

Government of India

Indian Railway Standard

Track Manual

Metric

(Revised)

Chapters I to XI

Issued by

Research Designs & Standards Organisation

(Ministry of Railways)

2024

Preface

The Indian Railways Standard Manual of Permanent way was first issued in 1934 and revised initially in 1936. Again in 1947, Chapters I to IV were revised and the new The Indian Railway Standard Track Manual (IRS Track Manual) was issued. The scope of the Manual was later expanded by adding Chapter V on Turnouts, Switches and Crossings in the year 1953, Chapter VI on Diamonds and Slips in 1956 and Chapter VII of Scissors and ordinary Cross-overs in 1961. The 1962 edition of the Manual thus comprised chapters I to VII. This edition was later reprinted in 1967 incorporating addendum and corrigendum slips issued up to 30.09.1966. First edition of the IRS Track Manual Vol. I (in metric unit) was issued in 1980. Subsequently, chapter VIII, IX, X, XI & XII were added and IRS Track Manual had been bifurcated in two volumes. Vol. I containing Chapter I to VI and Vol. II containing Chapters VII to XII and an Annexure showing therein the statement and drawings for adoption of rail screws/plate screws in place of dog spikes/round spikes in turnout assemblies.

The current revision has been carried out to accommodate latest technological up-gradation in Track related components and fastening system. It also includes alterations & deletions of obsolete drawings pertaining to Track components and fastening system. This IRS Track Manual has been compiled in single volume containing Chapter I to XI and an Annexure after the rearrangements of chapters.

The information contained in the notes and the drawing plates will, illustrate clearly the salient features of the Indian Railway Standard Track Designs and tabulated data will be of practical value to those concerned with the construction and maintenance of track. 'Part Number' in the tables indicates the RDSO drawing number of the component.

As the ultimate aim of standardisation is to reduce the number of types and consequently the stocks to be maintained for replacements, it is desirable that before placing orders for supply of track parts of non-standard assemblies, those concerned should satisfy themselves that none of the standard parts will suit or could be modified to suit their requirements.

The size of the Manual and its loose leaf features have been retained to facilitate additional pages to be added or replacements made subsequently, if necessary. Separate content pages before each Chapter shall facilitate quick reference. Brief notes have been given at the beginning of each chapter.

Further, it is to be mentioned that IRS Track Manual may not be containing some latest or modern components drawings for which various specification related to track and fastening system may be referred to RDSO website. For old drawings, previous version of IRS Track Manual (Volume-I 1994 version and Volume –II 1989 version) may be referred.

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CHAPTER I

RAILS AND FISHPLATES (RF)

S.N.	Description	Pages	Page No.
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Brief notes on rails & fishplates

Rails : The rail sections IRS 52 kg, UIC 60kg, 60E1 and 60E1A1 have been adopted for use on Indian Railways. These rail sections are appearing in UIC code 861-3, EN:13674-1 & EN:13674-2 and reproduced in Indian Railway Standards Specification T-12.

52kg, UIC 60kg & 60E1	For Broad Gauge
60E1A1 (Asymmetric Rail)	For use in thick web switches

The tables on pages RF 1 in 8 sheets give the main dimensions, calculated weights and properties of rail sections relevant to the two principal axes.

Track Bolts and Nuts: The Properties / Design of Track Bolts and nuts are governed by IRST-23 which is based on the latest IS codes. Threads of the bolts and nuts are metric screw threads.

The main dimensions are shown on Sheet RF 2 Sheet 1.

Spring washers: Single and double coiled spring washers are shown on page RF2A sheet 1, for 25mm dia. and 20mm dia bolts respectively.

Fishplates:

Fishplates are manufactured from fishplate bars using carbon steel billets/ blooms and shall meet the physical and chemical requirements as laid down in IRST-1. Fishplates have been classified under the following categories depending on their use:

- 1- Normal fishplate- used for fastening rails of the same sections (RF 3 Sheet 1- 6).
- 2- Combination fishplate - used for rails of different sections (RF 4 Sheet 1-3)
- 3- Joggled fishplate- used for welded joints (RF 5 Sheet 1-4)
- 4- Special fishplate- Used for fabrication of Glued Insulated Rail Joints (Detailed in chapter -10)

Combination fishplates:

The IRS combination fishplates have been designed, with an adequate thickening up of the section in the middle portion where the change in section takes place. Another feature of these designs is the elimination of the expansion joint, i.e. the rail ends are made to butt, which helps in making the joints considerably stronger than the ordinary joints.

A uniform system of marking the right or left hand and the inner or outer fishplates has been adopted. This is illustrated in the key plans on the drawings at RF 4 Sheet 1 & 2.

The combination fishplate of 52kg & 60kg rails, main dimensions and part numbers of the fishplates as well as those of the special Track bolts have been tabulated at RF 4 Sheet 3.

Types of joggled fishplate:

Following types of joggled fishplates with its fastening arrangement are in use:

RT-5551:- Joggled fishplate with 4 clamps for 52kg rail section (RF 5 Sheet 1-2)

RT-5848:- Joggled fishplate with 2 far end bolts and 2 inner side clamps for 52 kg rail section.

RT-5849- Joggled fishplates with 2 far end bolts and 2 inner side clamps for 60 kg rail section. (RF 5 Sheet 3-4)

M.S. Clamps: M.S. Clamps are used in emergent situations to join the rails with respective fishplates. The sketches/drawings for holed/grooved fishplates are available at RF 6 Sheet 1 - 3 as detailed under:

Fishplate Type	Rail Section	Fishplate Drg.	Drg no. of M.S. Clamp	Sheet No.
Holed Fishplate	60E1/UIC60	RT-1898	RT-5852 & RT-5852/1	RF 6 Sheet 1
	52kg	T-090(M)	RT-5853 & RT-5853/1	
Grooved Fishplate	60E1/UIC60	RT-5851	RT-5854 & RT-5854/1	RF 6 Sheet 2 *With some different dimensions as tabulated in sheet
	52kg	RT-5850	RT-5855 & RT-5855/1	
Joggled Fishplate (with 2 far end bolts and 2 inner side clamps)	60E1/UIC60	RT-5849	*RT-5854 & RT-5854/1	
	52kg	RT-5848	*RT-5855 & RT-5855/1	
Joggled Fishplate (with 4 clamps)	52kg	RT-5551	RT-5552 & RT-5552/1	RF 6 Sheet 3

Insulated rail joints:

The item Glued Insulated Rail Joints has been detailed in chapter 10 of the Manual.

Rail anchors: Spring steel rail anchors for 60E1/UIC 60kg, 52kg, rail sections are detailed on pages RF 6A. They have to be procured as per IRS Specification T-24.

RF 1
SHEET 1 of 8

IRS 52kg

Technical drawing of a mechanical part, likely a bracket or arm, showing dimensions and radii. The part is symmetrical about a central vertical axis. Key dimensions include a total width of 136, a central straight section of 156, and various radii such as R80, R13, R2, R381, and R22.5. The drawing includes a note "TO CENTRE OF 381 mm RAD" and a "STRAIGHT" section label.

PROPERTIES

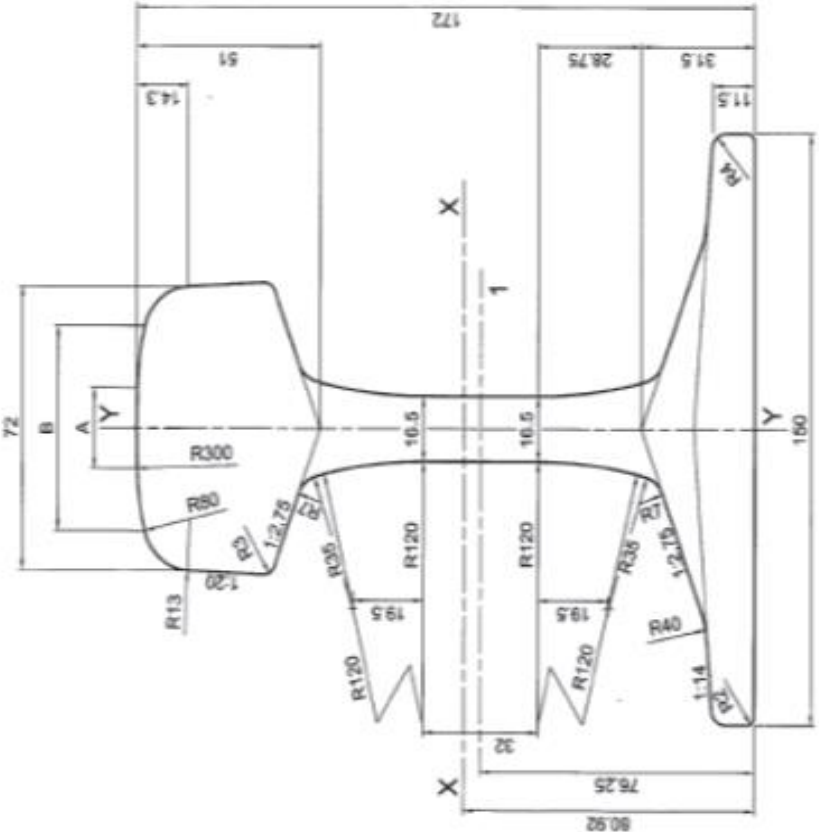
Rail Section	Weight per meter	Area of Section	Moment of Intertia		Section Modulus (Horizontal Axis)		Max. Distance from Neutral Horizontal Axis	
			Horizontal Axis	Vertical Axis	For Compression	For Tension	Compres sion Side	Tension Side
	Kg/m	cm ²	cm ⁴	cm ⁴	cm ³	cm ³	mm	mm
52kg	51.89	66.15	2158	363	268.50	285.50	80.41	75.59



PROPERTIES

Rail Section	Weight per meter	Area of Section	Moment of Inertia		Section Modulus (Horizontal Axis)		Max. Distance from Neutral Horizontal Axis	
			Horizontal Axis	Vertical Axis	For Compression	For Tension	Compres sion Side	Tension Side
	Kg/m	cm ²	cm ⁴	cm ⁴	cm ³	cm ³	mm	mm
UIC 60Kg	60.34	76.86	3055	512.9	335.5	377.4	91.05	80.95

60E1

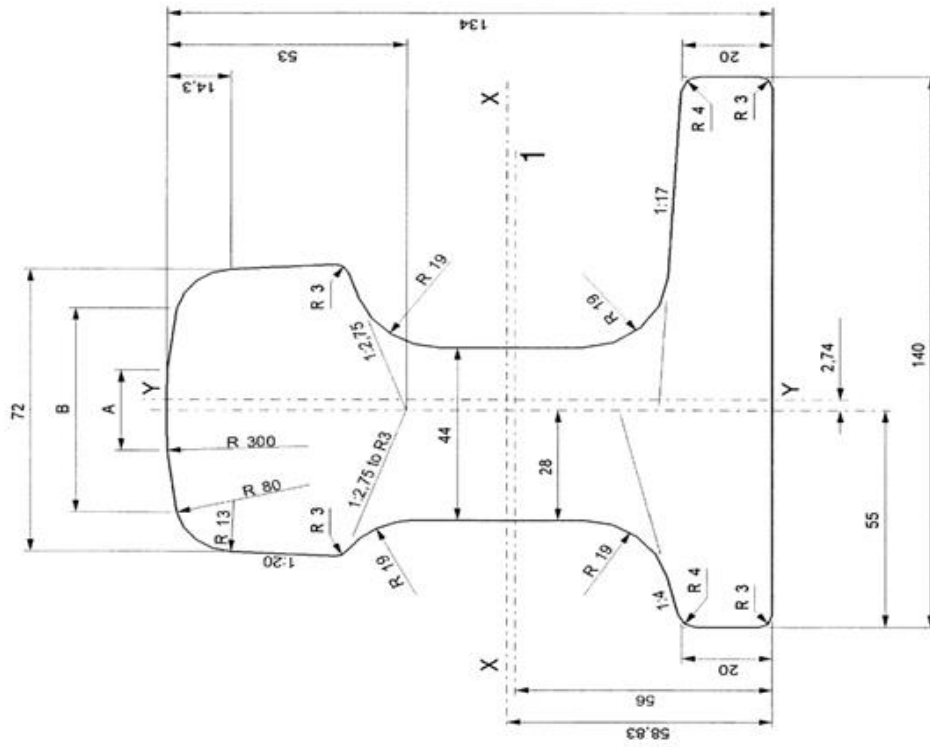


Indicative Dimensions: A = 20.456 mm
B = 52.053 mm

PROPERTIES

Rail Section	Weight per meter	Area of Section	Moment of Intertia		Section Modulus (Horizontal Axis)		Max. Distance from Neutral Horizontal Axis	
			Horizontal Axis	Vertical Axis	For Compression	For Tension	Compression Side	Tension Side
	Kg/m	cm ²	cm ⁴	cm ⁴	cm ³	cm ³	mm	mm
60E1	60.21	76.70	3038.3	512.3	333.6	375.5	91.08	80.92

60E1A1

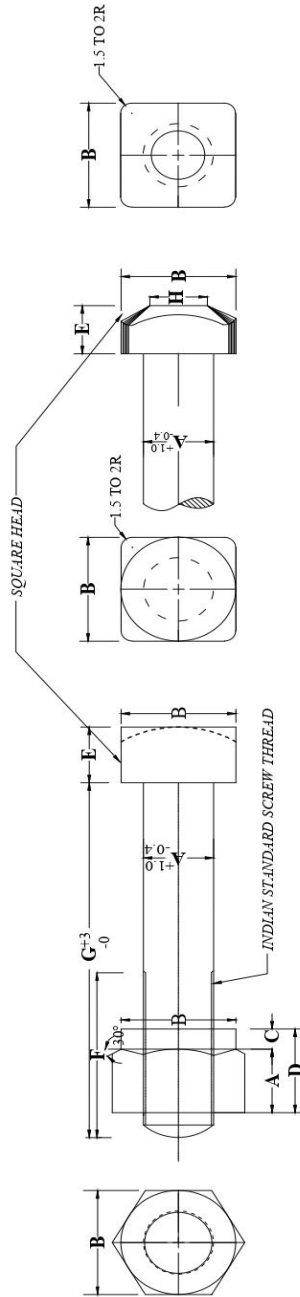


Indicative Dimensions: A = 20.456
B = 52.053

PROPERTIES

Rail Section	Weight per meter	Area of Section	Moment of Intertia		Section Modulus (Horizontal Axis)		Max. Distance from Neutral Horizontal Axis	
			Horizontal Axis	Vertical Axis	For Compression	For Tension	Compression Side	Tension Side
	Kg/m	cm ²	cm ⁴	cm ⁴	cm ³	cm ³	mm	mm
60E1A1	72.97	92.95	1726.9	741.2	229.7	293.5	75.17	58.83

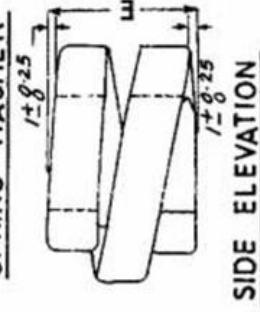
TRACK BOLTS & NUTS



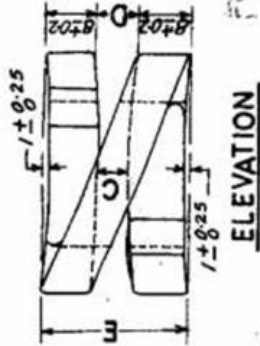
MAIN DIMENSIONS OF TRACK BOLTS & NUTS

RAIL SECTION	PART NUMBER	DIMENSIONS (mm)								WEIGHT APPROX. (WITH ORDINARY HEAD kg./PIECE
		A	B	C	D	E	F	G	H	
60 E/UIC 60 & 52 kg.	RDSO/T-1899	25 D/A, -1.0	41+0	8	33+0.80	22+0.65	65	140	-	0.98
52 kg.	RDSO/T-3549	25 D/A, -1.0	41+0	8	33+0.80	22+0.65	75	140	20.5	0.979
52 kg.	T-11501	25 D/A, -1.0	41+0	8	33+0.80	22+0.65	65	130	20.5	0.940
Combination fishplate for 60kg. & 52kg.	RDSO/T-700	25 D/A, -1.0	41+0	8	33+0.80	22+0.65	65	180	20.5	1.130

