MINISTRY OF DEFENCE

PROVISIONAL SPECIFICATION FOR

Dobeckot E4 Resin/Equivalent

(Specification No. HEMRL/TRIM/PROP/IM/ 14)

HEMRL,
SUTARWADI, PUNE - 411021

CONTENTS

0 FOREWORD

0.1 This specification has been prepared by High Energy Materials Research Laboratory, Sutarwadi, Pune-411021

0.2 This specification will be approved by the Ministry of Defence after appropriate sealing action by Controllerate of Quality Assurance (Military Explosives) and will be mandatory for use by Defence Services.

0.3 Before sealing action, any queries regarding this specification may be referred to "The Director High Energy Materials Research Laboratory, Sutarwadi, Pune-411021."

1. SCOPE

This specification is intended to govern, supply and assure the quality of Dobeckot E4 Resin/Equivalent. This material is intended for use as an inhibition ingredient in the booster propellant of "AKASH" Missile/ booster & sustainer propellant of "TRISHUL" Missile/Pinaka/RZ-61/Pechora.

2. RELATED SPECIFICATIONS AND DOCUMENTS - Nil

3. DESCRIPTION OF THE MATERIAL

The material shall be in the form of Amber coloured and clear viscous liquid .

4. MANUFACTURE

4.3 Dobeckot E4 Resin/Equivalent shall be manufactured by a process which will produce the product conforming to this specification.

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

5. TENDER SAMPLE

The contractor / supplier shall submit a tender sample of 1 Kg free of cost. Acceptance of the tender will denote that the tender sample is accepted as a standard of supply, in accordance with the terms of this specification.

6. INSPECTION

6.1. Dobeckot E4 Resin/Equivalent and the containers in which it is packed shall be subjected to inspection and the final approval will be given by the Quality Assurance Officer / Quality Assurance Authority.

6.2 Samples of the material may be withdrawn at random from any portion of the batch /lot / consignment.

6.3 If on examination any sample is found not conforming to the requirements of this specification the whole batch / lot / consignment is liable for rejection.

7 SAMPLING

Sampling shall be carried out as mentioned in Para 6.2 and each sample shall be labeled with date, lot number, and manufacturer's container identification number.

8 TEST REQUIREMENTS

Samples taken from any portion of the batch / lot/ consignment of the material shall conform to clause 3 and shall also conform the following test requirements.

Tests:

Sl No.	Characteristics	Passing Standard	Reference to Test Method
1.	Specific gravity, g/cc at25^0 C	1.115 ± 0.02	Appendix –IM/14/I DIN 51757
2.	Viscosity, CP, at 25^0 C	26000 ± 10000	Appendix –IM/14/II
3.	Epoxide Equivalent g/eg	365 ± 40	Appendix –IM/14/III DIN 16945
4.	Volatile matter %, max	3	Appendix –IM/14/IV DIN 16945
5.	Gel time Minutes at 40 ^{0} + 1^0 C	90 ± 5	Appendix –IM/14/V

9 SUPPLIERS INSPECTION OF STORES / CONSIGNMENT

Before tendering the store for inspection the supplier shall carry out a thorough inspection of each delivery to satisfy himself that the store fully conforms to this specification and shall render certificate to that effect to the Quality Assurance Officer / Quality Assurance Authority.

10 WARRANTY

The stores supplied against the contract shall deem to have been warranted against defective material and performance by the contractor / manufacturer for a period of 12 months from the date of receipt of the stores at the consignee's end and if during this period any of the stores supplied is found defective the same shall be replaced by the contractor / manufacturer free of charge at the consignee's premises.

11 PACKING AND MARKING

11.1 Dobeckot E4 Resin/Equivalent shall be packed in suitable plasic drums.

11.2 When the material is required to be transported by rail the packing shall conform to the provisions of Indian Railways Conference Association, Red Tariff No.18.

11.3 The inclusion of any foreign matter or impurities in any of the packages shall render the whole consignment liable to rejection.

11.4 All packages containing the material shall be durably and legibly marked with the following details (as applicable):

i. Nomenclature and specification number of the material.
ii. Name and address of the consignee.
iii. S.O. Number and date
iv. Consignment number
v. Lot / Batch number and date of manufacture
vi. Gross and net weight
vii. Consecutive number of package and total number of packages in the consignment
viii. Date of Supply
ix. Contractor's initials or recognized trade mark
x. Storage temperature limit.

11.5 In addition to the above the Quality Assurance Officer / Quality Assurance Authority may suggest some more markings / identifications considered suitable at the time of inspection.

