



AUSTRALIAN GOVERNMENT

AUSTRALIAN DEFENCE STANDARD

DEF(AUST)1000C PART 9 / Issue 3

Dated June 2009

SUPERSEDING

DEF(AUST) 1000C PART 9 / Amendment
1 / Issue 2

Dated Mar 2004

ADF PACKAGING; PART 9 : REQUIREMENTS FOR REUSABLE CONTAINERS

STANDARD

*

PUBLISHED UNDER AUTHORITY
OF DEPARTMENT OF DEFENCE

DEPARTMENT OF DEFENCE NOTICE

**THIS ON-LINE PUBLICATION IS A CONTROLLED COPY
OF DEF(AUST)1000C, PART 9.**

**CONFIRM ISSUE STATUS BEFORE USE -
CONTACT LAND ENGINEERING AGENCY,
TECHNICAL DATA CENTRE**

<mailto:LEATechnicalData@drnex.defence.gov.au>

**WHEN PRINTED THIS PUBLICATION IS AN
UNCONTROLLED COPY AND IS NOT SUBJECT TO
UPDATE OR AMENDMENT ACTION.**

USAGE: Maritime Land Air

NSC: PACK

UNCONTROLLED COPY WHEN PRINTED

DEF(AUST)1000C PART 9 / Issue 3

DOCUMENT MANAGEMENT INFORMATION

Ownership and responsibility for approval and acceptance of this specification is detailed below.

Sponsoring Defence Group:	Army	
Sponsoring Organisation:	DMO	
Sponsoring Appointment:	LSD	
Specification Author:	Defence Packaging Committee	Approved: 4 Jun 09
Approval Authority:	DGLEA	Approved: 11 Jun 09
Executive Authority:	SES - LEA	Approved: 4 Jun 09

Prepared by the Defence Packaging Committee of the Defence Standardisation Coordination Group.

The following Government, and industry organisations were consulted during the preparation of this document:

ARMY, RAN and RAAF
Standards Australia
Potential Suppliers from Industry
Defence National Storage and Distribution Centre
Australian Institute of Packaging

This document is the property of the Department of Defence.

This document and associated documentation may be used only for specific enquiries, tenders or orders, placed by an Officer for the Department of Defence and is not to be used for any other purpose whatsoever, without the express written sanction of an Executive Authority of the Department of Defence.

No copies of this document in whole or in part may be made without the express written sanction of an Officer of the Department of Defence.

Any questions regarding this document should be addressed to the authority named in the tender schedule, contract or order.

Published by:
Army Standardisation

AMENDMENT LIST

AMENDMENT		EFFECTED	
NO	DATED	SIGNATURE	DATE

Revision Note

This document supersedes: DEF(AUST)1000C PART 9 Amendment No. 1

Revision Summary

(1) Minor formatting changes

(2) Additional data added

Deletion of reference to QSTAG 879 - Materials Handling Equipment

Deletion of reference to QSTAG 1033 - ABCA Materiel Configuration Policy

Deletion of reference to STANAG 4183 - NATO Metrication Policy

Deletion of reference to STANAG 4329 - NATO Standard Barcode Symbolologies

Additional data added includes:

[ANNEX C](#) - Link to (AECTP) 300, Method 302

[ANNEX D](#) - Link to (AECTP) 300, Method 309

[ANNEX E](#) - Link to (AECTP) 400, METHOD 407 MATERIAL TIEDOWN

[ANNEX F](#) - CHECKLIST No. 1 - REUSABLE CONTAINER - REQUIREMENTS

[ANNEX G](#) - CHECKLIST No. 2 - Criteria in Selection of Test Program for Reusable Containers

NOTE: Some page renumbering has occurred.

Historical Record

Original Issue **DEF(AUST)1000C PART 9**: Requirements for Reusable Containers dated July 2000

Second C issue DEF(AUST)1000C PART 9 Amendment No. 1 dated Mar 2004

Released on DMO – LSD Internet Aug 2005

Blank Page

AUSTRALIAN DEFENCE STANDARD

DEF(AUST)1000C

ADF PACKAGING;

PART 9 : REQUIREMENTS FOR REUSABLE CONTAINERS

June 2009

Prepared by the Defence Packaging Committee under the Authority of the Defence Logistics Committee

Specific inquiries regarding the application of this Standard to Requests for Tender or contracts should be addressed to the Procurement Authority named in the Request for Tender, or to the Quality Assurance Authority named in the contract, as appropriate.

This Standard is mandatory for use by the Australian Defence Organisation (ADO), and Contractors to the ADF.

This Standard implements the requirements of QSTAG 1156: Requirements for Reusable Containers.

This Standard supersedes DEF(AUST)1000C, PART 9 Amendment 1: Requirements for Reusable Containers.

WARNING (1)

This Standard may call for the use of substances and test procedures that may be injurious to health if adequate precautions are not taken. It refers to technical suitability only and in no way absolves the supplier or user from statutory obligations relating to health and safety at any stage of manufacture or use.

WARNING (2)

For timber products (ie packaging, dunnage and **plywood veneered products**) that are to be forwarded overseas please be aware of AQIS conditions on the export or import of timber products. Information on timber products is contained in DEF(AUST)1000, ADF Packaging, Part 10, AQIS Requirements, and AQIS Requirements for the Australian Wood Packaging Certification Scheme (IPSM-15) relevant information is contained at the following AQIS URL:

<http://www.daffa.gov.au/aqis/avm/military>

WARNING (3)

Environmental Impact / Materiel Minimisation.

In order to comply with Defence waste minimisation policy, users are reminded of their obligations to maximise use of recycled materials and the intent of the National Packaging Covenant in material decisions. Further information is available at : <http://www.defence.gov.au/environment> - waste

DEF(AUST)1000C is issued in 20 parts, with each part sub-divided into Sections. The 20 parts are:

PART 1:	General Information ¹
PART 2:	Packaging Requirements ¹
PART 3:	Packaging Practices and Materials ¹
PART 4:	Standard Packaging Test Procedures ¹

PART 5:	Marking of Packages ¹
PART 6:	Packaging of Dangerous Goods (Except Dangerous Goods Class 1); Packaging Requirements and Packaging Mediums ¹
PART 7:	Packaging for Materiel Susceptible to Damage by Electrostatic Discharge ¹
PART 8:	Defective Packaging Reporting System ¹
PART 9:	Requirements for Reusable Containers ¹
PART 10:	Australian Quarantine Inspection Service (AQIS) Requirements ¹
PART 11:	Unitisation ¹
PART 12:	Bar Code Symbolology ¹
PART 13:	Packaging Material Catalogue
PART 14:	Minimum Packaging Specifications of Commercial Items ¹
PART 15:	Packaging Specifications and Classification Systems ¹
PART 16:	Creative Brief Template
PART 17:	Packaging ILS Checklist
PART 18:	Life Cycle Analysis
PART 19:	Caching
PART 20:	Techniques for Deployment, Packaging and Storage for Tropical Conditions

¹ Denotes available at http://www.defence.gov.au/dmo/lcd/standards/def_aust_1000.cfm

Two or more parts may apply to any one packaging requirement and it is essential that all parts be considered and used where appropriate.

This Standard does not apply to the packaging of ammunition and explosives (for packaging information refer to EO Division- Munitions Branch). Further guidance available at URL: TBA

It should be noted that this standard might not be applicable to the packaging of materiel already covered by detailed contractual packaging or production data. Examples are, but not limited to, ammunition, explosives, non-commercial foodstuffs, POL, vehicles, small craft, clothing, arms, armament, telecommunications equipment and systems.

TABLE OF CONTENTS

REQUIREMENTS FOR REUSABLE CONTAINERS

Para No	Page
1. Introduction.....	11
2. Scope.....	11
3. Applicable Documents	11
4. Definitions	11
4.1 General.	11
4.2 Australian Quarantine Inspection Service (Aqis).	12
4.3 Cracking Pressure (Relief Valve).	12
4.4 Minimum Flow Rate (Relief Valve).	12
4.5 Re-Seal Pressure (Relief Valve).	12
4.6 Energy Absorbing Device.	12
4.7 Reliability.	12
4.8 Reusable Container.	12
5. Requirements / Criteria	12
5.1 General Requirements.	12
5.1.1 Handling Equipment.	12
5.1.2 Distribution Network.	12
5.1.3 Unit Load Compatibility.	12
5.1.4 Configuration Management.	12
5.2 Transportability Requirements.	12
5.3 Volume And Mass.	13
5.4 Materials And Manufacturing Methods.	13
5.4.1 Environmental Requirements.	13
5.4.2 Dissimilar Metals.	13
5.4.3 Rubber And Synthetic Rubber Parts.	13
5.4.4 Standard Parts.	13
5.4.5 Material Stability.	13
5.5 Internal Packaging Materials.....	13
5.5.1 Materials Compatibility.	13
5.5.2 Cushioning Materials.	13
5.5.3 Resilient Mounts.	13
5.5.4 Dynamic Characteristics.	13
5.5.5 Interchangeability.	14
5.5.6 Support Fasteners.	14
5.5.7 Fire Resistance.	14
5.6 Drainage.....	14
5.7 Ventilation.....	14
5.8 Closure Devices	14
5.9 Preservation.	14
5.10 Clean Room Requirements.	14
5.11 Classified Contents.	14

Para No		Page
5.12	Types Of Containers.	14
5.12.1	Closed Containers Without Auxiliary Barriers.	14
5.12.2	Closed Containers With Inside Barriers.	14
5.12.3	Integral-Barrier Containers.	15
5.13	Container Accessories.	15
5.13.1	Humidity Indicator.	15
5.13.2	Desiccant Receptacle.	15
5.13.3	Documents Receptacle.	15
5.14	Special Requirements For Non-Breathing Integral Barrier Containers	15
5.15	Special Requirements For Controlled-Breathing Integral Barrier Containers.	15
5.16	Special Requirements For Free-Breathing Integral Barrier Containers.	16
5.17	Dynamic Dehumidification.	16
5.18	Stacking.	16
5.18.1	Stacking Stability.	16
5.18.2	Stackability/Stacking Strength.	16
5.18.3	Safety Factor.	16
5.18.4	The Stacking Strength	16
5.18.5	Distributed Load.	17
5.19	Handling.	17
5.19.1	Handles.	17
5.19.2	Handle Characteristics.	17
5.19.3	Hoisting.	17
5.19.4	Hoisting Provisions.....	17
5.19.5	Tie-Down.	18
5.19.6	Skids.	18
5.19.7	Forklift Truck Compatibility.	18
5.19.8	Shipboard Handling.	19
5.20	Special Protection Devices.....	19
5.20.1	Temperature Control.	19
5.20.2	Protection Against The Effects Of Static Electricity.	19
5.20.3	Field-Force Protection.	19
5.20.4	Magnetic Shielding.	19
5.21	Container Surfaces Protection.....	19
5.21.1	Painting.	19
5.21.2	Exterior Surfaces.	19
5.21.3	Interior Surfaces.....	19
5.22	Container Markings.....	20
5.22.1	Container Identification Markings.....	20
5.22.2	Elucidation Of Identification Markings.....	23
5.22.2.1	Acquisition Instrument Identification Number.	23
5.22.2.2	Bar Code.	23
5.22.2.3	Configuration Item Identification (C11 Number).	23
5.22.2.4	Design Activity.	23
5.22.2.5	Identifying Number.	23

Para No		Page
5.22.2.6	Manufacturer's Identification (Nscm).	24
5.22.2.7	Nato Stock Number (Nsn)	24
5.22.2.8	Nato Supply Classification (Nsc) Number	24
5.22.2.9	National Item Identification Number (Niin)	24
5.22.2.10	Nato Supply Code For Manufacturers (Nscm)	24
5.22.2.11	Nomenclature.	24
5.22.2.12	Serial Number (Ser No).	24
5.22.2.13	Special Characteristics.	24
5.22.3.	Markings For Shipment And Storage.	24
6.	Test Requirements	24
6.1	General.	24
6.1.2	Test Report.	25
6.2	Dummy Loads.	25
6.3	Instrumentation Requirements.....	25
6.4	Fit And Compatibility.....	25
6.4.1	General.	25
6.4.2	Fit Test.	25
6.5	Mechanical Shock.....	25
6.5.1	General.	25
6.5.2	Acceptance Criteria.	25
6.5.3	Temperature Combined With Shock.	26
6.5.4	Drop Test.	26
6.5.5	Topple Test.	26
6.5.6	Bending Test.	26
6.5.7	Flexing (Racking) Test.	26
6.5.8	Horizontal Impact Test.	26
6.5.9	Impact (Horizontal) Test Stacked.	26
6.5.10	Transfer-At-Sea Shock Test.	27
6.5.11	Bounce (Wheeled Vehicle Transportation) Test.....	27
6.6	Vibration Test.....	27
6.6.1	General.	27
6.6.2	Acceptance Criteria.	27
6.6.3	Resonance Strength And Dwell Test.	27
6.7	Shock Mount Ageing.	28
6.7.1.	Salt Fog Test.	28
6.7.2.	Ozone Resistance Test.	28
6.7.3.	Air-Heat Ageing Test.	28
6.8.	Structural Integrity.....	28
6.8.1.	General.	28
6.8.2.	Pressure Test.	28
6.8.3.	Vacuum Test.	28
6.9.	Leakage Integrity.....	28
6.9.1	General.	28
6.9.2	Leak Test.	28

Para No	Page
6.10 Superimposed Load	29
6.10.1 General.	29
6.10.2 Stacking Test.....	29
6.10.3 Distributed Load Test.	29
6.11 Hoisting And Lifting Provisions, Tie-Down Attachment Points, Sling Lifting Features.	30
6.11.1 General.	30
6.11.2 Acceptance Criteria.	30
6.11.3 Hoisting Provisions Strength Test.	30
6.11.4 Container Hoisting Strength Test.	30
6.11.5 Lifting Provisions Strength Test.	30
6.11.6 Tie-Down Strength Test.	30
6.12 Fork-Lift Truck Compatibility Test.....	30
Publication Improvement Report And Reply (PIRR)	53

LIST OF ANNEXES

ANNEX A - VALVE, PRESSURE EQUALISING, GASEOUS PRODUCTS	31
ANNEX B - SUPERIMPOSED LOAD TEST (UNIFORMLY DISTRIBUTED, WITHOUT TOP DUNNAGE)	39
ANNEX C - (AECTP) 300, METHOD 302	43
ANNEX D - (AECTP) 300, METHOD 309	45
ANNEX E - (AECTP) 400, METHOD 407.....	47
ANNEX F - CHECKLIST NO. 1 - REUSABLE CONTAINER - REQUIREMENTS	49
ANNEX G - CHECKLIST NO. 2 - CRITERIA IN SELECTION OF TEST PROGRAM FOR REUSABLE CONTAINERS.....	51

LIST OF TABLES

TABLE 1 MARKING METHODS	22
TABLE 2 CRITERIA IN SELECTION OF MARKING METHODS	23
TABLE 3.....	29
TABLE 4 FIRST ARTICLE INSPECTION TESTS	35
TABLE 5 QUALITY, CONFORMANCE, INSPECTION, TESTS	35

LIST OF FIGURES

FIGURE 1 EXAMPLE OF IDENTIFICATION PLATE	20
FIGURE 2 EXAMPLE OF BARCODE MARKING	21
FIGURE 3 CONTAINER FOR ROUGH HANDLING TEST	38
FIGURE 4 TOP SUPERIMPOSED LOAD TEST	41

1. INTRODUCTION

1.1 Reusable containers are used for transport and storage of those items of supply, which are known or required to undergo repeated or frequent repair, maintenance, re-calibration, etc., during their life cycle. Reusable containers are both unit and shipping containers.

