 02-887 MANUFACTURE AND ASSURANCE OF THE PUMPKIN MOUNT

1.2.4 DEFSTAN 02-887 describes the proposed shock mounting “pumpkin mount” arrangement to be used for containerised modules.

1.3 DEFINITIONS

1.3.1 This section contains definitions used throughout the document.

1. **Approved Layouts**. In spaces on board intended for module operation, module layouts that have been assessed from a fire safety and an escape and evacuation point of view. A module that has not previously been embarked in a platform may be deemed to conform to an Approved Layout, provided that:
    a. It presents a fire risk equivalent to an approved module;
    b. It provides equivalent fire detection and firefighting measures;
    c. The escape and evacuation arrangements are not affected.
2. **Certified safe equipment**. Equipment certified by an independent national test institution or competent body to be in accordance with a recognised standard for electrical apparatus in hazardous areas.
3. **Fitted out mass**. The mass in kg of the containerised module ready for use, including both the structural mass and the equipment mass.
4. **Low flame spread**. A surface, which in accordance with the IMO Fire Test Procedures (FTP) code, will adequately restrict the spread of flame.
5. **Naval Administration**. The Department of Government of the State responsible for providing safety regulation for naval ships.
6. **Naval containerised module**. The subject of this standard; naval module installed within an ISO container envelopefor transport purposes. Referred to as “containerised modules”, and simply “modules” throughout.
    a. Dimensions of an ISO container are 8’ wide, 8’6” high (standard, though “hi-cube” 9’6” containers are commonplace) and vary in length.
    b. This standard is written anticipating that most naval modules will be 20’ long, or more rarely 40’ long. Shorter containers may be used for storage, but are unlikely to perform a naval module function – though this standard does not preclude it.
    c. Some specialised modules may be designed with fold-out, slide-out, or expanding/extendable sections which protrude from the envelope of the ISO container when deployed.
7. **Naval module**. A unit built and equipped for a special service task, mainly for temporary installation, intended to be operated on board a ship, in support of delivering a military effect.
8. **Non-combustible material**. Material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to

approximately 750 ºC, this being determined in accordance with the FTP code.

9. **Offshore container**. A portable container, with a maximum gross mass not exceeding 25,000 kg, for repeated use in the transport of goods or equipment, handled in the open seas, to, from or between fixed and/or floating offshore installations and ships. See DNV GL 2.7-1 for a more detailed definition.
10. **Offshore service module**. A unit built and equipped for a special service task, mainly for temporary installation, on an offshore installation
11. **Payload**. The maximum permissible mass in kg of cargo or loose equipment which may safely be transported by a container.
12. **Routinely manned**. Manned for more than 2 hours in every 24-hour period, or required to be manned during an emergency or action stations.

1.4 IMPERIAL UNITS

1.4.1 It is noted that imperial units are used in this ANEP, as they are common place for description of container lengths and threads. For clarity, the following unit notation is used (examples):

1. 20’ = 20 feet (~6096 mm)
2. 3” = 3 inches (~76.2 mm)
3. 8’6” = 8 feet and 6 inches (~2591 mm)

1.5 REFERENCED REGULATIONS AND STANDARDS

1.5.1 The following standards include provisions which, through reference in the text, constitute provisions of this standard. The latest issue of the references shall be used unless otherwise agreed. Other recognised standards may be used provided it can be demonstrated that these meet or exceed the requirements of the standards referenced below:

1. NATO
   a. ANEP-77, Naval Ship Code
   b. STANAG 1169, Firefighting Equipment and Principles for Harmonisation of Present and Future Equipment and Materials
   c. STANAG 4293, Guidelines for the Acoustical Environment in NATO Surface Ships.

d. STANAG 4370, Environmental Testing – and the following covered publications:

   i. AECTP 230, Climatic Conditions.

   ii. AECTP 240, Mechanical Conditions.

   iii. AECTP 250, Electrical and Electromagnetic Environmental Conditions.

e. STANAG 4602, Fire Assessment of Materials.

f. ATP-3.3.4.1 Tactics, Techniques and Procedures for NATO Air Movements

g. STANAG 4154, Common Procedures for Seakeeping in the Ship Design Process

2. DNV GL

   a. DNV GL 2.7-1 Offshore Containers

   b. DNV GL 2.7-2 Offshore Service Modules

   c. DNV GLStandard for Certification No. 2.22, Lifting Appliances

   d. DNV GL Rules for Ships

3. IEC

   a. IEC 60079 Series – Explosive Atmospheres

   b. IEC 60092 Series – Electrical Installations in Ships

   c. IEC 60309 Series – Plugs, socket-outlets and couplers for industrial purposes

   d. IEC 60529 – Ingress Protection Rating

   e. IEC 60603-7 – Detail specification for 8-way, shielded, free and fixed connectors for data transmission with frequencies up to 600 MHz

   f. IEC 61000-6-2 Generic Standards – Immunity Standards for Industrial Environments

   g. IEC 61000-6-4 Generic Standards – Emission Standards for Industrial Environments

   h. IEC 61754-20 – Fibre optic interconnecting devices and passive components

4. IMO

   a. FSS, International Code for Fire Safety systems

   b. FTP, International Code for Application of Fire Test Procedures

   c. MSC.1/ Circ. 1275 Unified interpretation of SOLAS Chapter II-2 on the number and arrangement of portable fire extinguishers on board ships

d. International Maritime Dangerous Goods Code, 2016 Edition Amendment 38-16

5. ISO
   a. ISO 668-1 Freight Containers – Classification and Dimensions
   b. ISO1496-1 – Freight Containers – Specification and Testing
   c. ISO 228 Series – Pipe threads where pressure-tight joints are not made on the threads
   d. ISO 1161:2016 – Series 1 freight containers. Corner and intermediate fittings. Specifications
   e. ISO 16890-1 – Air filters for general ventilation
6. US Department of Defence
   a. MIL-DTL-38999 – Detail specification: connectors, electrical, circular, miniature, high density, quick disconnect (bayonet, threaded, and breech coupling), environment resistant, removable crimp and hermetic solder contacts, general specification for.
   b. MIL-DTL-5015 – Connectors, electrical, circular threaded, AN type, general specification for.
   c. MIL-C-27487D – Coupling Halves, Quick-Disconnect, Cam-Locking Type
7. UK MoD
   a. DEFSTAN 02-887 Manufacture and Assurance of the Pumpkin Mount

1.6 ABBREVIATIONS

AECTP		Allied Environmental Conditions and Test Publication
ANEP		Allied Naval Engineering Publication
CoG		Centre of Gravity
CMS		Combat Management System
CONOPS		Concept of Operations
DEFSTAN		Defence Standard (UK MoD)
DNV GL		Det Norske Veritas and Germanischer Lloyd
EMC		Electro Magnetic Compatibility
EEBD		Emergency Escape Breathing Devices
FSS		Fire Safety Systems
FTP		Fire Test Procedure
GbE		Gigabit Ethernet
HPSWM		High Pressure Sea Water Main

HVAC		Heating, Ventilation and Air Conditioning
IEC		International Electro-Technical Commission
IMO		International Maritime Organization
IP		Ingress Protection
ISO		International Standards Organisation
MAP		Maritime Acquisition Publication
MSC		Maritime Safety Committee
NATO		North Atlantic Treaty Organization
OME		Ordnance, Munitions and Explosives
QPS		Quality of Power Supply
SOLAS		Safety of Life at Sea
STANAG		(NATO) STAN(dardisation) AG(reement)
WLL		Working Load Limit

CHAPTER 2 ENVIRONMENTAL REQUIREMENTS

2.1 CLIMATIC CONDITIONS

2.1.1 Applicable climatic conditions shall be the most onerous of:

1. The relevant applicable national standards;
2. The conditions defined in AECTP-230, covered by STANAG-4370;
3. Those applicable to the area of operation.

