APPENDIX "D"

RAILWAY STORES SPECIFICATION NO.: 585

SLR SPECIFICATION FOR GLASS REINFORCED NYLON RAIL INSULATORS FOR 20(A) RAILS FOR 80 LBS. RAIL SEAT, 83 RAILS FOR 88 LBS. RAIL SEAT & 90(A) RAILS FOR 88 RAIL SEAT

SPECIFICATION AND TESTS

The use of equivalent National Standards to these quoted is permissible subject to the agreement of Sri Lanka Railways.

SCOPE:

This specification details the requirements of rail insulators manufactured from Glass Reinforced Nylon 66.

INTRODUCTION:

Insulators are for use between the rail clip, the clip housing and the rail providing electrical insulation and should be in accordance with S.L.R. Drawing Nos. 20101, 20102 and 20103.

1 **RAW MATERIALS:**

The raw material shall be Nylon 66 with 30% to 35% glass fiber reinforcement. An additional ultra violet stabilizing agent shall be added to the raw material. A maximum of 10% clean reground insulator sprues may be added to the virgin raw material. The sprues are to be ground when still hot.

The raw material shall have the following properties:

1.1 **DENSITY:**

Test method DIN 53479 or ASTM D 792	1.3 - 1.45 g/cm^3

1.2 **MELT POINT**

Test method ASTM D 789	250^{0}C - 270^0 C

1.3 **ELECTRICAL VOLUME RESISTIVITY:**

Test method ASTM D 257 as moulded	min 2 x 10^{12} ohm cm
Conditioned as paragraph 2.1	min 2 x 10^{12} ohm cm

2 **MOULDED INSULATORS**

2.1 **WATER ABSORPTION (CONDITIONING):**

All insulators shall be conditioned in water at a minimum of 95 deg. C until they ha absorbed 0.8 - 1.2% of water by weight above their original "as moulded" weight.

2.2 **ULTIMATE TENSILE STRENGTH:**

Conditioned samples shall be fixed in a rigid clamp and a load shall be applied as sho figure 2.2 A minimum load of 450 kg. shall be applied to the insulator without fail occurring

2.5 HARDNESS:

Conditioned samples shall be tested for hardness using Rockwell scale R to test method ASTM D 785 procedure A. The average of two readings shall be taken.

The insulator hardness shall be a minimum of 95 Rockwell R.

2.6 DIMENSIONAL ACCURACY:

Samples shall conform to the dimensions and tolerance detailed on the relevant drawing and significant dimensions shall be checked with the appropriate block and angle gauges.

2.6 VISUAL INSPECTION:

The surface shall be cleaned and free from any evidence of gassing or burning. The sprue and any flash shall be cut off cleanly.

2.6 POROSITY:

Samples shall be sectioned through the retaining nibs as shown in figure 2.6. There shall be no evidence of porosity visible to the naked eye.

2.7 IDENTIFICATION:

In addition to carrying the manufacturing detail drawing number each moulding will be marked with the last two digits of the year of manufacture, a manufacturer's identification mark, a material identification mark and pattern number clearly visible in the position shown on SLR drawing.

GRN Insulators 80/90- Field shall be in Brown Colour	Drawing No.20103 :
GRN Insulators 88/90 – Field shall be in Black Colour.	Drawing No. 20101
GRN Insulators 88/90 – Gauge shall be in White Colour.	Drawing No. 20102

3. SCHEDULE OF TESTS:

3.1 RAW MATERIALS:

3.1.1. Raw material supplier shall submit with each batch of raw materials a statement confirming the compliance of the material to its relevant manufacturer's specification.

3.1.2. Tests detailed in paragraph 1.1, 1.2, 1.3 will only be required to be carried out of failure of acceptance tests 2.1, 2.2, 2.3, 2.4 2.5 and 2.6 indicate a possible fault on the raw material.

3.1.2.1 Tests detailed in paragraphs 1.1, 1.2, 1.3 if required shall be carried out by the relevant raw material supplier or a mutually acceptable independent testing authority.

3.2 MOULDED INSULATORS:

3.2.1 WATER ABSORPTION:

One sample for each 2000 insulators conditioned.

3.2.2 **ULTIMATE TENSILE STRENGTH:**

One sample for each cavity 2000 sprues produced.

3.2.3 **HARDNESS:**

One sample for each cavity for each 5000 sprues produced.