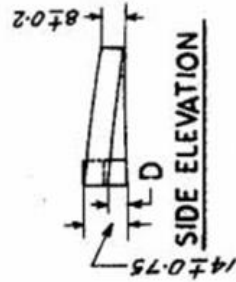
SPRING WASHER



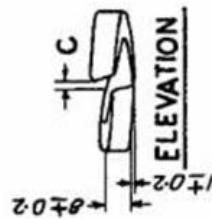
SIDE ELEVATION



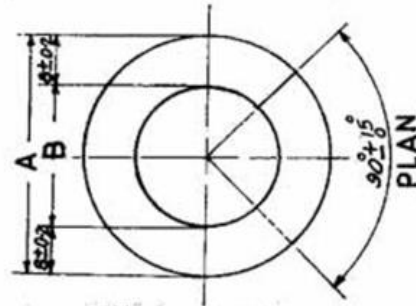
ELEVATION



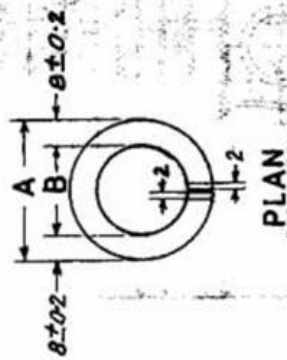
SIDE ELEVATION



ELEVATION



PLAN



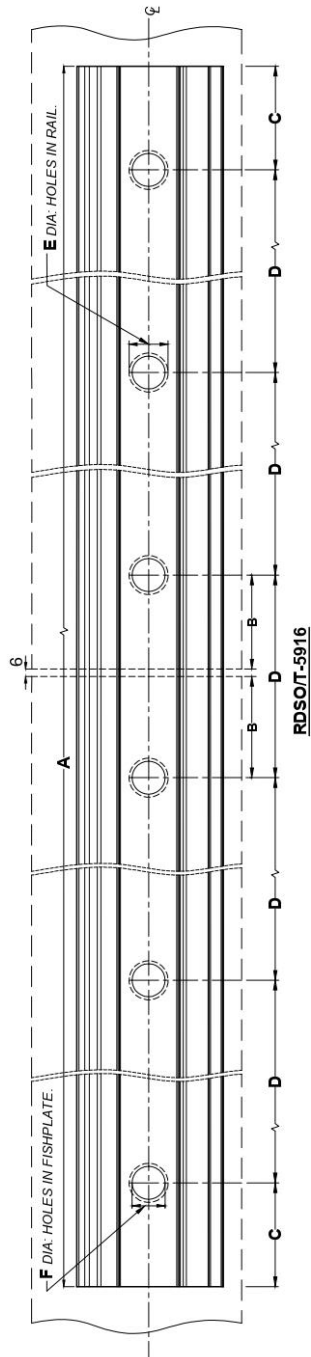
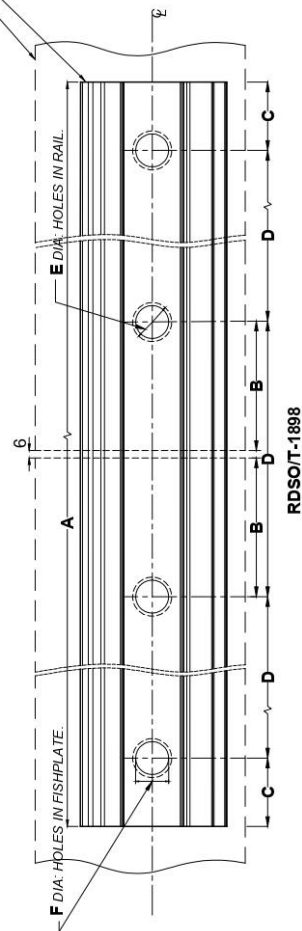
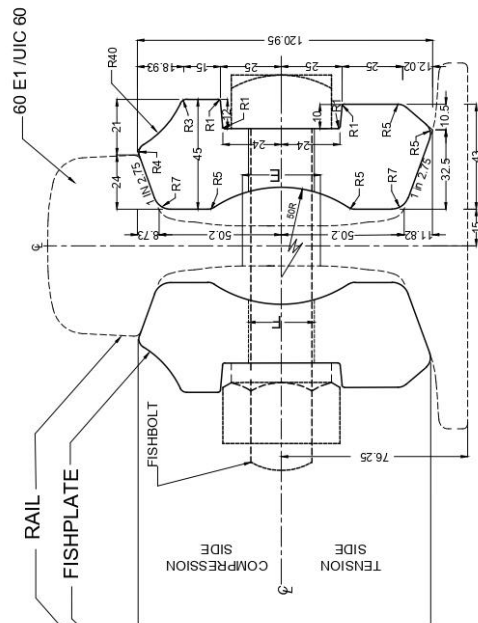
PLAN

TABLE OF DIMENSIONS

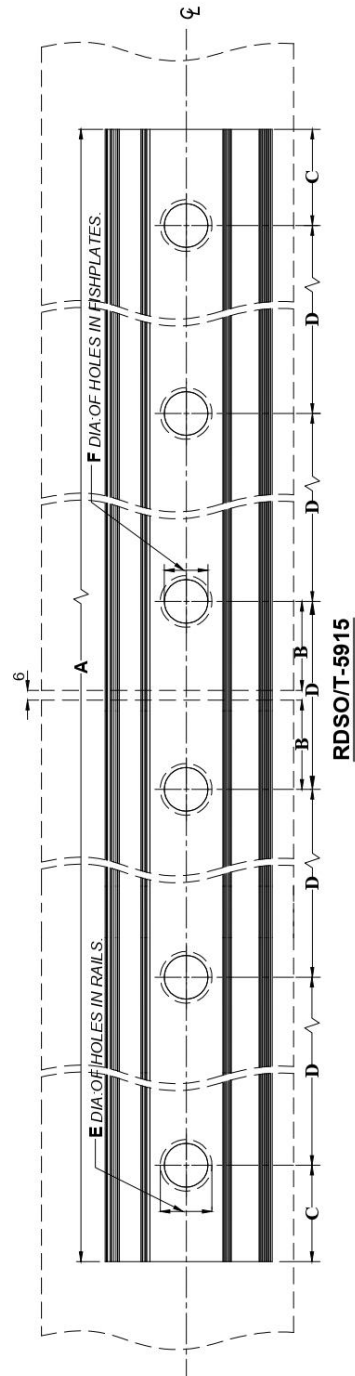
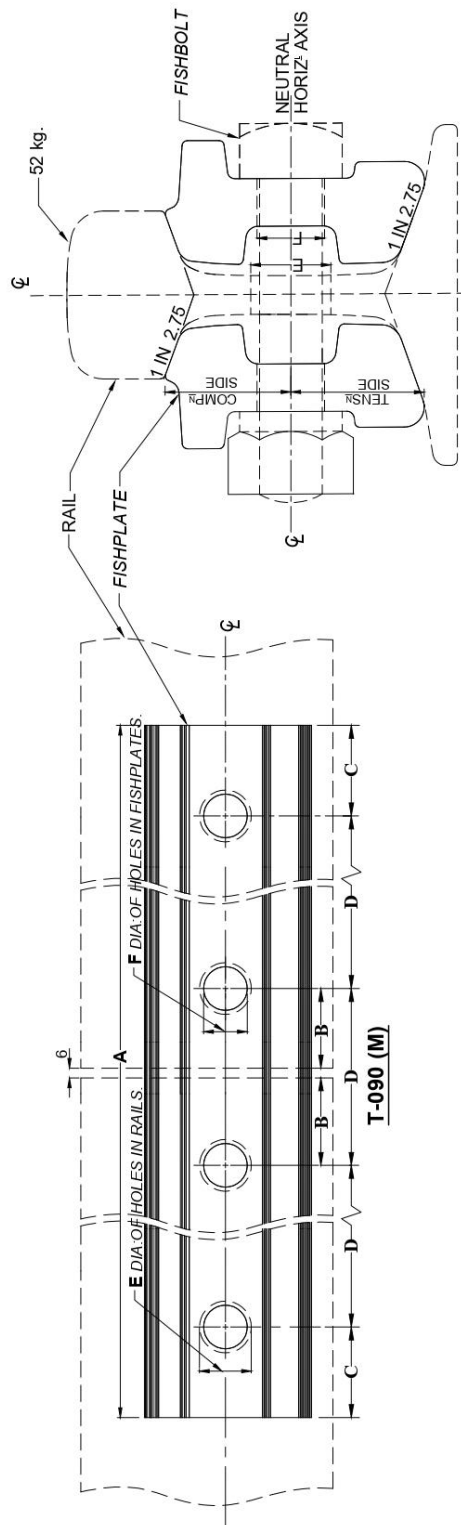
DRAWING NUMBER	DIA: OF BOLT/PLATE SCREW	DIMENSIONS (mm)				
		A	B	C	D	E
T-10773	25	44.4 max	27±1.0	2.5±1.0	6±0.5	
RDS01F-1878	20	38±1.4	22±1.0	5±0.0	7±0.9	23±1.0

RF 3
SHEET 1 OF 6

FISHPLATE



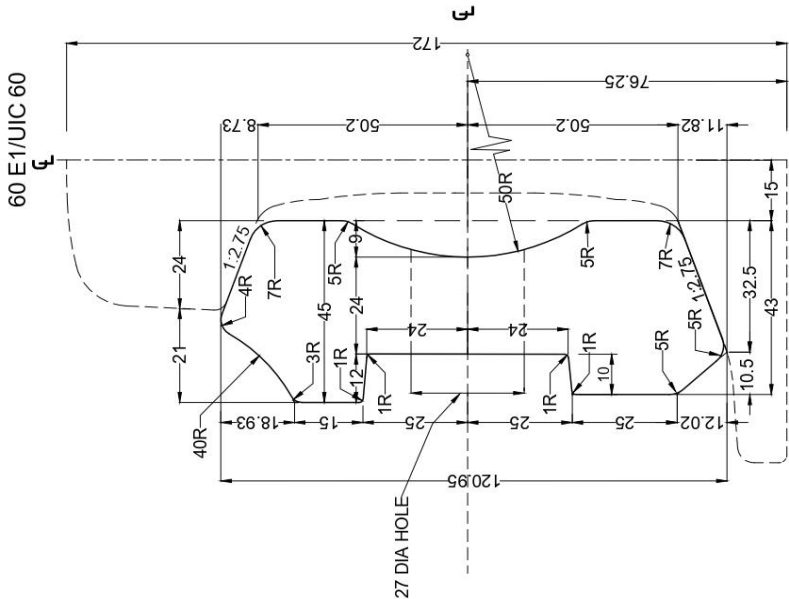
FISHPLATE



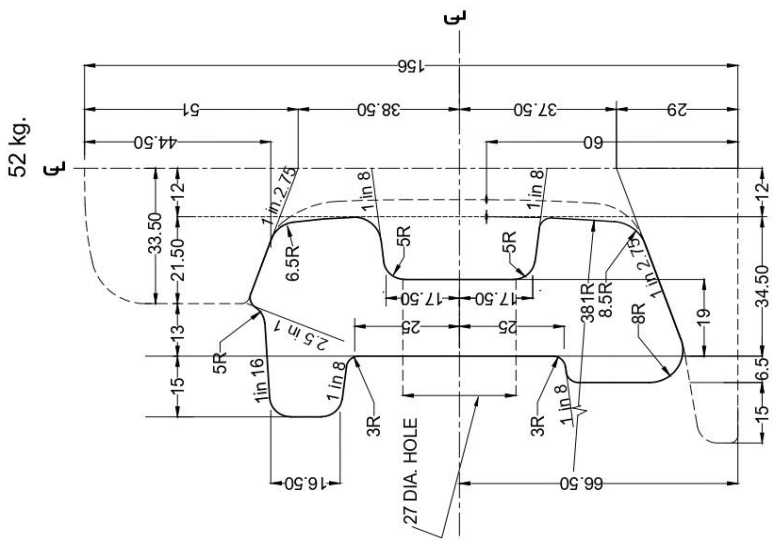
MAIN DIMENSIONS & PROPERTIES OF FISHPLATES

RAIL SECTION	PART NUMBER	DIMENSIONS						MOMENT OF INERTIA (PER PAIR)	MAXIMUM DISTANCE FROM NEUTRAL HORIZONTAL AXIS		SECTION MODULUS HORIZONTAL AXIS (PER PAIR)	WEIGHT APPROX: (PER PAIR)
		A	B	C	D	E	F		COMP ^N SIDE	TENS ^N SIDE		
		mm	mm	mm	mm	mm	mm					
60 E1/UIC 60	RDSO/T-1898	610	80	56	166	32	27	875.8	60.4	60.4	145.0	35.20
	RDSO/T-5916	1000	80	85	166	32	27	875.8	60.4	60.4	145.0	-
52 kg.	T-090(M)	610	80	56	166	32	27	644.00	50.36	52.89	128.02	28.71
	RDSO/T-5915	1000	80	85	166	32	27	644.00	50.36	52.89	128.02	-

FISHPLATE SECTIONS

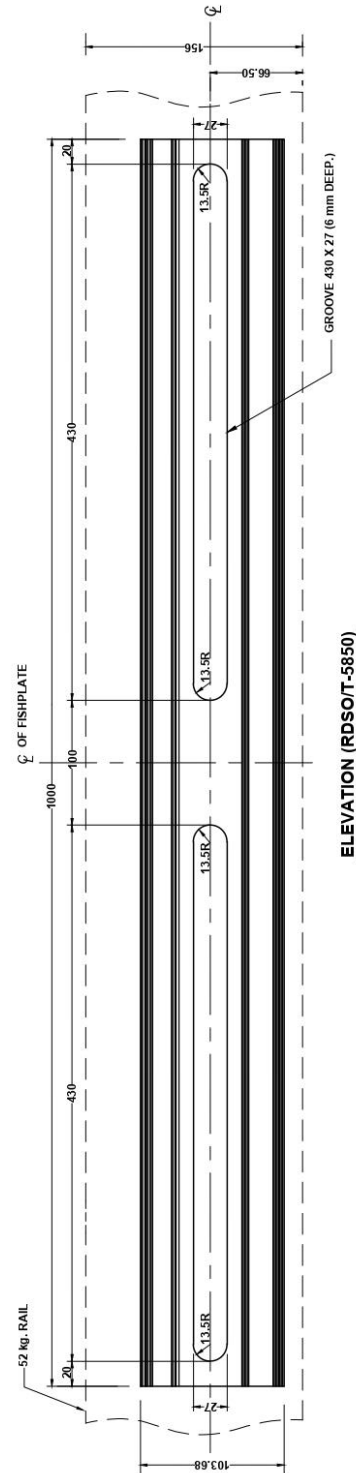
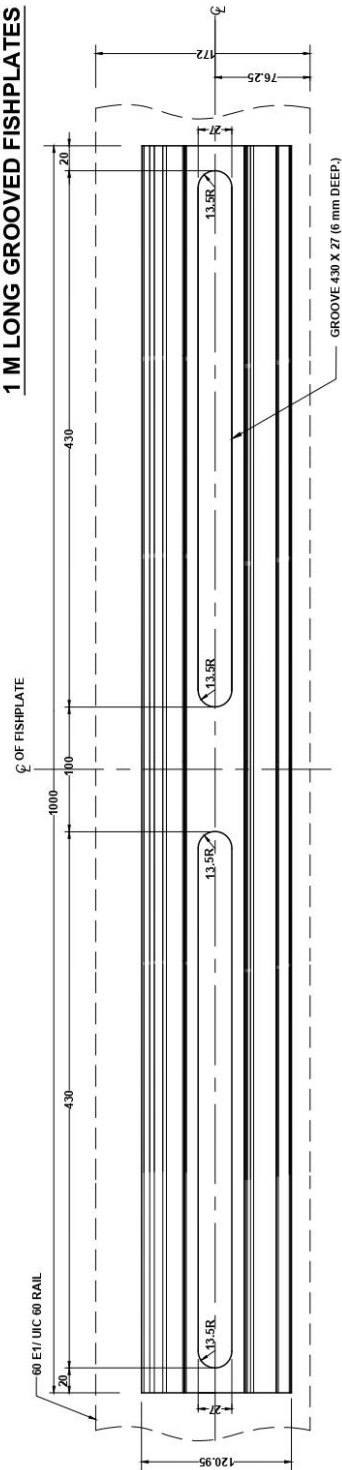


