PACKING DESIGN

OPERATION PROCEDURE : 9-OP-0001	Version: 06	Page: 1 / 14

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I. PURPOSE

This procedure provide the guide line:

- How to design packing for products which is not required in customer specification.
- How to carry out packing test for carton box at packing process.
- Method of packing tests for confirming product's packing design.

II. APPLICATION

This procedure concern to packing design process

III. REFERENCE DOCUMENT

International Safe Transit Association (ISTA) 1A

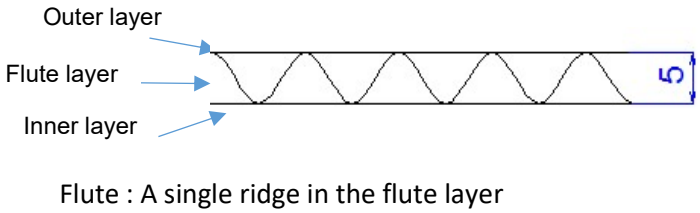
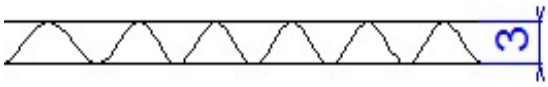
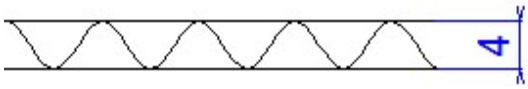
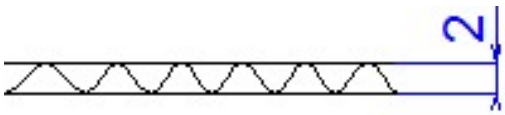
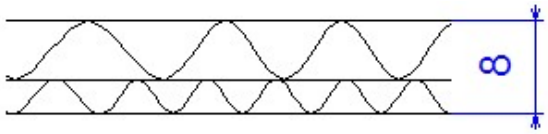
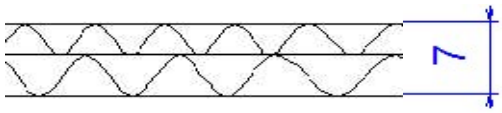
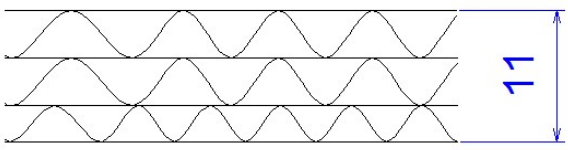
IV. CONTENTS:

IV.1 Flowchart for packing design

No.	Flow chart	Description
1	Demand of new packing design	Demands come from: - Not have requirement about packing method in product specification. - Unsuitable packing method in product specification. - Customer's request
2	Confirm product type	Engineer confirm which product type is : - Cable/cord/fiber with the ends is connector or same as that (MT ferrule, array...) - Module case, plastic/metal case - Accessory part, Connector
3	Choose shipping mode	*Normal design: - If ship air: Final packing (final layer of packing) is outer box - If ship sea: Final packing (final layer of packing) is pallet. Max height for ship sea: **2.2 m** * Special design (Depend on customer's demand): - If ship air: Final packing is pallet. Max height for ship air: **1.4m** * Note: About packing pallet, please refer "IV.3.2"
4	Choose packing method	With each product type, choose the suitable packing method (refer IV.4)
5	Choose carton box If FOV have suitable carton box If FOV don't have suitable carton box.	- Choose carton box have suitable size with packing method and product quantity. - With inner box and PAD: choose carton with 3 paper layers at least (ex: flute A or C...) - With outer box: choose carton with 5 paper layers at least (ex: flute AB or CB...) - With pallet: choose carton with 7 paper layers at least (ex: flute CCB…) * Note: Flute: Refer "IV.2. Carton type" - Engineer should place high priority on using available carton boxes in FOV first.
6	Design new carton box	Engineer will issue "Request create material code" and request MDP to make new carton drawing follow engineer requirement
7	NG Packing test OK	**A. For testing the capability of protecting product:** Engineer need to confirm product, package inside carton, have no appearance defect (torn, crack, damage, deformation) before testing. - Engineer carry out packing test for carton box to confirm that packing design can prevent products from harm and meet customer's requirements - if any. - If there's no special requirement from spec/customer: Drop test (Refer IV.5. Drop test). - If there're requirement from spec/customer: Follow spec/customer. **B. For testing functions of label:** 06 **1. Sticky function of label:** - Engineer need to evaluate label which chosen by FOV for the new packing design. - If there is no special requirement from Spec/ Customer: Refer IV.6. Label test. - If there is requirement from Spec/ Customer: Follow Spec/Customer **2. Other functions:** Depend on the functions of label which specify in the specification, Engineer need to conduct evaluation to confirm their characteristic can meet the requirements. (Refer IV.3 Common functions of label in using) **C. For testing the unpacking process:** -The packing method should be free from damage product during unpack. And it makes easy for the end user unpack product. - If the packing method still have a risk on unpacking process that effect to product, we should consider of re-design or update the unpacking instruction for user.
8	Record result and apply.	Issue technical report to record packing test result.

