

IBM Engineering Specification P/N 92F6933 Packaging/Product Requirements for Dangerous Goods

Written by: Mark Maresh
IBM Hazmat Program Manager
Global Logistics Program Management
mmaresh@us.ibm.com

Supersedes All Previous Updates

PN 92F6933 1 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
-----------------------	---------	----------------------	----------------------	-----------------------	-----------------------

Contents

1.0 Introduction	3
1.1 Abstract	3
1.2 Purpose	3
1.3 Application	3
1.4 Document Administration	3
2.0 Scope	4
3.0 Packaging Requirements	4
3.1 General Packaging Requirements	5
3.2 Packaging Performance Requirements	5
3.2.1 Inner Packagings	5
3.2.2 Outer Packagings	5
4.0 UN Packages--Marking Requirements	6
5.0 Overpacks	6
6.0 Dangerous Goods Categories	7
6.1 Bulk Chemicals	7
6.2 Chemical FUMs (Field Use Materials)	7
6.3 Batteries	8
6.3.1 Non-Spillable Lead Acid Batteries	8
6.3.2 Lithium Batteries	8
6.3.3 All Batteries	11
6.4 Gas Springs	12
6.5 Magnetized materials	15
6.6 Radioactive Materials	14
7.0 Supplier Responsibilities	14
8.0 IBM Responsibilities	14
9.0 Definitions	15

PN 92F6933 2 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
-----------------------	---------	----------------------	----------------------	-----------------------	-----------------------

1.0 Introduction

1.1 Abstract

There are specific packaging performance and marking requirements which apply to dangerous goods. The specific requirements may vary according to the mode of transport. The **United Nations Recommendations on the Transport of Dangerous Goods** are a set of requirements common to all modes of transport. The United Nations Recommendations are the basis for this document. Dangerous goods which reference this document should be packaged and marked in compliance with the UN recommendations.

1.2 Purpose

To outline the requirements for the packaging of dangerous goods shipped to any IBM facility or shipped by IBM to other users. This document applies to all geographies.

Note: This document is intended to complement regulatory and transportation publications. It is not to be used in lieu of regulations/requirements provided by various agencies or associations. If conflicts exist, governing regulatory requirements shall take precedence over the **United Nations Recommendations on the Transport of Dangerous Goods** or other requirements contained herein.

1.3 Application

These packaging requirements apply to the finished, assembled container as tendered for shipment. The finished, assembled container may consist of the inner-, intermediate-, and outer-packagings or overpacks, if applicable, as well as the dangerous good(s) being transported.

1.4 Document Administration

This document is maintained and controlled by IBM's Global Logistics Program Management (GLPM) organization.

PN 92F6933 3 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
-----------------------	---------	----------------------	----------------------	-----------------------	-----------------------

2.0 Scope

This specification applies to all dangerous goods as defined in this document. Compliance with this specification is required whenever such articles are shipped to, from, or as services for, IBM.

Dangerous goods must be packaged for compliance with regulations governing all means of transport including truck, rail, ocean, and air to any country in the world. In addition, these items must not be packaged and marked for a single mode of transport or destination country without consideration of regulations mandated by other modes or destinations. **The supplier who packs the dangerous good is responsible to respond to changes in government regulations that may affect the package, labeling and/or markings.**

3.0 Packaging Requirements

Each dangerous article must be packaged per applicable regulations. Unit packages shipped to IBM must be capable of reshipment without additional preparation

Any quantity limitations which apply to the specific dangerous goods being shipped must be adhered to. If two or more limitations are offered, as in the case of passenger and cargo aircraft, the more restrictive (passenger) limitation and packaging requirements shall be used unless approved by IBM Procurement in writing.

Any packing instructions supplied by IBM which apply to the specific dangerous good being shipped must be adhered to. Packing instructions may prohibit specific packaging materials or methods. In the case where packing instructions are in conflict with regulations, contact IBM Procurement for further instructions. Do not violate regulations to comply with packing instructions supplied by IBM.

Exceptions to the packaging performance requirements, including the ICAO Limited Quantity Exception, are not universally accepted and shall not be used by suppliers who package dangerous goods unless specifically requested by IBM Procurement in writing. The IBM Program Manager for Dangerous Goods can also request exceptions in writing for dangerous goods that are only distributed within a country or region under their control.