FISHPLATE 60 E1/UIC 60: RDSO/T-1898

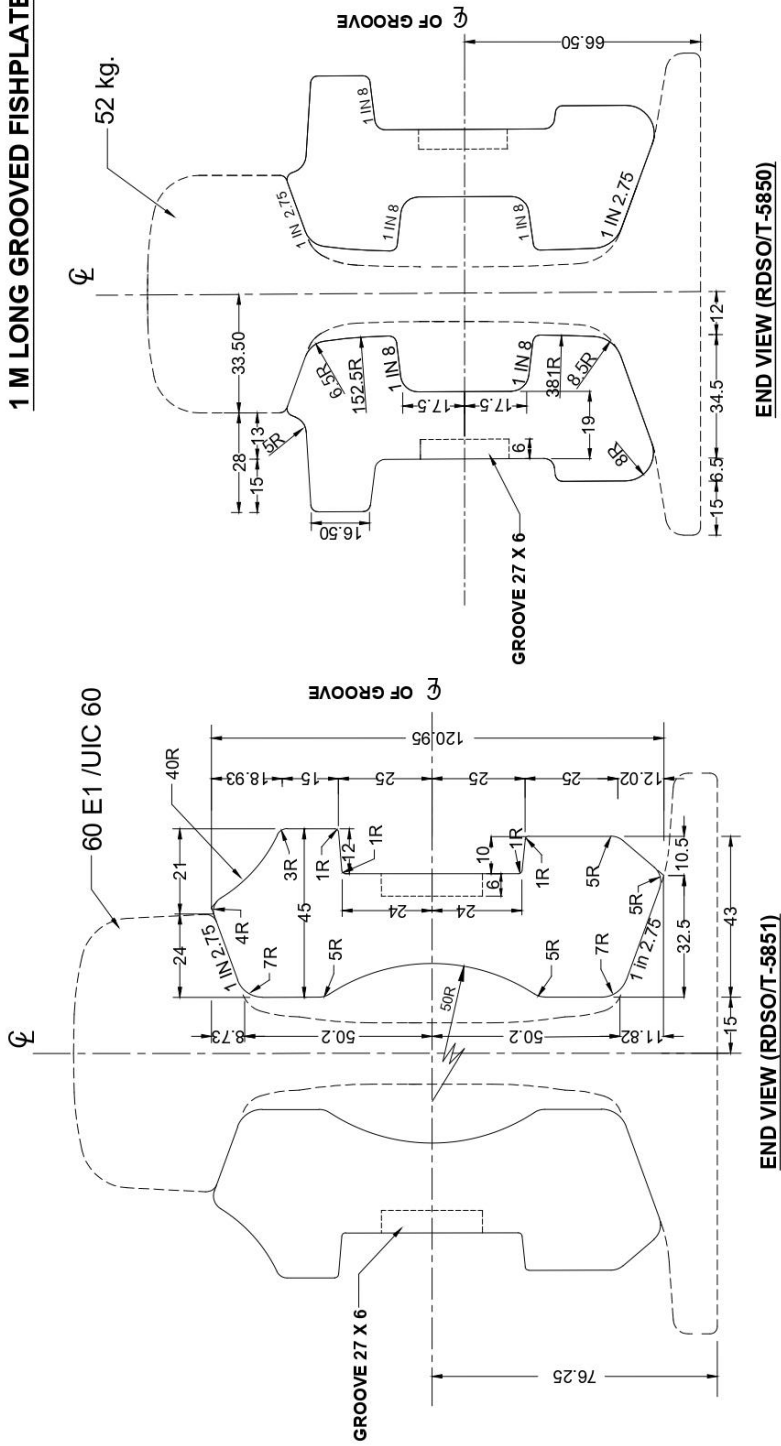


FISHPLATE 52 kg-T090(M)

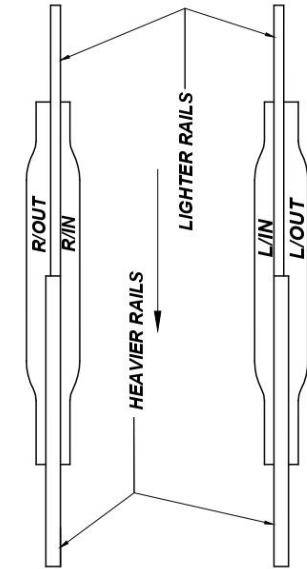
1 M LONG GROOVED FISHPLATES



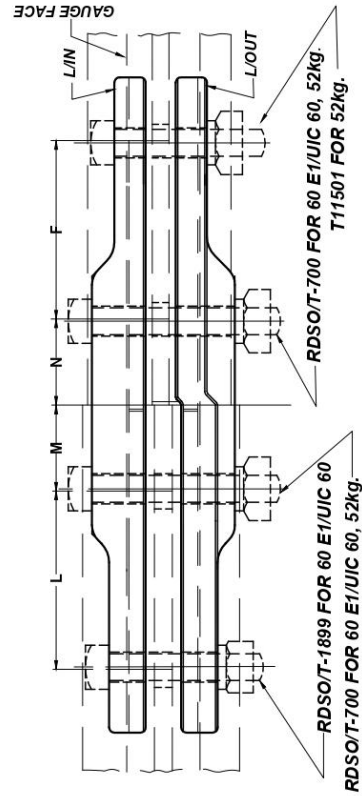
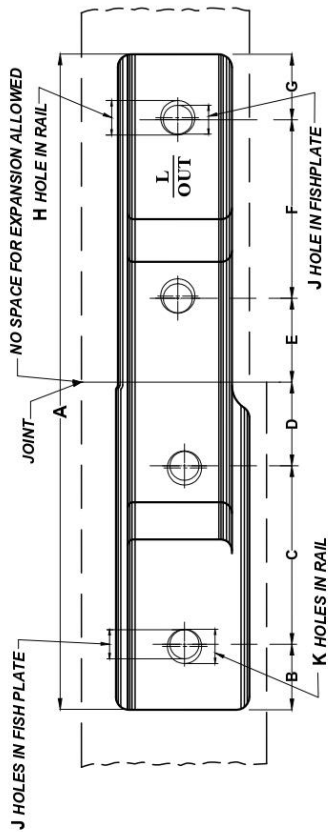
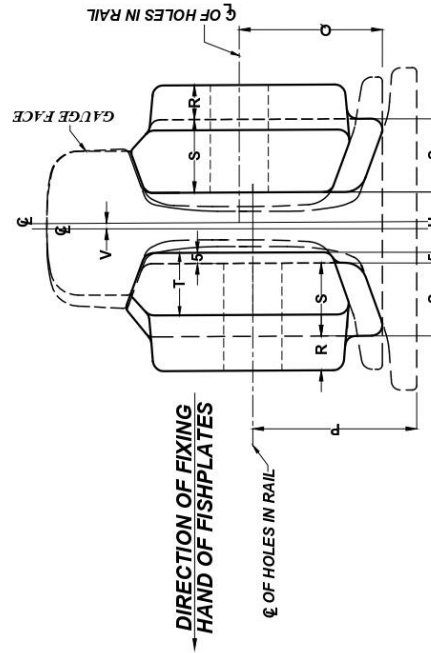
1 M LONG GROOVED FISHPLATES



COMBINATION FISHPLATES

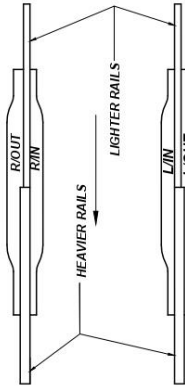


KEY PLAN OF FISHPLATES

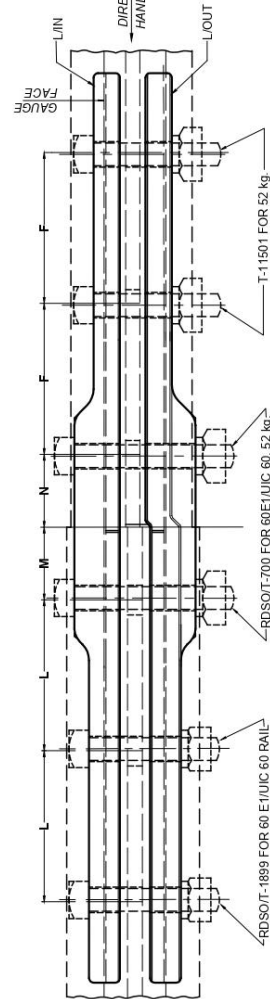
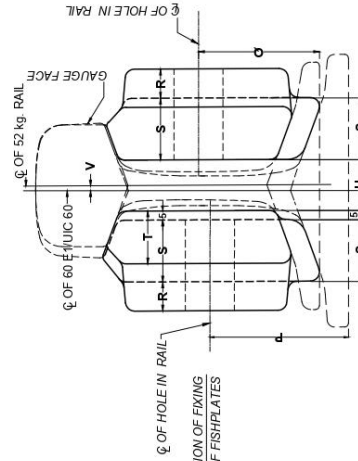
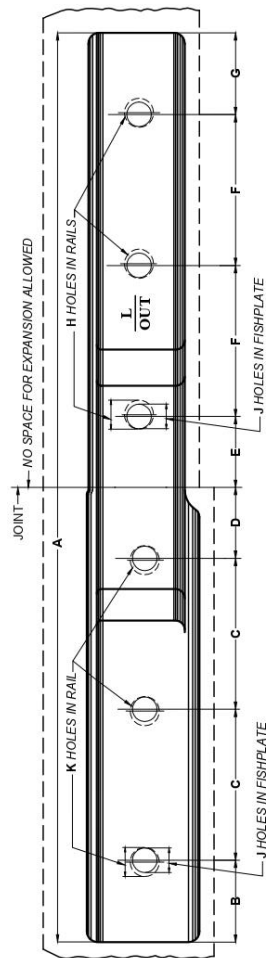


RDSO/T-696 TO 699 (60 E1/UIC 60 & 52kg.)

COMBINATION FISHPLATES



KEY PLAN OF FISHPLATES



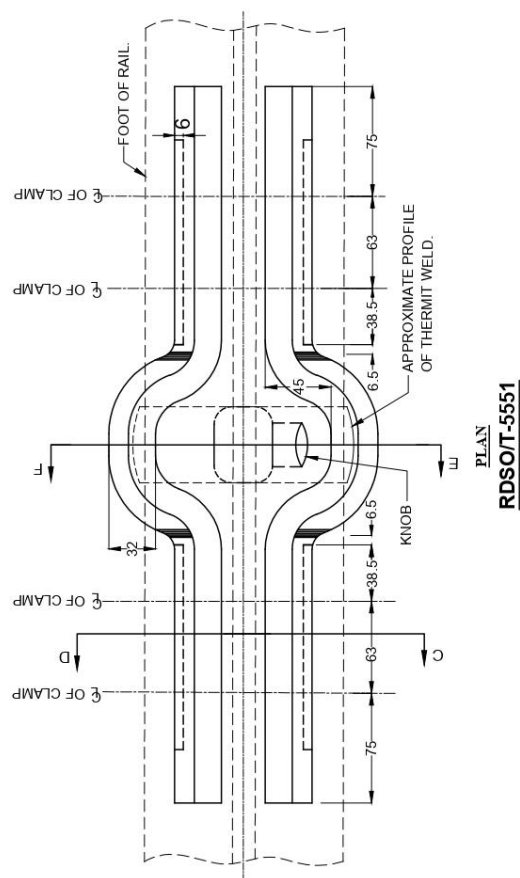
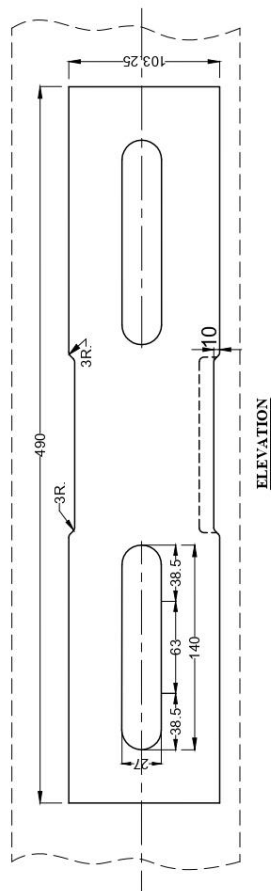
RDSO/T-8533 TO 8536 (60 E1/UIC 60 & 52 kg.)

PART NUMBERS & MAIN DIMENSIONS

RAIL SECTIONS TO BE JOINED	PART NUMBERS			
	L/OUT	L/IN	R/IN	R/OUT
60 E1/UIC 60-52 kg	RDSO/T-696	RDSO/T-697	RDSO/T-698	RDSO/T-699
60 E1/UIC 60-52 kg.	RDSO/T-8533	RDSO/T-8534	RDSO/T-8535	RDSO/T-8536

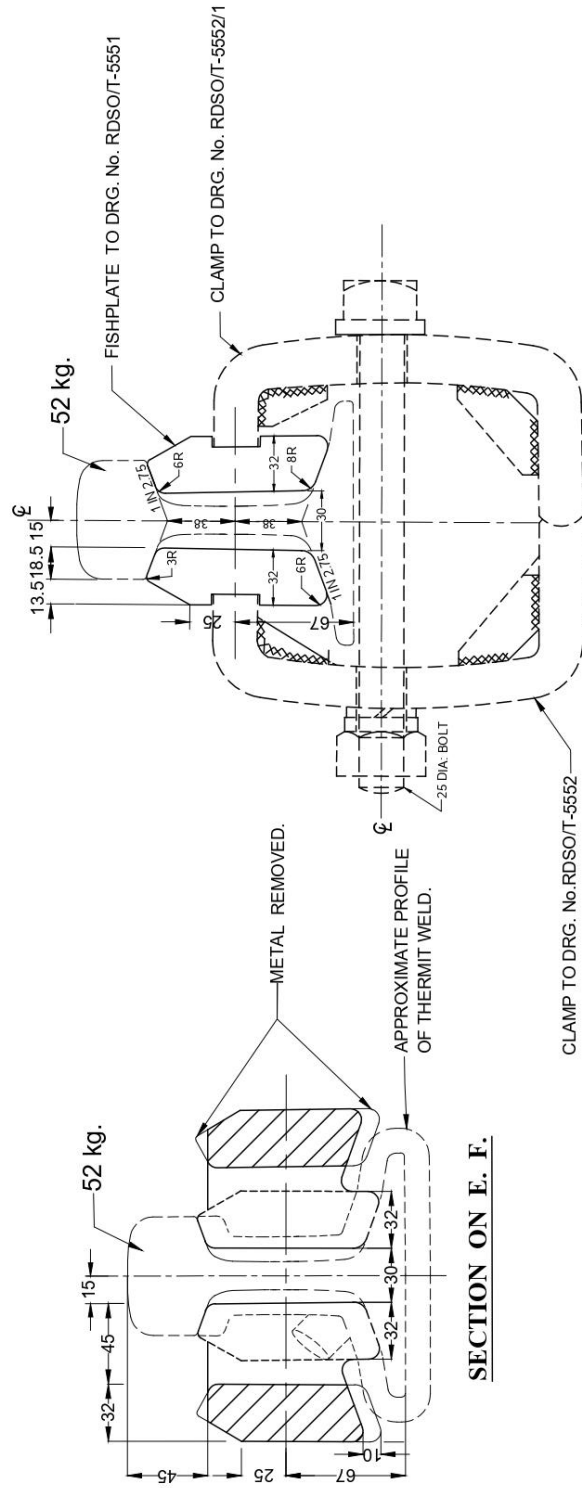
RAIL SECTIONS TO BE JOINED	PART NUMBERS	DIMENSIONS (mm)																			
		A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
60 E1/UIC 60-52 kg.	RDSO/T-696 to RDSO/T-699	610	61	166	78	78	166	61	32	27	32	166	80	80	76.25	66.5	16	34	29	28	2.5
	RDSO/T-8533 to RDSO/T-8536	1000	90	166	78	78	166	90	32	27	32	166	80	80	76.25	66.5	16	34	29	28	2.5

JOGGLED FISHPLATES WITH CLAMPS



RDSO/T-5551

JOGGLED FISHPLATES WITH CLAMPS

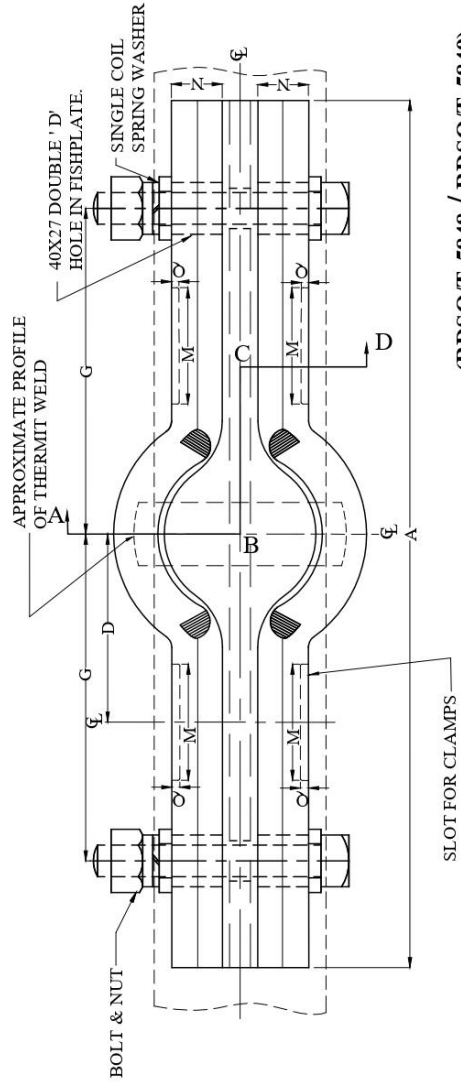
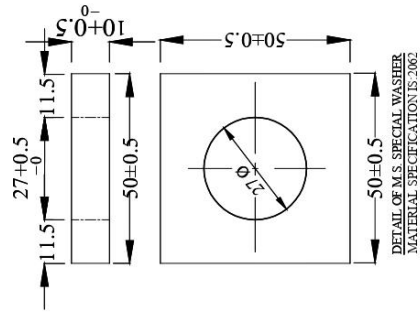
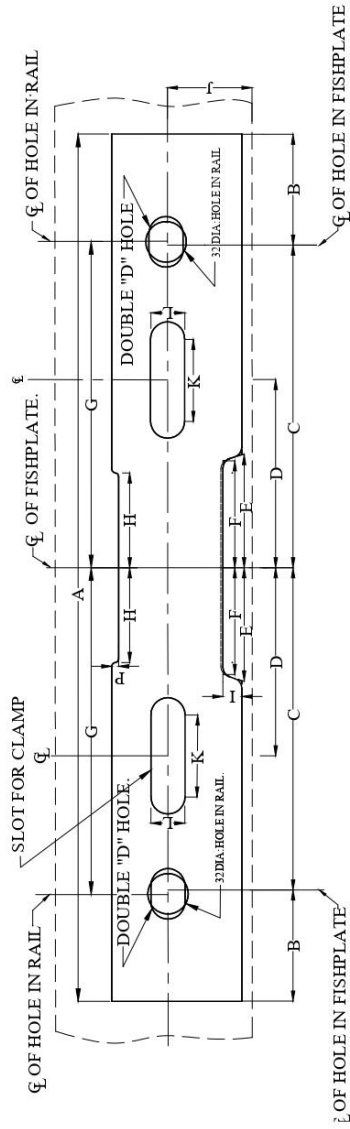


SECTION ON C. D.

