

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

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Supersedes All Previous Updates

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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 package as tendered for shipment. The finished, assembled package 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.

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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, markings, and volumes or weight limitations.**

3.0 Packaging Requirements

Each dangerous article must be packaged per applicable regulations. Individual 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.

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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 reshipe the material to any worldwide 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.

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4.0 Marking and Labeling Requirements

Qualified **UN Specification Packaging** must be marked by the manufacturer of the package with a UN Specification marking. Stamping, printing or embossing are acceptable marking methods if allowed by regulations. The marking must be durable, legible and placed in a location and of such size relative to the package as to be readily visible.

Package must contain all marking and 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.**

Markings or labels that are required by dangerous goods transportation regulations must only be applied to the package when the package contains the corresponding dangerous goods. Conversely, it is strictly prohibited for a package to carry dangerous goods markings or labels if there are no dangerous goods packaged inside.

- Example: Uninterruptible Power Supply (UPS) chassis that **do NOT** contain sealed lead acid batteries **must NOT** have the “NONSPILLABLE” marking on the package.

5.0 Overpacks

Whenever feasible and allowed by dangerous goods transportation regulations, the use of overpacks is recommended 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 or other package required by dangerous goods transportation regulations and must be marked and labeled as prescribed by the regulations. No additional preparation should be required to reshipe the overpack and/or any single interior package.

Overpacks must be marked and labeled according to applicable dangerous goods transportation regulations. If overpacks are reused, then all non applicable marks and labels must be removed or covered up.

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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.

New chemical FUMs should be formulated and/or packaged so that they are not fully regulated as a dangerous good in transportation. For example, isopropanol wipes (Solids containing flammable liquids - UN 3175) can ship as non-regulated under IATA Special Provision A46 if it is in a sealed packet that contains less than 10 ml of isopropanol absorbed in a solid material and there is no free liquid in the packet.

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.

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c. A FUM containing liquids must use combination packagings, as single packagings are restricted by some airlines.

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 Sealed Lead Acid Batteries

All Non-Spillable Sealed 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. This includes meeting all packaging requirements. 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 173.185 (c), ADR Special Provision 188, and all other applicable dangerous goods transportation regulations. Bulk shipments of lithium cells or batteries must conform to all requirements of IATA Dangerous Goods Regulations, including package requirements, quantity and/or weight restrictions.

Note 1: Some shipments of lithium batteries require shipment as a class 9 dangerous good under Section IB of IATA Packing Instructions 965 and 968.

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Note 2: Power Bank (power pack, mobile battery, etc.). These are portable devices designed to be able to charge consumer devices such as mobile phones and tablets. For the purposes of the IATA Dangerous Goods Regulations, power banks are to be classified as batteries and must be assigned to UN 3480, lithium ion batteries, or UN 3090, lithium metal batteries, as applicable.

A. Requirements for Lithium Cells and Batteries:

Each cell and battery is of the type prove to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3. Cells and batteries manufactured according to a type meeting the requirements of subsection 38.3 of the UN Manual of Tests and Criteria, Revision 3, Amendment 1 or any subsequent revision and amendment applicable at the date of the type testing may continue to be transported, unless otherwise provided in applicable dangerous goods transportation regulations. Cell and battery types only meeting the requirements of the UN Manual of Tests and Criteria, Revision 3, are no longer valid. However, cells and batteries manufactured in conformity with such types before 1 July 2003 may continue to be transported if all other applicable requirements are fulfilled. Note: Batteries, including those which have been refurbished or otherwise altered, must be of a type proved to meet the testing requirements of the Manual of Tests and Criteria, Part III, subsection 38.3, irrespective of whether the cells of which they are composed are of a tested type.