11.6 The paint used for marking shall conform to IS :138 –1981 and to the satisfaction of the Quality Assurance Officer / Quality Assurance Authority.

12 **DEFENCE STORES CATALOGUE NUMBER**

Defence Stores Catalogue Number allotted to this store = not allotted.

13 SUGGESTIONS FOR IMPROVEMENT

Any suggestion for improvement in this particular document may be forwarded to "The Director High Energy Materials Research Laboratory, Sutarwadi, Pune-411021"

14 SUGGESTED SOURCE OF SUPPLY

Yuvaraj Chemicals, Pune; Schenectady-Beck India Ltd., Pune; M/s Rakhee Chemicals, Pune

15 SAFETY REQUIREMENT

Supplier should mention about storage conditions and safety measures during handling and transport.

16 APPENDICES

Appendix – IM/14/I

Density

1. **Apparatus:-**
   a. Thermostatic bath
   b. Hygrometer (spindle)

2. **Procedure:-** It is determined by DIN 51757 method i.e. determination of density with hydrometer (spindle). Dobeckot E4 is filled into the cylinder which is kept in a thermostatic bath having temperature 25°C. When the sample achieves the temperature of the bath (30-40 minutes approx), density is found out by exploring with different hydrometers (spindles), and then correct density is found out with the help of selected hydrometer.

APPENDIX – IM/14/II

Viscosity

1. **Apparatus:-**
   a. Brookfield viscometer (model RVT)
   b. Glass beaker
2. **Procedure:-** It is determined by Brookfield viscometer (Synchro-electric Viscometer, Model RVT) manufactured by Brookfield Engineering Laboratory, USA. Dobeckot E4(~ 500 ml) is taken in a clean cup, which is immersed, in a thermostatic bath at 25° C. When the material attains temperature of 25° C, selected spindle (no.1) is dipped in the material unto the mark. The spindle is rotated at a speed of 0.5 rpm and dial reading is taken when it is constant and viscosity is calculated by multiplying dial reading with the factor.

APPENDIX – IM/14/III

Epoxide Equivalent

1. **Apparatus:-**
   a. Weighing balance
   b. Burette & pipette
   c. Reagents – MEK/HCl
2. **Procedure:-** It is measured by DIN 16945. Epoxide equivalent defined as the weight of the resin in g, which contains one g equivalent of epoxide. 0.15-0.20 g Dobeckot E4 is weighed in a flask and is dissolved in 5 ml methyl ethyl ketone and then 10 ml of MEK/HCl solution is added. The flask is kept at room temperature for 30-35 minutes. After addition of 3 ml distilled water, excess of HCl is titrated back with N/10 KOH solution using cresol red as indicator. The colour change from golden yellow to violet indicates the end point

3.Calculations:-

Epoxide Equivalent = E x 10 / (a-b) F

a- Volume of N/10 KOH required for blank

b- Volume of N/10 KOH required for sample

E- Weight in mg of resin sample

F- Factor of N/10 KOH

APPENDIX – IM/14/IV

Volatile matter

1. **Apparatus:-**
   a. Weighing balance
   b. Oven
   c. Metal lid with flat base
2. **Procedure:-**
   It is determined by DIn 16945. About 5 g Dobeckot E4 is weighed into the metal lid with a flat base and is kept for 3 hours at 140°c. It is then cooled to room temperature and weighed.
3. **Calculations:-**
   The volatile matter is calculated as
   volatile matter = (E-A) x 100/E
   E: Initial weight of sample
   A: Weight of sample after heating

APPENDIX – IM/14/V

Gel time

1. **Apparatus:-**
   a. Thermometer
   b. Beaker
2. **Procedure:-**

The term Gel time used here is defined as time corresponding to sudden build up of viscosity (known as Gelling) of standard weight (125 g) of resin composition at constant temperature on mixing specified quantity (50 g) of Hardener EH411.

125 g of resin composition (Dobeckot E4-100 g, Diluent C-10 g and Antimony Trioxide-15 g) is weighed in a plastic beaker of dimensions (approx height 95 mm and a diameter of 71 mm) and beaker is immersed in a constant temperature water bath at 40°C+1°C.

When the resin attains the constant temperature i.e. 40°C±1°C, 50 g of Hardener EH 411 is added and mixed homogeneously and slow stirring is continued. The temperature of the resin is recorded at an interval of 2 minutes till maximum temperature is reached and subsequently drops down by about 5° C. A mean of minimum 3 readings is taken in order to minimize experimental errors.