Document Control Information

This is a controlled document. Versions of this document prior to its import into the DMS are considered draft versions.

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A	11 January 2011	Initial release
B	13 July 2022	Updated document to ISO format, updated Section 9.4; Titled Carton Taping to include the Agilent Tape graphics and branding requirements and updated Section 11; Titled Marking and Labeling to include the new Agilent PN Label artwork and format changes.

1.0 Purpose-

The purpose of this document is to establish guidelines and expectations for the preparation and packaging of all parts, subassemblies, products and materials which will be shipped to any worldwide Agilent Technologies manufacturing site, Logistics Center or customer from either Agilent Technologies suppliers or other Agilent Technologies manufacturing sites.

2.0 Scope and Limitations -

This guideline becomes part of any document in which it is referenced and may be exhibited to contracts, purchase orders, agreements, or other procurement or business arrangements with the approval of Agilent. The latest revision should be used at all times.

This guideline does not specify all packaging materials and does not specify all aspects of government or military packaging. It will not take precedence over any requirements prescribed by interstate commerce regulations, uniform freight classification tariffs, official air transport regulations, National Motor Freight Classification rules, postal regulations, and other applicable rail, motor, air, parcel post, or express carrier regulations, including those for hazardous materials.

The general guidelines identified herein are considered to be the best practice for the packaging of all parts, subassemblies, products.

When individual part drawing or purchase order requirements conflict with those listed in this document, the former will take precedence, unless otherwise stipulated by the Agilent Technologies Procurement Department concerned.

Unless otherwise agreed between Agilent Technologies and the supplier, all Agilent Technologies products, assemblies, support parts (SPs) and consumables are required to be adequately protected as a single unit. For ease of palletization, individual boxes may be over packed before placement on a pallet for shipment. Any exceptions should be documented and approved by Agilent Technologies prior to shipment.

At any time, Agilent Technologies has the right to:

Reject and return any shipments received that are improperly packaged or identified.

Charge the shipper for the cost of labor and materials for any repackaging resulting from noncompliance with this or any other specification referenced on the purchase order.

Remove from its list of approved supplier sources any supplier that, after notice, repeatedly fails to follow its packaging requirements.

3.0 Training Requirements

All parties responsible for the packaging of parts, subassemblies, products and materials which will be shipped to any worldwide Agilent Technologies manufacturing site, Logistics Center or customer from either Agilent Technologies suppliers or other Agilent Technologies manufacturing sites must be trained on this procedure.

4.0 Document References

Document #	Title	Relationship
N/A		

5.0 Records

Unique records generated by this process are maintained according to the Agilent General Retention Schedule (http://legal.agilent.com/rim/retention_schedule.shtml) as follows:

Records	GRS Record Series Number
1. N/A	

6.0 Introduction

6.1 Executive Summary

Table 1. Executive Summary

This is a summary of the major areas of concern regarding packaging. The rest of the document and links provide additional details.

Description	Executive Summary of Minimum General Packaging Guidelines	Ref Section
Purpose and Objectives	The document includes the minimum packaging guidelines for all shippers to and from Agilent Technologies.	1.0
Other Agilent Agreement Requirements	The most important thing is to ensure damage free shipments. We know that following this guide will work. In the event a shipment is received which does not conform to this guideline or the packaging requirements defined in the part purchase order Agilent Technologies has the right to: **Reject and return** any shipments received that are improperly packaged or identified. **Charge the shipper** for the cost of labor and materials for any repackaging resulting from not following this guideline or any other specification referenced on the purchase order. **Remove** from its list of approved supplier sources any supplier that, after notice, repeatedly fails to follow its packaging guidelines and/or purchase order requirements.	2.0
Consistency	The same packaging should be used for the same item on an ongoing basis. Bulk packaging for Manufacturing use. For Accessories, Parts, and/or Consumables going to Agilent Logistics Centers, individual packaging is required unless otherwise specified. Regardless of format, all parts should always be adequately protected.	7.2
Environmentally Conscious Packaging	Design packaging materials to Reduce, Reuse and Recycle (the 3 R's, in that order) Also, avoid CFC's, HCFC's, Heavy Metals, Halogenated Flame Retardants, PVC and materials procured from old growth or temperate rain forests and permanently commingled dissimilar materials.	7.3
ESD Sensitive Items	Use only ESD appropriate materials. The package assembly should consist of a static dissipative material closest to the part and a conductive/shielding layer somewhere in the package assembly. "Metal In" style ESD shielding bags (which are usually less expensive) are not approved for quality reasons.	8.2
Package Testing	All packages for critical or fragile items (e.g. glass, ceramic, etc…) should be designed and tested by qualified individuals using either Agilent Technologies Corporate Test Standards or ASTM or ISTA test protocols.	8.3
Primary Packaging	Should protect the part/product from damage throughout the entire Distribution, and Transportation network, while minimizing its overall dimensional weight. Use appropriately dimensioned cartons where possible but don't grossly misfit the item in order to do so. Design packaging to fit the item, smaller is better. Also, do not use labels, Shock Watches, Tilt Meters, etc… in an attempt to avoid a hazardous environment for the item.	9.0
Bulk Containers	Pallet loads should be over packed in bulk containers when loads are heavy, consist of many layers or are transported inter-continental. **Note:** For air shipments, savings of roughly $10US per cm ($24US per inch) can be achieved by cutting down typical size bulk containers, 1000mm x 1200mm (42" x 48") to reduce voids.	4.1, 5.0, 5.1, 5.2, 5.3
Carton Taping	Use "I" style taping (2 strips) for lightweight items and domestic shipments. Use "H" style (6 strips) for items over 15.2 kg (35 lbs.) and for all express and inter-continental shipments.	9.4
Palletization	1.2 x 1.0 m is the worldwide standard. Use custom sizes for specific routings if this will improve shipping density. Stretch wrap alone is acceptable for intra-continental truckload or container load shipments. 4-way banding or mechanically applied stretch wrap with 2-way banding for all inter-continental, LTL and air shipments. Also, use alternatives to solid wood if possible.	10.0

