

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			



**TELECOM DIRECTORATE
RESEARCH DESIGNS AND STANDARDS ORGANISATION
MINISTRY OF RAILWAYS
MANAK NAGAR, LUCKNOW-226011**

RDSO/SPN/TC/44/2002

**SPECIFICATION FOR
EMERGENCY SOCKET BOX OF FRP MATERIAL**

I. AMENDMENT HISTORY:

S.N.	Date of Amendment	Version	Reasons for Amendment
1	08.02.2002	First Draft	First draft issued for receiving comments.
2	11.05.2002	1	First issue based on comments from Rlys.
3	15.10.2004	2	Based on meetings with Manufacturers.
4	21.02.2005	Amendment No. 1 issued.	Change in Cl. No. 3.2 & 4 pertaining to glass fiber content in the material & Inspection and testing of FRP material respectively. A copy of the drawing is also issued.
5	28.12.2008	Amendment No. 2 issued.	Change in Cl. No. 4.0 & Appendix "A" pertaining to flammability test.
6	22.11.2016	Amendment No. 3 issued.	Cl. No. 9.0 added pertaining to QO-D-7.1-11 namely "Vendor Change in approved Status" in compliance to Vigilance/RDSO directives.
7	29.12.2020	Corrigendum	To include missing drawing No.

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

		-1 issued	TCDO/RE/001/2002/1 (dated 26.05.06) and typographical correction in drawing No. TCDO/RE/001/2002.
8	19.07.2021	3.0	Reviewed as per directives vide DG's Note No. DG/Misc. dated 10 June 2020. Approved by ED/Tele-I on 19.07.2021 at Note # 64 in e-Office file No. RDSO-TELE0LKO(SPEC)/34/2020-Telecom Directorate/RDSO

II. DOCUMENT DATA SHEET

Document Number:	RDSO/SPN/TC/44/2002, Version No. 3.0
Document Title:	Specification for Emergency Socket Box of FRP Material
Prepared by, Director/Telecom-I	
Approved by, Executive Director/Telecom-I	
Abstract: This document defines specification of Emergency Socket Box of FRP Material	

III. DOCUMENT CONTROL SHEET

Designation	Organisation	Function	Level
JRE/Telecom	RDSO	Member	Prepare
ADE/Telecom	RDSO	Member	Prepare, Check
Director/Telecom-I	RDSO	Member	Prepare/Review/Issue
ED/Telecom-I	RDSO	Approving Authority	Approve

Issued by:	Director/Tele- I	Page 2 of 13
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ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

IV. ABBREVIATIONS USED

S.N.	Abbreviation	Detail
1.	dB	Decibel
2.	DC	Direct Current
3.	DIP	Dual Inline Package
4.	DTMF	Dual Tone Multi Frequency
5.	Hz	Hertz
6.	IC	Integrated Circuit
7.	IR	Insulation Resistance
8.	IRS	Indian Railways Specification
9.	IS	Indian Standards
10.	kHz	Kilohertz
11.	km	kilometer
12.	LCD	Liquid Crystal Display
13.	ECISO	Electronic Components Standardisation Organisation
14.	LD	Lighting Discharge
15.	LED	Light Emitting Diode
16.	MOV	Metal Oxide Varistor
17.	PCB	Printed Circuit Board
18.	PIJF	Polyethylene Insulated Jelly Filled
19.	RH	Relative Humidity
20.	rms	root mean square
21.	Rx	Receive
22.	S/N Ratio	Signal to Noise Ratio

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

23.	SPN	Specification
24.	SMPS	Switch Mode Power Supply
25.	TC	Telecom
26.	Tx	Trans
27.	VF	Voice Frequency

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

V. TABLE OF CONTENTS:

S. N.	Clause No.	Item	Page No.
1.	0.0	Forward	6
2.	1.0	Scope	6
3.	2.0	Terminology	7
4.	3.0	General Requirements	7
5.	4.0	Tests and Requirements	8
6.	i)	Visual Inspection	8
7.	ii)	Marking	8
8.	iii)	Dimensional Measurements	8
9.	iv)	Flexural strength	8
10.	v)	Izod impact resistance	8
11.	vi)	Flammability Characteristics	9
12.	vii)	Glass filler by Ash content (%)	9
13.	viii)	Specific gravity	9
14.	4.1	Type Test	9
15.	4.2	Acceptance Test	10
16.	4.3	Routine Test	11
17.	5.0	Sampling	11
18.	6.0	Acceptance / Rejection Criteria	12
19.	7.0	Packing	12
20.	8.0	Undertaking	13
21.	ANNEXURE-I	Drawings for Emergency Socket Box	-

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

0.0 FORWARD:

This specification is issued under the serial No. RDSO/SPN/TC/44/2002.