2.2 MECHANICAL CONDITIONS

2.2.1 Applicable mechanical conditions shall be the most onerous of:

1. The relevant applicable national standards;
2. The conditions defined in AECTP-240 covered by STANAG-4370.

2.3 ELECTRICAL AND ELECTROMAGNETIC CONDITIONS

2.3.1 Applicable electrical and electromagnetic environmental conditions shall be the most onerous of:

1. The relevant applicable national standards;
2. The conditions defined in AECTP-250, covered by STANAG-4370.

2.4 ACOUSTIC ENVIRONMENT

2.4.1 Applicable acoustic environmental conditions shall be the most onerous of:

1. The relevant applicable national standards;
2. The conditions defined in STANAG-4293.

2.5 SHOCK

2.5.1 The containerised module (i.e. both the integrated equipment, and the projected role of the module) shall be assessed in accordance with relevant national guidance for the host platform to determine whether shock requirements are applicable.

2.5.2 Where shock requirements are applicable:

1. Shock mounting shall be delivered:
    a. Either, by shock mounting of the whole containerised module, using a suitably sized system as defined in DEFSTAN 02-887.
        i. NB. At the time of release, the pumpkin mount system is understood to be suitable for a 20’ containerised module with a maximum gross weight of 12 tonnes (evenly distributed at low-level). Where longer, heavier, or un-evenly loaded containerised modules are required to be embarked with shock requirements, then bespoke analysis to determine the structural withstand of the containerised module, and a suitable shock protection system, shall be undertaken.
    b. Or, by shock mounting of relevant equipment internal to the module (noting that this may reduce usable space within the module).

CHAPTER 3 STRUCTURAL REQUIREMENTS

3.1 GENERAL

3.1.1 A containerised module shall be designed in accordance with the Structural Technical Requirements of DNV GL 2.7-2 Offshore Service Modules, with the application of the ***specific deviations and amendments*** identified in this chapter.

3.2 CERTIFICATION

3.2.1 The module shall be certified in accordance to “Ship type service container” standards, as referenced in DNV GL 2.7-2.

3.2.2 If there is a requirement to lift the modules at sea, the container shall be certified according to DNV GL 2.7-1 (includes IMO/MSC/Circ.860).

3.3 STABILITY

3.3.1 To prevent the module from overturning (tipping) on moving deck, the module is to be designed to withstand tilting of 30º in any direction without overturning (in accordance with DNV GL 2.7-1 Section 4.1.2).

3.4 LIFTING

3.4.1 The module shall be fitted with ISO-corner fittings to ISO 1161 on the top and bottom corners. (NB. These fittings are not designed for lifting at sea)

3.4.2 If there is a requirement for the modules to be lifted at sea, the module shall be fitted with:

1. Pad-eyes rated for the WLL of the containerised module (in accordance with DNV GL Standard No. 2.22);
2. Permanently attached sling sets for the lifting pad-eyes.

3.4.3 The module shall be fitted with bottom fork lifting pockets.

3.4.4 Where additions to the lower structure of the module are required (e.g. to support internal equipment), the design shall still enable the forklift pockets to be used (see Section 3.4).

3.4.5 Any installed lifting apparatus shall have their WLL marked and shall be at least annually inspected and re-certified.

3.4.6 The fitted out mass and CoG of the containerised module, and WLL of any installed lifting apparatus shall be included on the module information plate and module information package (see Chapter 16 and Chapter 17).

3.5 RETENTION AND SECURING FITTINGS

3.5.1 The module shall be securable to a deck using “twistlock” connectors in the standard pattern (in accordance with ISO 1161).

3.5.2 Twistlocks shall be manually operated (i.e. not semi or full automatic version), and shall be mechanically securable in the locked position, to prevent unwanted opening or release.

3.5.3 Twistlocks shall be certified by an appropriate third party.

3.5.4 The module shall be secured without the requirement for deck-head or side-wall fittings.

STACKING

3.5.5 Containerised modules shall not be stacked when embarked and performing a mission function, but shall retain the normal ISO container capability to be stacked for transport and shore-side (and the relevant loading that this will induce).

PROTRUSIONS

3.5.6 The module shall be capable of fitting within the space envelope for an ISO container, as defined in ISO 668. That is, any protruding items to fulfil mission functions from the overall shall be removable, collapsible, or moveable to meet the requirement.

3.6 INDUCED LOADING

GENERAL

3.6.1 Containerised modules shall be classed as “*Important Service*” under the definition of DNV GL 2.7-2, and shall therefore be assessed against platform related induced loading, which shall be driven by the most strenuous requirement arising from review of the potential host platforms.

3.6.2 As a minimum, the following requirements from DNV GL 2.7-2 Section 3.3.1 shall be adhered to:

1. Allowable bending and shear stresses shall be taken as 160 f_1 and 90 f_1 N/mm^2 respectively where f_1 is the relevant material factor (in accordance with DNV GL Rules for Ships Pt.3 Ch.1.).

2. Design loads and accelerations will be specified in the DNV GL 2.7-2 certificate. The thickness of walls must not be less than 4 mm. Special attention shall be paid to buckling control of thin-plated structures subjected to compression stress in the face plate caused by local bending.
3. NB. The plate flanges of corrugated/stiffened-plates shall be checked for buckling (in accordance with DNV GL Rules for Ships Pt.3 Ch.1.).
    a. The compression stress σ_b in the plate flange, induced by lateral pressure and local bending of the plate profile, shall not exceed the critical buckling stress x utilisation factor for normal load level σ_c x η.
    b. For loads applied on normal load level η = 0.80.

EXTERNAL AND ENVIRONMENTAL LOADING

3.6.3 Sea pressures and accelerations from vessel motion shall be identified on a project by project basis.

3.6.4 Strength requirements shall be identified on a project by project basis.

OTHER SERVICE LOADS

3.6.5 Wind loads acting on module structure shall be taken as not less than 2.5 kN/m^2 (in accordance with DNV GL 2.7-2).

