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SPECIFICATION No. CQA(A) 2805 (h)

(Corrected upto \_\_\_\_\_)

PAPER CONTAINER COMPOSITE FOR  
AMMUNITION STORES

ISSUED BY  
THE CONTROLLERATE OF QUALITY ASSURANCE (AMMUNITION)  
KIRKEE, PUNE - 411 003

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# Record of Amendments

Amendment				
DC (I) No. and Date	Numerical to which Specn. is advanced	Date of incorporation	Incorporated by (Name and Rank)	Initials
	<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p>26</p> <p>27</p> <p>28</p> <p>29</p> <p>30</p> <p>31</p> <p>32</p> <p>33</p> <p>34</p> <p>35</p> <p>36</p> <p>37</p> <p>38</p> <p>39</p> <p>40</p> <p>41</p> <p>42</p> <p>43</p> <p>44</p> <p>45</p> <p>46</p> <p>47</p> <p>48</p> <p>49</p> <p>50</p> <p>51</p> <p>52</p> <p>53</p> <p>54</p> <p>55</p> <p>56</p> <p>57</p> <p>58</p> <p>59</p> <p>60</p> <p>61</p> <p>62</p> <p>63</p> <p>64</p> <p>65</p> <p>66</p> <p>67</p> <p>68</p> <p>69</p> <p>70</p> <p>71</p> <p>72</p> <p>73</p> <p>74</p> <p>75</p> <p>76</p> <p>77</p> <p>78</p> <p>79</p> <p>80</p> <p>81</p> <p>82</p> <p>83</p> <p>84</p> <p>85</p> <p>86</p> <p>87</p> <p>88</p> <p>89</p> <p>90</p> <p>91</p> <p>92</p> <p>93</p> <p>94</p> <p>95</p> <p>96</p> <p>97</p> <p>98</p> <p>99</p> <p>100</p>			

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DC (I) No. 36145-A

CQA(A)  
SPECIFICATION No. 2805(h)  
[Supersedes Specn IA 1240 (J)]

GOVERNMENT OF INDIA  
MINISTRY OF DEFENCE  
CONTROLLERATE OF INSPECTION (AMMUNITION)

PAPER CONTAINER COMPOSITE FOR AMMUNITION STORES

Specification to govern manufacture, repair, inspection and supply.

Approved on 14-7-80

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*Any question relating to the drawing, pattern or this specification should be referred to CQA(A), KIRKEE, PUNE or the : duly authorised to act on behalf of him.*  
QUALITY ASSURANCE OFFICER

Obtainable from :—

The Controller,  
Controllerate of (Ammunition)  
Government of India  
Ministry of Defence  
KIRKEE : PUNE - 411 003.  
Quality assurance

# 1. SCOPE

This specification governs the manufacture, repair and inspection of Paper Container Composite for Ammunition Stores.

## 2. RELATED DOCUMENTS

2.1 This specification is to be read in conjunction with the drawings quoted in the contract/order.

2.2 Wherever a reference is made to any document in this specification, it should be taken as a reference to the latest edition of the document unless otherwise stated.

2.3 Copies of related documents are obtainable from :—

- |                                  |    |   |
|----------------------------------|----|---|
| (a) Indian Standard Specn        | }  | Indian Standards Institution,<br>Manak Bhavan, 9, Bahadur Shah Zafar Marg,<br>NEW DELHI - 110 001.          |
| (b) British Standard Specn       |    |   |
| (c) IND/ME Specification         | }  | The Controller,<br>Controllerate of L. (ME), Quality Assurance<br>KIRKEE, PUNE - 411 003.                   |
| (d) Joint Services Specification |    |   |
| (e) DEF Specification            | .. | The Manager, H.M.S.O. Sales Section,<br>British Information Services,<br>Chanakyapuri, NEW DELHI - 110 002. |
| (f) IA Specification             | .. | The Controller,<br>Controllerate of L. (Amn), Quality Assurance<br>KIRKEE, PUNE - 411 003.                  |

## 3. STANDARD PATTERN

3.1 Any sample lent to the Manufacturer shall be used only as a guide to workmanship and not as a guide to details. However, a standard pattern, if obtainable from the purchasing or inspection authority, shall constitute the standard as regards any particulars or properties noted/defined in this specification.

## 4. STORES

4.1 Stores covered by this Specification are Laminated Paper Container and components thereof viz. End Caps, Plywood/Millboard discs securing rings etc.

