


ANNEXURE -XII

- DOMESTIC PACKNG-AA0490010, Rev 01
- VPI FOR ELECTRONIC EQUIPMENT-AA0490006,  
Rev 01
- VPI FOR ELECTRICAL EQUIPMENT-AA0490008,  
Rev 01

	<h1 style="margin: 0;">CORPORATE STANDARD</h1>	<div style="border-bottom: 1px solid black; padding: 2px;">AA0490010</div> <div style="border-bottom: 1px solid black; padding: 2px;">Rev. No. 02</div> <div style="padding: 2px;">PAGE 1 of 24</div>			
<h2 style="margin: 0;">DOMESTIC PACKING</h2>					
<p><b>COMMON GUIDELINES</b></p> <p><b>1 GENERAL:</b></p> <p>This standard lays down packing instructions for domestic packing of Components/ Assemblies/ Equipment to be despatched against Customer's contracts, for which there are no special instructions issued by the Engineering Departments. For Seaworthy Packing refer standard AA0490004 wherever applicable.</p> <p>The Components/Assemblies need to be packed suitably to avoid physical damage &amp; corrosion during transit &amp; storage. For specific applications the concerned engineering department shall issue a product standard. Reference of this product standard, must appear in the Shipping list/Packing List.</p> <p><b>2 SCOPE:</b></p> <p>This procedure gives minimum guidelines to be complied with for domestic packing of Components /Assemblies/ Equipment. This domestic packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage of materials.</p> <p><b>3 WOOD SPECIFICATION</b></p> <p>Based on availability, the wood shall conform to specification AA51401 or AA51402.</p> <p><b>4 TYPES OF PACKING:</b></p> <p>The following 5 types of packing have been standardized for packing of General Components/ Assemblies.</p> <ol style="list-style-type: none"> <li>1) 'OP' - Open Type.</li> <li>2) 'PP' - Partially Packed.</li> <li>3) 'CP' – Crate/Box Packing - Components/Equipment requiring physical protection.</li> <li>4) 'CQ' - Case Packing – Machined components-Small &amp; Medium Components/ Assemblies/ Equipment which require corrosion &amp; physical protection.</li> <li>5) 'CR' - Case Packing – Electrical/Electronic Components/ Assemblies, which require special packing viz. Water Proof, Shock Proof etc...</li> </ol> <p><b>5 DESCRIPTION OF TYPES OF PACKING:</b></p> <p>The various types of packing, as standardized above, are described below.</p> <p><b>5.1 'OP' - Open Type</b></p> <p>In case, of components which are not affected by water &amp; dust and do not require special protection, are generally not machined, shall be sent as open packages. However, these components may be sent in crates, wherever necessary.</p> <p><b>5.2 'PP' - Partially Packed</b></p> <p>Components which need special protection at selected portions only shall be despatched partially packed. Machined surfaces should not be allowed to come directly in contact with the wood. Such surfaces should be protected with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene</p>					
Revisions:		<b>APPROVED:</b> PROCEDURAL GUIDELINES COMMITTEE – PGC (Packing)			
Rev. No. 02	Amd. No.	Reaffirmed	Prepared HPBP, Trichy	Issued Corp. R&D	Dt. of 1 <sup>st</sup> Issue 31-05-2018
Dt: 28-08-2018	Dt:	Year:			



Film to Specification No. AA51420. All sharp corners and edges shall be protected by rubber mats to prevent damage to the polyethylene film

### **5.3 'CP' - Crate Packing**

Assemblies/Components which need only physical protection from the point of view of handling shall be despatched duly packed in crates.

### **5.4 'CQ' - Case Packing - Machined Components/Assemblies/Equipment**

Small and medium sized components/assemblies/equipment due to size/weight and to avoid handling and pilferage problems shall be packed in Case/Containers. Wherever required adequate quantity of silica gel to AA55619 or VCI Powder/Tablets, packed in thin muslin cloth cotton bags shall be suitably placed. Small machines/components of less weight shall be provided with suitable cushioning by Rubberised coir. The components inside the case shall be entirely covered with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film Specification No. AA51420, wherever required. This may be prescribed for electronic parts/critical machined components/surfaces.

For mechanical product like valves where motors are separately securely wrapped in polyethylene, the requirement of individual component wrapping shall be exempted.

### **5.5 'CR' - Case Packing - Electrical & Electronic Components/Assemblies**

Delicate components likely to be damaged e.g. Gauges, Instruments etc. are to be wrapped in waxed paper or polyethylene air bubble film and packed in cartons. Adequate quantity of Silica gel to AA55619 packed in cotton bags of 100grams each are to be suitably placed in the cartons. The cartons shall be entirely covered with 100GSM(Colourless) Multi Layered Cross Laminated Polyethylene Film Specification No. AA51420 before being packed in the cases. VCI Powder/Tablets can be used as an alternative to Silica Gel to AA55619.

Empty space in the cartons shall be filled with rubberized coir to get proper cushioning effect. The cartons shall be manufactured from corrugated Fiber Board, meeting requirements of AA51414.

## **6 PREPARATION OF PACKING CASES**

### **6.1 DIMENSIONS:**

- Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm as per applicable drawings of the respective units.
- Width of all planks including the tongue shall be more than 125mm and after planing it shall be minimum 100mm.
- Minimum number of planks shall be used for a shook.
- Horizontal, vertical, diagonal planks shall be given for binding (number of such planks depend on the dimension of panel).
- Width of binding planks shall be minimum 100mm.
- Distance between any 2 binding planks shall be less than 750mm.
- diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm
- Distance of the outer edges of these planks from the edge of case shall be less than 250mm.
- Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm.

### **6.2 JOINTING OF PLANKS**

Single length planks shall be used for cubicles whose overall length is less than 2400mm. For cubicles of length more than 2400mm, jointing is permitted. The jointing shall be done with one single or maximum of 2 planks of wood same as other planks of width 250 mm (minimum) with two rows of nails on either side of the joint in zigzag manner. From the joint along height side, it shall be of lap joint with overlap of at least the width of plank.



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### 6.3 TONGUE AND GROOVE JOINTS

Two consecutive planks shall be joined by tongue and groove joint. Depth of tongue shall be 12+1 mm, thickness of tongue shall be 8 +1 mm. The groove dimensions shall be such that the tongue fits tightly into the groove to make a good joint. This type of joint can be done based on the product requirement wherever required.

### 6.4 PERMISSIBLE DEFECTS

Wood shall be free from knots, bows, visible sign of infection and any kind of decay caused by insects, fungus, etc.

**End splits:** Longest end splits at each end shall be measured and lengths added together. The added length shall not exceed 60mm per meter run of shook's. Wood pins shall be used to prevent further development of split.

**Surface cracks:** Surface cracks with a maximum depth of 3mm are permissible. A continuous crack of any depth all along the length is not allowed.

### 6.5 OTHER MATERIALS

#### 6.5.1 NAILS

The dia. of the nails shall be 3.15mm. The length of the nails shall be 65mm wherever two planks of 25mm thickness are joined and 75mm wherever a 25mm planks is joined to a 50mm plank.

#### 6.5.2 BLUE NAILS

These are used for nailing bituminized Kraft paper/hessian cloth to the planks. The length of the nails shall be 16mm.

#### 6.5.3 HOOP IRON STRIPS

These are used for strapping the boxes. The width of the strips shall be 19+1mm and thickness 0.6+0.01mm. The material shall be free from rust. If sufficient nailing is done for bigger boxes, strapping need not be done.

