FUZE, SAFETY, NO. 11, MARK 2.

(Specification to govern manufacture and inspection)

Approved : ... Oct. '71

Any enquiries regarding this specification should be addressed to the Inspecting Officer named in the tender or contract.

1. SCOPE :

1.1 This specification governs the manufacture and inspection of Fuze, Safety, No.11, Mark 2.

2. RELATED DOCUMENTS :

2.1 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.

3. GENERAL :

3.1 The dimensions and construction of the fuze are to be in conformity with this specification.

3.2 Any sample which may be lent to the contractor must be taken only as a general guide to workmanship and finish, and not as a guide to dimensioning.

4. MATERIALS :

4.1 Materials specification shall conform to the following :-

Sl No	Material	Specification	Remarks
1	Charcoal	Left to contractor	See para 4.5
2	French Chalk	Good Commercial Quality	-
3	Gunpowder	Left to contractor	See para 4.4
4	Jute	Good Commercial Quality	See para 4.3

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Sl. No	Material	Specification	Remarks
5	Paraffin Wax	Good Commercial Quality	-
6	Paraformaldehyde	Good Commercial Quality	-
7	Potassium Nitrate	Left to contractor	See para 4.5
8	Sulphur	Left to contractor	See para 4.5
9	Jeffery's Marine Glue No.7	Proprietory item	-
10	Water Proofing Mixture	Left to contractor	See para 4.7
11	Pitch	Good Commercial Quality	-

4.2 Special Clauses for materials :

4.3 Jute -

The jute yarn must have a moisture content of not more than 12 per cent and the Inspecting Officer will prohibit the use of any material which has not been dried to his satisfaction.

4.4 Gunpowder -

The moisture content of the gunpowder must not be less than 0.5 per cent nor more than 1.25 per cent.

4.4.1 An aqueous extract of the gunpowder must not contain :

i) chlorides equivalent to more than 0.05 per cent of chlorine (Cl) calculated on the dry powder.

ii) sulphates equivalent to more than 0.05 per cent of sulphuric anhydride (SO_3) calculated on the dry powder.

iii) acidity, as indicated by congo-red paper, exceeding that shown by dilute sulphuric acid of strength 1 in 60,000 when the powder is extracted with four times its weight of neutral distilled water.

iv) sodium salts sufficient to impart a yellow colour is a colourless flame, the extract being made as in para 4.4 (iii).

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4.5 Pot Nitrate and Sulphur and Charcoal :

The gunpowder is to consist of potassium nitrate, sulphur and charcoal well incorporated in the proportions necessary to give the specified rate of burning at para 8. No foreign matter is to be added.

4.6 Jeffery Marine Glue No.7 :

This is a proprietory item. Any alternative could be used provided proper sealing is obtained. The alternative should be compatible with gunpowder.

4.7 Waterrroofing mixture :

The composition of the waterproofing mixture and the nature of the outer covering are left to the discretion of the contractor, but they must be such that the following conditions are observed :-

i) They must be of an inert nature.

ii) Will efficiently protect the train against ingress of moisture.

iii) Will not harden or deteriorate when stored in hermetically sealed packages, over a reasonable period of time.

iv) Will not exude - due to changes of climatic temperature.

v) That when the fuze is cut with a sharp knife it cuts clean, i.e. does not blind the train.

4.8 All other materials used in manufacture and packing must be of good commercial quality.

5. CONSTRUCTION :

5.1 The fuze is to consist of a train of fine grain gunpowder enclosed in jute yarn contained in a tubular wrapping of waterproofing composition which is in turn protected by an outer covering, black in appearance. Material for outer covering is left to the contractor.

5.2 The external diameter of the finished fuze is to be not more than 5.3 mm nor less than 5.08 mm and the fuze must be between these limits for the whole of its length.

5.3 Each end of each length is to be immersed to a depth of about 13 mm in a bath of molten Jeffery's Marine Glue No.7, for a period of not less than 30 seconds, the temperature of the bath of glue being about 120°C (248°F). After removal, the glued ends are to be allowed to become perfectly dry. The whole surface of the fuze is then to be liberally coated with a powder consisting of 20 per cent paraformaldehyde and 80 per cent french chalk.

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5.4 The finished fuze must be pliable, free from tackiness, and display no tendency to crack or unravel when subjected to ordinary usage, and capable of conforming with the proofs specified in para 8.

6. INSPECTION :

6.1 Samples of any of the materials employed may be selected at any time by the Inspecting Officer for testing. Such samples must be supplied by the Contractor free of charge.

6.2 The fuze may be inspected during manufacture and after completion will be subjected to examination and testing by, and proof, and to the satisfaction of the Inspecting Officer. Any fuze which is not finished to his satisfaction, or which has any flaw or imperfection will be rejected.

7. LOTTING :

The fuze is to be delivered in lots of 50 lengths of 7.32 metres or in such other lengths as are agreed to in the contract. The fuze, sprinkled with a small quantity of the paraformaldehyde and french chalk powder, is to be packed in hermetically sealed cylinder No. 32.

8. PROOF :

Proof will be selected by the Inspecting Officer at the rate of one length per lot, or alternatively one length from each package delivered by the Contractor. The length selected will beproved as given in succeeding paragraphs. Any failure to function correctly will render the lot liable to rejection.

