



# Ministry of Defence

## **Defence Standard 81-041 Part 1**

**Issue 9**

**Date: 14 December 2016**

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### **Packaging of Defence Materiel Part: 1 : Introduction to Defence Packaging Requirements**

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## Section 1

### Foreword

#### Defence Standard Structure

##### Section 1 (Generated by the StanMIS toolset)

- Revision Note
- Historical Record
- Warning
- Standard Clauses

##### Section 2 (Technical information provided by Subject Matter Expert)

- Title
- Introduction (optional)
- Table of Contents
- Scope
- Technical Information to include Tables and Figures
- Annexes (as required)

##### Section 3 (Generated by StanMIS toolset)

- Normative References
- Definitions
- Abbreviation

### REVISION NOTE

Changes in Normative Standards and Editorial amendments -absorption of 81-094

### HISTORICAL RECORD

This standard supersedes the following:

81-041 part 1 issue 9

### WARNING

The Ministry of Defence (MOD), like its contractors, is subject to both United Kingdom and European laws regarding Health and Safety at Work. Many Defence Standards set out processes and procedures that could be injurious to health if adequate precautions are not taken. Adherence to those processes and procedures in no way absolves users from complying with legal requirements relating to Health and Safety at Work.

### STANDARD CLAUSES

- a) This standard has been published on behalf of the Ministry of Defence (MOD) by UK Defence Standardization (DStan).
- b) This standard has been reached following broad consensus amongst the authorities concerned with its use and is intended to be used whenever relevant in all future designs, contracts, orders etc. and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of the Defence Standard, DStan shall be informed so that a remedy may be sought.
- c) Please address any enquiries regarding the use of this standard in relation to an invitation to tender or to a contract in which it is incorporated, to the responsible technical or supervising authority named in the invitation to tender or contract.



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- d) Compliance with this Defence Standard shall not in itself relieve any person from any legal obligations imposed upon them.
- e) This standard has been devised solely for the use of the MOD and its contractors in the execution of contracts for the MOD. To the extent permitted by law, the MOD hereby excludes all liability whatsoever and howsoever arising (including, but without limitation, liability resulting from negligence) for any loss or damage however caused when the standard is used for any other purpose.



## Section 2

### Packaging of Defence Materiel

#### Part 1: Introduction to Defence Packaging Requirements

##### 0 Introduction

**0.1** Equipment and spares must be available and ready for use when needed, in a serviceable condition, at short notice by the MOD. However it may be impossible to forecast when and where the materiel is required and, although "just in time" principles are used when possible, it may mean that materiel could be stored for long periods and/or transported to inhospitable locations at short notice.

**0.2** Packages should be designed as economically as possible. Packaging provided by the manufacturer (commercial packaging) may be adequate for some items. However commercial packaging is usually designed for a single journey to the customer at a known location and long storage periods are unlikely.

**0.3** To guarantee performance a higher level of packaging may be required to cater for MOD's requirements. This higher level is expressed as three separate Military Packaging Levels (J, N & P), each of which defines the severities for movement, handling, storage, and distribution of materiel within the military sphere of activity. These Military Packaging Levels have equivalent NATO Packaging Levels (2, 3, & 4).

NOTE: Other degrees of protection may be demanded by the Services in the form of a Special Requirement (Code H) to meet a particular operational or financial consideration.

**0.4** Defence Standard 81-41 consists of the following six parts. More than one part may apply to any one packaging requirement. It is essential that all parts are used when appropriate.

- a) **Part 1: Introduction to Defence Packaging Requirements** provides the package designer with information about the MoD requirement defines the various types and levels of packaging used and outlines the requirements for premises, transport, handling, and storage.
- b) **Part 2: Design** gives information on the factors influenced by packaging levels and specifies the requirements for the design of packaging.
- c) **Part 3: Environmental Testing** specifies test conditions and methods used to test packages to Military and NATO Packaging Levels.

NOTE: The test selection process and the associated test procedures for the materiel within the package are not covered by this Defence Standard. Guidance on the selection of tests for materiel, together with test procedures and their associated severities, are contained in Defence Standard 00-035.

- d) **Part 4: Service Packaging Instruction Sheet (SPIS)** specifies the documentation to be used when recording a package design and includes instructions for the completion of the SPIS.
- e) **Part 5: Production Processes** specifies the processes, including the materials, preservation and packing, that are applicable to the packaging of defence materiel to a military packaging level...
- f) **Part 6: Package Markings** outlines the markings required to be placed on defence packaging including bar code and dangerous goods requirements.

**0.5** BS 1133 sections 1-3 provides general guidance on the basic functions of packaging, the factors influencing the selection of packaging and advice on packaging methods and management. This standard should be consulted for additional background information.