#### 6.5.4 CLIPS

These shall be used for strapping the hoop iron strips on the boxes.

#### 6.5.5 BRACKETS

These brackets are used for nailing to the corners of cubicle boxes. The brackets shall be of mild steel of thickness min 2mm and width 25+1mm. The brackets shall be of "L" shape, the length of each side being 100+2mm. Two holes shall be provided towards the end of each side for screwing /nailing.

#### 6.5.6 FASTENERS

Bolts, double nuts, spring washers will have to be used for packing of some special items like transformers, reactors, breakers, etc., to hold the job to the bottom plank of the box. The bolts, nuts, washers will be provided by the vendor. Drilling of holes will have to be done using contractor's tools.

#### 6.5.7 MULTI LAYERED CROSS LAMINATED POLYTHELENE FILM

100GSM (Colourless) Multi Layered Cross Laminated Polythelene Film Specification No: AA51420 are used to make covers to the jobs individually. The cross lamination gives qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays.

#### 6.5.8 RUBBERISED COIR:

The rubberized coir is used as cushioning material. For the packing of loose items, items are to be arrested by using rubberized coir. For the packing of cubicles rubberized coir of thickness 25mm and width 75mm shall be used.

#### 6.5.9 FOAM RUBBER / 'U' FOAM:

This is used for covering the delicate items. This material is provided by the vendor.

**6.5.10 MARKING PLATE:**

This shall be of anodized aluminium sheet. Size of the marking plate shall be maintained minimum of size as per the details specified in the Figure 4.

**6.5.11 PACKING SLIP HOLDER:**

This shall be of galvanized iron tinned sheet /Aluminium sheet

**6.5.12 SILICA GEL:**

This shall be of indicating type to conform to IS: 3401/AA55619. Silical gel shall be used for such products only where moisture needs to be avoided.

**6.5.13 COTTON BAGS:**

These are used for holding silica gel. The bags shall have the following matter indicated on them:

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BHEL-UNIT NAME	PLACE-PINCODE
SILICA GEL	INDICATING TYPE
BLUE :	ACTIVE
ROSE :	REDUCED ACTIVITY
WHITE :	NO ACTIVITY. TO BE REPLACED WITH FRESH SILICA GEL

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**6.5.14 COTTON/ PLASTIC TAPE:**

This is used for tying small items. And also to prevent vibrations of moving parts within the cubicles.

**6.5.15 MARKING INK:**

The ink used normally is black in color. In some special cases other color also will have to be used. The ink shall be non-fading/indelible and non-washable by water.

**6.5.16 POLYETHYLENE BAGS:**

These are to be used for keeping the Packing slips. The bag shall be of size 70mm X 100mm (minimum).

**6.5.17 Hessian cloth, twine thread, paint will have to be used in packing certain items.****6.5.18 Mechanical Latching clamps:**

For CLW Railway panels and similar Panels self-locking clamps can also be used on need basis in conjunction with or apart from regular bolt and nut fixing arrangement. For reusable boxes, these clamps provide easy locking and unlocking arrangement. These clamps will be made available from BHEL in some cases.

**6.5.19 STICKERS**

The following stickers to be put by the vendor on cubicles/Boxes after packing.

- 1) Case No sticker: 2 nos. Size 25.Cm x 0.45Cm
- 2) BHEL Monogram sticker: 1 no. Size 1.75Cm x 2.3Cm
- 3) Address sticker: 2 nos. Size 3.8Cm x 3.0Cm
- 4) Direction sticker "Front" & "Back" - 4 nos. Size 2.0Cm x 0.75Cm
- 5) Chain Mark Sticker: 4 Nos. Size – 3.0Cm x 0.75Cm
- 6) "Fragile" sticker: 2 Nos. Size. 2.1Cm x 1.5Cm
- 7) "DO NOT STACK" sticker - 2 Nos. Size 3.0Cm x 2.2Cm



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In place of stickers, writing all the details legibly with paint shall be allowed & respective units may take decision accordingly.

### 7 PACKING OF CUBICLES:

**7.1** The packing is to be done as per clause 5 in all respects.

**7.2** The cubicles are already fixed on wooden pallets. Hence the contractor need not arrange the bottom pallets normally.

**7.3** The cubicles will be of different sizes both width wise and lengthwise. The cubicles may be made up of single suite, 2 Suite, 3 Suite, 4 Suite, etc., The width of the cubicles generally varies from 400 mm to 1650mm. The length of the cubicle, generally varies from 1500 mm to 4800 mm. The height is normally 2430 mm. In some cases, the height may be less/more.

#### 7.4 MULTI LAYER CROSS LAMINATED POLY FILM

The inner surface of 4 sides of shoo's shall be nailed with Multi-layer cross laminated poly film (as per 6.5.7) using blue nails (as per 6.5.2) wherever 2 pieces of Cross laminated poly film are used, the joint shall have an overlap of minimum 20mm.

The inner surface of top cover shall be nailed with Multi-layer cross laminated poly film (as per 6.5.7). This sheet shall project outside on 4 sides by at least 100mm and shall be nailed properly on sides. Joining of sheets should have overlap of minimum 20mm.

The cubicles shall be covered with Multi-layer cross laminated poly film (as per 6.5.7).

#### 7.5 SILICA GEL:

Silica gel (as per 6.5.12) packed in cotton bags shall be kept at different places inside the cubicle as per BHEL-Unit directions. Each suit of cubicle shall be provided with 1 kg of Silica gel (for a 4 suit cubicle 4 kgs of Silica Gel to be used. The bag containing silica gel to be as per 6.5.13).

#### 7.6 LOOSE PARTS:

Any loose parts in the cubicles shall be tied using cotton/ plastic tape. Wooden battens shall be provided wherever necessary.

#### 7.7 WOODEN BATTENS:

In case of cubicle which are not rectangular in shape like control desks, sufficient number of wooden rafters/battens of proper size shall be provided to give strength to the package.

#### 7.8 RUBBERISED COIR:

Gap between the cubicle and the case shall be filled with rubberized coir (as per 6.5.8) with distance between consecutive layers less than 500mm.

#### 7.9 CLAMPING:

Packing shall be bound at edges by nailing M.S. Clamps / Brackets (as per 6.5.5). Each vertical edge shall have minimum 3 clamps. Top horizontal edges will have one clamp for every meter length of package. However, minimum 4 clamps shall be nailed at the top for any cubicle.

#### 7.10 PACKING SLIP:

Packing slip kept in the polyethylene bag (As per 6.5.16) shall be placed in the box at appropriate place. In addition, one more packing slip covered in polyethylene cover and packing slip holder (as per 6.5.11) shall be nailed to front / rear of case.

#### 7.11 MARKING PLATE:

One no. (As per 6.5.10) shall be nailed to the front side of the case.

#### 7.12 CASE MOUNTING:

After complete packing, stencil marking of various details and marking of symbols shall be done as per BHEL instructions using indelible / non washable marking ink.

**7.13 Different types (Typical) of Cubicles with sizes for Packing**

1. Single suite cubicle - 900 x 950 x 2500
2. Two suite cubicle - 1650 x 950 x 2500
3. Three suite cubicle - 2400 x 950 x 2500
4. Four suite cubicle - 3150 x 950 x 2500
5. Regulation cub - 1300 x 1350 x 2500
6. Thy cub - 2870 x 1350 x 2500
7. VFD Cub - 3800 x 1550 x 2500

**7.14 PACKING OF CUBICLES FOR EXPORT**

Refer Corporate Standard AA0490009.