0.1 This specification requires reference to the following specifications;

S.N.	Specification No.	Description/Title
1.	IRS: S 23	Electrical and Electronics based signaling and interlocking equipment.
2.	ASTM D 256	Test method for impact resistance of plastic and electrical insulating materials.
3.	ASTM D 790	Test method for flexural properties of unreinforced and reinforced plastic and electrical insulating materials.
4.	ASTM D 792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
5.	IS-12866	Specification for plastic translucent sheets made from thermosetting polyester resin (glass fibre reinforced)
6.	IRS:TC-42/20 Version-1.0	Six Pin Emergency Plug and Socket

Note:

- i. Wherever reference to any of the above specifications appears in this document, it shall be taken as a reference to the latest version of the specification unless the year of issue of the specification is specifically stated.
- ii. In case of withdrawal/revision of any of reference specification, latest or equivalent specification shall be applicable.

0.2 This specification is intended mainly to cover the technical requirements and does not include all the necessary provisions of a contract.

1.0 SCOPE:

- 1.1 This specification covers the technical requirements and provisions of tests of FRP material to be used for manufacture of Emergency Socket Box for outdoor use along the side of the track in AC electrified areas as well as non-electrified areas.
- 1.2 This specification covers the constructional features of Emergency Socket Box as per Drawing No. TCDO/RE/001/2021-1/7 to TCDO/RE/001/2021-7/7. The bracket holder

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

should be reinforced with the MS plate for better strength and holding of the Rail post on which the Emergency Socket Box will be fixed. The MS plate (reinforced) of the same size having 3 mm (minimum) thickness should be provided throughout the bracket holder. Two numbers of such bracket holders will be required to fit the Emergency Socket Box on the rail post.

2.0 TERMINOLOGY:

- 2.1 For the purpose of this specification, terminology given in IRS: S-23 shall apply.
- 2.2 The term referred to in this specification but not covered in IRS: S-23 is defined below.
 - 2.2.1 LOT – A lot is constituted by the emergency socket box, of the same type manufactured in the same factory during the same period using the same process and material.

3.0 GENERAL REQUIREMENT:

- 3.1 The material shall consist of an unsaturated epoxy or polyester resin system, combined with fillers and chopped strand mat glass reinforcement to form a mix which is capable of being cured by moulding under heat and pressure. The glass fiber shall be made from E-glass, which is low alkali glass containing not more than 1% of alkali metal oxides expressed as Na₂O.
- 3.2 The glass fibre content in the material shall not be less than 35% with 50% minimum of the glass of the length 12 mm or above.
- 3.3 The surfaces of FRP components shall be smooth, sound and free from moulding defects, such as bubbles, surface streaks, splash marks, burn marks, voids, surface-sinking, crazing and blistering of the surface, windows, warping, weld lines, laminations, cracks etc. All edges shall be neatly finished and free from flash.
- 3.4 The FRP components shall be free from liability to distortion under service conditions, storage or transshipment. The components shall withstand all the extremities of the environment, viz dry, cold and humid conditions.

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

- 3.5 No reconstituted or recovered material shall be used for manufacturing of components of Emergency Socket Box. An undertaking shall be submitted by the manufacturer to this effect.
- 3.6 The cover of the Emergency Socket Box shall have a self-locking system for ease of use by field staff of Railway (driver/guard etc.) in any emergency situation.

4.0 TESTS AND REQUIREMENTS:

i) **Visual Inspection:**

- a) The workmanship and finish shall be proper.
- b) The surfaces of FRP components shall be smooth, sound and free from moulding defects, such as bubbles, surface streets, splash marks, burn marks, voids, surface-sinking, crazing and blistering of the surface, windows, warping, weld lines, laminations, cracks etc.
- c) All edges shall be neatly finished and free from flash.

ii) **Marking:** Marking on Emergency Socket Box shall clearly indicate the following:

- a) Name/Trade mark of the manufacturer
- b) Specification No.
- c) Month & year of Manufacture
- d) Batch No.
- e) Serial Number.

iii) **Dimensional Measurements:** The emergency socket box shall meet the requirement of all dimensions as per drawing No. TCDO/RE/001/2021-1/7 to TCDO/RE/001/2021-7/7 (ANNEXURE-I of this specification).

iv) **Flexural strength:** The Flexural strength test shall be conducted on standard test specimens and procedure as prescribed in ASTM D 790. The value of Flexural strength shall be 150 MPa (Minimum).

v) **Izod impact resistance:** The test shall be conducted on specimens and procedure prescribed in ASTM D 256. The value of Izod impact resistance shall be 700 Joules/m (Minimum).

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

vi) **Flammability Characteristics:** The flammability test shall be conducted as per procedure given below;

The moulded sample shall be subjected to luminous batswing flame preferably supplied by a Bunsen burner. The sample shall be held with the flat side up, its longitudinal axis at an angle of 45 degrees to the horizontal. The flame shall be of 25 mm with across the tips. The lower end of the sample shall be at the mid point of the flame. The flame shall be applied for 30 seconds and removed for a similar period and then applied again at the same location for a second period of 30 seconds and then again removed. The tests shall be carried out on the other side of the specimen also.