## **1 Scope**

**1.1** This Part of the Defence Standard provides the package designer with information about the MOD requirement for packaging items of equipment and spares, defines the various types and levels of packaging used and outlines the requirements for packaging premises, transport, handling and storage

**1.2** Defence Standard 81-041 (Part 1) does not apply to the packaging of ammunition and explosives except when used in conjunction with Def Stan 00-088 Packaging of Ammunition and Explosives and Def Stan 00-810 Marking of Ammunition and Explosives and related standards.

**1.3** This Standard does not apply to; the transportation of dangerous goods, its packaging or its supply

**1.4** This Standard does not apply to the packaging of; fuels, oils, lubricants, foods, medical supplies (pharmaceuticals).

NOTE: It is understood that there is overlap in **1.2** to **1.4**, (e.g. Munitions that are or contain explosives are Class 1 dangerous goods); also these exceptions are as a result of other regulations or specifications applying preferentially.



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## 2 Warning

Refer to Section 1 of this document for the safety warning.

## 3 Normative References

Refer to section 3 of this document for normative references.

## 4 Definitions

Refer to section 3 of this document for Definitions.



## **5 General**

**5.1** In order for MOD to procure materiel in an economical manner the type of packaging most adequate to the requirement shall be chosen. Where commercial packaging is acceptable this shall be used. However it should be pointed out that this may be suitable only for delivery purposes and the contents may have to be over-packaged if not used immediately or if subsequently held in store.

**5.2** Packages used for Defence materiel shall be designed to an appropriate Military Packaging Level in accordance with Def Stan 81-041 (all Parts) unless one of the following is specified

- a) Commercial packaging (see Paragraph 6, and Annex C)
- b) Special requirement packaging; known as Code H or Level H (see Paragraph 7)

**5.3** All packages should be able to be transported throughout the logistics chain without the use of specialized equipment if possible.

**5.4** All packages where applicable must conform to national and/or international regulations particularly with respect to the transportation of dangerous goods.

**5.5** All packaging produced on behalf of the MOD must meet the relevant Packaging and Packaging Waste Regulations including certain UK essential environmental requirements. These include:

- a) Minimising packaging volume and weight in line with safety, hygiene and product / user acceptance
- b) Designing packaging to permit its reuse and/or recovery and to minimize the impact of packaging waste on the environment
- c) Manufacturing packaging to minimize the presence of hazardous substances in emissions, ash, or leachate when packaging waste is incinerated or landfilled.
- d) Limits on the concentrations of heavy metals present (lead, cadmium, mercury, hexavalent chromium).

**5.6** All wood / timber shall be obtained from legal and sustainable sources or from a FLEGT (Forest Law Enforcement, Governance and Trade initiative) licensed or equivalent source (See DEFCON 691).

## **6 Commercial Packaging for Military Use**

**6.1** Commercial packaging is that used by the manufacturer to provide ease of handling and to ensure delivery in an undamaged and serviceable condition to the consignee named in the contract or order.

**6.2** Commercial packaging shall be subject to the identification and other particulars detailed in the contract.

**6.3** Commercial packaging may be either Trade Package or Export Trade Package defined as follows:

- a) Trade Package (Packaging Code A): The package containing the required PPQ constructed using commercial grade materials and methods that will provide suitable protection to the item within, during onward shipment to the end user using enclosed transport. With handling predominantly by mechanical handling equipment. Trade Pack is most often used for UK deliveries of small light weight items and consumables.
- b) Export Trade Package (Packaging Code C): The Package containing the required PPQ constructed using commercial grade materials and methods that will provide suitable protection to the item within, during onward shipment to the end user when being moved and handled by any means. Export Trade Pack mostly used for overseas deliveries, large items, or items that are in some way more 'difficult' to package, handle, or transport.



**6.4** When Defence Materiel is delivered into the Military supply chain it needs to be packaged to ensure that it reaches the end user in a serviceable condition. Not all items of Defence Materiel require the degree of packaging stipulated under the guidelines given for the Military Packaging Levels (MPL). However, there is still the requirement to ensure that the item of supply can pass through the supply chain without defect or damage. Therefore, while not MPL, where the use of commercial packaging materials and methods is employed; this type of packaging is known as "Military Commercial Packaging", see 6.3 a) and b).

**6.5** Military Commercial Packaging shall provide the item with adequate physical protection, thus ensuring that the materiel can pass through the supply chain without being damaged and without causing disruption to the supply chain. Military commercial packaging is not intended for items that require long-term storage (i.e. in excess of 6 months).

**6.6** The choice of packaging materials and processes is left to the packaging supplier. However the following points shall be taken into account when providing items packaged to a Military Commercial Level.

- a) Provide adequate physical protection.
- b) Not make the item attractive
- c) Provide clear identification and marking
- d) Be the most cost effective solution
- e) Provide a solution that is space efficient.
- f) Be fit for purpose for the journey specified
- g) Be easily handled by in-service Mechanical Handling Equipment (MHE)

## **7 Special Requirement Code H**

A special requirement is a defined set of conditions that is not covered adequately by commercial packaging or military level packaging, although Def Stan 81-041 requirements apply where applicable unless otherwise stated. It is designated Code H (see also DEFFORM 96).