**8 PACKING OF LOOSE ITEMS/SPARES**

- 1) Shape of cases shall be square, rectangular with single gabled roof or with double gabled roof depending on the nature of the job to be packed. Construction shall be as per drawings enclosed. Only gable will be additional as required.
- 2) Wood shall conform to specification AA51401 or AA51402 with Tongue and Groove joint as per clause 6.3.
- 3) Width of planks shall be at least 100 mm. Width of binding planks (battens) shall be at least 75mm.
- 4) External surface of planks on front and rear shall be plane 100% (except bottom plank).
- 5) Inner surfaces of all 6 sides shall be lined with Multi Layered Cross Laminated Polythelene Film (as per clause 6.5.7) using blue nails.
- 6) Rubberized coir of minimum 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of box.
- 7) Internal packing: Items that go into the box shall be packed using 100GSM, (Colourless) Multi Layered Cross Laminated Polyethylene Film Specification No: AA51420. Any space left between the job and the sides and the top of the box shall be filled with rubberized coir to get proper cushioning effect.
- 8) Certain items like transformers, reactors, breakers, etc., shall be bolted to the bottom of the box using bolts, nuts and washers.
- 9) Silica gel as per clause 6.5.12 held in cotton bags as per clause 6.5.13 shall be kept at proper places in the box.
- 10) Packing slip kept in polyethylene bag (clause 6.5.16) shall be placed in the box.
- 11) Marking plate as per clause 6.5.10 shall be nailed to side of the box.
- 12) Two numbers of hoop iron strips as per clause 6.5.3 shall be strapped tightly on the case using clips.
- 13) Stencil marking of various details and marking of various symbols shall be done as per BHEL instructions using indelible/non-washable marking ink.
- 14) Loose items to be kept inside the cubicle
  - The components which are removed from cubicle for shipping purpose only, such as meters shall be kept inside the cubicle individually, kept in wooden box and tied firmly in bottom of Cubicle.
  - Other items which are given loose in addition to cubicle shall be packed in separate boxes.

**9 BOX SIZES****9.1 BOX SIZES**



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**Table 1 – SPARES WOODEN BOX DETAILS**

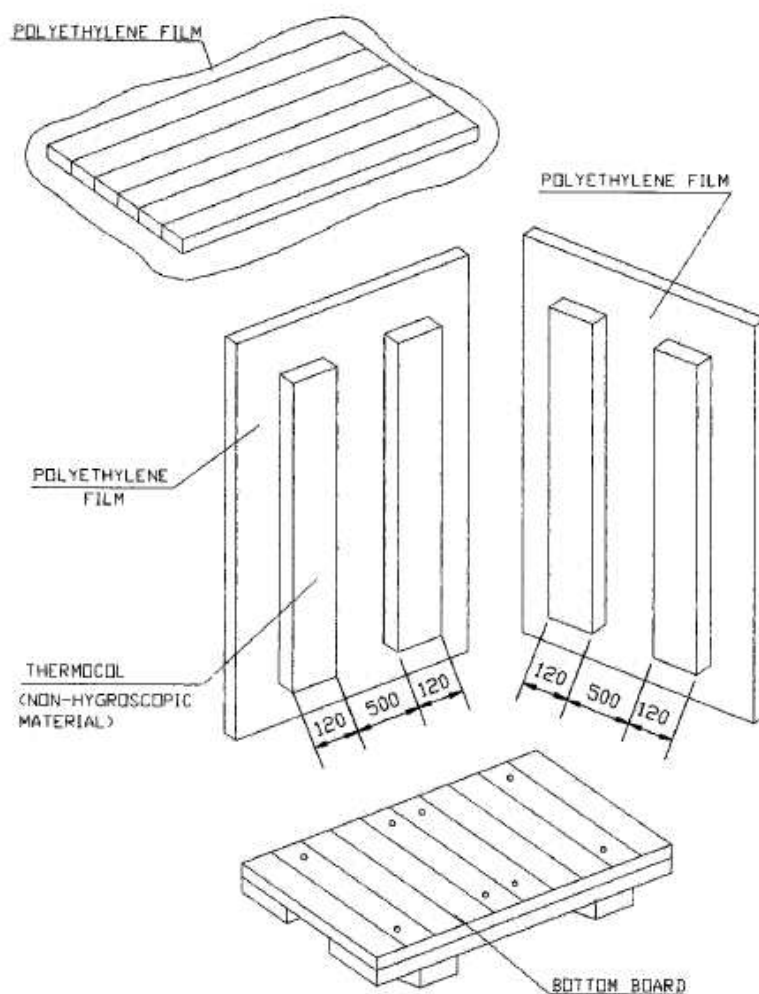
SNO	BOX TYPE	BOX SIZE (in mm)	BOX Wt (in KG)	Carrying Capacity
1	A	800 X 200 X 200	15	
2	B	1500 X 200 X 200	22	
3	C	2000 X 200 X 200	27	
4	D	1100 X 200 X 200	15	
5	E	200 X 200 X 200	5	
6	F	320 X 250 X 260	13	
7	G	320 X 250 X 430	16	
8	H	430 X 370 X 430	23	
9	I	1100 X 400 X 400	45	
10	J	1500 X 500 X 400	65	
11	K	2000 X 500 X 400	93	
12	L	2500 X 500 X 400	88	
13	M	900 X 600 X 600	100	
14	N	3000 X 400 X 400	60	
15	P	600 X 500 X 400	35	
16	Q	710 X 630 X 600	90	
17	R	850 X 630 X 670	102	
18	S	1000 X 770 X 670	140	
19	T	2500 X 850 X 800	180	
20	U	1500 X 700 X 700	120	
21	W	1200X900X600	120	
22	Y	450 X 200 X 200	10	