Result: Should the specimen get ignited, it shall self extinguish within 30 seconds after the flame has been removed and shall not drip.

vii) **Glass filler by Ash content (%):** The test shall be conducted as per IS-12866. The value shall be 35% (minimum).

viii) **Specific gravity:** The test shall be conducted as per ASTM D 792. The value of specific gravity shall be 1.6 (minimum).

4.1 **Type Test:**

4.1.1 Following shall constitute the Type Test;

- i) Visual inspection as per clause No. 4.0 (i)
- ii) Marking as per clause No. 4.0 (ii)
- iii) Dimensional Measurement as per clause No. 4.0 (iii)
- iv) Flexural Strength as per clause No. 4.0 (iv)
- v) Izod Impact Resistance as per clause No. 4.0 (v)
- vi) Flammability characteristics: As per clause No. 4.0 (vi).
- vii) Glass filler by ash content (%) as per clause No. 4.0 (vii)
- viii) Specific Gravity as per clause No. 4.0 (viii)

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

4.1.2 For the Type Test during initial type approval (or conducted otherwise), 5 samples of Emergency Socket Box (ESB) shall be manufactured & 3 samples shall be selected randomly for testing of the parameters.

- (i) All non-destructive tests shall be conducted on one of the samples and the same sample shall be sent for type test.
- (ii) Second moulded sample shall be submitted for the flammability test during the Type Test.
- (iii) Specimens of the suitable size specified in relevant standards shall be prepared from the third sample and all destructive tests shall be conducted accordingly (except for flexural Strength).

For flexural Strength, specimens shall be prepared with the help of flexural strength mould using raw material from the same lot used for making products in the presence of Inspecting official.

4.2 **Acceptance Tests:**

4.2.1 Following shall constitute the Acceptance Test;

- i) Visual inspection as per clause No. 4.0 (i) (sampling plan as per Cl. No.5.0)
- ii) Marking as per clause No. 4.0 (ii) (sampling plan as per Cl. No.5.0)
- iii) Dimensional Measurement as per clause No. 4.0 (iii) (sampling plan as per Cl. No.5.0)
- iv) Izod Impact Resistance on specimens prepared from one randomly selected moulded samples as per clause No. 4.0 (v)
- v) Flammability characteristics on one moulded sample selected at random from the lot offered for inspection as per clause No. 4.0 (vi).
- vi) Glass filler by ash content (%) on specimens prepared from one randomly selected moulded sample as per clause No. 4.0 (vii)
- vii) Specific Gravity on specimens prepared from one randomly selected moulded sample as per clause No. 4.0 (viii)
- viii) **Undertaking:** No reconstituted or recovered material shall be used to manufacture components of Emergency Socket Box. An undertaking shall be submitted by the manufacturer to this effect.

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

4.3 **ROUTINE TEST:**

4.3.1 Following shall constitute Routine Test;

- i) Visual inspection as per clause No. 4.0 (i), on the complete lot.
- ii) Marking as per clause No. 4.0 (ii), on the complete lot.
- iii) Dimensional Measurement as per clause No. 4.0 (iii), (Sampling plan as per Cl. No. 5.0)
- iv) Izod Impact Resistance as per clause No. 4.0 (v).
- v) Flammability characteristics as per clause No. 4.0 (vi).
- vi) Glass filler by ash content (%) as per clause No. 4.0 (vii).
- vii) Specific Gravity as per clause No. 4.0 (viii).

5.0 **SAMPLING:**

5.1 The double sampling plan as given in the table below shall be adopted for dimension measurement & visual Inspection.

Lot consisting of (Nos.)	1 st sample size (N1)	2 nd sample size (N2)	Combined sample size (N1+N2)	Accepted Number (C1)	Rejected Number (C2)
(1)	(2)	(3)	(4)	(5)	(6)
Under 25	3	6	9	0	2
25 to 50	7	14	21	0	3
51 to 100	10	20	30	0	3
101 to 200	13	26	39	0	5
201 to 300	20	40	60	1	5
More than 300	25	50	75	1	6

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

5.2 The number of Emergency Socket Boxes (N1) as given in column 2 shall first be selected to the acceptance tests. If in the first sample the number of defective socket boxes, that is those failing in one or more acceptance tests, is less than or equal to the corresponding number (C1) given in col. 5, the lot shall be considered as conforming to the requirements of the acceptance tests.

If the number of defective socket boxes in the first sample is greater than or equal to the rejection number given in col.6, the lot shall be considered as not conforming to the requirements of the acceptance tests.

If the number of defective socket boxes in the first sample lies between (C1) and (C2), a second sample of size (N2) as given in column 3 shall be selected and subjected to acceptance tests. If in the combined sample size (i.e. N1+N2), the number of defective socket boxes is less than (C2) the lot shall be considered as conforming to the requirements of the acceptance tests.