8.1 Details of Proof -

Sl No	Test	No. required	Passing Standard	Test Method
(1)	(2)	(3)	(4)	(5)
1	High temperature test	Two pieces of 1320 mm ~~(51 mm will be tested)~~	Should fire at the rate of ~~72 to 110 Secs per 914.4 mm length~~ 100 ± 10 S / m	Appendix 'A'
2	Humidity test	600 mm ~~(100 mm will be tested)~~	Should fire at the rate of ~~72 to 110 Secs per 914.4mm length~~ 100 ± 10 S / m	Appendix 'B'
3	Low temperature test	1320 mm ~~(51 mm will be tested)~~	Should fire at the rate of ~~72 to 110 Secs per 914.4 mm length~~ 100 ± 10 S / m	Appendix 'C'
4	Rate of burning at ambient temperature	1220 mm	Should fire at the rate of ~~80 to 100 Secs per 914.4 mm length~~ 105 S / m	Appendix 'D'
5	Sensitivity test	300 mm	Should ignite each other	Appendix 'E'

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/. Should the proof or examination of any delivery bring to notice any defect or defects, which, in the opinion of the Inspecting Officer, affect the serviceability of the safety fuze, the delivery in question may be rejected or further proof taken at his discretion, not only from the particular delivery, but from any other lots made by the Contractor which may be under inspection, to ascertain whether the defect is general. Should the safety fuze fail at these further proofs, the delivery or deliveries will be rejected without reference to any previous proof. The total proof of any delivery shall not exceed 10 per cent of the number delivered.

10. REPLACEMENT OF PROOF :

The Contractor will be required to replace all the safety fuze expended in proof free of charge.

11. PACKING AND LABELLING :

11.1 Any approved package to the satisfaction of the Inspecting Officer can be used for packing the hermetically sealed cylinder No.32 mentioned in para 7.

11.2 Labels can be had from the Director of Armament Supply, Naval Headquarters, New Delhi - 22.

12. RESPONSIBILITY FOR SAFETY :

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

APPENDIX - 'A'.

HIGH TEMPERATURE TEST.

Two pieces 1320 mm long will each be formed into a coil of approximately 76 mm in diameter and the coils will be stored at 60°C (140°F) for four weeks and then tested as follows :-

(i) The ends of one coil will be hermetically sealed and the coil stored for three days at atmospheric temperature. At the end of this period the coil will be immersed in water to a depth of 457 mm for 6 hours.

(ii) The other coil will be stored for 12 hours at 71°C (160°F) followed by 3 days at atmospheric temperature.

Immediately after the expiration of the above tests each piece will be straightened and 51 mm will be cut off from each end; the waterproofing composition must not drag when cut with a sharp knife. Each piece will be tested as in Appendix 'D' when the time of burning must not vary by more than ± 10 per cent from the time measured in Appendix 'D'. indicated there.

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APPENDIX - 'B'.

HUMIDITY TEST.

Both ends of a 600 mm length of the unpowdered fuze will be sealed with soft pitch and the length of fuze formed into a coil. The coil will be placed in a sterile Petri dish of approximately 100 mm diameter and a small open dish containing water or a wad of damp cotton wool placed in the centre of the coil (by this means a relative humidity of 100 per cent will be maintained). The Petri dish will then be sealed with paraffin wax of setting point not below 50°C (122°F) and, when the wax has set, the dish and its contents incubated in a suitable oven at 30°C (86°F) for 3 days. At the end of this period no mould growth should be visible. The fuze will be tested as in Appendix 'D' and must burn in the manner stipulated and the time of burning must not vary ~~by more than ± 10 per cent~~ from the time indicated therein.

APPENDIX - 'C'.

LOW TEMPERATURE TEST.

A 1320 mm length of the fuze will be formed into a coil of approximately 76 mm diameter and stored for 24 hours at a temperature of -20°C (-4°F). On being unrolled at the end of this period and at this temperature the fuze must not crack. 51 mm will be cut off each end of the fuze and the remainder tested as in Appendix 'D' the fuze must burn in the manner stipulated, and the time of burning must not vary ~~by more than ± 10 per cent~~ from the time indicated therein.

The mandrel on which the fuze is coiled for the purpose of the abovementioned tests is, in all cases, to be removed from the fuze before the application of the test.

APPENDIX - 'D'.

RATE OF BURNING AT AMBIENT TEMPERATURE.

Two pieces 1220 mm long will each be ignited in the open by means of a safety fuze or other approved means of ignition at one end and must each burn out to the end of the section, steadily and without undue sparking. The rate of burning is to be ~~from 80 to 100 seconds per 914.4 mm.~~ 100 ± 10 S/m.

APPENDIX - 'E'.

SENSITIVITY TEST.

A piece 300 mm long will be cut into two pieces, the one 100 mm in length and the other 200 mm. Each piece will have one end inserted into a piece of glass tubing, a distance of 25.4 mm between the ends in question being maintained. The longer piece will be ignited by meansof a service ~~fuze~~ safety at the free end and this must cause the ignition of the other piece.

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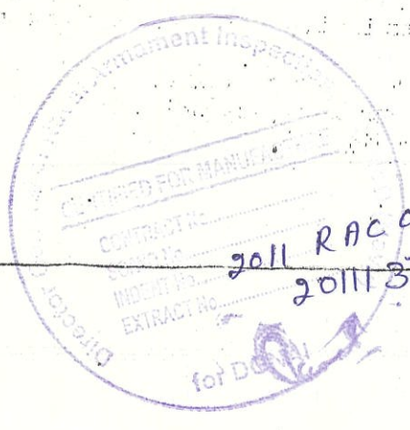

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