3.6.6 Snow and ice loading shall be taken as 143 kg/m^2 (from ANEP-77 Chapter III, Regulation 4.20.2.1, loading from 150 mm ice, as for stability).

SHOCK AND BLAST LOADS

3.6.7 Blast loads shall be identified on a project by project basis.

3.6.8 For general purpose, the DNV GL 2.7-2 structural requirements will provide increased robustness against anticipated shock/blast characteristics, while functionality of internal equipment may not be retained, unless the module is suitably shock mounted (see Section 2.5). Typical ISO containers will not withstand such loading.

INTERNAL LOADS

3.6.9 The loading from any machinery internal to the module shall be considered (including vibration, fatigue over lifetime etc.).

1. NB. This is most likely to be relevant for compressors, pumps, auxiliary generators etc. but may also be applicable to movable racking etc.

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CHAPTER 4 TRANSPORTATION REQUIREMENTS

4.1 GENERAL

4.1.1 If air-transport of the module is required, then the requirements of ATP-3.3.4.1 Chapter 7 Annex D, should be met, or relevant National Administration requirements if these are tighter.

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CHAPTER 5 PASSIVE FIRE PROTECTION

5.1 GENERAL

5.1.1 A containerised module shall have the minimum fire integrity required by ANEP-77 Part 2 - Chapter VI Regulation 8 for a compartment performing the same function as the module, with the adjacent compartment being classed as either an open deck space or a special purpose space as applicable. This results in different fire integrity requirements, depending on the type of platform (A, B, or C as per ANEP-77) in which the module is intended to be embarked.

5.1.2 The type of compartment and type of platform that the module is intended to be deployed in shall be indicated in the module's information plate (see Chapter 16) as well as in the module information package (see Chapter 17).

5.1.3 Openings and penetrations in fire-rated divisions are to be arranged so as to maintain the fire rating of the divisions.

5.1.4 Arrangements for openings and penetrations shall comply with the requirements stated in ANEP-77 Chapter VI Regulation 8.

5.2 FIRE GROWTH POTENTIAL

5.2.1 Insulating materials shall be non-combustible. Vapour barriers and adhesives used in conjunction with insulation, as well as the insulation of pipe fittings for cold service systems, need not be of non-combustible materials, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have low flame-spread characteristics.

5.2.2 All linings, grounds, draught stops and ceilings shall be of non-combustible materials.

5.2.3 All furniture and furnishings shall be of restricted fire risk.

5.2.4 Combustible materials may be used to face non-combustible divisions in accommodation and service modules, provided they comply with the following requirements:

1. Where used, combustible materials shall have a calorific value in accordance with ANEP-77 Chapter VI- Regulation 4.14.
2. Total volume of combustible materials is to comply with the requirements of ANEP-77 Chapter VI- Regulation 4.15.
3. The surfaces shall have low flame-spread characteristics in accordance with STANAG 4602.

5.3 SMOKE GENERATION AND TOXICITY

5.3.1 Smoke and toxic products released from materials exposed to the effect of elevated temperatures shall comply with the requirements of STANAG 4602 or to Naval Administration standards if these are tighter.

5.3.2 Any modules that are classed as control stations shall be kept free of materials which generate smoke and toxic products if exposed to heat or fire.

5.3.3 The following materials, as a minimum, are prohibited for use in a module:

1. Asbestos
2. PVC
3. PTFE

5.3.4 The use of fire–retardant-treated timber is permitted, but this shall be kept to a minimum (this excludes the use of timber as flooring material).

5.3.5 All electric cables are to be in accordance with the requirements of ANEP-77 Chapter IV.

5.3.6 Paints, varnishes and other finishes shall be limited and when used, such products shall be approved in accordance with the FTP Code or to Naval Administration standards if these are tighter.

5.3.7 Primary deck coverings, if applied within modules classed as accommodation, service spaces or control stations, shall be of approved material which will not give rise to smoke or toxic or explosive hazards at elevated temperatures, as determined in accordance with the FTP code or to Naval Administration standards if these are tighter.

CHAPTER 6 FIRE RISK CATEGORISATION

6.1.1 A fire risk assessment shall be carried out for the module. The risk assessment shall evaluate:

1. Module role, contents and foreseeable use;
2. Module construction and materials, including embarked materials;
3. Potential ignition sources;
4. Likely fire types;
5. Periodicity and duration of occupation (see "*Routinely Manned*" definition, Para 1.1.11);
6. Emergency exits and provision;
7. Environmental considerations (i.e. likely location of module).
    a. NB. Reductions in the capability of the module's fire alarm system from taking account of the external environment may lead to restrictions in use.
    b. Where this approach is taken, any restrictions to operability shall be noted in the module information package (see Chapter 17).

6.1.2 The fire risk assessment shall also determine:

1. The general fire risk category, according to Table 6-1, which also provides general guidance on minimum fire detection and firefighting requirements for each fire risk category.
2. The required fire detection and firefighting systems, in accordance with the FSS Code and MSC.1/ Circ. 1275;
    a. Including the type and quantity of portable extinguishers.
3. NB. The fire risk assessment takes precedence over the guidance in Table 6-1. Lower requirements shall be explicitly justified in the module information package.

Table 6-1 – General Fire Risk Category and Guidelines on Minimum Requirements.

Categorisation	Definition	Minimum fire detection system requirement	Minimum firefighting system requirement
No fire risk	Modules containing no energy sources (i.e. electrical, chemical or mechanical)	None	Portable extinguishers (see Section 8.2)
Low fire risk	Modules for storage of non-flammable equipment such as tools, mechanical parts and electrical equipment not connected to power. The module itself contains only a minimum of necessary electrical equipment for lighting, heating, etc. A fire is not likely to be supported.	Fire alarm, non-integrated (Section 7.2)	Portable extinguishers (see Section 8.2)
Medium fire risk	Modules containing electrical panels, electrical testing equipment, offices. Routinely manned modules (not accommodation).	Fire alarm, integrated (Sections 7.2 and 7.3)	Portable extinguishers (see Section 8.2) The need for a fixed firefighting system (see Section 8.3) is dependent on risk assessment conclusions
High fire risk	Module containing Category-A machinery spaces, accommodation and stores for flammable liquids. Also high voltage electrical machinery including battery charging and storage.	Fire alarm, integrated (Sections 7.2 and 7.3)	Portable extinguishers (see Section 8.2) Fixed firefighting system (see Section 8.3)

CHAPTER 7 FIRE DETECTION

7.1 DETERMINATION OF REQUIREMENTS

7.1.1 The minimum fire detection system requirement shall be determined from the fire risk assessment, and as per Table 6-1.

7.1.2 Both non-integrated and integrated fire alarm systems shall comply with Section 7.2, while integrated systems shall also comply with Section 7.3.