5.3 The samples shall be selected at random.

5.4 Sampling/Specimen for all other parameters of Acceptance test as per Clause No. 4.2 shall be as indicated in the relevant reference document. Specimen samples shall be prepared from one randomly selected Emergency Socket Box in presence of Inspecting Official.

6.0 ACCEPTANCE / REJECTION CRITERIA

6.1 The lot passing in all acceptance tests defined in Cl. No. 4.2 shall be considered as conforming to the requirement of acceptance test of the specification and be accepted.

6.2 If the lot does not comply with any of the requirements of the specification & acceptance test as stated in Cl. No. 4.2 above shall be treated as nonconforming to the specification and be rejected.

7.0 PACKING

7.1 Emergency Socket Box shall have to undergo arduous transportation before reaching the destination and will have to be stored and handled in tropical climate conditions (including monsoon) before they are put to actual use. It is therefore imperative that the

ISO 9001:2015	Document No.: RDSO/SPN/TC/44/2002	Version No.: 3.0	Date Effective: 19.07.2021
Document Title: Specification for Emergency Socket Box of FRP Material			

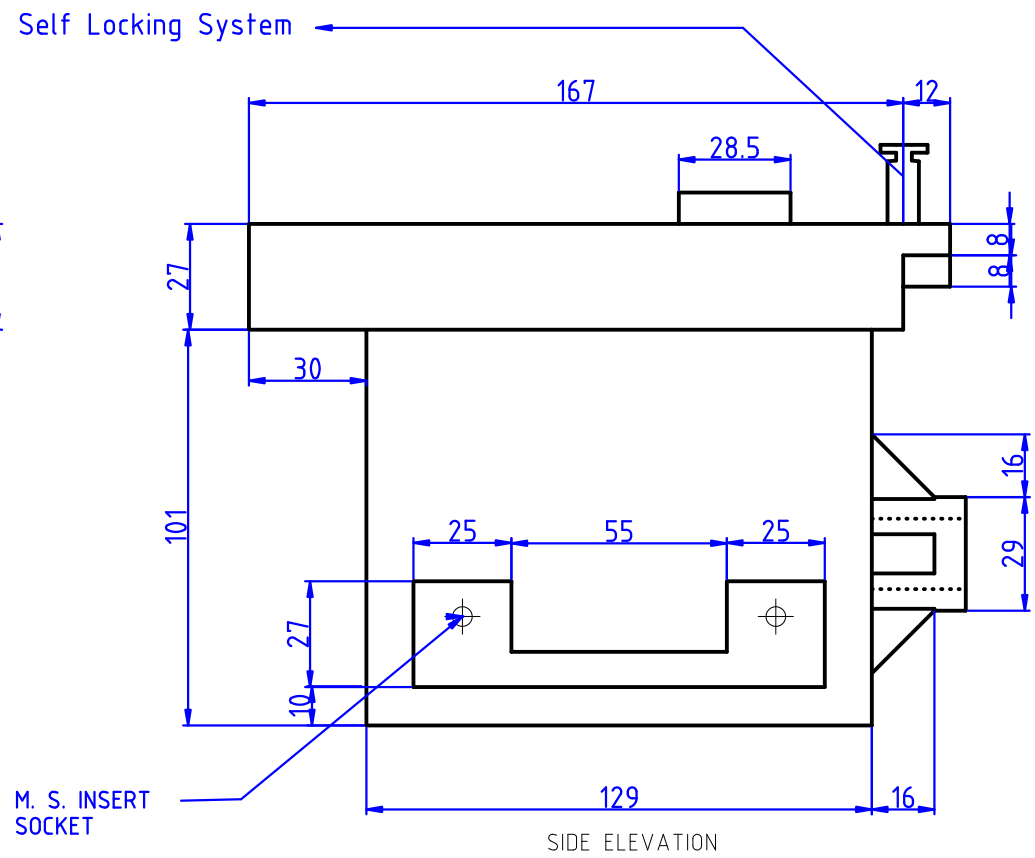
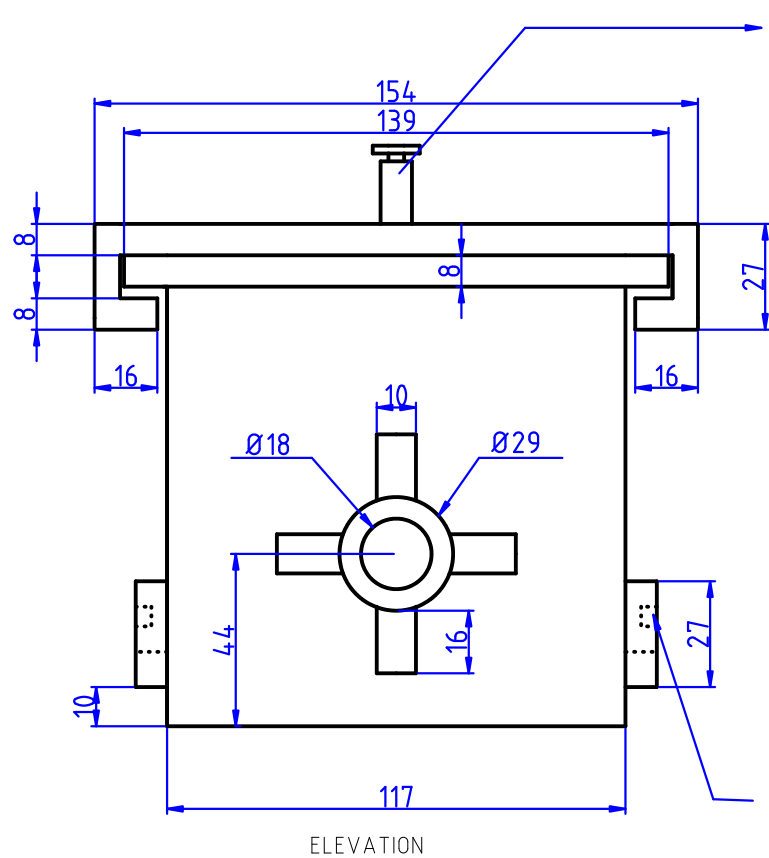
packing is decided by taking into consideration, inter-alia, the above two vital factors so as to eliminate damage/deterioration of the systems in transit/transshipment/handling or during storage.

