

RAILWAY STORES SPECIFICATION NO.: 585SLR SPECIFICATION FOR GLASS REINFORCED NYLON RAIL INSULATORS FOR 90(A) RAILS FOR 80 LBS. RAIL SEAT, 88 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, 20103 and 20104.

## 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 | <b>DENSITY:</b><br>Test method DIN 53479 or ASTM D 792   | 1.3 - 1.45 g/cm <sup>3</sup>                                       |
| 1.2 | <b>MELT POINT</b><br>Test method ASTM D 789  | 250 <sup>o</sup> C - 270 <sup>o</sup> C                            |
| 1.3 | <b>ELECTRICAL VOLUME RESISTIVITY:</b><br>Test method ASTM D 257 as moulded<br>Conditioned as paragraph 2.1 | min 2 x 10 <sup>12</sup> ohm cm<br>min 2 x 10 <sup>12</sup> 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 have 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 shown in figure 2.2. A minimum load of 450 kg. shall be applied to the insulator without fail occurring.



2.3 **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.

2.4 **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.

2.5 **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 ribs 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- Gauge shall be in Red Colour.

Drawing No. 20104

GRN Insulators 88/88 - Gauge shall be in Blue Colour

Drawing No. 19807

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 if 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.

**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:**

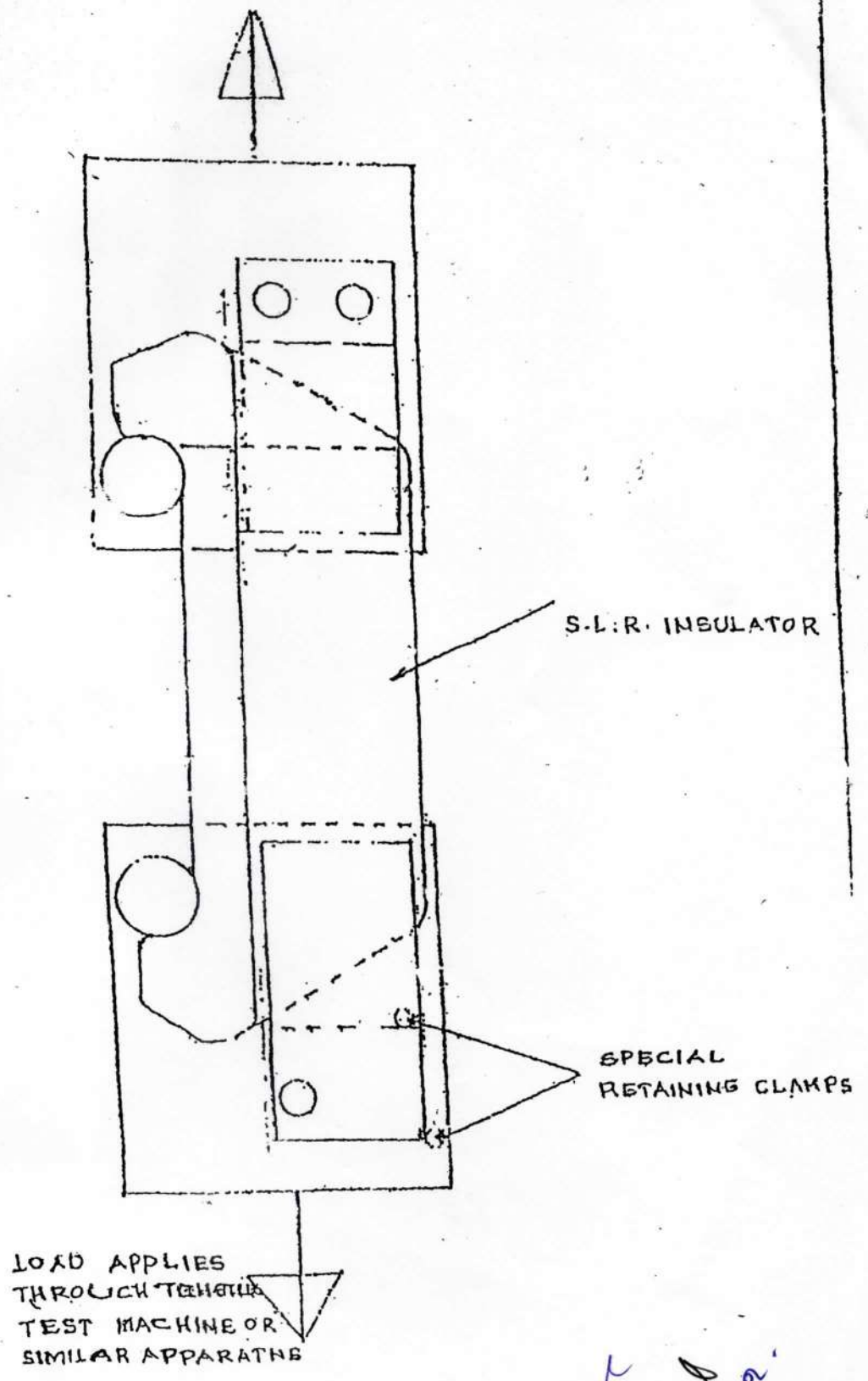
6.1 In the case the tests detailed in paragraph 2.1, 2.2, 2.3, 2.4, 2.5 and 2.6 all test result shall be treated as though they were independently obtained for each property.