RDSO/T-5551

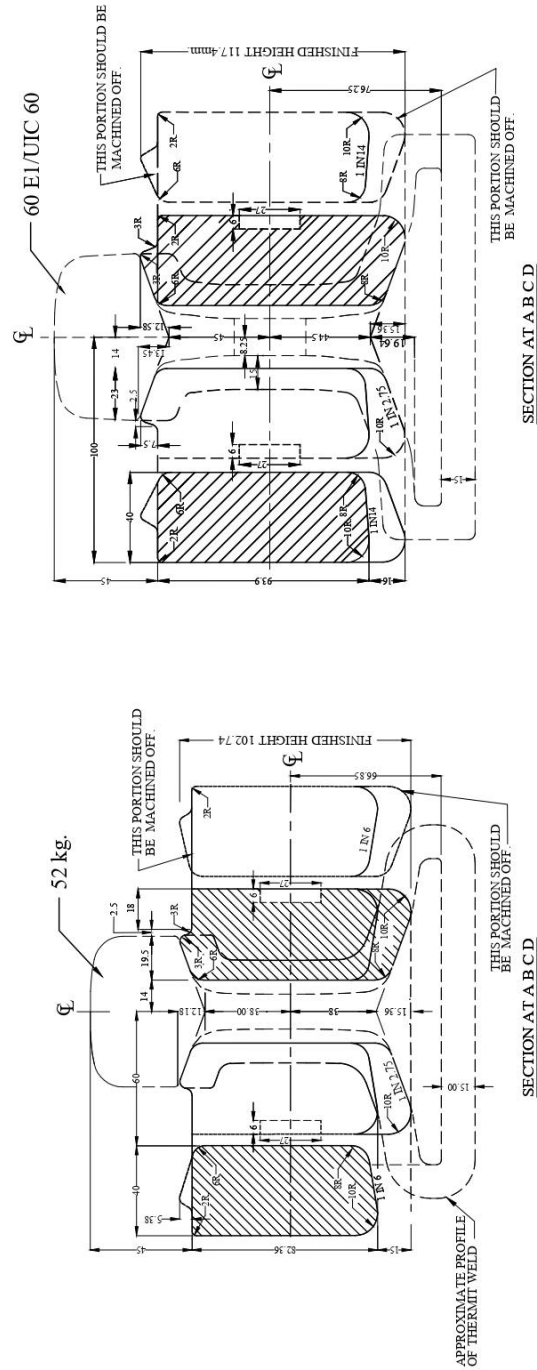
RF 5
SHEET 3 OF 4

JOGGED FISHPLATES



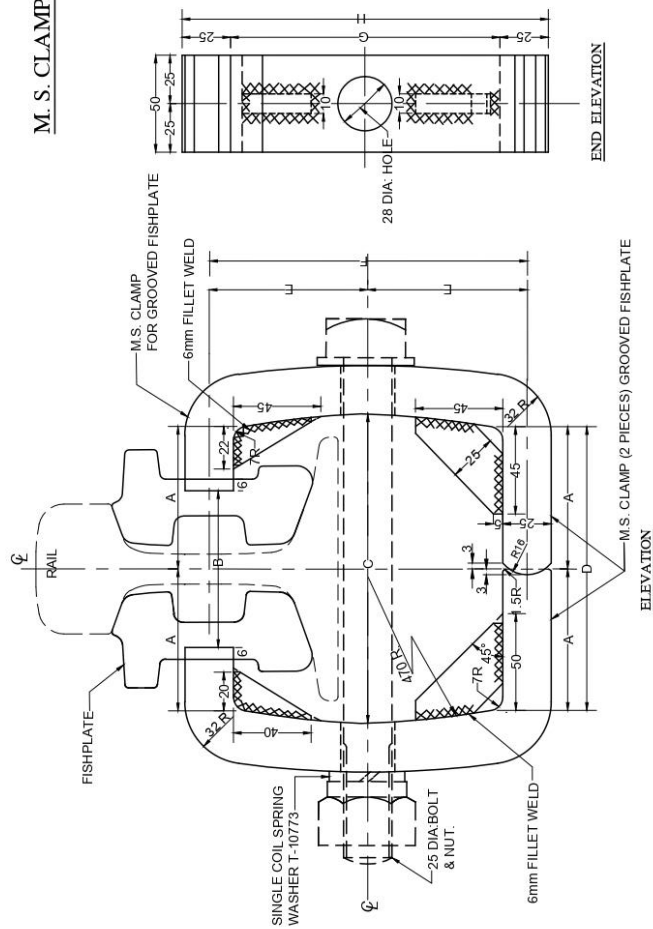
(RDSO/T-5848 / RDSO/T-5849)

JOGGLED FISHPLATES



RAIL SECTIONS	PART No.	DIMENSIONS (mm)															
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q
52 kg	RDSO/T- 5848	686	88	255	149	89.5	84.5	258.5	75	15	67.00	65	27	92	40	5.38	6
60E1/UIC 60	RDSO/T- 5849	686	85	258	145	89.5	84.5	258.5	78	16	76.25	65	27	92	40	7.5	6

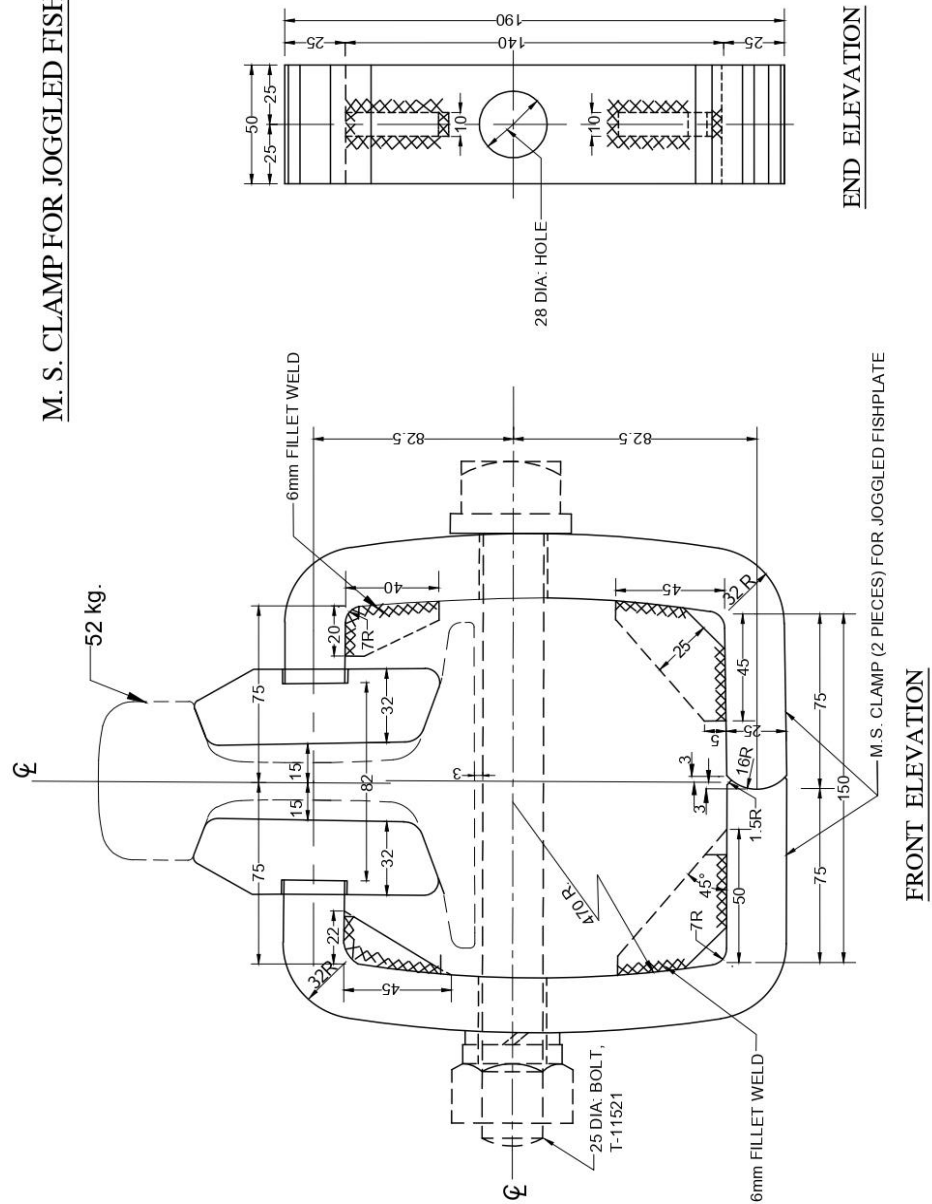
M. S. CLAMP



M.S. CLAMP FOR GROOVED FISHPLATE
PART NOs. AND DIMENSIONS

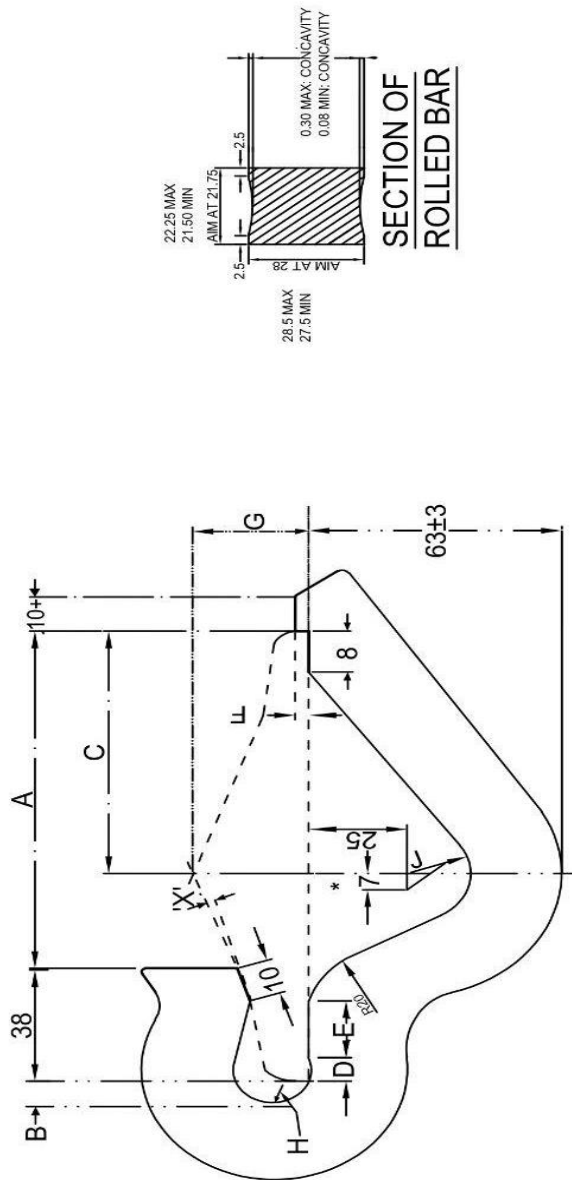
M. S. CLAMP	RAIL & FISHPLATE	BOLT & NUT	DIMENSIONS							
			A	B	C	D	E	F	G	H
RDSO/T-5854 & RDSO/T-5854/1	60 E1/UIC 60 RDSO/T-5851	T-11523	80	84	172	160		91.5	183	158 208
	60 E1/UIC 60 RDSO/T-5849	T-11525	86	96	184	172				
	52 kg	T-11522	73	81	160	146				
RDSO/T-5855 & RDSO/T-5855/1	RDSO/T-5850	T-11525	80.5	96	175	161				
	52 kg RDSO/T-5848									

M. S. CLAMP FOR JOGGLED FISHPLATES

RDSO/T-5552 & RDSO/T-5552/1

RAIL ANCHORS

RF 6A
SHEET 1 OF 1



NOTE:-

DIMENSION 'X' MUST BE SUCH AS TO ENSURE THAT THE FINISHED ANCHORS COMPLY WITH THE PHYSICAL TESTS LAID DOWN IN THE RELEVANT SPECIFICATION.

* DIMENSION FOR 60E1/UIC 60Kg.

TABLE OF DIMENSIONS

RAIL SECTION	DRAWING NUMBER	DIMENSIONS (mm)									
		A	B	C	D	E	F	G	H	J	
60E1/UIC 60Kg	RDSO T-1045	102	6	75	10	20	5 ⁺⁰ _{0.8}	31.50	10	14	
52 Kg	T 10327	98.00	4.00	68	10	20	5 ⁺⁰ _{0.8}	29	9	14	

CHAPTER II

SLEEPER FASTENINGS

S.N.	Description	Pages	Page No
1.	Brief notes on sleeper fastenings	SFa to SFh	33
2.	Dogspikes, fang bolts, round spikes and rail Screws, plate screws	SF1	41
3.	Hook bolts for sleepers	SF2	45
4.	Bearing plates- mild steel-(single rail) Canted and flat	SF3	47
5.	Bearing plates-cast iron-(single rail)-Anticreep CI one key and two key types	SF4	53
6.	Spring steel loose jaws, mild steel keys: Ordinary and over-size	SF5	63
7.	Modified loose jaws, special Key	SF5A	66
8.	Fastenings for CI sleepers	SF6	68
9.	Grooved rubber sole plate and steel Pads for ST sleeper	SF6A	70
10.	Table showing approximate weights and quantities of Sleepers and fastenings for various densities of sleepers	SF7	71
11.	Elastic Rail Clip (ERC)	SF 8	73
Liner			
12.	Insulating Liner (GFN/HVN)	SF 9A	78
13.	Non- Insulating Liner (Metal)	SF 9B	83
Rail Pad			
14.	Grooved Rubber Sole Plates	SF 10A	87
15.	Composite Grooved Rubber Sole Plates	SF 10B	88
16.	Nylon Cord Rail GRSP	SF 10C	89
17.	Table Showing Details of PSC Sleepers and Fastenings	SF 11	90
18.	Table Showing Details of Elastic Rail Clips Used on IR	SF 12	91

Brief notes on sleeper fastenings

Dog spikes: The head and point of all sizes of dog spikes are identical and the shank is a uniform 16 mm square section. The length under the head is varied to suit sleepers with or without bearing plates for the various gauges, viz. Broad, Metre and Narrow. The part numbers, lengths and weights of the spikes have been tabulated on page SF1 sheet 1. Specification IRS T-2 covers other requirements.

