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Specifications  
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vide COA (ME) IND/ME/790(a)

17212/62 Supersedes IND/ME/551(b)

DT-6 Nov. 14

DC NO. 3754-ME

12-12-2002

for G. I. M. V. Carbox

TAPE, ADHESIVE, WATERPROOF, FABRIC

- (i) <sup>for 12.4mm width</sup> (Ds cat NO. 7510-002208)
- (ii) for 19.01mm ~~width~~ width - 7510-002-242
- (iii) for 25.04 " " - 7510-002-243
- (iv) for 37.0 " " - 7510-002-244
- (v) for 50.0 " " - 7510-002-245

<u>APPROVAL REFERENCE</u>	<u>DATE OF APPROVAL</u>	<u>APPROVAL AUTHORITY</u>
0746/115/DGI (Arm-13)	dt. 17th June 77	D.I. (Armts)

CONTROLLERATE OF QUALITY ASSURANCE (MILITARY EXPLOSIVES)

KIRKEE, PUNE - 411 003.

DEPARTMENT OF DEFENCE PRODUCTION

MINISTRY OF DEFENCE.

गु. यो. स. अनुभाग  
Q. P. C. SECTION  
आ. नि. खुमरिया जयपुर  
O. F. K. JAIN

पत्र संख्या  
दिनांक 10/1/2012  
बिल संख्या COA (ME)  
दिनांक 7204/260  
28 Dec. 2011

No. Pradaka-As  
26/12/11  
No. P. Rao  
JSD



RECORD OF AMENDMENTS

Amendment list No.	Subheading to which amendment pertains	Authority	Incorporated by Name & Rank in block letters	Initials
1	2	3	4	5
DC NO 3547-ME 10/12/98	clause 4 descriptions H. 2 after last line Add ② clause 9.1 Add slno 5 ③ Existing slno. 5 to 12 Renumbered as 6 to 13 ④ Add Appendix 'A'			VMC
DC NO 3754-ME 12.12.2002	Page - 3, Top para last line			



3. INFORMATION TO BE SUPPLIED BY THE PURCHASER

3.1 The purchaser shall stipulate in his tender enquiry/  
supply order, A/T, or indent, the following details of his requirements :

- (a) Colour of the waterproofing of the tape adhesive, if it is other than black.
- (b) Width of the tape adhesive.
- (c) Length of tape adhesive in a roll.
- (d) Schedule of supply.

4. DESCRIPTION

4.1 The tape adhesive shall consist of a suitable quality of fabric, waterproofed on one side by nitrocellulose based black ~~waterproof coating~~, or any other suitable colour waterproof coating and primed on the other side with pressure sensitive natural rubber or synthetic rubber based adhesive composition which shall be off white. The width of tape adhesive shall be in accordance with the requirements of contract or supply order. There shall be no joint in the rolls of 25 metre length and not more than one joint in rolls of 50 metre length.

4.2 The tape adhesive shall be of good finish and get up, and free from pin holes, defects like off-setting unwinding and deformation. Each roll shall be free from loose batching, telescoping, cupping, air-pockets, oozing out of adhesive priming on sides and there shall be no sign of reaction between the priming and waterproof backing as indicated by the dulling of waterproof backing. The sides shall be clean-cut, free from any loose threads. The adhesive priming shall be uniformly spread without any voids or blisters and the quantity of adhesive priming shall be so adjusted that the waterproof backing shall not be visible. *Add see slip attached* ⊗

4.3 Unless otherwise agreed to between the purchaser and the supplier, the colour of the waterproof backing of the tape adhesive shall be black.

5. TENDER SAMPLE

5.1 The contractor shall submit a tender sample of minimum four rolls of length 25 to 50 metres each, free of charge, essentially from the same batch/lot of manufacture and conforming to this specification. (Alternatively, the length and the width of the tender sample shall be as stipulated in the contract).

..5/-

⊗ Add

The composition of  
(a) water proof coating  
and (b) Adhesive priming  
shall be of such quality  
that they will remain  
firmly anchored (Adhearing)  
to the base cloth, on which  
they are coated during the  
service life of the tape

6. PRE-INSPECTION

6.1 Before tendering the store to the Inspector, the contractor shall carry out a thorough inspection of each delivery to satisfy himself that the store fully conforms to this specification and shall render a certificate to that effect to the Inspecting Officer.