1.2 Reusable containers are typically used for packaging of the 'rotable' spares list for major equipment capabilities. For a combat vehicle the list of rotables required to be supplied in a reusable container for use within a closed distribution loop are identified as (but not limited to the following):

- (a) Axle assemblies and drive-shaft couplings;
- (b) Electrical components (batteries, lighting, etc);
- (c) Fire suppression systems;
- (d) Power packs (engine, gearbox and support assembly);
- (e) Radiators;
- (f) Seating;
- (g) Survival Enhancement Kits (SEK);
- (h) Transmissions and transfer cases;
- (i) Tyre assemblies including run-flat components;
- (j) Weapon systems;
- (k) Winches (if removable), and
- (l) Windows (including armoured types).

2. SCOPE

2.1 This publication establishes general and test requirements and design criteria relating to reusable containers for the military forces of the ABCA nations.

2.2 No part of this document is classified for security purposes.

3. APPLICABLE DOCUMENTS

3.1 Reference may be necessary to the latest issue of the following documents:

American, British, Canadian, Australian (ABCA) Documents

- QSTAG 360 - Climatic Environmental Conditions Affecting the Design of Military Materiel
- QSTAG 627 - Materials Handling in the Field

NATO documents Requests for QSTAG, STANAG & AECTP documentation are available at request from service Technical Data Centres (TDC) or at links provided in the relevant Annex.

- AECTP 300 - Allied Environmental Conditions and Test Publications Climatic Environmental Tests

- AECTP 400 - Allied Environmental Conditions and Test Publications Climatic Environmental Tests

ISO documents

- ISO 1431 - Rubber, Vulcanised or Plastics, Resistant to Ozone Cracking; Part 1 Static Strain Test

3.1.1 The Australian Macquarie Dictionary fourth edition, 2005 is the reference source for all terms used in this specification, except for those defined in this Definitions section.

4. DEFINITIONS

4.1 General. The terms used throughout this publication and their interpretation shall be in accordance with the following definitions. Other terms are defined in DEF(AUST)1000 PART 1.

- 4.2 Australian Quarantine Inspection Service (AQIS). Refer DEF(AUST)1000 PART 10.
- 4.3 Cracking Pressure (Relief Valve). The pressure(s) at which the container's relief valve first opens when subjected to a pressure differential, either pressure or vacuum.
- 4.4 Minimum Flow Rate (Relief Valve). The minimum rate of flow (expressed in m³/min.) required to allow a sufficient exchange of air through the relief valve in order to prevent damage to the container during handling, transportation and storage. (Minimum flow rate calculations shall be made in accordance with [ANNEX A](#), paragraph 3.6.3).
- 4.5 Re-seal Pressure (Relief Valve). The pressure(s) at which the container's relief valve reseals after being open (NOTE: In general, this pressure is lower than the cracking pressure).
- 4.6 Energy Absorbing Device. For the purpose of this publication, energy absorbing devices are defined as container components employed to provide shock and/or vibration isolation. They may be composed of elastomers bonded to metal parts, metals, plastic foams, or spring assemblies, and are commonly referred to as shock, elastomeric, or resilient mounts or isolators, and cushioning.
- 4.7 Reliability. The ability of an item to perform a required function under stated conditions for a specified period of time, i.e., two, ten, or one hundred physical trips.
- 4.8 Reusable Container. A shipping and storage container designed for reuse without impairment of its protective function and which may be repaired and/or refitted, (see DEF(AUST)1000, PART 1, Glossary of Packaging Terms).
- 4.8.1 The following documents form a part of this specification to the extent specified herein.
- 5. REQUIREMENTS / CRITERIA**
- 5.1 General Requirements. Reusable containers shall be designed to be consistent with:
- the specified packaging level or equivalent national packaging level in accordance with DEF(AUST)1000 PART 2;
 - the maintenance concept for the contents;
 - the planned distribution logistics of the contents;
 - to provide reliable protection at lowest life cycle costs to the contents; and
 - the advice and guidance on AQIS cleaning and inspection procedures for military equipment returning to Australia.
 - to provide reliable protection with minimum use of virgin materials in accordance with Defence's waste minimisation policy.
- 5.1.1 Handling Equipment. The container shall be designed to be compatible with:
- all other designated handling equipment used throughout the logistic system including that used to pack and unpack the container;
 - handling in the field in accordance with QSTAG 627.
- 5.1.2 Distribution Network. The container shall be designed to move without restriction, special routing, or special escort throughout the material distribution system whenever possible.
- 5.1.3 Unit Load Compatibility. Reusable container designs, which are to be formed into unit loads as a part of the logistic distribution plan, shall have features, which permit ready assembly into such unit loads.
- 5.1.4 Configuration Management. Configuration management practices shall be consistent with the requirements of QSTAG 1033.
- 5.2 Transportability Requirements. Reusable container designs shall reflect consideration of techniques for road, rail, air and ship loading, to ensure that applicable national and/or

international transportation requirements are met, and that transportation costs are minimised consistent with safety considerations and container integrity.

- 5.3 Volume and Mass. Containers shall be designed for smallest volume and lightest mass consistent with protection of contents, durability, intended use, safety, and economy.
- 5.4 Materials and Manufacturing Methods. Commercially available standard materials and manufacturing processes are preferred whenever feasible. The application of technological advancements in materials and processes is encouraged where economically justified.
- 5.4.1 Environmental Requirements. Where possible, low-ecological impact materials, which can be recycled, shall be used. Cadmium plating is not acceptable.
- 5.4.2 Dissimilar Metals. Dissimilar metal combinations causing corrosion should be avoided.
- 5.4.3 Rubber and Synthetic Rubber Parts. All rubber and synthetic rubber parts of shock mounts shall bear a cure date in addition to any other required markings. The maximum age of rubber and synthetic rubber parts shall not exceed one year from date of cure when installed in the container.
- 5.4.4 Standard Parts. Standard parts shall be used unless they are technically or economically impractical.
- 5.4.5 Material Stability. All material used shall be stable after prolonged exposure to extremes of temperature and humidity which may be reasonably encountered during the expected logistic life cycle. In this sense, stability shall be considered after return to room conditions and shall be construed as freedom from the following defects:
 - (a) Change of state of the material, e.g. crystallisation, hydrolytic conversion, etc;
 - (b) Permanent cracking or any damage which would impair the functional performance of the container; and
 - (c) Significant changes in physical properties, e.g. modulus of elasticity.

The environmental extremes to which the container shall be exposed during storage and transportation are described in the definitions of the levels of packaging. DEF(AUST)1000, PART 2, defines these levels of packaging and provides information on the equivalence of the ABCA levels with national levels.

- 5.5 Internal Packaging Materials
- 5.5.1 Materials Compatibility. Internal packaging materials shall not adversely affect the contents because of incompatibility of chemical and hygroscopic properties. Internal materials shall not be placed in direct contact with contents surfaces sensitive to ruggedness or abrasion.
- 5.5.2 Cushioning Materials. Whenever practical, materials conforming to nations specifications shall be used. In selecting a cushioning material for a specific application, consideration shall be given to the following:
 - (a) Cushion assemblies shall be suitably located in or attached to the interior of the containers so that cushioning is applied at the intended areas. The attachment shall not be so permanent as to prevent replacement of the cushion.
 - (b) Moulded cushioning shapes having a skin shall only be in contact with the packaged item if material compatibility exists and if consistent with other objectives of the cushion.
 - (c) Cushion creep shall be consistent with the life cycle of the container.
- 5.5.3 Resilient Mounts. Resilient mounts shall be designed to meet the specified shock and vibration requirements. The resilient materials shall be resistant to ageing and deterioration and shall be capable of meeting all performance requirements following exposure to the tests of paragraph 6.7.
- 5.5.4 Dynamic Characteristics. Materials for use in shock or vibration attenuation systems (see paragraph 4.4) shall protect the contents to fragility levels established by the designer of the contents. Testing of the container and of the internal shock/vibration attenuation system shall be performed to ensure that the contents will be adequately protected to the fragility level specified and that the container will be capable of meeting the applicable test requirements of paragraph 6.5 and 6.6.

- 5.5.5 Interchangeability. All parts of one specific type of container shall be directly and completely interchangeable with the respective parts of another container of the same type with respect to installation and performance.
- 5.5.6 Support Fasteners. All fasteners used in the primary support structure shall have provisions to prevent loosening, such as self-locking nuts, safety wiring, or other suitable devices.
- 5.5.7 Fire Resistance. Containers intended for use aboard ships shall be constructed from noncarcinogenic flame retardant materials.
- 5.6 Drainage
- 5.6.1 When applicable, free drainage shall be provided in the normal storage position. All pockets on the exterior of containers in which water can collect shall have provisions for drainage. Where a metal or plastic container is of such size that water cannot be conveniently poured out of the bottom, a drain plug shall be provided.
- 5.6.2 Metal containers that have all faying (contact or overlapping) surfaces and discontinuous welds filled with sealing compound are not permitted.
- 5.7 Ventilation
- 5.7.1 Where applicable and suitable, ventilators shall be placed in the ends of non-watertight and non-water-vapourtight containers, but in such a fashion as not to interfere with primary structural members. Louvered metal ventilators, slotted ventilators, or drilled hole ventilators shall be screened on the inside with galvanised or aluminium wire mesh with apertures of less than 10 mm. Slotted ventilators (without external louvers) and drilled hole ventilators shall also be furnished with an exterior baffle structure designed to trap driving rain, draining to the outside. Except for timber sheathed crates, total surface area of ventilating openings shall be not less than 35 cm² per m³ of container volume. Maximum size of any slot in a ventilator shall be 100 mm x 300 mm.
- 5.7.2 For timber sheathed crates, drilled hole ventilators may be used, with each hole drilled upward as viewed from the outside at a 45° angle. Holes shall be 20 mm ± 2 mm in diameter. The number of holes shall be not less than one hole per 0.6 m³ of the container volume. Holes may be clustered in each end or may be uniformly spaced about the periphery of the container. Containers with cross ventilation should have at least one opening on two opposite sides.
- 5.8 Closure Devices
- 5.8.1 Whenever possible, latches or other closure fasteners shall permit rapid opening and closing as well as rapid packaging and unpacking preferably without the use of tools.
- 5.8.2 All fasteners shall be captive and shall be either recessed or provided with a protective guard. The requirement for rapid opening and closing may be waived for those containers which will not be opened frequently for maintenance or inspection of the contents and which contain items not likely to be urgently needed.
- 5.9 Preservation. Containers shall be designed to be compatible with methods of preservation selected to afford the level of packaging specified for the contents.
- 5.10 Clean Room Requirements. When required, the container system shall be designed to be compatible with nationally defined clean-room requirements and to maintain required component cleanliness during shipment and storage.
- 5.11 Classified Contents. When the contents of a container are classified, the container shall be designed to enable detection of unauthorised entry, as for example by lead wire security seals.
- 5.12 Types of Containers. The nature of the contents and the expected logistic environment determine the type of container and its closure and sealing requirements. Design criteria for the various classes of container sealing are provided in the following subparagraphs.
- 5.12.1 Closed Containers without Auxiliary Barriers. These are boxes or sheathed crates. They do not provide climatic but only physical and mechanical protection.
- 5.12.2 Closed Containers with Inside Barriers. These containers are boxes and sheathed crates fitted with an inside waterproof or water vapour proof barrier sealed on all sides, bottom, and top, and dehumidified by desiccants contained therein, or not dehumidified and shall provide preservation

in accordance with Methods of Preservation 3, 5 and 6 as defined in DEF(AUST)1000 PART 3, ANNEX C.

