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SPECIFICATION No. CIA 0516 (Rev) (C)

CORD, DETONATING, A

Certified for use

31.10.2009
Date— DGM/TS

ISSUED BY

THE CONTROLLERATE OF INSPECTION (AMMUNITION)

KIRKEE, PUNE – 411 003

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SPECIFICATION No. CIA 0516 (a) (b) (c)
[Supersedes Specification No.
IA 1251 (*d*) and Proof Schedule
No. DM/18/4]

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

CORD, DETONATING, A

Specification to govern manufacture, inspection and supply.

Approved on 25-11-78

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Any question relating to the drawing, pattern or this specification should be referred to the CI(A) KIRKEE or other INSPECTING OFFICER, duly authorised to act on behalf of him.

Obtainable from :—

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

1 SCOPE

1·1 This specification governs the manufacture, inspection, proof and supply of CORD, DETONATING, 'A'.

2 RELATED DOCUMENTS

2·1 Wherever a reference is made to any documents in this specification it should be taken as a reference to the latest edition of the documents unless otherwise stated.

2·2 Copies of related documents are obtainable as follows :—

(*a*) Indian Standard
(*b*) British Standard
— Indian Standard Institution, Manak Bhavan, 9, Bahadur Shah Zafar Marg, NEW DELHI-110 001.

(*c*) IND/ME Specifications
(*d*) Joint Services Specification
— The Controller of Inspection (Military Explosives) 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 detail. 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 MATERIALS

4·1 Following materials should conform to the specifications shown against them :—

Sr. No.	*Material*	*Specification No.*
1.	PETN Type 'A'	IND/ME/698
2.	Tape Adhesive Waterproof Fabric	IND/ME/790
3.	Cotton Yarn or Jute	IND/ME/800 Good commercial quality known as Assam Bottom
4.	PVC (Brown Coloured) Compound	IND/ME/801 (Also *see* para 4·3 below)

4·2 The material for the rubber sleeve will conform to the requirements stipulated on the drawing No. ITX 223.

4·3 The colour of the PVC compound used should be dark brown or amber.

4·4 The explosive will usually be supplied to the Manufacturer, but should he be called upon to supply it, then it must conform to the relevant specification quoted in para 4·1 above.

4·5 Explosive supplied to the Manufacturer must not be used for any purpose other than that for which its use is covered by this specification or by special instructions issued by the Inspecting Officer.

4·6 The Manufacturer shall supply any other material required for the completion of the order.

5. MANUFACTURE

5·1 The dimensions and form of the cord shall be in conformity with this specification. The external diameter of the cord shall be as follows :—

Low 5 mm High 5·5 mm

5·2 The cord shall consist of a core of PETN surrounded by such coverings as are made by the Manufacturer in the commercial product and enclosed in layers of Jute or Cotton, Yarn or both contained in a tubular covering of a water proofing material Polyvinyl Chloride suitably stabilized, plastisized and coloured. The cord shall be uniform with smooth finish as per approved sample.

5·3 The completed cord shall not be altered or rectified in any way not provided for in the specification without the prior sanction of the Inspecting Officer.

5·4 Where the specification permits a choice of alternative materials, the Manufacturer is required to notify the Inspecting Officer, in writing, which of the permitted alternatives he chooses to produce. If the choice of alternatives is changed during the course of the order, the Manufacturer shall again notify the Inspecting Officer of such change.

5·5 No operation which may modify the physical properties of the material, will be carried out after it has been submitted for tests unless authorised by the Inspecting Officer.

5·6 The charge PETN should not be less than 9·5 g per metre run taken from any part of the cord.

5·7 The mass of the plastic waterproofing cover is to be not less than 5·67 g per metre run taken from any part of the cord.

5·8 The atmospheric condition of the filling room must be regulated so as to ensure a relative humidity of 65–75%. The temperature must not fall below 15·6°C.