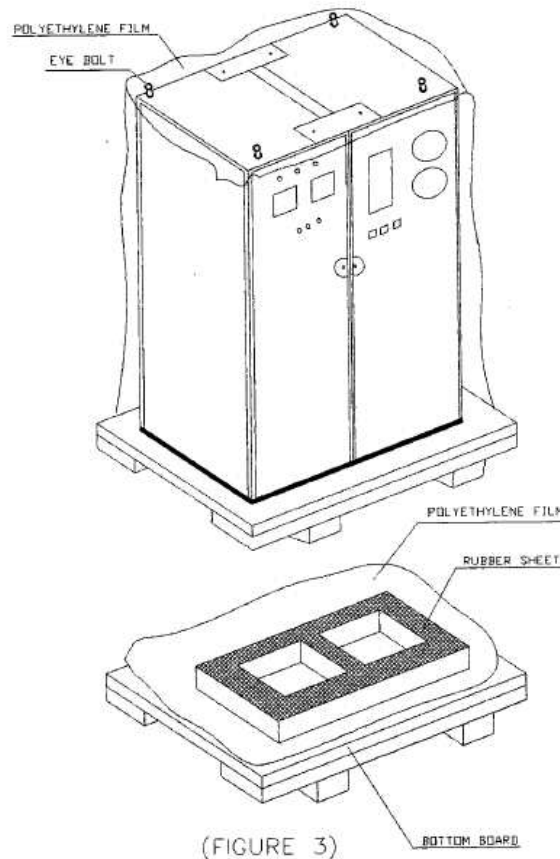
**Table 2 – WOODEN BOX DETAILS**

BOX TYPE	BOX SIZE (in MM)	BOX Wt (in KG)	Carrying Capacity
1	320X250X260	10	
2	320X250X430	15	
3	430X370X430	25	
4	670X670X470	65	
5	720X630X600	75	
6	1000X770X660	100	
7	1100X430X670	80	
8	1200X1200X900	80	
9	1300X770X1050	155	
10	2500X850X800	225	
11	2000X1500X1200	305	
12	1850X1050X1250	260	
13	2000X800X800	180	
14	2600X1500X1600	470	
15	250X250X600	20	
16	250X250X880	30	
17	300X300X700	25	
18	380X380X880	45	
19	510X510X1400	60	
20	570X570X1400	80	
21	575X575X1875	105	
22	3600X1100X1100	390	
23	900X500X800	110	
24	2000X950X740	225	
25	1600X1120X700	220	
26	2500X2000X1200	490	
27	2900X1900X1400	525	
28	3000X1000X900	370	
29	3200X2200X950	450	
30	2150X1100X750	325	
31	2000X2000X700	130	
32	700X1200X1325	130	

**Table 3 – STEEL BOXES**

SL NO	TYPE	DIMENSION IN MM			WEIGHT	CARRYING CAPACITY (KGS)
		LENGTH	BREADTH	HEIGHT		
1	I	2480	1680	1500	339	4500
2	II	1200	900	600	061	2000
3	IIB	1800	850	950	115	2500
4	III	900	600	600	029	1000
5	IV	600	450	500	019	750
6	V	400	350	300	011	500

**TYPICAL PATTERN OF WOODEN BOX****Figure 1**



**Figure 2**

## 9.2 STEEL CONTAINERS:

Steel containers for packing can be used in case of repeated supplies of the same equipment. Empty steel containers are to be returned back from customer's end and to be reused for the next supplies. The containers are to be made of structural steel as per AA10108 with proper reinforcement with I, C and T Sections. Depends on the availability of resources & requirements units may be allowed to use standard cargo containers also instead of fabricated steel boxes.

- Following precautions are to be taken during packing: -
- Put the machine in the steel container properly,
- Cover the machine with polythene.
- To arrest the movement in the steel container necessary wooden Blocks/Battons may be put.
- Put cover on steel, container and Bolt Properly

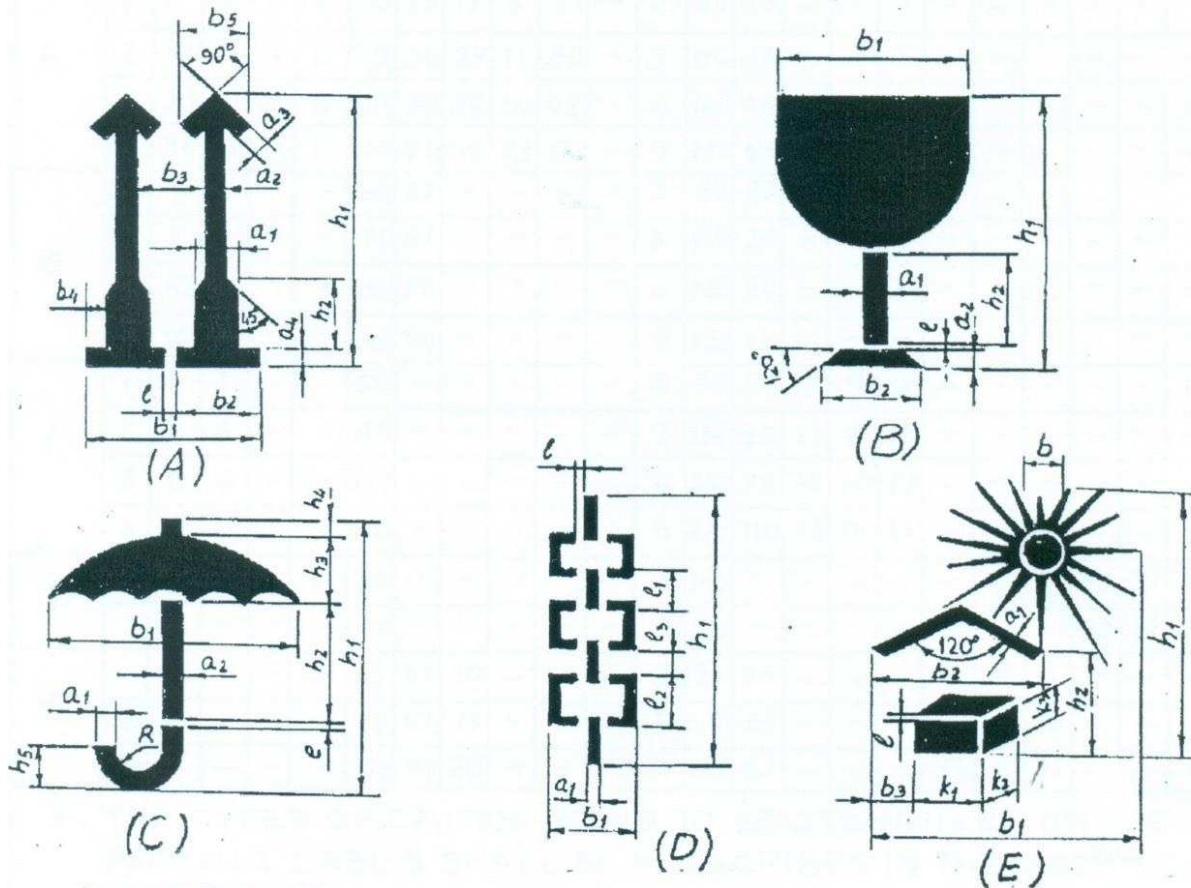
## 9.3 SEALED PACKING:

Components sub-assemblies and assemblies sensitive to climatic conditions shall be packed seal tight. All the openings of the sensitive components, sub-assemblies and assemblies shall be blanketed to prevent the ingress of dust and moisture. The components sub-assemblies and assemblies are completely covered with 2 layers of polyethylene sheet. All sharp corners and edges are to be protected by rubber mats to prevent the polyethylene sheet from damage. Top surface of the case shall be free from dents to prevent rain water pockets.

## 10 MARKINGS/STENCILINGS

## MARKINGS ON PACKING CASES

1. THIS PLANT STANDARD PRESCRIBES THE VARIOUS CAUTION SIGNS AND OTHER MARKINGS ON PACKING CASES.
2. DIMENSIONS IN THE TABLE 1 SHALL BE USED FOR MAKING STENCILS ONLY.



- A. UPRIGHT  
 B. FRAGILE  
 C. PROTECTION FROM FALLING OR CONDENSING MOISTURE.  
 D. SLINGING POSITION  
 E. PROTECTION FROM DIRECT RADIATIONS.

