

**DRAFT MATERIAL SPECIFICATION FOR ANTISTATIC POLYPROPYLENE
CORRUGATED SHEET**

(Draft Specification No.-OFV/SPECN/PP/102)

1. **MATERIAL.** Polypropylene impact copolymer intended for Extrusion and blow moulded products with antioxidants and other ingredients to match the specified requirements. and shall be free from pigment and plasticizers like Polyisobutylene.. PP corrugated sheet shall conforms the antistatic properties. PP corrugated sheet shall be free from any colour additives.

2. **TENDER SAMPLE.**

a) The manufacturer / supplier / contractor shall submit a tender sample of 10 kg of Polypropylene grain & 1 kg antistatic grain essentially from the same batch / lot of manufacture along with test specimens as per IS 10951:2002 for the tests mentioned in clause 4(b) free of all charges and conforming to this specification. Also Samples of the material and of the packages may be taken from any portion of the batch / lot / consignment.

b) The manufacturer / supplier / contractor shall submit a tender sample of 5 Nos PP corrugated sheets from the same batch / lot of manufacture for the tests mentioned in clause 4(a) free of all charges and conforming to this specification. Also Samples of the material and of the packages may be taken from any portion of the batch / lot / consignment.

3. **Criteria for Conformity.** If on examination, any sample is found not conforming to this specification, the whole batch / lot / consignment may be rejected.

4. **Test Requirements:** Samples taken from any portion of the batch/lot/consignment of material shall conform to clause 1 and in addition shall conform to the test requirements shown in the following tables:-

4(a) **Requirements of Finished Product i.e Antistatic PP corrugated sheet:**

Sl.No.	Characteristic	Passing Standard	Test Method
(a)	pH of water extract	Min. 5 Max. 8	IS 1060 (Part 1) Method 10
(b)	Water soluble matter, % by mass	Max. 0.2	Appendix 'A'
(c)	Water soluble chlorides calculated as Sodium Chloride, % by mass	Max. 0.05	IS 1060 (Part 2) Method 17
(d)	Water soluble sulphates, calculated as anhydrous Sodium sulphate, % by mass	Max. 0.1	IS 1060 (Part 2) Method 18
(e)	Solubility in Xylene at 140 °C ± 1 °C	Soluble	Appendix 'B'

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(f)	Extractable matter in Toluene at 25 °C ± 1 °C, % by mass	Max. 6.0	Appendix 'C'
(g)	Solubility in Acetone at 25 °C ± 1 °C	Insoluble	Appendix 'D'
(h)	Surface resistivity	10 ⁹ to 10 ¹¹ ohm	ASTM D-257
(i)	GSM requirement	1500 ± 75	
(j)	Thickness	Min 4.5 mm Max 5.0 mm	
(k)	Length X Breath for side piece,	245 ^{±0.5} mm X 160 ^{±0.3} mm	
(l)	Length X Breath for Bottom piece	250 ^{±0.5} mm X 70 ^{±0.3} mm	
(m)	6P Low temperature Testing	To be conforms	JSG-0102, Joint Services Guide on Environmental Testing of Armament Stores Ammunition
(n)	15 U Bump Testing	To be conforms	- do -

(b) Requirements of raw material (97% *Polypropylene Grain & 3% Antistatic grain):

Sl. No.	Characteristic	Passing Standard	Test Method
(a)	Melt flow index@230 degree C/2.16 kg	1.8 ± 20 %	ASTM - D 1238
(b)	Density g/ml	0.90 Min	ASTM- D792
(c)	Tensile stress at yield, (50mm/min)	22 Mpa Min	ASDT- D638
(d)	Elongation at yield, (50mm/min)	10% Min	-- do --
(e)	Notched Impact strength	160 J/mMin.	ASTM - D 256
(f)	Flexural modulus(1% secant)	800 Mpa Min.	ASTM - D 790A
(g)	Heat deflection temperature at 455 kPa load	85° C Min	ASTM - D 648
(h)	Ash content	0.5 % Max	ASTM - D5630

*REPOL C015EG Impact Copolymer is used by OFV during trials.

5. WARRANTY. The stores supplied against the contract shall be deemed to be warranted against the defective material and performance by the contractor for a period of 12 months from the date of receipt of the stores at the consignee's end and shall retain the properties described above. If during this period any of the stores supplied is found defective, the same shall be replaced by the manufacturer / supplier / contractor free of charges at the consignee's premises.

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6. **PACKAGING.** The packaging shall be in accordance with the terms of the contract or as agreed to between the purchaser and contractor.