## **8 Military Packaging Levels (MPL)**

**8.1** Three Military Packaging Levels are based upon defined storage and distribution requirements. These are designated P, N, and J according to the physical and climatic conditions which may be experienced within the military sphere of activity (see Table 1).

**8.2** When packaged to one of these Levels the packaging will provide adequate protection against the defined environmental conditions and physical constraints that may be experienced by equipment and spares during storage and distribution.

### **8.3 Use of Military Packaging Levels**

Packages designed to Military Packaging Levels may be invoked in a contract usually by quoting:

- a) An existing Standard Family Specification (SFS) packaging defence standard
- b) An existing SPIS
- c) DEFCON 129

When; **8.3 a)** is not applicable, or **b)** is not in existence, or where **b)** does exist but the MPL is changed, a new package design (SPIS) shall be produced according to Def Stan 81-041 (Part 4).

NOTE: Packages may be required to be designed to a special requirement (e.g. Code H) to suit a specific set of conditions. In this case the exact conditions shall be defined before the design process commences in accordance with Def Stan 81-041 (Part 2). The test methods used in Def Stan 81-041 (Part 3) may be adapted to accommodate the special conditions.





**Table 1 Military Packaging Level Requirements**

<b>Storage Requirements</b>	<b>Distribution Requirements</b>	<b>Military Packaging Level</b>
Storage for a minimum of 5 years world-wide and in frost free permanent buildings.  (See <b>NOTES 1 and 2</b> ).	In store handling, overpack for issue.	<b>P</b>  (See <b>NOTE 3</b> )
Storage for a minimum of 5 years world-wide and in frost free permanent buildings  (See <b>NOTES 1 and 2</b> ).	Movement by enclosed transport, handling usually by mechanical handling equipment.  (See <b>NOTES 4 &amp; 8</b> ).	<b>N</b>
Storage for a minimum of 2 years world-wide with full weather protection.  (See <b>NOTES 5 and 6</b> ).	Movement and handling by any means within the transportation budget.  (See <b>NOTES 7 &amp; 8</b> ).	<b>J</b>
<p><b>NOTE 1</b> Permanent buildings may be heated or unheated.</p> <p><b>NOTE 2</b> In extreme cases, items may be stored outside, with full weather protection for a maximum period of 60 days.</p> <p><b>NOTE 3</b> When an order or contract specifies packaging to Level P, the supplier shall overpack the packaged article(s) in the most economical commercial form to provide for ease of handling and to ensure delivery to MoD in an undamaged and serviceable condition. Articles of only one MoD stock reference, domestic management code, and vocabulary section or class group may be bulked together.</p> <p><b>NOTE 4</b> The distribution requirements of Level N include unavoidable exposure to weather for very short periods (less than 10 minutes) for example when transporting stores from a building to a vehicle or aircraft.</p> <p><b>NOTE 5</b> Temperature range for world-wide storage and distribution shall be taken as -13°C to +55°C.</p> <p><b>NOTE 6</b> Full weather protection means avoidance of direct exposure to rain, sun, or wind. This may involve no more protection than that afforded by a tarpaulin properly lashed down.</p> <p><b>NOTE 7</b> Movement and handling by any means includes unavoidable exposure to weather, e.g. in uncovered transport or storage on docksides for periods up to 12 hours</p> <p><b>NOTE 8</b> Distribution transportation budget means:</p> <p><b>Road</b> Service/commercial wheeled vehicles 20,000 km  <b>Rail</b> Western European Standard 5,000 km  <b>Air</b> A total of 10 air journeys may occur totalling 175 hours distributed as follows:</p> <p>Fixed wing jet aircraft 100 hours  Fixed wing propeller aircraft 50 hours  Helicopter (internal) 20 hours  Helicopter (under-slung) 5 hours</p> <p><b>Sea</b> At sea within unventilated containers 4 months  Storage in port within unventilated containers 12 months  <b>Forklift trucks and trolleys</b> 2 hours  <b>Cranes and hoists</b> 50 lifts</p>		

NOTE: Table 1 should be interpreted as a guide, e.g., here are the probable Storage and Distribution requirements, and this listed packaging level is the most appropriate. It is mostly a guide for the MPL selector. It does not specify the maximum storage period.



## 9 NATO Packaging Levels

**9.1** Four NATO Packaging Levels are used based upon defined storage and distribution requirements. These are designated 4, 3, 2, and 1 according to the physical and climatic conditions which may be experienced within the NATO sphere of activity.

**9.2** Def Stan 81-041 does not deal specifically with the design of packages to NATO levels however they are included for information and comparison purposes. NATO Packaging Levels 4, 3 and 2 are the nearest to Military Packaging Levels P, N and J according to STANAG 4280 (see Table 2).