3.2.4 **DIMENSIONAL ACCURACY:**

One sample for each cavity for each 500 sprues produced.

3.2.5 **VISUAL INSPECTION:**

One sample for each cavity for each 500 sprues produced.

3.2.6 **POROSITY:**

One sample for each cavity for each 2000 sprues produced.

4. **RESPONSIBILITY FOR TESTS ON MOULDED INSULATORS:**

The test detailed in paragraph 3.2 shall be carried out by the moulder or a mutually acceptable independent testing authority.

5. **ACCEPTABILITY OF MOULDED SAMPLES:**

5.1 Prior to the commencement of bulk production, three insulators from each cavity moulded from the proposed raw material shall be tested as specified in paragraphs 2.1, 2.2, 2.3, 2.4, 2.5 and 2.6. Test results and test insulators shall be submitted to SLR together with the statement confirming the compliance of the material to its relevant manufacturer's specification.

An additional three conditioned samples from each cavity shall be sent to S.L.R. in their untested state.

5.2 Production may only commence on formal acceptance of these samples by SLR.

6. **RETEST:**

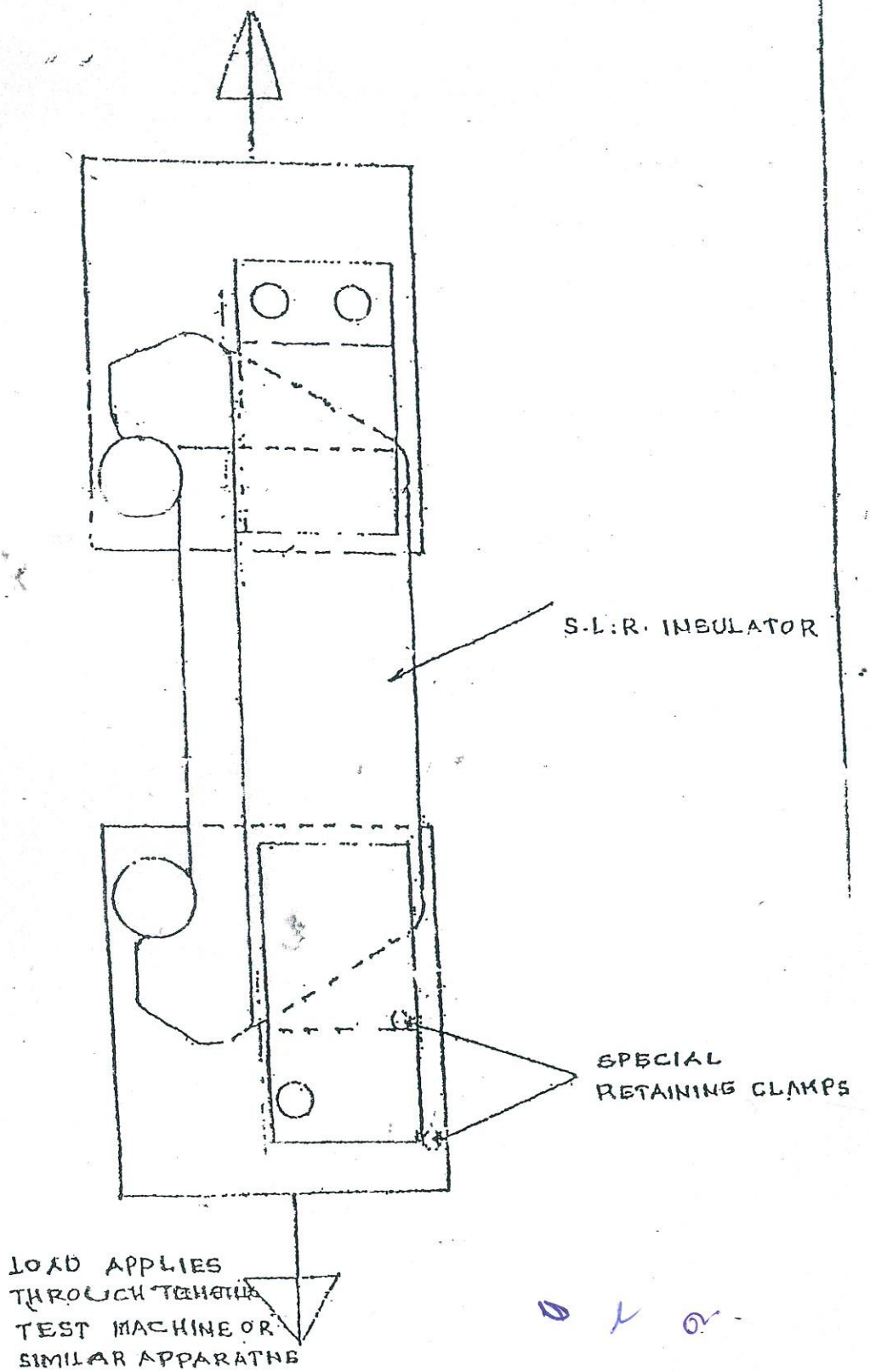
6.1 In the case the tests detailed in paragraph 2.1, 2.2, 2.3, 2.4, 2.5 and 2.6 all test result shall be treated as though they were independently obtained for each property.