7. **MARKING**

7.1 All packages containing the material shall be indelibly and legibly marked with the following details:-

- (i) Nomenclature and Specification Number.
- (ii) Name and Address of the Consignee.
- (iii) A/T. or S.O. Number and Date.
- (iv) Consignment Number.
- (v) Lot / Batch Number and Date of Manufacture.
- (vi) Gross and Net Mass.
- (vii) Consecutive Number of Package and Total Number of Packages in the Consignment.
- (viii) Date of Supply.
- (ix) Contractor's Initials or Recognized Trademark.

7.2 In addition to the above the Quality Assurance Officer / Quality Assurance Authority may suggest some more marking / identification considered suitable at the time of inspection.

7.3 The paint used for marking should conform to IS 138.

8. **SAFETY OF OPERATIONS.** Nothing in this specification shall relieve the manufacture / supplier / contractor of his responsibility for the safety of operations in the manufacture, storage, transit use of this store.

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APPENDIX 'A'

A. PREPARATION OF AQUEOUS EXTRACT AND ESTIMATION OF WATER SOLUBLE MATTER, CHLORIDES AND SULPHATES.

A.1 Cover 10 g of sample, cut to small pieces passing through 200 micrometer IS sieve, with 100 ml of boiling distilled water. Allow to stand in stoppered conical flask for an hour with occasional shaking. Filter through No. 1 Whatman filter paper. Evaporate 25 ml of the above solution in a previously cleaned, dried and weighed glass evaporating dish (M1). On sand bath, keep the dish at 100° C for 30 minutes. Cool in desiccators and weigh (M2).

$$\text{Water soluble matter \%} = \frac{(M2-M1) \times 100 \times 100}{\text{Mass of the sample taken} \times 25}$$

A.2 Using the remaining extract, estimate chlorides and sulphates as per method 17 and method 18 of IS 1060 (Part 2) respectively.

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APPENDIX 'B'

B. SOLUBILITY IN XYLENE AT $140^{\circ}\text{C} \pm 1^{\circ}\text{C}$

B.1 Samples shall be tested at $140^{\circ}\text{C} \pm 1^{\circ}\text{C}$ with Xylene. Three samples of the material 1.5 g each shall be accurately weighed. These are transferred to three Erlenmeyer flasks of 125 ml capacity. To each sample shall then be closed with ground glass stoppers or with rubber stoppers wrapped with Aluminium foil to eliminate any effect of Xylene on the rubber. The mixture shall be stored for 16 hours at $140^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The solubility of PP Corrugated sheet in Xylene at $140^{\circ}\text{C} \pm 1^{\circ}\text{C}$ shall be observed at this temperature. The PP Corrugated sheet shall be treated as soluble in Xylene at 140°C if a clear, homogenous solution with no undissolved residue is obtained.

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APPENDIX 'C'

C. EXTRACTABLE MATTER IN TOLUENE AT $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$

C.1 Polypropylene -Toluene mixture from Appendix 'B' shall be allowed to cool to $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$. It is advisable not to accelerate the cooling operation. The solution shall be filtered through a sintered glass crucible (G-3) which has been previously treated in order to remove any Toluene soluble material and to bring it to constant mass by heating at $50^{\circ}\text{C} \pm 1^{\circ}\text{C}$ (M2). The solution shall then be transferred to the tared crucible and suction applied to hasten the filtration followed by rinsing of flask with Toluene three times using 15 ml of Toluene each time. After the transfer and rinsing are complete, the final traces of Toluene are completely removed by applying suction.

C.2 The crucible shall then be heated in an oven at $50^{\circ}\text{C} \pm 1^{\circ}\text{C}$ to constant mass (M3). During the period when crucible and/or residue is not being heated or weighed, it shall be kept in desiccators with anhydrous Calcium chloride as desiccant.

C.3 The percent extractable matter in Toluene shall be calculated by the following formula:-

$$\text{Percent insoluble matter} = \frac{(M3-M2) \times 100}{M1}$$

Where M1 = The mass of the sample taken for test for Solubility at $80^{\circ}\text{C} \pm 1^{\circ}\text{C}$ in Toluene at Appendix 'B'.

C.4 If the value is less than 6.0%, the material shall be considered insoluble at 25°C in Toluene and also to have complied with the requirement for extractable matter.

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APPENDIX 'D'

D. SOLUBILITY AT $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ IN ACETONE

D.1 1.5 g of sample is stored with Acetone at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for 20 hours with approximately 60 ml of reagent. The solubility shall then be observed by evaporating the solvent or visually.

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