NOTE: When a NATO Level is called up on a contract, the item shall be packaged to the National Level of packaging existing within the manufacturing/packaging country.

**Table 2 NATO Packaging Level Requirements (STANAG 4280)**

Storage Requirements	Distribution Requirements	NATO Packaging Level	Nearest UK MPL
Storage for 1 year in a ventilated permanent building in NATO Europe	Common carrier only. Minimum handling by mechanical handling equipment	<b>4</b>	<b>P</b>
Storage for 5 years in a ventilated permanent building in NATO Europe	Enclosed movement by land, air, or sea. Multiple handling by mechanical handling equipment	<b>3</b>	<b>N</b>
Storage for 3 years outdoors in NATO Europe	Open or enclosed movement by land, air, or sea under operational conditions. Multiple handling	<b>2</b>	<b>J</b>
Storage for 1 year outdoors in NATO worldwide	Open or enclosed movement by land, air, or sea under operational conditions. Multiple handling	<b>1</b>	<b>Not Applicable</b>

## 10 Conditions of Premises

NOTE: The conditions of premises / Process areas for the packaging of explosives are covered separately by Explosives Storage and Transport Committee (ESTC) Standards. Information on which can be obtained from the ESTC (contact Sec ESTC Tel. 030 679 35592).

**10.1** All Stages of packaging should be carried out either under one roof or in separate buildings connected by completely enclosed passages. Where this is not practicable both the materiel and packaging materials shall be protected against climatic and physical damage during transit between the separate buildings.

**10.2** All sections of buildings where materiel is received, stored, or packaged shall be maintained at an acceptable standard of cleanliness, i.e., one that does not negatively impact the packaging and item.

**10.3** The floor surfaces where packaging processes are carried out shall be constructed from materials having a high resistance to wear and low dust generating properties and shall be impervious to cleaning and preservation materials.

**10.4** The atmosphere in areas where materiel is packaged shall be kept free from harmful concentrations of dust, fumes, gases, or vapours. Smoke or steam shall not be allowed to escape or be discharged inside any section.



**10.5** The process area includes (but not exclusively) the; manufacture of packaging, general storage and the packing areas. It shall be controlled to have a minimum temperature of 15°C and a maximum RH of 75%, unless otherwise specified.

**10.6** Dehumidified storage sections shall be controlled to ensure % RH is a maximum of 55%.

**NOTE:** Above 75% RH is considered to be damp and enhances; corrosion, swelling, fungal & microbial growth. 30% and below is considered dry and can desiccate some materials. Below 40% is generally considered to be a rust free environment for many metallic alloys. 50% and below is known to retard; corrosion, fungal and microbial growth. The human comfort zone is usually 40 to 60% RH at STP.

## **11 Storage of Packaging Materials**

Storage conditions in general shall be; sheltered, cool, dry, and well ventilated.

**11.1** Materials for use in the packaging process shall be stored under cover in accordance with the materials specification or manufacturer's instructions, and;

- a) In the absence of material specification requirements or manufacturer's instructions for the storage environment;
  - i. The temperature shall be not less than 15°C,
  - ii. The recommended nominal RH range is 40 to 60 %; the actual range should be determined for the material(s) in question and applied.
- b) For any period long enough to adversely affect the stored materials; the RH shall not exceed 75% and the temperature shall not exceed 30°C.

**NOTE 1:** Useful information on the storage and handling of packaging materials is contained in BS 1133 Section 3 (Paragraph 9) & Section 8 (for wooden containers) which should be consulted and followed where practicable.

**NOTE 2:** While shrinkage and swelling of timber as its Equilibrium Moisture Content (EMC) varies with environment temperature and RH is unavoidable, it should be accommodated, e.g. ensuring all timber components have similar EMC via acclimatisation in store etc., reduces problems. Ensuring the EMC does not significantly vary during construction is also useful; this may be done by controlling the temperature & RH or ensuring timber is not in an uncontrolled area for long enough to significantly affect the EMC. Therefore, monitoring wood case and similar construction areas RH & temperature, and/or the time elapsed, or alternatively periodically sampling moisture content, is good practice.

**NOTE 3:** Consistency of Temperature and RH, minimising variation, has been shown to be of value. Particularly for long term storage, or archiving, of paper based products and other materials that can have a changeable EMC.

**11.2** Plastics shall be stored away from direct sunlight and protected from contaminants, particularly oils and greases. Rolls of material shall be suspended from their formers or stored on their ends suitably protected to prevent abrasion with the contact surface. Sheet material shall be laid flat and high stacking be avoided as it is liable to cause compression and folds.

**11.3** Rubber and assemblies or components containing rubber shall be stored in accordance with BS ISO 2230 as appropriate.

**11.4** Adhesive tapes. Reels of pressure-sensitive adhesive tapes shall be interleaved with a release paper and stored on a solid flat surface away from direct sunlight.