- 5.12.3 Integral-Barrier Containers. These containers use their walls to form the protective barrier. The choice of a specific form of integral barrier (non-breathing, controlled-breathing, free-breathing, or dynamic dehumidification) depends on the total-size of the container, the expected logistic flow, and cost effectiveness. The controlled breathing type shall be used unless otherwise specified. The following features shall be provided in all integral barrier containers:
- (a) Mating surfaces resistant to mechanical damage and prevents gasket overloading.
 - (b) Assembly guides when appropriate to ensure alignment of mating surfaces and to prevent shear action on gasket surfaces
 - (c) Preformed gaskets or seals that can be readily replaced and which are retained in place by the structure.
 - (d) Gaskets compatible with any contents of the container, service liquid lubricants, or liquid fuels shipped therewith. Moulded one-piece gaskets are preferred but joints may be cemented or joined by vulcanising, provided the joints are of the same dimensions.
 - (e) Container design to permit sufficient seal compression to achieve required sealing and shall limit compression to preclude unacceptable compression set on the seal material. Current solid silicone seal gasket designs require 15 to 25 percent compression for proper sealing, and 30 percent maximum compression to limit compression set over 15 years lifetime.
 - (f) Container structure, closure devices, and similar equipment designed to meet the pressure and test requirements of paragraph 6.8.
 - (g) Container watertightness. The leakage integrity shall meet the test requirements of paragraph 6.9. The test container shall therefore be provided with a pressurising fitting for pressure testing.
- 5.13 Container Accessories. Valves (except drain valves), humidity indicators, document receptacles, desiccant receptacles, and pressure fittings that are subject to routine inspection shall be grouped in one end of the container, unless the size of the container would warrant placement of an accessory item at more than one location. All covers for such features shall be captive and replaceable without removal of the primary container cover.
- 5.13.1 Humidity Indicator. A humidity indicator shall be provided in all dehumidified packages. The inside of the container shall be configured to provide free access of the enclosed air to the indicator. Electrical humidity-indicating devices may be used provided the logistic flow indicates prolonged storage in one place or use of dynamic dehumidification. The humidity indicator must be readable from outside. In case of closed containers with auxiliary barriers, a corresponding opening in the container wall with a readily accessible cover shall be provided.
- 5.13.2 Desiccant Receptacle. A refillable enclosure for bagged desiccant shall be provided when specified. The size of the enclosure shall allow room for a minimum of one 8 unit¹ bag of desiccant. Ensure that air enclosed in the container has free access to the desiccant bed. The receptacle shall be easily refillable from the outside of the container. Therefore, a rectangular or circular opening of the minimum dimension of 100 mm is recommended. The desiccant receptacle shall be located as far away as possible from the humidity indicator.
- ¹ US unit of desiccant
- 5.13.3 Documents Receptacle. When the contents are to be accompanied by pertinent documents, a suitably sized watertight receptacle shall be provided. The contents of the document receptacle shall be accessible from outside without opening the container.
- 5.14 Special Requirements for Non-Breathing Integral Barrier Containers. A simple, manually operated bleeder valve to equalise pressure before opening shall be provided.
- 5.15 Special Requirements for Controlled-Breathing Integral Barrier Containers. Unless otherwise specified, each container shall be provided with a pressure and a vacuum relief valve in accordance with [ANNEX A](#). A simple, manually operated bleeder valve shall also be provided to

equalise pressure before opening. This valve may be integral with any required automatic relief valve. The valve shall have cracking pressures of 17.2 ± 1.72 kPa and -10.34 ± 1.03 kPa for pressure and vacuum -relief, respectively. Reseal pressure shall be 13.8 ± 1.72 kPa for pressure relief and -7.0 ± 1.72 kPa for vacuum relief. Container design requirements must comply with the design testing requirements in paragraph 6.9. When justified by operational requirements, cracking and reseal pressures may be adjusted accordingly.

- 5.16 Special Requirements For Free-Breathing Integral Barrier Containers. Free-breathing should be considered only for very large structures where pressure tightness of the order of 7.0 kPa (700 mm water) is not a practical design solution. A refillable desiccant breather unit for each container shall be provided. The breather unit shall have the following general characteristics:
- (a) Designed to accommodate 1 kg of desiccant per m^3 of empty container volume.
 - (b) A breather valve incorporated into the desiccant port cover so that the inlet air is forced over the desiccant bed.
 - (c) A sight glass on the container side of the desiccant bed with coloured desiccant or humidity indicator card to indicate desiccant saturation.
 - (d) End filters and plenum chambers to ensure airflow distribution over the full surface of the bed. Filter characteristics shall be determined by cleanliness requirements of internal voids and desiccant particle size.
 - (e) Spring-loaded devices or their equivalent to prevent development of voids in the breather charge resulting from packing or reduction of charge particle size.
 - (f) Openings to the ambient environment that face downward and have a length-to-diameter ratio of at least 10 to 1.
 - (g) Minimum flow rate through the breather of 6 percent of contained volume-per-minute at ambient pressure.
- 5.17 Dynamic Dehumidification. Dynamic dehumidification shall be used only when necessary power sources will be available throughout the logistic system applicable to the contents. Capacity shall be such as to remove not less than 23 mg of water per hour for each 1 m^3 of container capacity on the assumption that the container air is at 21 °C and 35 percent relative humidity.
- 5.18 Stacking. Containers shall be capable of being stacked for prolonged periods and of meeting the specified test requirements.
- 5.18.1 Stacking Stability.
- 5.18.1.1. Design features shall ensure a stable stacking configuration. Stacking stability provisions shall, in general, include positive means for restricting relative displacement under impact loads encountered in the shipment of multiple packages. Where the interface between like containers is wood-to-wood, fibreboard-to-fibreboard, or combinations of these two materials, reliance may be placed on friction and palletising or carloading procedures. Metal and plastic containers shall be provided with interlocking dimples, ribs, or panels. Provision shall be made for banding which prevents movement of stacked containers.
- 5.18.1.2. Stacking brackets with lips for lateral restraint shall be provided. The design shall allow for the application of tie bars that secure containers together for carloading or truckloading.
- 5.18.2 Stackability/Stacking Strength. Unless justified by logistic considerations, each container shall be designed to support a load of like containers placed thereon. The container shall be designed for a load equivalent to a stacking height:
- of 2 m for containers up to 15 kg gross mass
 - of 4 m for containers over 15 kg gross mass
- 5.18.3 Safety factor. A factor of 1.5 shall be used for NATO packaging level 1 and 2 (Australian level A) containers to be stowed or transported aboard ships.
- 5.18.4 The stacking strength shall be tested in accordance with paragraph 3.5 and 6.10.2.

- 5.18.5 Distributed Load. The top structure of large, flat-topped containers, such as sheathed crates, shall be designed to carry a uniformly-distributed, long-term static load equivalent to that required in paragraph 5.18.2 and shall be tested in accordance with paragraph 6.10.1 and 6.10.3.
- 5.19 Handling. Containers shall be provided with lifting, hoisting, and tie-down provisions commensurate with their gross mass, size, and intended mode of transportation to ensure safe and efficient movement. Riveted connections shall be used only in pure shear applications.
- 5.19.1 Handles. Handles shall be provided on all containers between 20 and 75 kg gross mass. If four handles are required, they shall be located conveniently above the centre of gravity on the long side for two-man lifting. If two handles are used, they shall be located on the short sides perpendicularly above the centre of gravity.
- 5.19.1.1. When required by the design activity, handles or handholds may be put on containers of under 20 kg gross mass to permit convenient one-man handling. Containers may employ moulded-in or structurally integral handles.
- 5.19.1.2. Where applicable, handles should be recessed within the structural element of the container to provide protection from impact damage
- 5.19.1.3. Testing. Handles shall be tested in accordance with paragraph 6.11.1, 6.11.2 and 6.11.3.
- 5.19.2 Handle Characteristics. Handles shall have the following strength and design features:
- (a) They shall fold down against the side of the container to prevent accidental impact damage when not in use and stop open at approximately a 90° angle when extended.
 - (b) The grip diameter for handle loads in excess of 18 kg shall be a minimum of 13 mm.
 - (c) The clear inside dimension shall be a minimum of 133 mm in length and 76 mm in depth. The use of wire rope handles is unacceptable.
 - (d) When handles are used to lift the loaded container, each handle shall be capable of lifting three times the total gross mass by single-point suspension.
 - (e) Handles used to lift unloaded containers or covers shall be clearly labelled to avoid misuse, and strength requirements shall relate only to the gross mass of the object to be lifted.
- 5.19.3 Hoisting. Means shall be provided for hoisting all containers weighing more than 75 kg gross.
- 5.19.4 Hoisting provisions shall have the following characteristics and be located as follows:
- (a) Hoisting provisions shall result in safe and stable handling compatible with the intended logistic cycle.
 - (b) Containers intended for transfer at sea shall be compatible with the transfer system.
 - (c) Containers intended for shipboard use shall have provisions to make them compatible with common shipboard handling equipment used in limited access storage areas.
 - (d) Lifting eyes and multipurpose eyes on containers intended for external lift by rotary-wing aircraft shall be provided if required.
 - (e) Hoisting provisions shall meet the minimum hoisting strength requirements. Each hoisting point shall be capable of lifting three times the total gross mass of the container.
 - (f) Hoisting provisions, which are to be used as tie-down provisions, shall meet the strength requirements of tie-down provisions.
 - (g) Where containers are to be assembled into unit loads without pallets, the set of hoisting provisions shall be capable of supporting five times the total gross mass of the unit load.
 - (h) Hoisting provisions shall be placed as far from the loaded Centre of Gravity as practical to provide the greatest handling stability. Consideration shall be given to specific hoisting sling configurations, which may be used so that the spacing of the hoisting provisions will not result in sling leg angles with the horizontal of less than 30 degrees.
 - (i) Unless the configuration of the hoisting sling is known, the strength of the fittings and supporting structure shall be banded on sling leg angles of 30 degrees to the horizontal.

- (j) Hoisting provision design shall prevent protrusion beyond the container envelope when not in use.
 - (k) Hoisting provisions shall not be placed at locations which require the container closure fitting to carry the lifting loads; i.e., containers having a removable section or cover shall not have the hoisting provisions located on this section or cover.
 - (l) Rings or eyes shall have a clear inside diameter of at least 64 mm where feasible. The use of wire rope cables and straps for lifting devices is unacceptable. The lifting device shall use a solid piece of material.
- 5.19.4.1. The hoisting provisions shall be tested in accordance with paragraph 6.11.1, 6.11.2 and 6.11.3 additionally when also serving as tiedown provisions, in accordance with paragraph 6.11.6.
- 5.19.5 Tie-down. A minimum of four tie-down provisions shall be provided on all containers having a gross mass of 450 kg or more. Tie-down attachment design shall be guided by the following:
- (a) Tie-down provisions for containers to be shipped by air shall be compatible with the attachment points on aircraft floors which, in general, have a capacity of 2270 kg or greater and are placed on 510 mm \pm 3 mm centres.
 - (b) Where tie-down provisions are required, not less than two each on the longest sides shall be used.
 - (c) Tie-down provisions shall be located as high on the container structure as practical to provide optimum balance of restraint vectors.
 - (d) Clear inside diameter of the tie-down provisions shall be the same as that required for the hoisting provisions (see paragraph 5.19.3).
 - (e) Tie-down provisions shall be tested in accordance with paragraph 6.11.1, 6.11.2 and 6.11.6.
- 5.19.6 Skids.
- 5.19.6.1. Skids or rubbing strips shall be provided on all containers of over 1m in the longest dimension or exceeding 75 kg gross mass. They shall be arranged to permit handling by forklift trucks and shall permit easy blocking and bracing in railcar loading and truck loading. Preferred orientation of skids is parallel to the long dimension of the container base if consistent with meeting capability requirements.
- 5.19.6.2. Skid attachments shall be tested in accordance with paragraph 6.5.1, 6.5.1.1, 6.5.8 and 6.5.9, and paragraph 6.12 as applicable.
- 5.19.7 Forklift Truck Compatibility. Provisions shall be made to permit access and handling by forklift truck. The following features shall be provided:
- (a) Containers of over 1m in the longest dimension or over 75 kg gross mass shall be capable of being handled safely from at least two sides four-way entry is preferred but limited to 1200 mm container length and width respectively by fork-lift trucks of rated capacity appropriate to the gross mass and geometry of the container.
 - (b) Container with a length greater than 2.44 m, which is handled aboard ship, must have enclosed fork tine pockets at the opening only. Unless otherwise specified, the dimensions of each pocket (height and width) shall be 100 mm x 150 mm +10 / -0 mm. When specified for containers intended for use on ships or in other areas having restricted movement, the dimensions shall be 100 mm x 380 mm +10 / -0 mm. The openings shall be spaced 760mm +10 / -0 mm apart with the centre of gravity located between the inside edge of the fork-lift pockets.
 - (c) If the container fork pockets are to be used for unitizing or tie-down, special consideration should be given to the loads and forces, which are involved. The maximum inside-to-inside dimension shall be 508 mm. Wooden or wood-reinforced containers may have a single opening 1 metre wide or more to provide fork-lift access.
- 5.19.7.1. Fork-lift truck compatibility shall be tested in accordance with paragraph 6.11, 6.11.1, 6.11.2, and 6.11.3 and paragraph 6.12 as applicable.

- 5.19.8 Shipboard Handling. Containers of over 135 kg gross mass or 90 cm length which are intended to be end-handled by mechanical means aboard combatant or auxiliary naval ships shall have special provisions for handling and stowage in confined and limited access storage areas:
- (a) A fitting at each end of the container shall be provided to permit handlift truck handling. Each container fitting shall be capable of supporting three times the maximum mass that it is required to support. The container structure shall be sufficiently stiff to permit a minimum clearance of 75 mm between the bottom of the container and a level deck with the handlift truck in its fully elevated position and, when tested, in the configuration in which it will be used, i.e., with or without cover applied. The fitting and container structure shall meet the specified strength and test requirements.
 - (b) Additionally, the container must include features for the sling lifting of the container from the Centre of Gravity at two points. The centre lift points shall be located on the container base, which eliminates the possibility of loading/lifting the entire load through the latches/fasteners.
- 5.19.8.1. Sling lifting features shall be tested in accordance with paragraphs [6.11.1](#), [6.11.2](#) and [6.11.4](#).
- 5.20 Special Protection Devices.
- 5.20.1 Temperature Control. Special provisions for controlling or limiting the extremes of temperature within a container shall be avoided. In those cases where such provisions may be justified and specifically required by the design activity, they shall be as simple and as light-weight as possible. Detailed design requirements shall be established on a case-by-case basis by the design activity by consideration of the thermal properties of the item to be protected and the temperature environment in which it must survive.
- 5.20.2 Protection Against The Effects of Static Electricity. The container intended for the protection of contents sensitive to the effects of static electricity shall be designed to comply with the requirements of DEF(AUST)1000, PART 7 and with the rules provided therein for loading and unloading such containers and handling the contents. In particular, the effect of static electricity on the contents of the container and the environment in which it will be unloaded shall be considered in the design of the containers. Solid propellant motors normally do not require bonding to the container or grounding while in the container. In those instances where a potential hazard exists, the design shall prevent build-up of a static charge or provide a conducting path to ground by one or more of the following practices:
- (a) Firm metal-to-metal contact to provide an acceptable ground;
 - (b) Items suspended in a shock-mounted cradle are grounded to the container structure;
 - (c) If the container structure is non-metallic, a clearly identified metallic external grounding connection shall be provided;
 - (d) Maximum resistance of the ground path shall be 1 Ohm
 - (e) Materials in contact with the package contents (bare item) shall satisfy the requirements of DEF(AUST)1000, PART 7.
- 5.20.3 Field-Force Protection. When the contained item is susceptible to damage from electrostatic, electromagnetic, magnetic, or radioactive forces, the container shall be designed to provide the required protection from the appropriate field force.
- 5.20.4 Magnetic Shielding. Containers for items which are considered magnetic and which may be shipped by air shall be provided with appropriate shielding.
- 5.21 Container Surfaces Protection.
- 5.21.1 Painting. When required, e.g. for protection against corrosion or against emission of infrared emission, or to provide camouflage, shall meet health and environmental protection guidelines.
- 5.21.2 Exterior surfaces. When applicable, may be painted with a chemical agent resistant coating (CARC). For aluminium containers, glass bead blasting may be considered as a means to reduce life cycle maintenance costs of the containers in lieu of painting.
- 5.21.3 Interior surfaces of closed containers need be painted with primer only.