PN 92F6933 4 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
-----------------------	---------	----------------------	----------------------	-----------------------	-----------------------

3.1 General Packaging Requirements

The primary packaging requirements for Dangerous Goods are identified in the **UN Recommendations for the Transport of Dangerous Goods; IATA Dangerous Goods Regulations; Title 49 code of Federal Regulations**. Other regulations, like ADR, TDG, and IMDG-Code may also apply.

The UN certified and tested packaging must meet all requirements of all these regulations unless written approval is obtained by IBM Procurement to conform to a specific regulation. This approval will only be granted if IBM determines that the mode of transportation warrants such approval (i.e. Shipments within the United States may require adherence to DOT regulations only). The mode of transportation may not be apparent to the supplier because IBM may reship the material to any world wide location.

3.2 Packaging Performance Requirements

The package performance requirements include performance tests. Only government approved third-party test laboratories are permitted to authorize and certify a UN specification package. Testing requirements can be found in the **UN Recommendations for the Transport of Dangerous Goods; IATA Dangerous Goods Regulations; and the Title 49 code of Federal Regulations**.

Testing shall include but may not be limited to the following requirements:

3.2.1 Inner Packagings

Internal Packagings intended to contain liquids must pass an Internal (Hydrostatic) Pressure Test.

Single Packagings designed to contain liquids must also pass a leakproofness test.

3.2.2 Outer Packagings

All packages prepared for transportation must pass a drop test.

Packages prepared for transportation must pass a stack test.

It is strongly recommended to obtain and maintain most current testing certificates for the packaging material in use.

PN 92F6933 5 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
-----------------------	---------	----------------------	----------------------	-----------------------	-----------------------

4.0 UN Packages--Marking Requirements

Once successfully tested, each shippable package must be marked with a UN Specification marking. Stamping, printing or embossing is acceptable marking methods if allowed by regulations. Identification must be waterproof. In addition supplier must follow all labeling requirements for transport as specified by regulations. Marking and Labeling requirements can be found in the **UN Recommendations for the Transport of Dangerous Goods; IATA Dangerous Goods Regulations; the U.S. Title 49 code of Federal Regulations, or other applicable dangerous goods transportation regulations.**

5.0 Overpacks

Whenever feasible, the use of overpacks is required to enclose multiple identical packages to form a single handling unit for convenience of handling and stowage. Each dangerous good contained in an overpack must be in an individual UN specification package that is marked and labeled as prescribed by the regulations. No additional preparation should be required to reship the overpack and/or any single interior package.

Overpacks must be Marked and Labeled according to regulations. If overpacks are reused, then all non applicable marks and labels must be removed or covered up.

PN 92F6933 6 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
-----------------------	---------	----------------------	----------------------	-----------------------	-----------------------

6.0 Dangerous Goods Categories

This section covers the different categories of dangerous goods and any unique requirements that may apply to the specific dangerous good category.

IMPORTANT: If the chemical composition or part specification of an item regulated as a dangerous good is changed so that it is no longer regulated as a dangerous good during transportation, then the IBM part number must be changed. If the chemical composition or part specification of an item not regulated as a dangerous good is changed so that is now regulated as a dangerous good during transportation, then the IBM part number must be also be changed. This is to ensure that IBM can properly ship the down-level stock in inventory.

6.1 Bulk Chemicals

This specification does not cover chemicals purchased in large quantities (bulk) used to support manufacturing or facilities operations. Bulk chemicals must meet all transportation, packaging, and security regulations. Contact IBM Procurement if you need further clarification.

6.2 Chemical FUMs (Field Use Materials)

Chemical FUMs are materials stocked by IBM for service representatives use. Some examples include cleaners, adhesives, glues, paint, oils, alcohol, and chemicals in kits. Chemical FUMs that are regulated as dangerous goods by transportation regulations must be packaged according to this specification including the following:

- a. They must be packaged in field use units (usually a unit of one) in UN Specification Packaging so that IBM can reship them in the same package.
- b. Under special circumstances, IBM Procurement may permit the use of a single combination package that consolidates **multiple** inner containers inside a **single** outer container. Such configurations may be acceptable due to the small physical package size, shipping quantity or other factors as defined by IBM. In this instance, only government approved third-party test laboratories are permitted to authorize and certify the UN specification package. Authorization to use a combination package, which consists of multiple inner packages in a single outer package, must be provided by IBM Procurement in writing.
- c. A FUM containing liquids must use combination packagings, as single packagings are restricted by some airlines.