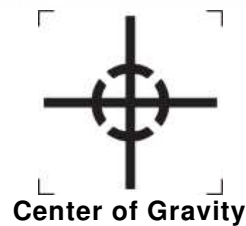


Figure 3

DESIGN- ATION		DIMENSION IN MM																						
		a1	a2	a3	a4	b1	b2	b3	b4	b5	b	l	h1	h2	h3	h4	h5	k1	k2	k3	l1	l2	l3	R
<b>A</b>	1	12	5	5	4	52	25	19	8	21		2	84	23										
	2	17	7	7	6	75	36	29	11	30		3	119	33										
	3	24	10	10	8	104	50	38	16	42		4	168	46										
	4	34	14	14	11	147	71	59	23	60		5	239	65										
<b>B</b>	1	5	5			50	33					2	84	25										
	2	7	7			71	47					3	119	36										
	3	10	10			100	66					4	168	50										
	4	14	14			142	94					5	239	71										
<b>C</b>	1	4	3			66						2	80	39	19	5	11							6
	2	6	4			85						3	114	55	27	7	16							9
	3	8	6			120						4	160	78	38	10	22							12
	4	11	9			170						5	227	110	54	14	31							17
<b>D</b>	1	6				30						4	148								30	30	10	
	2	9				42						5	209								42	42	14	
<b>E</b>	1	3				69	47	10			16	2	91	26				17	8	11				
	2	4				98	67	15			23	3	128	33				24	11	16				
	3	6				138	94	20			32	4	182	62				34	16	22				

**Table 4**

Black and Red Marking Ink to IS:1234 "Ink, Stencil, Oil Base, For Marking Porous Surfaces" or duplicating ink stencilling, oil base for marking porous surfaces.

All cases containing fragile items are to be stencilled with red marking and stencilling paint/ink

**"HANDLE WITH CARE", "FRAGILE DO NOT TURN OVER".**

Besides the caution signs the product information's shall be stencilled of letters with 13mm to 50mm height.

In case of consignment consists of more than one package, each package shall carry its package no as given in shipping list. All caution signs shall be stencilled in high quality full glossy out door finishing paint red in colour (AA56126). All other markings shall be carried out in black enamel(AA56126).

Caution signs & other markings shall be stencilled on both the end shooks & the side shooks.

Caution sign (for slinging) shall be stencilled only on side shooks at the appropriate place.

Note: Incase the size of package is small for using the stencils, then hand written letters/figures shall be allowed.


	<b>BHEL – &lt;unit&gt; - &lt;location&gt; - &lt;pin&gt;</b>				
CONSIGNEE					
MATERIAL					
CUSTOMER REF.				MO. NO.	
DESPATCH ADVICE NOTE NO				CASE NO	
DIMENSIONS(MM) L x B x H				NET WT –KGS	GROSS WT –KGS
SPECIAL INSTRUCTIONS	HANDLE WITH CARE - KEEP DRY DO NOT DROP - DO NOT TILT				

Figure 4 – TYPICAL MARKING PLATE (225 X 170)



Figure 5

Easy spares [Initial and O&M] Traceability and Identification at units and as well as at sites:

## 11 RECYCLING OF INCOMING WOODEN PACKING CASES

### OBJECTIVES

- To utilize useable wood of incoming packing cases, for manufacturing of new packing boxes.
- To recycle incoming wooden packing cases, as such, wherever possible.



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- 1) All incoming wooden packing cases received from suppliers /customers will be opened carefully, with the intention of reusing them, by Shop.
- 2) After carefully taking out the contents, the empty wooden packing cases will be shifted by Shop to the specified locations i.e. bin / nearly spaces, already earmarked in stores.
- 3) Material shifting contractor engaged by store, will collect all such wooden packing cases and scrap wood from specified points, on a regular basis.
- 4) After collecting / loading the empty packing cases/ scrap wood, contractor will take the carrier first to Weighment Bridge for weighment, thereafter; he will go to Carpentry, where Carpentry representative will identify the packing cases which can be used by Carpentry for manufacturing of New Packing Boxes. All such identified packing boxes will be unloaded and handed over to Carpentry by contractor.
- 5) These packing boxes will be made re-useable after necessary rectification and additional work.
- 6) Contractor will again take the carrier for weighment and this second reading will also be recorded on the same "Weighment Slip".
- 7) Weight of empty packing cases / scrap wood taken will be calculated on the basis of 1st and 2nd weighment readings recorded on the "Weighment Slip". A copy of "Weighment Slip" (where both the weighment readings are recorded) will be given by the contractor to the carpentry representative. Based on this "Weighment Slip", carpentry will maintain a register in which details of quantity received will be recorded.
- 8) All "Weighment Slips" will invariably be signed by carpentry representative (even when no boxes have been unloaded by carpentry). Store will accept the scrap wood only if "Weighment Slips" are signed by carpentry representative.
- 9) Balance empty packing cases / scrap wood will be handed over by contractor to Store, for storing in scrap yard.
- 10) A separate area in Scrap yard will be provided, for executing the work of denailing of wooden packing cases, under supervision of carpentry.
- 11) Carpentry contractor will identify packing cases / scrap wood for denailing, which will be handed over to him by Store, at Scrap yard, for denailing and further operation.
- 12) Quality and Carpentry will jointly inspect the wood generated by de-nailing process and will prepare "INSPECTION CUM RECEIPT REPORT OF USEABLE WOOD RECEIVED FROM TPS – STORE BY CARPENTRY".
- 13) After acceptance of the wood by Quality and Carpentry, the same will be shifted to carpentry for receipt and its record will be maintained by carpentry.
- 14) This will be a Permanent Productivity Project executed by carpentry. "Productivity Savings" duly verified at the current Purchase Order rate of wood, will be sent every month to Resource Management Department, for highlighting it in their monthly progress report.

## 12 STANDARD METHOD OF PACKING


Table 5 - Standard Method of Packing

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
PRESSURE VESSELS								
TOWERS					O			
TANKS					O			
VESSELS					O			
GASKETS	O							
FASTENERS	O							
COVERS		O						
EXCHANGERS								



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	<div> <div>CORPORATE STANDARD</div> <div>AA0490010</div> <div>Rev. No. 02</div> <div>PAGE 15 of 24</div> </div>							
DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
SHELL SEGMENTS IN STACKS					O			
SPHERE PETALS								
COLOUMNS, BASE PLATES, TIERCOS, PIPES, NOZZLE E1, F1, INTERNAL PIPES, PADS ETC.					O			
ROLLERS	O							
VALVE TRAYS								
VALVE TRAY COMPONENTS	O							
LATTICE GIRDERS		O						
FASTENERS	O							
GASKETS	O							
SUB CONTRACTS								
FAB STRUCTURALS					O			
SUPPORTING STRUCTURALS					O			
STRUCTURE SUB ASSEMBLY					O			
FAB PIPES					O			
GRATINGS					O			
STAIR CASES					O			
HANDRAILS/ PLATFORMS					O			
BOUGHT OUT COMPONENTS								
IRON & STEEL (LIKE PLATES, BEAMS, ANGLES, CHANNELS ETC.)					O			
PIPE FITTINGS								
CS PIPES, TUBES					O			
SS PIPES, TUBES					O			
FIN TUBES	O							
ELBOWS		O			O			
FLANGES	O	O						
VALVES	O							
GAUGES	O							
DEMISTERS		O						
ABSCRBANTS (LIKE MOLECULAR SIEVES, ACTIVATED ALUMINA, MOBILE SORBID)						O		
PAINT TINS		O						
PAINT DRUMS						O		
IGNITORS	O							
SPRAY NOZZLES	O							
ELECTRICAL INSTRUMENTATION								
MOTORS, PUMPS, COMPRESSORS, TURBINES	O							
SWITCH BOARDS, DISTRIBUTION BOARDS, STARTERS, JUNCTION BOXES		O						
INDICATORS, VIBRATOR SWITCHES	O							

**CORPORATE STANDARD**

DESCRIPTION	CASE	CRATE	SKID	BUNDLE	BARE	DRUM	METAL DRUM	FIBRE DRUM
CABLE BUNDLES, CABLE DRUMS					○			
CABLE TRAYS, CABLE RACKS, EARTHING MATERIAL		○						
OPERATIONAL SPARES	○							

**13 PROCEDURE FOR HANDLING OF COMPONENTS**

The purpose of this procedure is to protect the quality of the components/equipment while handling in various stages of manufacturing packing & despatching.