## 5. MATERIALS

5.1 Following materials should conform to the specifications mentioned against them :—

Sl. No.	Material	Specn
1.	Paper Laminated	IND/ME/786 (c)
2.	Ammunition Protective Composition No. 2 (CEMENT RD 1192 K, AMMUNITION)	JSS - 8030-14-1991
3.	Synthetic Adhesive	IND/ME/788 (b) (d) Latest
4.	Rubber	IND/ME/584 (f)

5.	Ammunition Protective Composition No. 225 (Varnish Shellac 30%)	JSS - 8010-63-1991
6.	Polyethylene (polyethelene)	JSS 9330-03-1995
7.	Sodium Pentachlorophenate	IS 6515
8.	Paranitrophenol	JSS 1-59-32
9.	Tin Plate	IS 597/IS 1993
10.	Mild Steel	IS 1079/IS 513
11.	Painted Oxide Zinc Chrome	JSS 8010-68
12.	Plywood (CWR) - IS 303-1989, 3rd Revision	Amendment No. 1
13.	Ammunition Protective Composition No. 6	JSS 8040-12
14.	Mill board	JSS 9310-01-1994

5.2 Commercial quality of mild steel if used, should be homogenous, free from cracks, laminations, pittings, irregular thickness or any other defect likely to impair the strength of the material. The material should be capable of withstanding, without cracking or breaking, operations such as pressing, curling and spinning as called for in the drawing. End caps/securing rings made from this material should not crack or deform. No difficulties should be experienced in spinning the components made from this material on to the composite paper tubes. The specifications quoted for Mild Steel in para 5.1 are preferential ones.

## 6. MANUFACTURE

6.1 The dimensions and form of the container and its components are to be in conformity with relevant drawings.

glazed or

6.2 The composite containers shall be made by using unglazed Grade I, II and III paper laminated judiciously. The outermost layer for tube lid and tube outer shall be of grade I paper.

6.3 Only the methods shown on the drawings will be employed for forming and securing the end caps/rings securing, in the construction/assembly of containers.

### Construction of Paper Tubes

6.4 The paper tubes required for manufacturing the composite containers must be spirally wound.

6.5 Specified thickness of the paper components should be built up by winding adequate number of plies using approved adhesive between the plies. Pressure on the tubes by hand should not result in separation of plies.

6.6 Any gap between the butt joint of all the inner layers should not exceed 1.5 mm. In the case of outer most layer of tube outer and tube lid it should be ensured that there is an overlap of 3 to 5 mm.

6.7 Collars having wall thickness which cannot be built up in a continuous run of winding, may be built up by spiral winding in two or more parts and assembled together with adhesive to form a composite unit of requisite dimensions. Alternatively such collars may be manufactured by using convolute winding process or by stamping from suitable thickness of mill board. Thickness of mill board may be achieved by gluing two or more thicknesses with synthetic adhesive.

6.8 Tubes outer, tubes inner and collars, should have their ends trimmed at right angles to their axis to ensure proper assembly of end caps and assembly of lid and body.

6.9 Sodium Pentachlorophenate or Paranitrophenol 0.5% by weight should be added to synthetic adhesive used.

## End Caps

6-10 The flange of the end cap should penetrate tube lid or tube outer firmly and uniformly. The penetration of the flange should be deep enough to withstand specified minimum pull off load. Tube lid/tube outer should not in any way be filed/deformed to facilitate assembly of end cap. The end of tube should rest on the inner surface of channel of end cap. The end cap will be assembled over tubes as shown on the drawing.

## Securing Rings

6-11 Securing ring, where fitted, shall be spun into place so that no sharp corners or burrs project out. The securing ring shall be flush with the outside surface of the tube and may project above the inside surface of the tube by the thickness of the metal.

## 7. ASSEMBLY OF CONTAINERS

7-1 Manufacture and assembly of containers should be done preferably under controlled humidity conditions so that RH is maintained at 65%. If RH goes beyond 80% the production may be stopped.

7-2 Moisture content of the finished containers should not exceed 7.5 percent. For this purpose it is essential that paper components/intercomponent assemblies are dried separately to ensure that the moisture content is reduced to less than 7.5 percent, preferably less than 6.5%. The ends of all the paper components should be sealed with APC No. 2.

7-3 The tubes inner/outer and the tube lid/tube ring must be fixed together by synthetic adhesive.

7-4 Minimum moisture content of the container/components should not be less than 4.5% preferably.