Fang and bolt: This fitting is employed for fastening slide chairs to sleepers under switches of turnouts and is an alternative to round spike. It is, however, a more effective fastening and its use is advisable particularly on the sleepers carrying switch tieplates. Some railways use fang bolts for securing ordinary track chairs to sleepers and others use them for all the chairs through turnouts. Details of the fang and bolt are shown on page SF1 sheet 2. The CI fang, the bolt head and the diameter of the shank are standard but the length of the bolt has to be specified by the purchaser. Specification No. IRS T-13 are to be referred for fangs and bolts.

Round spikes: As mentioned under “Fang and bolt” the round spike is an alternative fitting and has been mentioned as such on all the IRS assemblies of switches on wooden sleepers. The standard anti-creep cast iron bearing plates are designed to be secured to sleepers by means of round spikes also. As in the case of dogspikes, the shape of the head and point and the diameter of the shank i.e. 18mm, have been standardised, the length being specified by the purchaser. The details are given on page SF1 sheet 2. Specification No. IRS T-4 is to be referred for round spikes.

Rail Screws: Rail screw is employed for fastening the rails to sleepers with or without bearing plates and is an alternative to dogspikes. It is however, a more effective fastening and its use is preferable to dogspikes. The overall length under head and length of unthreaded portion are varied to suit sleepers with or without bearing plates for various gauges, viz. Broad gauge and Metre gauge. The part numbers, overall lengths, lengths of unthreaded portion and other dimensions of rail screws have been tabulated on page SF1 sheet 4. Specification IRS T-16 covers other requirements of manufacture.

Plate screws: This fitting is an alternative to round spikes, It is, however, a more effective fastening and its use in place of round spikes is advisable. The overall length under head is varied to suit crossing timbers (special) and CI anticreep bearing plates. The part numbers, overall length and other dimensions of the plate screws are tabulated on page SF1 sheet 4. Specification IRS T-16 covers other requirements of manufacture.

Hook bolts: There are two types of hook bolts, viz. (1) with straight lips meant for securing sleepers to plate girders and (2) with sloping lips for securing sleepers to joists. In both types, the hook is an integral part of the bolt. The details of both the types of hook bolts are given on pages SF2 in 2 sheets, together with sketches showing the application of the hook bolts in the various cases. With the help of an arrow head stamped on the top end of the bolts, maintenance staff are enabled to check the position of the hook on the under-side of the sleeper.

Bearing plates, mild steel (single rail) flat: These bearing plates are only meant for use in turnout track, except in the portion where the use of combined bearing plates is unavoidable, e.g. under the crossings and near the heel of switches, as the rails through the turnouts and crossovers with FF rails are generally laid flat. The main dimensions, weight and part numbers are tabulated on pages SF3 in 2 sheets. The bearing plates for BG sections are 20mm thick and those for MG 16mm thick. Four holes 20mm square are provided to suit 16mm square dog spikes. Specification No. IRS T-10 is to be referred for bearing plates MS flat.

Bearing plates, mild steel (single rail) canted: The various bearing plates for the four rail sections are cut from three sizes of specially rolled plates and by varying the position of holes for dogspikes, rail screws, five different types are obtained; the main dimensions and part numbers of which are tabulated on pages SF 3 sheets 3, 4, 5 & 6.

The salient features of these bearing plates are :-

1. A shoulder on the outside of the rail foot;
2. A recess under the middle of the rail seat to prevent rocking of the rail on its seat;
3. A cant of 1 in 20 incorporated in the rolling of the plate.
4. Specifications No IRS T-5 is to be referred for bearing plates MS canted.

Bearing plates, cast iron, ordinary, canted (single rail)

These bearing plates shown on pages SF 4 sheet 1 serve the same purpose as the mild steel canted plates shown on pages SF3 sheets 3 & 4 but they are more suitable than the latter when used in conjunction with anticreep cast iron bearing plates which have the same thickness and overall dimensions. When a track is laid with these bearing plates, it can be made to resist creep simply by substituting some anticreep type bearing plates for the ordinary ones, the number of the anticreep bearing plates per rail length depending on the severity of creep experienced in the section of track under consideration. These bearing plates are suitable for dogspikes and the main dimensions for 90R section have been tabulated. Designs of bearing plates for other sections of rails have not been prepared.

Specification No.IRS T-7 is to be referred for bearing plates CI ordinary canted.

Bearing plates, cast iron, anticreep, canted: As stated in the foregoing notes, the anticreep type bearing plates are effective against creep, when some of the sleepers in a rail length are provided with these plates. The sleepers throughout may advantageously be provided with this type of bearing plates, if the creep is severe and the extra cost is financially justified by the traffic demands on the track.

One key anticreep bearing plates have a single two-way key provided on the gauge side jaw only. As some railways experienced difficulty in obtaining the chaired sleepers true to gauge, when the sleepers are pre-bored, designs of two-key bearing plates were prepared so as to be able to make adjustment in gauge, which is not possible when a single key is used. The directions of keys can be fixed to suit that of creep in the track.

Designs exist for one-key and two-key bearing plates for UIC 60kg, 52 kg/90R, rail sections for BG and 90R, 75R, 60R and 50R rail sections for MG. The main dimensions of these plates have been tabulated in pages SF4 under sheets 2 to 10. Specification No.IRS T-7 is to be referred for bearing plates cast iron anticreep.

Loose jaws: These jaws form a very efficient sleeper fastening for steel sleepers and have replaced the pressed up jaws of the older type of sleepers which were liable to get more easily damaged, cracked or permanently deformed.

The spring steel loose jaw has been standardised. The part numbers, weight and dimensions of the spring steel loose jaws for various rail sections are tabulated on page SF 5 sheet No.1. Specification No.IRS T-17 is to be referred for loose jaws.

Two-way keys: The dimensions and the taper have been so adjusted that they suit cast iron anticreep bearing plates and cast iron plate sleepers as well as steel sleepers alike. Their chief advantage lies in their two-way feature, which enables them to be used as either LH or RH keys and at the same time makes the key light in weight due to the double recess, i.e. one on either side of the central fin.

These keys are cut from a special rolled bar section thus:

Four sections have been designed, one for UIC 60kg, the other for 52kg/90R/75/R rails, the third for 60R/50R rails and the fourth section of over-size two-way keys for 52kg/90R/75R rails. The horizontal taper in all the designs is 1 in 32. The part numbers and main dimensions for the four section have been tabulated on page SF5 sheets 2 & 3. Specification No.IRST-8 is to be referred for two-way keys.

Modified loose jaws: The modified loose jaws form an efficient and elastic fastening with steel trough sleepers and are meant for use with elastic rail clips. The part numbers, weight and dimensions of modified loose jaws are tabulated on page SF5A sheet 1. The relevant Specification No. is IRS T-31.

Special key: The dimensions shown at page SF5A sheet 2 and taper have been modified to suit the steel sleepers for turnouts beyond the heel of switch where switch rail is reduced in steps of 1.5mm height till it attains the level of stock rail.

CI sleeper fastenings: Cotters and tie bars are now the only fastenings peculiar to CI sleepers, gibs etc., used in the earlier and experimental types of sleepers have been withdrawn.

Cotters: There are four different types of cotters but the overall dimensions, taper, etc. are very nearly identical in all cases and all are interchangeable. The difference is in the manner of forming or splitting the cotter. Railways can choose any of these types for use with the standard CI sleepers. The various types are fully detailed on page SF6 Sheet No.1. Specification No. IRS T-8 is to be referred for cotters.

Tiebar: The tiebars for sleepers dealt with in the next chapter on CI sleepers are fully detailed on page SF6 sheet 2. The section of the tie bars are 50 mm x 12 mm and 45 mm x 10 mm. Specification No. IRS T-8 is to be referred for tiebars.

Steel rail pad for steel sleepers: The dimensions of steel rail pads and their position of welding on steel trough sleeper are shown on page SF6A sheet 1. Specification IRS T-38 is to be referred for steel rail pad. The designs are suitable for steel trough sleepers to Drg.Nos.T-460 and T-460 (M) for UIC 60kg, 52kg and 90R rail for BG. It should be ensured that specified tolerances are strictly adhered to get the correct toe loads.

Table showing weights and quantities of sleepers and fastenings: Estimates of quantities and weights of sleepers for track projects are often required to be made by the permanent way staff. To facilitate this work, the table on page SF 7 in two sheets gives the number and weight per track kilometre of sleepers of various types, for different standards of sleeper density and for rail lengths in more common use viz. 9 metres, 10 metres, 11 metres, 12 metres and 13 metres.

Brief Note On Elastic Fastenings

Elastic Rail Clip (ERC):

Elastic rail clip is used in conjunction with spheroidal graphite cast iron (SGCI) insert cast integrally with PSC sleeper. The centre leg of the elastic rail clips houses into the eye of SGCI insert while toe of the clips rests on the liner at flange of rail and heel of the clip rests on the heel shoulder of SGCI insert.

Same clip is used for BG 52 kg and 60kg UIC/60E1 rail sections with different insert, liner & rail pads.

The clip is manufactured with 20.64 mm/23mm dia. silico-manganese spring steel bars with following process to meet the requirements of IRS Specification No.T-31 to give desire toe load. Details of the elastic rail clip are shown on page SF8. Manufacturing of ERC's involve following processes.

- i) Shearing of bars
- ii) Turning of bars (for ERC Mk-V only)

- iii) Heating
- iv) Forging / Moulding,
- v) Quenching,
- vi) Tempering,
- vii) Oiling & Packing

Insulating Liners (GFN/HVN):

At locations where track circuiting is contemplated, insulating liners are used in lieu of Metal liners.

There are two types of Insulating liners used on IR.

- i) Glass filled Nylon-66 (GFN-66) Liner
- ii) High Viscous Nylon-66 (HVN) liner

i) GFN liners are manufactured by automatic screw type injection moulding machine with GFN-66 moulding nylon granules of natural colours with about 33% glass filler equipped with UV resistant properties

ii) HVN liners are manufactured by automatic screw type injection moulding machine with unfilled HVN-66 moulding nylon granules. HVN liners are made with the specified RAL colour mentioned in IRS/T-44

These liners offer necessary electrical insulation for the sleeper for use in track circuited areas. The liners have slope to match the slope of rail flange. Insulating liners are to be manufactured to meet the requirements of IRS Specification No.T-44.

Details of insulating liners are shown on page SF 9A, and for drawing numbers of other types of liners page SF 9A may be referred.

Non-Insulating Liners (Metal):

At locations where track circuiting is not contemplated, Non-insulating liners is used in lieu of insulating liners. Non-insulating liners are manufactured with the metal liner bars conform to the stipulations of IS: 2062:2011 (Grade designation E250, Quality C). These liners are manufactured by the process of shearing, punching, grinding etc. of metal liner bars.

The liners have slope to match the slope of rail flange. Insulating liners are to be manufactured to meet the requirements of IRS Specification No.T-56.

Details of Non-insulating liners are shown on page SF 9B, and for drawing numbers of other types of liners page SF 9B may be referred.

Rail Pad:

There are three types of rail pad used on IR:

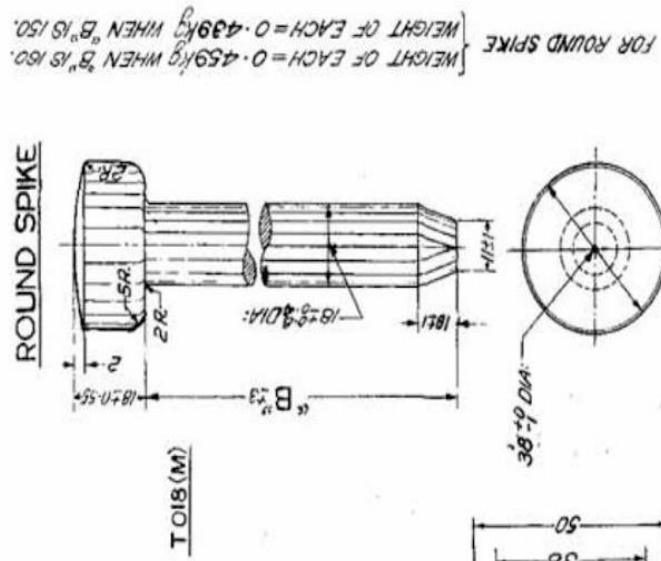
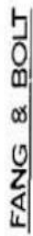
- i) Grooved Rubber Sole Plates
- ii) Composite Grooved Rubber Sole Plates
- iii) Nylon cord Reinforced Grooved Rubber Sole Plate

i) Grooved rubber sole plates (GRSP) are placed beneath the rail over the mail line PSC sleeper for electrical insulation and affording resilience. Grooved rubber sole plates are manufactured with Natural Rubber, Ribbed Smoked Sheet (RSS) either of grade 1 to 4 or a blend with Styrene Butadiene Rubber (SBR) and/or Poly Butadiene Rubber (PBR). The GRSP is manufactured using the Natural Rubber with following process conforming to the requirements of IRS/T-55. Details of GRSP are shown on page SF 10A.

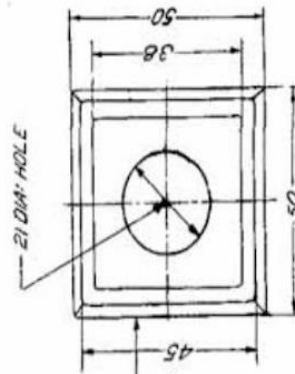
- i) Preparation of rubber compound
- ii) Mixing
- iii) Shaping and curing/ vulcanizing
- iv) Compression moulding
- v) Trimming of finished products

ii) Composite Grooved rubber sole plates (CGRSP) are placed beneath the rail over the mail line PSC sleeper for electrical insulation and affording resilience. CGRSP is also manufactured with Natural Rubber, Ribbed Smoked Sheet (RSS) either of grade 1 to 4 or a blend with Styrene Butadiene Rubber (SBR) and/or Poly Butadiene Rubber (PBR) followed by above manufacturing process. However, CGRSP is consist of two layers of different rubber compound A & B vulcanized together conforming to the requirement of IRS/T-55. Details of CGRSP are shown on page SF 10B.

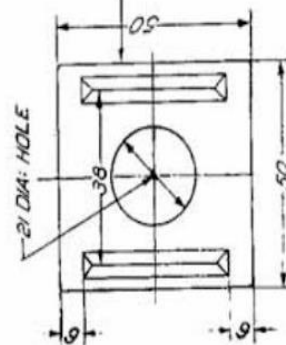
iii) Nylon cord Reinforced Grooved Rubber Sole Plates (Nylon cord GRSP) are placed beneath the rail over the turn out PSC sleeper for electrical insulation and affording resilience. Nylon cord GRSP is manufactured with two layers of same compound of GRSP reinforced in between with two layers of treated Nylon Cord placed cross wise to each other conforming to the requirements of IRS/T-55. Figure of Nylon cord GRSP is shown on page SF 10C.