7.2 GENERAL REQUIREMENTS

7.2.1 These requirements are applicable to both non-integrated and integrated fire alarms systems.

7.2.2 On activation of the fire alarm system:

1. The fire alarm system shall generate audible and visible signals in and around the module where persons may be present;
2. Where fitted, mechanical ventilation to the module shall stop, and fire dampers shall close automatically.

7.2.3 There shall be two or more sources of power for the electrical equipment used in the operation of the module's alarm system, one of which shall be a battery of sufficient capacity to permit the continued operation of the system with all detectors activated, and shall be sufficient for 24-hr operation.

7.2.4 All components (e.g. detectors, manual call points, alarms control panels cabling etc.) shall comply with the requirements of the FSS Code Chapter 9.

7.2.5 Detection units:

1. Fire detector units shall be of the type dictated by the fire risk assessment (i.e. visual, heat and/or smoke as appropriate).
2. The number of detectors shall be identified by the fire risk assessment.

7.2.6 Alarm units:

1. As a minimum, an audible alarm shall be fitted internal and external to the module.
2. As a minimum, a visual alarm indicator shall be fitted external to the module. This indicator shall be labelled "Fire Alarm".
3. The alarm units shall be silence-able (to be activated via key-switch or other similar control to prevent unauthorised use).

7.2.7 Combined detector and alarm units are acceptable, as long as other requirements are met.

7.3 INTEGRATED FIRE ALARM SYSTEMS – SUPPLEMENTARY REQUIREMENTS

7.3.1 Where an integrated fire alarm system is fitted, the requirements in this section are also relevant.

7.3.2 Interface with ship's fire alarm control system:

1. The module's integrated fire alarm system shall behave as an extension to the ship's fire alarm control system.
2. A module's integrated fire alarm system shall interface with the ship's fire alarm control system, providing indication upon the ship's fire detection and fire alarm control panel/indicating units that at least one detector/manual call point has alarmed in the module.
3. Each module shall be capable of being individually identifiable by the ship's fire detection and alarm control system.
4. The ship's fire alarm control system shall give a visual and audible warning if the signal to the module integrated alarm is lost.
5. If the signal to the ships fire alarm control system is lost, the module alarm shall activate.

7.3.3 Manual call points:

1. Routinely manned modules shall have a minimum of one manual call point, mounted in a suitable position near the main exit, and labelled "Fire Alarm".
2. There is no requirement for module emergency escape panels to have a manual call point fitted locally.

CHAPTER 8 FIREFIGHTING

8.1 GENERAL REQUIREMENTS

8.1.1 The minimum firefighting system requirement shall be determined from the fire risk assessment, and as per Table 6-1.

1. Portable extinguisher systems shall comply with Section 8.2.
2. Fixed firefighting systems shall comply with Section 8.3.

8.1.2 Modules shall be fitted with one or more drain points in the deck (and internal flooring as applicable), to allow draining of water from firefighting or wash down post firefighting. These shall be in suitable locations for the layout of the module, and plugged with removal plugs to prevent water ingress

8.2 PORTABLE EXTINGUISHERS

8.2.1 At least one portable extinguisher shall be located inside the module in an easily accessible position.

8.2.2 For modules with several means of escape, one portable fire extinguisher is to be available near each exit.

1. There is no requirement for module emergency escape panels to have a fire extinguisher fitted locally.

8.2.3 Minimum capacities for fire extinguishers shall be as indicated in this paragraph, or their equivalent to the satisfaction of the Naval Administration:

1. 5 kg for carbon dioxide or dry powder
2. 9 litres for foam or water based extinguishers.

8.3 FIXED EXTINGUISHING SYSTEMS

8.3.1 When a fixed fire extinguishing system is mandated, the requirement can be satisfied by either connecting to the ship's High Pressure Water Main (HPWM) fixed fire extinguishing system, or by having an on-module system.

8.3.2 If the adopted solution is connection to the fire extinguishing system on board the ship, the ship's fixed fire extinguishing medium in the area where the modules are to be located will need to be compatible with the types of fire assessed as likely to occur in the module. Information on the assumed fire extinguishing medium shall feature on the module marking plate and the module information package (see Chapter 16 and Chapter 17).

8.3.3 Accepted fixed fire extinguishing systems shall be as per ANEP-77 Chapter VI-Regulation 9.13.1.

8.3.4 The hazards arising from the fixed fire extinguishing system shall be included in the module information package (see Chapter 17).

8.3.5 On activation of the fixed extinguishing system (either automatically or manually released):

1. Where fitted, mechanical ventilation to the module shall stop, and fire dampers shall close automatically.
2. The system shall signal the release to the Ship Control Centre.
3. Where the fire-extinguishing system (or media) may cause danger or harm to personnel, the system shall generate audible and visible alarms in and around the module where persons may be present.
    a. This alarm shall be different and distinguishable from other signals.

OPERATING MECHANISM

8.3.6 In addition of remote operation from the Ship Control Centre, the module shall incorporate a local operating mechanism for the fixed extinguishing system. This shall have suitable protection against unintentional operation and be clearly marked.

8.3.7 Automatic operating mechanisms shall only be used in exceptional circumstances, based upon the fire risk assessment. Further:

1. The automatic operating mechanism shall be selected suitable for the module (e.g. a direct temperature sensitive device).
2. Where the fire-extinguishing system (or media) may cause danger or harm to personnel, no automatic operating mechanism shall be fitted. In this case, only manual activation shall be provided.

CHAPTER 9 ESCAPE AND EVACUATION

9.1 ESCAPE ROUTES AND ESCAPE EXITS

9.1.1 Unless technically unfeasible, the normal access or exit route to the modules shall be located on one of the narrow sides of the module. This shall include access routes for planned maintenance in modules not routinely manned.

9.1.2 Routinely manned modules:

1. With either an internal area exceeding 20 m^2, or the distance to the external exit door exceeding 5 m, shall have a separate emergency exit as widely separated from the primary access as possible.
2. With an internal area less than 20 m^2 shall have an escape panel fitted to a narrow side of the module.

9.1.3 If provided, a separate emergency exit is to be located in an easily accessible position and is to be as far from the main exit as possible. When the normal access route is on the narrow side, the emergency exit shall therefore be on the opposing narrow side. When the normal access route is on the wider side of the module, the emergency exit shall be situated on one of the narrow sides.

9.1.4 Doors, unless specifically stated otherwise, shall open in the direction of escape.

9.1.5 Securing arrangements shall be provided to maintain positive control of door movement. These shall be sufficiently robust to ensure that the door remains secure against heavy sea motions of rolling and pitching.

9.1.6 To prevent unauthorised access, doors are to be fitted with a lock but emergency access arrangements for rescue must be provided. Provision is to be made for safe egress from inside without a key.

9.1.7 Where a module is routinely manned, clearance is to be provided within the module to allow for manoeuvring of a stretcher out through the emergency exits.

9.1.8 An unobstructed route of 650 mm minimum clear width is to be provided between areas where personnel may be seated and the module exits.