- a. Cells and batteries must be manufactured under a quality management program as described in 3.9.2.6(e) of the IATA Dangerous Goods Regulations.
- b. For lithium ion cells the Watt-hour (Wh) rating shall not exceed 20 Wh.
- 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 grams (g).
- e. For lithium metal or lithium alloy batteries the lithium content cannot exceed 2 g.
- f. The total net weight of lithium ion batteries installed in an item (including parts, Field Replaceable Units (FRUs), and Options) cannot exceed 5 kilograms (kg). Machines cannot exceed 35 kg total net battery weight, otherwise they cannot be transported by air. Any machines that exceed 5 kg total net battery weight must be shipped as fully regulated by air and must meet all of the requirements to ship under Section I of IATA PI 967, which are not covered in this specification. The IBM Hazmat Program Manager (Document Owner) must be notified before any new Machines are released that exceed 5 kg total net battery weight as the processes must be set up before the first shipment.

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- g. The total net weight of lithium metal batteries installed in an item (including parts, FRUs, Options, and Machines) cannot exceed 5 kg.
- h. All loose piece (not installed or packed with equipment) rechargeable lithium ion cells and batteries (e.g. FRUs, Options, Field and Production (FAPs), and Production Parts) classified under UN 3480 Packing Instruction 965, Sections II and IB, must be supplied to IBM between 25 and 30% State of Charge (SoC) of the rated capacity so IBM can reshipe the cells and batteries by air transport under ICAO/IATA regulations.

Tamper evident or quality seals must be applied to each individual cell or battery package and **bulk package** to seal all openings of the package to ensure SoC control. (Reference Global Labeling Guide Volume 8, Section 8.0 Security Seals and Symbols” which is available on the IBM Supplier Portal at the following link: <http://www-03.ibm.com/procurement/proweb.nsf/ContentDocsByTitle/United+States~Information+for+suppliers>)

In addition, an “Air Eligible” label (examples shown below) or a label with the text “**AIR ELIGIBLE**” must be applied to each individual cell or battery package and **bulk package** to indicate that they meet the <or =30% SoC air transportation requirement. The “Air Eligible” label is commercially available. When a supplier places this label on the package they are confirming that the SoC does not exceed 30% of the rated capacity of the battery at the time they packaged the battery.

Important: The “Air Eligible” label must never be placed on a package where the SoC is unknown or greater than 30% of the battery’s rated capacity.



B. Requirements for Lithium Cells and Batteries Packaging:

a. For loose lithium battery shipments, including a individual battery FRUs and Options, to and from IBM the following requirements apply (per Section II of IATA Packing Instructions 965 and 968):

- i) cells and batteries must be packed in inner packagings that completely enclose the cell or battery. To provide protection from damage or compression to the batteries, the inner packagings must be placed in a strong rigid outer packaging of the type Boxes.
- ii) the package must be capable of meeting a 1.2 m drop test 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;

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- release of contents.
- iii) the package must bear the appropriate lithium battery mark (see Figures 1, 2, 3, and 4). If this mark is on the individual battery package the supplier is certifying that the package is qualified to the 1.2 m drop test required by IATA and other dangerous goods transportation regulations (e.g. 49 CFR, ADR, and TDG), as well as meets all other packaging requirements of IATA and this IBM engineering specifications.
- iv) packages containing lithium ion cells and batteries (per IATA Packing Instruction 965) and lithium metal cells and batteries (per IATA Packing Instruction 968) must be labeled with a Cargo Aircraft Only (CAO) label (see Figure 5) as defined in the IATA Dangerous Goods Regulations. The CAO label must be on the same surface and next to the lithium battery mark if the package dimensions are adequate. If a lithium ion or lithium metal battery package is placed in an overpack, the overpack must bear the CAO label in addition to the appropriate lithium battery marks .
- v) some shipments of lithium cell and batteries require shipment as a class 9 dangerous good under Section IB of IATA Packing Instructions 965 and 968. Packages that fall under IB must have the correct UN ID and Proper Shipping Name marking, the class 9 lithium battery label, the appropriate lithium battery mark, and a Cargo Aircraft Only (CAO) label. Additional requirements apply for the shipper of class 9 dangerous goods that are not defined in this specification.
- vi) **Important (for air shipments only):** Only one (1) package prepared under Section II can be placed into an overpack. In addition, a shipper is not permitted to offer for transport more than one (1) package prepared under Section II in any single consignment. For package quantities per consignment that exceed these limits, Section IB must be used instead of Section II.