IV. CONTENTS:

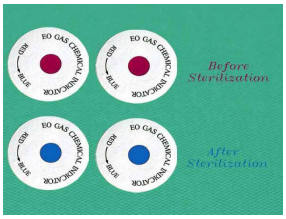
IV.2 Carton type

No.	Flute	Layer quantity	Thicknes s (mm)	Picture
1	A (30-36 flutes per 30cm) A-flute provides the greatest cushioning properties for fragile products	3	5	 Flute : A single ridge in the flute layer
2	B (44-50 flutes per 30cm) B-flute provides the crush resistant properties from outside.	3	3	
3	C (36-42 flutes per 30cm) C-flute offers good crushing resistance from inside.	3	4	
4	E (86-94 flutes per 30cm) E-flute is the thinnest flute, commonly used as smaller carton.	3	2	
5	AB (combine Flute A & B) AB-flute offers the crush resistant properties	5	8	
6	BC (combine Flute B & C) BC-flute offers a higher level of transit protection.	5	7	
7	CCB (combine two Flute C & 1 flute B) CCB-flute offers a higher level of transit protection such as pallet.	7	11	

IV. CONTENTS:

IV.3 Common functions of label in using:

06

No.	Main fucntion	Description	Example picture
1	Product Identification or Informational	Labels help in identifying the product and its brand,convey information about ingredients, nutritional facts, usage instructions, and expiration dates,….	
2	Provide security and prevent counterfeiting.	These labels display holographic images that are difficult to replicate, adding a layer of security or reflect specific color under UV light,...	
3	Identicating the impact of environment or environmental condition changes.	These labels change color based on temperature or humidity levels, detect and indicate if a product has been subjected to potentially damaging impacts during transit or storage, indicating that the product has been properly sterilized (EtO indicator labels),...	 
4	Ensure a product has never been used and remains in its sealed status	These labels provide a clear indication if a product has been opened or tampered with.	 

IV. CONTENTS:

IV.4 Packing method

IV.4.1 Packing method depend on product structure

a. Cable/cord/fiber with the ends is connector:

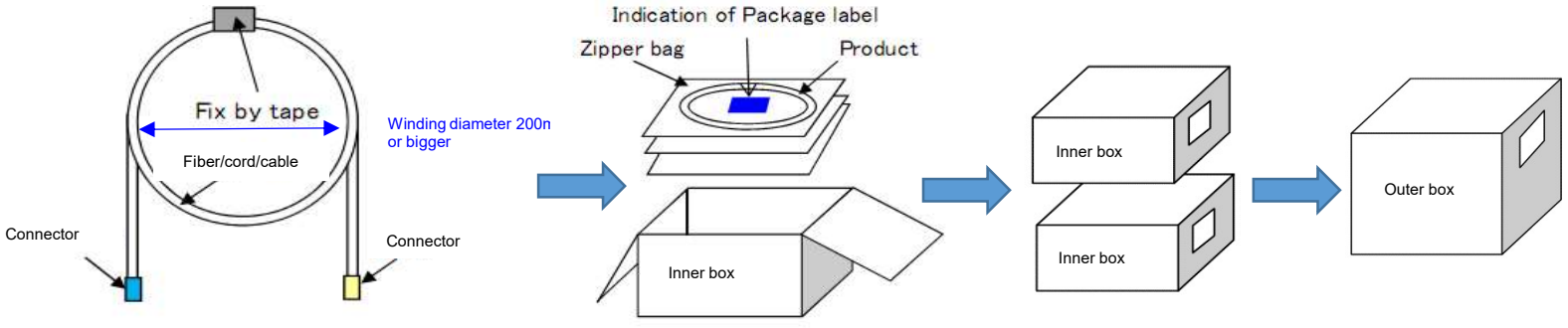


Fig 3.1

b. Module case, plastic/metal case:

