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Packaging manual for suppliers

Division: Robotics and Motion

Business unit: Drives

Version: June, 2018

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This document is for external use and reference.

Make quality happen.

ABB is committed to continuously improving its supply chain. Through collaboration with our business partners, we aim to enhance supplier relationships, ensure the highest quality standards in our business and create a sustainable value chain.

Sustainability and integrity are a key part of ABB's procurement and logistics strategy. Therefore, we have released an update of our global **Packaging Manual for Suppliers**, which are in a current or upcoming business relationship with the Robotics and Motion (RM) global Business Unit **Drives**.

This packaging manual supersede all other general instructions and guidelines for the **BU Drives** on a global level. The material specific instructions submitted with dedicated orders are excluded from that.

ABB is looking forward to a continued cooperation and the way forward to more agile continuously improvements in procurement and logistics incl. packaging and therefor the optimization of the end to end value chain.



Packaging manual for suppliers

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Glossary

Blocks

Vertical members used as spacers between the top and bottom decks of full four-way entry pallets.

Container

A box or receptacle that is usually the outer protection used in packing goods for shipment.

- **Returnable container:** Method of packaging intended for more than one shipment. Containers are returned to supplier for reuse.
- **Primary container:** The smallest container in which a part is packed for a shipment.
- **Secondary container:** A larger container in or on which multiple containers of a part are shipped.

Corner posts

A square or triangular member placed inside or outside of the corners of pallet containers.

Dunnage

Interior support or protection for the commodity packaged.

ESD

Electrostatic discharge (ESD) is the release of static electricity when two objects come into contact.

Flaps

The closing parts of a fiberboard box.

Label

A card, strip of paper, etc. marked and attached to an object to indicate its nature, contents, ownership, destination, etc.

Pack

- To put material or goods into a container for storage or transportation.
- Number of inner pack units per outer pack unit.

Pad

A corrugated or solid fiberboard sheet, or other authorized material, used for extra protection or for separating tiers, or layers of articles, when packed for shipment.

Seaworthy packaging

As per the German HPE (Holzpackmittel, Paletten, Exportverpackung) standard seaworthy packaging refers to packaging with the definition: "Fit-for-use packaging is designed to counter normal stresses envisaged for a particular transport route, duration, means of transport, country and place of destination and usual handling and transshipment, storage before, after and during transit. It guarantees undamaged arrival of the packaging goods based on transport, handling and storage stresses to be expected." (Also referring to DIN (Deutsches Institut für Normung - German Institute for Standardization) Standard 554 05) As per Transport Information Service (TIS) definition concepts that have been used previously, such as „seaworthy packaging“ or „ordinary commercial packaging“ are not defined and are replaced by the term „**fit-for-purpose packaging**“. Packaging cannot be designed to suit the stresses that will be encountered unless these stresses have been defined beforehand during the packaging planning phase. Packaging is subject to different stresses depending on the means of transport used and the distance the package is transported. This fact means that all packaging is individual.

Shipping/parts identification label

A label used to identify the contents of a shipping pack.

Sub-pack

One of the smaller packs (which may be a standard quantity or non-standard quantity pack) that make up a larger multiple pack.

Tape

A strip of cloth or paper, sometimes having a filler or reinforcement, coated on one side with an adhesive. It is used to form the joint on a fiber box or to close or reinforce such a box. Closure and reinforcement can also be effected with pressure-sensitive tape.

VCI

Volatile corrosion inhibitors, protection against corrosion, comes in different types, main one is a plastic bag

Weight:

- **Gross:** Total weight of parts and tare (net + tare).
- **Net:** Weight of parts only.
- **Tare:** Includes the weight of primary and secondary containers, dunnage, and strapping, and plastic films but excludes the weight of the parts.

Introduction

The following are ABB's packaging, labelling and shipping requirements for the global business unit (hereafter called BU) Drives (hereafter called RMDR) that each supplier **MUST** adhere to effective October 1st, 2015. The purpose of this manual is to inform our supply base of our general guidelines required to minimize safety risks, achieve optimum part quality and zero solid waste discharge from our facility. With the cooperation of all parties, we can continually reduce injuries, make improvements, increase our competitiveness, and minimize costs.

Suppliers are responsible for packaging and shipping parts that are of an acceptable quality to the point of use, utilizing the transportation method designated by ABB BU RMDR.

These specifications provide guidelines for printing and applying a shipping/parts identification label. The label is designed to improve the productivity and control at suppliers and at ABB BU RMDR, by allowing effective and efficient capture of data for production counts, warehouse input/output, cycle checking, shipper generation, forwarding, freight transfer control, receiving, and other inventory controls. Strict adherence to these specifications for the shipping/parts identification label will reduce implementation costs and increase benefits for ABB BU RMDR and its suppliers. In this document, the word **"SHALL or MUST"** indicates a requirement and the word **"SHOULD"** indicates a recommendation.

These guidelines are to be used during development of packaging, prior to submitting a quotation for production parts. Specific regulations for each local business unit (hereafter called LBU) e.g. products or country-specific requirements can be added separately to this manual by each LBU individually as an appendix. If such specific regulations are needed, ABB's contact person (LBU) is responsible to provide such appendixes to the supplier. If specific regulations exist these supercede the data in the main document.



Compliance

Due to its significant importance to our operations, adherence to these packaging, labelling and shipping requirements is mandatory, and will be continuously monitored. Non-compliance to the instructions contained in this manual will be brought to the attention of the supplier by means of a „**Rejected Packaging**” issued by our receiving plant.

Charges for repackaging and/or disposal of any non-recyclable materials will be billed back to the shipping location. Any persistent violation or recurring problem will be referred to the appropriate ABB buyer for corrective action as necessary.

General regulations

Upon quotation, all suppliers **MUST** furnish the appropriate purchasing activity via the packaging specifications. The actual cost for each item purchased to package the part and costs for the pallet, box or container, dunnage, and containment (e.g. strapping or glues), **MUST** be available for review and **MUST** be included in price list of the product.

When submitting the quotation, a packaging specifications and a packaging costs form **MUST** be submitted to ABB for review including:

- Information about package type
- Pieces per packaging
- Weight
- Shipping point and return point for packaging materials for all parts shipped to ABB...etc.

For direct shipments, the supplier **MUST** ask the ABB contact or buyer for the guidelines concerning the packaging and labeling required by final customer. If a specific packaging format **MUST** be filled, the ABB contact will inform the supplier. Suppliers **MUST** designate a packaging contact to the ABB category manager for problem resolution related to packaging.

The determination of the type of package design is the supplier's responsibility and the supplier **MUST** ensure that the parts and all packages of all shipments are received in an acceptable (damage-free) condition, and are efficiently and economically packaged for the method of transportation, storage and type of handling planned for the final destination and its intended point of use.

General regulations

To ensure that all packages and shipments will reach their intended point of use, all packages **MUST** be tested under simulated real-life conditions or ABB approved test standard. The packaging should be inspected during FAI (First Article Inspection).

Package contents and routing **SHOULD** be easy to see, along with any special handling requirements.

All features/surfaces considered important to the quality or operation of the part (e.g., machined surface, bore, etc.) **MUST** be protected from damage and/or moisture, salt corrosion, road dust, wood chips, or other debris as required by ABB.

Supplier-initiated packaging or cost improvements are encouraged, but **MUST** be initiated and approved through the ABB category manager to ensure that our plant productivity is not adversely affected.

All packaging **MUST** conform to all government and transportation rules and regulations (country of origin, travel and destination).

The packaging of hazardous materials **MUST** follow relevant country-specific regulations, which prescribe the proper method of classification, packaging, marking and labeling of each shipment. Furthermore, where other federal, state, or local standards and/or regulations are in effect the packaging and labeling **MUST** comply.