**NOTE:** No adhesive tape to be used for military packaging should be held in store for more than one year from the date of manufacture or dispatch as appropriate, unless otherwise specified.

**11.5** Waxed wrapping rolls shall be stored on end or suspended from their formers. Sheet material shall be laid flat with a maximum stack height of one metre.



**11.6** Desiccants shall be stored in dry, airtight containers.

**11.7** Containers shall be stacked in such a manner as to preclude crushing, puncture and abrasion. Drums and casks shall be stored in such a position as to prevent the ingress of contaminants such as water or dirt.

**11.8** Wooden containers shall be stacked so as to allow free circulation of air through and around the stacks. They may be stored in the open provided they are adequately covered to exclude rain and dust.

**11.9** Any relevant Shelf-life, Expiry Date, Restriction, Hazard etc. should be clearly indicated, see also Def Stan 81-041 Part 6 for marking, particularly of shelf-life

**11.10** Materials which have exceeded their stated storage life / shelf-life shall not be used unless revalidated, where that is permitted.

## **12 Transport, Handling and Storage of Materiel Prior to Packaging**

**12.1** Interim protection against climatic and physical damage shall be provided to the item of equipment prior to packaging.

**12.1.1** Unless it is to be cleaned or preserved by methods involving heating, materiel consisting mainly of metal shall be stored for a minimum of 24 hours to allow it to reach equilibrium with the atmospheric conditions of the packaging section before any processes are applied.

**12.1.2** If practicable, materiel shall be stored on pallets, stillages, or racks in such a manner that neither physical damage nor deterioration can occur through contact.

**12.1.3** Materiel shall not be placed near any heating apparatus.

**12.1.4** Large and heavy equipment shall be kept out of direct contact with floors and walls.

**12.1.5** Materiel that is received packaged by the manufacturer shall remain in its protective covering until Military Level Packaging operations commence.

NOTE: Certain forms of protective covering, e.g. electrostatic shielding bags, nuclear clean processing etc. shall not be removed. These coverings should be treated as part of the item.

**12.2** Materiel shall not be handled directly with bare hands if deterioration might occur. Gloves worn during handling shall be replaced when they become soiled or contaminated.

**12.2.1** Care shall be taken in handling all materiel particularly items that are small or fragile or either magnetic sensitive or static sensitive.

**12.3** Materiel shall be inspected on receipt at the packaging site and verified to be in an acceptable condition and in accordance with the accompanying documents, e.g. that the stores reference number, catalogue or part number on the item or attached labels are those on the incoming release/advice notes.

**12.3.1** If there is any doubt the materiel shall be placed in quarantine and referred back either to the prime contractor or, when the packer is the prime contractor, to the Quality Assurance Focal Point stated in the contract.





### **13 Military Packaging Level Designs**

**13.1** Designs shall follow the requirements of Defence Standard 81-041 (All Parts), in particular Part 2.

**13.2** All MPL designs shall be recorded on Service Packaging Instruction Sheets (SPIS) as per Defence Standard 81-041 Part 4. Level/Code H designs should also be so recorded.

**13.3** All SPIS designs shall be uploaded onto the MOD design library known as the 'Service Packaging Index' (SPIN). They will not be considered completed / valid unless available from SPIN.

NOTE: SPIN is an MOD library / database held upon a MOD system; at the time of issue "Technical Documents Online" (TDOL). This is available to all MOD project teams and MPAS registered organisations.

**13.4** All SPIS designs shall be made by or certified by a MPAS Certificated Designer working for a MPAS registered organisation, (see MPAS Part 3), or another MOD accepted equivalent.



## Annex A Obsolete Packaging Levels

**A.1** These packaging levels listed in Tables 3 and 4 are obsolete and shall not be used in any new contract or order.

**Table 3 Obsolete Packaging Levels**

Climatic Requirements (common to all levels)	Physical Requirements		
	PRIMARY	RESTRICTED	FULL
A level of protection to ensure that material remains serviceable anywhere in the world for a minimum of 5 years from the date of packaging whilst being held in storage which provides full weather protection.	Normal handling only in storage.	Movement under cover: (a) by air or service-controlled sea transport anywhere in the world, or;  (b) by any normal commercial means within the UK / NW Europe	Movement by any normal commercial means anywhere in the world.