7. INSPECTION

7.1 The tape, adhesive, waterproof, fabric and the packages in which it is contained, shall be subject to inspection by and to the final approval of the Inspecting Officer/Inspecting Authority.

7.2 Samples of tape adhesive and the packages may be taken from any portion of the consignment.

7.3 If, on examination, any sample be found not to conform to this specification, the whole consignment may be rejected.

7.4 The foregoing provisions shall apply equally to prime contractors and to sub-contractors, if any.

8. SAMPLING

8.1 Normally four representative rolls from each batch/lot shall be drawn. However, the number of samples/rolls to be drawn will be at the discretion of the Inspecting Officer.

9. TEST REQUIREMENTS

9.1 Samples drawn from any portion of the supply shall be in accordance with clause 4 above, and with the requirements as may be laid down in the contract. In addition, it shall also comply with the following test requirements.

Sl. No.	Characteristics	Passing Standard	Test Method
1	2	3	4
1.	Tolerances on width		
	(a) 6 mm to 12 mm	± 0.5 mm	
	(b) 13 mm to 25 mm	± 1 mm	
	(c) 25 mm to 100 mm	± 2 mm	

1	2	3	4
2.	pH of water extract, Min Max.	5.5 8.0	Appendix A for preparation of water extract & method No 5(b) of JSG 0112:1991
3.	Chlorides, calculated as sodium chloride (NaCl) percent, Max.	0.05	Appendix A for preparation of water extract & method No 7(b) of JSG 0112:1991
4.	Sulphates calculated as sodium sulphate, (Na <sub>2</sub> SO <sub>4</sub> ) percent, Max.	0.25	Appendix A for preparation of water extract and method No 8 of JSG 0112:1991.
5 <sup>②</sup>	Sec. slip attached		
6	Tensile strength, KN/m, Min.	5.30	Appendix B to this specification.
7 <sup>5</sup>	Adhesion to metal (as received) Rate of stripping in 25 minutes, mm, Max.	25	Appendix C to this specification.
8 <sup>7</sup>	Adhesion to self (as received) Rate of stripping in 25 minutes, mm, Max	25	Appendix D to this specification.
9 <sup>8</sup>	Keeping quality (a) Ageing at 50°C ± 1 deg C for 72 hours. 1) Visual Examination	a) Shall show no signs of deterioration like off-setting, loose-gaps, brittleness of water-proof coating, peeling of priming etc. b) Shall show no apparent signs of reaction between adhesive priming and waterproof coating as indicated by the dulling of the water-proof backing & change of colour of the adhesive priming.	Appendix E and Appendix C & D to this specification

SL No.	Characteristic	Passing Standard	Test Method
5.	Unwinding/ stripping off test	The unwound ing Tape Must not show (a) The trans. cification for of water proof Coating to Adhesive Priming and (b) The Transfer of Adhesive Priming to water proof coating.	Appendix 'M' of this specification

Existing AL No. 5 to 12  
Renumbered as 6 to 13

Add Appendix 'M'  
Unwinding/ stripping off Test

Unwind the tape and discard the first 1 to 1.5 metres length tape. Then hold the tape, in one hand and unwind it by pulling with other hand, to a length of about 5 (Five) Metres, observe both sides of the unwound tape, to check for the transfer of water proof backing on to Adhesive priming, to water proof backing, and Note the observations for the test.

1	2	3	4
ii) Adhesion, Rate of stripping			Appendix 'E' and Appendices 'C' & 'D' to this specification.
a) To metal, in 15 minutes, mm, Max.		25	
b) To self, in 10 minutes, mm, Max.		25	
b) Ageing at 70°C ± 1 deg C for 168 hours.			Appendix 'H' to this specification.
i) Visual examination.		i) Shall show no significant signs of end lifting, shrinkage or displacement from the position.	
		ii) Shall be able to strip out clean both from metal surface & self after cooling at ambient temperature and conditioning at 27°C ± 2 deg C for minimum 1 hour & then shall have sufficient adhesion to the metal surface.	
		iii) Shall show no signs of brittleness of the waterproof backing, after cooling at ambient temperature & conditioning at 27°C ± 2 deg C for minimum 1 hour.	
10 Moisture vapour permeability, g/m <sup>2</sup> Max.		250	Appendix F to this specification.
10 Flexibility, limpness value, mm, Min.		<del>250</del> 100	Appendix G to this specification.