9.1.9 Escape exits are to be marked with photo luminescent ISO signs on both sides with the words “EMERGENCY ESCAPE” and “KEEP CLEAR”.

9.1.10 Specific emergency escape procedures and directions for the user shall be specified in the module information package (see Chapter 17), and if necessary marked on the emergency exit.

9.2 ESCAPE PANELS

9.2.1 Containerised modules not fitted with emergency exits shall be fitted with escape panels.

9.2.2 Escape panels are to be used if the normal exit route is blocked, and therefore shall be located at the opposite end to the normal exit route if the latter is situated on the narrow side of the module. For modules with the normal exit route on their wider side, the escape panel shall be situated on one of the narrow sides.

9.2.3 Module escape panels shall have a minimum clear opening area of 800 x 800 mm and shall be able to be opened from the inside of the module.

9.2.4 Module escape panels shall allow easy passage of persons wearing personal protective equipment.

9.3 EMERGENCY BROADCAST

9.3.1 See Chapter 13.

9.4 EMERGENCY LIGHTING

9.4.1 Routinely manned modules shall have sufficient internal emergency lighting to enable navigation for escape in the event of the module filling with smoke.

9.4.2 Emergency lights are to be installed in each partitioned space of the module where persons may be present and above main and emergency exits.

9.4.3 Emergency lights shall be battery powered. The battery shall be:

1. Charged automatically from the module power supply;
2. Sized sufficient for 4 hours operation following loss of power.

9.5 MAN TRAPPED-ALARM

9.5.1 In modules which present additional danger if locked in (e.g. air tight modules or refrigeration/freezer modules), a “*man-trapped*” alarm shall be provided to raise attention of personnel trapped within the module.

9.5.2 The alarm shall provide a visual and audible warning external to the module when activated.

9.5.3 The man-trapped alarm shall be powered from a battery back-up in case of power loss.

9.6 EMERGENCY ESCAPE BREATHING DEVICES

9.6.1 The allocation of Emergency Escape Breathing Devices (EEBD) on board shall be approved by the Naval Administration, and shall account for the maximum number of additional personnel expected to man the modules.

9.6.2 The number and location of the EEBD shall be indicated in the ship's Life Saving Appliance Plan.

9.6.3 The maximum time to escape from any occupied containerised module to an area of relative safety shall be verified by an Escape and Evacuation analysis and an Escape and Evacuation demonstration. If the escape time exceeds 10 minutes, then the minimum service duration of the EEBDs located nearest to the containerised modules shall be reviewed and increased accordingly.

9.7 LIFE-JACKETS

9.7.1 The allocation of Life Jackets on board shall be approved by the Naval Administration, and shall account for the maximum number of additional personnel embarked with the modules.

9.7.2 The number and location of the Life Jackets shall be indicated in the ship's Life Saving Appliance Plan.

9.8 ESCAPE AND EVACUATION ARRANGEMENTS

9.8.1 The approved layouts for embarking containerised modules onto a particular platform are to be included in the Escape and Evacuation Analysis and Demonstration for the platform; evacuation times are to be in accordance with ANEP-77 Regulation 2.

9.8.2 Modules shall be embarked in accordance with these approved layouts.

9.8.3 Where modules are embarked in layouts which are not in accordance with these approved layouts, the Naval Administration's approval shall be sought.

9.9 PLANS TO BE PROVIDED

9.9.1 Approved layouts are to be shown in the Ship's Fire Control, Safety and Life Saving Appliance plans. Such plans are to show the interdependence of containerised modules and the existing and revised escape routes and usage of emergency damage control and rescue equipment

9.9.2 A plan of the module shall be included in the module information package (see Chapter 17). A copy of this plan shall be kept in the ship damage control centre. The plan shall include:

1. The internal layout
2. Hazard
3. Safety equipment
4. Emergency equipment
5. Designated location of personnel (i.e. chairs and beds).

9.10 ESCAPE, EVACUATION AND RESCUE EMERGENCY PROCEDURES

9.10.1 A designated person shall be on watch at all times, who is responsible for:

1. The safety and security of the containerised module in accordance with ANEP-77 Reg. 6.2.1.
2. In an emergency, undertaking a review of the module status and a head-count at a muster-point of those who are on watch in the modules.

9.10.2 The Ship's Officer of the Watch is the substitute for this designate person.

CHAPTER 10 ORDNANCE, MUNITIONS AND EXPLOSIVES

10.1 GENERAL REQUIREMENTS

10.1.1 Where containerised modules are intended for use as magazines or stores for Ordnance, Munitions and Explosives (OME), the design shall be made against the most strenuous requirement arising from review of the potential host platforms.

10.1.2 Where containerised modules are intended for use in transporting OME, the module shall be designed with cognisance of the International Maritime Dangerous Goods Code, 2016 Edition Amendment 38-16.

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CHAPTER 11 HEATING, VENTILATION AND AIR CONDITIONING

11.1 GENERAL

11.1.1 Some modules may require Heating, Ventilation and Air Conditioning (HVAC) (e.g. for refrigeration, habitat maintenance, removal of fumes, maintenance of temperature conditions).

11.1.2 If HVAC capability is required, then all necessary HVAC equipment shall be provided with the module, and shall be contained within the ISO container envelope itself for transport purposes.

11.1.3 The interface with the host platform shall be limited to electrical power (i.e. not require chilled water etc.).

11.1.4 The maximum equipment heat load ("wild heat") arising from the module and its integrated equipment shall be marked on the information plate (see Chapter 16) and included in the module information package (see Chapter 17).

11.2 TECHNICAL REQUIREMENTS

11.2.1 Any HVAC provision shall be designed in accordance with DNV GL 2.7-2 Section 4.12.

11.2.2 Air intake and exhaust shall be to free air, and shall be positioned:

1. To not pose a hazard to personnel.
2. On the side walls of the module, not on the roof or floor.

11.2.3 Air intakes shall be designed to prevent the ingress of water or sea-spray (e.g. intake to incorporate a cowl).

11.2.4 Filtration shall be provided to ISO 16890-1 to prevent ingress of particulate or vapours. The filtration shall be specified for the most strenuous requirement arising from review of the potential host platforms.

11.2.5 Fire alarm/extinguishing interfaces (as described in Paras 7.2.2 and 8.3.5):

1. The control system for mechanical ventilation shall be linked to the fire detection and extinguishing systems. Mechanical ventilation shall stop upon activation of either of these fire systems.
2. Intakes shall be fitted with fire dampers linked to the fire detection and extinguishing systems. The fire dampers shall close upon activation of either of these fire systems

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CHAPTER 12 ELECTRICAL

12.1.1 The module's electrical systems and interface connections shall comply with the relevant requirements of IEC 60092.

12.1.2 Where the module is expected to be used in explosive (or potentially explosive) atmospheres, then:

1. The electrical systems and interface connections shall comply with the relevant requirements of IEC 60079.
2. The worst case explosive environment rating in which the module can be sited shall be marked on the information plate and included in the module information package (see Chapter 16 and Chapter 17).