- 8.0** "All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-8.1-11 latest (titled "Vendor-Changes in approved status"), shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways"

ANNEXURE-I

**Drawings for Emergency Socket Box of FRP Material as per Specification No.
RDSO/SPN/TC/44/2002, Version No. 3.0**

S. N.	DRAWING NUMBER	PART NAME
1.	TCDO/RE/001/2021-1/7	SOCKET BOX- PLAN
2.	TCDO/RE/001/2021-2/7	SOCKET BOX WITH COVER- ELEVATION
3.	TCDO/RE/001/2021-3/7	SOCKET BOX- SECTION
4.	TCDO/RE/001/2021-4/7	M. S. INSERT SOCKET & SCREW
5.	TCDO/RE/001/2021-5/7	BRACKET HOLDER
6.	TCDO/RE/001/2021-6/7	TOP COVER
7.	TCDO/RE/001/2021-7/7	TERMINAL BRACKET MOUNTING PLATE



M. S. INSERT SOCKET

Note:

1. All dimensions are in mm.
2. Tolerance ± 2 mm

TCDO/RE/001/2021-2/7

SOCKET BOX WITH COVER-ELEVATION

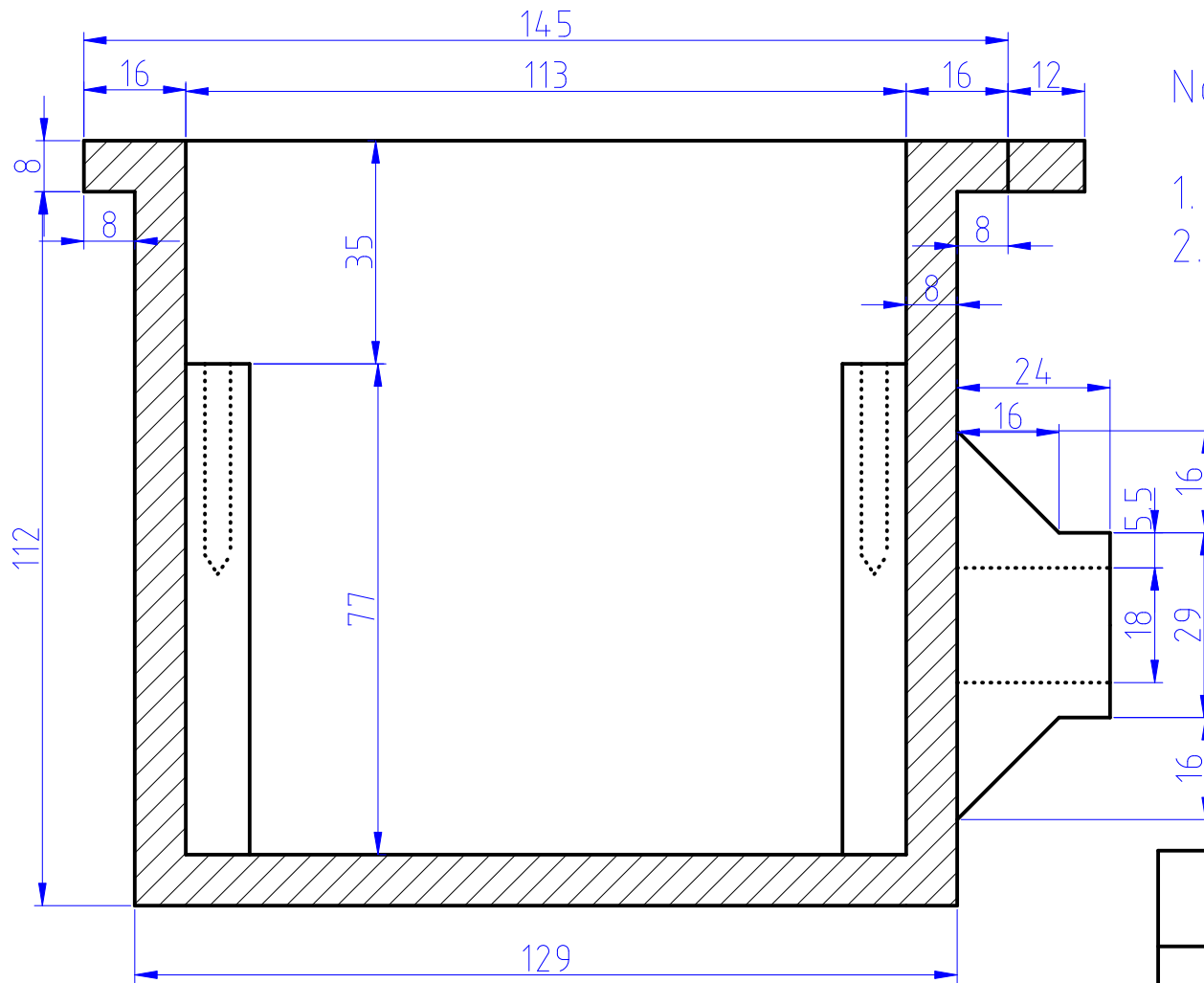
R. D. S. O.