..8/-





10.1.2 Each roll in the package shall have inter-leaving of waxed paper or cellophane or polythene film and convenient No. of rolls of the same diameter shall be suitably wrapped in a polythene film and then packed in an approved dust proof tin container/plastic container/carton to prevent ingress of dust and moisture into the package. The mass of each such package shall not exceed 6.0 kg.

10.1.3 In case the rolls are being packed in card board container/cartons the rolls shall be pre-packed in polythene bag made of polythene film of minimum thickness 0.13 mm and heat sealed to prevent deterioration of the store due to ingress of moisture.

10.1.4 The appropriate number of metal/plastic/card board containers shall be finally packed in a wooden box fit for transit by rail/road.

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

10.2 MARKING

10.2.1 Each roll shall be legibly and durably marked or stamped to show :-

- i) Length correct to complete metres.
- ii) Width in mm.
- iii) Lot or batch No.
- iv) Date of manufacture.
- v) Manufacturer's initials/recognised trade mark.

The marking/stamping shall be on the body(side-ways) of the roll/or on the central core and not on a separate packing note.

10.2.2 The external packages constituting a consignment shall be legibly and durably marked with the following details as applicable:

- i) Nomenclature, specifying width and specification number.
- ii) Name and address of the consignee.
- iii) A/T/S.O. No. and date.
- iv) Consignment No.
- v) Distinctive lot No. and date of manufacture.
- vi) Consecutive No. of package and total No. of packages.
- vii) No. of rolls and quantity in a/c unit in each package.
- viii) Date of supply.
- ix) Contractor's initials or recognised trade mark.

10.2.3 In addition to above, the Inspecting Officer may suggest some more marking/identification at the time of inspection.

11. SHELF LIFE

11.1 When stored in approved packages and under normal conditions of temperature, the material is expected to have a shelf life of one year from the date of inspection of the <sup>minimum</sup> material.

Sd/ x x x x

(Dr. SURJIT SINGH)

DIRECTOR

CONTROLLERATE OF INSPECTION (MILITARY EXPLOSIVES)  
for DIRECTOR OF INSPECTION (ARMAMENTS)

12. APPENDICES

APPENDIX 'A'

PREPARATION OF WATER EXTRACT

Add 10 g of material, cut into small pieces, to 400 ml of boiling distilled water. Stir well and allow to stand for 18 hours with suitable precautions against contamination by atmospheric impurities.

Stir the material again and allow to stand for one more hour. Decant the extract into a beaker, filtering if necessary through a dry sintered glass filter and discarding the first 25 ml of filtrate.

APPENDIX 'B'

DETERMINATION OF TENSILE STRENGTH

Determine the tensile strength in the testing machine with a test length of 180 mm between the jaws and with the rate of traverse of the lower jaw of approximately 460 mm per minute. Just prior to testing the test strips shall be conditioned for at least 16 hours at  $27 \text{ C} \pm 2 \text{ deg C}$  and relative humidity  $65\% \pm 2 \%$ .

APPENDIX 'C'

ADHESION TO METAL

The surface shall be a polished aluminium plate 200 mm x 100 mm mounted on a suitable frame so that it can be laid horizontally and erected vertically.

The tests shall be carried out after conditioning the tape at  $27^{\circ}\text{C} \pm 2 \text{ deg C}$  for minimum 1 hour.

Lay the frame to which the aluminium plate is attached horizontally on a bench. Clean the polished aluminium surface with toluene or other suitable solvent allow to dry, and then polish with a dry cloth.

Wind off a piece of tape adhesive about 500 mm long after discarding first 5 metres from the roll taking care not to touch the centre portion of the piece with the fingers.

Place one end of the piece of tape adhesive on the plate with the adhesive side downwards, so that the tape adhesive runs along the centre of the plate and is a parallel to the longer sides of the plate. Place a cylindrical 2.3 kg weight, approximately 100 mm in diameter, on one end of the plate and roll it along the tape back in the opposite direction, and again in the first direction, so as to traverse the length of tape adhesive on the plate three times. The time taken to complete each traverse should be 10-12 seconds.