PN 92F6933 7 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
-----------------------	---------	----------------------	----------------------	-----------------------	-----------------------

d. Packaging, labeling and marking must be compliant with all transportation regulations where materials will be shipped (i.e. IATA / 49 CFR / ADR /IMDG-Code....). All FUM packaging, labeling and marking must be compliant with IATA regulations as purchased from the supplier no matter where it is intended to be shipped, unless an exception is approved by IBM Procurement or IBM Program Manager for Dangerous Goods in writing for FUMs that are intended for local distribution only and controls are in place within IBM to restrict air shipments.

e. The net quantity per package shall not exceed the standard maximum net quantity per package as allowed on “Passenger and Cargo Aircraft”, as defined by IATA regulations. The net quantity per package is not required to meet IATA Limited Quantity requirements.

See IBM Engineering Specification 46G3772 “IBM Environmental Requirements for Materials, Parts, and Products” for additional FUM requirements.

Contact IBM Procurement if further clarification is required.

6.3 Batteries

6.3.1 Non-Spillable Lead Acid Batteries

All Non-Spillable Lead Acid Batteries, including Uninterruptable Power Supplies (UPS), purchased for use in IBM or non-IBM equipment must be non-regulated for shipment per IATA Special Provision A67; 49 CFR 173.159a; and all other application transportation regulations. The battery and outer package must be marked “NONSPILLABLE” or “NONSPILLABLE BATTERY” according to 49 CFR 173.159a (c) (2).

6.3.2 Lithium Batteries

All lithium batteries purchased for use in IBM or non-IBM equipment must be non-regulated for shipment per Section II of IATA Packing Instructions 965 - 970; 49 CFR Special Provision 188, ADR Special Provision 188, and all other applicable transportation regulations. Bulk shipments of lithium cells or batteries must have a gross package weight of 2.5 kg or less for lithium metal batteries and 5 kg or less for lithium ion batteries which are purchased for field use (FRUs). The restrictions on bulk shipments quantities and gross weight does not apply to lithium battery or cell shipments used to support manufacturing operations as long as all transportation regulations are met.

A. Requirements for Lithium Cells and Batteries:

- a. All lithium cells and batteries must be the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3.
- b. For lithium ion cells the Watt-hour rating shall not exceed 20 Wh.

PN 92F6933 8 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
-----------------------	---------	----------------------	----------------------	-----------------------	-----------------------

- c. For lithium ion batteries the Watt-hour rating shall not exceed 100 Wh. The Watt-hour rating must be marked on the outside of the battery case.
- d. For lithium metal or lithium alloy cells the lithium content cannot exceed 1 g.
- e. For lithium metal or lithium alloy batteries the lithium content cannot exceed 2 g.

B. Requirements for Lithium Cells and Batteries Packaging:

For loose lithium battery shipments, including a unit of one battery, to and from IBM the following requirements apply:

- i) the package must be capable of meeting a 1.2 m drop in any orientation without:
 - damage to cells or batteries contained therein;
 - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
 - release of contents.
- ii) the package must contain the appropriate lithium battery handling label. If this label is on the individual battery package the supplier is certifying that the package is qualified to the 1.2 m drop.

C. Lithium Battery Handling Label

a. A lithium battery handling label is required for:

- i) Lithium batteries contained/installed in equipment require the applicable lithium battery handling label (lithium metal or lithium ion) on the equipment package if the total number of lithium cells or batteries exceeds 4 cells (except button cells) or 2 batteries per package. Per Section II of IATA PI 967 and 970.
- ii) All equipment where the lithium battery is packed with equipment require the applicable lithium battery handling label (lithium metal or lithium ion) on the equipment package. Per Section II of IATA PI 966 and 969.
- iii) All loose lithium batteries require the applicable lithium battery handling label (lithium metal or lithium ion) on the battery package. Per Section II of IATA PI 965 and 968.

IBM uses 2 different lithium battery handling labels, depending on the type of lithium batteries in the package or contained in equipment in the package.