Prepared By: JRE/Tele

Checked By: ADE/Tele

Verified & issued
By: Director/Tele-I

Approved By: ED/Tele-I

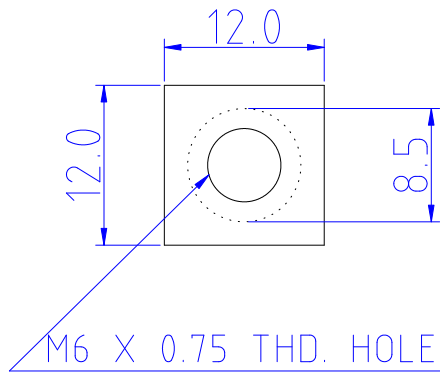


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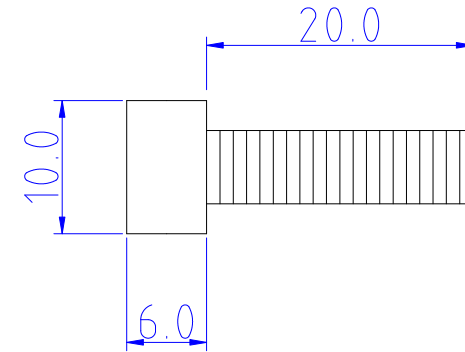
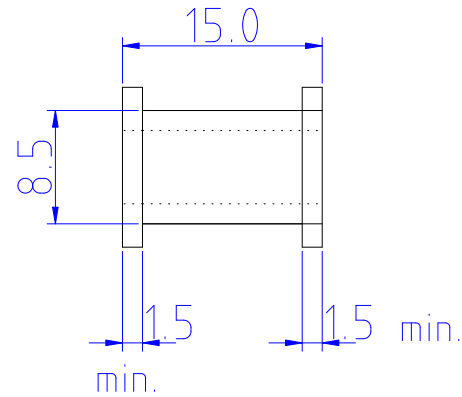
1. All dimensions are in mm.
2. Tolerance ± 2 mm

TCDO/RE/001/2021-3/7
SOCKET BOX-SECTION
R.D.S.O.

Prepared By: JRE/Tele	Checked By: ADE/Tele	Verified & issued By: Director/Tele-I	Approved By: ED/Tele-I
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M. S. INSERT SOCKET



SCREW

Note:

1. All dimensions are in mm.
2. Tolerance ± 2 mm
3. Screw shall be of SS material & Allen key type.

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M. S. INSERT SOCKET & SCREW

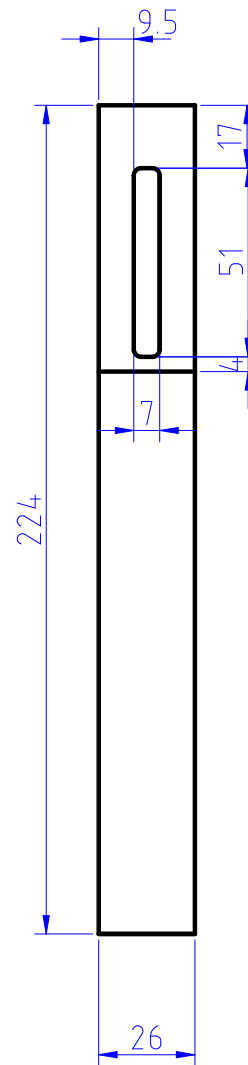
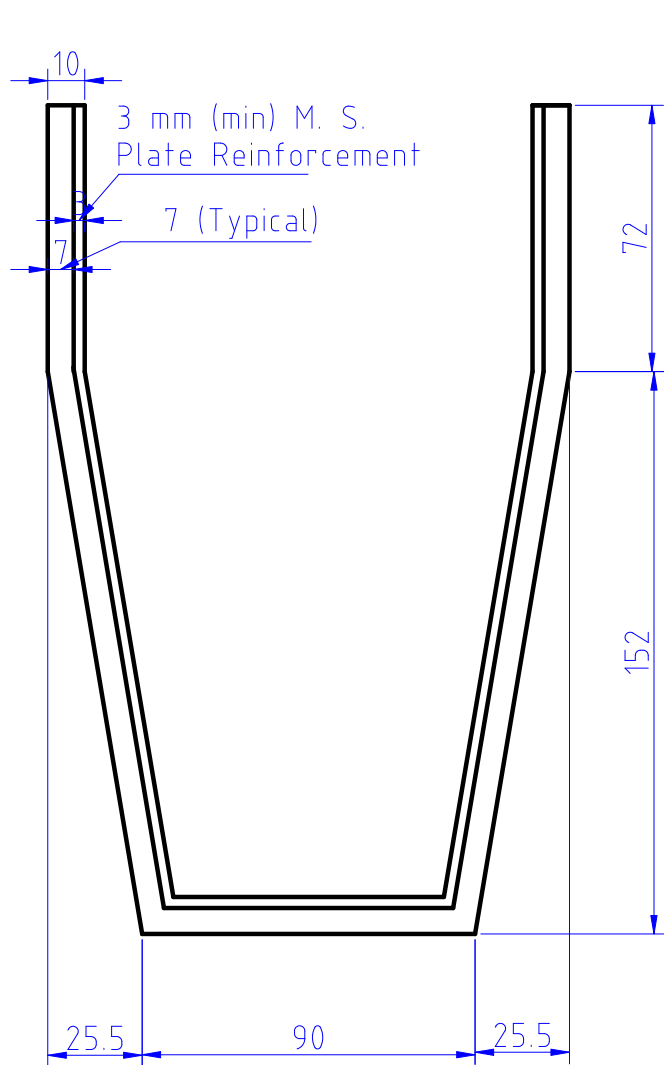
R.D.S.O.

Prepared By: JRE/Tele

Checked By: ADE/Tele

Verified & issued
By: Director/Tele-I

Approved By: ED/Tele-I



Note:

1. All dimensions are in mm.
2. Tolerance ± 2 mm
3. Two Bracket holder with M. S. Plate reinforcement

TCDO/RE/001/2021-5/7

BRACKET HOLDER

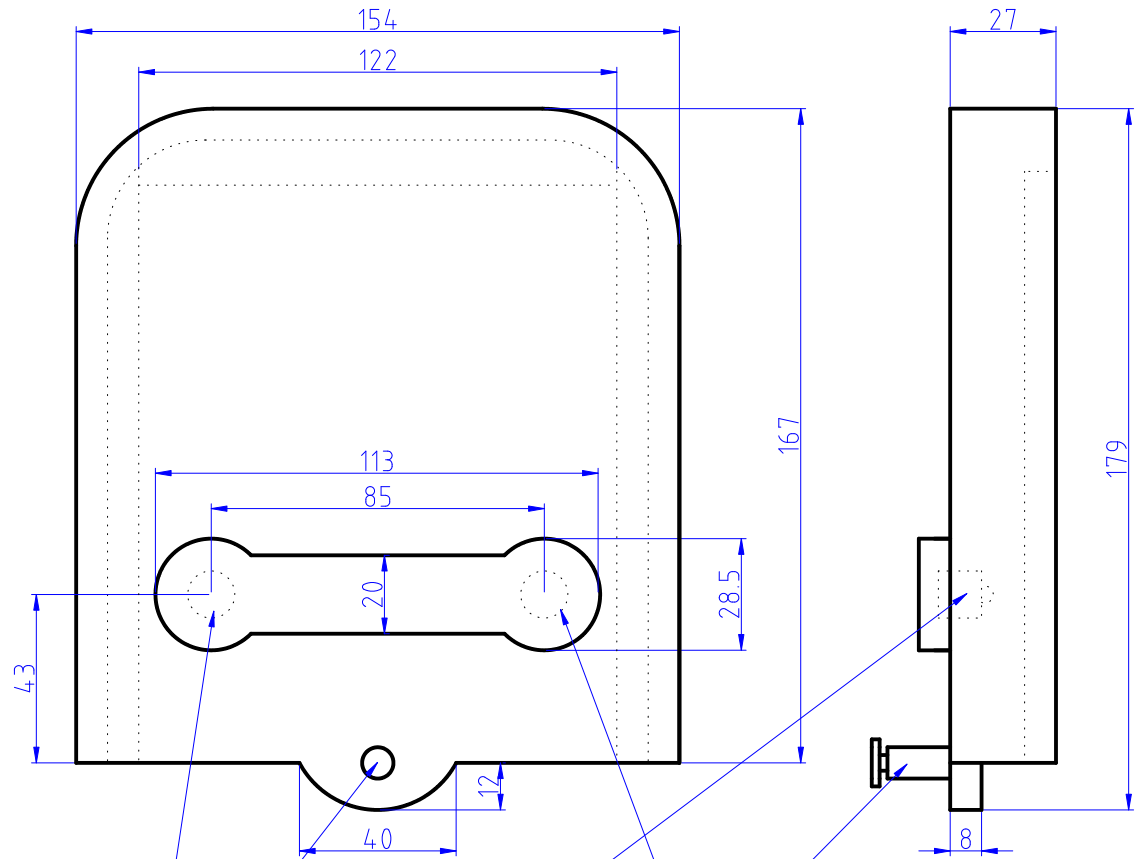
R.D.S.O.