For details on the definition of the batteries per package quantity limits, net battery weight per package limits, and/or packages per consignment limits that require shipment under Section IB refer to the IATA Dangerous Goods Regulations.

vii) **Additional requirements when shipping FRU's, FAP's and Options under Section IB:** FRU's, FAPs, and Options must be packaged to meet IATA Section II requirements. In addition, the battery quantity of the FRU, FAP, or Option in the Section II package must match the IBM Bill of Material (BOM) quantity (i.e. no bulk packages) for the FRU, FAP, or Option part number.

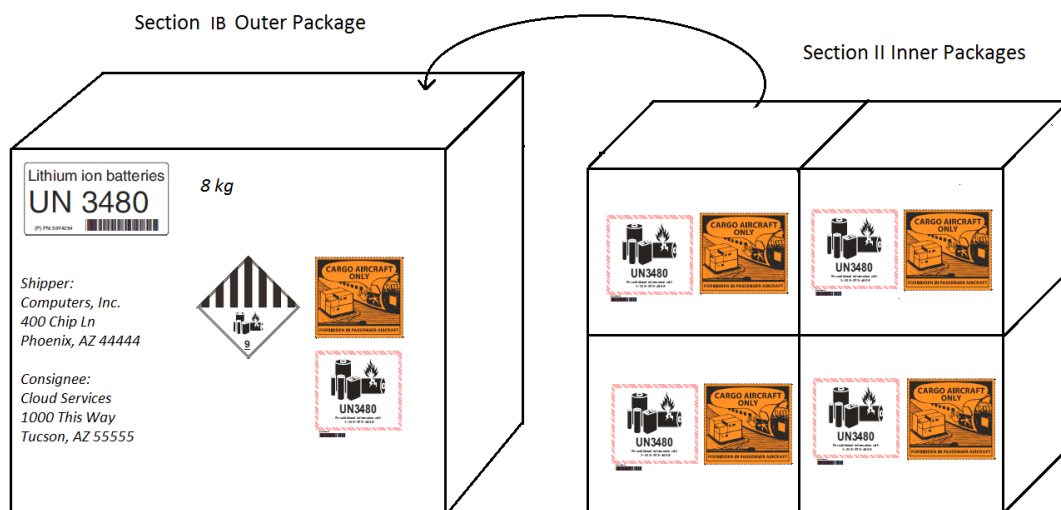
If supplier ships Section II packages to IBM in quantities greater than one package per consignment by air, the Section II packages must be consolidated as inner packages into a Section IB outer carton (box). The Section II inner packages must meet all the requirements to ship under Section II, including the 1.2 m package drop requirement, the package quantity and/or net battery weight limits, and all labels required to ship under Section II must be applied to each Section II inner package.

Note: In order to ship Section II packages using this method, the Section IB outer

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package (box plus contents) must meet all requirements for Section IB, including the 1.2 m package drop requirement (Section IB outer carton with all Section II inner packages inside), the total net battery weight limits, and all marks and labels required under Section IB must be applied to the Section IB package. See IATA Section IB for battery net weight limits. This is the combined total net battery weight of all the batteries inside the Section II inner packages that are placed in a Section IB outer carton.

See the figure below for an example of Section II inner packages, consolidated inside a Section IB outer carton, for lithium ion cells and batteries. Lithium metal cells and batteries would be similar but with appropriate marks and labels. In this figure, the Section IB outer carton would not be considered an overpack, and therefore, should **never have an “OVERPACK” marking on it.**



Note: The figure above is just an example for reference only. Refer to the IATA Dangerous Goods Regulations for the requirements to mark and label a Section IB and Section II package. The net battery weight and addresses shown on the Section IB package above must be adjusted for each shipment.

b. For lithium batteries packed with equipment shipments to and from IBM the following requirements apply (per Section II of IATA Packing Instructions 966 and 969):