7-5 The interior surface of the channel of the end cap must be thoroughly coated with ammunition protective composition No. 2 and the end caps seamed on to the paper tube before the composition dries. After seaming a dab of the APC No.2 must be applied on the spiral joints where it enters the end caps.

7-6 The entire external edge of the metal end cap should be coated with APC No. 2 after seaming operation.

7-7 The ends of the paper tubes in containers are required to be sealed with APC No. 2 in accordance with para 8.3 below.

7-8 The components like polythene guide rings will be assembled as shown on relevant drawings.

## 8. PROTECTIVE TREATMENT

8-1 End caps/sealing rings should be phosphated (class of phosphating as class II of specn IA 1279) or coated with two coats of Red Oxide or Zinc plated as per specification IS:2633 or IS:6745.

8-2 Plywood components used must have moisture content less than 7.5% (when determined as per IS:3031) and should be treated with 5% copper naphthenate dispersion in white spirit or kerosene oil superior for a period of five minutes and after drying varnished with APC No. 225.

8-3 Before varnishing and sealing, it should be ensured that containers are dried at 60°C so that the moisture content does not exceed 7.5%. Then varnishing and sealing of containers should be completed within 72 hours at an RH not greater than 65%.

8-4 The composite containers thus constructed will be finished with two coats of approved APC No. 225 (varnish shellac 30%) externally and internally. It should be ensured that 2nd coat is applied only after the first coat has dried.

8-5 After varnishing and sealing, containers should in no case be reheated beyond 70°C.

## **9. SAMPLES AND INSPECTION**

### **9.1 Arrangement for Inspection**

9.1.1 The Manufacturer shall notify the Inspecting Officer as to when he is in a position to start work and shall inform him of all sub contracts in connection with the order as they are placed.

9.1.2 The Inspecting Officer shall have access at all times, to all departments of manufacturing plant which are concerned with the production and storage of material/components under the order, at the works of the manufacturer/sub-manufacturers and shall arrange for inspection to be carried out by his representative as considered necessary by him.

### **9.2 Inspection of Materials**

9.2.1 Before proceeding to manufacture, all material shall be submitted to the Inspecting Officer in conveniently sized batches. Each batch shall contain a quantity of material prepared under uniform conditions in respect of composition/manufacturing process.

9.2.2 The Manufacturer shall not take into use any material, or component until it has been accepted for that purpose by the Inspecting Officer, who may require the bulk of the material or the components to be sealed or bonded until results of tests or analysis of samples are available.

### **9.3 Samples for Testing**

9.3.1 The Manufacturer shall supply and prepare, free of charge, the materials or components required by the Inspecting Officer for testing purposes and shall provide the facilities and apparatus which may be required for carrying out the tests called for by the drawing or by this and or other standard specifications.

9.3.2 Test pieces or samples will invariably be selected by the Inspecting Officer or his representative and will remain the property of the Government.

### **9.4 Submission and Inspection**

9.4.1 The Manufacturer is expected to submit for inspection only satisfactory material and components and he shall be required to assume full responsibility for any material or component submitted which is later found to be unsatisfactory.

9.4.2 The Manufacturer shall submit for acceptance the material, components or assemblies called for in the order in suitably sized batches. The amount of material or number of units that comprise a batch may be decided by the Inspecting Officer after consultation with the Manufacturer.

9.4.3 If the Inspecting Officer's examination of a proportion of batch of material, components, or assemblies submitted to him reveals departure from the drawings and/or specification the whole batch may be rejected.

### **9.5 Resubmission of Rejected Batches**

9.5.1 Rejected batches may be re-submitted with the approval of the Inspecting Officer. Where re-submission is permitted and the Manufacturer elects to re-submit, the Manufacturer shall first inspect the rejected batch, either for the particular types or classes of defects that caused the batch to be rejected, or for all types and classes of defects, as directed by the Inspecting Officer, and shall repair or replace all defectives of those types or classes. The Inspecting Officer shall inspect a re-submitted batch for these types or classes of defects, using normal or tightened inspection criteria at his discretion.

### **9.6 Replacement by Manufacturer**

9.6.1 Formal acceptance of material or components, by the Inspecting Officer, shall not relieve the Manufacturer of his responsibility for any item, which may subsequently found to be defective. If material or components from batches accepted after sampling inspection prove to be subsequently defective during examination or assembly, the Manufacturer shall replace the defective material or components free of cost.



9-6-2 If the materials or finished or partly finished stores are expended or damaged in examination or test as stipulated in this specification or elsewhere as a condition of acceptance, the Manufacturer will replace or repair, free of charge the number so expended or damaged, which become the property of the Government.