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Two numbers of spring loaded Inserts of suitable size to hold the cover after opening.

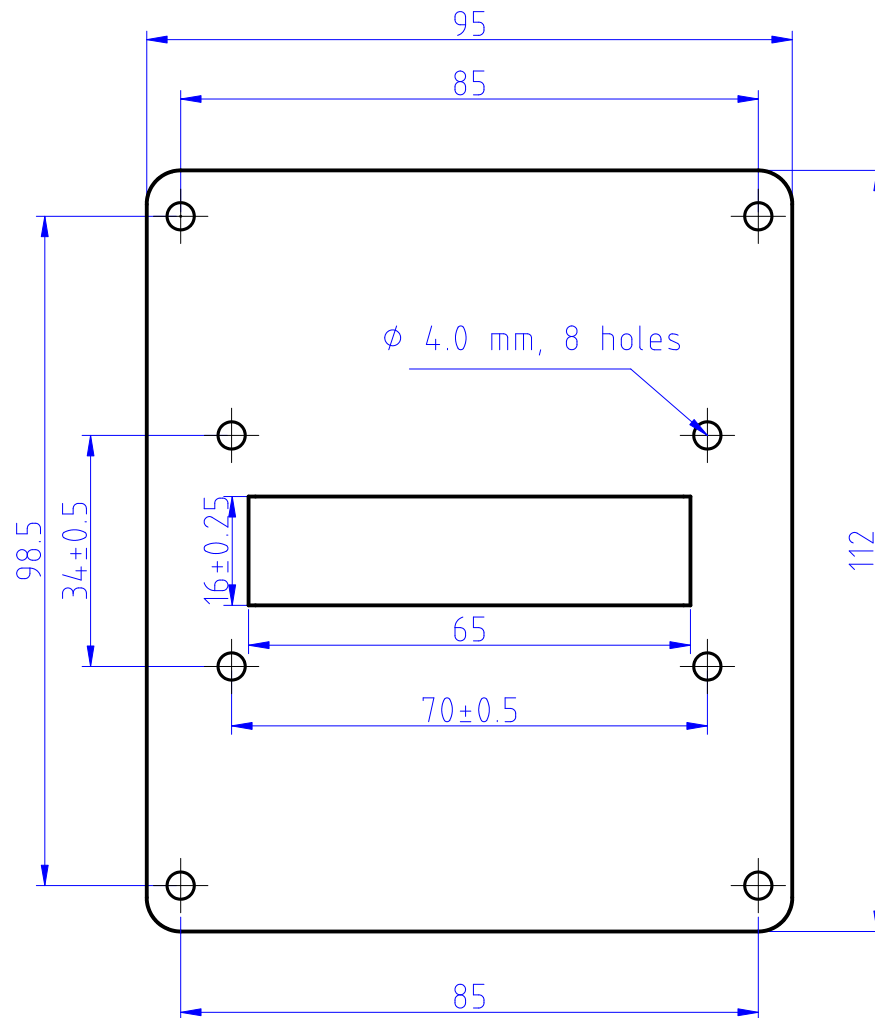
Self Locking Mechanism

Note:

1. All dimensions are in mm.
2. Tolerance ± 2 mm

TCDO/RE/001/2021-6/7
TOP COVER
R.D.S.O.

Prepared By: JRE/Tele	Checked By: ADE/Tele	Verified & issued By: Director/Tele-I	Approved By: ED/Tele-I
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Note:

1. All dimensions are in mm.
2. For all other dimensions, tolerance shall be ± 2 mm.
3. Nut & Bolt with washer (duly Nickel plated) of proper dimensions shall be provided along with Terminal Bracket Mounting Plate.
4. Screw shall be of SS material & Allen key type.
5. Thickness 6.0 mm (minimum).

TCDO/RE/001/2021-7/7

TERMINAL BRACKET MOUNTING PLATE

R.D.S.O.

Prepared By: JRE/Tele

Checked By: ADE/Tele

Verified & issued
By: Director/Tele-I

Approved By: ED/Tele-I