5.22 Container Markings

5.22.1 Container Identification Markings.

5.22.1.1. The identification marking may include the markings listed in FIGURE 1. The marking may be applied to an identification plate (Fig. 1) whenever suitable. The identification plate shall be securely fastened to the container wall in such a manner as to allow its being visible during storage, handling and transportation operations. Marking methods and criteria for their selection are contained in TABLES I and II.

5.22.1.2. Additional information may be integrated into the identification plate or may be applied adjacent.




5.22.1.3. Permanent information including bar coding may be included on a plate separate from the variable information plate (FIGURE 2).

1>---	---	C11234567	SER NO:			
					<--	--<2
			12345678		<--	--<3
4>---	---	CONTRACT NO: F33657-92-G-0310				
5>---	---	RADAR SEARCH, MOBILE, AN/000-2				
6>---	---	115V 50-2000 KHZ				
7>---	---	DESIGN ACT.				
		PART NO:	12345			
8>---	---					
9>---	---	55B23456789-10				
10>---	---	MFR:				
11>---	---		54321			
		NSN:				
12>---	---					
13>---	---	5840243864567				
				PL: 2	<--	--<14
				FR	<--	--<15

- 1> Configuration item identification
- 2> Bar code - serial number
- 3> Serial number
- 4> Acquisition instrument identification number
- 5> Nomenclature (item name and type designation).
- 6> Special- characteristics
- 7> Design activity (NSCH)
- 8> Bar coded - identification part number
(when NATO stock number not available)
- 9> Identification part number
- 10> Bar coded - manufacturer identification (NSCM)
- 11> Manufacturer NSCM
- 12> Bar coded - NATO stock number
- 13> NATO stock number
- 14> Packaging level (PL)
- 15> Government ownership designation

NOTES	
1	This example is given only as a guide and should not be considered a mandatory format
2	Bar code density will be 2.56 to 3.70 cpcm height minimum 3.175 mm.
3	Item 3, 9, 11, and 13 shall be used for Human Readable Interpretation (HRI) purposes for the associated bar code

Figure 1
Example of identification plate

SER NO:	 ABCDE123456
NAME :	CONTAINER, RADAR
CONTR:	F33657-92-G-0310
NSCM:	 MASS: 50 KG 12345
PART NO:	 5950242341234
MFR BY:	LEE STEEL LTD CA NAVY NAVSEACOM

NOTE: All bar codes contain "START/STOP" characters that are not printed in the human readable - interpretation. Therefore, a bar code that appears to be 13 characters long is actually 15

Figure 2
Example of bar code marking identification plate

Table 1 MARKING METHODS

(This table is given only as a guide and these methods are not mandatory)

MARKING METHODS	DEPTH OF MARKING (mm)	RECOMMENDED USE
Metal stamp	0.30	Metal or nonmetal parts that will not deform under the stamping pressure required. Also, the alteration of the surface roughness finish will not be detrimental to proper functioning.
Engraving	0.10 - 0.30 0.30 - 0.40	Sheet metal fabrication that will deform if metal stamped. Functional markings with coloured filler.
Electric arc pencil	0.20	Sheet metal fabrication that will deform if metal stamped, irregular surfaces.
Embossing		Thin sheet metal, plastic on non-functional surfaces.
Cast or forged	0.30 - 1.0	Castings or forgings - characters raised or depressed depending on method of manufacture, unless otherwise specified on the drawing. Markings should be used on non-machined surfaces only.
Moulded	0.10 - 0.30	Usually plastic or rubber parts, may be either raised or depressed, unless otherwise specified.
Electro-chemical etch (electrolytic process)	0.001	Characters normally depressed, but may be raised. Used on fine surface finishes without protective coatings, also high hardness parts (RC 50 or higher).
Stencil - Rubber Stamp and Ink / paint	N/A	Fabrics, woods, plastics. On metal parts with protective finishes (i.e., phosphate) cover with clear lacquer. Apply before oiling. Also temporary markings; work in progress.
Decalcomania	N/A	Instructional plates, part identification, when other methods are not suitable, temporary marking - protect with clear lacquer. Apply before oiling.
Metal or plastic tags	N/A	When other methods are not suitable.

NOTES:

1. For bar-code application, reference DEF(AUST)1000, PART 12.
2. Polymerising inks, paints, epoxies, or urethane may be used without an overcoat when specified by the contract or controlling specification. Apply any of these methods before oiling.

Table 2 Criteria in selection of marking methods

(This table is given only as a guide and these criteria should not be considered mandatory.)

PROTECTIVE FINISH	SURFACE ROUGHNESS	MARKING METHOD	REMARKS
No protective finish or coating of light oil applied after marking.	3.2 mm or coarser	Cast, forged, moulded	Specify raised or depressed only when necessary, use on non-machined surfaces.
		Metal stamp	On machined surfaces.
	Less than 3.2 mm to 1.6 mm	Moulded Engraved metal stamp Electro arc pencil	Remove raised metal or burrs by light stoning if necessary for satisfactory functioning.
	Finer than 1.6 mm	Electro-chemical etch (electrolytic process)	Specify depressed when marking a functional surface.
Phosphate dry film, anodise or plating.	3.2 mm or coarser	Cast, forged, moulded, metal stamp	As above, plus mark prior to application of finish
	Less than 3.2 mm to 1.6 mm	Moulded. Engraved metal stamp. Electric arc pencil	As above, plus mark prior to application of finish.
	Finer than 1.6 mm	Decalcomania	Apply over protective coating before oiling, cover with clear lacquer.
	All surfaces	Rubber stamp. Stencil	Apply over protective coating before oiling, cover with clear lacquer.
Paint.	All surfaces	Rubber stamp. Stencil Decalcomania	Apply over protective coating before oiling, cover with clear lacquer.
Epoxy or urethane coating.	All surfaces	Rubber stamp. Stencil Marking machine Decalcomania Hand brush	For marking of printed wiring boards and assemblies. Epoxy base fungus resistant, non-conducting ink may be used.

5.22.2 Elucidation Of Identification Markings

- 5.22.2.1. **Acquisition instrument identification number.** The Government acquiring activity's contract or purchase order number. When an order shows both a contract number and a purchase order number, the number shall be as specified by the acquiring activity.
- 5.22.2.2. **Bar code.** An array of rectangular bars and spaces in a predetermined pattern.
- 5.22.2.3. **Configuration item identification (C11 number).** The alpha number assigned to identify a configuration item. When assigned, it is the unchanging base number to which serial numbers are assigned.
- 5.22.2.4. **Design activity.** The activity having responsibility for the design of an item. It may be a Government activity, contractor, vendor, or others
- 5.22.2.5. **Identifying number.** The number used to identify an item. It is assigned by the design activity whose engineering drawings, specifications, standards, and inspection requirements control the

design of the item. It may be a specification, drawing, part, model, type, catalogue, etc., number depending on the numbering system of the design activity.

- 5.22.2.6. **Manufacturer's identification (NSCM).** The actual manufacturer's name.
- 5.22.2.7. **NATO stock number (NSN).** The NSN is a 13-digit number divided into two parts:
- 5.22.2.8. **NATO supply classification (NSC) number.** The first four digits are the NSC number and establish its relationship to other items identified within the same NSC.
- 5.22.2.9. **National item identification number (NIIN).** The last nine digits are the NIIN. This is a semi-significant number of which the first two digits are the National Codification Bureau code identifying the country assigning the number. The remaining seven numbers are a non-significant serially assigned number. The NIIN fixes the identity of an item of supply and differentiates it from all other items of supply.
- 5.22.2.10. **NATO supply code for manufacturers (NSCM).** The five character alpha numeric code that is assigned to an organisational entity, located in a country other than the United States or Canada, that maintains design control or is a source of supply for items acquired by agencies of the NATO member nations and other participating friendly governments.
- 5.22.2.11. **Nomenclature.** Unless otherwise specified by the acquiring activity, the nomenclature shall be the approved item name listed in the Government type designation (if assigned by the acquiring activity) plus such additional words as may be necessary for identification. Where space precludes the spelling out of the nomenclature, abbreviations may be used except that the basic noun or noun phrase shall be spelled out.
- 5.22.2.12. **Serial number (SER NO).** The unique notation, which identifies a single unit of a family of like units, normally assigned sequentially. The identifier "SERNO" may be used to avoid confusion with other identifiers, where marking space allows.
- 5.22.2.13. **Special characteristics.** The pertinent rating, operating characteristics, and other information necessary for identification of the item.
- 5.22.3 **Markings For Shipment And Storage.** All markings shall be applied in accordance with DEF(AUST)1000, PART 5. As required, all basic instructional and operating caution markings for safe, expeditious handling and use of the container shall be provided:

These markings may include:

- Centre of Gravity,
- Forklift and stacking points,
- Identification of any special sling needed,
- Document receptacle,
- Desiccant receptacle,
- Pressure relief valves,
- Humidity indicator,
- Hoisting and tiedown attachment points,
- Warning notes,
- Instructions for opening, closing and re-pressurising the container.

6. TEST REQUIREMENTS

- 6.1 **General.** The complete container shall be tested in order to confirm the required properties. A test program shall be developed which reflects the constraints of that environment in which the container will be later used. The following section contains:
 - the criteria for the selection and application of the test methods to be applied,
 - the test severity requirements, and
 - the criteria for the acceptance of test results.

- 6.1.1 The test requirements defined below apply to all containers except containers for special purposes or special contents such as ammunition, nuclear weapons, etc
- 6.1.2 Test Report. Unless otherwise specified a test report of results shall be provided for First Article Testing. The test report will be used as the basis for Type test approval between contractor and the ADO.
- 6.2 Dummy Loads.
- 6.2.1 Dummy loads may be used during container development and testing when:
- items of supply are not available,
 - items are very sensitive to the testing constraints and damage to these items must be anticipated, and
 - items are too expensive to be used as test package contents.
- 6.2.2 The dummy characteristics specified below shall be identical to those of the object (item) being simulated (within the tolerance envelope of the real end items):
- 6.2.2.1. Envelope dimensions.
- 6.2.2.2. Mounting points or external hard area geometry and strength.
- 6.2.2.3. Mass, centre of gravity, and radii of gyration in the three principal axes.
- 6.3 Instrumentation Requirements
- 6.3.1 When required, the contained item shall be suitably instrumented and data shall be collected during testing to ensure established fragility levels are not exceeded. Unless otherwise specified, shock spectra in the major directions assuming not more than 5% damping shall be obtained either at the centre of gravity, at the extremities of the dummy load, or at points at which the fragility is clearly defined.
- 6.4 Fit and Compatibility.
- 6.4.1 General. The container shall be designed to be compatible with the contained item. It shall permit easy loading and unloading. It shall be compatible with the normal logistic patterns for its contents as well as with any special requirements being specified as design constraints. The container shall be designed so that the intended load will fit securely but without interference or binding. It shall support and restrain the item at points and by methods, which are not likely to result in damage due to careless manipulation or handling. Loading and unloading shall be a simple process by the handling equipment intended to be available at the points of use.
- 6.4.2 Fit Test.
- 6.4.2.1. This test shall be conducted by bringing together the container and the intended contents (load). The load shall be placed in position and the container shall be assembled in its normal shipping condition by fitting the cover, fastening all restraining devices, putting desiccant in place, and otherwise completely securing the container for shipment. The container shall then be unloaded.
- 6.4.2.2. Only the normal handling equipment likely to be available at points of loading and unloading may be used. Care shall be exercised to ensure that both the container and the load are representative of the final configuration and that normal dimensional variations are considered.
- 6.4.2.3. A lack of 'fit' or extreme awkwardness during the necessary loading and unloading process is cause for rejection. Loading and unloading times shall be recorded if such times are a specified design constraint. Not meeting specified loading or unloading times with the specified number of appropriately qualified personnel shall be cause for rejection.
- 6.5 Mechanical Shock.
- 6.5.1 General. Containers shall be designed to protect their contents from damage resulting from exposure to different kinds of mechanical shocks likely to be encountered during transport and handling. These shocks shall be simulated by the following tests.
- 6.5.1.1. The test shall provide visible evidence of damage as well as test data about the protecting properties of the containers and the energy-absorbing system within the container.
- 6.5.2 Acceptance Criteria. The function of a container shall not be impaired by the shock test. Significant evidence of one or more failures of the following shall be cause for rejection:

- (a) Damage to the contents of container. (Visible damage or failure of the function of the item to be protected, recorded in a test run).
- (b) Failure of the container's energy-absorbing system (cushioning system/shock isolation system) to protect the contents to the fragility level required as a design constraint for the container. (The fragility level can be expressed as a maximum permissible shock spectrum or as a maximum permissible shock acceleration level (g level) along with resonant frequencies of sensitive elements of the container contents.)
- (c) Failure of a water-vapourproof or waterproof container to prevent water vapour transmission or water leakage within the specified limits.
- (d) Failure of the container to retain the contents.
- (e) Failure of the container to permit continued handling.
- (f) Loosening of restraining material or devices which may permit contents to be damaged if further handling is experienced.
- (g) Permanent deformation of any portion of the container that affects its functional performance throughout the anticipated logistic cycle.
- (h) Evidence of the contents striking the container walls.