Erect the frame to the vertical position and after an interval of 5 minutes, attach a stripping weight equivalent to 33 g per 10 mm width of the tape adhesive to the free end of the tape. Double back the tape adhesive so that the two waterproofed surfaces are approximately in contact with the weight hanging freely, without touching the plate.

APPENDIX 'D'

ADHESION TO SELF

Mount a piece of the tape adhesive under the same conditions as described in Appendix 'C' but carry the free end beyond the end of the plate and over the back of the frame, so that it cannot strip off. Select a second piece of tape with the same precautions and lay it with the adhesive side down along the waterproofed side of the piece already mounted.

Place a cylindrical 2.3 kg weight approximately 100 mm in diameter on one end of the plate and roll along the tape, back in the opposite direction and again in the first direction so as to traverse the length of tape adhesive of the plate three times. The time taken to complete each traverse should be 10-12 seconds.

Erect the frame to the vertical position and after an interval of 5 minutes, attach a stripping weight equivalent to 33 g per 10 mm width of the tape to the free end of the tape. Double back the tape so that the two waterproofed surfaces are approximately in contact, with the weight hanging freely, without touching the plate.

#### APPENDIX 'E'

##### DETERMINATION OF KEEPING QUALITY

A complete roll as received shall be kept at  $50^{\circ}\text{C} \pm 1 \text{ deg C}$  for 72 hours in horizontal position on a glass or aluminium plate.

It shall then be withdrawn and allowed to stand at ambient temperature for 24 hours. After this period visual examination will be carried out. Adhesion test shall be carried out on the tape as described in Appendices C and D after conditioning the tape adhesive at  $27^{\circ}\text{C} \pm 1 \text{ deg C}$  for minimum 1 hour.

#### APPENDIX 'F'

##### DETERMINATION OF MOISTURE VAPOUR PERMEABILITY

The apparatus required is a box made of non-corrodible metal like stainless steel with external dimensions approximately 100 mm x 40 mm x 15 mm, closed completely except that the top has a centrally placed rectangular opening 80 mm long and 10 mm or 5 mm wide and the opening is sealed perfectly with the tape with clear margin on all sides, to prevent any ingress of moisture from the sides. The mass of the box shall be kept as minimum as possible.

Take a piece of convenient length of tape and stretch it under a load of approximately 0.9 kg/10 mm width by suitable means and allow it to remain in the stretched condition for 5 minutes. Remove the tape from the clamps and press it down firmly over the opening in the box containing about 5 g of dry calcium chloride. Trim off any overlap of tape. Weigh the sealed box and place it in a desiccator containing water and then place the desiccator in an oven at  $40^{\circ}\text{C}$ . After 24 hours remove the box from the desiccator, allow to cool, wipe off any adherent moisture with a clean cloth, and reweigh. From the moisture vapour permeability per 24 hours thus determined, calculate the permeability  $\text{asg/m}^2$  (according to the dimensions of opening depending on the width of tape as described in the previous para).

DETERMINATION OF FLEXIBILITY ( LIMPNESS VALUE )

Two rigid strips of thin metal, about 20 mm in width and at least as wide as the tape to be tested, and a suitable clamping device are required.

Maintain the sample roll at  $27^{\circ}\text{C} \pm 2 \text{ deg C}$  and  $65\% \pm 2\% \text{ R.H.}$  for at least 24 hours and test in these conditions.

Remove a test piece radially from the roll at a rate of approximately 300 mm per second. Adhesive tape of width over 50 mm shall be removed at a rate of 150 mm to 200 mm per second. Lay about 340 mm of the test piece adhesive side up on the bench and place the two metal strips on the tape so that their inner edges are exactly 300 mm apart and normal to the tape.

Pick up the tape by the metal strips and form into a heart-shaped loop, adhesive side innermost and with the metal strips turned over to bring the non-adhesive faces into contact and the strips in alignment. Secure the metal strips in a clamp so that the loop is freely suspended and hanging vertically. Allow the loop to hang for 5 minutes, then measure the distance in mm from the upper edge of the metal strips to the bottom of the loop.

Record this distance as the limpness value.