- 13.1** Adequate care shall be taken in handling the material, and components to avoid damage during receipts, storage issue manufacture & despatch operations.
- 13.2** Appropriate material handling equipment like fork lifters, cranes etc. shall be used where needed.
- 13.3** Lifting by crane and transportation by trolley of critical items and large components like rotors castings etc. shall be done carefully.
- 13.4** For critical items, where specified, special handling fixtures shall be used for lifting.
- 13.5** Slings and shackles used for lifting the components/equipment shall be checked for fitness and suitability before use.
- 13.6** Slings used on machined surfaces shall be suitably padded. No slings shall be used on journal surfaces.
- 13.7** Precision machined components like blades, catches, rollers etc. shall be lifted using suitable wooden pallets.

**13.8 HANDLING OF COMPONENTS ON RECEIPT/DESPATCH**

Before loading/unloading a packing case from the carrier look for the following shipping instructions painted on the packing case.

- a) The markings showing the upright position.
  - b) The markings showing the sling position
  - c) Markings showing the fragile contents.
  - d) Other required markings as per clause no.10
- 13.8.1** Appropriate cranes and slings should be used for different components/ cases. Slings should normally make an angle as minimum as possible (width wise) but in no case more than 15°.
  - 13.8.2** Handling and lifting should be done without jerks or impacts.
  - 13.8.3** Immediately after receipt of the goods, the packing should be examined all-round for any sign of damage. If necessary, lift the cover or a number of boards of the case so as to make the contents visible. In the event of sealed packing being used the plastic sheeting should not be damaged. It is imperative that the packing material is restored in original condition after the inspection.
  - 13.8.4** On receipt of the equipment it should be checked with the shipping list and missing or damage if any should be reported immediately. It is important to arrange for immediate examination to determine the extent of the damage, the cause of the damage and where applicable the person or persons responsible for the damage. According to general practice when transporting by railway or by road vehicle the carrier concerned should be immediately called upon (within specified periods) for jointly establishing a statement of the damage. This is essential as a basis for a subsequent claim and possible damage report to the insurance company.
  - 13.8.5** Protective coating applied on machined surfaces should not be disturbed. The plastic covering should be put back carefully so that it prevents ingress of dust and moisture. Some packing may have vapour phase inhibitor (VPI) paper enclosed inside the packing cases. This should be restored to its original place as far as possible.



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**13.8.6** Silica gel and such other chemicals kept in the box as desiccants and indicators should also be left in the box itself.

### 14 GENERAL GUIDELINES FOR ODC TRANSPORTATION/DESPATCH

Based on the Dimensions/Weight indicated in the Transportation Sketch, the type of Trailer is decided and indicated in the Tender Enquiry.

#### 14.1 TRANSPORTATION:

1. LOW BED TRAILERS (LB 8):

Well Bed Length	: 10000mm
Over Gooseneck	: 13000mm
Width	: 3000mm
Carrying Capacity	: 40MT

2. LOW BED TRAILERS (LB 16):

Well Bed Length	: 12000mm
Over Gooseneck	: 16000mm
Width	: 3000mm
Carrying Capacity	: 75MT

3. TOW TYPE TRAILERS (WITH FRONT DOLLEY 16 TYRES): 12000MM length  
(for Exceptional equipment length: 30000mm and above)

Bigger Dia equipment are loaded in the Well with overhanging.

Smaller Dia equipment with excess length are loaded over Gooseneck with rear hanging.  
The Vehicle Dimensions are defined above are only guidelines for selection based on actual Dimensions/ Weight of the Consignment

#### 14.2 PACKING:

For all ODCs, Wooden Saddles are cut to the diameter of equipment as per the Transportation Sketch.

Wooden Saddles	For Diameter up to 4000mm	For Diameter above 4000mm
Length:	1836/2743mm (6'0"/9'0")	3353mm (11'0")
Width:	300mm (1'0")	300mm (1'0")
Height:	Saddle + one/two wedges a top	Saddle + three/four wedges a top

Number of Saddles:	
Minimum	3 in case of Loading inside Well +1 when loaded on Gooseneck
Maximum:	4 in case of Loading inside Well +2 when loaded on Gooseneck

For Securing the equipment firmly on the Trailer, 19mm (3/4"), wire rope with 25mm (1") Heavy Duty Turn Buckles / BD Clamps are used as Lashing for the equipment.

#### 14.3 NUMBER OF LASHINGS:

	CONSIGNMENT LOADED INSIDE WELL BED	CONSIGNMENT LOADED OVER GOOSENECK
a) up to 40MT	4 (2 Single Line lashing 2 Double Line Lashing)	5 (3 Single Line Lashing 2 Double Line Lashing)
b) 40MT to 60MT	5 (3 Single Line Lashing 2 Double Line Lashing)	5 (Single Line Lashing 3 Double Line Lashing)
c) 60MT and above	5 (2 Single Line Lashing 3 Double Line Lashing)	6 (3 Single Line Lashing 3 Double Line Lashing)

## 15 GUIDELINES FOR HANDLING/LOADING/LASHING

### 15.1 HANDLING



**Figure 6**

Before unloading the jobs Completely painted and neatly stencilled will be checked.

Pipes with split type end cover will be checked

**Figure 7**

All Coil Tubes to be provided with End Caps.

**Figure 8**

Neatly stacked Coil Assemblies.

**Figure 9**

Columns to be lifted with Nylon belts. This protect painting, edges and attachments.

**Figure 10**

## **15.2 LOADING**

All the components to be transported by putting inside the properly fabricated Crating

**Figure 11**

Small components may fall down while transporting without closed crating and there are chances of missing of small parts. Hence, it is always better to transport small components in closed containers/crating. Loose to be being shipped in a closed crating.

**Figure 12**

No component loaded over the crating.



**Figure 13**

Headers supported with wooden V blocks at 3 meters interval.



**Figure 14**

Spacers in between each coil assembly.

**Figure 15**

Goose pipe to be provided with rubber pad protects removal of painting and damage to the job.

**Figure 16**

### 15.3 LASHING

Use Nylon belts only for lashing of all components. It prevents removal off painting and cut in the materials.



Figure 17

Nylon Belts used for lashing the beams.



Figure 18

## 16 PRODUCT WISE SPECIAL INSTRUCTION

Additional instructions of packing not included in this standard shall be covered by individual product standard.

## 17 REFERRED STANDARDS (Latest publications including amendments):

- |            |            |            |            |            |
|------------|------------|------------|------------|------------|
| 1) AA51420 | 2) AA55619 | 3) AA51414 | 4) IS:3401 | 5) AA10108 |
| 6) AA56126 | 7) AA51402 | 8) AA51401 | 9) IS:1234 |            |



## CORPORATE STANDARD

AA0490006

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### VACUUM PACKING FOR ELECTRONIC COMPONENTS

#### 1 GENERAL

This standard lays down the packing instructions for packing of components / Electronic module / Assemblies to be dispatched against Customer contracts.