## 9-7 Method of Inspection

9-7-1 The acceptance inspection for all non-destructive tests shall be in accordance with Specification DEF 131 A. Extracts from the relevant tables from this specification used by the Inspection Authority may be supplied to the Manufacturer on request. A list showing classification of defects and AQLs to be adopted is attached as Appendix 'B'. 'A'

9-7-2 The Inspection Authority reserves the right to inspect any unit of product within the batch in addition to operating sampling plan or plans associated with the specified AQL or AQLs.

9-7-3 The Inspection Authority, may draw samples from each batch, or at his option, from the production intermittently.

9-7-4 The Manufacturer shall provide and maintain an effective quality assurance system acceptable to the Inspecting Officer covering the supplies against the order. The written description of the system will be considered acceptable when as a minimum it provides the quality assurance required by this specification and related documents. Results of all examinations and tests performed under this quality assurance system shall be made available to the Inspecting Officer. The Manufacturer shall notify the Inspecting Officer and obtain approval for any change to the written procedure that affects the degree of assurance required by this specification or other documents referred to therein.

9-7-5 The designation of an AQL shall not imply that the supplier has the right to knowingly supply any defective unit of product.

9-7-6 In case of disputes about the inspection characteristics of an item the verdict of the Inspecting Authority shall be final and binding upon the Manufacturer.

## 10 TESTS

### 10-1 Non Destructive Tests

10-1-1 Samples selected for non-destructive tests in accordance with agreed sampling plan between Manufacturer and Inspector based on stipulated AQLs given in Appendix 'A' must be representative of the bulk supply.

10-1-2 Any container taken from the bulk supply after conditioning at  $65\% \pm 2$  RH and  $27 \pm 2^\circ\text{C}$  until equilibrium is reached must comply with dimensions and tolerances shown on drawings.

### 10-1-3 Test Procedure

#### 10-1-3-1 Lid Fitment Test

When the container is held in inverted position the lid must not fall off under its own weight but should be capable of removal without using undue force.

#### 10-1-3-2 Assembly Test

Containers will be subjected to assembly trial as follow :—

- The containers will be packed as per service condition with dummy rounds/full form gauges of appropriate Ammunition/Rounds.
- The same containers will be packed in the outer boxes as per service condition in which these are normally packed using authorised packing pieces.

### 10-1-3-3 Tackiness Test

Containers will be heated to 60°C for four hours to check tackiness.

### 10-2 Destructive Tests

#### 10-2-1 Jolting & Dropping

*1- LOT SIZE UP TO 3200 NOS  
and four containers for  
LOT SIZE 3201 to 5000 NOS*

Two (or minimum Nos. required for one complete package) containers *Lot 10-1-3-3* will be drawn for this test. Containers will be packed with appropriate inert round and sealed in the manner shown in the relevant drawing. Complete assemblies will be packed in the specified outer package and the package will be jolted for 8 hours in a machine having a lift of 50 mm and frequency of 60 jolts per minute. The package will be rested on side (or base as applicable to the type of the package). In case jolting machine is not available alternatively the bump test machine may be utilised. For this 5000 bumps each in three different orientations allowing 25 mm free drop per bump be given to complete package. The package will then be dropped from a height of 1.4 metres on concrete floor, successively on its base, top, any one side and any one corner/or any other position at the discretion of the Inspecting Officer.

#### 10-2-2 Water Resistance Test

The assembled container after jolting and dropping tests and taken out from outer package would be immersed completely in water at room temperature in horizontal position under 50 mm water head for 48 hours. At the conclusion of the test :

- (i) The seal and the lid must be readily removable and the interior of the container must be free from water.
- (ii) There must be no signs of rusting/corrosion of metallic parts or fittings.
- (iii) There must be no evidence of delamination or other apparent signs of deterioration on container.
- (iv) The inert round must be capable of being easily withdrawn and the dimensions of the containers must still comply with design tolerances.
- (v) After removal of surface water, the gain in mass of the container must not exceed 5%.
- (vi) Any failure in this test will render the lot unacceptable.

#### 10-2-3 Corrosion Test

This test will be normally carried out on advance and control samples unless considered necessary as regular test by the Inspecting Officer. Minimum two containers after drop test will be subjected to the following temperature cycles :

- (i) 38 ± 2°C at 90 - 100% Relative Humidity for 8 hours.
- (ii) Ambient temperature for 16 hours.