**Table 4 Obsolete Military Packaging Levels**

	Distribution Requirements		
Storage Requirements	Movement and handling by any means	Movement by enclosed transport, handling usually by mechanical handling equipment	In store handling, overpack for issue
Storage for a minimum of 2 years world-wide with full weather protection	-	<b>K</b>	<b>L</b>
Storage for a minimum of 5 years in a temperate climate and in frost free permanent buildings	<b>M</b>		
Storage for a minimum of 1 year in a temperate climate and in frost free permanent buildings	<b>Q</b>	<b>S</b>	<b>U</b>



## Annex B

### Glossary (Informative) of Terms in Def Stan 81-041 (Parts 1 to 6) Defined Elsewhere

Can <sup>1</sup>	Used for statements of possibility and capability, whether material, physical, or causal, (be able to, it is possible to).
Full Standard Package	A package providing protection to the Full Level and containing only the PPQ.
Makers Part Number	A group identification number allocated by the manufacturer of the item of supply.
May <sup>1</sup>	Indicates an optional requirement to be implemented at the discretion of the practitioner. "Can" is not used instead of "May" in this context.
Multi-item Package	A package providing protection to a specified Level and containing a quantity of various items with the same Army Domestic Management Code (DMC) or RAF vocabulary section or Class Group of the Catalogue of Naval Stores.
Must	In text this indicates an absolute, mandatory requirement of Statutory / Regulations that has to be implemented in order to conform to statutory / regulatory obligations
NATO Identification Number (NIIN)	Last 9 digits of the NSN consisting of the 2 Digit – NCB and 7 digit - Item Number
NATO Stock Number (NSN)	A unique 13 digit coding system utilised by all NATO countries, (and other participating countries) allocated to individual Service items of supply. The 13 digits are broken down into specific groups as shown in Table 5.
Not in Vocabulary Number (NVN)	A temporary number given to an item of supply awaiting allocation of a NATO Stock Number (NSN)
Primary Package Quantity (PPQ)	The quantity of an item of materiel selected as being the most suitable for packaging. This may differ from the Unit of Issue. They should be harmonised where possible.
Primary Standard Package	Package providing protection to the Primary Level and containing only the PPQ.
Prototype Package	The original model package fully representative in layout and functioning, but not necessarily produced by technique which will be used for production in quantity.
Restricted Standard Package	A Package providing protection to the Restricted Packaging Level and containing only the PPQ. (Not a security designation).
Service Identification Number	The number assigned by a Service Department to identify an (MOD Stock Reference) article.
Services Packaging Instruction Sheet Number (SPIS No.)	An obsolete identifier derived from the NSN of the packaged item; It consisted at a minimum of the last nine digits of the items NSN. Replaced by the full NSN, as the NSN, on SPIS sheets.
Shall not <sup>1</sup>	Indicates an absolute preclusion of the Standard, and if implemented would represent a non-conformity with the Standard. "May not" is not used instead of "shall not" to express a prohibition.



Shall <sup>1</sup>	Indicates an absolute, mandatory requirement of the Standard that has to be implemented in order to conform to the Standard and from which no deviation is permitted. "Must" is not used as an alternative for "shall". (This is to avoid confusion between the requirements of the document and external statutory obligations.)
Should not <sup>1</sup>	Indicates a practice explicitly recommended not to be implemented, or that a certain possibility or course of action is deprecated but not prohibited. To conform to the Standard, an acceptable justification must be presented if the requirement is implemented.
Should <sup>1</sup>	Indicates a recommendation; among several possibilities that is particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required.
Unit Load (UL)	One item, or a number of items suitably put together to form one load, capable of being lifted by the appropriate handling equipment.
Unit of Issue ( UI aka UOI)	The quantity normally issued to the ultimate user

Note: <sup>1</sup> in accord with DStan policy and the ISO/IEC Directives, Part 2 Annex H, and Pages 69 - 70

**Table 5 NATO Stock Number Breakdown (13 digits; nnnn-nn-xxx-xxxx)**

CLASSIFICATION		NATION CODE	ITEM IDENTIFICATION NUMBER
Group	Class		
62	40	99	027-2059

The last 7 characters, Item Number, comprise a 'non-significant' serial number.

Example 13 Digit NATO Stock Number (NSN) as text;

6240-99-027-2059

4 digit - NATO Supply Classification Code (NSC)			
6	2	4	0

9 digit - National Identification Number (NIIN)								
9	9	0	2	7	2	0	5	9

Group Code	
6	2

Class Code	
4	0

2 Digit - NCB	
9	9

7 Digit - Item Number						
0	2	7	2	0	5	9

NOTE 1; NCB – NATO Code for National Codification Bureau, aka Country Code (CC), e.g., 99 for the United Kingdom and 00 to 09 for the USA, etc., generally the country of origin / codification

NOTE 2; The NIIN, the last 9 digits of the NSN, are usually fixed after codification, the NSN first 4 digits can change

NOTE 3; The hyphens between digit groups exist for ease of reading text and are not used in automatic identification systems using bar codes or in databases etc:





## **Annex C**

### **Packaging of Consumable Stores when a Military Level or Code is not Stipulated**

**C.1** This annex covers situations where commercial packaging of consumable stores applies and when no Military Packaging Level or Code is stipulated. It requires the storage period will not exceed one year world-wide in frost free permanent buildings.