Suppliers **MUST** assure that packaging materials in need of repair are not used for shipping purposes.

Pack design and parts count (pieces per container) **SHALL** not vary and containers are to be shipped completely filled except when a release is marked.

Ergonomics **MUST** be considered as part of the packaging design.

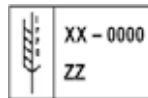
Material usage regulation overview

Material
Composites
General plastics
Cardboards and paper
Wood
Filler materials
Approved materials
Polyethylene (PE), polypropylene (PP)
Paper, paperboard, corrugated board
Untreated solid wood or plywood
Paper, corrugated board, air pads
Prohibited material
Composites should be avoided
Polyvinylchloride (PVC), polystyrene
Waxed, oiled, paraffin or bitumen papers
Chipboards, coated or varnished wood
Polystyrene, styrofoam

A more extensive list of ABB prohibited or restricted items can be found at:

- Guide for Suppliers to ABB List of Prohibited and Restricted Substances
- ABB List of Prohibited and Restricted Substances

All wood-packing materials used in international shipping must be stamped with the approved by IPPC (International Plant Protection Convention) stamp.



ISPM 15 (International Standards for Phytosanitary Measures) Marking with IPPC certification symbol should be clearly marked on all wood used for international shipments. MB (methyl bromide) not accepted according to EU regulations since March 19th 2010.

*all in accordance with:
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:286:0001:0030:EN:PDF>

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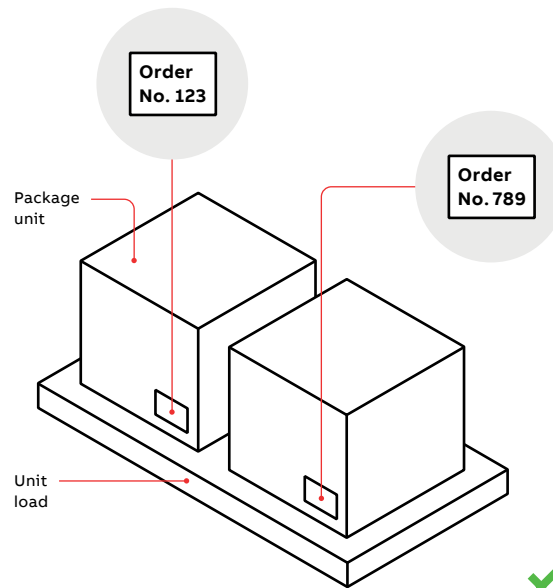
02 General order and load information

02 General order and load information

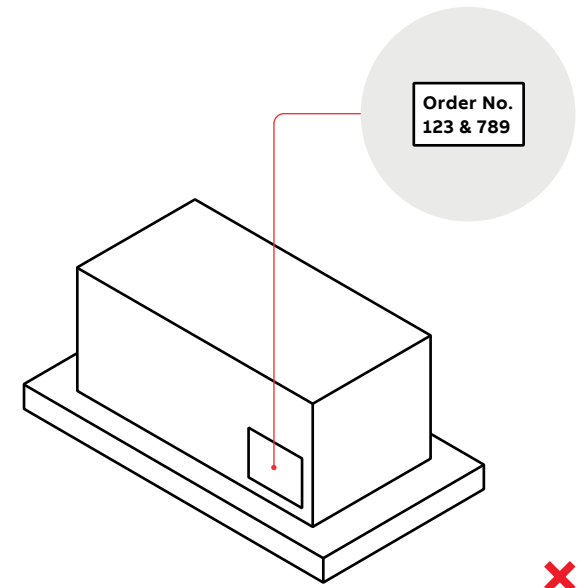
Packaging based on orders

Each order should be packaged separately. If a supplier has to deliver more than one order on the same delivery date, each order should be delivered in a separately packaged unit. The packaging guidelines of ABB forbid the combination of two orders into one package unit as shown on the illustration. It is allowed to deliver two differently packaged units on the same unit load carrier (e.g. Euro Pallet).

DO



DON'T

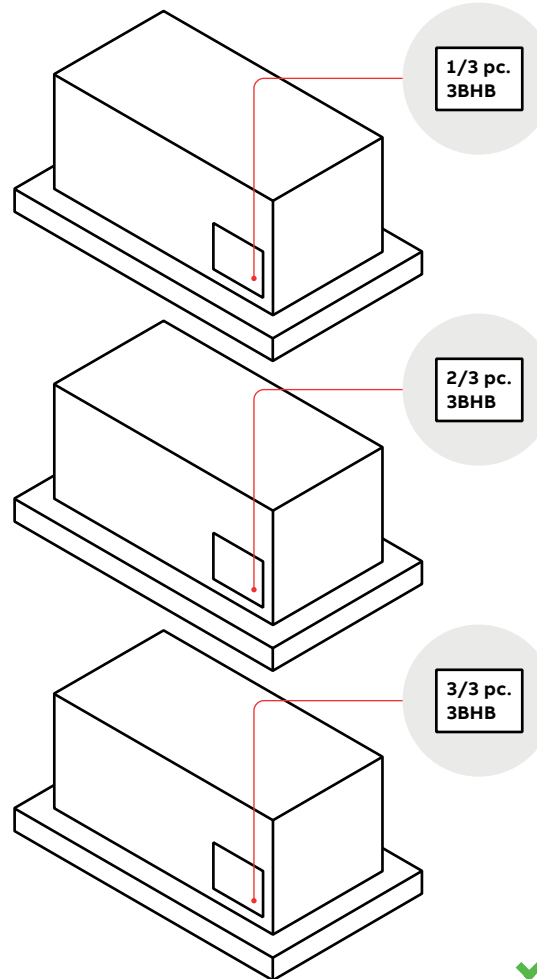


02 General order and load information

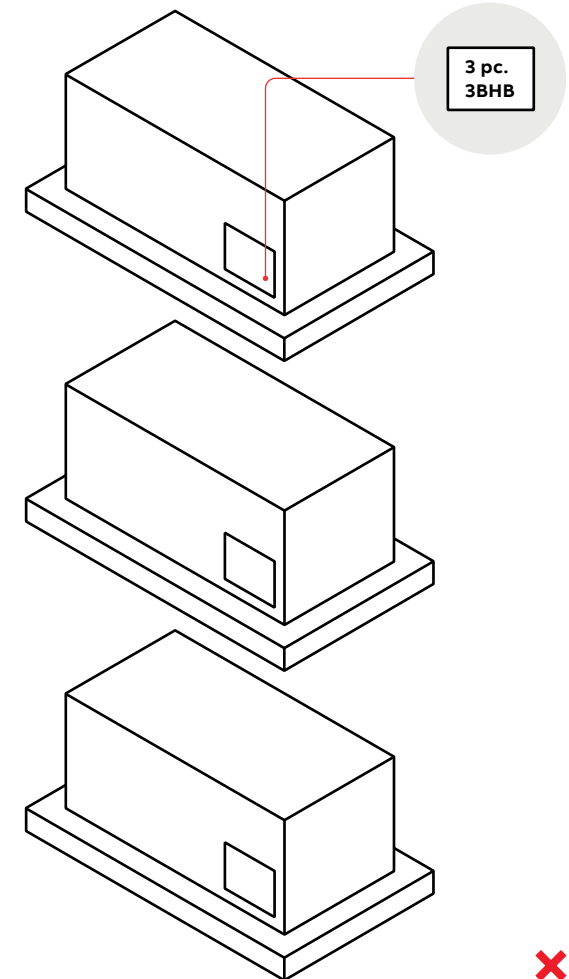
Packaging based on orders

Where multiple package units are needed to deliver one order, each package unit **MUST** be clearly marked to identify which part of the order it comprises. A copy of the delivery note which includes information on the partial order **MUST** be attached to each unit.