6.2 In the event of a rejection the test, which failed shall be repeated by taking further samples at same frequency from the rejected production. If this repeat test results in a further failure the batch shall be rejected except in the case of water absorption, dimensional accuracy and visual inspection tests where the batch may be 100% inspected and resubmitted for acceptance.

7. **RETEST:**

All quality assurance records shall be available for a minimum period of five years.

ULTIMATE TENSILE STRENGTH OF INSULATOR



CRITICAL INSULATOR DIMENSIONS & ANGLES

NOTE :- ⊛ - THIS FACE TO BE FLAT WITHIN 0.5 mm

⊕ - MAXIMUM CONVEXITY ON THIS SURFACE OVER THE WHOLE LENGTH MUST NOT EXCEED 0.25 mm.

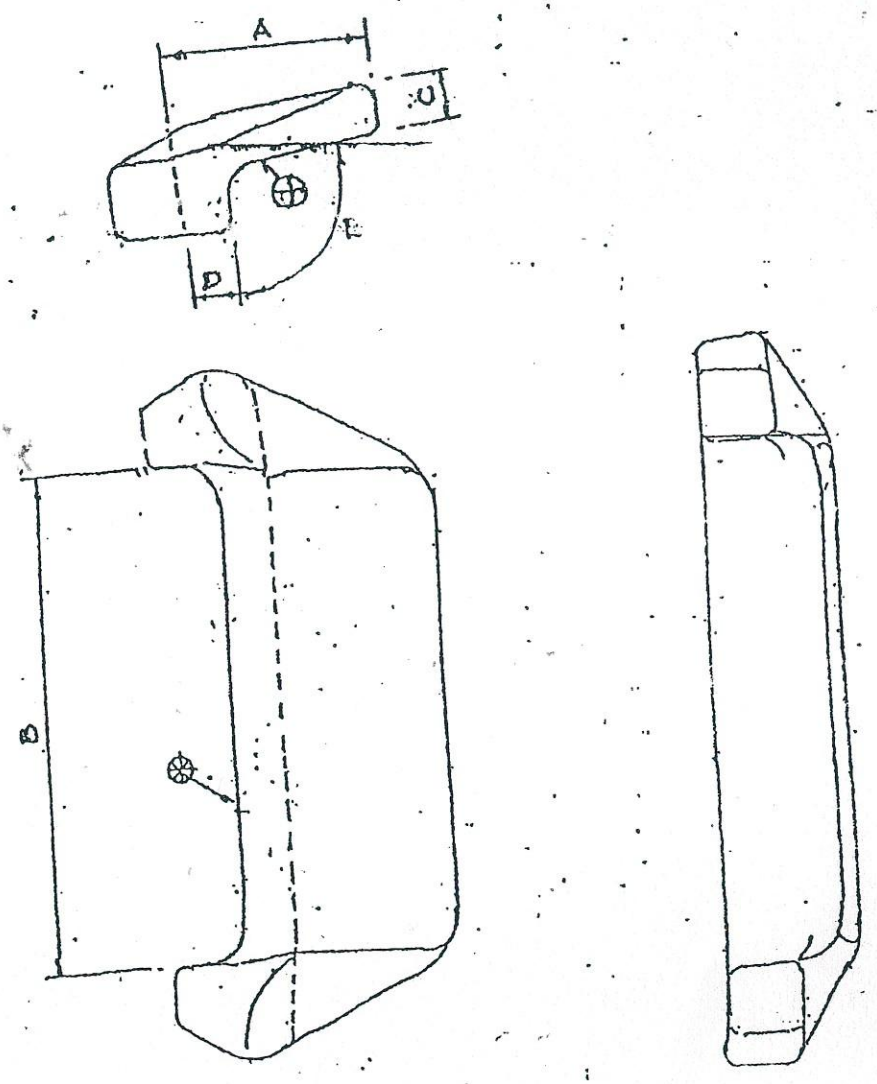
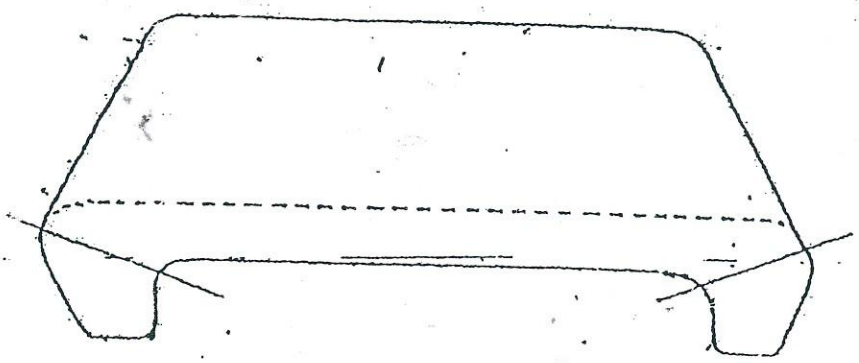