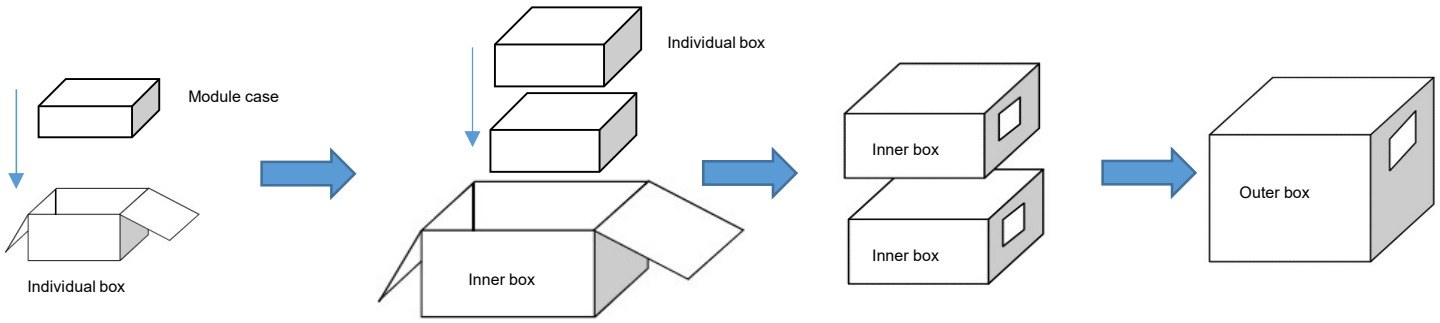
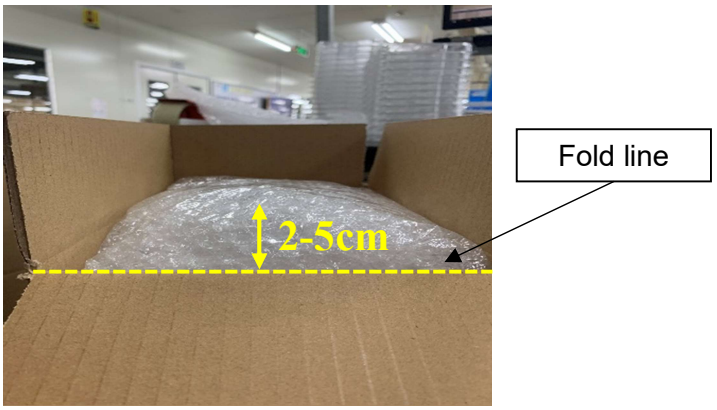


Fig 3.2

Note:

When design packing for unfull box if the product only wrapping by air bubble or put into PE bag Eng must consider:

+ The position of product in the inner box should be in centre of box.
+ Fill the empty space by suitable dummy or air bubble around product to prevent the product directly impact to the wall of carton.
+ Air bubble must fold tidy to have the unique absorb force before using.
+ Air bubble should high than the fold line of box about 2-5cm. When OP closing the carton box the product can be fixed well.



Good case

Put 1 more air bubble sheet at the bottom.

Lay the product at the centre of box.

Using the air bubble to fill empty space around product.

Continue using air bubble sheet to fill inner box full before closing.

Fig 3.3

Not good case

Put product near by the carton's wall.--> Product directly impact to carton wall.

Air bubble only applied on 1 side.

Air bubble don't fold tidy before using → Product can be move in transportation.

Product can be damage in transportation.

Fig 3.4

c. Accessory part, Connector/housing part:

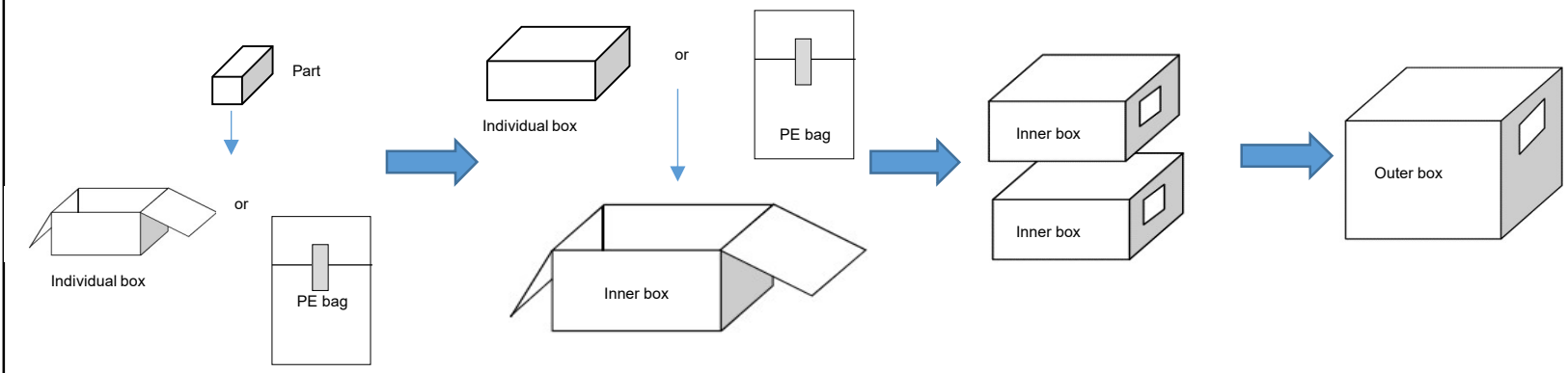
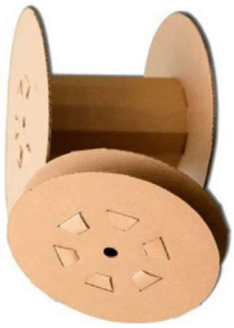


Fig 3.5

d. Product in Reel/Bobbin/Drum:

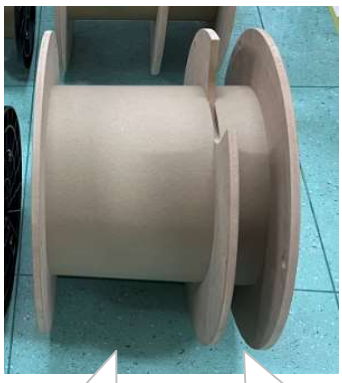
1. Identify Reel/Bobbin/Drum types

Paper



Bobbin has 1 **slot**

Wooden bobbin has 2 slots



Wide slot

Narrow slot

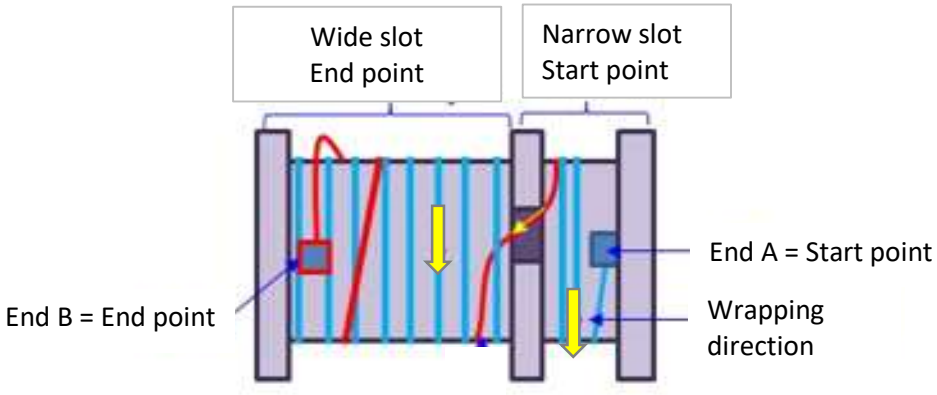
Plastic bobbin has 2 slots

Wide slot

Narrow slot

2. How to coil product into bobbin has 2 slots:

For bobbin has 2 slots, need to note Start point & End pont.
Start point is wrapped for Wide slot & End point is wrapped for Narrow slot.