#### 2 SCOPE

This procedure covers method of packing electronic components using vacuum packing in a wooden packing boxes.

#### 3 OBJECTIVE

To establish a rust proof safe packing procedure and where the components required to protect against temperature and humidity. In general minimum temperature +5 deg C and maximum temperature 45 deg C, and relative humidity between 10% to 40%.

#### 4 PACKING BOX

Wooden Box shall be made as per BHEL Standard AA0490010 for Domestic/ AA0490009 for Export/ AA0490004 for Seaworthy packing. Size of the box as per the contract requirement which has to be checked by QC.

#### 5 PACKING PROCEDURE

- Cleaning parts shall be thoroughly cleaned just before VCI (Volatile Corrosion Inhibitor) Vacuum packing. Finger prints on cleaned items are to be avoided as the same are very corrosive.
- VCI Rust preventive oil (Ferrous grade oil base) shall be applied to all the components to withstand any corrosion.

#### 6 VCI VACUUM PACKING

- Bubble wrapping the items VCI vacuum packing.
- Appropriate vapour corrosive packets one pouch (1 gm. /pouch) of VCI Anticorrosive Powder and one pouch (10gm./ pouch) of VCI Desiccant per 1000 cub. meter packing space shall be placed inside the VCI vacuum packing.
- All the components shall be separately packed using VCI laminated Aluminium foils from which air/moisture are removed by the air vacuum device and sealed thoroughly using heat sealing machine. At the time of the evacuation the vacuum inside the pack should be less than 0.5 ata.
- One identification slip containing component information such as description of item, Material No. Customer PO, Item No. Quantity etc. shall be put inside the VCI vacuum packing.
- Top cover of the wooden box shall be sealed only after final clearance from QC for confirmation of above.
- All boxes should be covered by water proof tarpaulin over top and on all sides.
- The packing boxes shall be covered with GI sheets (0.25 -0.4mm thick) on all the sides for Export / Seaworthy packing.
- Vacuum packing room temperature and Relative Humidity should be maintained as mentioned below:

Min. +5 deg. C and Max. 45 deg. C, Relative humidity between 10% to 40%.

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## 7 COMPONENTS REQUIRED

### 7.1 VCI laminated Aluminium foil

Volatile Corrosion Inhibitor (VCI) safe foil shall be with aluminium barrier laminated which is flexible, heat sealable, water vapour and anticorrosion resistant barrier laminate of polyester, Aluminium foil and VCI Polyethylene. It is used as a primary packaging material for packing metal components and sealed with the help of a heat sealer after vacuuming with vacuum machine maintaining the humidity level below 40 RH inside the package.

### 7.2 Composition construction of VCI laminated Aluminium foil

- a) PET Film : 12 Microns
- b) Bonding layer : 2 Microns
- c) Aluminium Foil : 9 Microns
- d) Bonding layer : 2 Microns
- e) VCI Poly film : 100 Microns
- f) Total thickness : 125 Microns + or – 5%

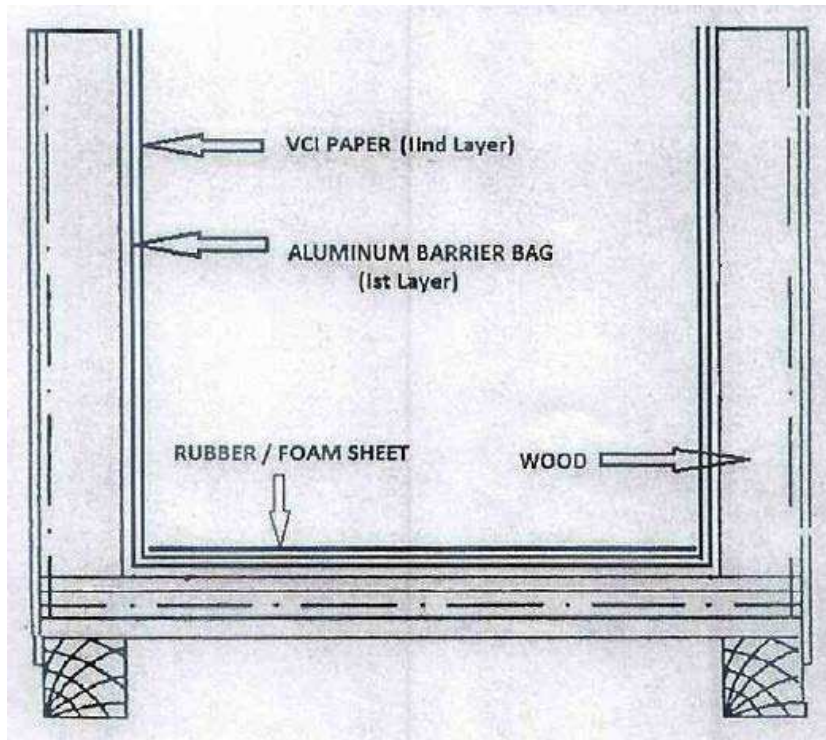
### 7.3 Properties of VC Laminated Aluminium foil

- a) Basic Weight : 138 gsm +/- 8%
- b) Sealing condition : 180 C/ 2 sec
- c) Tensile strength  
MD: 20 kgf  
CD: 18 kgf
- d) Tear Strength  
MD 4.8 kg  
CD:3.4 kg
- e) Heat Seal Strength : 30.380 N/cm
- f) WVTR Value : 0.05gms/m /24 hrs.
- g) OTR Value : 0.1 cc/m/24 hrs

## 8 MARKING OF PACKING BOX

Mark the following information on the two adjacent sides of the each package

- a) Material No.
- b) Customer PO
- c) Item No.
- d) Quantity
- e) Storage Requirement : Indoor
- f) Content Description : Electronic Module
- g) Net weight (in kg)
- h) Dimension (L x W x H in centimetres)
- i) Project Name
- j) Consignee
- k) Water proofing (Umbrella Stencilling)
- l) Upside direction



**Figure 1**



## CORPORATE STANDARD

AA0490008

Rev. No. 01

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### VACUUM PACKING FOR ELECTRICAL COMPONENT

#### 1 GENERAL

This standard lays down the packing instructions for packing of components / Electrical components Stator/ Rim punching, Wound Pole/ Field Coils and Stator coils / bars to be dispatched against Customer contracts.

#### 2 SCOPE

This procedure covers method of packing component in a wooden packing boxes.

#### 3 OBJECTIVE

To establish a rust proof safe packing procedure and where the components required to protect against temperature and humidity. In general minimum temperature +5 deg C and maximum temperature 45 deg C, and relative humidity between 10% to 40%.

#### 4 PACKING BOX

Wooden Box shall be made as per BHEL Standard AA0490010 for Domestic/AA0490009 for Export/AA0490004 for Seaworthy packing. Size of the box as per the contract requirement, which has to be checked by QC.

#### 5 PACKING PROCEDURE

- All items packed are to be marked by QC with "OK" stickers. Varnished stator punchings are to be brought down to room temperature before labelling them "OK" for packing. Do not pack hot/warm stator punchings that have is just received from the varnishing.
- Packing of stator punchings, wound pole/ field coils and stator coils / bars should be done in a covered shed.
- Packed materials are to be stacked in proper alignment and to be kept in wooden packing.