FIGURE 2.4

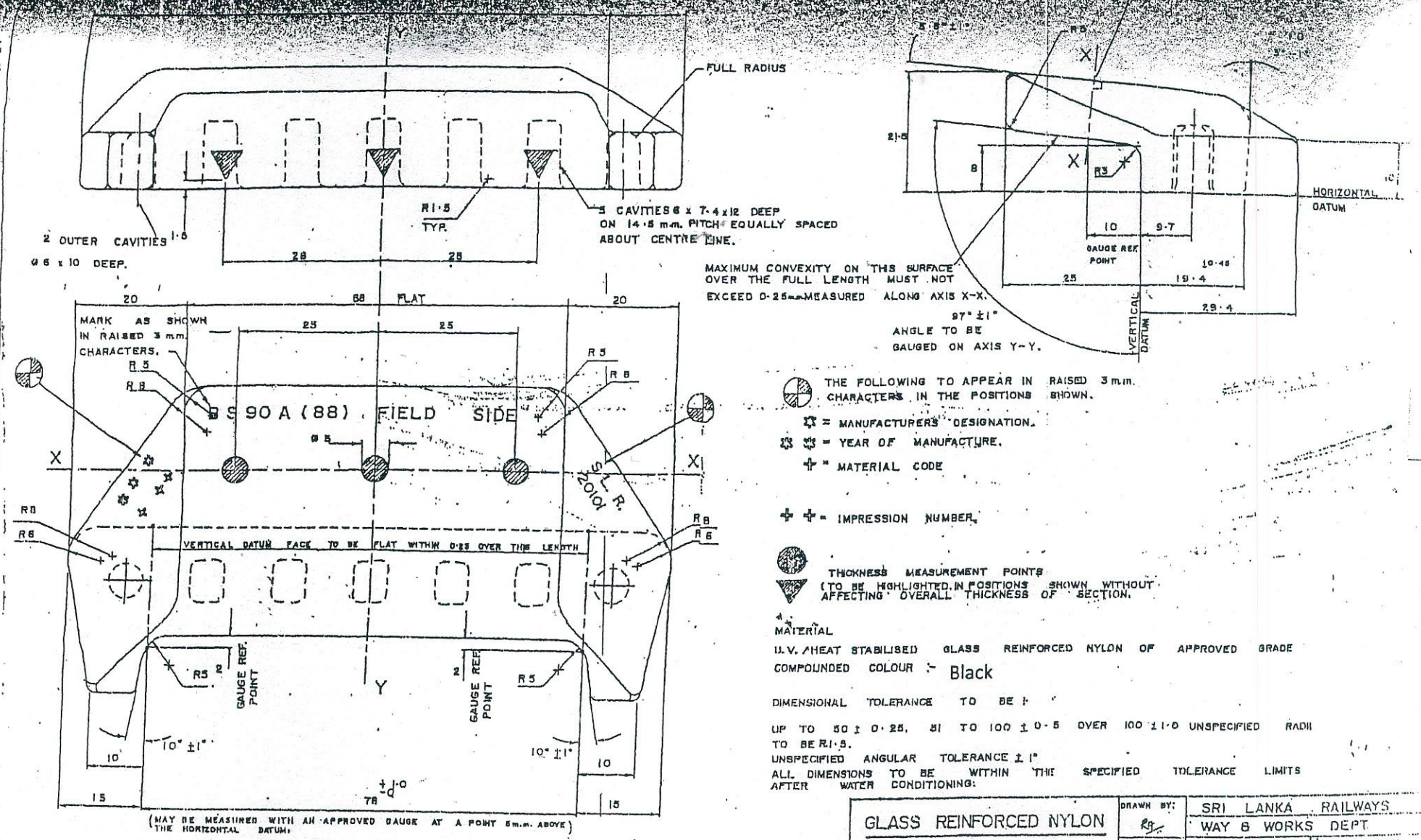
AREA FOR INSULATOR SECTIONING



TO TEST FOR POROSITY, INSULATORS SHOULD BY SECTION THROUGH LUGS AS SHOWN.

FIGURE 2-6

DRG No. 20101



THE FOLLOWING TO APPEAR IN RAISED 3 m.m. CHARACTERS IN THE POSITIONS SHOWN.

- ✡ = MANUFACTURERS DESIGNATION.
- ✡ ✡ = YEAR OF MANUFACTURE.
- ✡ = MATERIAL CODE
- ✡ ✡ = IMPRESSION NUMBER.

THICKNESS MEASUREMENT POINTS (TO BE HIGHLIGHTED IN POSITIONS SHOWN WITHOUT AFFECTING OVERALL THICKNESS OF SECTION.

MATERIAL

U.V. / HEAT STABILISED GLASS REINFORCED NYLON OF APPROVED GRADE COMPOUNDED COLOUR :- Black

DIMENSIONAL TOLERANCE TO BE :

UP TO 50 ± 0·25, 51 TO 100 ± 0·5 OVER 100 ± 1·0 UNSPECIFIED RADII TO BE R1·5.

UNSPECIFIED ANGULAR TOLERANCE ± 1°

ALL DIMENSIONS TO BE WITHIN THE SPECIFIED TOLERANCE LIMITS AFTER WATER CONDITIONING:

INSULATOR FOR RAIL FASTENING

GLASS REINFORCED NYLON INSULATOR FOR BS90A RAIL WITHIN 88 S.L.R. RAIL SEAT FIELD SIDE	DRAWN BY: RG
	CHECKED BY: M.S.
	O. O. A.
	APPROVED BY:

SRI LANKA RAILWAYS
WAY & WORKS DEPT.
DATE: 23·06·1993 | DRG NO 20101

CHIEF ENGINEER

2102

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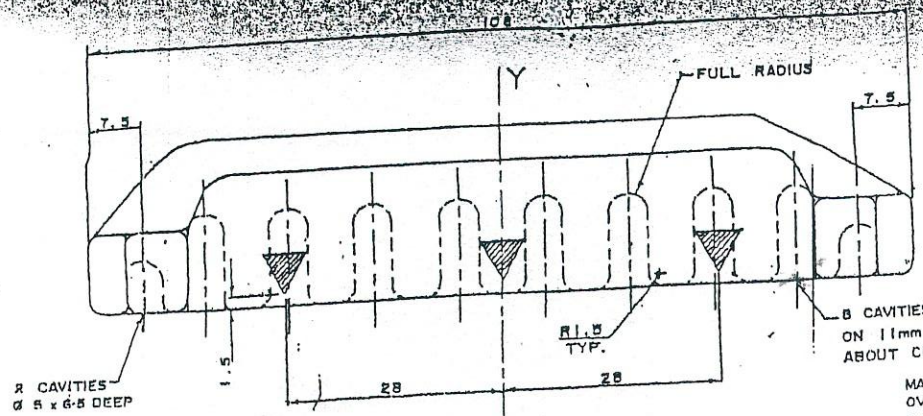
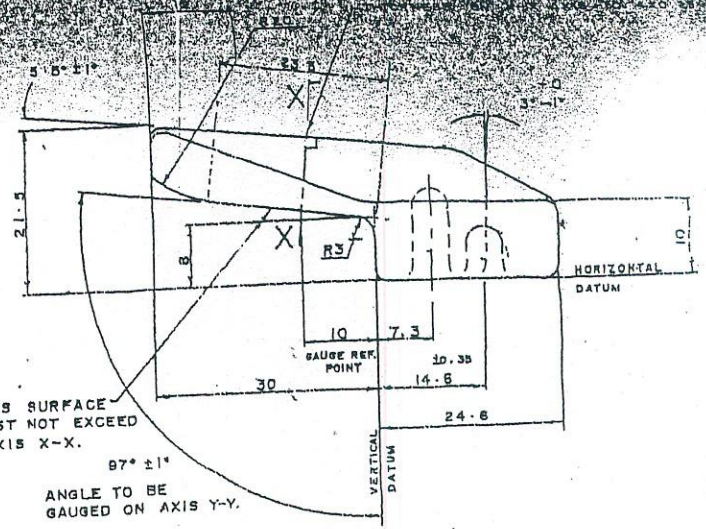
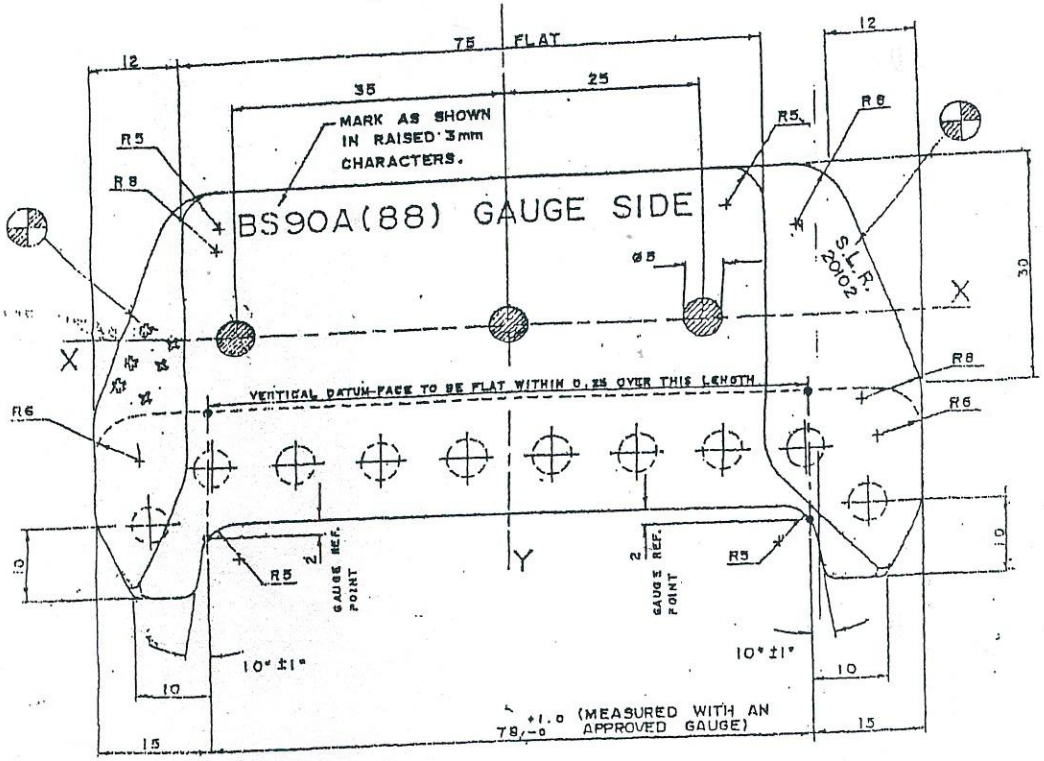
DRG No. 20102







THE FOLLOWING TO APPEAR IN RAISED 3mm CHARACTERS IN THE POSITIONS SHOWN.

= MANUFACTURERS DESIGNATION.

= YEAR OF MANUFACTURE.

= MATERIAL CODE

= IMPRESSION NUMBER.