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 :-  $\oplus$  - THIS FACE TO BE FLAT WITHIN 0.5 mm  
 $\ominus$  - MAXIMUM CONVEXITY ON THIS SURFACE OVER THE  
WHOLE LENGTH MUST NOT EXCEED 0.25 mm.

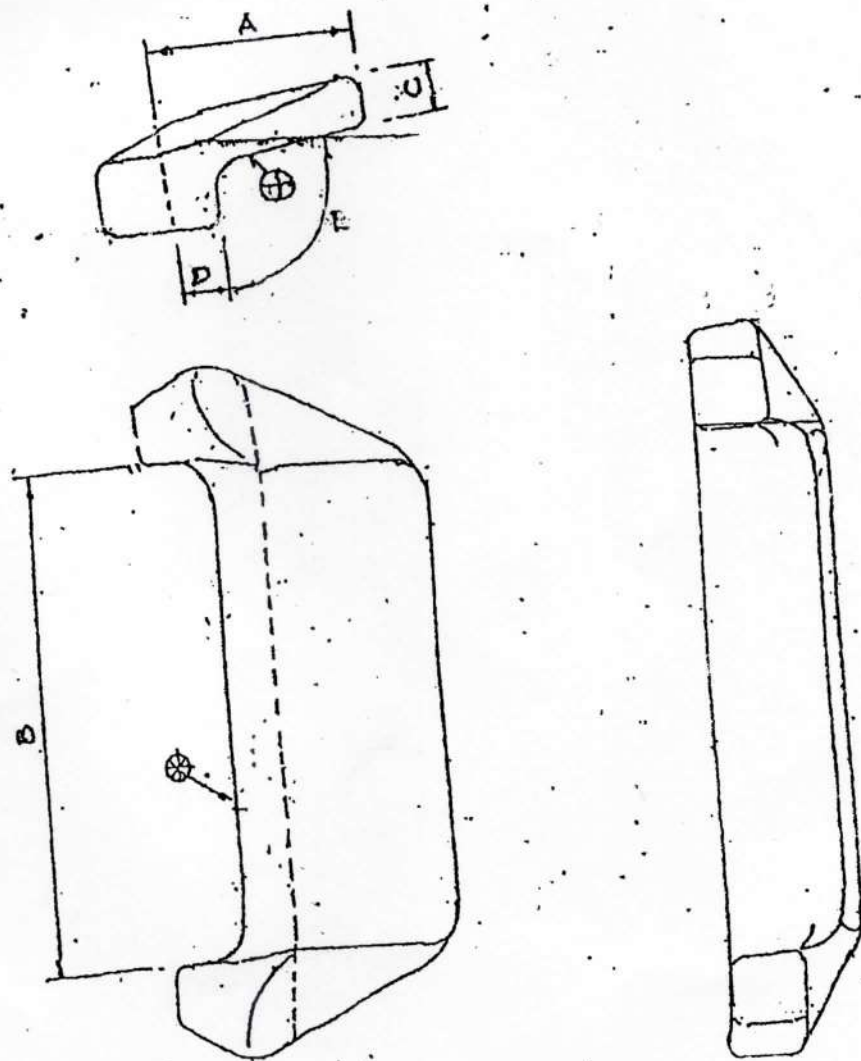
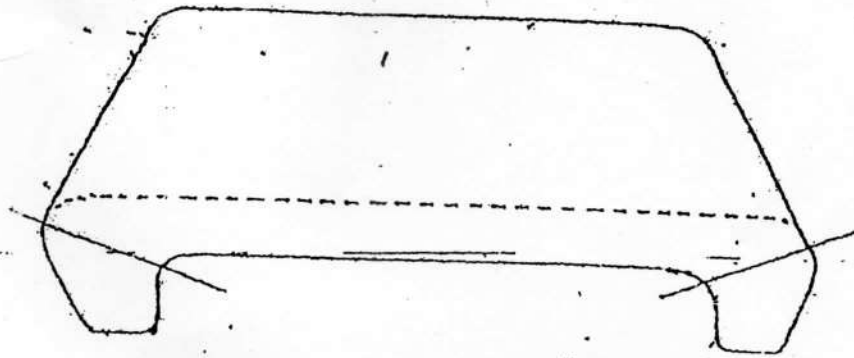