12.1.3 Quality of Power Supply (QPS) shall be to the satisfaction of the Naval Administration, subject to an analysis of the platforms the containerised module is to be deployed on, and the equipment on board the module.

12.1.4 The required QPS standard shall be indicated on the module information plate.

12.1.5 As a minimum, the module shall comply with the requirements of IEC 61000-6-2 (Immunity) and IEC-61000-6-4 (Emissions) for electromagnetic compatibility, unless the requirements defined by the Naval Administration are tighter.

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CHAPTER 13 COMMUNICATIONS AND COMBAT SYSTEMS

13.1 GENERAL REQUIREMENTS

13.1.1 Gigabit Ethernet (GbE) shall be used for combat system data transfer.

13.1.2 Connections for containerised modules requiring communications and combat system interfaces are defined in Section 15.6.

13.1.3 Containerised modules requiring interfaces to host platform systems/networks shall be designed cognisant of the need to gain security accreditation for connections from the respective host platform Naval Administration.

DISCUSSION

13.1.4 The intent of this ANEP is to define requirements for commonality of communications and combat systems, and their interfaces, to enable interoperability of containerised modules with combat systems.

13.1.5 ANEP-91, Edition A, Version 1 (Maritime Mission Modularity) Annex D.19 provides an evaluation of the range of industry standards, their performance, common trends and interoperability. The ANEP concludes that industry standard GbE could support the majority of communication requirements for containerised modules, and that this would aid rationalisation of the number of individual physical interfaces.

13.1.6 However, ANEP-91 also highlights that, while interfaces based on GbE could support the majority of requirements, interfaces for tactical data could be difficult to implement with GbE (at least in the near term); primarily because of the range of different standards and Combat Management Systems (CMS) in use across NATO.

13.1.7 The philosophy described in ANEP-91 has been adopted by this ANEP and requirements for GbE are defined. However, acknowledging that adoption of this ANEP will be incremental:

1. Module designers should allow flexibility in interface panels for exchanging connector types;
2. The need for conversion units for legacy interfaces should be acknowledged in the requirements and be factored into the design where applicable.

13.2 GENERAL EMERGENCY, MAIN BROADCAST AND COMMUNICATION SYSTEM

13.2.1 Where a module is routinely manned:

1. The ship's General Alarm System and the Main Broadcast System shall be relayed to the module.
2. The ship's internal communications system shall be relayed to the module.

CHAPTER 14 SURVIVABILITY

14.1 DARKEN SHIP

14.1.1 For containerised modules intended to be installed on open decks, Darken Ship measures need to be implemented:

1. Tactical lighting should be used in areas that are visible to threats.
2. Darken ship switches installed on external doors.
3. Adequate covers and blinds provided for deadlights and other openings

14.2 ARMOUR AND FRAGMENTATION PROTECTION

14.2.1 Armour and fragmentation protection shall be assessed on a project by project basis. Protection levels are to be to the satisfaction of the Naval Administration.

14.3 SHOCK

14.3.1 See Sections 2.5 and 3.6 for shock requirements

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CHAPTER 15 INTERFACES AND CONNECTIONS

15.1.1 Containerised modules will incorporate systems which require supplies/interfaces/connections with the host platform. This section provides requirements for these interfaces to strive for full interoperability of modules and host platforms.

15.2 GENERAL REQUIREMENTS

15.2.1 To reduce the risk of accidental cross-connection:

1. Where possible, interfaces shall be non-interchangeable (e.g. different or different sized connectors to be used for different services).
2. All interfaces shall be clearly labelled.

15.2.2 All connections shall be fitted with blanking/protection devices to prevent ingress of dirt or debris.

15.2.3 Interfaces shall be constructed from suitable corrosion-resistant materials, and shall be IP67 in accordance with IEC 60529.

15.2.4 Interfaces shall be robustly mounted to allow connections to be made without damage to the interfaces or module (e.g. where threads are to be engaged by hand tools).

15.3 LOCATIONS

15.3.1 The interfaces shall be:

1. Located in an area extending no more than 1 m along each wall from either of the “right hand” corners of the module (as indicated in Figure 15-1);
   a. The interfaces shall be co-located into only one of the two “right hand” corners.
   b. The interfaces shall be either on the long or the short sides (not both).
2. Located on the vertical wall of the module;
3. Placed at a suitable height to enable connections to be made without access equipment.

15.3.2 Interface connectors which are permanently mounted on the structure of the module shall not protrude from the global envelope of the module – a recessed panel may be required, or a removable/re-mountable panel used for shipping.

15.3.3 Fluid interfaces shall be placed below all electrical/communication interfaces.

15.3.4 Space between interfaces shall be maintained to ensure connections can be made easily (e.g. spanner access, actuation of catches etc.).

15.3.5 Interfaces shall not impinge the operation of module equipment (e.g. doors, twistlocks, lift points etc.).

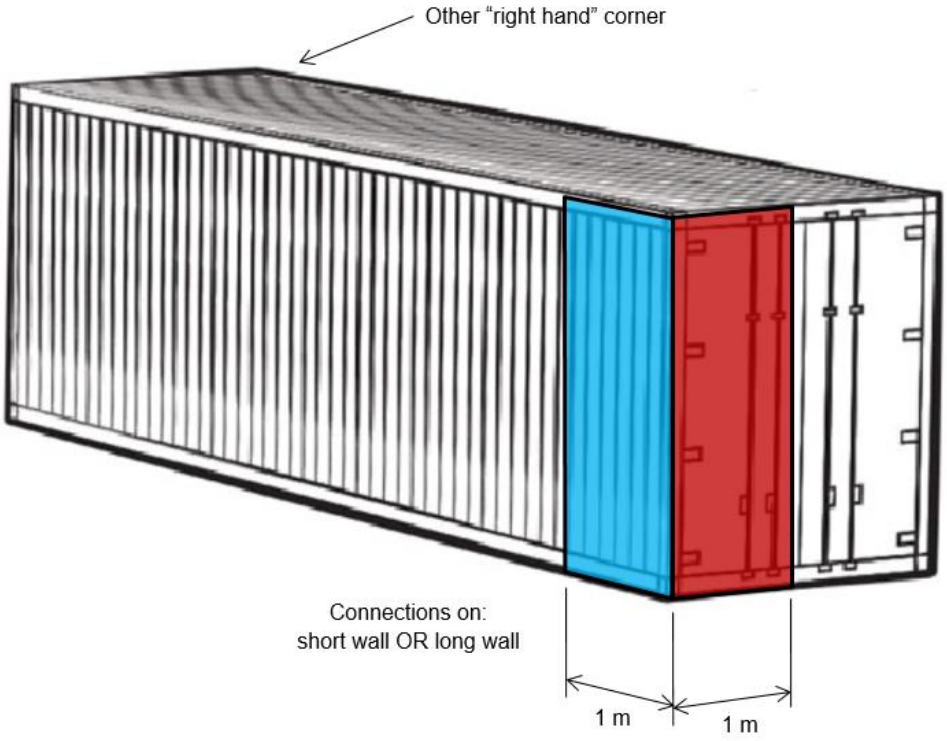

Figure 15-1 – Interface area on "right hand" corner of module

15.4 MECHANICAL SERVICES

FLUID CONNECTIONS

15.4.1 For systems other than black water, all fittings shall be either:

1. Standard size, female, parallel threaded fittings to ISO 228-1:2000;
2. Fluid fittings to ISO 9669:1990.
3. Connections to HPWM shall fit a NATO standard fire hose coupling to STANAG 1169.