6.5.3 **Temperature Combined With Shock.** Container designs using materials, which may be affected by temperature variations, should be subjected to shock tests, described in the following, at the extreme temperatures, which may be expected in service. Temperature extremes¹ may be:

- for normal climatic conditions (such as in Europe): $63^{\circ}\text{C} \pm 3^{\circ}\text{C}$ / $-33^{\circ}\text{C} \pm 3^{\circ}\text{C}$.
- for extreme climatic conditions (such as in desert, tropical and arctic zones):

$71^{\circ}\text{C} \pm 3^{\circ}\text{C}$ / $-51^{\circ}\text{C} \pm 3^{\circ}\text{C}$.

1 See STANAG 2895 (QSTAG 360)

6.5.4 **Drop Test.** This test is primarily intended to verify the effectiveness of the protection against the occurrence of drops to be anticipated during handling and transportation and may also reveal weakness of the container structure, closure devices and the shock isolation within the container. The test shall be conducted in accordance with DEF(AUST)1000, PART 4, Section C, Paragraphs 3, 4 and 5.

6.5.5 **Topple Test.** This test shall be applied to containers of which the contents are vulnerable to bending. The test may also be applied when the position of the centre of gravity is higher than the geometric centre such that the container has a tendency to topple when transported or stored. The test shall be conducted in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 7.

6.5.6 **Bending Test.** This test shall be employed to containers with contents, which are vulnerable to damage through bending when lifted, or when the ability to withstand compressive loads across their section is required in storage and in transportation. The test shall be conducted in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 2.

6.5.7 **Flexing (Racking) Test.** This test shall be applied to containers when their contents are liable to become damaged through twisting when lifted or transported under conditions, which would produce twisting. The test shall be conducted in accordance with DEF(AUST)1000 PART 4, Section C, Paragraph 6.

6.5.8 **Horizontal Impact Test.** Containers are exposed to side and end impacts arising during handling operations and transportation. These impacts occur in crane lifting, during shunting and violent braking operations and other abrupt movements of the transporting vehicle. This test, to be conducted in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 9 simulates these movements and is intended to assess the effectiveness of the physical protection provided by the container and by the method of location, i.e., by the shock isolation system within the container.

6.5.9 **Impact (Horizontal) Test Stacked.** Containers likely to be stacked and shipped in rail cars shall be designed to survive shunting operations. The test shall be identical to the impact test of 6.5.8, except that the normal number of containers shall be unitized in the stacked shipping configuration. One impact shall be made on each end of the bottom container. Dummy contents may be used. Evidence of failure of the connecting structures, which would permit any of the containers to become unattached, shall be cause for rejection.

- 6.5.10 Transfer-At-Sea Shock Test. Containers planned for transfer-at-sea for horizontal or vertical replenishment shall be designed to withstand the shocks associated with the mode of transfer to be anticipated. The loaded container shall be subjected to a 460 mm flat drop on the bottom in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 3 and one horizontal impact on each of the four sides at in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 9. Following this-test, the container shall continue to protect the contents and shall not be damaged in any way that would prevent continued safe handling.
- 6.5.11 Bounce (Wheeled Vehicle Transportation) Test.
- 6.5.11.1. This test shall be performed in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 12, and, unless otherwise specified, be conducted at ambient temperature. The temperature of the resilient mounts shall not be allowed to exceed the safe operating temperature of the elastomer.
- 6.5.11.2. When containers are likely to be shipped by truck or railway in stacked position two or more layers high, they shall be tested using a superimposed load and an interface equivalent to the anticipated superimposed mass of like containers.
- 6.6 Vibration Test.
- 6.6.1 General. Containers which may employ energy-absorbing devices for shock isolation purposes, or which have sufficient structural flexibility that resonances below 50 Hz may be created, shall be designed to satisfactorily survive exposure to an appropriate vibration fatigue test. Dummy loads, as defined in paragraph 6.2, may be used. The isolation system should meet the requirements of paragraph 6.5 and the following:
- (a) Peak transmission across the isolators in the major translational modes of vibration (as measured during resonance search portion of the test of paragraph 6.6.1 should not exceed 5.0 if the resonant frequency is less than 15 Hz, 8.0 if the natural frequency is between 15 Hz and 25 Hz, and 10.0 from 25 Hz to 50 Hz.
 - (b) If consistent with the shock requirements of paragraph 6.5 and other design considerations, the resonant frequency in the major translation modes of vibration should be above 7.5 Hz.
- 6.6.2 Acceptance Criteria. The container and the vibration isolation system shall continue to perform their function following the vibration test. Evidence of any of the following shall be cause for rejection:
- (a) Damage to the contents of the container (visible damage or failure of the functions of the item to be recorded during function tests),
 - (b) Structural failure of the vibration isolation system,
 - (c) Failure of the isolation system to meet the transmissibility or resonant frequency requirements specified;
 - (d) Excessive looseness of the contents in the devices of the vibration isolation system.
 - (e) Failure of the isolation system to prevent contents from striking container walls.
 - (f) Leakage according to the criteria given in Table III if the container is intended to be leak-proof and
 - (g) Excessive rotation or shifting of the contents, which would cause damage or prohibits easy removal of the contents out of the container.
- 6.6.3 Resonance Strength and Dwell Test.
- 6.6.3.1. The container, in its normal position, shall be rigidly attached to a vibration exciter. Suitable instrumentation shall be used to obtain transmissibility data at the points of interest. A search for resonance shall be conducted by applying sinusoidal vibration or other forms of vibration excitation in the vertical direction. Transmissibility data shall be obtained for the fundamental translational vibration mode over a frequency range of 5 Hz to 50 Hz minimum.
- 6.6.3.2. Input vibration within a frequency range of 5 Hz to 350 Hz shall follow a schedule level associated with the intended logistic cycle as defined by the design activity. The sweep rate shall be approximately one half octave per minute, and the total time shall be 7.5 minutes.
- 6.6.3.3. A dwell test of 30 min. total duration (the test may be interrupted if necessary to prevent excessive temperature rise of resilient materials) shall be conducted at the predominant resonance. The input

excitation for the dwell test shall be equal to that used during the sweep test at that frequency. Adjustment in frequency may be necessary during the course of the test to compensate for shifts in resonant frequency due to temperature rise of the elastomer. If the logistic environment is undefined, the input vibration for the search and dwell tests shall be 3.2 mm double amplitude or 1 g (0 to peak) whichever is the lesser value.

- 6.7 Shock Mount Ageing. Shock mounts in free-breathing containers shall be capable to withstand the influences of the atmosphere and shall be, dependent on the materials used, exposed to the following tests. The shock mounts shall pass these tests without any damage.
- 6.7.1 Salt Fog Test. The shock mount shall be tested in accordance with Armies Environmental Conditions and Test Procedures (AECTP) 300, Method 309 "Salt Fog". Refer [ANNEX D](#). The mount shall be alternately exposed to salt fog and standard ambient (drying) conditions for a minimum of four 24-hour periods (2 wet and 2 dry).
- 6.7.2 Ozone Resistance Test. The shock mount consisting of elastomers shall be tested in accordance with ISO 1431, Part I "Static Strain Test". The mount shall be subjected to an ozone concentration of 50 parts per hundred million at 40°C. The test period shall be 168 hours.
- 6.7.3 Air-Heat Ageing Test. The shock mount shall be tested under 20 percent strain in accordance with Armies Environmental Conditions and Test Procedures (AECTP) 300, Method 302, Test Procedure I "High Temperature Storage". Refer [ANNEX C](#). The shock mount shall be subjected to this test at a constant temperature of 80°C +/-1°C for an ageing time of 168 hours.
- 6.8 Structural Integrity.
- 6.8.1 General. Integral barrier containers (non-breathing, controlled-breathing, free-breathing, or dynamic dehumidification) shall be designed to withstand internal pressures or vacuum as indicated by the design pressure of Table III.
- 6.8.2 Pressure Test. The container shall be prepared and tested in accordance with DEF(AUST)1000 PART 4, Section C, Paragraph 16, "Pneumatic Pressure Method". The test shall be conducted by raising the internal pressure so that the required pressure differential (Table III) is obtained.

WARNING

**CONTAINER MAY EXPLODE OR FASTENERS MAY FAIL DURING THIS TEST!
USE PROTECTIVE BARRIERS TO AVOID INJURY TO PERSONNEL**

- 6.8.3 Vacuum Test. The test shall be conducted in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 16, "Vacuum Retention Method", except that the internal pressure shall be reduced so that the pressure differential exceeds the rated no-leak pressure of the vacuum relief valve by 3 kPa. Permanent structural deformation shall be cause for rejection.
- 6.9 Leakage Integrity
- 6.9.1 General. Integral barrier containers shall be designed to prevent leakage from the inside of the container when subject to the pressure drop criteria given in Table III. Leakage requirements apply following shock, vibration, and handling tests.
- 6.9.2 Leak Test. The container shall be prepared for testing by sealing all breathing devices and inserting suitable pressurising fittings and gauges. The container shall be closed and sealed, as it would be in service. The containers shall be pressurised, and/or a vacuum shall be accomplished in accordance with the requirements of Table III. The-leakage of air shall be tested in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 16, "Vacuum Retention Method" or "Pneumatic Pressure Method" as applicable.

Table 3

PRESSURE, VACUUM, AND LEAKAGE REQUIREMENTS FOR INTEGRAL BARRIER CONTAINERS

BARRIER TYPE CONTAINER	STRUCTURAL INTEGRITY		LEAKAGE INTEGRITY	
	Design and Test Pressure (see para 6.8.2)	Rejection Criteria(see para 6.9.2)	Leak Test Pressure	Rejection Criteria
Non breathing	103 kPa –21 kPa	see note 3	34 ± 3 kPa	Continuous formation of bubbles(by either immersion or soap solution test method)
Controlled breathing	24 kPa ¹ –17 kPa ¹	see note 3	17 ± 1.7 kPa ² –10 ± 1.7 kPa ²	Pressure drop exceeds 0.3 kPa per hour (corrected for variations in air temperature and ambient pressure)
Free breathing	3 kPa	see note 3	+0.9 kPa 1.7 kPa – 0.0 kPa	Pressure drop of greater than 95 % per hour
Dynamic dehumidification	1 kPa	see note 3	+0.03 0.25 kPa –0.01	Pressure drop of 95 % in less than 24 hours

NOTES:

1. This is a design objective. The design pressure may be modified and also reduced in specific cases if fully justified by either the size of the container or its logistical and operational environment. In no case shall the design pressure be less than the pressure at which the minimum flow rate of the relief valve was established.
2. Based on the use of a pressure relief valve in accordance with [ANNEX A](#), having cracking pressures of 17 kPa for pressure relief and -10 kPa for vacuum relief. If a valve having different characteristics is used, the leak tests shall be performed at the cracking pressure of the relief valve.
3. Rejection criteria:
 - (a) Failures of any part of the container structure, especially permanent deformations
 - (b) Failure of closure devices, such as loosening or breaking, and
 - (c) Displacement of lid or cover.

6.10 Superimposed Load

6.10.1 **General.** Containers shall be designed to permit the stacking of a like or uniformly distributed load, without structural failure of the stacking features or damage to the contents. Deformation resulting in damage to the contents or in any unsafe stacking shall be cause for rejection.

6.10.2 **Stacking Test.** Proof of adequate stacking strength shall be tested in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 1, and with the requirements of paragraph 5.18. If the principal container structure is a plastics or other material, with a tendency to creep or deteriorate when exposed to elevated temperatures and/or very humid conditions, the stacking test shall be conducted at a temperature of 49°C ±3°C and 90 percent relative humidity for a period of 168 hours.

6.10.3 **Distributed Load Test.** Containers required or expected to support a uniformly distributed load in storage or transport shall be tested in accordance with [ANNEX B](#).

- 6.11 Hoisting and Lifting Provisions, Tie-down Attachment Points, Sling Lifting Features.
- 6.11.1 General. Containers requiring handling by crane or fork lift because of their size and gross mass shall be equipped with a set of hoisting or lifting provisions. If the containers require tiedown to the cargo platform of rail carriages and lorries and/or to the cargo floor of transport planes they shall be fitted with tiedown attachment points.
- 6.11.2 Acceptance Criteria. Each hoisting or lifting provision or set of provisions and each attachment point shall be identified and shall be capable of safely supporting the required test load. Evidence that the hoisting or lifting provisions or attachment point show the following conditions shall be cause for rejection:
- (a) Failure of any part of the hoisting, lifting or tie-down structure;
 - (b) Creation of any unsafe handling condition;
 - (c) Permanent deformation of any part of the hoisting, lifting or tie-down provisions or supporting structure; and
 - (d) Creation of awkward handling, excessive time consuming or potentially dangerous handling practices.
- 6.11.3 Hoisting Provisions Strength Test. Each set of hoisting provisions or handles, each single hoisting provision or handle shall be tested in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 11, Test "Sling Handling with Attachments" and paragraph [5.19.1](#), [5.19.1.3](#) and [5.19.3](#). If any part of the hoisting or handle structure is a plastic or a non-metallic material, the test duration shall be 1 hour.
- 6.11.4 Container Hoisting Strength Test. Containers without hoisting provisions shall be tested in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 11, Test "Underslung Handling" and paragraph [5.19.8.1](#).
- 6.11.5 Lifting Provisions Strength Test. Lifting provisions for fork lifting and use of grabs shall be tested accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 11, Test "Lifting and Transporting by Forklift Truck" and Test "Hoisting with Grabs" and paragraph [5.19.8](#).
- 6.11.6 Tie-down Strength Test. The tiedown provisions/attachments shall be tested in accordance with Armies Environmental Conditions and Test Procedures (AECTP) 400, Method 407 "Tiedown" (Refer [ANNEX E](#) and paragraph [5.19.5](#)). The test load shall be specified according to ANNEX E to the above method taking into account the rules/specifications/standards for military transport planes, rail carriages and lorries in which the container is intended to be transported.
- 6.12 Fork-lift Truck Compatibility Test.
- 6.12.1 Containers requiring transportation and handling because of mass and size shall be tested in accordance with DEF(AUST)1000, PART 4, Section C, Paragraph 11 L, Tests,
- (a) "Lifting and Transporting by Fork-lift Truck";
 - (b) "Pushing"; and
 - (c) "Towing".
- 6.12.2 Containers more than 1.15 m wide or more than 2.3 m long. The Tests "Pushing" and "Towing" shall be repeated with one end of the container lifted off the ground 150 mm by the tips of the forks between the lids.
- 6.12.3 The container structure and the skids shall survive the tests without failure or permanent deformation. The handling provisions shall be convenient to use and shall generate no unsafe condition or practice.
- 6.12.4 When the container is fitted with fully captive fork tine enclosures, the Test "Lifting and Transporting by Fork-lift Truck" shall be modified to require a first pass with fork tines in the back-tilt position over nominal 50 mm x 100 mm instead of 25 mm x 100 mm boards carrying the specimen(s) in the handling configuration prescribed by the cognisant procuring activity followed by a prompt turn-around maintaining the required speed and proceeding with a second pass in the opposite direction with fork tines in the level position over the 30 m course.