This cycle will be repeated 7 times. At the conclusion of the tests :

- (a) The seals and lids must be readily removable.
- (b) There must be no signs of corrosion of the round, as distinct from slight staining.

After the above cycles, the container and store must remain serviceable.

#### 10-2-4 Moisture Content Test *for lot size upto 3200 Nos and four containers for lot size 3201 to 5000 Nos.*

2 sample containers per ~~lot~~ *lot* should be tested for this test. Method of testing moisture content should be as per procedure given in Appendix 'B'. Even one observation beyond 7.5% moisture content will render the lot unacceptable.

10-2-5 Metal End Pull Off Test *For lot size upto 3200 Nos and four containers (eight joints) for lot size 3201 to 5000 Nos.*

Two containers (4 joints) ~~will be subjected to the test as per procedure given in Appendix 'C'~~ *will be subjected to the test as per procedure given in Appendix 'C'*. All the joints must withstand the load stipulated on drawing.

#### 10-2-6 Crushing Load Test

Normally this test will be carried out on advance and control samples unless considered necessary as regular test by the Inspecting Officer. The procedure will be as follows:—

Cut the container in such a manner as to obtain circular rings representing max/min and where possible intermediate wall thicknesses. The width of the ring should be approximately 20 mm for minimum thickness and 40 mm for higher thicknesses. Cut faces of the ring should be parallel and smooth.

Calculate the cross sectional area of the ring. Gradually apply an axial compressive load on the ring by any suitable device. Record the load at which the ring starts crumbling.

Calculate the stress value by dividing the above load by the area of cross section of the ring. The stress value should not be less than 50 kg/cm<sup>2</sup>. This is calculated as per the formula given below:—

$$\frac{\text{Load}}{\frac{\pi}{4} (D + d) (D - d)}$$

Where D = Outer Dia

d = Inner dia,

#### 10-2-7 Salt Spray Test

This test should be carried out as per specification 1A 1279, Para 16 (d) for phosphated surface and as per specification IS 2074 (Appendix 'A') for red oxide coated or zinc plated surface.

4 samples of end caps and two samples each of securing ring or steel washer etc. are tested at Random for the lot size upto 3200 Nos and eight samples of end caps and four samples each of securing rings or steel washer etc. for lot size 3201 to 5000 Nos.

Any one failure in above test, lot stands rejected. Samples drawn for moisture content may be utilised for this test also if agreeable to the Inspecting Officer. Appendix 'B' aims at recommending the tests to be carried out on composite containers at different stages of manufacture. The schedule of tests given is for general guidance and does not absolve the Manufacturer/Inspector from his responsibility to manufacture/accept the stores conforming to paper particulars in all respects.

### 11 PACKING AND DELIVERY

11-1 The containers shall be delivered in lots consisting of 1000 Nos preferably plus the number required for Destructive Tests as given in para-10-2.

11-2 The containers shall be packed so as to provide an effective protection from damage/dirt or moisture during transit and to ensure that the store reaches the consignee in perfectly serviceable condition. Each container should be packed in a heat sealed polythene bag and then wrapped with LP/Kraft paper before drating.

11-3 Each package must be clearly marked with the Order No., Batch/Lot No., nature and number of contents and the Manufacturers' initials or recognised trade mark and any other marking which the Inspecting Officer may consider necessary.

## 12 RESPONSIBILITY OF SAFETY

12.1 Nothing in this specification shall relieve the manufacturer of the responsibility for the safety of his operations.

Kirkee, Pune 411 003

Dated 14-7-80

Sd/- x x x x

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LT COL

AC QA

For CONTROLLER OF QUALITY ASSURANCE (AVI)

Correct copy of the sealed Specification at this date.

Kirkee, Pune 411 003

Dated 23 JAN 2002

(MT BANSOD)

Dy ASST CONTROLLER

for CONTROLLER OF QUALITY ASSURANCE (AVI)

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## QUALITY ASSURANCE PROVISIONS

### VISUAL, DIMENSIONAL AND TEST DEFECTS

#### ACCEPTABLE QUALITY LEVELS

#### 1 DEFECTS - DEFINITIONS

- 1.1 Defect: A defect is non-conformance of the unit of product to specified requirements.
- 1.2 Major Defect: A major defect is a defect, other than critical that is likely to result in failure, or to reduce materially the usability of the unit of product for its intended purpose.
- 1.3 Minor Defect: A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, but is a departure from established standards having little bearing on the effective use or operation of the unit.