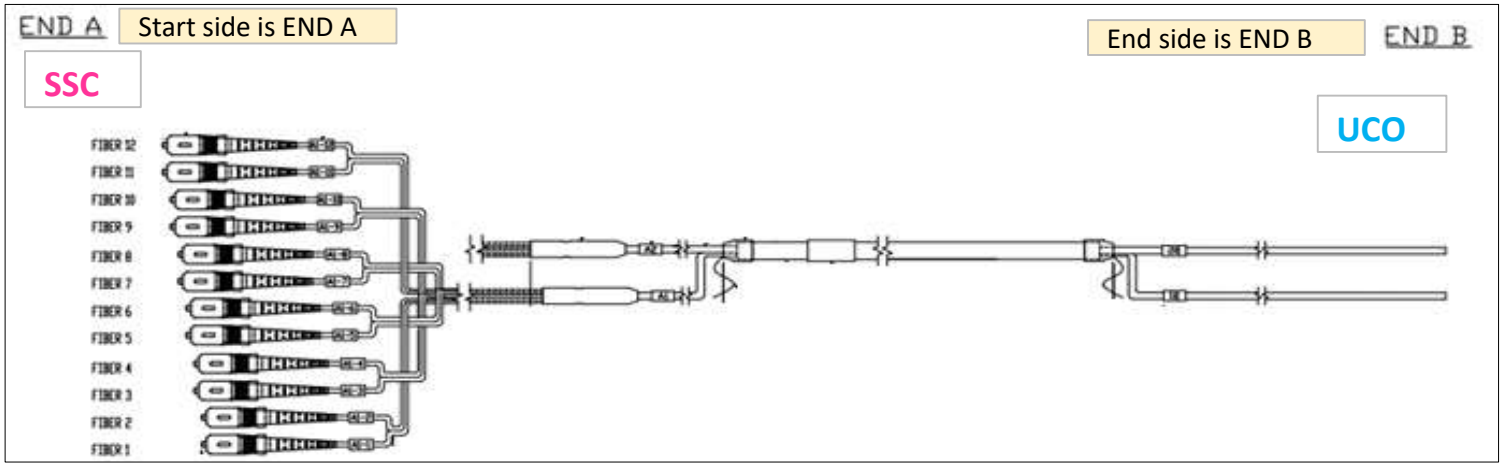
PACKING DESIGN

Example for packing pulling eye type

Product Name: FJ-A-K SY D SSC UCO-BB B M 100 R

Based on the product name, we know:

1. END-A is SSC, END-B is UCO



2. B - pulling eye (1 side), R is packing by reel.

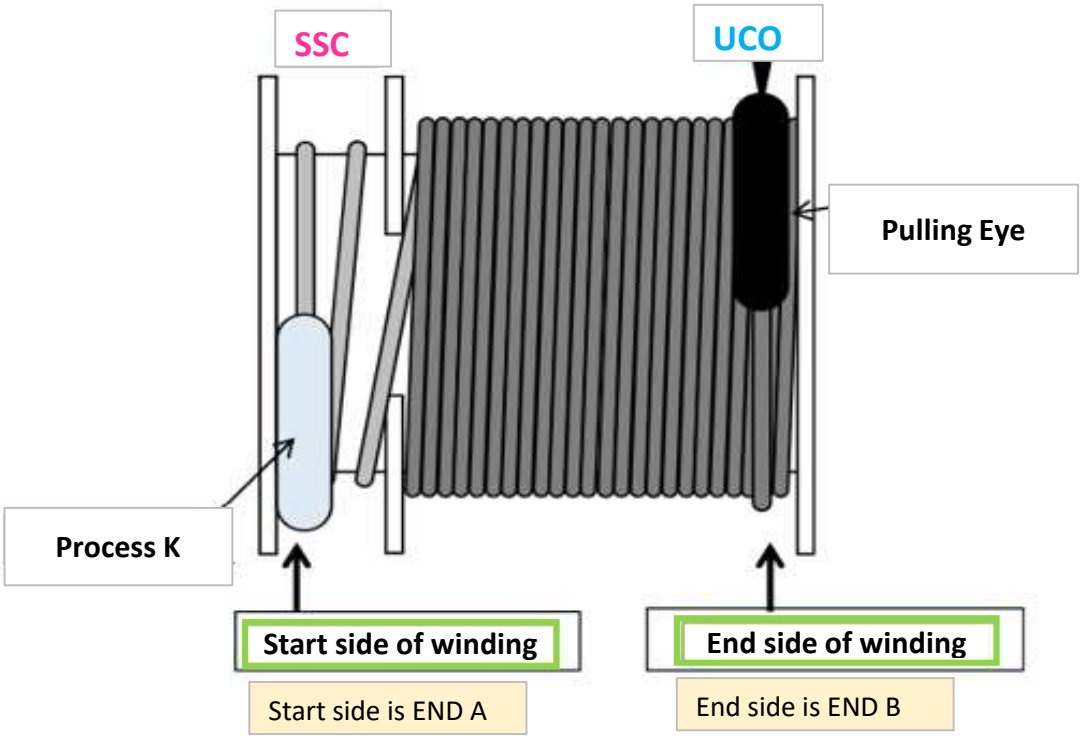
j	Pulling Eye:
	A : No Pulling Eye
	B : Pulling Eye (1 side)
	C : Pulling Eye (2 sides)
	(*2) In case of B, Pulling eye