- i) cells and batteries must be placed in inner packagings that completely enclose the cell or battery and then placed in a strong outer packaging; or be placed in inner packagings that completely enclose the cell or battery, then placed with equipment in a strong outer packaging.
- ii) the equipment must be secured against movement within the outer package and must be equipped with an effective means to preventing accidental activation.
- iii) the package of the equipment or the package of the battery packed with the equipment must be capable of meeting a 1.2 m drop test in any orientation without:
 - damage to cells or batteries contained therein;

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- shifting of the contents so as to allow battery to battery (or cell to cell) contact;
- release of contents.
- iv) the package must bear the appropriate lithium battery marks (see Figures 2 and 4). If this mark is on the equipment package the supplier is certifying that the package is qualified to the 1.2 m drop test required by IATA and other dangerous goods transportation regulations (e.g. 49 CFR, ADR, and TDG).
- iii) the total net weight of lithium ion batteries or lithium metal batteries packed with equipment must not exceed 5 kg per package.
- iv) the number of cells or batteries in each package must not exceed the appropriate number for the equipment's operation plus two spares.

c. For lithium batteries installed in equipment shipments to and from IBM the following requirements apply (per Section II of IATA Packing Instructions 967 and 970):

- i) the total net weight of lithium ion batteries or lithium metal batteries installed in equipment must not exceed 5 kg per package. See 6. 3. 2.A.f for an exception for Machines installed with Lithium ion batteries.
- ii) the package must bear the appropriate lithium battery mark. **This does not apply to packages that only contain lithium button cells installed in equipment.** No other markings and labeling are required.
- iii) The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the cell or battery is afforded equivalent protection by the equipment in which it is contained.

C. Lithium Battery Mark and Cargo Aircraft Only (CAO) Labels

a. A lithium battery mark is required for:

- i) Lithium batteries contained/installed in equipment require the applicable lithium battery mark (UN3481 or UN3091) applied to the equipment package for any quantity of cells or batteries installed in equipment. This does not apply to packages that only contain lithium button cells installed in equipment per Section II of IATA PI 967 and 970.
- ii) All equipment where the lithium cell or battery is packed with equipment requires the applicable lithium battery mark (UN3481 or UN3091) applied to the equipment package. Per Section II of IATA PI 966 and 969.
- iii) All loose lithium batteries require the applicable lithium battery mark (UN3480 or UN3090) applied to the battery package. Per Sections II and IB of IATA PI 965 and 968.

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IBM uses four (4) different lithium battery marks:

IBM PN 00RP152 - Lithium Ion Battery Mark (UN3480) (see Figure 1)

IBM PN 00RP153 - Lithium Ion Battery Mark (UN3481) (see Figure 2)

IBM PN 00RP154 - Lithium Metal Battery Mark (UN3090) (see Figure 3)

IBM PN 00RP155 – Lithium Metal Battery mark (UN3091) (see Figure 4)

IMPORTANT:

1. If any package with a lithium battery mark is placed within an overpack, the overpack must also be labeled with the corresponding lithium battery mark(s) that are on the packages inside. In addition, the marking “OVERPACK” must be placed on any overpacks that contain packages with lithium battery marks. The lithium battery mark must always be visible during shipment.
2. The use of the IBM PN lithium battery marks (Figures 1, 2, 3, and 4) are restricted for use to IBM shipments (shipments to, from, and on behalf of IBM) only. The phone number on these marks is owned by IBM and may be forwarded to a service company contracted by IBM
3. The lithium battery marks must conform to IATA requirements, including minimum dimensions, color, and content.
4. Suppliers who use the IBM PN lithium battery marks 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.