IBM PN 46D2120 - Lithium Metal Battery Handling Label

IBM PN 46D2121 - Lithium Ion Battery Handling Label

PN 92F6933 9 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
-----------------------	---------	----------------------	----------------------	-----------------------	-----------------------

Important: If any package with a lithium battery handling label is placed within an overpack, the overpack must also be labeled with the corresponding lithium battery handling label. In addition, the marking “Overpack” must be placed on any overpacks that contain packages with lithium battery handling labels. The lithium battery handling label must always be visible during shipment.

Important: The use of the IBM PN lithium battery handling labels is restricted for use on IBM shipments (shipments to, from, and on behalf of IBM) only, unless supplier has made arrangements with InfoTrac, who is the owner of the phone number on the label.

Suppliers who use the IBM PN lithium battery handling labels for shipments to IBM must report contact information (company name, contact name, contact phone number, and contact email address) to the document owner (see page 1), who will forward it to InfoTrac. They need this information in case they get a phone call concerning the shipment.

Example of a Lithium Battery Handling Label PN 46D2120



PN 92F6933 10 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
------------------------	---------	----------------------	----------------------	-----------------------	-----------------------

For IBM shipping operations:

If a package has a lithium battery handling label from a supplier and it is not one of the two Part Numbers listed above with the contact phone number shown on the label example, you must relabel over top of the supplier label with the applicable IBM lithium battery handling label if it is visible during shipment.

D. Suppliers should be aware that any package with a lithium battery handling label also requires accompanying documentation per IATA and ADR, and an Air Waybill Statement per IATA.

ADR (European) Regulations:

ADR Special Provision 188 regulations in Europe affect the ground transportation of lithium batteries and lithium batteries packed with or installed/contained in equipment. These regulations are similar to the ICAO/IATA regulations summarized above except the gross package weight cannot exceed 30 kg.

U.S. Shipments of Lithium metal batteries:

IMPORTANT: The U.S. Department of Transportation (USDOT) prohibits the shipment of loose primary (non-rechargeable) lithium metal batteries and cells on passenger aircraft for both foreign and domestic passenger-carrying aircraft entering, leaving, or operating in the United States according to IATA State Variation USG-02. In addition, the battery package must be marked "PRIMARY LITHIUM BATTERIES - FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT" when transporting loose lithium metal batteries by highway, rail, vessel and cargo aircraft in the U.S..

6.3.3 All Batteries

Documentation from the manufacturer/supplier of the battery or equipment that contains the battery must be provided to IBM upon request clearly stating that the part number being purchased by IBM meets all the requirements which make the battery non-hazardous for shipment via IATA, 49 CFR, and any other applicable transportation regulation such as ADR, IMDG, TDG, etc.. In addition, a UN 38.3 certification or test report for lithium batteries must be provided upon request.

An exception must be obtained from the IBM Hazmat Program Manager (Document Owner) for any battery released for IBM or non-IBM products that doesn't meet hazardous material transportation exemption requirements which requires it to be shipped as a fully regulated dangerous good. There are currently no products in production approved to use fully regulated dangerous good batteries.

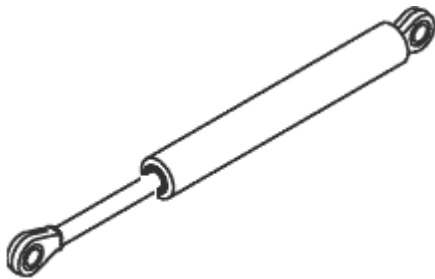
See IBM Engineering Specification 46G3772 "IBM Environmental Requirements for Materials, Parts, and Products" for additional battery requirements.

PN 92F6933 11 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
------------------------	---------	----------------------	----------------------	-----------------------	-----------------------

6.4 Gas Springs

Gas springs, dampers, accumulators, articles pressurized, etc. are to be designed and tested so they can be classified as non-hazardous according to IATA Special Provision A114; 49 CFR 173.306 (f) (4); and all other applicable transportation regulations. Documentation from the manufacturer of the item/article must be obtained clearly stating that the part number being purchased by IBM meets all the requirements which make the item/article non-hazardous for transportation. Failure to obtain this information from the manufacturer will cause the part to be "bin locked" in Mechanicsburg and other parts centers until appropriate classification information is obtained from the manufacturer. To assist in collecting this information a Gas Spring Certification form is available from IBM Procurement (available on the IBM internal HazMat Web site).