Symbol	Meaning of each symbol
n	Packing Method:
	C : Coil
	R : Reel

3. End A packing K, End B Pulling eye.

j: Pulling Eye	n: Packing Method	Start side: End A	End side: End B
A	C	Processing E	Processing E
B		Processing E	Pulling Eye
C		Pulling Eye	Pulling Eye
A		Processing K	Processing K
B	R	Processing K	Pulling Eye
C		Pulling Eye	Pulling Eye

4. Correct Pulling eye packing



IV.4.2 Packing method for pallet:

There're 2 types of paper pallet:

a. Paper Tri-wall pallet:

Packing method: …-> Inner box-> Pallet

Fig 3.6

b. Paper pallet without tri-wall:

NOT have body & cover

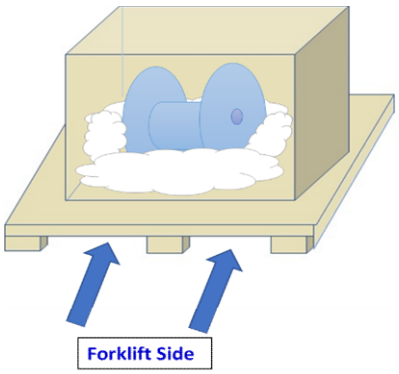
Packing method: …-> Inner box-> Outer box-> Pallet

Fig 3.7

Note:

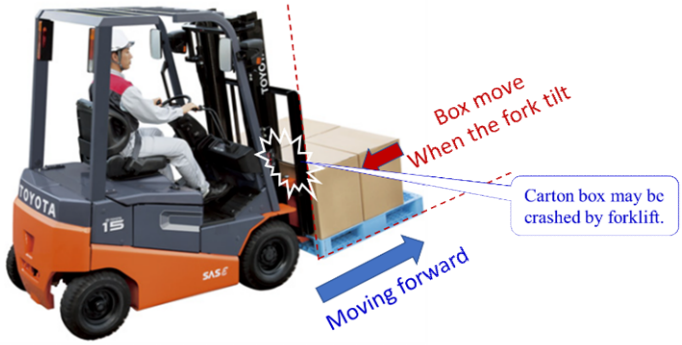
When Engineer design packing carton on pallet, engineer must consider:

- The direction of forklift when transportation to prevent carton crash into the forklift and damaged.



Direction of forklift when picking up the pallet.

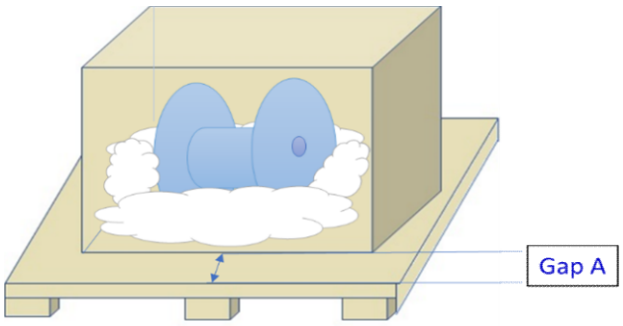
Fig 3.8



Carton box will move and impact to forklift if carton box

Fig 3.9

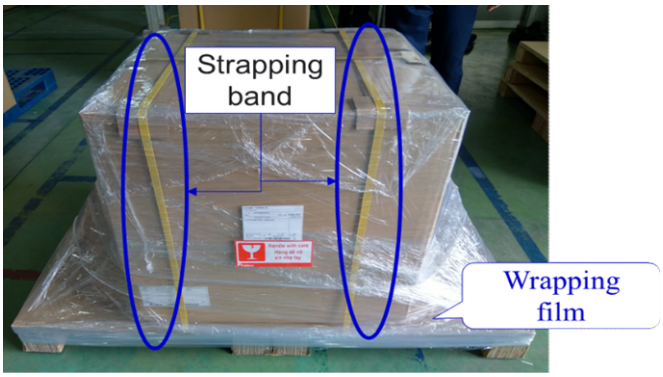
- Insert air bubble in empty position of carton to fix the reel not move and has the gap between the reel/ product and carton wall.
- Design a gap/space between carton box and pallet to reduce the risk of hitting carton box by external force.