THICKNESS MEASUREMENT POINTS (TO BE HIGHLIGHTED IN POSITIONS SHOWN WITHOUT AFFECTING OVERALL THICKNESS OF SECTION)

MATERIAL
U.V/HEAT STABILISED GLASS REINFORCED NYLON OF APPROVED GRADE,
COMPOUNDED COLOUR : White

DIMENSIONAL TOLERANCES TO BE:
UP TO 50 ±0·25, 51 TO 100 ±0·5, OVER 100 ±1.0
UNSPECIFIED RADII TO BE R1·5
UNSPECIFIED ANGULAR TOLERANCE ±1°
ALL DIMENSIONS TO BE WITHIN THE SPECIFIED TOLERANCE LIMITS AFTER WATER CONDITIONING.

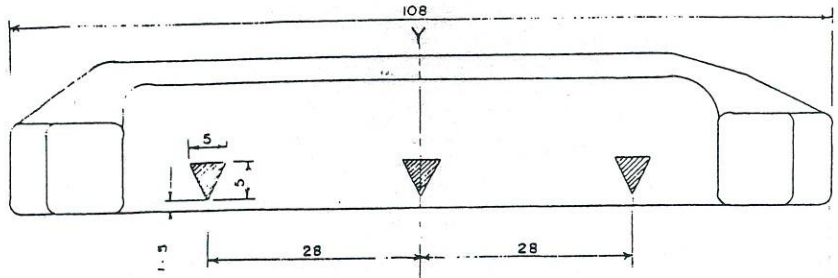
GLASS REINFORCED NYLON INSULATOR FOR BS 90 A RAIL WITHIN R8 SLR RAIL SEAT GAUGE SIDE	DRAWN H.S.	SRI LANKA RAIL WAY & WORKS
	CHECKED RG	DATE 23-05-93
	D.G.A	
	APPROVED	CHIEF ENGINEER