Wooden Packaging	In order to comply with international trade regulations restricting the movement of solid wood packing materials, Agilent Technologies has documented a policy statement requiring the adherence of the ISPM 15 standards to assist in clarifying Agilent Technologies' requirements. These requirements shall be followed for all wooden type package assemblies shipped to Agilent such as crates and pallets made from solid wood, plywood, or other wooden composites. Untreated and/or chemically treated lumber commonly used in pallets and crates are prohibited for shipment to Agilent.	11.2
Package Design Guidelines	The Design Guides (tables 13 and 14) provide recommendations in three areas which are applicable to parts, assemblies and products used by Agilent Technologies manufacturing and Logistics sites. .	12.0
Heavy Packages	Manually handled packages in excess of 12 kg (26 lbs.) gross weight are considered heavy and should carry one of the four international caution symbols which illustrate the proper lifting techniques for handling heavy packages. Packaged products, Support Parts (SPs) and Consumables weighing less than 32kg (70 lbs.) should not be palletized individually for shipment. The acceptable weight limit for inbound parts packages (bound for Agilent Technologies Manufacturing) will remain at 16 kg (35 lbs.).	13.0

6.2 Communication

All shipper's packaging questions and communications are to be coordinated through Agilent Technologies Procurement.
Ideas for improvement – it is the intent of this documents to reduce total operating costs for Agilent Technologies and extended throughout the supply chain by reducing damage and waste. We understand that inefficiencies in your process caused by these requirements may eventually adversely affect total supply chain costs. If the guidance herein appears to be particularly onerous please bring this to our attention via your Agilent Technologies Procurement Representative for prompt consideration.

7.0 General Packaging Guidelines

The general guidelines listed in this section should be applied to all shipments and purchases. Unless additional requirements are identified in this or other Agilent Technologies packaging specification, all other packaging decisions are left to the shipper. It is the shipper's responsibility to ensure shipments are packaged in a manner such that the containers and their contents arrive at their destination free from damage.

7.1 Materials

All packaging materials used should conform to Agilent Technologies guidelines specified herein or in referenced documents.
2.1 All ESD packaging materials should be qualified per the Agilent Technologies "Supplier Qualification Process for ESD Materials". (http://esd.manufacturing.agilent.com/corp.cfm)
2.2 All dangerous goods should be properly packaged for shipment per all appropriate regulations. Reference Agilent Technologies document, General Specification for the Environment, Packaging Requirements.
(http://www.agilent.com/environment/GSE.pdf)
2.3 The standard for Agilent Technologies corrugated container material is ***Kraft***. Agilent Technologies has discontinued the use of bleached white corrugated fiberboard for both environmental and cost reasons.

7.2 Consistency

Parts should be packaged consistently, both in terms of the container used and quantity of parts per container for a given part number. If the total delivered quantity is not evenly devisable, the remaining parts shall be packaged, identified with quantity, and marked “partial”. However, it is our intent to avoid partials wherever possible to increase overall efficiency. Suppliers and Agilent Technologies Procurement should work together to set order quantities consistent with carton, pallet layer, full pallet or truckload quantities. . For Accessories, Support Parts, and/or Consumables going to Agilent Logistics Centers, individual packaging is required unless otherwise specified.
Shippers should get approval of Agilent Technologies Purchasing prior to initiating a change to the container size or quantity.

7.3 Environmental Packaging

Agilent Technologies is very concerned about the effect packaging waste has on the environment. When choosing materials to package items to be purchased by Agilent Technologies, shippers should consider the impact on the environment of discarded packing materials. Agilent Technologies’ strategy for solid waste and overall environmental management can best be achieved by acting upon the focus items identified below.

Table 2. Environmental packaging

This is a summary of the major areas of concern regarding environmental attributes of packaging.

Description	Requirements
Ozone Depleting Substances (ODS’s)	Halogenated Chlorofluorocarbons (CFCs) and hydrogenated Chlorofluorocarbons (HCFCs) should not be used to manufacture materials used to package parts or products being shipped to Agilent Technologies. Halogenated flame retardants are also not to be used unless required for a specific application. The use of Methyl Bromide (commonly used as a fumigant for solid woods is not acceptable in accordance with the Agilent General Specifications for the Environment (GSE) Section 7.0 at. http://www.agilent.com/environment/GSE.pdf
Packaging Materials Essential Requirements—Restricted Heavy Metals and other Materials of Concern	The sum concentration of incidental amounts of lead, cadmium, mercury, hexavalent chromium and brominated flame retardants (PBB’s and PBDE’s) present in any packaging material, component or sub-component shall not exceed 100 parts per million (100 PPM) by weight (0.01%) of that material, component, or sub-component. These limits apply globally for all packaging used for products brought to market by Agilent Technologies.
Source Reduction	Agilent Technologies encourages the source reduction (minimization) of packaging materials used to package and ship our products, parts and supplies, provided safety and product protection are not compromised.
Reusable Packaging Systems	Agilent Technologies favors reusable package designs over expendable or recyclable ones provided total costs are equivalent or less. The design of a reusable container system is a *joint effort* between all parties to the reuse system (usually the supplier and the Agilent Technologies manufacturing location). The full involvement and approval of each is necessary to succeed with reusable container programs.
Recyclable Packaging	Use paper-based packaging materials that are easily recycled like corrugated fiberboard, molded pulp, etc. Minimize ink coverage and use water-based and soy-based inks or inks which are FDA/USDA approved. Use tapes and starch glues that do not inhibit recycling (adhesive remains with the tape when removed). Avoid coatings or impregnating of corrugated unless these are of a type which do not adversely affect recycling operations. Design packages so that components can be easily separated prior to recycling: - Do not bond two or more dissimilar materials together (e.g. foam pads to corrugated) in any disposable packaging design. Exceptions may be made for some types of reusable packaging but should be minimized. - Do not use free rise polyurethane-based foam in place or foam in bag materials. - Do not use Polyvinyl Chloride (PVC) for any packaging application. - Do not use free flowing dunnage materials regardless of material composition (loose “peanuts”, etc.).

8.0 Shipping Environment Hazards

Consideration should be given to all hazards encountered in the distribution environment. The following terms represent some of the most common hazards which should be considered.

Table 3. Shipping Hazards; Shock, Vibration, Compression, Temperature and Contamination.

These are some of the most common hazards.