Example of a Gas Spring



PN 92F6933 12 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
------------------------	---------	----------------------	----------------------	-----------------------	-----------------------

6.5 Magnetized Materials

Products or parts that contain sufficient physical ferrous material mass (i.e. racks) or contain permanent magnets must be tested for magnetic field strength per IATA regulations. If Product or Part has a magnetic field strength greater than 0.00525 gauss when measured from 2.1 m (7.0 ft), report the following information to IBM Procurement. IBM Procurement should forward this information to the IBM HazMat Transport Compliance Program Manager:

1. Machine Type / Model(s) affected and/or Part Number(s) affected.
2. Magnetic Flux densities at 2.1 m (7.0 ft) and 4.6 m (15.0 ft) in gauss if the reading at 2.1 m (7.0 ft) exceeds 0.00525 gauss.
3. Method used to conduct test.

Note: All rack systems (empty or populated) must be tested for magnetic field strength and results reported to IBM as stated above. This includes rack systems that don't exceed 0.00525 gauss when measured from 2.1 m (7.0 ft).

Reference IBM Corporate Standard C-S 6-0460-001 "Magnetic Limits for Air Shipments".

Example of a rack system



Note: Supplier should be aware that any item that measures maximum field strength of greater than 0.00525 gauss at 2.1 m (7.0 ft) is considered a Magnetized material and requires a Magnetized material label as well as an air waybill notation when shipping via air under IATA regulations per IATA Packing Instruction 953.

PN 92F6933 13 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
------------------------	---------	----------------------	----------------------	-----------------------	-----------------------

6.6 Radioactive Materials

Contact IBM procurement before procuring or shipping radioactive materials to IBM. It is a requirement of IBM Engineering Spec 46G3772 to report the presence of any radioactive substances to IBM if they are present in the supplier's product. If approved by IBM, IBM procurement must contact the IBM HazMat Program Manager (document owner) to classify the product in "CCCS Hazmat".

7.0 Supplier Responsibilities

It is the suppliers' responsibility to assure that dangerous goods supplied to IBM are properly packaged, tested, labeled, and marked in compliance with the requirements contained in this document and proper regulatory publications. Inner-, intermediate-, and outer- packagings, are to be tested jointly to ensure complete compliance with each requirement.

8.0 IBM Responsibilities

When IBM is the shipper of dangerous goods, the same responsibilities apply as outlined in Section 7.0 Supplier Responsibilities.

PN 92F6933 14 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
------------------------	---------	----------------------	----------------------	-----------------------	-----------------------

9.0 Definitions

49 CFR	'49 Code of Federal Regulations '. This is where the regulations can be found concerning the shipment of hazardous materials by all modes in the United States.
ADR	" Accord européen relatif au transport international des marchandises dangereuses par route " This is the European agreement concerning the International carriage of dangerous goods by road.
Combination packagings	A combination of packagings consisting of one or more inner packagings secured in an outer packaging.
Dangerous Goods/Hazardous Materials	Articles and substances exhibiting properties capable of damaging life, property, or the environment.
DOT	(U.S) " Department of Transportation ". This is the regulatory agency governing the shipment of dangerous goods within the United States.
IATA	" International Air Transport Association ". A private organization that publishes regulations which complement those issued by ICAO. These regulations contain additional requirements over ICAO and are used by shippers, forwarders, and carriers in everyday activities.
ICAO	" International Civil Aviation Organization ". Provides the official government regulations for the movement of dangerous goods by air.
Inner packagings	Packagings for which an outer packaging is required for transport.
IMDG	" International Maritime Dangerous Goods code. " This is the uniform international regulations for the transport of dangerous goods by sea.
Overpack	An enclosure which contains more than one package to form a single handling unit for convenience of handling and stowage. Each dangerous good contained in an overpack, must be properly packed, marked, labeled, and in proper condition as required by the regulations.
Single Packagings	The packagings which do not require any inner packaging in order to perform their containment function during transport.
TDG	" Transport Dangerous Goods ". These are the regulations used for the transport of dangerous goods by all modes in Canada.

PN 92F6933 15 of 15	History	EC J21618 05Apr05	EC L79185 02Oct08	EC L80800A 03Apr09	EC L80800G 30Mar11
------------------------	---------	----------------------	----------------------	-----------------------	-----------------------