#### 2 EXAMINATION

- 2.1 Examination shall be performed as indicated in the following sub-para's :
- 2.1.1 Major & Minor Defects: Examination for major and minor defects shall be performed on a class basis in accordance with classification of defects using applicable sampling plans and acceptance criteria of specification DEF 131 A, General Inspection Level II (Initially).

#### 3 ACCEPTABLE QUALITY LEVELS

- 3.1 The Acceptable Quality Levels for defects shall be as follows :

Defect Class	Percent
Major	2.5
Minor	6.5

#### 4 CLASSIFICATION OF DEFECTS

- 4.1 The visual and dimensional defects shall be classified as follows. The AQLs for major and minor defects are applicable groupwise.

Group No.	Assembly/Component	Classification and feature
1	Container	<b>MAJOR DEFECTS</b> (AQL 2.5% defectives applies to this group)  <b>Gauging</b> <ul style="list-style-type: none"> <li>(a) Incorrect dimensions of internal fitments affecting proper packaging of contents</li> <li>(b) Internal dimensions lower than low limit affecting proper packaging of contents</li> <li>(c) External dimensions higher than high limit affecting proper packaging in outer package.</li> </ul>

Group No.	Assembly/Component	Classification and feature
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1

Container (Contd.)

*Visual*

- (a) Hole or crack in end cap
- (b) Faulty curling of end cap or incomplete penetration of the metal into the paper tube
- (c) Any gap between tube outer and tube inner
- (d) Gap between lid and body
- (e) Cuts/check, or crimping marks penetrating outer tube
- (f) Incorrect/loose assembly of steel/rubber washer, polythene guide ring, polythene cone and plywood, disc etc.
- (g) Absence of internal and external varnishing
- (h) Delamination of number of layers of tubes inner or outer or tube lid
- (j) Metal end cap with special night identification markings assembled at wrong end
- (k) Fungus growth.

*Test*

- a) Assembly test as per para 10.1.3.2
- b) Tackiness test as per para 10.1.3.3

**MINOR DEFECTS**

(AQL 6.5% defectives applies to this group)

*Gauging*

- (a) Internal dimensions lower than low but not affecting packing of Ammunition
- (b) External dimensions higher than high but not affecting packing in outer box.

*Visual*

- (a) Embossing on end cap missing
- (b) Excess glue on the outside of tube inner or inside of tubes lid interfering in closing
- (c) Delamination of only surface layers
- (d) Delamination of collar lid assembly sleeves
- (e) Delamination of layers in collar
- (f) Damage to sleeve tube collar
- (g) Securing ring missing or not properly crimped
- (h) Minor blisters
- (j) Poor workmanship not affecting serviceability.

**TEST**

- a) Lid fitment test as per para 10.1.3.1

## MOISTURE CONTENT DETERMINATION IN LAMINATED PAPER CONTAINERS

### Sampling

In order to have a uniform procedure of sampling and testing of moisture content in laminated paper containers, samples should be taken from the out-turn lots of the containers at the manufacturer's end as under :

1. Two Nos. (or more as desired by the Inspecting Officer) from each lot of the containers immediately after their drying in oven and before varnishing. Samples will be drawn by the manufacturer.
2. Two Nos. (or more as directed by the Inspecting Officer) from each lot of the containers in the finished condition i.e. after varnishing and drying. Samples will be drawn by the Inspector.
3. Check samples (1 No. per lot) may be drawn at the consignee's end by the local Inspector.

## PROCEDURE FOR DETERMINATION OF MOISTURE CONTENT IN L.P. CONTAINERS

### 1 How to take Sample

The samples should be taken from the containers as per method given below :

Drill holes adjacent to each other in such a manner that a portion of the containers encircled by the holes gets detached. The diameter of the circles should be 3" approx. Care should be taken in the process of drilling so that the temperature may not rise to such an extent to evaporate the imbibed moisture. Holes should be drilled through the entire thickness of the wall of the containers including collars, sleeves, rings etc. wherever present. Hand drill may be applied in case of small containers and power drill may be used in case of bigger containers. Moisture content of containers should be on as received basis and no conditioning of sample is required.

### 2 Locations from which samples should be drawn

Samples should be taken from three places viz. lid, middle and bottom for bigger containers and from two places viz. lid and body for smaller containers (containers having length of 20 cm and above will be considered as bigger containers and containers having length less than 20 cm will be considered as smaller containers).