15.4.2 For black water systems, all fittings shall be NATO quick-disconnect sewage coupling to MIL-C-27487D.

15.4.3 The connections shall be appropriately sized for the module duty, noting that a minimum size of 1” nominal is suggested to ensure suitable robustness of the connection to prevent accidental damage during handling.

15.4.4 All piping shall be insulated appropriately in accordance with the duty of the module to prevent freezing damage.

15.4.5 External drain connections shall be fitted at the lowest point of all systems.

15.5 ELECTRICAL SERVICES

15.5.1 Electrical interfaces shall be surface mounted plugs to IEC 60309.

15.5.2 Where breakers or isolation devices are required, these shall be mounted so that they are accessible from the outside of the module.

15.6 COMMUNICATIONS AND COMBAT SYSTEMS SERVICES

15.6.1 Communications and combat systems interfaces shall be made using the following connectors:

1. RJ45 Cat.6A connections (to IEC 60603-7)
2. and/or Fibre Optic LC connections (to IEC 61754-20)

15.6.2 Containerised modules requiring access to the following host platform’s systems shall incorporate separate connections (as required):

1. Communications
    a. Internal Communications System (Voice)
    b. External Communications System (Voice, Data, Video)
    c. General Broadcast and Alarm System
2. Combat Systems
    a. Unclassified Network
    b. Classified Networks
    c. Coalition Network
    d. Mission Network
    e. Video System
3. Navigation Systems
    a. Geospatial referencing or positioning information

15.7 FIRE ALARM

15.7.1 Where a fire alarm interface is required (see Chapter 7) the interfaces shall be multi-pin, surface mount plugs to MIL-DTL-5015

CHAPTER 16 MARKINGS AND INFORMATION PLATE

16.1 GENERAL REQUIREMENTS

16.1.1 Containerised modules require appropriate marking to ensure that they are correctly handled, embarked and connected to host-platform services. This chapter lays out requirements for markings.

16.1.2 Module marking and instructions shall be in accordance with the requirements of DNV GL 2.7-2, Section 7, with the following modifications:

1. Use of plastic cable ties or glue for securing of marking shall only be accepted on the basis of documented evidence that exposure to environmental conditions in Chapter 2 shall not cause a deterioration or detachment of the marking.
2. Main isolating switches as required by Chapter 12 shall be marked to identify function and supply.
3. The information plate shall be in accordance with Figure 16-1, rather than the DNV GL 2.7-2 “Name Plate”.

ANEP-99
NAVAL CONTAINERISED MODULE
Name of Manufacturer:
Manufacturer Contact Details:
Originating Naval Administration:
Design Assessment Ref:
Date of Assessment:
Serial No:
Compartment Cat/Ship Cat (ANEP-77):
Fire Extinguishing Medium: *Type/On-module/Assumed Platform Provided*
Hazardous Area Rating:
Operational Temperature Range:
QPS:
Max No of Personnel:
Fitted out Mass:
CoG:
WLL of installed lifting equipment:
Information Package Ref. No:
INTERFACE INFORMATION IN MODULE INFORMATION PACKAGE

Figure 16-1 – Name plate for containerised modules (replaces DNV GL 2.7-2 Name Plate)

CHAPTER 17 MODULE ASSESSMENT AND INFORMATION PACKAGE

17.1 GENERAL REQUIREMENTS

17.1.1 The Naval Administration shall be responsible for assessing the containerised module for compliance with this standard, and for approving their use on board national naval platforms.

17.1.2 Where systems are incorporated which fall under the remit of other legislation, regulation or guidance, these systems shall be demonstrated to meet the applicable requirements arising (e.g. CE marking etc.).

17.1.3 Documentation requirements for a design assessment shall include, but not be limited to, all the applicable items in DNV GL 2.7-2, Section 8.4.

17.1.4 Survey and testing requirements shall follow DNV GL 2.7-2, Section 8.5.

17.1.5 Rebuilt or modified modules shall be re-assessed by the national Naval Administration. The scope of reassessment shall be agreed on a case-by-case basis. Repair or modification of structural aspects shall be surveyed according to the requirements of the original standard.

17.1.6 The module assessment shall include a review of the Module Information Package for completeness and accuracy.

17.2 MODULE INFORMATION PACKAGE

17.2.1 The module shall be delivered with a Module Information Package, which shall contain, as a minimum, the following information:

1. Administration information, including:
    a. Name of manufacturer
    b. Manufacturer contact details
    c. Naval Administration design assessment reference number
    d. Date of assessment
    e. Module serial number
2. Basic information
    a. Sketch of layout in all configurations, for transit or deployed (as required), to show external dimensions, openings etc.
    b. Description of principal features

3. Environmental constraints
    a. Temperature range
    b. Noise
    c. EMC
4. Deployment constraints
    a. Compartment category/ship category (ANEP-77)
    b. Location constraints, including any that may have resulted in a relaxation of requirements
        i. Particularly for fire risk assessment purpose (see Chapter 6)
    c. Hazardous area rating (if applicable)
    d. Fire extinguishing medium required (if assumed platform provided)
    e. Fire extinguishing medium fitted (if applicable)
    f. Gas group/temperature class if applicable
    g. Max number of personnel
    h. Fitted out mass
    i. CoG
    j. WLL of lifting equipment
    k. Certificate of lifting equipment
5. Interfaces
    a. Input voltages, frequencies and required protection settings from the ship’s installation
    b. QPS
    c. Heat load (“wild heat”) arising from the module
    d. Fluid interfaces
    e. Combat system interfaces
6. Operational information:
    a. Description of the conditions/functions the module shall perform
    b. Any safety precautions required to operate within prescribed conditions
    c. Any restrictions of use
    d. Maintenance requirements and periodic checks.
    e. Specific safety and escape and evacuation procedures.

CHAPTER 18 GUIDANCE FOR HOST PLATFORMS

18.1 INTRODUCTION

18.1.1 This chapter includes guidance information and notes for the design of areas on board naval vessels where modules are intended to be embarked. This could include weather decks, vehicle decks, mission bays etc.