Insert airbubble in empty position and design gap between carton box and pallet for safety.

Fig 3.10

- Fixing the box on pallet during design packing method for product



Fix the carton on the pallet by strapping band and wrapping film.

Fig 3.11

IV.5 Drop test method

a. Determine drop height

Table 1. Determine drop height based on packing weight

Package weight (Kg)	Height (cm)
Less than 9	76
10 - 18	61
19 – 27	46
28 - 45	30
46 - 68	20

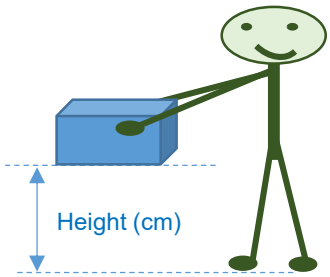


Fig 4.1

*Dropping height : The distance (height) from the floor surface to the closest end of dropping object.

b. Drop package from pre-determined height in the following order

Table 2. Position and order of dropping package

No	Items	Specific face, edge, corner	Remark
1	Corner	Corner of face 2-3-5	Choose corner have manufacture's joint.
2	Edge	Edge of face 2-3	
3	Edge	Edge of face 2-5	
4	Edge	Edge of face 3-5	
5	Face	Face 1	
6	Face	Face 3	
7	Face	Face 2	
8	Face	Face 4	
9	Face	Face 5	
10	Face	Face 6	

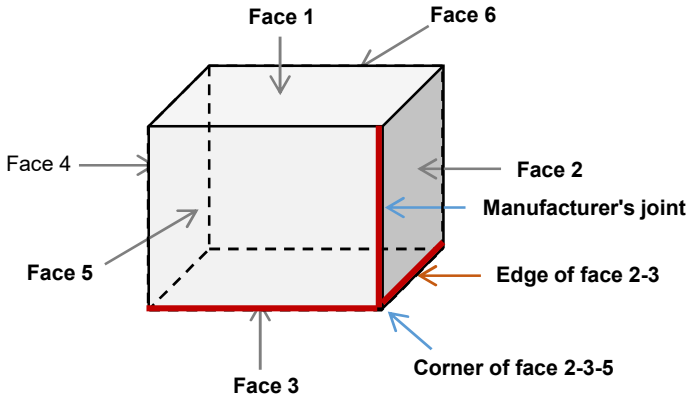


Fig 4.2

***Note:** The floor surface of applying drop test must be flat as stable concrete or steel plates.

c. Judgment after drop test

After testing, open box and check status of product or package inside box with judgement criteria below:

***Inner/outer box:**

Judgement criteria:

- Accept: + Corner, edge, face of carton box: Deform slightly (Refer below illustration pictures).
+ Adhesive tapes: Peel off with small areas and do not affect on packing function.
(Can load the weight of all products inside; not make the carton box open)

Fig 4.3

- Not accept: + Carton box: Harm, torn, crack that affect on protecting possibility for carton box/products inside.
Example: The top of carton is opened; edge has so big torn that the products can be out of the carton box.
+ Adhesive tape: Damage, peel off totally from one adhesive line that can make the carton box open, or cannot support loading weight for the bottom of carton.

***Product:**

Suggestion for sampling quantity of product for judgement:

- If having outer box: 1 inner box/outer box
  1 pc of tray/box/bag (*)/inner box
  All product inside that tray/box/bag

- If not having outer box: 1 pc of tray/box/bag (*)/inner box
  All product inside that tray/box/bag

(*) A tray/box/bag can contain many products.

Note: Select the inner box/tray/box/bag that have highest risk of harm.
Depend on packing method of each product, Engineer can choose another suitable sampling quantity for judgement.

Judgement criteria:

- Accept:

+ Check the appearance: The product is not deformed (dent, scratch, crack, broken, dis- assembly, the parts of product move (not keep original position in products)
+ Product's position: can move a little but not out of original packing position.