Term	Definition / Usage Notes
Shock	An intermittent force caused by dropping packages to the floor, stacks tipping over, bumps in the road, or any other number of causes. Express carrier or small package delivery systems represent the most severe environment for shock.
Vibration	Continuous forces applied to the package whenever it is physically transported. Airplanes, trucks and conveyors will always impart some level of vibration to the package. Vibration causes abrasion which can be especially damaging to painted and/or textured external machine covers and can fatigue electrical connections.
Compression	During shipping, handling and storage packages will be subjected to dynamic and static compression due to stacking. Compression strength diminishes considerably in humid/moist environments and when the stacks are not aligned. Small packages (<70kg or 150 lbs.) should withstand compressive forces in all directions. Packages or containers should withstand dynamic stack heights of at least 2.5 m (or 100 inches) since this is how high they will be stacked in trucks and other vehicles. Furthermore, packages or containers stored in a warehouse should be able to withstand static stack heights of 5.0 m (or 200 inches), measured from floor to top of stack, for a period of 30 days (including humid areas) without visible degradation to any package or its contents. Note: If for some reason the packaging cannot be stacked to these limits for safety (stability) reasons then the maximum stack quantity shall be marked on the package using the ISO-780 symbol for stack height limitations. However, this approach should not be used as a way to get away with a weak package which could otherwise be made to comply with the 5.0m (200 inch.) stack height standard.
Temperature	Products may encounter temperature extremes ranging from -40C to +60C (140F) in the distribution environment. Packaging materials and methods should therefore be effective at those extremes as well.
Contamination **Including Clean Room Quality Packaging**	Where applicable, this usually means double bagging in materials procured from appropriate clean room material suppliers. Clean room and contamination free quality extends beyond particulate free packaging. Tight limits on organic contamination, nonvolatile residue, and out gassing also apply. **Important:** Contamination is also a concern in non-clean room applications. Exports to China, India and most parts of Africa should be bagged to prevent the intrusion of dust and dirt. It is very important to customers to receive a clean looking product even if the dust would not necessarily damage the product functionally.

8.1 Moisture

There are several ways to protect moisture sensitive items. Electronic assemblies which require moisture protection because of special needs should be packaged in hermetically (heat) sealed metal style barrier materials with desiccant inside. Conversely, if bags are being used primarily for dust or surface protection only (not for moisture) then it is best not to seal the bags hermetically and not use desiccant.

Bare sheet metal is best protected with volatile corrosion inhibitors (VCI's) instead of barrier materials but do not use VCI's to package anything containing hard disk drives.

As with temperature extremes, it is also important to consider the effect moisture may have on the performance of the packaging materials used. Moisture has little effect on closed cell foams (EPS, EPE and EPP) but can affect all paper-based materials. Of

course, paper generally softens with increased moisture content reducing compression strength and altering, but not necessarily reducing the cushioning performance of molded pulp.

Table 4. Shipping Environment hazards, Moisture.

Barrier Materials	Barrier materials used in moisture-controlled packaging are: **Good**: Materials which are made to MIL B-131-F (Military Std). These are metal/polyethylene combinations with various types of outside layers (scrim fabric, polyester, Tyvek™, or Kraft paper). The Water Vapor Transmission Rates (WVTR's) for these materials is ~ 0.02 grams of water/24 hours/ 100in_2 **Better:** Materials which combine polyethylene with a sputtered metal layer. The minimize pin holes and can achieve MVTR's as low as 0.002 grams of water/ 24 hours/ 100 sq. in. Materials achieving WVTR's this low should be used for long term storage of highly valuable parts.
Desiccant Use and Handling	Silica gel or activated clay type desiccants are suggested. Desiccants are packaged in multiple units which define their moisture absorbing capacity not their volume. Use 1 unit of desiccant for every 562 cm_2 (90 in_2.) of barrier surface area or 0.03m_3 (0.083ft_3) of volume inside the barrier. This amount can be increased or decreased depending on the WVTR of the barrier and the intended storage time. Agilent Technologies generally uses desiccant in 2, 4, or 16 unit pouches depending on the size of the item. Desiccant should be carefully handled prior to use. It can become saturated in a matter of hours left exposed, even in an air-conditioned room. It should therefore always be sealed inside airtight drums or sealed barrier bags prior to use. Humidity indicating cards or small 1 gram size indicating silica gel pouches can be used inside the drum as needed to monitor the fitness of the desiccant. Indicating silica gel pouches change from blue (dry) to pink (when saturated) and therefore no longer capable of absorbing more moisture. Note: The indicating cards only indicate if the desiccant is still active. It is possible that the desiccant is 99% saturated but still active. Do not assume that a positive indication on the card (blue) means that the full capacity of the desiccant still exists. This can only be determined by weighing it on a precision calibrated gram scale. Activated clay type desiccant is reusable. It can be reactivated in an oven by baking it at 96C ± 5C for 6 hours. This will restore approximately 90% of its capacity. Do not exceed this temperature as it may melt the tyvek pouch material. Silica gel cannot be reactivated in this manner.
Vapor Phase Corrosion Inhibitors VpCI's)	Bare sheet metal parts such as chassis, brackets or other pre plated steel parts not containing disk drives **should** be wrapped in a volatile corrosion inhibiting (VpCI) bag or paper. This will prevent corrosion on the parts. Use 930cm_2 (1 ft_2) of VpCI paper for every 0.03m_3 (1 ft_3) of air space in the package. VpCI bags are also available. **Important: VpCI's should not be used for assemblies containing disk drives at this time.**

8.2 Electrostatic Discharge (ESD)

ESD is one of the most common hazards for electronic components. Static discharges of less than 50 volts can destroy or weaken (latent damage) electronic components. As a point of reference, people cannot feel a static discharge of less than 3000 volts. This is why it is critical to consistently handle these parts in a static safe manner and use packaging materials that can protect against these hazards.

Table 5. ESD Definitions.

Term	Definition/ Usage Notes
ESDS	Electrostatic Discharge Sensitive (or simply ESD sensitive)
Static Dissipative	Materials with surface resistivity of 1 x 10^5 to 1 x 10_{12} ohms/square. Materials of this type should be the closest in proximity to the ESD sensitive parts.

Conductive	Materials with surface resistivity less than 1 x 10^5 ohms/square. Materials of this type will provide the necessary *faraday cage* but should generally not be in direct contact with the ESD sensitive part.

Table 6. ESD Packaging Requirements.

Description	Requirements
Applicability	All electronic parts will be treated as ESD sensitive regardless of the part's actual level of ESD sensitivity. This will eliminate confusion when to apply proper protective techniques.
Fundamental Requirements	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 and 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 after unpacking from the bag. In general, plain Kraft corrugated board 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.

Table 7. Approved ESD Packaging Methods.

Static Shielding Bags	A multi-layer 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 part is manufactured from an appropriate static dissipative material ***and*** is inside a conductive outer container. For support parts the individual outer carton will be required to physical strength; this too should be made an appropriate conductive material unless the part is placed in an appropriate ESD shielding bag.
Reusable Tote Style Boxes for Bulk Handling	Reusable tote boxes manufactured from conductive corrugated or plastic materials may be used for interplant, supplier or intra plant shipments to manufacturing sites. Tote style boxes should not be used for parts inbound for support or field service uses.