FANG & BOLT

NOTE:-
LENGTH "5" TO BE SPECIFIED
BY THE PURCHASER

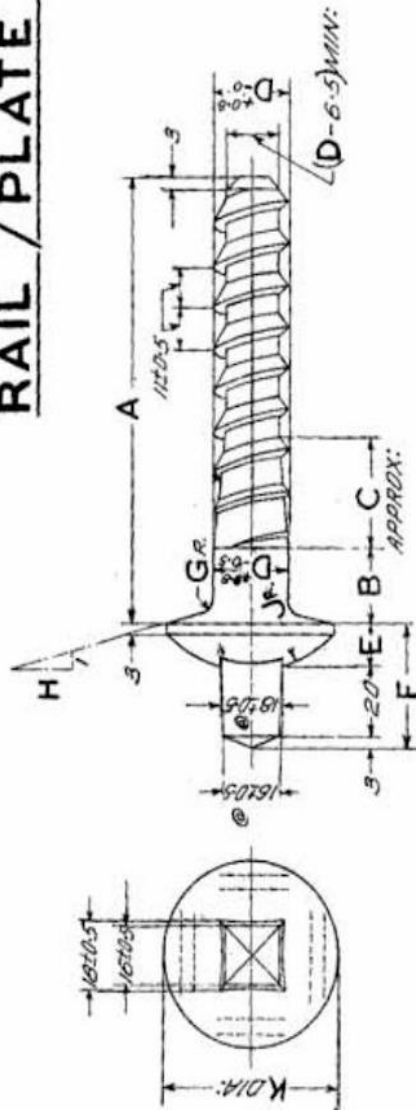


PLAN FROM BOTTOM

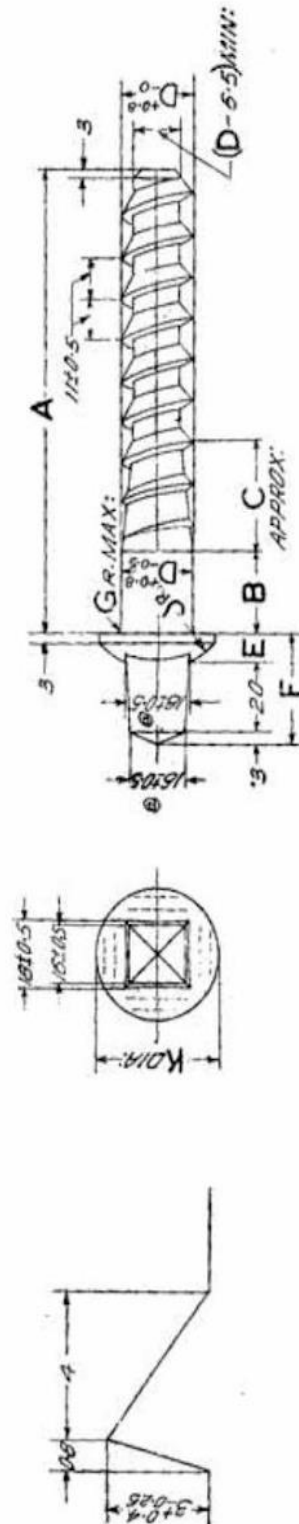


PLAN FROM TOP

RAIL / PLATE SCREWS



RAIL SCREWS



DETAIL OF THREAD

NOTE:—(3) THE RELEVANT DIMENSIONS FOR 16 ± 0.5 & 18 ± 0.5 ARE 24 ± 0.5 & 26 ± 0.5 FOR DRAWING NN RD50/7-1034, RD50/7-1035 & RD50/7-1036.

PLATE SCREWS

RAIL SCREWS

TABLE OF DIMENSIONS

GAUGE	DESCRIPTION	DRAWING NUMBER	D I M E N S I O N S (mm)									
			A	B	C	D	E	F	G	H	J	K
B.G.	FOR USE WITH CROSSING TIMBER SPECIAL.	T 10681	160 $\pm$ 3	30 $\pm$ 5	30	22	11	34 $\pm$ 7	4	6	35	50 $\pm$ 0.5
	FOR USE WITHOUT BEARING PLATES.	* RD50/T-1034	120 $\pm$ 3	20 $\pm$ 5	30	22	11	34 $\pm$ 7	4	14	35	50 $\pm$ 0.5
		T 10673	120 $\pm$ 3	20 $\pm$ 5	30	22	11	34 $\pm$ 7	4	6	35	50 $\pm$ 0.5
	FOR USE WITH BEARING PLATES.	* RD50/T-1035	135 $\pm$ 3	30 $\pm$ 5	30	22	11	34 $\pm$ 7	4	14	35	50 $\pm$ 0.5
		T 10675	135 $\pm$ 3	30 $\pm$ 5	30	22	11	34 $\pm$ 7	4	6	35	50 $\pm$ 0.5
M.G.	FOR USE WITHOUT BEARING PLATES	T 10674	110 $\pm$ 3	20 $\pm$ 5	30	22	11	34 $\pm$ 7	4	6	35	50 $\pm$ 0.5
	FOR USE WITH BEARING PLATES.	T 10676	120 $\pm$ 3	30 $\pm$ 5	30	22	11	34 $\pm$ 7	4	6	35	50 $\pm$ 0.5

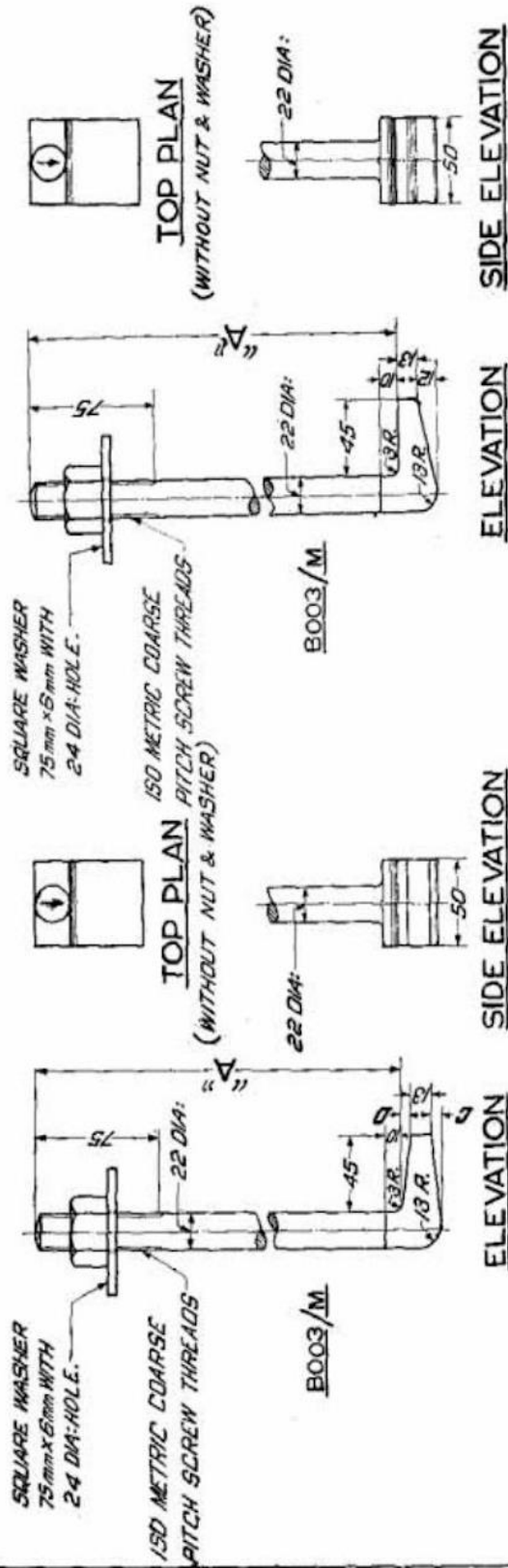
* THESE DRAWING ARE EXCLUSIVELY FOR USE WITH UNC 60kg RAIL/C.I. ANTI-CREEP BEARING PLATES FOR UNC 60kg RAIL.

PLATE SCREWS

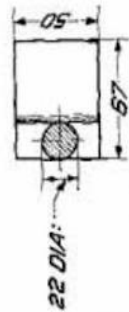
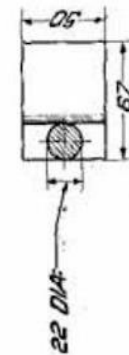
TABLE OF DIMENSIONS

D I M E N S I O N S (mm)											
GAUGE	DESCRIPTION	DRAWING NUMBER	D I M E N S I O N S (mm)								
			A	B	C	D	E	F	G	J	K
B.G.	FOR USE WITH THE PLATES & SLIDE CHAIRS (WITH DCS WASHERS ONLY)	T 10725	190 $\pm$ 3	60 $\pm$ 5	30	20	7	30 $\pm$ 7	1	25	35 $\pm$ 0.5
		T 10726	185 $\pm$ 3	20 $\pm$ 5	30	20	7	30 $\pm$ 7	1	25	35 $\pm$ 0.5
		T 10677	160 $\pm$ 3	30 $\pm$ 5	30	20	7	30 $\pm$ 7	1	25	35 $\pm$ 0.5
		* RD50/T-1036	135 $\pm$ 3	30 $\pm$ 5	30	22	11	34 $\pm$ 7	1	35	50 $\pm$ 0.5
		T 10678	135 $\pm$ 3	30 $\pm$ 5	30	20	7	30 $\pm$ 7	1	25	35 $\pm$ 0.5
M.G.	FOR USE WITH C.I. ANTI- CREEP BEARING PLATES.	T 10679	120 $\pm$ 3	30 $\pm$ 5	30	20	7	30 $\pm$ 7	1	25	35 $\pm$ 0.5
	FOR USE WITH CROSSING TIMBERS(SPECIAL).	T 10678	135 $\pm$ 3	30 $\pm$ 5	30	20	7	30 $\pm$ 7	1	25	35 $\pm$ 0.5

HOOK BOLTS FOR BRIDGE SLEEPERS



	DIMENSION	
	C	D
FOR BEAM ISM 600x210	6	6
FOR CHANNEL ISM 400x100	7	5

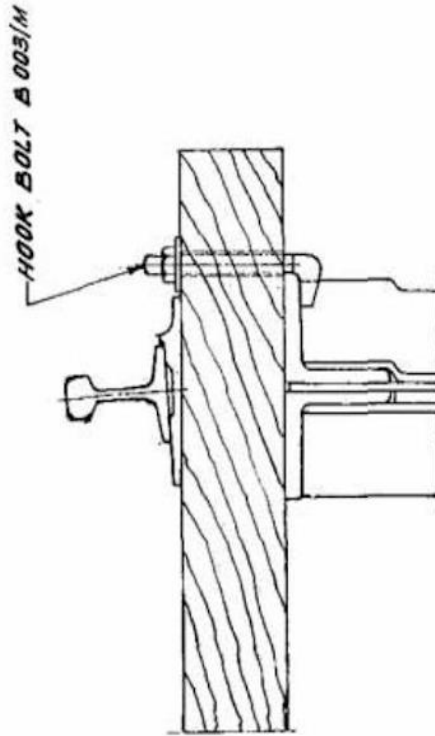


NOTE:-
LENGTH 'A' TO BE SPECIFIED
BY THE PURCHASER.

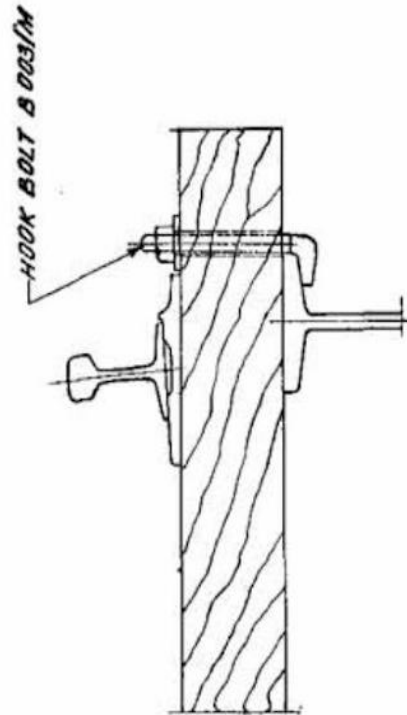
DETAIL WITH SLOPING LIP FOR IRS JOISTS DETAIL WITH STRAIGHT LIP FOR PLATE GIRDERS

HOOK BOLTS FOR BRIDGE SLEEPERS

SF 2
SHEET 2 OF 2



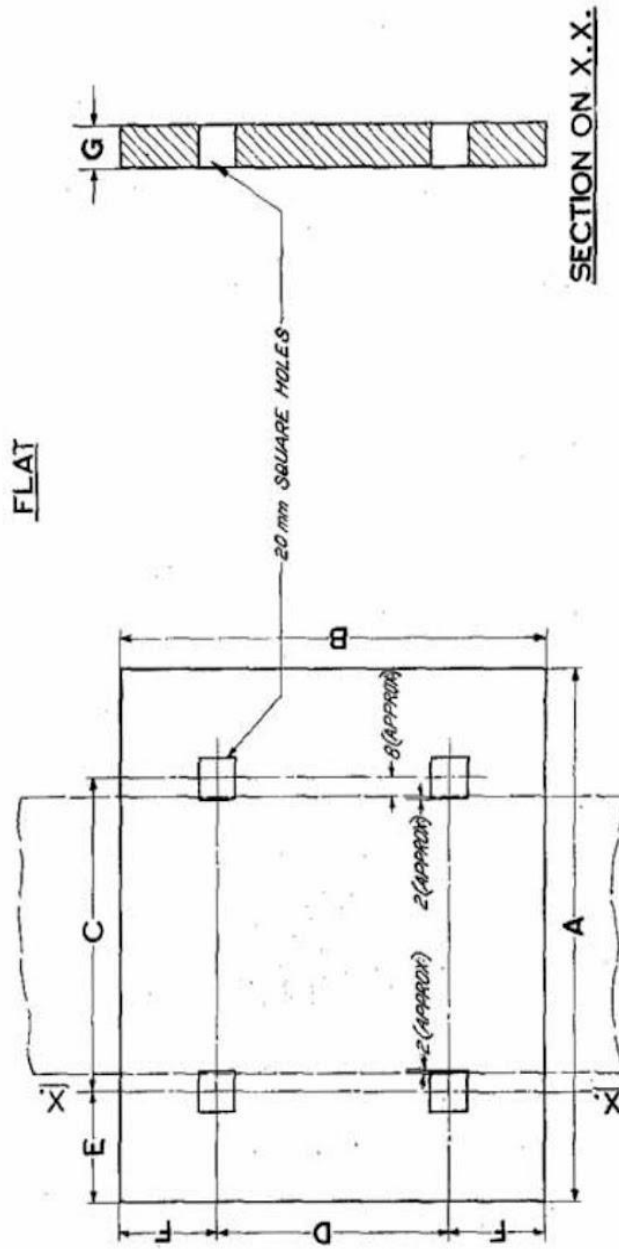
METHOD OF FASTENING WOODEN
SLEEPERS ON PLATE GIRDER SPANS



METHOD OF FASTENING WOODEN
SLEEPERS ON JOIST SPANS

BEARING PLATES MILD STEEL

(SINGLE RAIL)



PART NUMBERS AND DIMENSIONS

RAIL SECTION	PART NUMBER	GAUGE	APPROX. WEIGHT OF EACH IN kg	DIMENSIONS (mm)						
				A	B	C	D	E	F	G
52 kg & 90 R.	T 1394(M)	B. G.	8.72	260	220	152	120	54	50	20
75 R.	T 12545	M. G.	3.57	200	150	138	80	31	35	16
60 R.	T 12531	M. G.	3.57	200	150	125	80	38	35	16

(SINGLE RAIL)

SF 3
SHEET NO. 3



PART NUMBERS AND DIMENSIONS

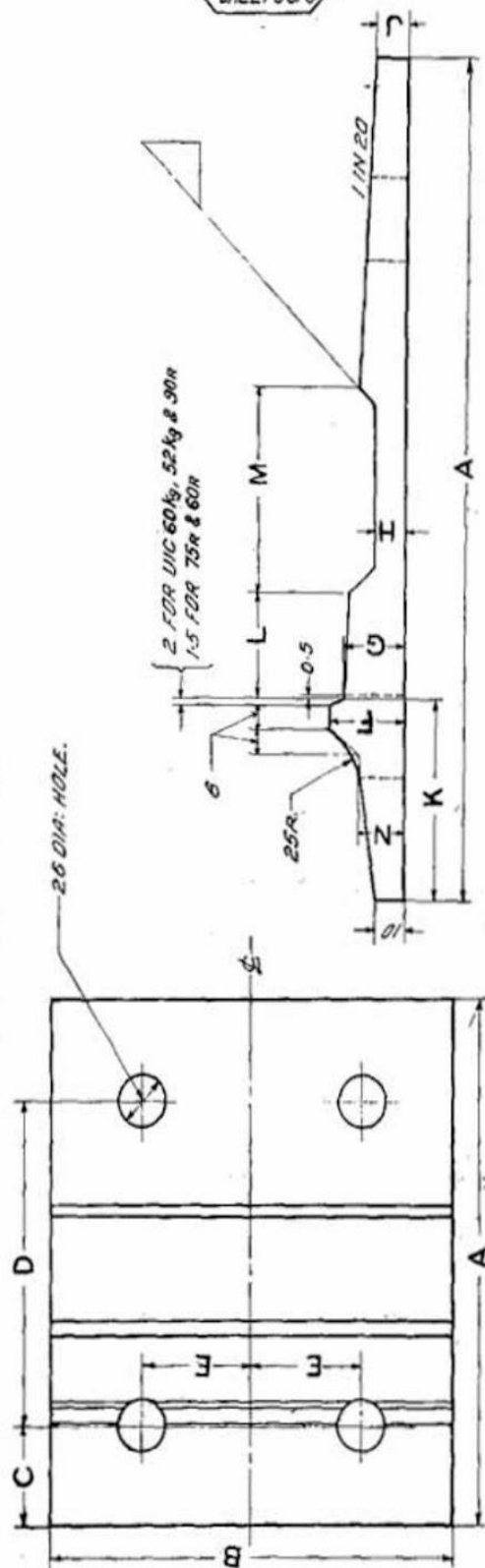
RAIL SECTION	WEIGHT PER METRE OF ROLLED SECTION IN Kg (APPROX.)	PART NUMBER	GAUGE	WEIGHT OF EACH IN kg (APPROX.)	DIMENSIONS (mm)												
					A	B	C	D	E	F	G	H	J	K	L	M	N
52 kg & 90 R.	29.59	T10430	B. G.	6.27	260	220	54	152	60	26	21	11	11	64	32	68	16
75 R.	21.94	T10431	M. G.	3.30	210	160	40	138	40	25	18	10	10	50	27	48	13
60 R.	21.94	T10432	M. G.	3.30	210	160	40	125	40	25	18	10	10	50	27	48	13