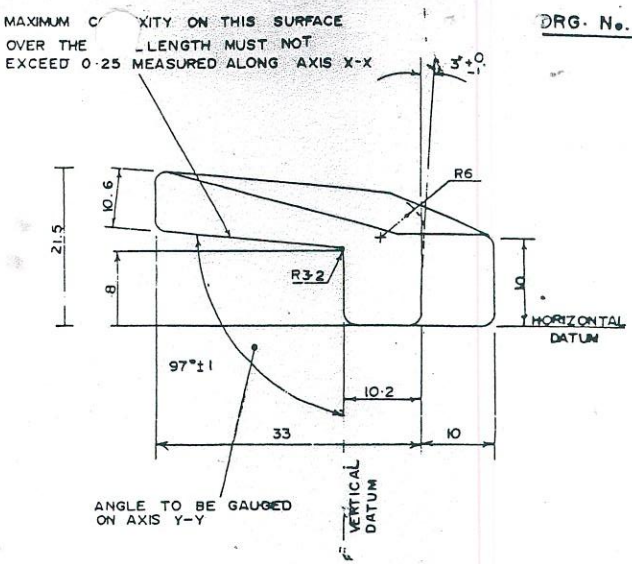
INSULATOR FOR RAIL FASTENING

DO NOT SCALE

ALL DIMENSIONS IN MILLIMETRES

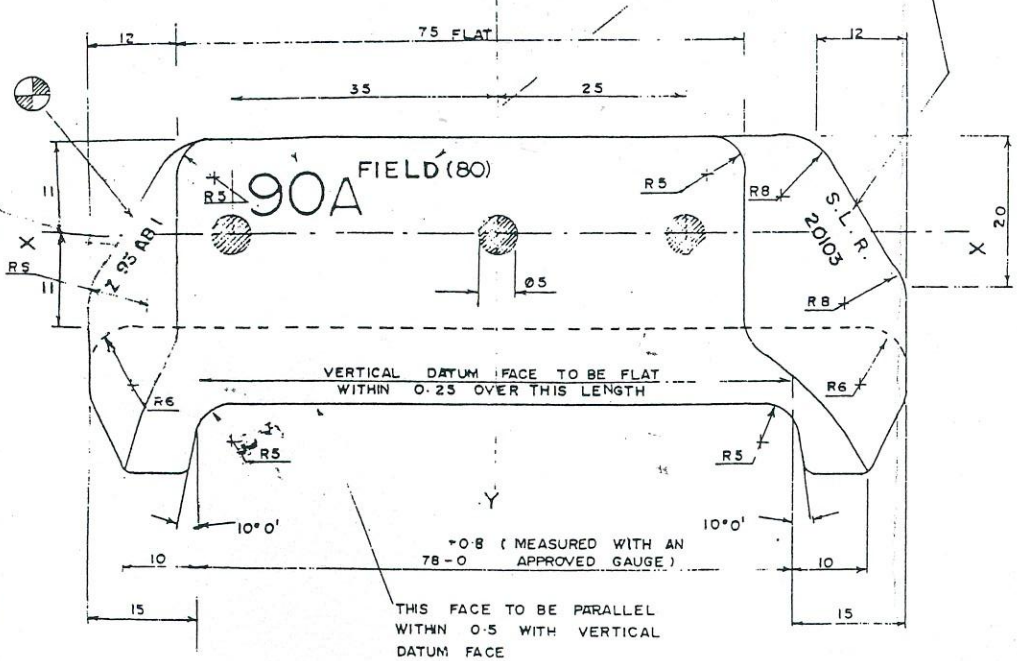
DRG. No. 20103





MARK AS SHOWN IN INDENTED CHARACTERS APPROX 7mm. HIGH

MARK AS SHOWN IN RAISED 3mm CHARACTERS



THICKNESS MEASUREMENT POINTS (TO BE HIGHLIGHTED IN POSITIONS SHOWN WITHOUT AFFECTING OVERALL THICKNESS OF SECTION)

THE FOLLOWING TO APPEAR IN RAISED 3mm CHARACTERS IN THE POSITIONS SHOWN

Z = MANUFACTURERS DESIGNATION

93 = YEAR OF MANUFACTURE

AB = MATERIAL CODE

I = IMPRESSION No.

(ACTUAL CHARACTERS MUST BE TAKEN FROM PURCHASE ORDER)

MATERIAL
U.V. / HEAT STABILISED GLASS REINFORCED NYLON OF APPROVED GRADE
COMPOUNDED COLOUR – BROWN

DIMENSIONAL TOLERANCE TO BE –
UP TO 50 ±0·25, 51 TO 100 ±0·5, OVER 100 ±1·0
UNSPECIFIED RADII TO BE R1·5
UNSPECIFIED ANGULAR TOLERANCE ±1°
ALL DIMENSIONS TO BE WITHIN THE SPECIFIED TOLERANCE LIMITS AFTER WATER CONDITIONING

BY TRANSPOSING THE INSULATORS 9mm. OF GAUGE WIDENING IN INCREMENTS OF 4·5 mm IS POSSIBLE

POSITION OF INSULATORS				
SIDE	FIELD	GAUGE	GAUGE	FIELD
STD GAUGE	10·2	5·8	5·8	10·2
+4·5mm	5·8	10·2	5·8	10·2
+9 mm	5·8	10·2	10·2	5·8

GLASS REINFORCED NYLON INSULATOR FOR BS 90A RAIL WITHIN 80 SLR RAIL SEAT FIELD SIDE