8.3 Package Testing

The package should provide enough protection to ensure its contents arrives to the end user damage free. Agilent Technologies reserves the right to audit a supplier package design conformance to these guidelines. Individual supplier quality plans should address package verification/approval methods. Any of the following specification or an equivalent may be used. Contact Agilent Technologies Purchasing if more information is required.

American Society for Testing and Materials - ASTM D-4196 Performance Testing of Shipping Containers and Systems. ***Internet:*** http://www.astm.org/

Agilent Technologies Specification – Product protection Test Manual ***Intranet:*** http://emg.communications.Agilent Technologies Technologies.com/quality/environ_test_man/External_PPTM/index.asp

National Motor Freight Classification Item 180 – Performance Testing of Shipping Containers. This method applies for shipments via the Less Than Truckload (LTL) common carrier environment in the US. ***Internet:*** http://www.nmfta.org

9.0 Containers (Primary Packaging)

Table 8. Primary Packaging Do's and Don'ts.

This table summarizes the basic guidelines for the use of containers. Exceptions may apply for specific situations. **Item**	**Do**	**Do Not**
General	*Do protect parts from: 1. Dust, dirt and abrasion. 2. All reasonable hazards during shipping, handling and storage, such as shock, vibration, compression, moisture and ESD. 3. Provide packaging that permits safe handling, shipping, and storage.	* Do not use crates, wire bound boxes or expendable wooden containers unless corrugated containers will not provide adequate protection. * Do not pack different part numbers in the same package. *Do not pack different orders in the same package.
Containers	*Do use boxes of sufficient strength to permit stacking during shipment and storage.	*Do not use boxes less than 190mm x 150mm x 25mm (7.5" x 6' x 1") in size. *Do not use non-padded envelopes as a part shipping container. *Do not use padded or non- padded envelopes as a part shipping container for fragile items.
Closure	*Do use pressure sensitive film tapes (polyester or polypropylene) or reinforced water activated gummed tape for corrugated containers. *Do use tape which is a minimum of 50mm (2") wide. *Do use tape or heat sealing to close poly bags. *Do use strapping/banding for half slotted. Telescoping or double cover (cap and tube) containers. *Do use the "H" style taping method to reinforce the flaps of heavy containers (> 35lbs).	*Do not use staples as part of the package closure; that is, where the customer should open the package to gain access to the contents. This includes all packages including bags, envelopes, or cartons. Stitched manufacturer's joints are not preferred but they are acceptable since this is not where the container is opened. This is primarily a safety concern, not an environmental concern.
Markings	*Do use "heavy" symbols on containers exceeding 12 kg. (26 lbs.) *Old labels and markings on used packaging material should be removed or permanently and indelibly covered up if they do not apply to the current shipment. *Do use essential safety warnings or symbols where applicable. Example: the graphic "Top Heavy" symbol.	*Do not attempt to use labels as a means to get away with a less than adequate package design. Example: "Do Not Top Load". When these types of labels are used it is an indication that more work is needed to improve the package. Such labels are no guarantee that the instruction provided by the label will be observed and followed by the carriers. *Do not routinely put Agilent Technologies logo's on cartons unless part of a specific marketing design. This is intended to reduce cost and theft in distribution. *DO NOT use passive monitoring devises (Shock Watches, Tilt Meters, etc…) on the exterior of a package.

Dunnage	*Do use corrugated inserts and dividers. *Do select the right size container/carton for the parts to minimize the use of dunnage material. *Do minimize internal part vibration, especially on painted and/or textured surfaces by reducing internal pack or partition cell void space.	*Do not use or specify others to use any form of "free flow or loose fill" dunnage material (aka "peanuts", "popcorn" or similar) regardless of material type. *Do not use newspaper as dunnage. *Do not stuff wrong sized cartons with excess dunnage, get a smaller carton instead.

9.1 Selection of Bulk versus Individual Style Packaging

Inbound parts to support manufacturing applications are to be packaged in bulk (multiple parts per package but individually protected). Accessories, Parts, and/or Consumables going to Agilent Logistics Centers are to be individual packaged unless otherwise specified. Suppliers of support parts and/or consumables should coordinate this with the appropriate Agilent Technologies Procurement representative. The default method for all support parts (SPs) and Consumables is individual packaging unless otherwise instructed.

Agilent Technologies Procurement will work closely with suppliers to design packaging which is most efficient considering the total supply chain.

9.2 Edge Crush Test (ECT) vs. Mullen Equivalents

Either method of specifying corrugate can be used for packages of equal size and gross weight according to their respective rules. However, they may not perform exactly the same in practice because the materials are made differently. See table 9 for equivalency values. In general, compression strength is more important to Agilent Technologies than bursting strength. Therefore, all corrugate should be specified by its ECT as the primary requirement. An acceptable burst strength (Mullen) alternate is also provided.

Table 9. Edge Crush Test (ECT) vs. Mullen Test Equivalency Chart.

The following defines rule equivalents not necessarily performance equivalents.

Single Wall			**Double Wall**		
ECT (lb./inch)	**ECT (kN/M)**	**Mullen (lb./in²)**	**ECT (lb./inch)**	**ECT (kN/M)**	**Mullen (lb./in²)**
32	5.60	200			
40	7.00	250			
44	7.70	275	48	8.41	275
55	9.63	350	51	8.93	350
			61	10.68	400
			71	12.43	500
			82	14.36	600

9.3 Minimum Corrugated Board Strength

The following table provides minimum board strength for cartons of various sizes and weight ranges. Exceptions to these guidelines are approved only if tests are conducted which verify that the package design provides equivalent compression strength.

Table 10. Minimum Board Strength for Corrugated Containers.

ECT = Edge Crush test, SW = Single Wall, DW = Double Wall

Container Style	**Sum of container Length + Width + Depth**			
	0 – 762mm 0 – 30”	**763 – 1270 30.1 – 50**	**1271 – 2286 50.1 – 90**	**Over 2286 Over 90**
Regular Slotted Container (RSC)	44 ECT 1896 kPa 275psi, SW	48 ECT 1896 kPa 275 psi, DW	51 ECT 2413 kPa 350 psi, DW	51 ECT 2413 kPa 350 psi., DW
Half Slotted Container (HSC)	44 ECT 1896 kPa 275 psi, SW	48 ECT 1896 kPa 275 psi, DW	51 ECT 2413 kPa 350 psi, DW	N/R[1]
Half Slotted Container (Palletized)	N/R[1]	N/R[1]	71 ECT 3447 kPa 500 psi, DW	Triple wall
Full Telescoping Style (FTHSC)	44 ECT 1896 kPa 275 psi, SW	44 ECT 1896 kPa 275 psi, SW	55 ECT 2413 kPa 350 psi, SW	51 ECT 2413 kPa 350 psi, DW
Tube and Cap Style	N/R[1]	N/R[1]	71 ECT 3447 kPa 500 psi, DW	Triple wall
Roll-End Tuck Top Mailers	44 ECT 1896 kPa 275 psi, SW	55 ECT 2413 kPa 350 psi, SW	55 ECT 2413 kPa 350 psi, SW	N/R[1]
All Other Styles	44 ECT 1896 kPa 275 psi, SW	48 ECT 1896 kPa 275 psi, DW	51 ECT 2413 kPa 350 psi, DW	51 ECT 2413 kPa 350 psi, DW
Notes: N/R[1] = Package style Not Recommended for this size container. ECT = Edge Crush test SW = Single wall DW = Double wall				