DO



DON'T



02 General order and load information

Kit item loads

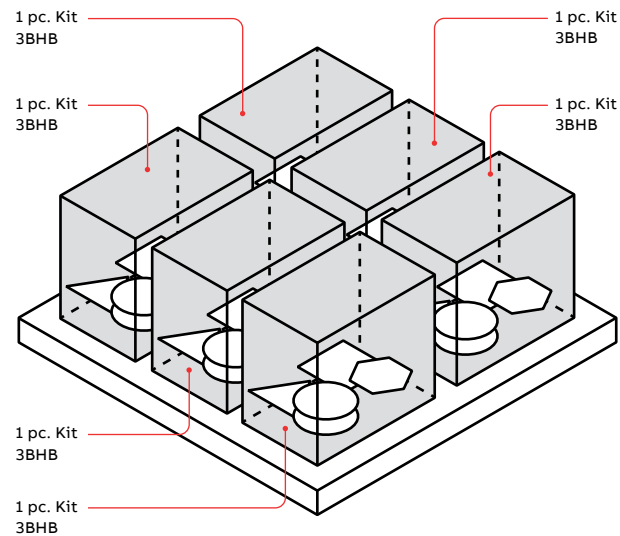
If a kit exists, the kit delivery **MUST** be delivered as a complete kit. It is not acceptable to deliver individual components contained within the kits separately unless prior approval has been obtained or ABB has requested this delivery method.

Loose individual components without customer material identity number ID-No. (e.g. accessory items) have to be fastened or packed together with the corresponding main material. Material without customer ID-No. could not be handled. Partial shipments must be clearly indicated on the delivery note. Additionally, the ABB purchaser who authorized the partial shipment should be noted.

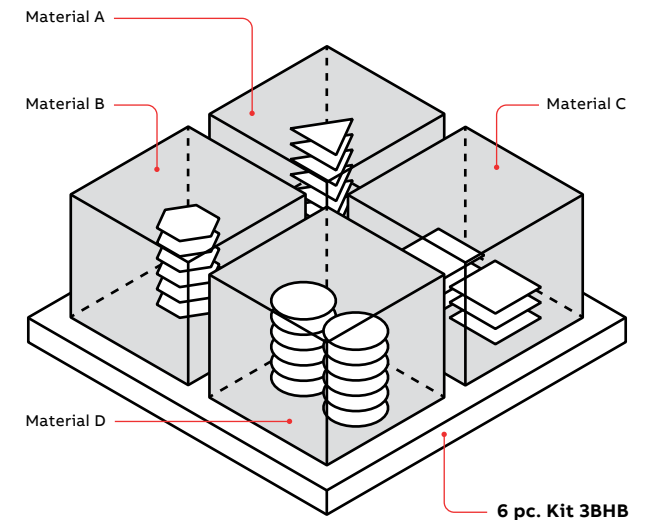
In addition to the material ID label, a kit shall be labeled with a content label that lists the following for each component in the kit:

- Component part number
- Quantity in kit
- Component part description

DO



DON'T



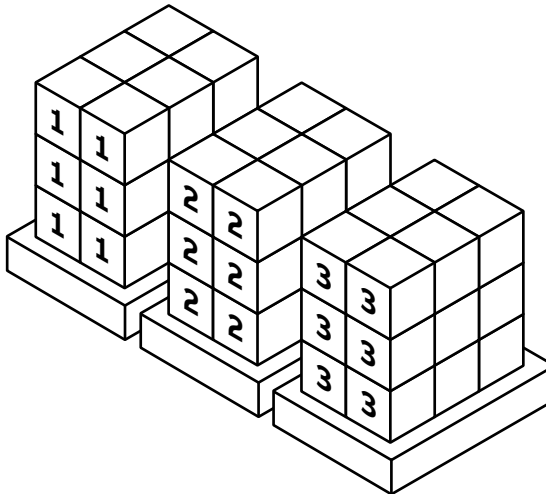
02 General order and load information

Mixed item loads

Mixed item loads **SHALL** be avoid. If necessary, a label with the words “mixed parts” have to be attached in a noticeable location. Each sub-pack or item **SHALL** be identified with an individual label.

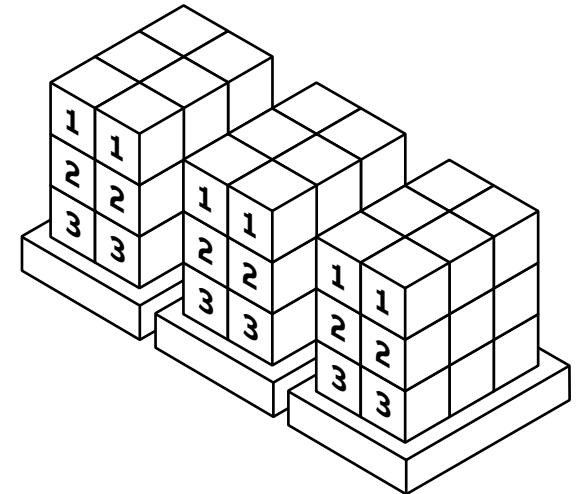
DO

Correct loading



DON'T

Incorrect loading

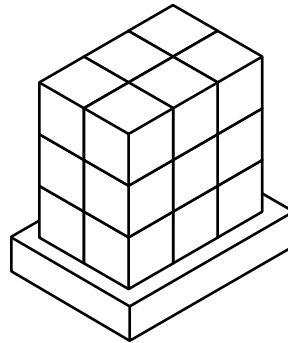


02 General order and load information

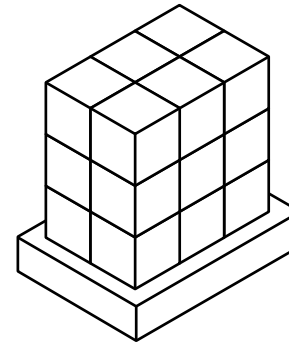
Mixed item loads

- Product **SHOULD** be stacked vertically onto pallet
- Mixed loads **MUST** be stacked with the heaviest package at the bottom and the lightest package on top
- Same part number **SHALL** not cross pallets unless carton quantity is more than a single pallet.
- Multiple purchase order (PO) numbers of the same part number **SHALL** not cross pallets unless carton quantity is more than single pallet

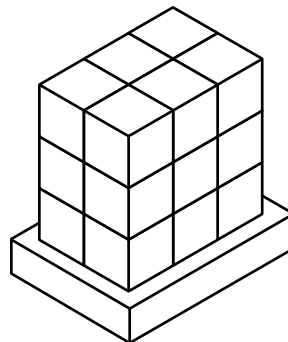
Complete pallet of ducks



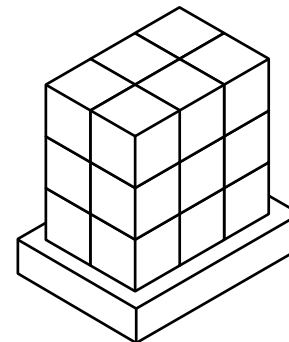
Complete pallet of birds



Complete pallet of dogs



Mixed pallet of ducks, birds & dogs



02 General order and load information

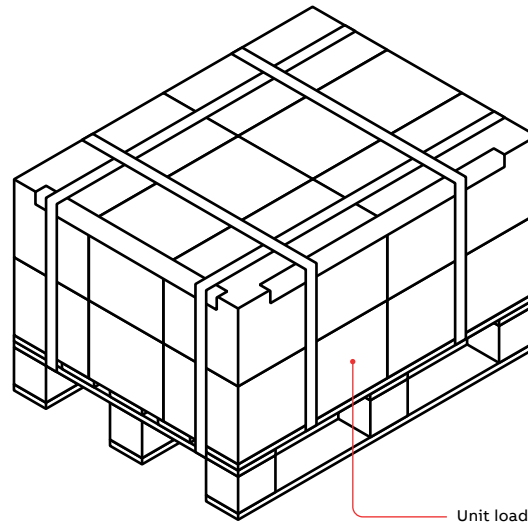
Positioning of packages and packaged goods

The packaged goods should be arranged within the packaging to allow an even weight distribution. The size of the packaging should reflect the size of the packaged goods. To ensure that the packaged goods do not slip out of position during transport and handling, all empty spaces in the packaging should be filled.