5·9 The rubber sleeves required will be manufactured to Drawing No. ITX 223. The sleeve shall be black in colour and shall have a smooth and non-tacky surface, free from blisters and air marks, gritty matter and other defects. The sleeves when subjected to accelerated ageing at 80 ± 1°C dry heat for 48 hours, shall not become brittle or unduly hard.

6 SAMPLES AND INSPECTION

6·1 Arrangements for Inspection

6·1·1 The Manufacturer shall notify the Inspecting Officer when he is in a position to start work and shall inform him of all sub-orders placed in connection with the order at the same time as they are placed.

6·1·2 The Inspecting Officer shall have access at all times, to all departments of manufacturing plants which are concerned with the production and storage of material under the order, at the works either of the Manufacturer or of the sub-manufacturers and shall arrange for inspection to be carried out by his representative as he considers necessary.

6·2 Inspection of Materials

6·2·1 Before proceeding to manufacture, all materials shall be submitted to the Inspecting Officer in batches. Each batch shall contain a quantity of material prepared under uniform conditions in respect of composition and manufacturing processes.

6·2·2 The manufacturer shall not take into use any material, until it has been accepted for its purpose by the Inspecting Officer, who may require the bulk of the material to be sealed or bonded until results of test or analysis of samples are available.

6·3 Samples for Testing

6·3·1 The Manufacturer shall supply, free of charge, the materials required by the Inspecting Officer for testing purposes and shall provide the necessary facilities and apparatus which may be required for carrying out the test called for by this specification and other standard specifications.

6·3·2 Test samples will invariably be selected by the Inspecting Officer or his representative and will remain the property of the Government.

Alternatively, A second cord of 30cmlength is weighed (M). Cut the cord through the length, the PVC cover is removed and weigh the PVC (M1). Separate the cotton yarn (i.e. enclosed material of PETN) and weigh (M2). The mass of PETN shall be estimated by difference [M-(M1 + M2)] and charge mass as g/m is calculated.

(c)

6.4 Submission and Inspection

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

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

6.4.3 If the Inspecting Officer's examination of a proportion of batch of material, submitted to him reveals departures from the specification, the whole batch may be rejected.

6.5 Replacement by Manufacturer

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

6.5.2 If the materials or finished or partly finished cords are expended or damaged in examination or test as stipulated in this specification or elsewhere as a condition of acceptance, the Manufacturer shall be required to replace or repair, free of charge the number so expended or damaged, which become the property of the Government.

6.6 Method of Inspection

6.6.1 From a lot of 3000 metres, two samples of 30 cm (selected at random) from either end shall be inspected as follows. The length of the sample cord should be measured accurately and ends cut off square with a sharp knife.

6.6.1.1 Visual Inspection and checking of dia and mass

(*a*) Sample cords are inspected visually to ensure that they are uniform with smooth finish and have specified colour.

Note : Non-uniform coating will result from

(*a*) rough surface

(*b*) inclusion of foreign matter/and unplasticised PVC

(*c*) formation of pin-holes due to absence of coating.

(*b*) Using a micrometer screw gauge, the diameter of one sample cord is measured at three points on the length. Mean of these three measurements is recorded which shall lie between the limits stipulated in para 5.1. Care must be taken not to distort the cord and the gauge must be tightened slowly until the Cord is gripped so gently that it is just free to slide through the jaws of the gauge.

(*c*) A second cord of 30 cm length is cut through the length and the PVC cover removed. PETN is then carefully taken out on a clean sheet of white paper and weighed. The mass of plastic covering is also recorded. The mass of PETN and plastic covering should not be less than that stated in paras 5.6 & 5.7 respectively. * see slip attached . . . . (c)

6.6.2 Should the cord fail to meet the above requirements, two further sample cords shall be selected at random for re-inspection. Any cord failing at re-inspection, will entail rejection of the lot represented by the sample.

7 PROOF

7·1 Samples for proof will be selected and sealed in accordance with the proof schedule enclosed as Appendix to this specification.