9.4 Carton Taping

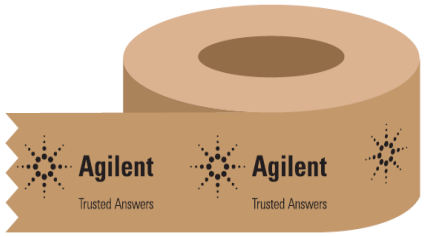


Figure 19.1: Agilent branded, reinforced paper tape

Tape

Two types of tape may be used to seal containers: Agilent branded, reinforced (non-asphaltic), water-activated, gummed paper tape (Figure 19.1) and transparent plastic tape. The minimum tape width is 51mm (2").

The recommended types of tape are:

Agilent branded, reinforced paper tape 3" wide PN: 5042-2839.

Plastic tape (transparent) 2" or 3" wide

No other variations of tape types or graphics are allowed to be used.

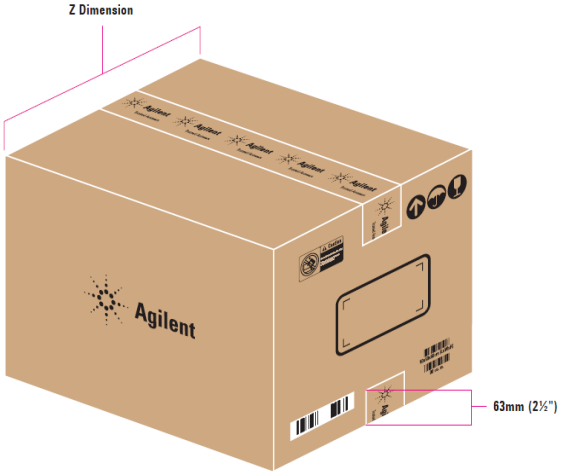


Figure 20: Taping for containers weighing less than 15.2kg (35lbs.)

Taping Procedures

Containers with contents weighing less than 15.2kg. (35lb.) may be sealed with a total of two strips of tape: one running along the top center seam and one running along the bottom center seam. The tape should extend a minimum of 63mm (2½") past the edge of the container (Figure 20).

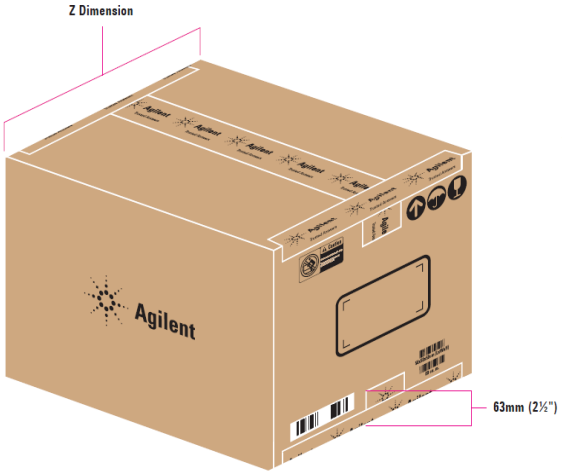


Figure 21: Taping for containers weighing over 15.2kg (35lb)

Containers with contents weighing more than 15.2kg. (35lb.) require the addition of tape along the top and bottom edge seams of both ends. The length of each tape strip should equal 2/3 of the container Z dimension so that the tape does not extend to the container edge (Figure 21).

Local packaging requirements may indicate other taping procedures not covered in this company standard.

Judicious use of tape is requested.

Do not cover graphics with tape.

10.0 Palletization

Table 11. *Palletization, Unitization and Securement*

This table summarizes the basic guidelines. Exceptions allowed only if otherwise specified by the responsible Packaging Engineer.

Item	Do	Do Not!
Pallets	*Use stringer pallets, 40" x 48", *On custom sized pallets, provide a minimum 711 x 95mm (28" x 3.75") inside dimension for pallet jack access on two opposite sides. *Use only non-solid wood (plywood, plastic, etc.) or approved solid wood pallets for all inter and intra country shipments. Use appropriate HT markings as required by USDA/APHIS. *Use a center block or stringer if the span between the blocks or stringers exceed 500mm (20").	*Do not use pallets which have bark visible on the wood. *Do not use pallets which have evidence of insect damage on them (such as grub holes). *Do not use broken wood pallets. *Do not accept substandard pallets from your suppliers (Agilent Technologies and suppliers). *Do not use alternative pallet materials (paper, metal) without prior Agilent Technologies approval.
Packaging	*Cut down palletized bulk container if head space is greater than 76mm (3.0"). This reduces dimensional weight, prevents collapsing of the lid and prevents pooling of water on top. *Fill only lateral voids in palletized bulk containers.	*Do not use top caps on top of cartons if the cap is too big or too small (use a top pad instead). *Do not stack cartons into unit palletized bulk containers higher than the top surface of the bulk container. *Do not use free-flow dunnage materials to fill voids in over packs. *Do not fill voids in the top of palletized bulk containers (cut the bulk container down instead). *Do not extend bulk container heights by adding a second tube on top of the first. *Do not allow containers to overhang pallet.
Palletization, Unitization	*Build only cubic, stackable loads. *Occupy at least 80% of the pallet surface. *Palletize shipments consisting of a single package weighing in excess of 32kg (70 lbs) Pallet size should match package size (minimum 80% coverage).	*Do not exceed 4 layers when stacking on a pallet if a bulk container is not being used. *Do not palletize a shipment consisting of a single carton weighing less than 32 kg (70 lbs). *Do not bulk fill bulk containers with unpackaged small parts.
Stretch Wrap	*Use mechanically applied stretch wrap. Stretch wrap alone when properly applied is sufficient for intra-continental surface shipments. 2-way banding is also approved. *For inter-continental and all air shipments use 2-way banding in combination with mechanically applied stretch wrap. Band first, then wrap for best results. *Tie the stretch wrap to the pallet directly, cover all corners. Covering the areas for forklift access is OK. *Use 5mm (.180") fiberboard 50mm x 50mm (2" x 2") vertical corner posts to keep cartons aligned under the film. *Tie the wrap to the pallet like a rope around the base. Use a top cap outside of the vertical corner boards (under stretch wrap).	*Do not use hand applied stretch wrap unless combined with 4-way banding for inter-continental shipments or 2-way banding for intra-continental surface shipments. *Do not use pass-thru style stretch wrapping unless supplemented with banding or spiral wraps. *Do not use black opaque stretch wrap for security purposes (use corrugated over packs instead). ***Note:** Do not confuse shrink wrap with stretch wrap. Shrink wrap is applied with heat to form a tight load. Stretch wrap is applied from a roll and is pre-stretched by the applicator.