#### 6 Additional Packing Methodology for Stator / Rim Punchings (Double stacking) only

In order to eliminate the use of studs avoid double stack packaging per box. Where double stacked packing boxes are unavoidable, the stator /rim punchings are to be securely tightened using GI studs, nuts and soft material washers (rubber/plastic). GI studs, nuts and soft material only to be used in case of double stacking of rim / stator punchings (with holes). Use soft rubber washers to seal the punctured opening at the bottom from where the studs pass in each layer of VCI (Volatile Corrosion Inhibitor) paper, polythene and tarpaulin sheet in case of rim /stator punchings (with holes).

- GI studs with rubber washer to be placed initially inside the wooden packing box.
- Over the wooden base, place water proof tarpaulin sheet.
- Rubber washer shall be placed after the layer of tarpaulin sheet.
- Then place a layer of porous plastic sheet with total thickness of at least 5mm (for cushioning and reduces the chances of damage to punchings).
- Place the Aluminium Barrier laminated Bags over this porous sheet, place the rubber washer over it.
- Place VCI papers on the Aluminium barrier bag and fix with rubber washer.

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- g) PVC Pipes shall be inserted over the GI studs. These pipes are to be used to cover each stud, to protect its direct contact and hence rubbing with punchings.
- h) Now place the stack of punchings over the VCI paper and securely tighten the punchings using nuts and soft material, washers.
- i) Each layer should be secured in position. Wrap the punchings with VCI paper and properly sealed separately using an adhesive tape.
- j) Silica Gel packets are to be placed over the VCI paper and uniformly distributed inside the boxes on the VCI paper to remove/prevent moisture.
- k) Aluminium barrier laminated bag has secured in position and properly sealed by using heat sealing machine and air to be drained out by using vacuum pump. At the time of the evacuation the vacuum inside the pack should be less than 0.5ata.

Use two separate VCI papers for doubled stacked boxes independently covering each stack. Similarly two Aluminium barrier laminated bag are to be used to wrap the two stacks independently, as explained above.

## **7 Additional Packing Methodology for Wound Pole/ Field Coils and Stator Coils/Bars only**

- a) Over the wooden base, place the waterproof tarpaulin sheet.
- b) Then place a layer of porous plastic sheet with total thickness of at least 5mm (for cushioning and reduces the chances of damage to Wound pole/field coils and stator coils/ bars.
- c) Place the Aluminium barrier laminated bag over this porous sheet.
- d) Place the VCI paper (Volatile Corrosion Inhibitor as per BHEL Standard AA51406) on the Aluminium barrier laminated bag along with rubber washer.
- e) Bare copper portion of field coils and stator coils / bars to be covered by VCI paper pouch and fasten with VCI tape.
- f) Now place the wound pole, stack of field coil and stator coil / bars over the VCI paper.
- g) Each layer should be secured in position. Wrap wound pole / field coils and stator coils / bars with VCI paper and properly sealed separately using an adhesive tape.
- h) Silica Gel packets are to be placed and uniformly distributed inside the boxes on the VCI paper to remove/prevent moisture.
- i) Then Aluminium barrier laminated bag has secured in position and properly sealed by using heat sealing machine and air to be drained out by using vacuum pump. At the time of evacuation the vacuum inside the pack should be less than 0.5ata.
- j) The VCI paper must contact the stator / rim punchings, wound pole / field coils and stator coils/bars. It has to ensure that the VCI paper, Aluminium barrier bag should not get damage / puncture during the packing process.
- k) Top cover of the wooden box shall be sealed only after final clearance from QC for confirmation of above.
- l) All boxes should be covered by water proof tarpaulin over top and on all sides.
- m) The packing boxes shall be covered with GI sheets (0.25 -0.4mm thick) on all the sides for Export / Seaworthy packing.
- n) Vacuum packing room temperature and Relative Humidity should be maintained as mentioned below:  
Min. +5 deg. C and Max. 45 deg. C, Relative humidity between 10% to 40%.



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### 8 COMPONENT REQUIRED

#### 8.1 VCI laminated Aluminium foil

Volatile Corrosion Inhibitor (VCI) safe foil shall be with aluminium barrier laminated which is flexible, heat sealable, water vapour and anticorrosion resistant barrier laminate of polyester, Aluminium foil & VCI Polyethylene. It is used as a primary packaging material for packing metal components and sealed with the help of a heat sealer after vacuuming with vacuum machine maintaining the humidity level below 40 RH inside the package.

#### 8.2 Composition construction of VCI laminated Aluminium foil

- a) PET Film : 12 Microns
- b) Bonding layer : 2 Microns
- c) Aluminium Foil : 9 Microns
- d) Bonding layer : 2 Microns
- e) VCI Poly film : 100 Microns
- f) Total thickness : 125 Microns + or – 5%

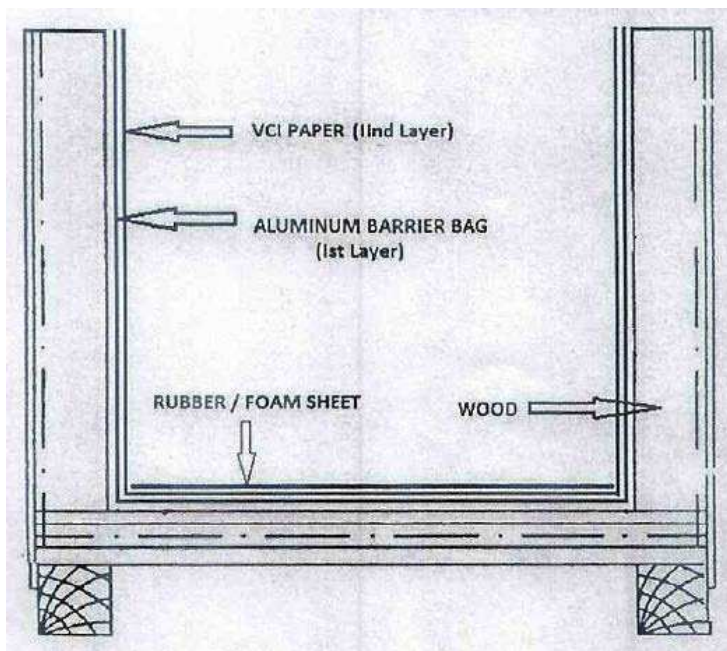
#### 8.3 Properties of Aluminium Barrier laminated Bag

- a) Basic Weight : Unit: g/sq. m 150 +/- 5
- b) Tensile strength : Unit: N/sq. mm MD: 40 (min.)  
Unit: N/sq. mm TD: 41 (min.)
- c) Water Vapour Transmission : Unit: g/m<sup>2</sup> 0.01 in 24 hrs. at 38 deg C & 90% RH(max)
- d) Oxygen Transmission : Unit: cm<sup>3</sup>/m<sup>2</sup> 0.02 in 24 hrs. at 38 deg C & 90% RH (max)
- e) Sealing Temp. : Unit : Degree C 180-220 deg C

### 9 MARKING ON PACKING BOX

Mark the following information on the two adjacent sides of the each package.

- a) Box No.
- b) Customer PO
- c) Product Name.
- d) Project Name
- e) Quantity
- f) Storage Requirement : Indoor
- g) Net weight (in kg)
- h) Dimension (L x W x H in centimetres)
- i) Consignee
- j) Water proofing (Umbrella Stencilling)
- k) Upside direction
- l) Sling position indicator

**CORPORATE STANDARD****Figure 1****Figure 2****Figure 3****Figure 4****Figure 5**