Note :- Sentencing will be done by the Inspecting Officer or by the CI(A) when so intimated.

7·2 Should proof or examination reveal a prevalent type of defect, further samples may be taken, not only from the particular lot or lots affected but also from associated lots manufactured by the Manufacturer. Any failure or defect found at this further proof or examination may entail rejection of the lots concerned without reference to the results of previous proof.

8 PACKING AND DELIVERY

8·1 The cord is to be supplied in lots of approximately 3000 metres divided into reels of 150 metres in length. If provision of single 150 metres lengths is not convenient, this quantity may be made up of not more than three portions. The smallest portion should be at least 10 metres in length, which shall be spliced with the other portion/portions. When two or three lengths are supplied on a reel, they must be of the same lot.

8·2 After examination, the lot number, date of manufacture, number and length of pieces shall be stamped by the Manufacturer on the reel on which the cord is wound.

8·3 Care must be taken to ensure that all ends including two ends spliced together, are sealed with rubber sleeve to drawing No. ITX 223 and then secured by Tape Adhesive Water-proof, Fabric.

8·4 The Cords are to be wound on reels to drg No. ISV 848. The method of packing the reels will be as per Package Ammunition, 79A to Drawing No. ISV 240 GA.

8·5 The packages are to be correctly painted and stencilled as shown on the stencilling drawing No. CIA/AMN/ST/122, Part packages will in addition be clearly labelled or stencilled 'PART BOX' on each end in Red paint.

9 RESPONSIBILITY FOR SAFETY

9·1 Nothing in this specification shall relieve the Manufacturer of his responsibility for the safety of his operations.

Revised and approved

Sd/-x x x x x
(BS YADAV)
Major
DA CIA
for CONTROLLER OF INSPECTION (AMN.)

Kirkee, Pune-411 003

Dated 25-11-78

Correct copy of the sealed Specification at this date.

EMC VIJAYAKUMARAN
DAO
for CONTROLLER OF INSPECTION (AMN.)

Kirkee, Pune-411 003.

Dated 03/05/2007

* "To prevent exposed PETN from interfering with the test, close the free ends of cord receptor by "Tape Adhesive Transparent".

[illegible]

* "In order to keep both the lead bars parallel to each other, 3 wooden distance pieces be placed as shown in the sketch. The distance pieces should be cut to the following dimensions :–

25mm length x 5mm height x 3mm width".

[illegible] 4.1(a)(ii)

APPENDIX TO SPECN No. CIA 0516

SCHEDULE OF PROOF AND SENTENCING CONDITIONS

CORD DETONATING 'A'

For the purpose of tests/proof, cords will be batched in the lots of 3000 metres approximately.

PROOF SAMPLES

The following samples will be taken from each lot :—

(*a*) One 2·2 metres sample for sensitiveness test.

(*b*) One 90 cm sample for waterproofness test.

(*c*) One 2 metres sample from every fifth lot for resistance to cold test.

(*d*) One 1·80 metres sample from every tenth lot for high temperature test.

SELECTION OF SAMPLES

All samples for test/proof will be selected by the Inspecting Officer from either end of different lengths (reels) of cord pertaining to the same lot.

The size of test/proof sample may be varied at the discretion of the Inspecting Officer and proof may be taken from any lot to confirm whether an unacceptable proportion of defectives is occuring.

PROOF CONDITIONS AND PERFORMANCE

The following tests will be carried out :—

(*a*) *Sensitiveness Test* :

(i) Cut one 30 cm and another 40 cm lengths of cord to act as receptor and initiator respectively and join them by means of adhesive tape as shown in CIA sketch No. ~~CIA/P.P./HH/45~~ CIA/P&R/1350 (enclosed) so that they lie parallel over a distance of 30 cm and are separated with a gap of 3 mm by means of four accurately cut wooden distance pieces, placed 5 cm apart and cut to the following dimensions :—

25 mm length × 5 mm height × 3 mm width.