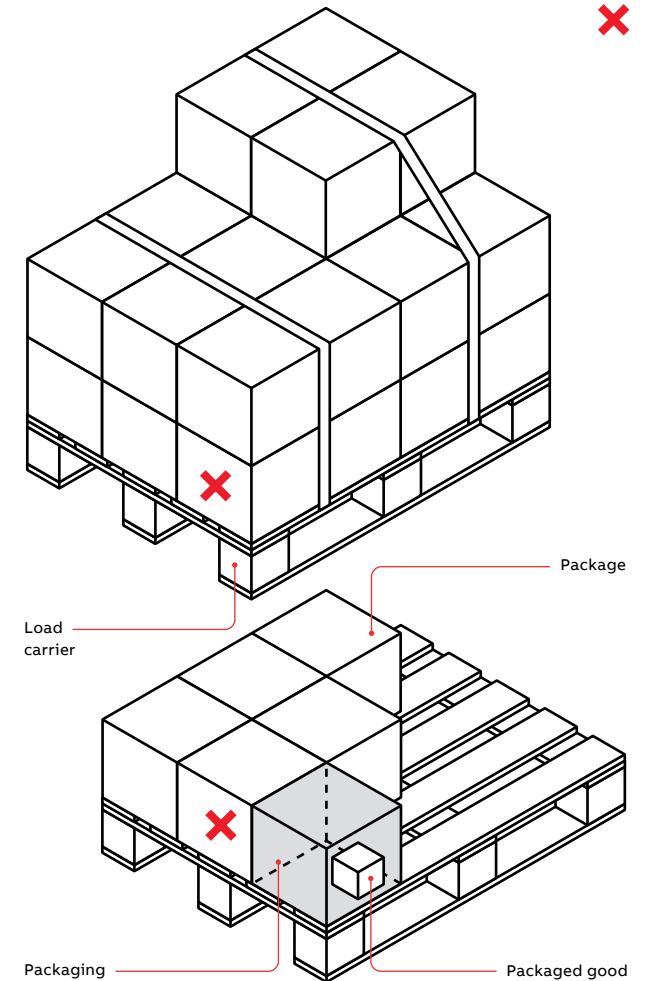
The package (packaged good + packaging) should be positioned on the load carrier to allow for an even weight distribution. The basic size of the load carrier must not be exceeded by the package.

If the packages do not completely cover the load carrier, they should be arranged to allow for an even weight distribution and to prevent them from slipping out of position.

DO



DON'T



02 General order and load information

Oversized items

Where the part size allows it, containers **SHOULD** be modularized to fit unit load shipping sizes. Packages with a weight above the maximum limit need to be delivered on load carriers which are designed for this purpose. Loading units **SHALL** be able to be lifted and therefore maneuverable by forklift, for instance with the use of pallets.

In the case of cabinets and housings, it is important that the load carrier exceeds the size of the packaged goods for collision protection.

Parts that exceed the load carrier are only permissible after consultation with the responsible local product group transport, traded and logistics (LPG TT&L) manager and clearly labeled.

Not approved loading



Approved loading

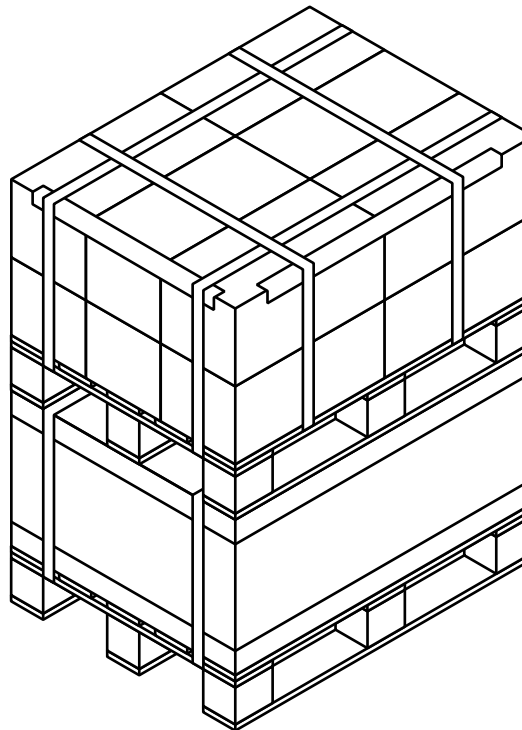


02 General order and load information

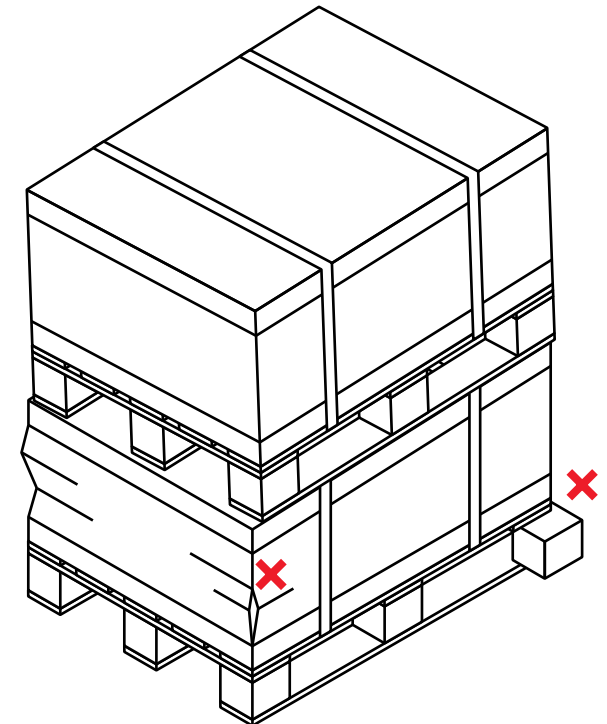
Unit load stacking

One of the most important properties of unit loads is that they be stackable. Carriers **MUST** guarantee that pallets etc. can be securely stacked on top of each other with or without any stacking support. The stacking of packaging must not be done at the expense of the stability and quality of the packaging.