Figure 1 - Example of a Lithium Ion Battery Mark (UN3480) IBM PN 00RP152

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Figure 2 - Example of a Lithium Ion Battery Mark (UN3481) IBM PN 00RP153

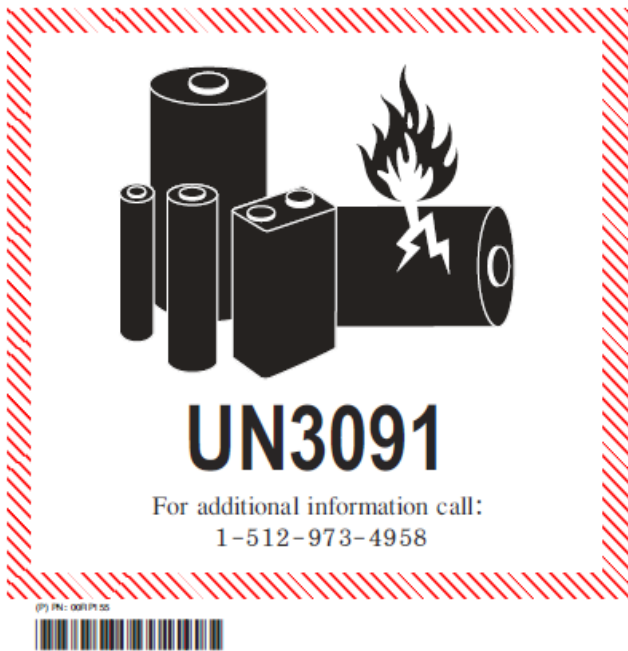


Figure 3 - Example of a Lithium Metal Battery Mark (UN3090) IBM PN 00RP154

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Figure 4 - Example of a Lithium Metal Battery Mark (UN3091) IBM PN 00RP155



IBM required all suppliers to complete the transition from the old lithium battery handling labels to the new lithium battery marks **by July 1, 2017**.

b. A Cargo Aircraft Only (CAO) label is required for:

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- i) All loose lithium metal cells and batteries require the CAO label applied to the battery package. When the package dimensions are adequate, the CAO label must be located on the same surface of the package near the lithium battery mark per Sections II of IATA PI 968 and on the same surface and near the hazard label per Section IB of IATA PI 968.
- ii) All loose lithium ion cells and batteries require the CAO label applied to the battery package. When the package dimensions are adequate, the CAO label must be located on the same surface of the package near the lithium battery mark per Section II of IATA PI 965 and on the same surface near the hazard label per Section IB of IATA PI 965.

Important: If any package with a Cargo Aircraft Only (CAO) label is placed within an overpack, the overpack must also be labeled with the Cargo Aircraft Only (CAO) label. In addition, the marking “OVERPACK” must be placed on any overpacks that contain packages with Cargo Aircraft Only (CAO) labels. The Cargo Aircraft Only (CAO) label must always be visible during shipment.

Important: The Cargo Aircraft Only (CAO) label must conform to IATA Requirements including minimum dimensions, color, and content.

Figure 5 - Example of a Cargo Aircraft Only (CAO) IBM PN 46W9416



For IBM shipping operations:

If a package has a lithium battery mark from a supplier and it is not one of the four Part Numbers listed above with the contact phone number shown on the label example, you must re-label over

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top of the supplier label with the applicable IBM lithium battery mark if it is visible during shipment.

D. Suppliers should be aware that any package with a lithium battery mark also requires an Air Waybill Statement per IATA and 49 CFR. In addition, lithium battery shipments as class 9 dangerous goods under Section IB of IATA Packing Instructions 965 and 968 require additional package marking and labeling, as well as dangerous good shipping documentation not covered in this specification. IATA dangerous goods training and certification is required for employees who process (packing, marking, labeling, and preparing and signing shipping documentation) class 9 dangerous goods shipments.

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.

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, which now aligns with the IATA Dangerous Goods regulations. In addition, the lithium metal battery package must be labeled with a Cargo Aircraft Only (CAO) label (see Figure 5), in addition to the lithium metal battery mark (see Figure 3), when transporting loose lithium metal batteries by highway, rail, and vessel 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 dangerous goods transportation regulation such as ADR, IMDG, TDG, etc.. In addition, all batteries must be packaged, and marked and labeled (if required) to comply with IATA, 49 CFR, and any other applicable dangerous goods transportation regulation such as ADR, IMDG, TDG, etc.