ANNEX A - VALVE, PRESSURE EQUALISING, GASEOUS PRODUCTS

(Direct extract from MIL-V-27166C, metrication excluded)

1. SCOPE AND CLASSIFICATION

- 1.1. Scope. This annex covers the requirements for low pressure relief valves for use in containers.
- 1.2. **Classification.** Unless otherwise specified, relief valves shall be of the following types, and reseal pressures:

Type I Vacuum Relief

Reseal Pressure	3.4 kPa	(1/2 psig)
Reseal Pressure	6.9 kPa	1 psig)
Reseal Pressure	13.8 kPa	(2 psig)
Reseal Pressure	20.7 kPa	(3 psig)

Type II - Pressure Relief

Reseal Pressure	1.7 kPa	(1/4 psig)
Reseal Pressure	3.4 kPa	(1/2 psig)
Reseal Pressure	6.9 kPa	(1 psig)
Reseal Pressure	13.8 kPa	(2 psig)
Reseal Pressure	20.7 kPa	(3 psig)
Reseal Pressure	34.5 kPa	(5 psig)

Type III - Pressure and Vacuum Relief.

Reseal Pressure 3.4 kPa	(1/2psig)	Pressure 3.4 kPa	(1/2psig)	Vacuum
Reseal Pressure 6.9 kPa	(1 psig)	Pressure 3.4 kPa	(1/2psig)	Vacuum
Reseal Pressure 6.9 kPa	(1 psig)	Pressure 6.9 kPa	(1 psig)	Vacuum
Reseal Pressure 13.8 kPa	(2 psig)	Pressure 6.900 kPa	(1 psig)	Vacuum
Reseal Pressure 13.8 kPa	(2 psig)	Pressure 13.8 kPa	(2 psig)	Vacuum
Reseal Pressure 20.7 kPa	(3 psig)	Pressure 13.8 kPa	(2 psig)	Vacuum
Reseal Pressure 34.5 kPa	(5 psig)	Pressure 13.8 kPa	(2 psig)	Vacuum

2. APPLICABLE DOCUMENTS

- 2.1. Issues of Documents. The following documents of the latest issue specification apply to the extent specified herein.

SPECIFICATIONS

Military

DOD-D-1000	Drawing, Engineering and Associated List
MIL-R-6855	Rubber, Synthetic, Sheets, Strips, Moulded or Extruded Shapes
MIL-P-7105	Pipe Threads, Taper, Aeronautical National Form, Symbol ANPT, General Requirements for
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series, General Specification for

STANDARDS

Military

DEF(AUST)1000 ADF Packaging, Parts 1 to 20.	
DEF(AUST)5047 Identification Marking of Stores and Equipment	
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD 143	Standards and Specifications, Order of Precedence for the Selection of
MIL-STD-810	Environmental Test Methods and Engineering Guidelines

MIL-STD-831	Test Reports, Preparation of
MIL-STD-889	Dissimilar Metals
MIL-STD-45662	Calibration Systems Requirements

Australian Standards

AS 1199	Sampling Procedures and Tables for Inspection by Attributes
---------	---

- 2.2. **Other publications.** The following documents form a part of this specification to the extent specified herein. American National Standards Institute (ANSI) ANSI Y14.5-1982 Dimensioning and Tolerancing for Engineering Drawing (Application for copies of ANSI Y14.5-1982 should be addressed to American National Standards Institute, 1430 Broadway, New York, NY 10018).

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Government Agencies.)

3. REQUIREMENTS

- 3.1. **First article.** This specification makes provisions for first article testing (see 4.2).
- 3.2. **Selection of specifications and standards.** Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143 except as specified in 3.2.1 and 3.2.2.
- 3.2.1. **Commercial parts.** Commercial parts having suitable properties may be used where, on the date of invitation for bids, there are no suitable standard parts. In any case, commercial utility parts, such as screws, bolts, nuts, and cotter pins, having suitable properties may be used provided:
- They can be replaced by the standard parts (MS or AN without alteration); and
- The corresponding standard part numbers are referenced in the parts list, and, if practicable, on the contractor's drawings.
- 3.2.2. **AN and MS standard parts.** With the exception specified in 3.2.1, AN and MS standard parts shall be used where they suit the purpose. They shall be identified on the drawings by their part numbers.
- 3.2.3. **Part numbering of interchangeable Parts.** All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The item identification and part number requirements of DOD-D-1000 shall govern manufacturers part numbers and changes thereto.
- 3.3. **Materials.** All materials shall be, as specified herein. Materials not specified shall be of the best quality used for the purpose in commercial practice. The materials shall be free from all defects or imperfections that might affect the serviceability of the finished product. Recovered or recycled materials may be used provided the end product is capable of passing the first article tests.
- 3.3.1. **Metals.** Metals shall be of the corrosion-resistant type or suitably treated to resist corrosion or atmospheric conditions likely to be met in storage or normal service. MIL-STD-889 shall be utilised to determine compatibility of metals from which the valves are fabricated.
- 3.3.2. **Protective treatment.** When materials used in the construction of the valves are subject to deterioration when exposed to climatic and environmental conditions likely to occur during service use, they shall be protected against such deterioration in a manner that will in no way prevent compliance with the performance requirements of this specification. The use of any protective coating that will crack, chip, or scale with age or extremes of climatic and dynamic conditions shall be avoided.
- 3.3.3. **Non-Metals.** When utilised, non-metallic parts such as packing's, interior gaskets, and valve seats shall be of the oil-resistant type.

- 3.3.4. **Exterior Gaskets.** Exterior gaskets for sealing valves to the container shall be made of rubber conforming to MIL-R-6855, class 2, grade 60. No additional sealing material shall be required.

3.4. Construction

- 3.4.1. **Gasket seat.** Valves employing exterior gaskets for sealing to containers shall provide grooves for seating of the gasket. The depth of the groove shall not be less than 65 percent nor more than 85 percent of the original gasket thickness.
- 3.4.2. **Castings.** When used, castings shall be of high quality, clean, sound, and free of blow-holes, porosity, cracks, and other defects, which may adversely affect the valve performance.
- 3.4.3. **Valve body.** Unless specifically approved by the procuring agency, non-metallic materials shall not be used in the construction of the valve body.
- 3.4.4. **Mounting devices.** Locknuts or other suitable devices shall be provided for the installation of valves with self-contained locking devices.

3.5. Design

- 3.5.1. **Maintenance.** The design of the valve shall be such that installation and removal from containers may be accomplished with common hand tools.
- 3.5.2. **Special features.** Special features, such as manual relief devices, to permit equalisation of pressure prior to opening the container, or filters to limit the entrance of sand or dust, may be used, provided they do not interfere with the other requirements of this specification.
- 3.5.3. **Lubrication.** The design of the valve shall be such that lubrication shall not be required for operating during the service life.
- 3.5.4. **Screw Threads.** All screw threads shall be in accordance with ANSI Y14.5 -1982.
- 3.5.5. **Locking of Parts.** All internal and external threaded parts shall be capable of being locked.
- 3.5.6. **Pipe threads.** Pipe threads shall be in accordance with MIL-P-7105.
- 3.5.7. **Dimensions.** Dimensions and tolerances shall be in accordance with ANSI Y14.5-1982. Where dimensions and tolerances may affect interchangeability, consistent operation, or performance of the valve, they shall be limited accordingly.
- 3.5.8. **Weight and size.** Weight and size of the valve shall be as small as possible consistent with the requirements specified herein.

3.6. Performance

- 3.6.1. **Reseal.** The valve reseal pressure shall be specified by the using activity. Valve reseal pressure shall be within ± 1.7 kPa (± 0.25 psig) of the specified value when 6.9 kPa (1 psig), or more, and within $+1.7$ kPa ($+0.25$ psig) and -0 kPa of the specified value when less than 6.9 kPa (1 psig). The valve shall not leak at a rate of 1 cm of standard air per minute or more in the flow direction at the specified reseal pressure when tested as specified in 4.6.1.2.
- 3.6.1.1. **Leakage.** Type I and II valves shall not leak at a rate of 1 cm³ of standard air per minute or more in the reverse flow direction at a pressure differential of 6.9 kPa (10 psi) when tested as specified in 4.6.1.2.

- 3.6.2. **Minimum flow rate.** The valve minimum flow rate shall be specified by the using activity (see 3.6.3 and Annex B, 6.2). When tested as specified in 4.6.1.2, valve minimum flow rate shall be determined at a differential pressure 10.3 kPa (1.5 psi) greater than the reseal pressure in the flow direction.
- 3.6.3. **Minimum flow rate calculations.** Calculations shall be made as follows by the valve using activity, to determine the minimum flow rate required to protect the container.

$$\text{Minimum Flow Rate m}^3/\text{min. (ft}^3\text{)} = (V_c - V_m) 0.12$$

Where

V_c = Volume of Container m^3 (ft^3)

V_m = Volume of Material in Container m^3 (ft^3)

- 3.6.4. **Operating life.** The valves shall withstand 2500 cycles, at ambient conditions, from the closed position to the open position for either or both positive and negative pressure differentials, as applicable for the type concerned.
- 3.6.5. **Environmental Tests.** The valves shall be capable of withstanding without degradation of performance attributes the following environmental conditions when tested as specified in 4.6.3.
- 3.6.5.1. **Temperature.** Temperatures ranging from -62.2°C to $+71.1^\circ\text{C}$ (-80°F to $+160^\circ\text{F}$) during operation and non-operation.
- 3.6.5.2. **Humidity.** Relative humidity up to 95 percent at 71.1°C (160°F) during operation and non-operation.
- 3.6.5.3. **Vibration.** Vibration incident to service use during operation and nonoperation.
- 3.6.5.4. **Sand and dust.** Sand and dust particles encountered in desert areas and conditions during operation and nonoperation.
- 3.6.5.5. **Rough handling.** Rough handling which may be encountered during shipping and service life.
- 3.6.5.6. **Salt fog.** Exposure to salt atmosphere as encountered in coastal areas.
- 3.7. **Identification of Product.** The valves shall be marked for identification in accordance with MIL-STD-130.
- 3.8. **Workmanship.** All parts of each valve shall be constructed and finished in accordance with good commercial practice. Particular attention shall be given to the machining of mating parts, finish of sealing surfaces, freedom of parts from burrs and sharp edges, and the removal of chips and other foreign material prior to and following assembly.

4. QUALITY ASSURANCE PROVISIONS

- 4.1. Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein.
- 4.2. Classification of inspection

The inspection and testing of valves shall be classified as follows:

- a. First article inspection (see 4.3); and
- b. Quality conformance inspection (see 4.4).

Table 4 First Article Inspection Tests

TEST	REQUIREMENT	METHOD
Quality Conformance		4.6.1
a. Cycling		4.6.1.1
b. Reseal	3.6.1	4.6.1.2
c. Leakage	3.6.1.1	4.6.1.2
d. Flow rate	3.6.2	4.6.1.2
Operating life	3.6.4	4.6.2
Environmental	3.6.5	4.6.3
a. High temperature	3.6.5.1	4.6.3.1
b. Low temperature	3.6.5.1	4.6.3.2
c. Humidity	3.6.5.2	4.6.3.3
d. Vibration	3.6.5.3	4.6.3.4
e. Sand and dust	3.6.5.4	4.6.3.5
f. Rough handling	3.6.5.5	4.6.3.6
g. Salt fog	3.6.5.6	4.6.3.7

Table 5 Quality, Conformance, Inspection, Tests

TEST	REQUIREMENT	METHOD
Cycling		4.6.1.1
Reseal	3.6.1	4.6.1.2
Leakage	3.6.1.1	4.6.1.2
Flow rate	3.6.2	4.6.1.2

- 4.3. **First article inspection.** First article inspection shall be performed by the contractor, after award of contract and prior to production. First article inspection shall be performed on sample units, which have been produced with equipment and procedures normally used in production. First article approval is valid only on the contract under which it is granted. A certified test report in accordance with MIL-STD-831 shall be submitted to the cognisant engineering activity.
- 4.3.1. **Waiver of first article tests.** If a particular valve has been delivered and a certified first article test report for that valve has been submitted to the cognisant engineering activity, first article tests for like valves shall be waived. When the first article tests have been waived, the contractor shall certify that the valve will conform to the requirements of this specification.
- 4.3.2. **Test samples.** The first article test samples shall consist of 3 valves of each manufacturer's part number to be tested, and shall be representative of the production valves. For valves employing filters (see 3.5.2), the filters shall be used during all tests to which the valve is subject.
- 4.3.3. **Test Sequence.** The 3 test samples shall be subjected to the following specified tests:
- | | | |
|---------|--|-----------|
| Valve 1 | a. Cycling, Reseal, Leakage, Flow Rate | (4.6.1) |
| | b. Humidity | (4.6.3.3) |
| | c. Salt fog | (4.6.3.7) |
| Valve 2 | a. Cycling, Reseal, Leakage Flow Rate | (4.6.1) |
| | b. High Temperature | (4.6.3.1) |
| | c. Low Temperature | (4.6.3.2) |
| | d. Sand and Dust | (4.6.3.5) |
| Valve 3 | a. Cycling, Reseal, Leakage, Flow Rate | (4.6.1) |
| | b. Rough Handling | (4.6.3.6) |
| | c. Vibration | (4.6.3.4) |
| | d. Operating Life | (4.6.2) |