DO



DON'T



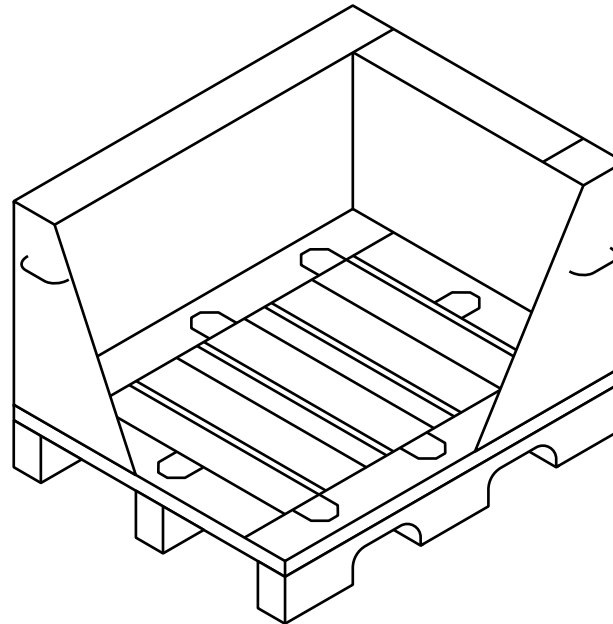
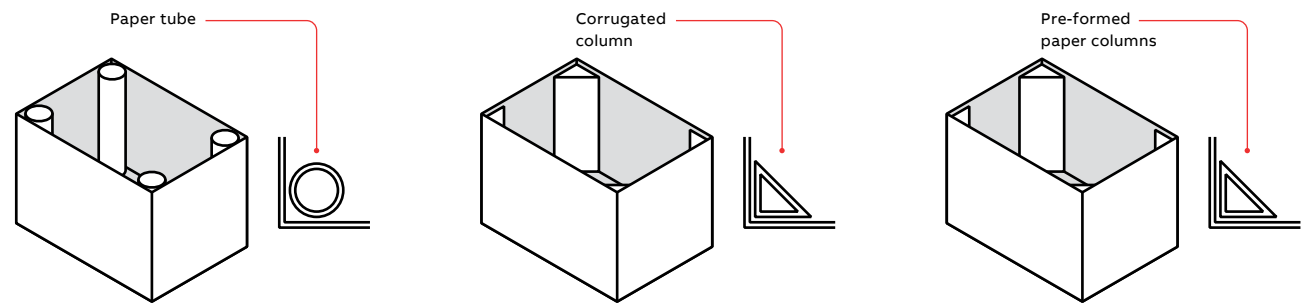
02 General order and load information

Unit load stacking

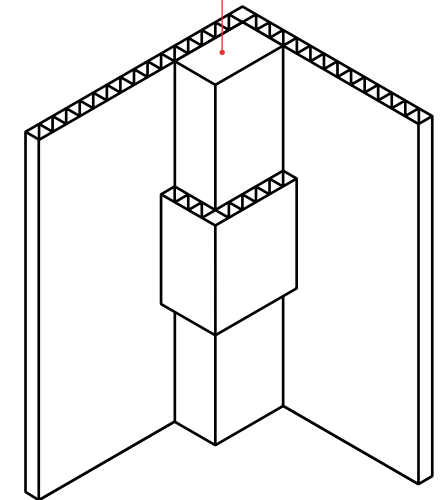
When corner posts are required for stacking strength, the preferred option is corrugated posts glued into place.

Wood corner supports require plant approval and **MUST NOT** be stapled to the boxes; instead, they are to be held in place by use of die cut folds with the flaps stapled over them.

Paper



Wood



02 General order and load information

Unit load stacking

Should unit loads not be stackable, due to the condition of the packaged good, they must be labeled accordingly.



03 Packaging solutions

Pallets/load carriers

Pallets/load carriers

New EUR-pallet

The pallet of the European Pallet Association (EPAL) pallet pool is the preferred load carrier and it is the only one where a multi-way use is acceptable. The EUR-pallet is always preferable to an equal one-way pallet.

The supplier has to use exchangeable pallets in a technically acceptable state.

The EUR-pallet is designed for the following loads:

- 1000 kilograms (kg) (nominal load), if the load is uneven on the surface of the pallet.
- 1500 kg, if the load distribution is even on the surface of the pallet.
- 2000 kg, if the load is in an aggregated form and if it is distributed evenly on the whole surface



500 Kg +

If the weight of the load exceeds 500 kg, unit load **MUST** be clearly marked.

Pallets/load carriers

Secondhand EUR-pallet

Requirements for the swap of EUR-pallets:

If EUR-pallets show one or more of the following defects, they are not swappable and have to be repaired according to the requirements of the UIC-Leaflet 435-4. Detailed information concerning the defects can be found on the following page.

Damaged pallets, which are not swappable anymore, will not be exchanged and the supplier has to pay for the repackaging.

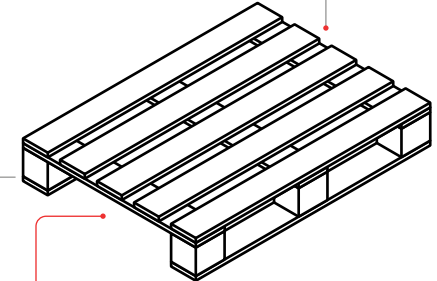
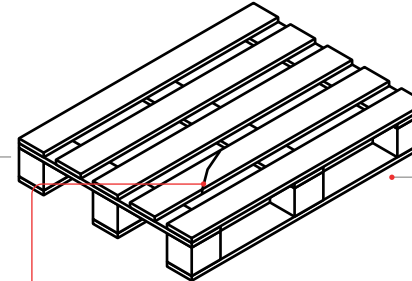
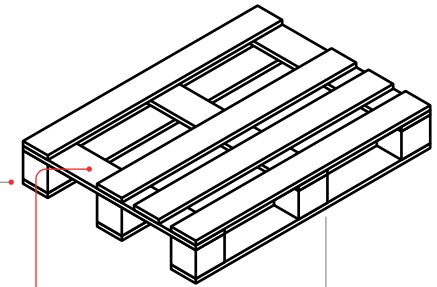
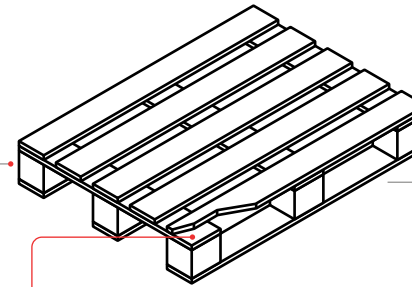
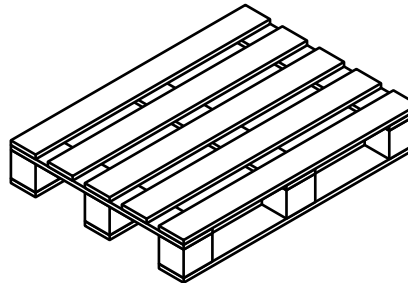
Secondhand, EUR-pallets are also an option classified as follows:

- Pallets that have passed the UIC-Leaflet 435-4 checks and been repaired accordingly
- Technical requirements still meet the EUR standards
- Marked in the right hand corner so that it is easier to distinguish the secondhand pallet.
- Re heat-treated if Heat Treated marked is older than 21 days in China.

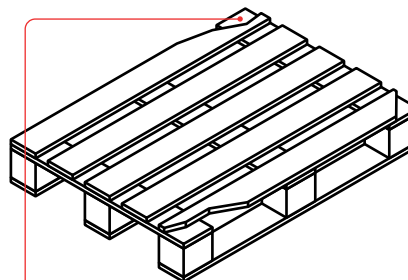
In case the supplier uses a non-marked EUR pallet, the following characteristics of the pallet need to be met:

Non-exchangeable epal-pallets:

If there is one or more defects on EPAL-pallets as below, the pallets are not exchangeable. They must be repaired as per the UIC-code 435-4.



To exchange EPAL certified EPAL-pallets 800x1200mm, the following exchange criteria must be observed:



A board is broken transversely or diagonally

A block is missing or split to the point where more than one nail shank is visible. Skewed blocks may not protrude more than 10mm

More than two lower or upper edge boards are damaged and reveal one nail or screw shank for each board.

Other characteristics (Poor condition overall):

- The loading capacity can no longer be guaranteed (wood worm eaten or rotten)
- Contamination is such that products may be soiled
- Large splinters are coming away from a number of blocks
- There is evidence that inadmissible construction elements have been used, e.g. boards and blocks that are too weak.