	Clear stretch wrap with unique markings or shrink wrap may be used for security purposes.	
Banding, Strapping	*Whenever banding is used, use at least 2 bands. 4 are preferred. *Use polyester banding for loads over 45 kg (100 lbs.). *Use steel banding only for loads over 363 kg (800 lbs.) if the banding is being used to hold the load to the pallet. *Use crimp or heat seal banding closures with the new padlock symbol. *Use the banding notches (not the forklift notches) for cross bands on stringer style pallets. *Use angle board style edge protectors under bands. Some exceptions may apply with automated banding applications. *For inter-continental shipments of palletized loads of multiple cartons, 4-way banding is an approved alternative to 2-way banding with mechanically applied stretch wrap. *For machines, the stretch warp or banding that would otherwise be required may be eliminated if the machine is bolted to the pallet provided that the banding or wrap is not needed to keep the package together. If it is, use wrap or banding as needed to maintain package integrity. *Use the padlock symbol on banding on clips for security purposes. *Permanent steel banding used for reinforcement of wooden crates should be accompanied with a pictorial “do not cut” graphical symbol.	*Do not use small plastic clips (load spreaders) as edge protectors unless the band is threaded through the clip to keep it from falling off. *Do not use metal banding for loads less than 363 kg (800 lbs.). *Do not use buckle style hand applied banding fasteners except in field use applications where banding tensioners are not available. *Do not staple or nail through the bands. Staples may be used to “frame” bands used for permanent reinforcement of crates. However, the staple itself should not puncture the bands. Whenever such bands are used, also mark these containers with a graphical symbol which indicates “Do not cut this band”.

10.1 Unit Load Size and Capacity Guidelines

Load Height requirements: Most Agilent Technologies locations have flexibility in storage heights.

Load Weight Maximum: 910 kg (2000 lbs.) for a full pallet.

10.2 Bulk Containers

Pallet loads should be over packed in bulk containers when loads are heavy, consist of many layers or are transported inter-continental.

Note: For air shipments, savings of roughly $10US per cm ($24US per inch) can be achieved by cutting down standard size bulk containers, 1000mm x 1200mm to reduce voids.

10.3 Key Dimensional Considerations for Transportation Efficiency

While these guidelines are useful for all shipments, the benefits are most pronounced on inter-continental shipments. To ensure the lowest possible shipping cost as well as minimum delivery cycle time, it is important to prepare loads which physically fit the transportation vehicles that will be used such as airplanes or inter modal containers. The following table provides some "rules of thumb" in this regard which apply to most shipping situations. Of course, there may be variances depending on the exact routing or carrier utilized.
When multiple modes of transportation are used where dimensions cannot be optimized for all modes it is advisable to optimize on the most expensive portion of the journey. In most cases this would be the AIR portion which can cost 7-10 times more on a per unit basis than ocean or surface shipment. A key height dimension to consider for all modes of transportation is 750cm (29.5") since these fits 2 high in belly positions on wide body aircraft and 3 high in inter modal and surface vehicles.
Nominal Air pallet ("cookie sheet") sizes are: 274 x 223cm (108" x 88"), 318 x 223cm (125" x 88") and 318 x 224cm (125" x 96"). The dimensions in the table account for clearances needed for cargo netting and so on. For full details on air cargo dimensions, get a copy of the IATA ULD Technical Manual. This is available for purchase from the International Air Transportation Association (IATA) located in Montreal, Canada (+1-514-844-6311) and Geneva, Switzerland (+41-22-799-2523). ULD means "Unit Load Devices" which are the containers which can be loaded onto aircraft for cargo purposes.

For additional information on inter modal (ocean) containers visit:

Internet: **http://www.export911.com/e911/ship/dimen.htm**

Table 12. Key Dimensional Considerations for Transportation Vehicles

Shipment Mode	Transport Vehicle Type	Try to Make Package Dimensions Modular to:			Comments
		Length	Width	Height	
Air	"Narrow Body" Aircraft, Lower Deck or "Belly" Positions (B707, B727, B737, DC8, DC9)	varies	varies	Varies	Belly positions are used for manually handled loose cartons and luggage.
	"Narrow Body" Aircraft, Upper Main Deck Positions (B707, B727, B737, DC8, DC9)	300 cm (118"), 258 cm (101")	213 cm (84")	193 cm (76") to 208 cm (82") Design for 203 cm (80")	Height limitation varies depending on the specific airplane and how it was configured for cargo.
	"Wide Body" Aircraft, Lower Deck or "Belly" Positions (B747, B767, DC10, MD11)	300 cm (118")	234 cm (92") 213 cm (84")	160 cm (63")	Items sized for lower deck "belly" positions enjoy lower costs and increased flight availability globally.
	"Wide Body" Aircraft, Upper Main Deck Positions (B747, B767, DC10, MD11)	300 cm (118")	234 cm (92") 213 cm (84")	238 cm (94"). Or 300 cm (118") B747 cargo only	Wide body, upper deck positions are not available to all destinations.
Ocean	Standard Inter modal Dry Cntrs (Nominal 20', 40' and 45')	592 cm (233"), 1201 cm (472"). 1538 cm (533")	234 cm (92")	228 cm (89")	Aluminum dry containers are lined with plywood, steel containers are not.
	"High Cube" Inter modal Dry Cntr (Nominal 40' and 45' only)	1201 cm (472"), 1358 cm (533")	234 cm (92")	258 cm (101")	Available on special request.

Surface	Typical North American Trucks (Nominal 28', 40', 45', 48', 53')	Nominal length less 20 cm (8")	244 cm (96")	264 cm (104")	Heights up to 279 cm (110") are available.
	Typical European Trucks (Nom. 6m, 8m, 12m, 14m and 16m)	Nominal length less 20 cm (8")	244 cm (96")	229 cm (90")	Soft sided is typical.
	Typical Asian Trucks (Nominal 3m, 6m and 9m)	Nominal length less 20 cm (8")	213 cm (84"), 244 cm (96")	218 cm (86"), 244 cm (96")	Soft sided is typical.