- 4.3.4. **Failures.** One or more failures shall be cause for refusal to grant first article approval.
- 4.4. **Quality conformance inspection.** Quality conformance inspection shall be performed on sample valves chosen from a lot to determine conformance of said lot with the requirements set forth in this specification prior to acceptance. Quality conformance inspection shall consist of the cycling, reseal, leakage, and flow rate test in 4.6.1.
- 4.4.1. **Sampling.** Samples shall be selected at random and sampling shall be conducted in accordance with AS1199, inspection level II, AQL 1.5.
- 4.4.1.1. **Inspection lot.** An inspection lot shall consist of all valves of the same type, and reseal pressure that is produced under essentially the same conditions, and offered for inspection at one time.
- 4.4.1.2. **Examination.** Each sample valve shall be subjected to an examination to determine conformance to the manufacturer's drawings and the requirements of this annex.
- 4.4.1.3. **Sample tests.** Each sample valve chosen as specified in 4.4.1 shall be tested as specified in 4.6.1.
- 4.4.1.3.1. **Lot rejection.** Failure of the inspection lot to pass quality conformance inspection at AS1199, inspection level II, AQL 1.5 shall be cause for rejection.
- 4.4.1.3.2. **Rejected lots.** If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separated from new lots, and shall be clearly identified.
- 4.4.2. **Test equipment and inspection facilities.** Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit the quality conformance inspection shall be established and maintained by the contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with MIL-STD-45662.
- 4.5. **Test conditions.**
- 4.5.1. **Pressure.** Pressures specified are gauge pressures $\pm .689$ kPa (± 0.1 psi).
- 4.5.2. **Temperature.** Unless otherwise specified, tests shall be conducted at ambient temperatures of from 21.1°C to 32.2°C (70°F to 90°F).
- 4.5.3. **Flow.** Unless otherwise specified, all flow rates specified are m³/min. taken at standard ambient conditions as defined in MIL-STD-810, and are minimum required values for container protection (see 3.6.2).
- 4.6. **Performance tests.**
- 4.6.1. **Cycling, reseal, leakage, and flow rate.** The following tests shall be performed for each sample valve in the order listed.
- 4.6.1.1. **Cycling.** The valves shall be cycled 10 times as follows.
- 4.6.1.1.1. **Types I and II.** Air pressure shall be applied to the inlet port of the valve with the outlet port open to the atmosphere or suitably vented. The pressure shall be uniformly increased until an air flow of at least 20 percent of the rated flow rate is reached. The air pressure shall then be reduced until the air flow is 2.0 percent or less of the rated flow of the valve. The cycle shall be accomplished in 3 seconds to 10 seconds.

- 4.6.1.1.2. **Type III.** One complete cycle shall consist of the cycle detailed in 4.6.1.1.1 accomplished in each direction of flow.
- 4.6.1.2. **Reseal, leakage, and flow rate.** The valve shall be placed in a test cell so that required pressure differentials can be applied. Suitable gauges or manometers shall be connected to the cell to determine the pressure differential across the valve to within ± 5 percent of the actual values. For reseal and leak testing, a gas flowmeter capable of measuring a flow rate of $1.0 \text{ cm}^3 \pm 0.1 \text{ cm}^3$ of standard air per minute (Gilmont® #3210 microflowmeter or equivalent) shall be connected in series with the valve test cell, so that all air flowing through the valve flows through the flowmeter. For valve flow rate testing, a flowmeter capable of measuring the specified valve flow rate ± 5 percent (Gilmont® #3205-30 bypass flowmeter or equivalent) shall be connected in series with the valve test cell. A suitable regulator or throttling valve shall be used to control test pressures so that test conditions are maintained to within ± 5 percent of specified values during test. Test results shall be reported in standard air conditions. For reseal and leakage tests, a flow of 1.0 cm^3 of standard air per minute through the valve shall be an indication of failure and cause for rejection. For flow rate tests, failure to develop at least the, specified flow rate at a differential pressure of 10.3 kPa (1.5 psig) greater than the reseal pressure across the valve in the flow direction shall be indication of failure and cause for rejection.
- 4.6.1.2.1. **Types I and II reseal.** The valve shall be subjected to the specified reseal pressure differential, which tends to produce flow in the flow direction. Observation for leakage shall then be made.
- 4.6.1.2.2. **Types I and II leakage.** The valve shall be subjected to a pressure differential of 68.9 kPa (10 psi) which tends to produce flow in the non-flow direction. Observation for leakage shall then be made.
- 4.6.1.2.3. **Type III reseal.** The valve shall be subjected to the specified reseal pressure differential, which tends to produce flow in the pressure relief flow direction. Observation for leakage shall then be made. The valve shall then be tested in the vacuum relief flow direction. Observation for leakage shall then be made.
- 4.6.1.2.4. **Flow rate.** For each flow direction, the valve shall be subjected to a pressure differential of 10.3 kPa (1.5 psig) greater than the specified reseal pressure which tends to produce flow in that respective flow direction. The flow rate through the valve shall then be measured. For valves using filters, the filters shall be installed during the flow rate test.
- 4.6.2. **Operating life.** While at room temperature, the valve shall be subjected to 250 cycles as specified in 4.6.1.1 or 4.6.1.1.2. After completion of the test, the valve shall be tested as specified in 4.6.1.2 and applicable subparagraphs.
- 4.6.3. **Environmental tests.** The valve shall be subjected to the following tests in accordance with the applicable procedures of MIL-STD-810.
- 4.6.3.1. **High temperature.** Method 501.3, Procedure II, operation shall be used, except that during the 71.1°C ($+160^\circ\text{F}$) exposure period the valve shall be operated through 1000 cycles. After completion of the test, the valve shall be tested as specified in 4.6.1.2 and applicable subparagraphs.
- 4.6.3.2. **Low temperature.** Method 502.3, Procedure II operation shall be used, except that during the -62.2°C (-80°F) exposure period the valve shall be operated through 1000 cycles. The duration of the test will be 72 hours. After completion of the test, the valves shall be tested as specified in 4.6.1.2 and applicable subparagraphs.
- 4.6.3.3. **Humidity.** Method 507.3, Procedure III shall be used. The valve shall be mounted in receptacle for cycling. Cycling shall be performed periodically during the test. At least 2 complete cycles shall be accomplished each hour. After completion of the test, the valves shall then be tested as specified in 4.6.1.2 and applicable subparagraphs.

- 4.6.3.4. **Vibration.** Federal Test Method Standard 101, Method 5020.1 shall be used. After completion of the test, the valves shall be tested as specified in 4.6.1.2 and applicable subparagraphs.
- 4.6.3.5. **Sand and dust.** Method 510.3, Procedure I shall be used except that the air velocity during all steps shall be $1.52 \text{ m/s} \pm 0.5 \text{ m/s}$ (300 ± 100 feet per minute) through the test chamber and removal of accumulated dust from the test item by brushing, wiping, shaking, air blast or vacuum cleaning prior to functional testing shall not be permitted. At least 2 complete functional cycles shall be accomplished each hour during the test. After completing the test, the valves shall be tested as specified in 4.6.1.2 and applicable subparagraphs.
- 4.6.3.6. **Rough handling.** The valve shall be mounted in a container conforming to FIGURE 3. The container shall be dropped 3 times on each of the 3 mutually perpendicular faces, for a total of 9 drops, from a height of 91 cm (3 feet) onto a concrete surface. Valve shall then be tested as specified in 4.6.1.2 and applicable subparagraphs.
- 4.6.3.7. **Salt fog.** Method 509.3, Procedure I shall be used. After completion of the test, the valves shall be tested as specified in 4.6.1.2 and applicable subparagraphs.

Box Material: 19 mm plywood
Mounting Plate Material: Steel plate – 165 mm x 165 mm x 12.7 mm

Groove plywood 6 mm to accept mounting plate.

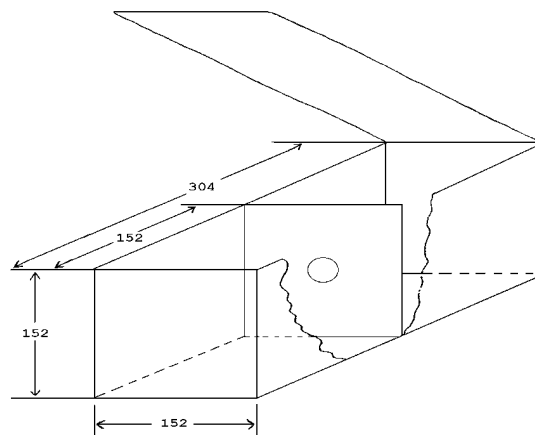


Figure 3 Container for rough handling test

5. NOTES

- 5.1. **Intended use.** The air relief valves covered by this specification are intended for use in shipping containers as a protective device against excessive internal and external pressures encountered during air lift and extreme temperature changes. Type I and Type II valves are intended to be used in sets of one of each type where a separation of the inlet and outlet ports is desirable.
- 5.1.1. **Use recommendations.** The relief valves are intended to allow significant container weight reductions by limiting container gas pressure differential loads that the container must support; however, the valve flow rating pressure should not cause gas pressure differential loads to exceed container design allowances. When a valve-equipped, controlled-humidity container is to be in a tropical outdoor storage environment, the pressure and vacuum reseal pressures should not be less than 20.7 kPa (3 psig), i.e. 13.8 kPa (2 psig) for pressure and 6.9 kPa (1 psig) for vacuum in order to prevent rapid desiccant depletion caused by cyclic breathing resulting from daily solar heating and night-time cooling.
- 5.2. **Disposability.** The preferred methods of disposing of valves are recycling, bailing, and sanitary landfill.

ANNEX B - SUPERIMPOSED LOAD TEST (UNIFORMLY DISTRIBUTED, WITHOUT TOP DUNNAGE)

1. SCOPE

- 1.1. The following procedure is applicable for determining the ability of a container to resist loads superimposed on its top. This is accomplished by stacking many small, heavy packages on a container, without the use of top dunnage. This procedure also determines the ability of the packaging and packing methods to provide adequate protection to the contents of the container during superimposed loading.

2. DEFINITIONS

- 2.1. Top dunnage. Relatively stiff material, usually wood, laid across the top of a container or layer of containers to carry the weight of superimposed loading to the sides of the containers.

3. APPARATUS

- 3.1. In conducting the top superimposed-load test, any convenient method may be used for placing the load on top of the container, such as a hoist, a block and tackle, or by hand. A sufficient quantity of weights not greater than 250 mm x 250 mm in outside length and width shall be provided. Weights may be boxes loaded with lead or other material.

4. SPECIMEN

- 4.1. One container and its contents shall constitute a single specimen. The container shall be loaded for the test with the interior packing and the actual contents for which it was designed. If use of the actual contents is not practical, a dummy load shall be substituted to simulate such contents in weight, shape, and position in the container. The contents, or dummy load, shall be blocked, braced, and cushioned in place as for shipment.

5. CONDITIONING OF SPECIMEN

- 5.1. Unless otherwise specified, no special conditioning of the test specimen shall be necessary.

6. PROCEDURE

- 6.1. The specimen shall be placed on its bottom on a flat, level, rigid floor. Weights shall be placed on top of the container in a symmetrical pattern approximating uniform loading, so that they do not extend over the sides or ends of the top surface. There shall be one weight to each 900 cm² of top surface and each weight shall be whatever is necessary to attain the prescribed load for the top area. The load shall be allowed to remain in place for a prescribed period of time. When the test is conducted to determine satisfactory performance of a container and unless otherwise specified, the prescribed period of time of loading shall be 1 hour and the prescribed load shall be as follows:

$$W = A[\text{cm}^2] \times 0.0244 \left[\frac{\text{kg}}{\text{cm}^2} \right] \times S, \text{ where:}$$

W = Prescribed top superimposed load in kg

A = Top area in cm²

0.0244 $\left[\frac{\text{kg}}{\text{cm}^2} \right]$ = Specific bearing load

S = Packaging level factor

S = 2 for NATO packaging levels 1¹⁾ and 2¹⁾

S = 1.5 for NATO packaging level 3¹⁾

¹⁾ See DEF(AUST)1000, PART 2, SECTION C.

- 6.2. Measurements of distortion shall be made and recorded immediately before the load is removed, and of any changes or breaks in the container, such as apparent buckling or failure of members in the tops, sides, or ends. Any vertical deflections of the sides and ends shall be measured from taut horizontal string lines stretched between nails in the top corners of each side and end. In addition, bulging of the side and end panels shall be measured from a vertical straightedge. The cupping of the top shall be measured similarly by using a straightedge across the top at mid-length of the specimen (see FIGURE 1). Observations shall also be made and recorded to determine if the distortions are sufficient to damage or dislodge any portion of the container, the interior packing, or contents. After removal of the load, the extent of recovery from distortions shall be observed and recorded.

7. REPORT

- 7.1. Following the test, a report shall be written which shall include the following:
- 7.1.1. A statement that the test was conducted in compliance with this procedure, or a description of the deviation from this procedure. The report shall include all options selected and "otherwise specified" details that were followed as permitted in 5.1 and 6.1.
- 7.1.2. Dimensions of the container, its structural details, kind of materials, spacing, size and type of fasteners, methods of closing and strapping, and the net and gross masses.
- 7.1.3. A description of the contents of the container including blocking, bracing, and cushioning.
- 7.1.4. The results of the test, describing the final conditions of both container and contents, and a record of the deflections under load.
- 7.1.5. When the test is conducted to determine satisfactory performance of a container or pack, the report shall include a statement that the container or pack either attained or did not attain the specified performance. If not specified elsewhere, it is suggested that satisfactory performance shall consist of:
- When subject to the top superimposed-load test, the contents (except a dummy load) shall show no functional or physical damage, and the container and packing shall show no functional damage;
- Damage to the exterior shipping container which is the result of improper interior packaging, blocking, or bracing shall be cause for rejection;
- Structural damage to the exterior shipping container, which would result in either spilling of the contents or failure of the container in subsequent handling, is cause for rejection;
- There shall be no evidence of a substantial amount of shifting of the contents within the exterior shipping container that would create conditions likely to cause damage during shipment, storage and re-shipment of the container; and
- The report shall include a statement of any observations that might help in improving the container or the methods of packing.