*all in accordance to European Pallet Association e.V.
<http://www.epal-pallets.org/uk/produkte/tauschkriterien.php>

Pallets/load carriers

Demands on non-EUR pallets

Dimensions for the following markets

Region		Dimension (W x L)		Max weight per single package	
Measure	mm	in	kg	lb	
Americas	812 x 762	32.00 x 30.00			
	1067 x 1067	42.00 x 42.00	18	40	
	1219 x 1016	48.00 x 40.00			
Asia	1000 x 1200	39.37 x 47.24			
	1067 x 1067	42.00 x 42.00	25	55	
	1100 x 1100	43.30 x 43.30			
	1140 x 1140	44.88 x 44.88			

Region		Dimension (W x L)		Max weight per single package	
Measure	mm	in	kg	lb	
Australia	1165 x 1165	44.88 x 44.88			
	1100 x 1100	43.33 x 43.33	20	45	
Europe	800 x 1200	31.50 x 47.24			
	1000 x 1200	39.37 x 47.24	20	45	
	1067 x 1067	42.00 x 42.00			

Pallets/load carriers

Demands on non-EUR pallets

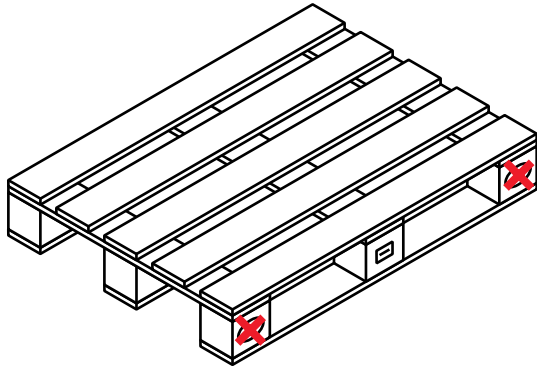


US: If the dimensions of a part require a pack greater than 1219mm (48"), size the package length to accommodate, but maintain the width dimension at a maximum of 1219mm (40").

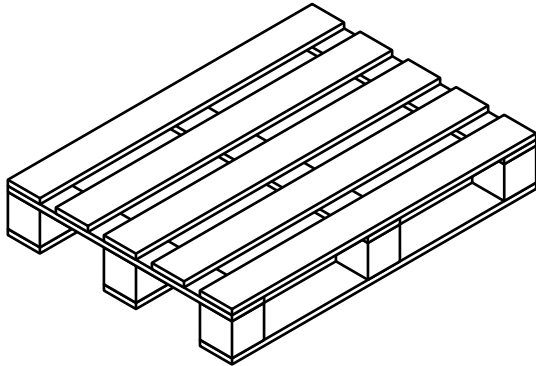
Pallets/load carriers

Demands on non-EUR pallets

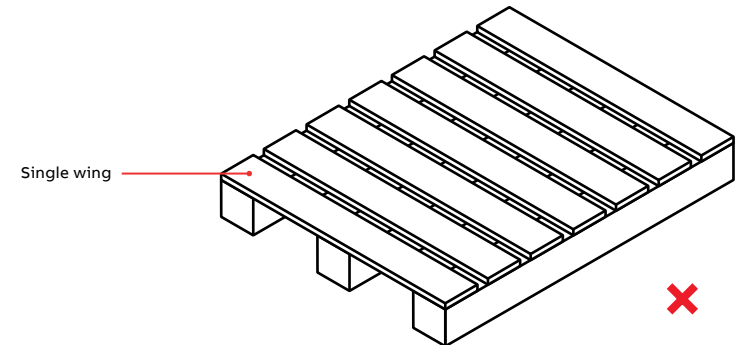
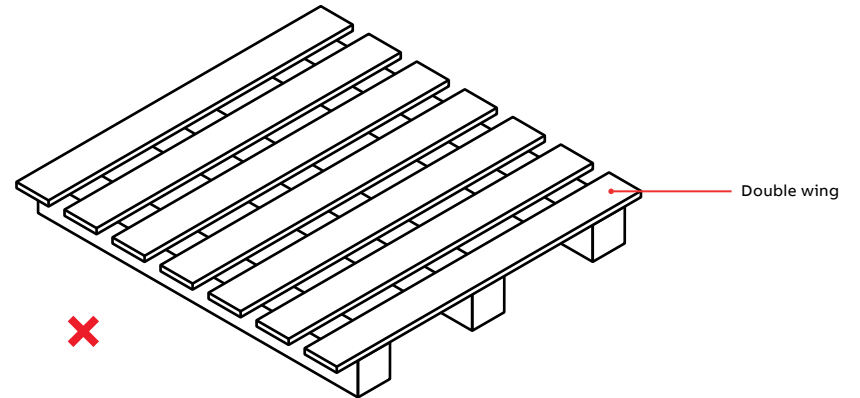
①



②



③



Load carrying ability needs to equal EUR characteristics

- ① Build as per EUR pallet structure and material just without the EUR marking
- ② Alternative block pallet as per below structure with blocks of the dimension 100 x 100 x 75mm
- ③ Unapproved pallets: Single wing, double wing are **NOT** acceptable.

03 Packaging solutions

Outer packaging

Depending on the products that are transported and their characteristics, the following options for outer standard packaging apply.

Outer packaging

Pallet collars/SBB-CFF-FFS
(Swiss Federation Railway)

- 1200 x 800 x 200mm
- 4 or 6 hinge
- HT (IPPC Marked) MB (methyl bromide) not accepted according to EU regulations since March 19th 2010.