18.1.2 This guidance is supplementary to the requirements of the standard, and is not mandatory.

18.1.3 The information is ordered as per the other chapters in the standard.

18.2 ENVIRONMENTAL CONDITIONS

SHOCK

18.2.1 The impact of the shock interface onto the platform should be considered:

1. Incorporation of pumpkin mounts
    a. Spatial
        i. The pumpkin mount system adds height to the module, and thus a higher deckhead may be required, and any mechanical handling system and/or crane should also take this into account.
        ii. Access into the module may be affected by the increased deck height.
    b. Structural
        i. Significant loads may be imparted to decks through the pumpkin mount system.
2. Service interfaces
    a. The module will displace significantly during shock events, so any services must be flexibly mounted with margin to prevent damage to services.
3. Module size/weight limits
    a. The pumpkin mounts are suitable for 20', 12 tonne (gross weight) containerised modules. Where larger or heavier loads are intended to be embarked, shock mounting in this manner may not be supported. This is not anticipated to impact most host platforms, as "mission bay" modules are typically expected to be 20' containerised modules, with cargo of low enough density to not exceed 12 tonnes.

4. Module spacing
    a. The module will displace significantly during shock events, so suitably spacing between modules and bulkheads/deckheads must be provided to ensure free movement in a shock event.
    b. Initial testing of the pumpkin mounts indicated oscillations of:
        i. ~89 mm movement per module longitudinally and transversely
        ii. ~40 mm vertically.
    c. It is recommended that a minimum spacing of 300 mm is maintained between modules, with 150 mm to any bulkhead.

18.3 STRUCTURAL REQUIREMENTS

GENERAL

18.3.1 As the DNV GL 2.7-2 specification is more onerous than ISO 1496 for standard shipping containers, the containerised module tare weight (un-laden weight) is likely to be higher (approximately 4 tonnes, over 2 tonnes for a standard 20’ container). This will result in reduced capacity for embarked weight of stores that may be expected or designed for.

18.3.2 “Hi-cube” containerised modules (9’6” tall) may be designed under this standard, requiring additional deckhead/lifting height within mission bays.

18.3.3 Some specialised modules may be designed with fold-out, slide-out, or expanding/extendable sections which protrude from the envelope of the ISO container when deployed (e.g. HVAC equipment). The mission bay should be designed to accommodate these where a need is identified.

STABILITY

18.3.4 The module retention fittings (i.e. twistlocks and subsequent deck interface) are to be designed to withstand the loads arising from 30º tilting in any direction.

18.3.5 STANAG 4154 should be reviewed when determining positions and orientations of modules, and their hold-down arrangements.

LIFTING

18.3.6 Where modules are fitted with permanently attached lifting accessories, these may not be able to be used in mission bays, dependent on deckhead height and crane design, and alternative arrangements may be required, depending on the type of embarked module – standard ISO container twistlock lifting accessories, jack-up wheels, or skids may need to be used instead.

RETENTION AND SECURING FITTINGS

18.3.7 Mission bay decks may require a comprehensive pattern of twistlocks to enable flexibility of module layouts.

18.3.8 Alternative arrangements to twistlocks may be provided for tie-down (e.g. lashing points). However, not all modules will have corresponding lashing points fitted, and the limitations on modules which may be embarked in these cases should be recognised.

STACKING

18.3.9 Stacking of containerised modules is not recommended because of the increased loading arising on a naval platform

EXTERNAL AND ENVIRONMENTAL LOADING

18.3.10 If a mission bay is enclosed, this may reduce the loading requirements on modules from green seas, wind and ice etc.

18.4 PASSIVE FIRE PROTECTION

18.4.1 Mission bays shall be classed as Special Category spaces when assessing passive fire protection requirements (See also 5.1.1)

18.5 FIRE RISK CATEGORISATION

18.5.1 No specific guidance identified.

18.6 FIRE DETECTION

INTEGRATED FIRE DETECTION SYSTEMS

18.6.1 Compatibility of fire-detection systems and system design intent should be addressed at an early stage of module/ship system design/procurement.

18.6.2 Interface boxes may be required to ensure compatibility of services.

18.6.3 The ship’s fire control system should be designed cognisant of the required system expansion necessary to interface with module detection systems.

18.7 FIREFIGHTING

PORTABLE EXTINGUISHERS

18.7.1 The allowance for fire extinguishers on board the ship (as per ANEP-77 Chapter VI, Regulation 9) should be increased by the amount required for the most onerous of the approved module layouts.

FIXED FIREFIGHTING SYSTEMS

18.7.2 Compatibility of fire-detection systems and system design intent should be addressed at an early stage of module design/procurement.

18.7.3 Interface boxes may be required to ensure compatibility of services.

18.7.4 The ship's fire control system should be designed cognisant of the required system expansion necessary to interface with module firefighting systems.

18.7.5 The ship's own fixed firefighting systems within the mission bay/module location should be sized and designed for the worst case anticipated module layout, contents, hazards etc.

FIRE HYDRANTS

18.7.6 Fire hydrants shall be located in the mission bay to allow compliance with ANEP-77 Chapter VII Regulation 9.4.5.1 for all Approved Layouts and supply module fixed systems where applicable..

18.7.7 High risk modules should be located so that boundary cooling can be undertaken on all exposed sides of the module.

18.8 ESCAPE AND EVACUATION

18.8.1 Modules should be spaced appropriately to enable:

1. Escape/evacuation from emergency exits/escape panels fitted.
2. Transit between modules
3. Stretcher movements between/into modules.
4. Opening doors

18.8.2 Doors/escape panels should be sited to ensure safe escape routes are presented to evacuating personnel.

18.8.3 Suitable flexibility in layout may need to be provided to accommodate the above requirements.

18.8.4 Life jackets and EEBD allowances are to include the maximum number of personnel to be embarked with the modules.

18.9 ORDNANCE, MUNITIONS AND EXPLOSIVES

18.9.1 No specific guidance identified.-

18.10 HVAC

18.10.1 The mission bay HVAC system should be designed to allow for the most onerous module configuration expected to be carried in accordance with the platform's CONOPS.No specific guidance identified.

18.11 ELECTRICAL

18.11.1 No specific guidance identified.-

18.12 COMMUNICATIONS AND COMBAT SYSTEMS

18.12.1 Compatibility of combat systems and system design intent should be addressed at an early stage of module design/procurement.

18.12.2 Interface boxes may be required to ensure compatibility of services.

18.13 INTERFACES AND CONNECTIONS

18.13.1 If shock mounted, the module will displace significantly during shock events (see para 18.2.1), so any services must be flexibly mounted with margin to prevent damage to services.

18.13.2 Module electrical/mechanical demands should be understood and factored into host platform system design.

18.14 MARKINGS AND INFORMATION PLATE

18.14.1 No specific guidance identified.

18.15 MODULE ASSESSMENT AND INFORMATION PACKAGE

18.15.1 No specific guidance identified.

ANEP-99(A)(1)