A UN 38.3 Test Summary and full test report for lithium cells and batteries must be provided to IBM. The UN38.3 Test Summary requirements are detailed under the UN Manual of Test Criteria, Part III, sub-section 38.3, paragraph 38.3.5. This includes loose lithium cells and batteries (IATA Packing Instructions 965/968),

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lithium cells and batteries packed with equipment (IATA Packing Instructions 966/969), and lithium cells and batteries contained/installed in equipment (IATA Packing Instructions 967/970). At this time the request does not include lithium button cells contained in equipment (IATA Packing Instructions 967/970).

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 dangerous goods transportation exception 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 that exceed the small lithium battery limit of 20 Wh for lithium ion cells, 100 Wh for lithium ion batteries, 1 g lithium content for lithium metal cells, or 2 g lithium content for lithium metal batteries.

Note: an exception is not required for lithium batteries that ship under Section IB of IATA Packing Instructions 965 and 968.

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

Release/Introduction of new battery designs and part numbers

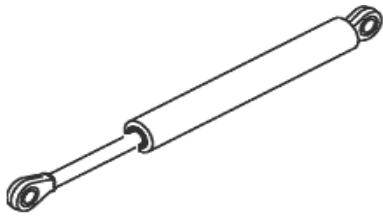
To reduce the complexity of the battery supply chain it is highly recommended to limit the number of new battery designs and part numbers where possible. For example, use standard battery models without modification, such as CR2032 lithium metal button cells. In addition, before releasing a new part number for a battery, including FRUs, check to make sure that the battery is not already released under a current part number. This does not apply when a new part number is needed to ensure inventory control or to ensure that IBM has control over the battery design or battery supplier.

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); IMDG code and ADR Special Provision 283 and all other applicable dangerous goods 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).

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Example of a Gas Spring



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

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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.

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".

6.7 Articles containing pressurized gases of Division 2.2

This section covers articles that contain pressurized gases of Division 2.2 that are not liquefied or refrigerated liquefied gases, except for gas springs, which are covered in section 6.4 of this document. One example includes tubing used in water cooled systems that are pressurized with Nitrogen during shipment to prevent corrosion.

Finished goods, manufacturing parts, and spare parts that contain pressurized Division 2.2 gases as described above must not have a pressure that exceeds 200 kPa at 20 degrees C. This requirement ensures that these articles are not classified as a dangerous good for transportation purposes.

6.8 Refrigerating machines

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IBM uses refrigerating machines for some liquid cooled servers. The refrigerating machines used in IBM branded equipment or OEM equipment procured for IBM use must be non regulated in transportation by meeting IATA Special Provision A26 and must contain less than 12 kg of a gas in Division 2.2 or less than 12 L ammonia solution (UN 2672).

6.9 Capacitors

This section covers electric double layer capacitors (EDLC) under UN 3499 and asymmetrical capacitors under UN 3508 used in IBM branded equipment or OEM equipment procured for IBM. The energy storage capacity in an individual capacitor must not exceed 0.3 Wh to ensure that these capacitors are not subject to dangerous goods transportation regulations. The energy storage capacity of a capacitor pack (capacitors electrically connected together by permanent means) can exceed 0.3 Wh as long as each capacitor inside the pack does not exceed 0.3 Wh.

Where feasible, it is recommended to use capacitors covered under this section instead of batteries as they have fewer transportation requirements and restrictions.

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.

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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. Examples of overpacks include: <ul style="list-style-type: none"> • A box, container or crate • A pallet sized container (aka. Gaylord, Power Pack, Bulk Bin, pallet box, etc.). • A pallet load of boxes wrapped or contained in clear plastic (shrink wrap, stretch wrap, etc.), whether clear or opaque.
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.

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10.0 Summary of Changes under EC P11604B 01Sep18

Section	Summary
Introduction	Added Bob McCord as additional author
6.3.2	Definition of Power banks as loose Lithium Ion Batteries added
6.3.2 B 4	Clarification for lithium battery packaging
6.3.2 C	Removal of lithium mark to lithium label to lithium mark part number conversion table
6.3.2 D	Removed requirement for accompanying documentation in the US
6.3.3	Added requirement for UN38.3 Test Summary

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