Pallet collars



SBB

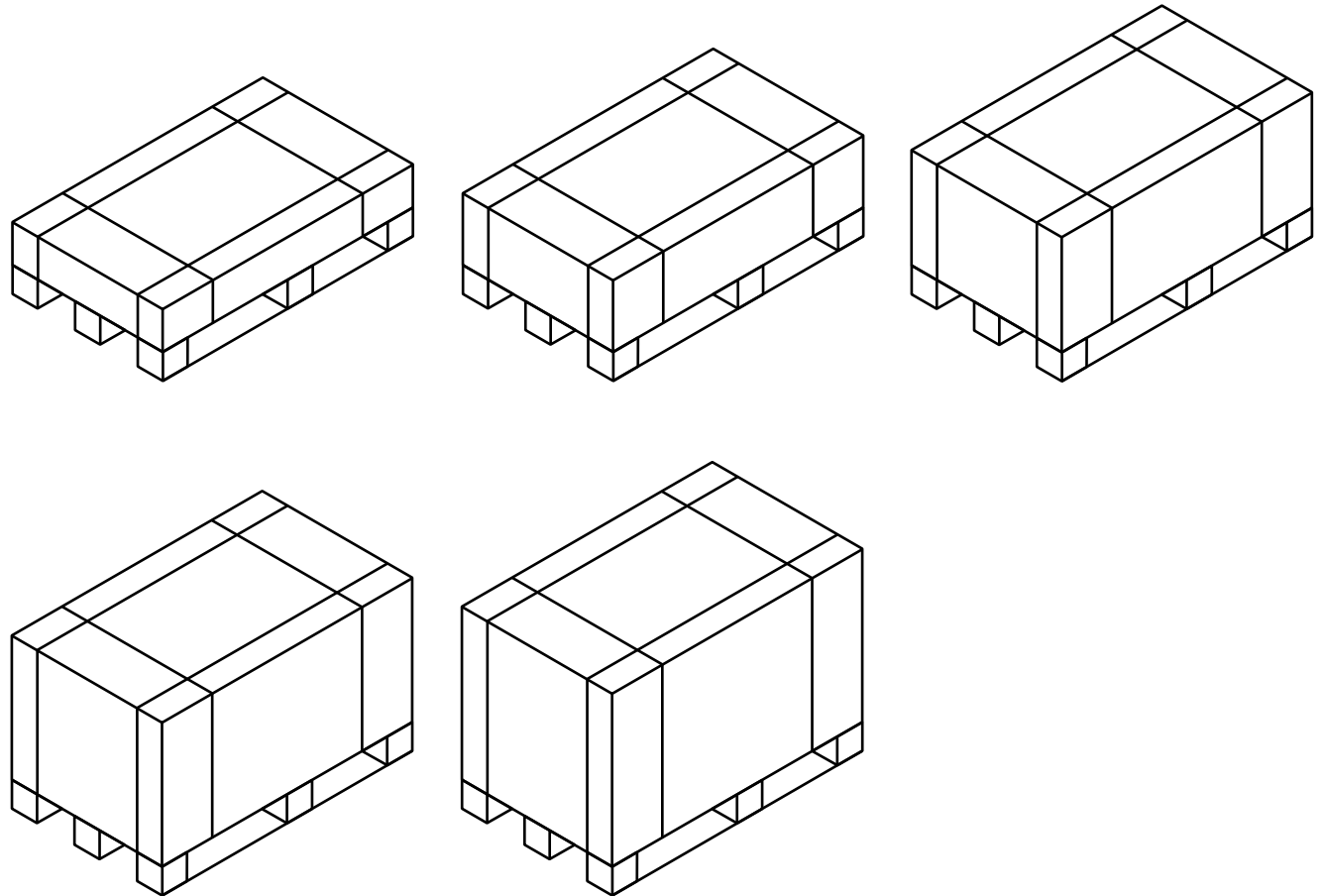


Outer packaging

Foldable one-way plywood packaging

Standard plywood packaging made from:

- Birch/Poppel/ eucalyptus or oriented strand board (OSB)
- Sizes 1200 x 800 x 200/ 400/ 600/ 800/ 1000
- Thickness 5.5-9 mm



Outer packaging

Corrugated packaging

Generally, selection of a corrugated container will depend upon the specific part or material, the method of transportation and the method of handling required by the fabricator and the receiver. However, certain basic factors deserve consideration. Packages which are to be dealt with by hand are subject to rougher handling than those handled mechanically, and consequently require more protection. Package size, strength and type **MUST** be selected to fit the method of transportation and applicable carrier regulations, sufficient protection from the elements, number of transfer points, distance of travel, and roughness of the route.



03 Packaging solutions

Preservation alternatives

Preservation is mainly used to protect products from corrosion and damage throughout the value chain.

Corrosion is the process of damage or deterioration of materials through chemical or electrochemical reactions taking place with other surrounding materials. Corrosive matters are those substances within the immediate proximity of the parts which impact on the material and cause corrosion e.g. dirt, gases, salts or dust.

Particularly in the case of sea freight, it is imperative that all parts which are susceptible to corrosion are protected accordingly. All worked and smoothed surfaces (particularly worked castings and forgings) require specific protection; therefore protective steps must be taken to prevent corrosion.

The type, nature and timing of anti-corrosion protection depends on the:

- required protection according to ABB specifications and drawings; if specifications are not given, follow the fit-for-purpose principle
- susceptibility of technical surface to corrosion and other harmful factors (dust, stains etc.)
- transport conditions and duration of transport
- storage conditions and duration of storage
- subsequent treatment
- subsequent usage
- air circulation in packaging.

Outer packaging

Preservation overview

Type of bag	Description	Benefits	Drawback
Plastic bag 	Shields from dust and provides corrosion protection for up to 6 months when emitters are applied.	Fast and easy to apply.	Suitable only for local transportation and limited period of time.
Vapor phase corrosion inhibitor (VpCI) bag 	Provides corrosion protection up to 12 months, is used together with clay bags (as a type of desiccant) and is see-through.	Faster and easier to apply compared to aluminium bag, closed only with a small tape and can be re-opened.	Quantity of clay bags important because they can cause corrosion after saturation.
Aluminium bag 	Aluminium bags have a humidity barrier where air is kept out by vacuum sealing, so a thermo sealer is needed. Silica gel bags are used against corrosion and should not be in direct contact with metal parts; instead hang them in net bags which provide protection up to 24 months.	Good protection for long storage.	More time consuming to apply, has to be 100 percent air tight as tearing and small holes reduce functionality. Cannot be opened during transport and storage.

Outer packaging

Description

PE bag plus desiccant:

- A PE bag protects the goods from dust.
- Desiccants are used inside the packaging to protect goods from moisture. They absorb the moisture inside the packaging, stopping any condensation that may happen during transport or storage.
- Wood, paper and cardboard already contain up to 20 percent of their weight in water; therefore, desiccants are needed.

Volatile corrosion inhibitor (VCI) corrosion protection:

- A chemical is added to PE film that exudes a non-toxic gas.
- The gas creates a layer between metal and outside air.
- VCI bags do not need to be air tight, but desiccants required.
- They provide protection up to 12 months.

Aluminium barrier bag plus desiccant:

- It creates a barrier between the products and the outside environment, while desiccants are placed inside the bag to keep the moisture level low.
- An aluminium barrier bag is suitable for long term storage (up to two years) as it can withstand very high temperatures and conditions of high relative humidity.
- It is closed with vacuum sealing and takes up to three times longer to apply compared with a VCI option.
- High quality demand and not reusable.

❶ PE bag plus desiccant

❷ Volatile corrosion inhibitor (VCI) corrosion protection

❸ Aluminium barrier bag plus desiccant

❶



❷



❸



❸



03 Packaging solutions

Packaging accessories

Packaging accessories

Electrostatic discharge (ESD) protective packaging and containers

ESD protective packaging **MUST** be static shielding and boxes provide protection against contact by ungrounded persons and against electrostatic fields. Suitable items include metalized protective bags, cardboard boxes or other antistatic materials with a conductive coating, boxes made from volume-conductive plastics etc. The maximum earth leakage resistance of ESD protective packaging and containers is regulated by standards IEC 61340-5-1 and ANSI/ESD S541-2008.

ESD packaging requirements

A device with ESD packaging and/or warning label **MUST** be treated like an ESD sensitive device.

All packing or padding materials used inside an ESD protected area (EPA) shall be low charging and static dissipative. When ESD sensitive devices are transported outside an EPA, they shall be packed in low charging and discharge shielding material.

Applicability: All electronic parts will be treated as ESD sensitive regardless of the part's actual level of ESD sensitivity. This will eliminate confusion as to when to apply proper protective techniques.

The best method for packaging ESD sensitive parts is to use a static dissipative material closest to the ESD sensitive part. A conductive material is then used to surround the ESD sensitive item, outside of the dissipative layer, to provide an electrostatic shield (Faraday cage).

Cushioning and outer packaging **SHOULD** also be static dissipative if there is potential for the ESD sensitive part to come in contact with it as the bag is unpacked. In general, plain cardboard is not considered a major ESD threat when combined with the use of a proper shielding bag. However, all materials and containers used within an ESD controlled manufacturing environment should be static dissipative.

Approved ESD packaging methods

Static shielding bags: A multi-layered bag which consists of a static dissipative material next to the ESD sensitive item along with a thin outer metallic layer.

Static dissipative cartons: An ordinary kraft corrugated container with static dissipative foam may be used to contain the ESD sensitive item provided the part is first placed in a static shielding bag. If a static shielding bag is not used, the outer box should be manufactured from conductive corrugated board and have static dissipative cushioning

Thermoformed blister-style packages: This style of packaging is acceptable if the material which contacts the ESD sensitive part is manufactured from an appropriate static dissipative material and is inside a conductive outer container. If supporting parts are required to provide physical strength, these **SHOULD** be made of an appropriate conductive material too, unless the part is placed in an appropriate ESD shielding bag.