### 3 Sample Size

After taking the samples from a particular container from different locations, the varnish film is to be removed completely from each sample and discarded. Then the samples are collected from middle portion of each circle in a wide mouthed air tight glass container of about 250 cc capacity. Two, 20 grams (Approx.) samples from each location shall be taken for moisture content determination.

### 4 Apparatus

As per specification IS-1060 Part I - 1966 clause 9.1.

## 5. Method of Testing

- (i) Weigh the cleaned and dried glass weighing bottle with stopper upto second place of decimal.
- (ii) Transfer the sample to weighed glass weighing bottle as soon as it is collected. Close the bottle with the stopper.
- (iii) Weigh the sample in closed bottle to obtain the nett mass.
- (iv) Remove the stopper of the bottle and place the weighing bottle containing the sample in drying oven. Heat for one hour at  $103^{\circ} \pm 2^{\circ}\text{C}$ .
- (v) Close the bottle with the stopper in oven and transfer it to a desiccator containing anhydrous alumina or conc.  $\text{H}_2\text{SO}_4$  (and not calcium chloride) and allow the sample to cool down to room temperature.
- (vi) Take out the weighing bottle from the desiccator and loosen the stopper momentarily to adjust any change in air pressure and weigh.
- (vii) Repeat the drying and weighing process of the sample until the difference in mass in two successive weighments is not more than 0.1% of the mass of the sample.

## 6. Precautions

- (i) Cloth hand gloves should be used while taking out the samples from the containers after drilling and subsequent operations.
- (ii) Care should be taken to avoid delay between cutting of sample and weighing before drying. In no case it should exceed 15 minutes.
- (iii) Cleanliness at the time of handling samples should be ensured.
- (iv) Avoid tight stulling of the sample in the weighing bottles.
- (v) Samples should be protected from exposure to heat, direct sun light, liquids, varying humidity conditions as well as any other harmful influence.

## 7. Calculations

Calculate the Moisture content as percentage on original mass of the sample as follows :

$$\text{Moisture content, percent by mass} = 100 \frac{W_1 - W_2}{W_1}$$

Where

$W_1$  = original mass of the sample before drying, and

$W_2$  = mass of the sample after drying.

## 8. Report

Report the moisture content as the percentage loss on original mass of the sample to the nearest first decimal.

## 9. Precision

As per clause 9.6 of IS Specification IS : 1060 Part 1 - 1966 viz. the percentage results of duplicate determination of moisture made at the same time should agree within 0.2.



**APPENDIX 'C'**  
( Refers to para 10.2.5 )

**Metal end pull off test**

This test shall be performed on the metal ends of the lid and the body assembly. Assembly shall be prepared for test by cutting the tube to 13 cm to 15 cm from end extracting all components where necessary from the lid or truncated body assembly without damage to the crimp of the end cap of the tube. The prepared lid and body assembly shall then be assembled in approved fixtures as shown in attached Plate 'A'. The test is to be performed in a tensile testing machine. The rate of the travel of the head shall be  $6.4 \pm 1.4$  mm/minute. Where tensile testing machine is not available apparatus as per Plate 'A' is used. The load is to be gradually applied in this apparatus.