APPENDIX 'H'

DETERMINATION OF KEEPING QUALITY

(Ageing Test at  $70^{\circ}\text{C} \pm 1 \text{ deg C}$ )

Prepare an aluminium plate and apply a 150 mm long sample of the material, each to the plate and to itself by the method described in Appendices 'C' and 'D' above.

Keep the plate in a vertical direction for 168 hours in an oven, in which temperature is maintained at  $70^{\circ}\text{C} \pm 1 \text{ deg C}$  and the air is constantly circulated.

Observe the samples for any defects, as indicated in clause 9.1 Sl.No.8(b).

DETERMINATION OF RESISTANCE TO WATER

Prepare an aluminium plate and apply samples of the material each to plate and to self by the method described in Appendices 'C' and 'D' above.

Keep the plate immersed in water at a temperature of  $27^{\circ}\text{C} \pm 2 \text{ deg C}$  for a period of 24 hours.

At the end of the period, drain off/wipe out any water from the surface and examine the sample for any defect as indicated in clause 9.1 Sl.No.8 of the test requirements. Also subject the samples to test for adhesion to metal and self as described in Appendices 'C' and 'D'.

APPENDIX 'K'

STRIPPING LOAD TEST

- (a) A rectangular steel test plate of stainless steel to specification En 58.D of B.S.1449 (1948) with on one face a standard abrasive satin finish (180 grit) as known to the trade with the direction of gritting lying parallel to the long sides of the plate.

The plate shall be 2.5 mm thick and shall not be bowed in any direction and shall be marked at 5 mm intervals along its longer edges as shown in fig.1. A convenient size of plate is 200 mm x 100 mm.

- (b) A toluene vapour bath using sulphur free grade toluene. A suitable bath is shown diagrammatically in fig.3.
- (c) A tensile testing machine, the moving jaw of which traverses at a constant rate of 300 mm/minute and which is equipped with a continuous load indicating device calibrated in 25 g.

Procedure :

Conditioning of sample : The sample roll should be conditioned for 24 hours at  $27^{\circ}\text{C} \pm 2 \text{ deg C}$ . The test piece shall be taken from the roll and applied to the plate and tested under the same condition.

Preparation of plate : Clean the face of the test plate with a fresh piece of clean cotton wool saturated with sulphur free grade toluene. Allow the cleaned plate to dry. Suspend the plate in the toluene vapour bath for 5 minutes, after the vapour line has reached the top of the plate so that no liquid is in contact with plate. Allow the plate to cool for about 30 minutes at about  $27^{\circ}\text{C} \pm 2 \text{ deg C}$  and relative humidity  $65\% \pm 2 \text{ percent}$  and immediately apply the test piece.

APPLICATION OF TEST PIECE : The test piece of 50 mm width shall consist of a 600 mm length of the adhesive tape removed radially from the roll at a rate of 300 mm/second or if width is more than 50 mm tape should be removed radially from the roll at the rate of 150 mm to 200 mm/second. The width which is more than 50 mm shall be cut to 50 mm with sharp blade. The portion applied to the plate must not be allowed to touch any object prior to application. Place the prepared plate, test surface upward, at the edge of the bench with end B (see fig 1) nearer the operator. Apply the tape without stretching to the plate so that the test piece lies centrally on the plate and parallel to the longer sides with about 250 mm over hanging and B taking care that no air hubbles are trapped between tape and plate. Cut off the excess tape over hanging end A.

Allow the plate with applied sample to remain undisturbed for 5 minutes to 6 minutes at  $27^{\circ}\text{C} \pm 2 \text{ deg C}$  and relative humidity  $65\% \pm 2 \text{ percent}$ .

STRIPPING OF TEST PIECE FROM PLATE :

Double back the free end of the test piece and strip 25 mm to 50 mm from the plate end B. Attach end B of the plate to the traversing jaw of the machine and grip the free end of the test piece in the upper jaw, ensuring that the free tape is parallel in both planes to the applied tape and that there is no friction between them. Set the traversing jaw in motion at 460 mm per minute by using a spring balance suitably fitted to the upper jaw and the stripping off end of tape to the spring balance and record the readings at five consecutive 25 mm interval marks. Calculate the average and give the value for adhesion.