FIGURE 2.4

AREA FOR INSULATOR SECTIONING



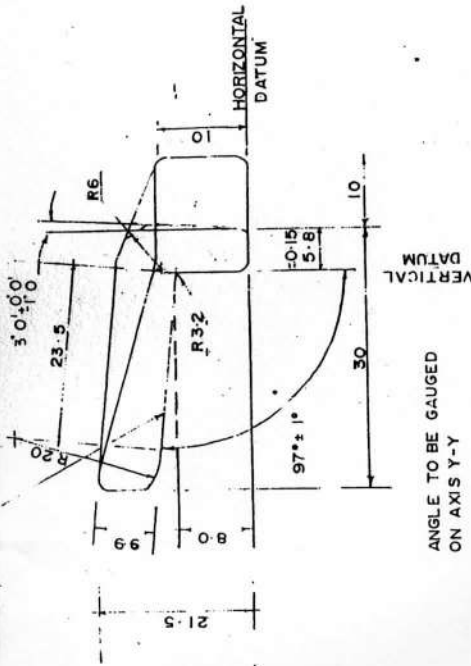
TO TEST FOR POROSITY INSULATORS SHOULD  
BY SECTION THROUGH LUGS AS SHOWN.

*h* *h* *o*

FIGURE 2-6



MAXIMUM CONVEXITY ON THIS SURFACE OVER THE FULL LENGTH MUST NOT EXCEED 0.25 MEASURED ALONG AXIS X-X



VERTICAL DATUM

HORIZONTAL DATUM

ANGLE TO BE GAUGED ON AXIS Y-Y

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  
90 = YEAR OF MANUFACTURE

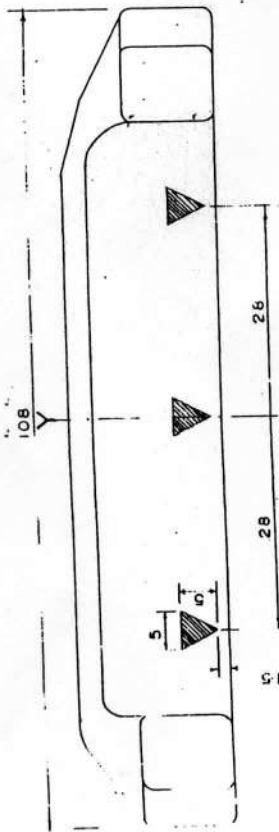
A B = MATERIAL CODE

I = IMPRESSION NO.