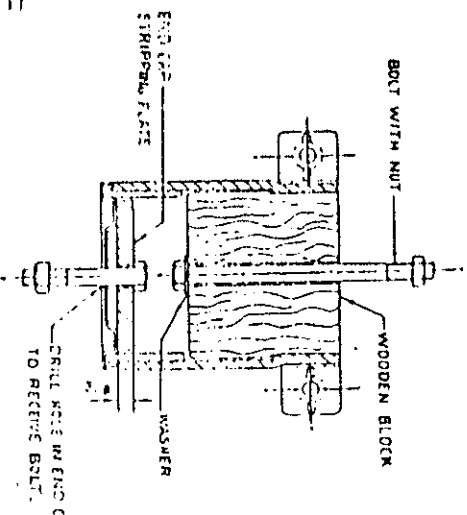
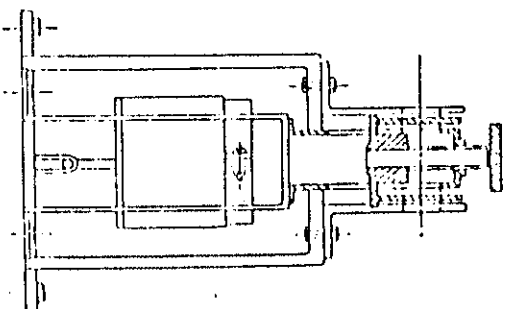
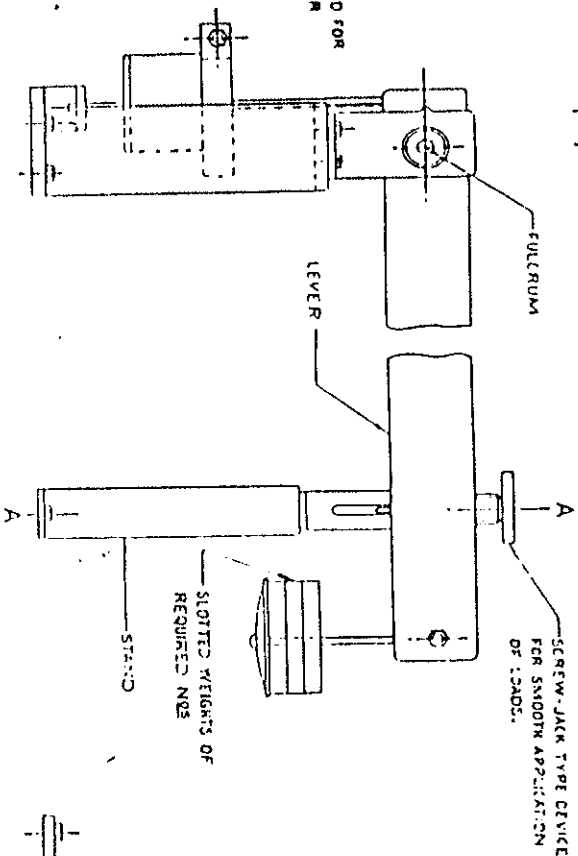
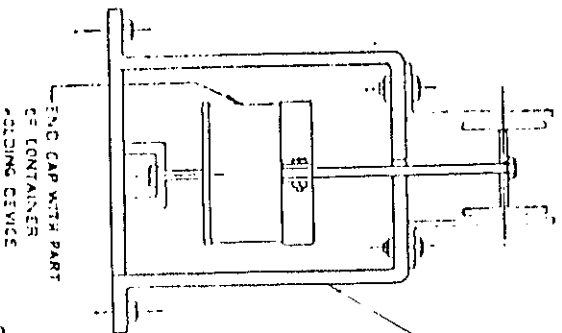
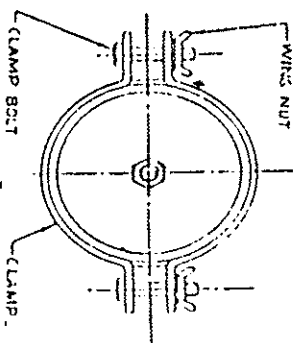
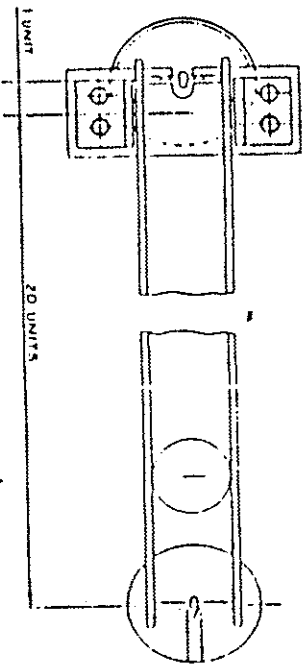
Determine the loads required to separate the metal end caps from the tube by applying the loads parallel to the axis of the tube. Crimped metal end caps shall withstand the load specified in the relevant drawings.

**APPENDIX 'D'**  
( Refer to para 10.3 )

**SCHEDULE OF TESTS FOR GENERAL GUIDANCE**

Design/first off production stage	Advance/control sample stage	Bulk production stage
1. Moisture content test	1. Moisture content test	1. Moisture content test
2. Jolt test, drop test and there after water resistance test on the same container	2. Jolt/Drop test and there after water immersion on the same container	2. Jolt/Drop test and there after water immersion on the same container
3. End cap pull off test	3. End cap pull off test	3. End cap pull off test
4. Salt Spray test	4. Salt Spray test	4. Salt Spray test
5. Crushing load test	5. Crushing load test	
6. ISAT 'B' tests	6. Corrosion test	

# 'PLATE A'



LEVER RATIO 1:20

SECTION AA

FIXTURE METAL END PULL OFF TEST FOR PAPER CONTAINER

SKETCH SHOWING GENERAL ARRANGEMENT OF APPARATUS FOR METAL END PULL-OFF TEST FOR PAPER CONTAINERS