8. NOTES

- 8.1. This test is meant to simulate top superimposed loads as imposed by piling without dunnage many small, heavy packages on a container. It is intended that this test be used only on containers that are likely to be stressed in this manner. Details are given with the qualification, "unless otherwise specified" in paragraphs regarding:
- Conditioning of specimens (5.1).
Load and duration of load (6.1).
- 8.2. Although the recommended period of time for the top superimposed load test is only 1 hour, the use of the factors for NATO packaging levels 1, 2 and 3 ensures a load-carrying capacity adequate for long-time loading and an occasional application of impact loads.

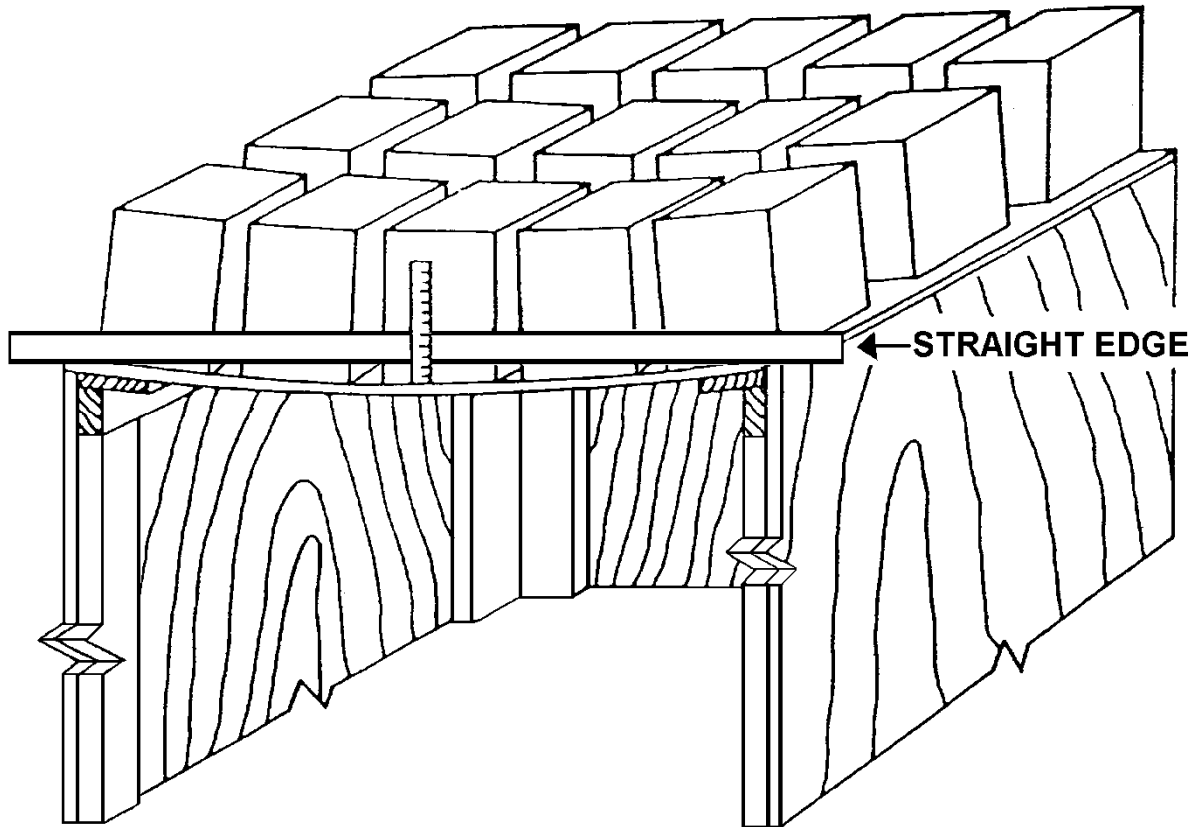


Figure 4 TOP SUPERIMPOSED LOAD TEST

Blank Page

ANNEX C - (AECTP) 300, Method 302

METHOD 302

HIGH TEMPERATURE (INCLUDING RADIATIVE HEATING)

***NOTE:** METHOD 301, GENERAL GUIDANCE AND REQUIREMENTS, CONTAINS INFORMATION NECESSARY TO CONDUCT THE TEST PROCEDURES OF THIS METHOD, AND MUST BE USED IN COMBINATION WITH THIS TEST METHOD.*

A copy of the relevant information is contained at the following URL:

<http://www.nato.int/docu/STANAG/aectp/aectp-300-3.pdf>

Blank Page

ANNEX D - (AECTP) 300, Method 309

**METHOD 309
SALT FOG**

***NOTE:** METHOD 301, GENERAL GUIDANCE AND REQUIREMENTS, CONTAINS INFORMATION NECESSARY TO CONDUCT THE TEST PROCEDURES OF THIS METHOD, AND MUST BE USED IN COMBINATION WITH THIS TEST METHOD.*

A copy of the relevant information is contained at the following URL:

<http://www.nato.int/docu/STANAG/aectp/aectp-300-3.pdf>

Blank Page

ANNEX E - (AECTP) 400, Method 407

MATERIEL TIE-DOWN

A copy of the relevant information is contained at the following URL:
<http://www.nato.int/docu/STANAG/aectp/aectp-400-3.pdf>

Blank Page

ANNEX F - CHECKLIST No. 1 - REUSABLE CONTAINER - REQUIREMENTS

(These criteria should be considered with all other relevant sub-paragraphs.)

Container for Assessment	Supplier:	Description:
--------------------------	-----------	--------------

REQUIREMENT/CRITERIA Consistent / Compatible with	Reference / Clarification	Applicability		Comply Y/N
		Essential	Important	
(1) Specified packaging level or equivalent national packaging level	DEF(AUST)1000 PART 2		X	
(2) Maintenance concept for the contents			X	
(3) Planned distribution logistics of the contents			X	
(4) AQIS Requirements for O/S deployment	DEF(AUST)1000 PART 10	X		
(5) Reliable protection at lowest life cycle costs			X	
(6) Handling equipment	Refer paragraph 5.1.1		X	
(7) Handling in the field	QSTAG 627		X	
(8) Movement without restriction throughout distribution network		X		
(9) Unit load compatibility	DEF(AUST)1000 PART11	X		
(10) Configuration management	QSTAG 1033		X	
(11) Transportability requirements	Refer paragraph 5.2	X		
(12) Smallest and lightest volume and mass	Refer paragraph 5.3	X		
(13) Materials and manufacturing methods	Refer paragraph 5.4		X	
(14) Environmental requirements	Refer paragraph 5.4.1		X	
(15) Standard parts	Refer paragraph 5.4.4		X	
(16) Material stability	Refer paragraph 5.4.5		X	
(17) Internal packaging materials	Refer paragraph 5.5		X	
(18) Drainage	Refer paragraph 5.6		X	
(19) Ventilation	Refer paragraph 5.7		X	
(20) Closure devices	Refer paragraph 5.8	X		
(21) Preservation	Refer paragraph 5.9		X	
(22) Clean room requirements	Refer paragraph 5.10		X	
(23) Classified contents	Refer paragraph 5.11	X		
(24) Types of containers	Refer paragraph 5.12		X	
(25) Container accessories	Refer paragraph 5.13		X	
(26) Special requirements for non-breathing integral barrier containers	Refer paragraph 5.14		X	
(27) Special requirements for controlled-free breathing integral barrier containers	Refer paragraph 5.15		X	
(28) Special requirements for breathing integral	Refer paragraph 5.16		X	
(29) Dynamic dehumidification	Refer paragraph (g)		X	
(30) Stacking	Refer paragraph 5.18.1	X		
(31) Handling / Handles / Hoisting / Tiedown	Refer paragraph 5.19	X		
(32) Shipboard handling - containers of over 135 kg gross mass or 90 cm length	Refer paragraph 5.19.8		X	
(33) Special protection devices	Refer paragraph 5.20		X	
(34) Container Surfaces Protection	Refer paragraph 5.21		X	
(35) Container markings	Refer paragraph 5.22	X		

Assessed by:

DATE:

Checked by:

Blank Page

ANNEX G - CHECKLIST No. 2 - Criteria in Selection of Test Program for Reusable Containers

(This table is given only as a guide and these criteria should not be considered mandatory.
The test requirements defined below apply to all containers except containers for special purposes or special contents such as ammunition, nuclear weapons, etc.)

Criterion		REMARKS
General	Dummy loads	To be considered for use in all test program
	Instrumentation	Suitably instrumented and data shall be collected during testing
	Fit and Compatibility	Container shall permit easy loading / unloading. Refer paragraph 6.4
	Fit Test	Refer paragraph 6.4.12
Mechanical Shock	Temperature Combined with Shock.	Extreme climatic conditions (such as in desert, tropical and arctic zones): 71°C ±3°C / -51°C ±3°C. Refer paragraph 6.5.3
	Drop Test.	Refer paragraph 6.5.4
	Topple Test	Refer paragraph 6.5.5
	Bending	Refer paragraph 6.5.6
	Flexing (Racking)	Refer paragraph 6.5.7
	Horizontal Impact	Refer paragraph 6.5.8
	Impact (Horizontal) Stacked	Refer paragraph 6.5.9
	Transfer at Sea Shock Test	Refer paragraph 6.5.9
	Bounce Wheeled Vehicle Transportation	Refer paragraph 6.5.10
	Vibration	Refer paragraph 6.5.11.2
	Acceptance Criteria	Refer paragraph 6.6.2
	Resonance Strength and Dwell	Refer paragraph 6.6.3
	Shock Mount Ageing	Refer paragraph 6.7
	Salt Fog Test	Refer paragraph 6.7.1
	Ozone Resistance	Refer paragraph 6.7.2
	Air Heat Ageing	Refer paragraph 6.7.3
Structural Integrity	Pressure	Refer paragraph 6.8.2
	Vacuum	Refer paragraph 6.8.3
	Leakage Integrity	Refer paragraph 6.9
	Superimposed Load	Refer paragraph 6.10 and ANNEX B
	Stacking Test	Refer paragraph 6.10.2
	Distributed Load Test	Refer paragraph 6.10.3
	Hoisting Provision strength	Refer paragraph 6.11.3
	Container Hoisting strength	Refer paragraph 6.11.4
	Lifting Provisions Strength	Refer paragraph 6.11.5
	Tie-down Strength	Refer paragraph 6.11.6
	Fork-lift Truck Compatibility	Refer paragraph 6.12

Blank Page

PUBLICATION IMPROVEMENT REPORT AND REPLY (PIRR)

8.1. Introduction

- 8.1.1. Correction of publication deficiencies depends largely on feedback from the users. Publication Improvement Report and Reply (PIRR) forms (Form AO011) provide a straightforward and readily available method for reporting deficiencies and suggesting improvements in the publication to the Sponsor.

8.2. Typical deficiencies include:

- errors on text, drawings, photographs, circuit diagrams, charts and tables;
- omission of procedures;
- ambiguous or inadequate data;
- conflict with other publications; and
- errors in additional information.

8.3. Form completion and submission

The originator completes the PIRR form stating, in their own words, the deficiencies in the publication and where applicable, suggested amendments. Any comments that exceed the space provided should be handwritten or typed on white paper and attached to the form. The form is to be verified and signed by the originator's supervisor.

In all cases completed PIRR forms are to be sent directly to the publication Sponsor:

*Assistant Program Coordinator
Army Standardisation
Land Engineering Agency
3rd Floor, Defence Plaza Melbourne
661 Bourke Street
MELBOURNE VIC 3000
<mailto:LEATechnicalData@drnex.defence.gov.au>
facsimile: (03) 962 22942.*

8.4. Sponsor Action

- 8.4.1. PIRR acknowledgement from a publication Sponsor does not constitute an approval authority to amend a publication process or procedure.
- 8.4.2. Once the PIRR form has been received, the sponsor shall acknowledge receipt and advise the originator of any proposed action.
- 8.4.3. Form AO 011. PIRR forms are available on the DRN within Web Forms in electronic format. Contractors without DRN access should obtain forms through the relevant Contract Authority.

NOTE 1: The PIRR web form (AO 11) is available on the DRN at the following
[URL: http://pubsdb.cbrdps.defence.gov.au/](http://pubsdb.cbrdps.defence.gov.au/)

REQUESTS FOR DOCUMENTS

Requests for copies of this Standard, or certain of the listed Applicable Documents, may be directed to the appropriate source listed below:

DEPARTMENT OF DEFENCE (Maritime)

Director Naval Platform Systems
Department of Defence (Navy Office)
Campbell Park Offices (CP4-SP-013)
CANBERRA ACT 2600
Attention: NSTDC
Telephone: (06) 266 2906
Facsimile: (06) 266 2105

DEPARTMENT OF DEFENCE (Land)

Land Engineering Agency
Attention: Technical Data Centre
3rd Floor, Defence Plaza Melbourne
661 Bourke St
MELBOURNE VIC 3000
Email: LEATechnicalData@drnex.defence.gov.au
Telephone: (03) 9282 7404
Facsimile: (03) 9622 2942

DEPARTMENT OF DEFENCE (Air)

Areospace Technical Standards Document Centre (ATSDC)
Common Services System Support Office (CSSSO)
Building L7-1
RAAF Williams
Laverton VIC 3027
Telephone: (03) 9256 4236
Facsimile: (03) 9256 4888

DEFENCE RESTRICTED NETWORK (DRN)

Army Standardisation:

<http://vbmweb.sor.defence.gov.au/SPECS/Triservice/Directory.htm>

Aerospace Technical Standards Document Centre

<http://wilap006.sor.defence.gov.au/Specs/defence.asp>

ADF Maritime Material Requirements Set:

<http://defweb.cbr.defence.gov.au/navsyscom/mrs/HomePage.htm>

(Note: The above websites addresses may change at any time without notice)

CROWN COPYRIGHT RESERVED

**PUBLISHED UNDER AUTHORITY OF
DEPARTMENT OF DEFENCE**

**Copies of DEF(AUST) documents are
obtainable from sources shown inside back cover**