Reusable tote-style box for bulk handling: Reusable tote boxes manufactured from conductive corrugated or plastic materials may be used for inter-plant, supplier or intra-plant shipments to manufacturing sites. Tote-style boxes should not be used for parts inbound for support or field service use.

Packaging accessories

Electrostatic discharge (ESD) protective packaging and containers

Material categories

ESD protective materials are categorized as follows:

Category	Standard specification	Note
Static dissipative	$105 < RS < 10^{11} \Omega$	If $RS > 10^9 \Omega$, 90% of the initial value must disappear during a measurement of the static field in $< 2 \text{ s}$
Insulator	$RS \geq 10^{11} \Omega$	Examples: plastics, glass, wood, ceramics.
Conductive	$\geq 10^5 \Omega < 10^{11} \Omega$	Examples: metals – aluminium, copper.
Conductive	$10^2 < RS < 10^5 \Omega$	
Discharge shielding (bags)	$< 50 \text{ nJ}$	ANSI/ESD STM 11.31

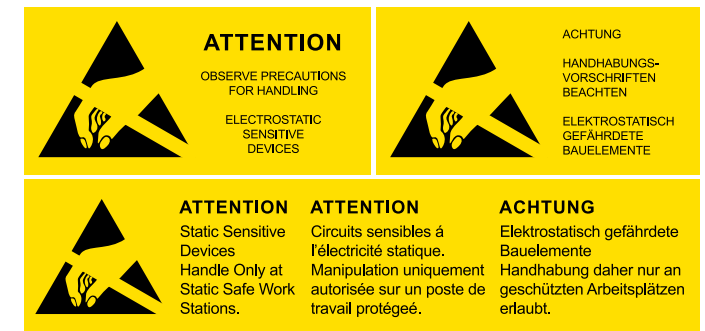
Identification

General warnings (e.g. stickers) MUST be affixed in the presence of ESD, e.g. for printed board assemblies. This also applies for packaging, storage containers, work surfaces, transport trolleys etc.

The ESD symbol (black on yellow background) according to IEC 60417, symbol no. 5134:



ESD packaging materials can generally be identified by special markings:



03 Packaging solutions

Shock Indicators

Shock Indicators

Shock indicators are used to record the impact on the transported goods. See table reference below for applicable indicators. ABB reserves the right to request the use of such shock indicators.

An example of an indicator used at a RMDR site in Turgi:



Selection guide

Metric	Volume						
	0.14 - 0.42m ³	0.42 - 1.42m ³	1.42 - 2.83m ³	2.83 - 7.08m ³	7.08 - 14.16m ³	14.16 - 304.8m ³	304.8+ m ³
Weight							
0 - 5kg	75g	75g	50g	37g	N/A	N/A	N/A
5 - 11kg	75g	50g	50g	37g	25g	N/A	N/A
11 - 23kg	50g	50g	37g	25g	25g	15g	N/A
23 - 45kg	50g	37g	37g	25g	15g	15g	10g
45 - 113kg	37g	37g	25g	25g	15g	15g	10g
113 - 454kg	37g	25g	25g	15g	15g	10g	10g
454 - 907kg	25g	25g	25g	15g	15g	10g	5g
907 - 2,268kg	25g	25g	15g	15g	10g	10g	5g
2,268 - 4,536kg	25g	15g	15g	15g	10g	10g	5g
4,536 - 6,804kg	N/A	15g	15g	10g	10g	5g	5g
6,804 - 9,072kg	N/A	N/A	10g	10g	5g	5g	5g
9,072 - 13,608kg	N/A	N/A	N/A	5g	5g	5g	5g
13,608+ kg	N/A	N/A	N/A	N/A	5g	5g	5g

03 Packaging solutions

Other accessories

Packaging accessories like tension bands, foil or upholstery have to be used in a way which enables them to fulfil their specific packaging task. A detailed look on packaging material is given in the earlier chapter on usable packaging.

— 04 Marking

04 Marking

Listed below are commonly used markings. Please also refer to the TIS guide in order to find the correct markings for your product and shipping method.

Mandatory



This way up:

indicates correct upright position of the transport package



Fragile:

contents of the transport package are fragile, handle with care



Do not stack:

stacking of the transport package is not allowed and no load should be placed on the transport package



Do not roll:

transport package shall not be rolled

Mandatory



Center of gravity:

indicates the center of gravity of the transport package which will be handled as a single unit



Sling here:

slings for crane lifting shall be placed where indicated for lifting the transport package

Mandatory



Heat treated wood:

to prevent bark beetles



Top heavy load:

indicates that the product could easily tip over

http://www.tis-gdv.de/tis_e/verpack/markier/markier.htm

05 Labeling requirements

Purpose, Compliance

Purpose

To standardize incoming identification of materials. Product and package identification **SHALL** be able to remain intact throughout all transit, storage and handling, right up to the point of use.

Compliance

Inbound shipments **SHALL** be randomly verified at ABB for compliance to these specifications. In the event of non-compliance, ABB reserves the right to:

- Reject and return (at the supplier's expense) any shipment(s) received that are improperly identified.
- A supplier may be removed as an approved source if, after being notified, the supplier repeatedly fails to comply with these requirements.

05 Labeling requirements

Labels

05 Labeling requirements

Labels

ABB **SHALL** require all suppliers to label all materials which are supplied to our facilities. All shipments **SHALL** be easily and quickly identified. All shipments **SHALL** be identified as per this label specification.

The data contained in the label **SHALL** be consistent with the data transmitted in the advance shipping notice.

Mixing of part numbers on a pallet is strongly discouraged; when unavoidable, due to handling/shipping expense, pallets **MUST** have the proper “Mixed Load” label per ABB labeling instructions and each box needs to have individual labeling.

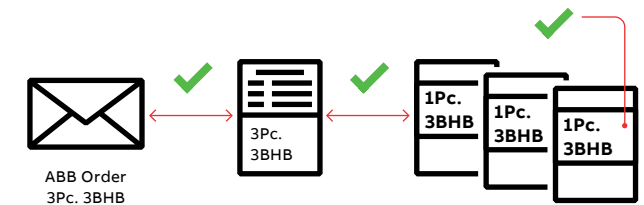
To facilitate receiving activities, every order **MUST** be identified with its own delivery note through a well-defined link between the delivery note and the articles. And, the labeling information **MUST** be consistent across the delivery note and the articles (e.g. with respect to units). Labeling information **MUST** be consistent across articles (with respect to units etc.)

Within the order, each loading unit (e.g. pallet, cardboard box, wooden box etc.) must be explicitly identified with a label containing the following information:

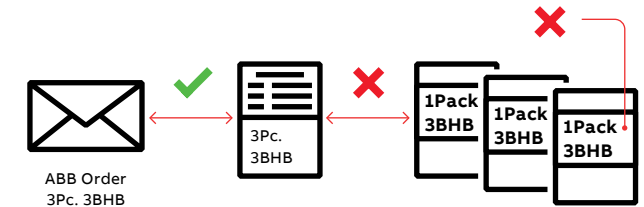
- ABB ID-number (according to delivery note)
- Article description (according to delivery note)
- Quantity and unit (e.g. 10 pieces)
- Risks and handling instructions

Additionally, each packing unit within the order must be labelled in a manner that makes it easily identifiable to the receiving staff. Therefore, each article, or the smallest packing unit, should be labelled with supplier part number and ABB ID-number. Certificates, as well as hazardous material and safety data sheets, are to be enclosed with the relevant materials. Non-identifiable or incomplete deliveries will be rejected.

DO



DON'T



Contact

If you have any further questions, please contact your local ABB procurement or logistics contact

This packaging manual has been created for all suppliers of the ABB Business Unit Drives.

For ABB internal: The Document is available on the Procurement & Logistics SharePoint of BU Drives and the Integrated Management System of BU Drives.