BEARING PLATES MILD STEEL

(SINGLE RAIL)

SF 3
SHEET 5 OF 6

CANTED
(USING RAIL SCREWS)

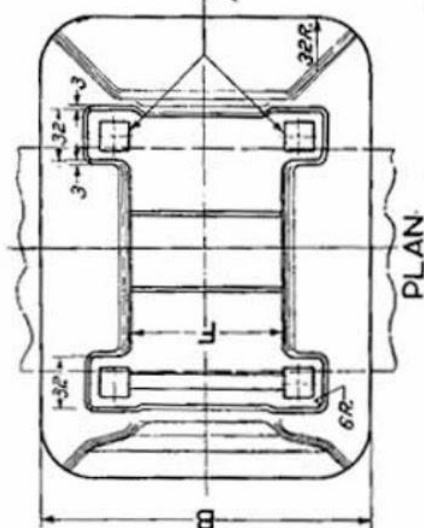
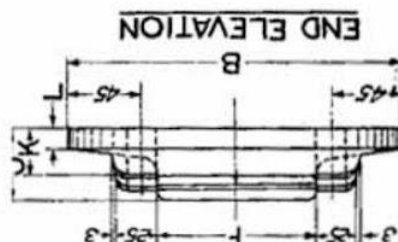
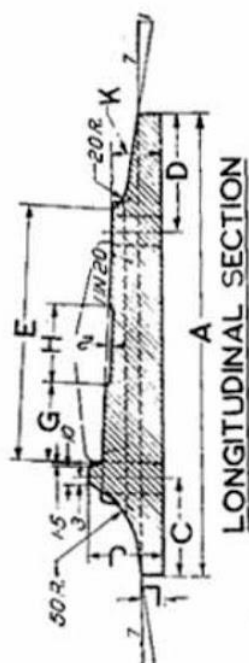


PART NUMBERS AND DIMENSIONS

RAIL SECTION	WEIGHT PER METRE OF ROLLED SECTION IN Kg (APPROX.)	PART NUMBER	GAUGE	WEIGHT OF EACH IN Kg (APPROX.)	D I M E N S I O N S (in mm)												
					A	B	C	D	E	F	G	H	J	K	L	M	N
UNC 60Kg	—	RD50/T-1033	B.G.	—	270	220	47.5	174	60	27	22	12	11.5	60	38	74	16
52Kg 890R	29.18	T 10671	B.G.	6.12	254	220	49.5	160	60	26	21	11	11.5	62	32	68	16
90R	28.18	RD50/T-2551	M.G.	4.37	254	160	49.5	160	40	26	21	11	11.5	62	32	68	16
75R	22.48	T 10692	M.G.	3.34	220	160	37.5	146	40	23	18	10	9.5	50	36	50	13
60R	22.48	T 10672	M.G.	3.34	220	160	37.5	134	40	23	18	10	9.5	50	36	50	13

BEARING PLATE **CAST IRON** (SINGLE RAIL)

S F 4
SHEET 10F10

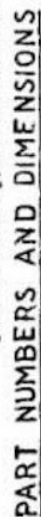


19 mm SQUARE HOLES
FOR DOG SPIKES.

PART NUMBERS AND DIMENSIONS

RAIL SECTION	PART NUMBER	GAUGE	APPROX. WEIGHT OF EACH IN kg.	DIMENSIONS										
				A	B	C	D	E	F	G	H	J	K	L
90 R.	T 211 (M)	B.G.		285	204	60	72.5	157	95	44	48	45	29	13

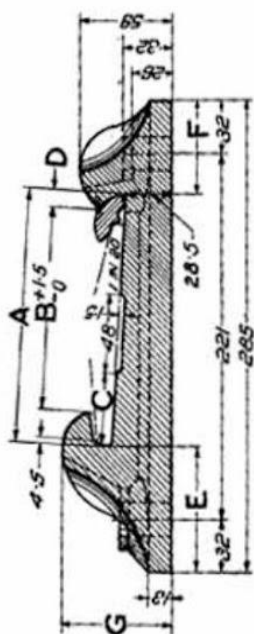
SF 4
SHEET 20F10



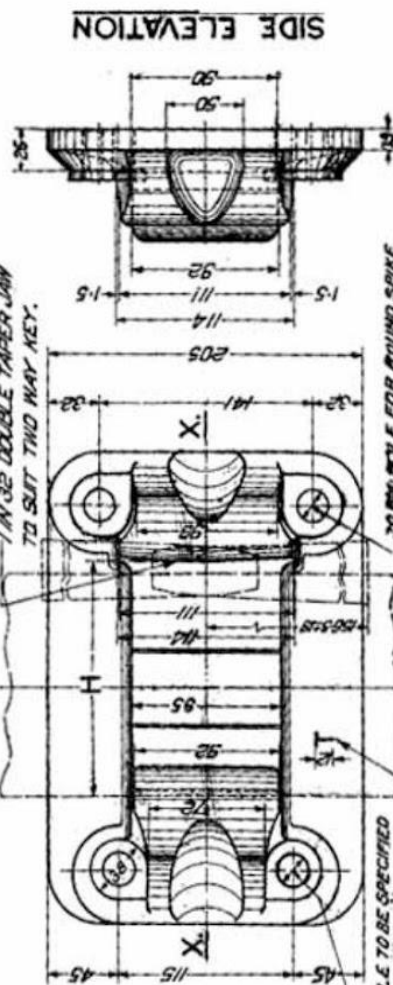
RAIL SECTION	GAUGE	PART NUMBER	APPROX: WEIGHT OF EACH IN kg.	D I M E N S I O N S (mm)																			
				A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
UTC 60kg	B.G.	R250127E	—	330	40	90	71.5	168.5	132	11	50	50	30	70	15	25	30	64	230	50	105	100	155
52kg & 90R.	B.G.	T10141	10.76	285	32	75.5	55	154.5	139	11	44	48	28.5	65	13	26	32	59	205	45	114	111	143
75R.	B.G.	T10143	—	285	32	85.5	59	140.5	123.5	12.5	38	48	28.5	63	13	26	32	59	205	45	114	111	127

BEARING PLATES
ANTI-CREEP C.I.
 (ALTERNATIVE ONE-KEY)

SF 4
 SHEET 3 OF 10



SECTION ON X-X



TOP PLAN

SIDE ELEVATION

20 DIA. HOLE FOR ROUND SPIKE
 TO DRG. NO. T 018 (M)
 22 DIA. HOLE FOR PLATE SCREW
 TO DRG. NO. T 10152

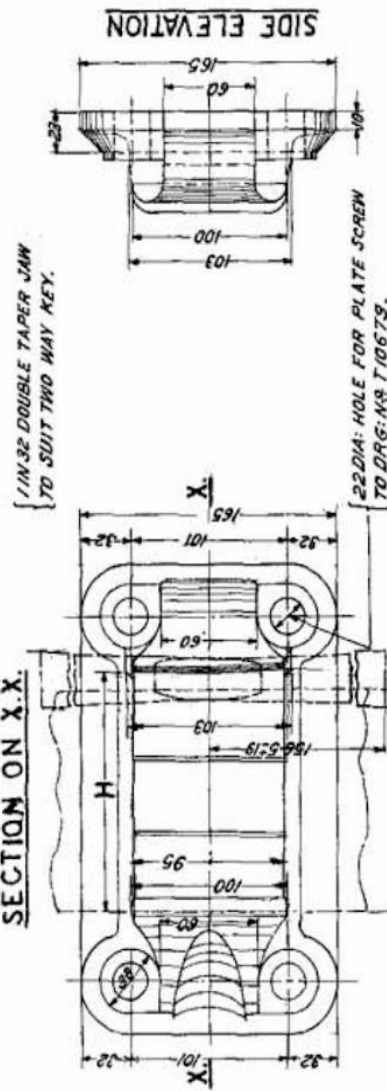
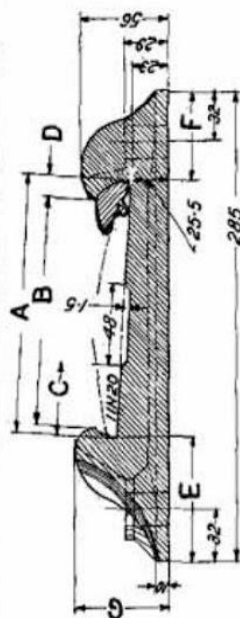
*DIA. OF HOLE TO BE SPECIFIED
 BY THE PURCHASER.
 PART NO. TO BE CAST ON HERE.

PART NUMBERS & DIMENSIONS

RAIL SECTION	GAUGE	PART NUMBER	APPROX. WEIGHT OF EACH IN KG	DIMENSIONS (mm)							
				A	B	C	D	E	F	G	H
52 kg 890R.	B.G.	T 10151		152.5	122.5	44	11	75.5	55	68	143
75 R.	"	T 10152		140.5	111.5	38	12.5	85.5	59	63	127

BEARING PLATES ANTI-CREEP C.I. (ONE-KEY)

SF 4
SHEET 4 OF 10

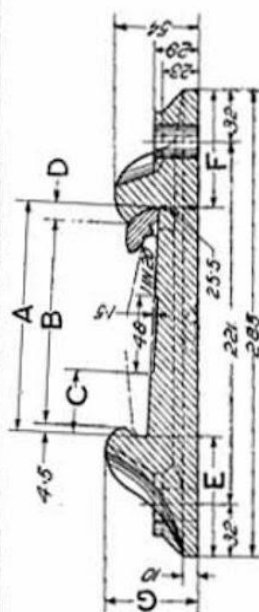


PART NUMBERS & DIMENSIONS

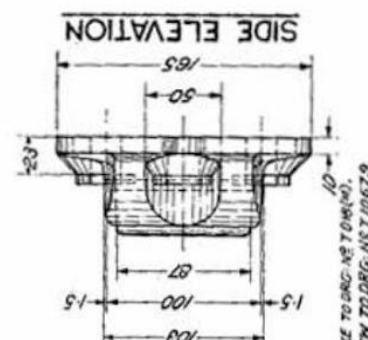
RAIL SECTION	PART NUMBER	GAUGE	APPROX. WEIGHT OF EACH IN KG.	DIMENSIONS (mm)							
				A	B	C	D	E	F	G	H
90 R.	RDS017-3506	M.G.	---	154.5	139	44	11	55	75.5	62	143

BEARING PLATES **ANTI-CREEP C.I.** **(ONE-KEY)**

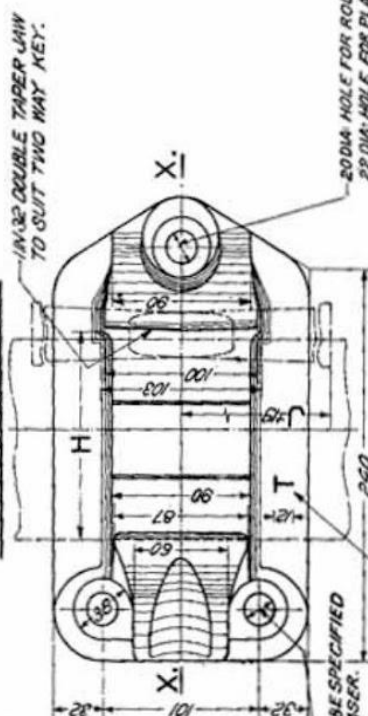
SF 4
 SHEET 5 OF 10



SECTION ON X-X.



SIDE ELEVATION



TOP PLAN

PART NUMBERS & DIMENSIONS

RAIL SECTION	GAUGE	PART NUMBER	APPROX. WEIGHT OF EACH IN KG	DIMENSIONS									
				A	B	C	D	E	F	G	H	J	
75 R.	M.G.	T 10145		140.5	123.5	38	42.5	70.5	71	60	127	156.5	
60 R.	"	T 10147		126	110.5	32	11	83	76	60	114	156.5	
50 R.	"	T 10149		118	102.5	25	11	90.5	76.5	58	105	130.5	

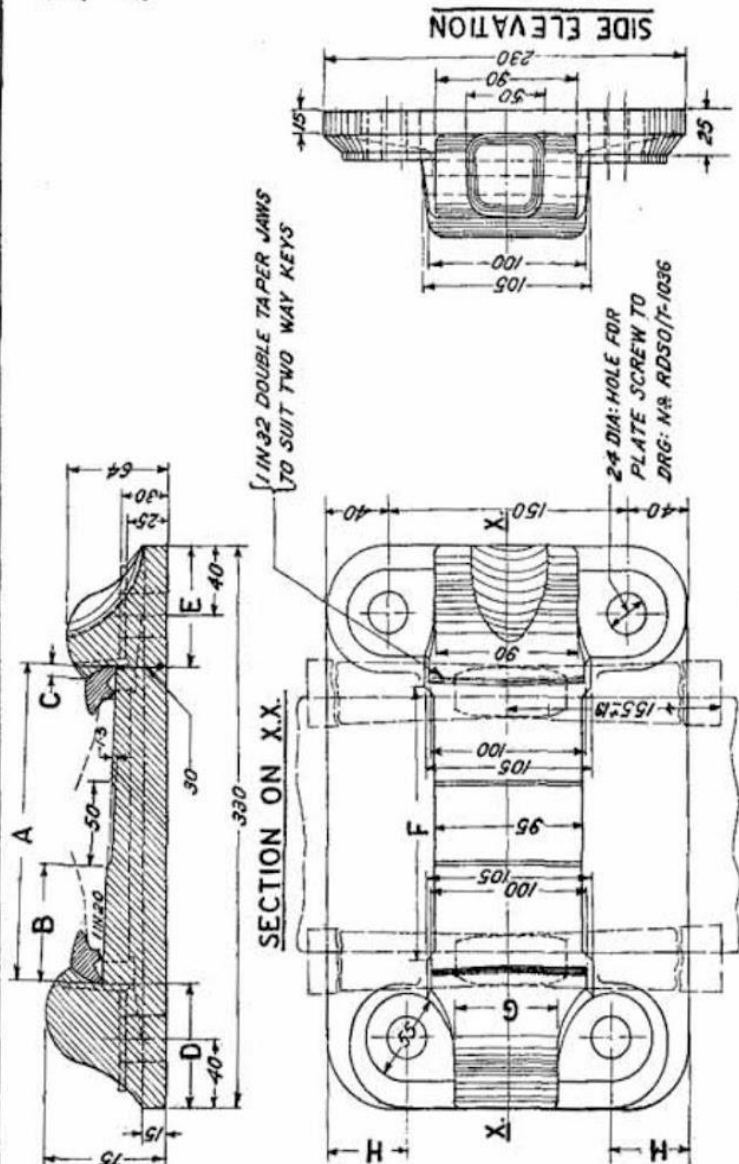
4" DIA. OF HOLE TO BE SPECIFIED BY THE PURCHASER.
 PART NR TO BE CAST ON HERE.

20 DIA. HOLE FOR ROUND SPIKE TO DRG. N.T 10679.
 22 DIA. HOLE FOR PLATE SCREW TO DRG. N.T 10679.

1/2" DOUBLE TAPER JOINT TO SUIT TWO WAY KEY.