ADHESION TO SELF : Prepare the plate and apply a test piece to it by the method described in paras (a) (b) and (c). Turn the free ends over on to the back of the plate removing the surplus. Complete the test as described above by applying the second test piece to the test piece on the plate so that they are precisely coincident.

(2) AFTER AGEING : Condition the sample roll at  $50^{\circ}\text{C} \pm 1 \text{ deg C}$  for 72 hours as described in appendix E. STRIPPING LOAD TEST shall then be carried out on the tape as described above after conditioning the tape adhesive at  $27^{\circ}\text{C} \pm 1 \text{ deg C}$  for minimum one hour.

(3) AFTER IMMERSION IN WATER : When the material is applied to the standard plate as described above (under "application of test piece") and then immersed in water at  $27^{\circ}\text{C} \pm 2 \text{ deg C}$  for 24 hours, and then tested as described above, adhesion to metal shall not be less than 180 g/10mm.

XXXXXXXXXXXX

APPENDIX 'L'

IDENTIFICATION OF N.C.

Fix a piece of Tape adhesive (25mm long) on the watch glass. Put 2 to 3 ml of acetone on the backing of tape. Allow it to trickle down from the tape to the watch glass. Allow it to evaporate. Add one drop of Diphenylamine indicator. The blue coloration indicates the presence of N.C.

————— x —————



DRG. NO. FIG. 177 b

DIMENSIONS ARE IN MM.

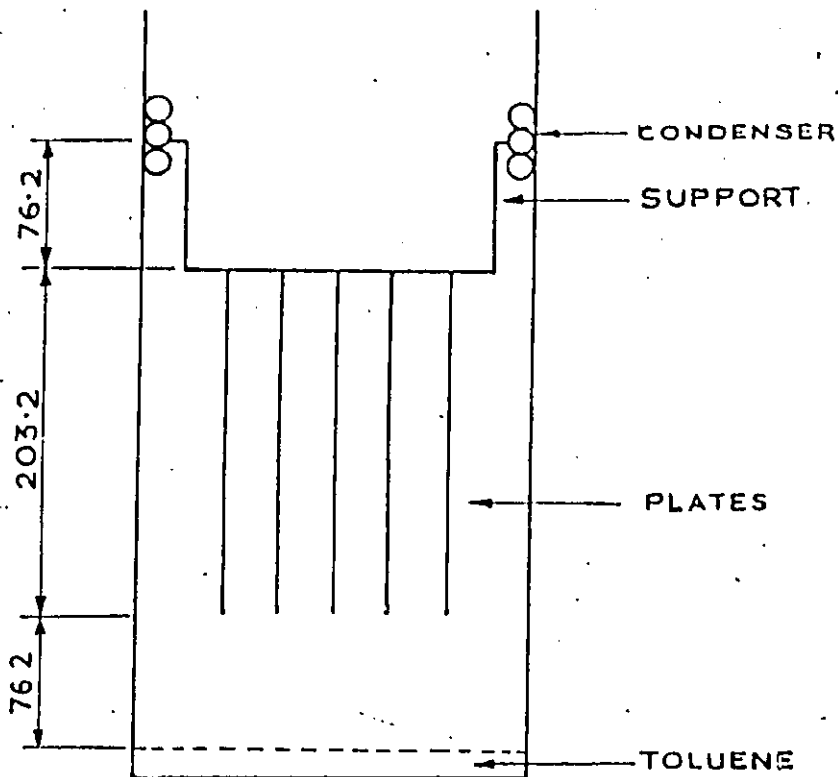


FIGURE-3  
PLATE FOR ADHESIVE STRENGTH TEST.

DRG N<sup>o</sup> FIG 177  
CQA (ME) KHADKI.