11.0 Marking and Labeling

This following provides the Agilent Technologies Std Part Number Label specifications and the information that is to be applied to it for all parts, subassemblies, products and materials which will be shipped to any worldwide Agilent Technologies manufacturing site, Logistics Center or customer from either Agilent Technologies suppliers or other Agilent Technologies manufacturing sites. The controlled version of these files are located in Agile.

Standard Size Label:

1. Specifications for Std Size Label: **5971-5260**
2. Electronic Artwork File for Std Size Label: **8700-5260**

The Std Label is to be marked and/or labeled with the following information:

Part Number in Barcode Format

Part Number

Product Name and Amount

Country of origin (optional)

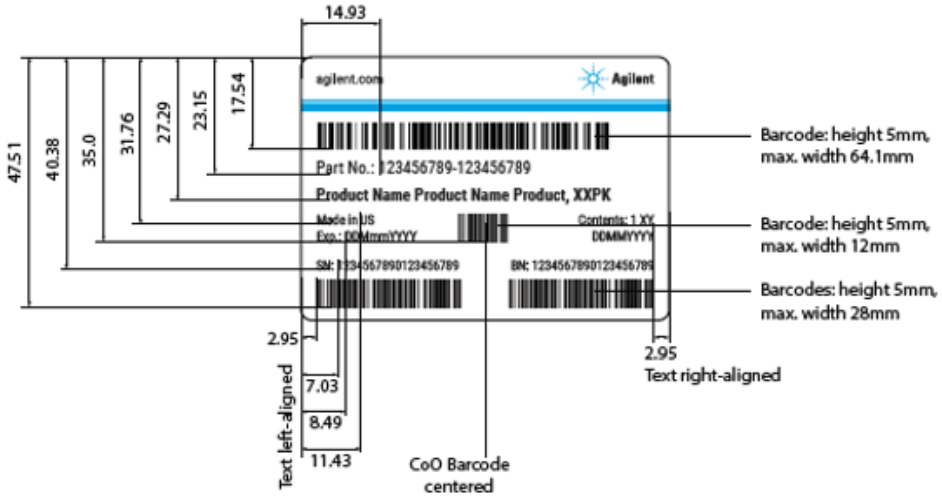
Country of Origin in Barcode Format (optional)

Expiration Date

Content Qty & Unit of Measure

Serial Number and/or Batch/Lot number (optional)

Serial Number and/or Batch/Lot number in Barcode Format (optional)



Small Label:

This following provides the Agilent Technologies Small Part Number Label specifications and the information that is to be applied to it for all parts, subassemblies, products and materials which will be shipped to any worldwide Agilent Technologies manufacturing site, Logistics Center or customer from either Agilent Technologies suppliers or other Agilent Technologies manufacturing sites. The controlled version of these files are located in Agile.

1. Specifications for Small label: **5969-1583**
2. Electronic Artwork File for Small Label: **8700-1583**

The Small Label is to be marked and/or labeled with the following information:

Part Number in Barcode Format

Part Number

Product Name and Amount

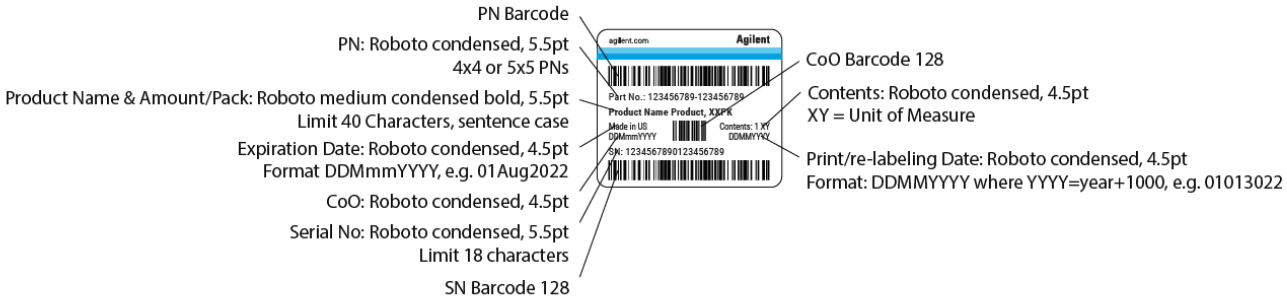
Country of Origin (optional)

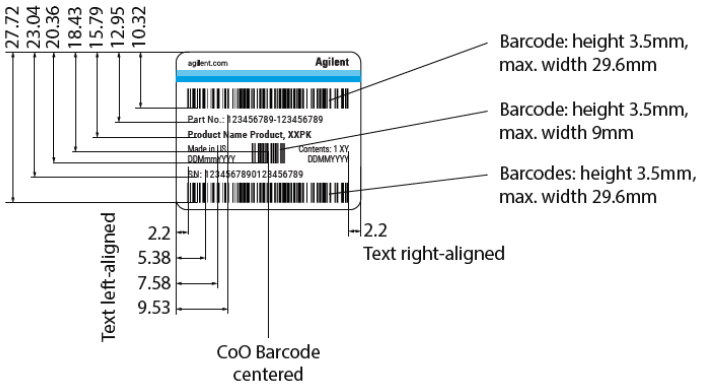
Country of Origin in Barcode Format (optional)

Expiration Date

Content Qty & Unit of Measure

Serial Number or Batch/Lot number (optional)





11.1 Country of Origin Markings

Each article should have the full English name of its country of origin marked on the article itself **and** on the article's product package (immediate container). The marking should be conspicuous, legible, indelible and permanent as the nature of the article and container will permit. Further definition of these terms is provided for convenience:

1. **Conspicuous**: Capable of being easily seen with normal handling of the article or container.
2. **Legible**: Can be easily read by a person with normal eyesight.
3. **Indelible**: Resists fading.
4. **Permanent**: Survives normal distribution and handling.

No abbreviations, with the exception of UK for United Kingdom and US or USA for the United States of America, are acceptable. The 2 character ISO 3166 country codes, alone, are not acceptable for country of origin markings or product packages.