TRACED BY: G.D.L 1	SRI LANKA RAILWAYS WAY & WORKS DEPT.
CHECKED BY:	DATE: 93-06-30 No. 20103
D.O.A	
APPROVED BY	CHIEF ENGINEER

INSULATOR FOR RAIL FASTENING

1 of 2

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THE LIST OF FOREIGN MISSIONS ABROAD

1. The Ambassador for the Democratic Socialist Republic of Sri Lanka in Austria, Belgium, France, People's Republic of China, Cuba, Egypt, Berlin, Indonesia, Iran, Iraq, Italy, State of Israel, Japan, Jordan, Republic of Korea, State of Kuwait, Lebanon, Myanmar, Katmandu, The Netherlands, Sultanate of Oman, The Philippines, Poland, State of Qatar, Russian Federation, Kingdom of Saudi Arabia, Sweden, Thailand and U.A.E.

2. The High Commissioner for the Democratic Socialist Republic of Sri Lanka in Australia, Bangladesh, Canada, India, Kenya, Malaysia, Republic of Maldives, Pakistan, Singapore, South Africa and United Kingdom.

3. The Consulate General of the Democratic Socialist Republic of Sri Lanka in Australia, Canada, Bonn, India, Norway, Pakistan, Kingdom of Saudi Arabia, U.A.E and Los Angeles

4. The Deputy High Commissioner of the Democratic Socialist Republic of Sri Lanka in Chennai.

5. Permanent Mission of the Democratic Socialist Republic of Sri Lanka in U.S.A. and Switzerland.