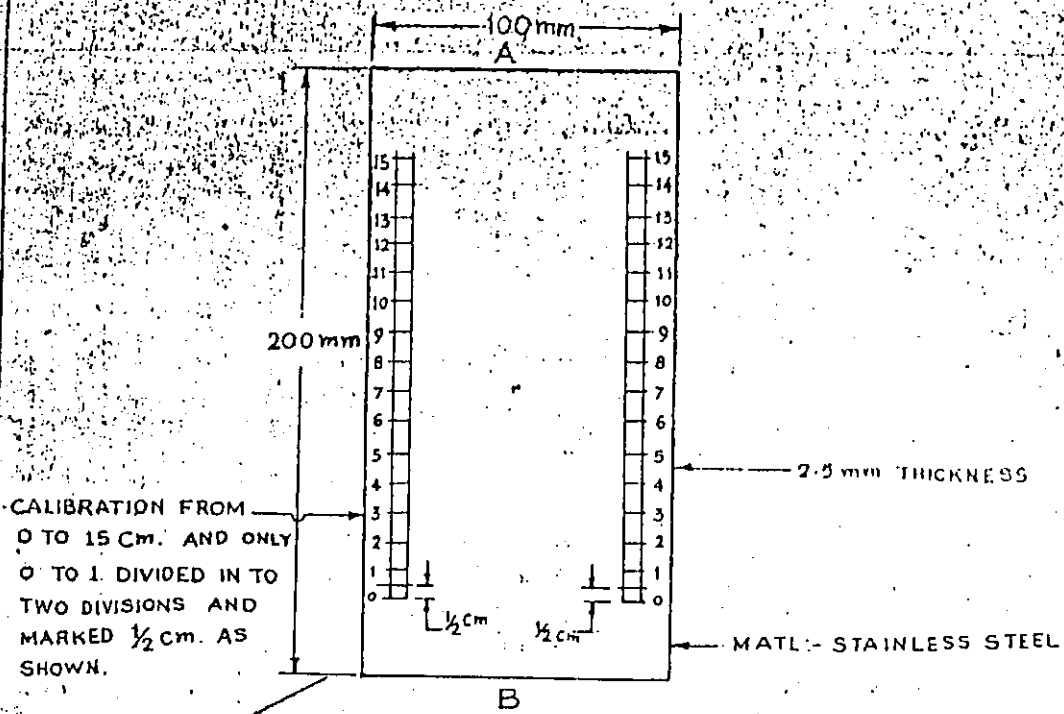


FIG. 1  
PLATE FOR ADHESIVE STRENGTH TEST

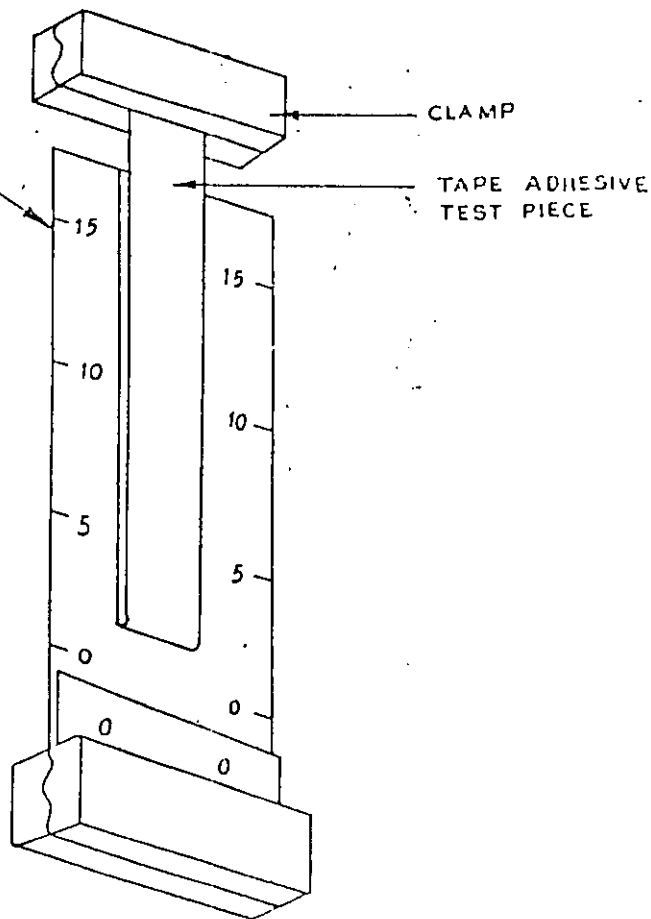


FIG. 2  
PLATE FOR ADHESIVE STRENGTH TEST

CIP/20

DRG NO  
FIG. 177 a

IND/ME/TJOC(L)

NOV. 68

REF - SPECN: C.S 1336 D