11.2 Wooden Package Assembly Markings

In order to comply with new regulations restricting the movement of solid wood packing materials, Agilent Technologies has documented a policy statement to assist in clarifying Agilent Technologies' requirements. The requirements should be followed for all wooden type package assemblies such as crates and pallets made from solid wood, plywood, or other wooden composites. It is not necessary to mark each component of the assembly, only the total assembly. For further details refer to Agilent Technologies policy statement:

Intranet: http://prodregs.corporate.agilent.com/regulated%20areas/Packaging/Docs/ISPM%2015%20Policy.pdf

In summary, each wooden assembly is required to be manufactured and marked according to the requirements of ISPM 15.

Internet:
https://www.ippc.int/servlet/BinaryDownloaderServlet/133703_E.pd.pdf?filename=1240490152156_ISPM_15_Revised_2009_E.pdf&refID=133703

12.0 Package Design Guidelines

The ***Design Guide*** (tables 13 and 14) provides recommendations in three areas which are applicable to parts, assemblies and products used by Agilent Technologies manufacturing sites and for support part purposes (SPs).

1. Best Methods (these ***SHOULD*** be used)
2. Acceptable Methods (these ***MAY*** be used)
3. Unacceptable Methods (these ***SHOULD NOT*** be used)

Table 13. Design Guide: Suggested Packaging Methods by Commodity

Commodity	Best	Acceptable	Unacceptable
Cards, Boards and PCAs	*ESD Shielding bag inside of a rigid corrugated container and wrapped in a way to prevent movement in the carton. Double boxing is recommended for international shipments. *Static dissipative blister (clamshell) inside a rigid conductive lined carton (E-flute or chipboard for mfg use, heavier materials for SPs. Double boxing is recommended for international shipments.	*The enhanced hinged mailer style package (pizza box) with ESD shielding bag and picture frame style foam inserts (not glued in). Double boxing is recommended for international shipments.	*Commingled EPU foam on corrugated (or foam-fold) style containers *Any container with non-ESD materials. *Static dissipative blister packs inside regular non-ESD type cartons. *Any container with commingled (bonded together) foam and corrugate.

			*Any flexible package without a rigid outer shell.
Disk Drives	*Packages made with vacuum formed cushions made from 100% recycled HDPE. Place inside a rigid corrugated container. Double boxing is recommended for international shipments.	*Packages using fabricated EPE or EPU foam cushions. Environmental problems are offset by low cost and good performance. Place inside a rigid corrugated container. Double boxing is recommended for international shipments.	*Any type of suspension style package. These are favored by customers but have not been proven to pass our shock test for these items. Still worth considering for less fragile commodities of similar size.
Power Supplies	2-piece urethane cushions for lighter weight items and EPE for heavier items. Place inside a rigid corrugated container. Double boxing is recommended for international shipments.		Foam in place or any loose dunnage.
Glass Items	2-piece EPE or EPP cushions inside a rigid chipboard or corrugated carton. Place inside a rigid corrugated container. Double boxing is recommended for international shipments. ***Also recommends marking or indication on package exterior that inner items are fragile and/or contain glass, etc...***		Chipboard or corrugated carton without inner foam
Note: The above are general guidelines only and packages should be designed and tested by qualified individuals.			

Table 14. Design Guide: Suggested Packaging materials Within Types.

This provides recommendations for selecting among various types of miscellaneous packaging materials and methods

Material	Best	Acceptable	Unacceptable
Edge Protectors	Full length pressed fiber type (Angleboard™, V-board™, or similar) where the same piece extends under both bands. They are effective for use under bands (horizontally), for aligning the corners of stacked boxes on pallets (vertically), and for fortifying the stacking strength of cartons. Specify uncoated materials (no metal or clay coat) for environmental benefits.	Plastic banding clips that require the banding to be threaded through the clip to keep it intact.	Metal edge protectors. These are subject to being bent and may present a safety hazard (sharp edges). Other plastic banding clips. These are less desirable since they are more prone to becoming dislodged and lost. Scrap pieces of corrugated fiberboard.
Banding	½" or wider steel for loads of 364 kg (800 lbs>) or more and ½" or wider polyester for loads less than364 kg (800 lbs.). Closure to be accomplished with either crimp or heat seal.	Nylon or polypropylene for use on lightweight individual cartons (automated processes).	Filiment tape, rope, twine and all other plastic banding materials. Also, buckle style bands unless part of a filed kit for returns.
Stretch Wrap	Machine applied using ***"roping technique"*** (film bundled and tied to pallet) with at least 50% pre-stretch.	All forms of hand applied stretch wrap.	**Stretch Wrap**
Carton Closure	****Heavy Duty Polypropylene Tape *72 mm (3" nominal) wide for all applications.***	76 mm (3") wide Kraft gummed reinforced tape (water activated).	*Masking tape and all other non-reinforced paper tapes. *Staples, stitches and similar if they should be torn open to access the contents of the package.

Dunnage	*Pad Pak™ crimped paper.	*Recycled bubble wrap. *Kimpack™ or Kushion Kraft™. *Air filled flexible plastic shapes.	*All forms of ***free flowing*** cushioning materials (plastic or paper peanuts, popcorn and similar materials). *Printed newspaper.

13.0 Requirements for Heavy Packages

13.1 Summarizing

1. Manually handled packages in excess of 12 kg (26 lbs.) gross weight are considered *heavy* and should carry one of the four *international caution symbols* which illustrate the proper lifting techniques for handling heavy packages.

2. Packaged SPs and consumable products weighing less than 32kg (70 lbs.) should not be palletized individually *for shipment.* Pallets may be used for internal handling, but do not tender the shipment to the carrier with the pallet. Some express carriers can accept packages up to 68 kg (150 lbs.) without pallets. Eliminating the pallet on items like this greatly reduces shipping cost.

3. The acceptable weight limit for inbound parts packages (bound for Agilent Technologies Manufacturing) will remain at 16 kg (35 lbs.).

4. Heavy packages should include handles, hand grips or hand holes to facilitate manual handling but these should be reinforced to ensure no tear out during handling.

13.2 Heavy Packages, Handling Features

Heavy packages should be designed with features to improve safety and convenience when handling. This means ***hand holes or integral handles*** for packages in the 12 kg – 55 kg weight range (26 – 121 lbs.) and others deemed to be ***bulky*** (use judgment). Hand holes should be die cut with a scored top line so that the material remains in the hole. This minimizes contamination and improves gripping comfort. Fortifying the hole is usually necessary to prevent the carton from ripping out when lifting. Reinforcement in the form of filament tape, or similar, imbedded in the corrugated board is highly recommended for this purpose. Interior cushions should also be designed to align with the hand hole. It is also very important that interior packing materials do not interfere with the hand hole.
Plastic or fabric handles may be used but should be recessed if possible when not in use to prevent snagging on conveyors.