**C.1.1** It covers the packaging of the following types of materiel that can be described as consumable items or commonality items with a Primary Packaged Quantities (PPQ's) that are single, multiple, up to and including 5 kg mass. This includes the following list which is not exhaustive;

Bolts, capacitors, collars, cleats, clips fasteners, compression springs, contact caps, covers, diodes, fuses, gaskets, grommets, helical springs, identification plates, instruction plates, knobs, lugs, nails, pins, resistors, retaining rings, rivets, seals, screws, shafts, spindles, terminals, torsion springs, transistors, washers.

**C.1.2** This annex does not cover the packaging of items identified as being electrostatic-discharge sensitive devices or items sensitive to magnetic fields.

#### **C.2 General Requirements**

**C.2.1** The function of the packaging is to provide sufficient physical and climatic protection to the item(s) for delivery and limited storage.

**C.2.2** All barrier film thicknesses are in  $\mu\text{m}$  and are minima.

**C.2.3** All packaging materials and processes used shall be compatible with the item.

**C.2.4** Many rubber products are susceptible to deterioration when in contact with certain materials; further details may be found in BS ISO 2230.

**C.2.5** All rubber items and other items that are time-limited in some way shall have a shelf life expiry date marked on the packaging, see Def Stan 81-041 (Part 6).

**C.2.6** Only components of one vocabulary section or class group shall be bulked together. This section or class group shall be shown on the outer package.

#### **C.3 Packaging**

**C.3.1** The items shall be cleaned of all contamination using a method that will not cause it damage in any way.

Note: If the item(s) are cleaned using a liquid, this shall be removed by a drying method that will also cause no damage to the item(s) prior to progression to the next packaging stage.

**C.3.2** The cleaned and dried (if applicable) item(s) shall then be enclosed in a primary wrap to keep the item clean using a commercial material which shall be secured around the item(s).

Note: If the item(s) being packed contain or are rubber in nature or are ultra-violet sensitive the primary wrapping material shall be opaque.

**C.3.3** The wrapped item(s) shall then be sealed within a waterproof barrier, e.g. polyethylene film.

**C.3.1** If polyethylene film is used **Table 1** provides a guide to the material thicknesses related to the mass of the item.



**C.3.4** If the mass of the item(s) in its barrier is in excess of 500 g then it shall be firmly located and sealed in a fibreboard carton or box.

**Table C.1 Polyethylene Film Thicknesses Related to Mass of Packaged Item**

Mass (g)	Barrier Thickness ( $\mu\text{m}$ )
Up to 100	65
Over 100 to 200	125
Over 200 to 500	250
Over 500 to 5000	500

## **C.4 Labelling**

**C.4.1** Labelling and marking shall comply with the requirements of Def Stan 81-041 (Part 6).

**C.4.2** Identification numbers and names shall be as stated in the contract or order.

**C.4.3** Packages containing vulcanized rubber material shall be marked in accordance with Def Stan 81-041 Part 6 and where required, BS 3F 69.

Also;

- a) 'Life Groups' should not be used in marking, but if specified then text noting the standard defining the Group and material shall be applied in close proximity.
- b) Additional packages for the MOD (N) use shall be also marked to show material hardness.

## **C.5 Recording of Package Production Data**

Packagers should retain the details of the package used for each specific item of materiel for future reference



## Section 3

### Normative References

1 The publications shown below are referred to in the text of this standard. Publications are grouped and listed in alpha-numeric order.

Note: Def Stan's can be downloaded free of charge from the DStan web site by visiting <http://dstan.uwh.diif.r.mil.uk/> for those with RLI access or <https://www.dstan.mod.uk> for all other users. All referenced standards were correct at the time of publication of this standard (see A.2, A.3 & A.4 below for further guidance), if you are having difficulty obtaining any referenced standard please contact the DStan Helpdesk in the first instance.

#### Def Stans

Number	Title
00-035, Iss 2	Environmental Handbook for Defence Materiel
00-035, Pt 1, Iss 4	Environmental Handbook for Defence Materiel - Control and Management
81-041, Pt 4, Iss 8	Packaging of Defence Materiel - Service Packaging Instruction Sheet (SPIS)
81-041, Pt 5, Iss 8	Packaging of Defence Materiel - Packaging Processes
81-041, Pt 6, Iss 09	Packaging of Defence Materiel - Package Marking
00-035, Pt 2, Iss 4	Environmental Handbook for Defence Materiel - Environmental Trials Programme Derivation and Assessment Methodologies
00-035, Pt 3, Iss 4	Environmental Handbook for Defence Materiel - Environmental Test Methods
00-035, Pt 4, Iss 4	Environmental Handbook for Defence Materiel - Natural Environments
00-035, Pt 5, Iss 4	Environmental Handbook for Defence Materiel - Induced Mechanical Environments
00-035, Pt 6, Iss 4	Environmental Handbook for Defence Materiel - Induced Climatic, Chemical and Biological Environments
00-088, Iss 3	Packaging for Ammunition and Explosives
00-810, Pt 1, Iss 2	Marking of Ammunition and Associated Packages - General
81-041, Pt 2, Iss	Packaging of Defence Materiel - Design