IV.6 Testing to confirm the sticky of label

IV.6.1. Determine label testing method:

No.	Label kind	Test method
1	Paste direct on product	- Paste label on the same product or equivalent material (by the same method as product design). - Apply humidity test with temperature variation (Refer IV.5.2. Aging condition). - Checking the status of the label after apply humidity test with temperature variation.
2	Paste on bag, tray or carton box	Apply 2 tests: - **Test 1:** Paste label on the bag, tray, or carton box. Keep at room temperature for 3 minutes. Checking the condition of the label after 3 minutes. Checking condition of the label during take off after 3 minutes. - **Test 2:** Paste label on the bag, tray, or carton box. Keep at room temperature for 24 hours. Checking the condition of the label after 24 hours.

IV.6.2. Aging condition:

a. Aging condition from FJK advise for challenge environmental testing:

Temperature: Cycle as below figure (-40˚C to +85˚C)
Humidity: 90%-100%
Duration: 21 cycles ~ 168 hours (7 days)

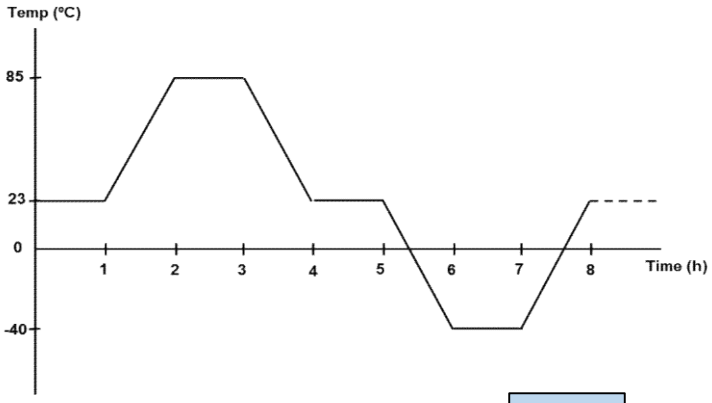


Fig 5.2

Detail of one Aging cycle			
Step	Temperature		Time
	From (°C)	To (°C)	(hour)
1	23	23	1
2	23	85	1
3	85	85	1
4	85	23	1
5	23	23	1
6	23	-40	1
7	-40	-40	1
8	-40	23	1
...	...	...	...

b. Other aging condition: We can separate to be 2 test: Humidity test and Heat cycle test as Telcordia GR-326.

IV.6.3. Judgment after testing

No.	Label kind	Acceptance criteria
1	Paste direct on product	Label's appearance: Label stick firmly on the product, without change color and adhesive outflow.
2	Paste on bag, tray or carton box	- **Test 1:** - Label's appearance: Label stick firmly on the bag/tray/ carton. - Label's resistance: during taking off the label, the label sticks firmly on the bag/tray and carton. In some cases, there is some label layer still stick on the tray/bag that could not remove/ Or the carton is peel off and stick on the label during removal. - **Test 2**: label's appearance: Label stick firmly on the bag/tray/ carton.

PACKING DESIGN

REVISION HISTORY

Date	Person	Version	Description		Reason of change	Change requester
			Old content	New contents		
24-Sep-24	MyNTH	6	-	Add item IV.3 Common functions of label in using	Update instruction as countermeasure of CAPA: CAPA-AFL-24-002	DucTNM
17-Aug-24	HienNTN	5	-	d. Product in Reel/Bobbin/Drum (Page7) Example for packing pulling eye type (Page8)	Update for JQHG-59-24-0002	DucTNM
26-Dec-22	HieuTT	4	IV.3. Packing method b.Module case, plastic/metal case.	Add note for packing unfull box if products only wrapping by air bubble or PE bag	Update instruction as countermeasure of CAPA: CAPA-CNC-22-058	DucTNM
31-May-22	TrangTNT	3	1.- 2.- 3.-	1.Testing the risk of unpacking 2.Update the properties for each flute 3.Update the method of design pallet packing	1, 2.Update instruction 3. Update instruction as countermeasure of CAPA: CAPA-CNC-22-016	DucTNM
10-Apr-21	TrangTNT	2	-	Update the instruction for testing new label for new design (No.7 of flowchart, IV.5)	Update instruction	DucTNM
02-Apr-19	Minhvh	1	-	First issue	-	