(ii) To prevent the exposed PETN from interfering with the test, close the free ends of the ~~cord with rubber sleeves to drg IPX 223~~. by "Tape adhesive Transparent." ※ ..... See slip attached.

(iii) By means of adhesive tape strap No. 27 detonator and a 30 cm length of Safety Fuze No. 11 to the far end of the initiator length and place the receptor length between and in contact with two lead bars, 30 cm long × 40 mm wide × 12·5 mm thick made out of lead sheets to Specn IS : 405–1961 (chemical composition as per para 5·1·2). If more than one shot is to be fired, 45 cm (or more if necessary) of safety fuze should be used. ※. See slip attached.

(iv) Fire the initiator length. Inspect the lead bars, which will show indentation if propagation has been successful. Failure is indicated by the presence of residual cord and by the absence of groove marks on the bars ("Plate-marks").

(v) Repeat the test three times with 3 mm distance pieces and report the results.

(*b*) Immersion Test (Water proofness test)

(i) *Apparatus :* The pressure vessel consists of a steel cylinder 105 cm long overall × 25 cm internal diameter, which can be filled with water and maintained under any pressure between 0 and 414 kPa by means of compressed air from the service mains.

(ii) *Method :* Cut the cord to be tested into 90 cm length, making sure that the cuts are square, and seal the ends as follows :—

Melt two parts by mass of bitumen with one part of ceresine wax at the temperature of a boiling water bath. By means of a pair of tongs immerse one of the small copper cups designed for the purpose, in the mixture and fill to the brim. Allow the mixture to cool for a few seconds, introduce one end of the cord into the cup and allow the mixture to solidify. Re-dip the capped end of the cord in the sealing mixture, withdraw it and allow it to cool. The other end of the sample will also be sealed likewise. Fill the pressure vessel with water to a suitable height. The water may be coloured red by addition of a little rhodamine. Immerse the sealed piece in water in such a way that the ends are just above the level of water. Close the vessel properly and apply a pressure of 207 kPa for 16 hours.

Withdraw the sample, wipe it free from water, cut each length in the middle and at the ends and examine the cut ends for evidence of penetration of water, Report the results.

Note :— In case of doubt, weigh the cord length before immersion in pressure vessel and reweigh after immersion test. The increase in the mass will indicate penetration of water.

(*c*) *Resistance in Cold test :* Wind approx 2 metres of cord spirally on a mandrel or rod of 4 cm diameter and store it at −25°C temperature for 24 hours. Immediately after withdrawal from cold chamber, the cord is to be unwound and examined to ensure that outer plastic cover does not show any cracks.

(*d*) On completion of the 'Immersion' and 'Resistance to cold' tests, the samples of cord will be subjected to firing proof to ascertain their performance. The firing proof will be carried out as follows :—

The sample cord will be initiated by means of safety fuze No. 11 (45 cm long) and Detonator No. 27. The other end of the cord will be secured to a ~~CC Primer~~ which will be kept on a steel plate 10 cm × 10 cm × 0·32 cm. On firing, the primer should puncture the plate.