(ACTUAL CHARACTERS MUST BE TAKEN FROM PURCHASE ORDER)

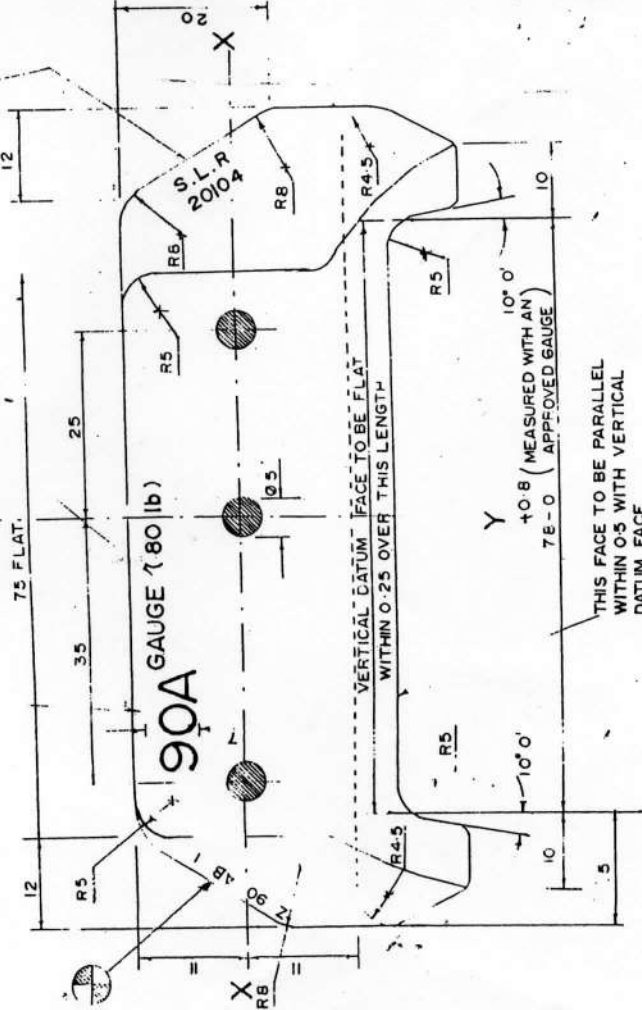
MATERIAL  
U.V./HEAT STABILISED GLASS REINFORCED NYLON OF APPROVED GRADE COMPOUNDED COLOUR:-

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



MARK AS SHOWN IN INDENTED CHARACTERS APPROX 7mm HIGH

MARK AS SHOWN IN RAISED 3mm CHARACTERS



THIS FACE TO BE PARALLEL WITHIN 0.5 WITH VERTICAL DATUM FACE

90A GAUGE 180 (b)

VERTICAL DATUM - FACE TO BE FLAT WITHIN 0.25 OVER THIS LENGTH

Y ± 0.8 (MEASURED WITH AN APPROVED GAUGE)

INSULATOR FOR RAIL FASTENING

DO NOT SCALE ALL DIMENSIONS IN MILLIMETRES.

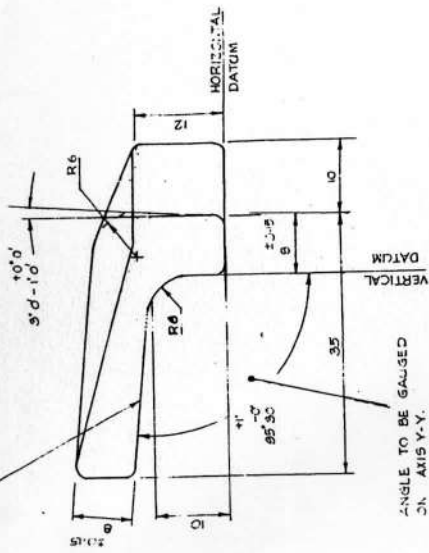
BY TRANSPOSING THE INSULATORS 9mm OF GAUGE - WIDENING IN INCREMENTS OF 4.5 mm IS POSSIBLE			
POSITION OF INSULATORS			
SIDE	FIELD GAUGE	GAUGE	FIELD
STD GAUGE	10.2	5.8	5.8 10.2
+4.5 mm.	5.8	10.2	5.8 10.2
+9 mm	5.8	10.2	10.2 5.8