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81-041; Pt 3, Iss 06	Packaging of Defence Materiel - Environmental Testing

**STANAGs**

Number	Title
4280 Edition 3	NATO PACKAGING AND PRESERVATION - APP-21 EDITION A

**Allied Publications**

Number	Title
APP-21 Edition A Version 1	NATO PACKAGING AND PRESERVATION

**Other References**

Standard Type	Standard Name
CIVIL	BS 1133 Packaging Code – 1      Section 1: The Functions of Packaging (withdrawn)
CIVIL	BS 1133 Packaging Code – 2      Section 2: Factors Influencing the Selection of Packaging (withdrawn)
CIVIL	BS 1133 Packaging Code – 3      Section 3: Packaging Methods and Management (withdrawn)
CIVIL	BS 1133 Packaging Code – 8      Section 8: Guidance on wooden boxes, cases and crates
CIVIL	BS EN ISO 780 Packaging – Pictorial Marking for Handling of Goods
CIVIL	BS ISO 2230 Rubber products – Guidelines for Storage
CIVIL	BS 3F 69      Specification for packaging and identification of vulcanized rubber items
Other	ISO/IEC Directives, Part 2      Rules for the structure and drafting of International Standards
Other	DEFCON 691 Timber and Wood - Derived Products
Other	DEFFORM 96 Coding Sheet for Procurement Documentation





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Other	MPAS – 1 Part 1	Scheme Details
Other	MPAS – 2 Part 2	Training Scheme Details
Other	MPAS – 3	Part 3 Register of MPAS Certification & Approval

**2** Reference in this Standard to any normative references means in any Invitation to Tender or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated. Care should be taken when referring out to specific portions of other standards to ensure that they remain easily identifiable where subsequent amendments and supersession's might be made. For some standards the most recent editions shall always apply due to safety and regulatory requirements.

**3** In consideration of clause A.2 above, users shall be fully aware of the issue, amendment status and application of all normative references, particularly when forming part of an Invitation to Tender or contract. Correct identification of standards is as defined in the ITT or contract.

**4** DStan can advise regarding where to obtain normative referenced documents. Requests for such information can be made to the DStan Helpdesk. Details of how to contact the helpdesk are shown on the outside rear cover of Defence Standards.



## DEF STAN 81-041 Part 1 Issue 9

### Definitions

For the purpose of this standard, ISO/IEC Guide 2 'Standardization and Related Activities – General Vocabulary' and the definitions shown below apply.

Definition	Description
Materiel	A generic term covering equipment, stores, supplies and spares.
Package	A product of a complete series of packaging operations
Packaging	<p>When used as a verb this is the preparation of articles for transportation, storage and delivery. The term includes, as appropriate; cleaning and preservation processes, packing techniques and marking procedures.</p> <p>When used as a noun it is the materials, and components, used for the preparation of the articles for transportation, storage and delivery.</p>
Packing	The operation of packaging by which materiel is enveloped in wrapping and/or enclosed in containers or otherwise secured
Standard Family Specification (SFS)	A defence standard for the packaging of certain ranges or "families" of similar components or assemblies by common processes to meet an appropriate Military Packaging Level
Services Packaging Instruction Sheet (SPIS) Design	The form used (see Def Stan 81-41 Part 4) to record the full details of all; information, materials, processes and operations used in a package design (also known as a SPIS Design).



**Abbreviations**

<b>Abbreviation</b>	<b>Description</b>
SFS	Standard Family Specification
SPIS	Service packaging Instruction Sheet
SPIN	Service Packaging INdex
TDOL	Technical Documents On-Line
Defcon	Defence Condition
DEFFORM	Defence Form
FLEGT	Forest Law Enforcement, Governance and Trade initiative
MPL	Military Packaging Level(s)
NATO	North Atlantic Treaty Organization
STANAG	NATO Standardization Agreement
ESTC	Explosives Storage and Transport Committee
% RH	Percentage - Relative Humidity
STP	Standard temperature and Pressure
EMC	Equilibrium Moisture Content
SI	Statutory Instrument(s)
MPAS	Military Packager Approval Scheme
DE&S	Defence Equipment and Support
SEOC	Support Enablers Operating Centre
SCP	Support Chain Process
SptEng	Support Engineering
Pkg	Packaging or Packaging Policy



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**File Reference**

The DStan file reference relating to work on this standard is DStan/81/41/1.

**Contract Requirements**

When Defence Standards are incorporated into contracts, users are responsible for their correct application and for complying with contractual and statutory requirements. Compliance with a Defence Standard does not in itself confer immunity from legal obligations.

**Revision of Defence Standards**

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