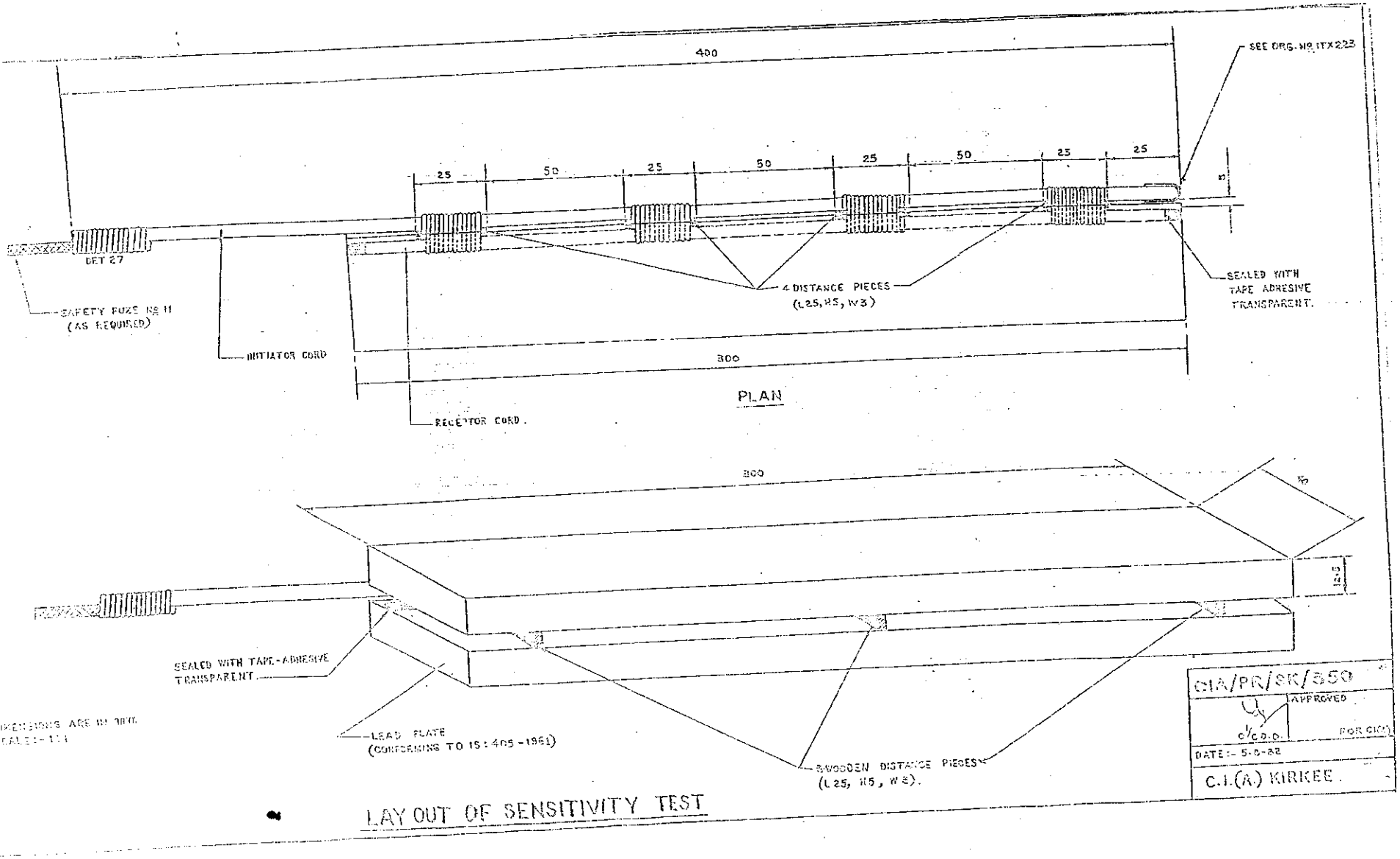
(*e*) *High Temperature Test :* A 1·80 metres sample will be placed in water at temp. 49°C for 4 hours. It will then be tested in the same manner as for sensitiveness test as per para 4·1 (*a*) above, except that no further wetting should be done. The sample should be still hot when tested.

5 SENTENCE ON PROOF RESULTS

5·1 If the results of Proof at conditions mentioned above are satisfactory the lot will be accepted.

5·2 In the event of a failure at any of the above conditions of proof, a double reproof under condition at which failure occurs may be taken at the discretion of the Inspecting Officer. Any failure at double reproof or more than one failure at first proof will entail the rejection of the lot represented.

5·3 Any performance at proof indicating lack of safety in service will entail rejection of the lot or lots concerned.



LAY OUT OF SENSITIVITY TEST