GLASS REINFORCED NYLON INSULATOR FOR BS 90A RAIL, WITHIN 80 S.L.R. RAIL SEAT, GAUGE SIDE

DRAWN BY  
SRI LANKA RAILWAYS  
WAY & WORKS DEPT.  
CHECKED BY  
DATE: 30.06.95 DRG-NO:20104

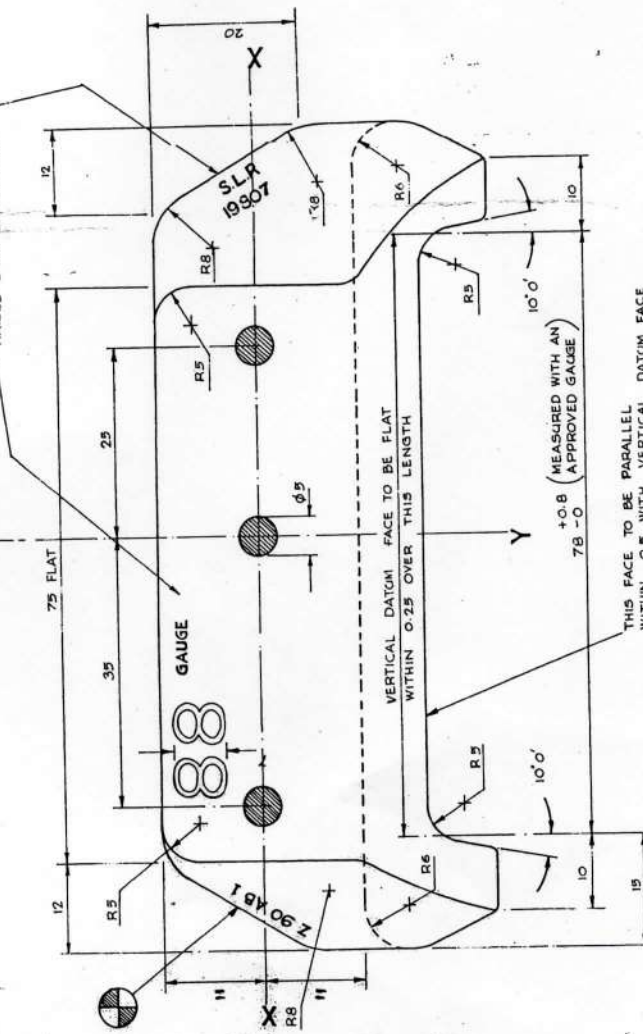
D.O.A.  
APPROVED BY  
CHIEF ENGINEER

MAXIMUM CONVEXITY ON THIS SURFACE OVER THE FULL LENGTH MUST NOT EXCEED 0.25 MEASURED ALONG AXIS X-X



ANGLE TO BE GAUGED ON AXIS Y-Y.

MARK AS SHOWN IN RAISED 3 MM CHARACTERS.



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



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



Z - MANUFACTURERS DESIGNATION

90 - YEAR OF MANUFACTURE

AB - MATERIAL CODE

1 - IMPRESSION NO.

(ACTUAL CHARACTERS MUST BE TAKEN FROM PURCHASE ORDER)

BY TRANSPOSING THE INSULATORS THE FOLLOWING GAUGE-WIDENING CAN BE OBTAINED

SIDE	FIELD	GAUGE	GAUGE FIELD
13	8	8	13
+5 mm	8	13	6 13
+10 mm	8	13	13 6

MATERIAL  
1. 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 RADI TO BE ± 1.5  
UNSPECIFIED ANGULAR TOLERANCE ± °  
ALL DIMENSIONS TO BE WITHIN THE SPECIFIED TOLERANCE LIMITS AFTER WATER CONDITIONING.

GLASS REINFORCE NYLON INSULATOR FOR RAILS WITH FOOT SLOPE OF

SRI LANKA RAILWAY WORKS

DATE: 26/10/83

CHECKED: [Signature]  
BY: D.G.A.  
APPROVED: [Signature]

CHIEF ENGINEER

INSULATOR FOR RAIL FASTENING