BEARING PLATES **ANTI-CREEP C.I.** **(TWO KEYS)**

SF 4
 SHEET 70F10

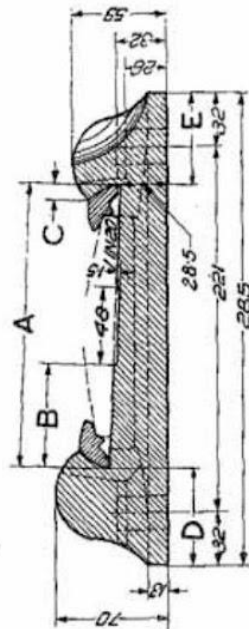


PART NUMBERS AND DIMENSIONS

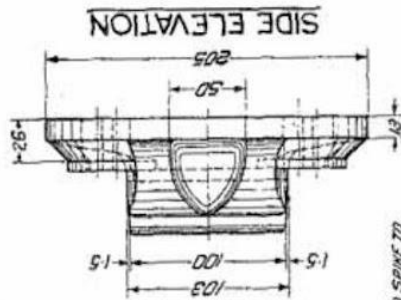
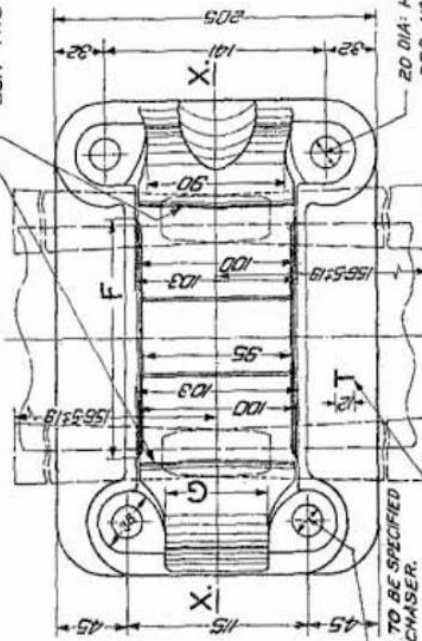
RAIL SECTION	GAUGE	PART NUMBER	APPROX. WEIGHT OF EACH IN Kg	DIMENSIONS (mm)						
				A	B	C	D	E	F	H
UIC 60Kg.	B.G.	RDS07-1040	-	187	69	11	71.5	71.5	165	50

BEARING PLATES **ANTI-CREEP C.I.** **(TWO-KEYS)**

SF 4
SHEET 8 OF 10



SECTION ON X.X.



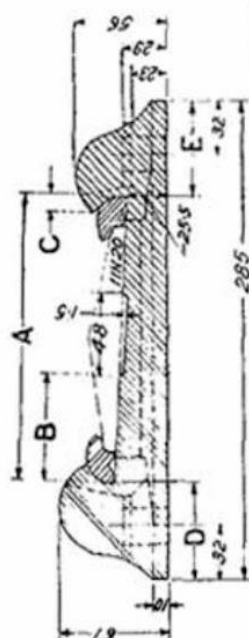
20 DIA. HOLE FOR ROUND SPINE TO DRG: NG T 018 (M)
 22 DIA HOLE FOR PLATE SCREW TO DRG: NG T 10678

PART NUMBERS & DIMENSIONS

RAIL SECTION	GAUGE	PART NUMBER	APPROX. WEIGHT OF EACH IN KG	DIMENSIONS (mm)						
				A	B	C	D	E	F	G
52 Kg & 90 R.	B.G.	T 101/42	11.26	173	63	11	57	55	145	65
75 R.	"	T 101/44		158.5	57	12.5	67.5	59	133	68

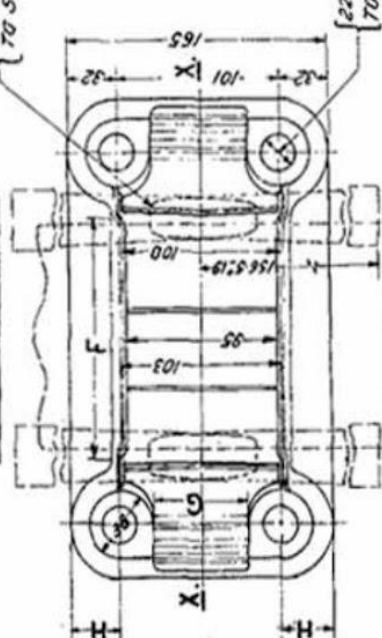
BEARING PLATES
ANTI-CREEP C.I.
(TWO KEYS)

SF 4
 SHEET 9 OF 10

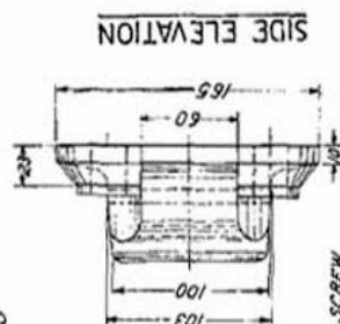


1 IN 32 DOUBLE TAPER JAWS
 TO SUIT TWO WAY KEYS

SECTION ON X-X.



22 DIA. HOLE FOR PLATE SCREW
 TO DRG. NR T 10679



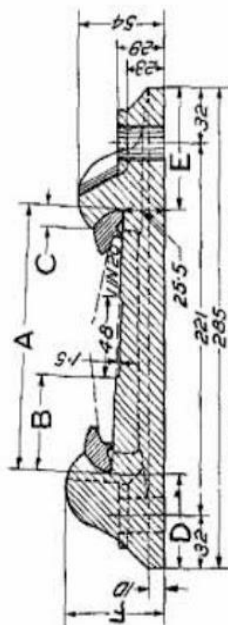
TOP PLAN **PART NUMBERS AND DIMENSIONS**

RAIL SECTION	GAUGE	PART NUMBER	APPROX. WEIGHT OF EACH IN Kg.	D I M E N S I O N S (IN MM)							
				A	B	C	D	E	F	G	H
90 _W	MIG.	RDS0/T-2552	-	173	63	11	57	55	145	60	32

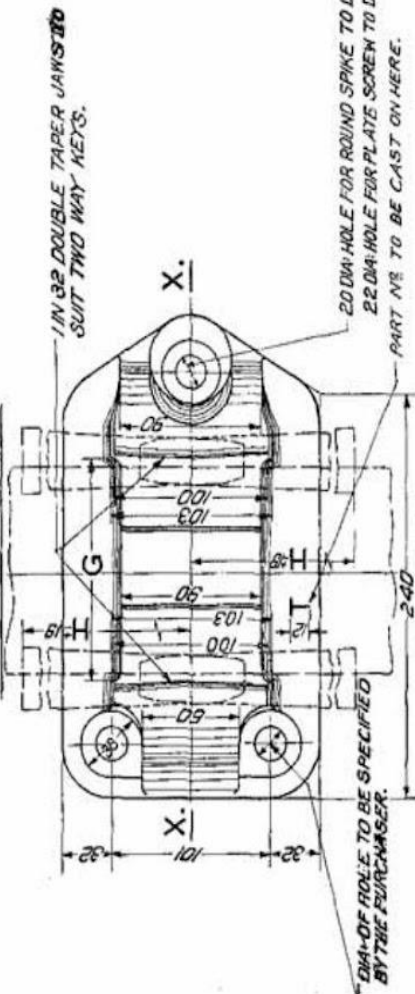
BEARING PLATES **ANTI-CREEP C.I.** **(TWO-KEYS)**

SF 4

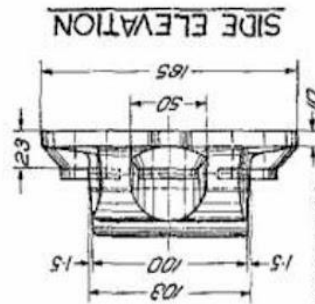
SHEET 7 OF 10



SECTION ON X.X.



TOP PLAN

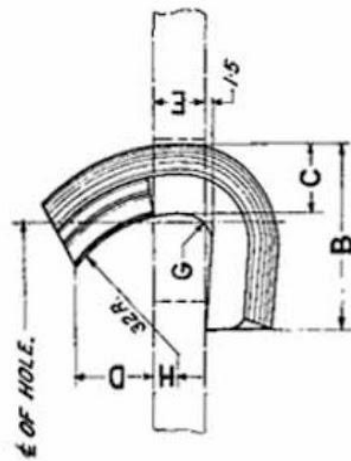
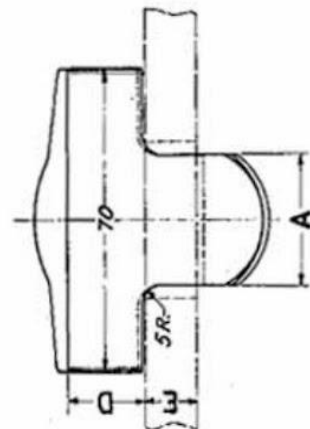
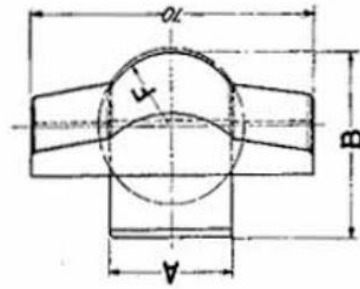
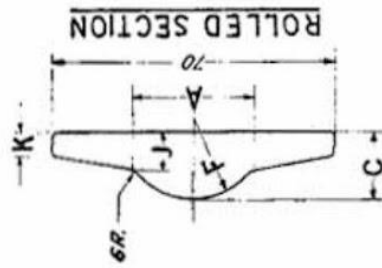


SIDE ELEVATION

PART NUMBERS & DIMENSIONS

RAIL SECTION	GAUGE	PART NUMBER	APPROX. WEIGHT OF EACH IN LB	DIMENSIONS (INCHES)							
				A	B	C	D	E	F	G	H
75 R.	M.G.	T 10146		138.5	57	12.5	55.5	71	63	133	155.5
60 R.	"	T 10148		142.5	50	11	66.5	76	63	120	155.5
50 R.	"	T 10150		136	45	11	72.5	76.5	62	111	130.5

SPRING STEEL LOOSE JAWS



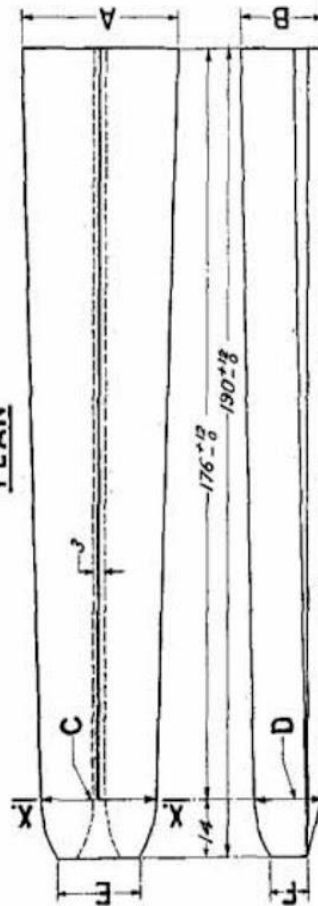
PART NUMBERS AND DIMENSIONS

RAIL SECTION	GAUGE	PART NUMBER	WT. OF 100 JAWS (IN KG APPROX)	D I M E N S I O N S (mm)									
				A	B	C	D	E	F	G	H	J	K
UIC 60K ₄	B.G.	R25017-2571	-	30	45	16	22.5	13	19	7	4	9	6
52 Kg & 90R.	B.G.	T-415 (M)	28.8	30	43	16	19	13	19	7	6	9	6
75R.	B.G.	T 10003	28.1	30	43	16	18	11	19	7	7	9	6
75R.	M.G.	T-419 (M)	23.1	27	35	13.5	19	9	16.5	4.5	6.5	6.5	5
60R. & 50R.	M.G.	T 10002	21.5	27	35	13.5	16	9	16.5	6	9.5	6.5	5

TWO WAY KEYS

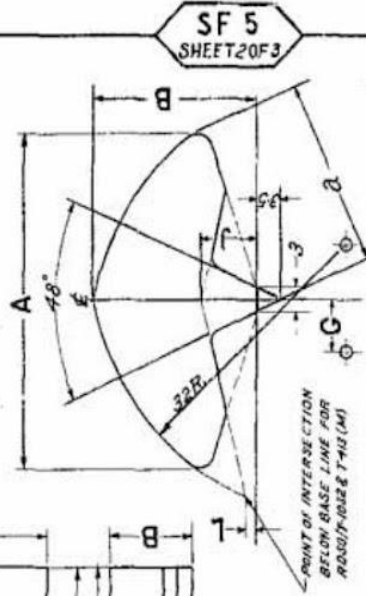
(MILD STEEL)

PLAN



ELEVATION

HORIZONTAL TAPER ON KEY = $\frac{B-b}{L} = \frac{1}{176}$ IN 32 MILLIMETRES = 1 IN 32



SF 5
SHEET 2 OF 3

SECTION ON X-X

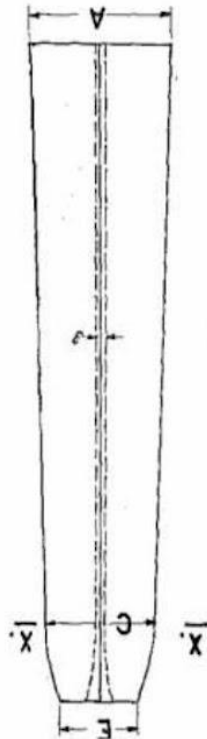
PART NUMBERS AND DIMENSIONS

END ELEVATION

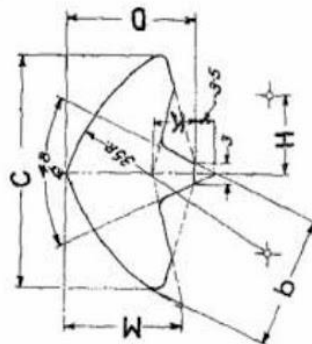
RAIL SECTION	PART NUMBER	WT. OF 100 KEYS IN Kg (APPROX)	D I M E N S I O N S (mm)												
			A	B	C	D	E	F	G	H	J	K	L	M	
UIC 60Kg	R400/T1032	—	39	20	28.5	16.5	21	9	6.5	11	7.5	7.5	0.6	1.75	
52Kg, 90R & 75R	T405 (M)	48.5	39	20.5	28.5	16.5	21	9	6.5	11	7	7	1.5	3	
60R & 50R	T413 (M)	43.0	35.5	18	25.5	14.5	19	8	4	9.5	5.5	5.5	1	1	

TWO WAY KEYS

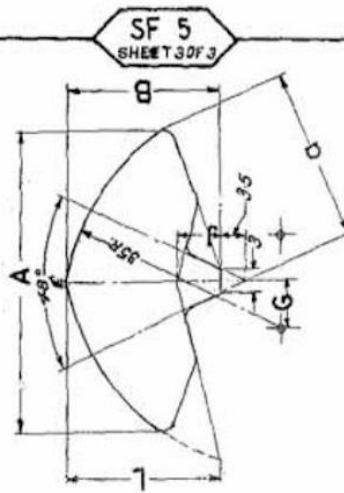
(OVER SIZE)



PLAN



SECTION ON X-X.



END ELEVATION

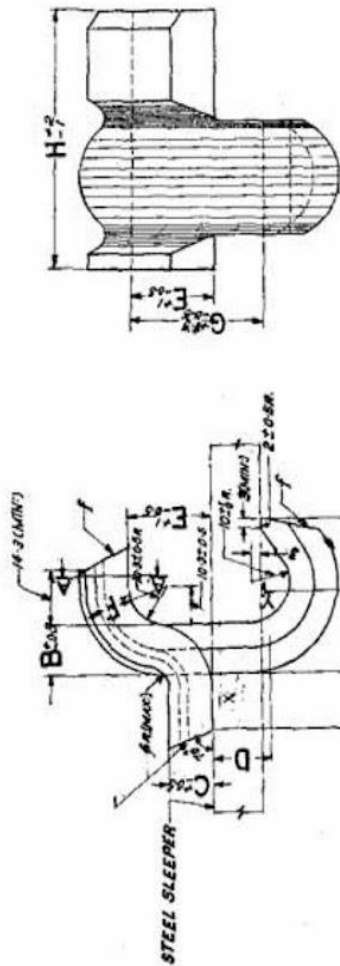
HORIZONTAL TAPE ON KEY = $\frac{9 \cdot 5}{176} \cdot 1 \text{ mm IN } 32 \text{ mm} = 1 \text{ IN } 32$.

PART NUMBERS AND DIMENSIONS

RAIL SECTION	PART NUMBER	WEIGHT OF 100 KEYS IN kg (APPROX)	DIMENSIONS (mm)												
			A	B	C	D	E	F	G	H	I	J	K	L	M
52 kg, 90R. & 75R.	RDS017-580		45	25	35	21	25	11	7	12	7	7	7	25	10.5

MODIFIED LOOSE JAWS (FOR ELASTIC RAIL CLIP)

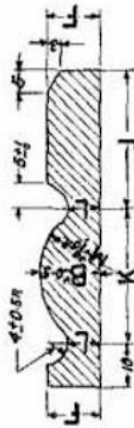
SF 5 A
SHEET 1 OF 2



SIDE ELEVATION

FRONT ELEVATION

NOTE: - EDGE SHOWN THIS ---f SHOULD BE FORMED FROM STRAIGHT SHEARED EDGE BEFORE FORMING.



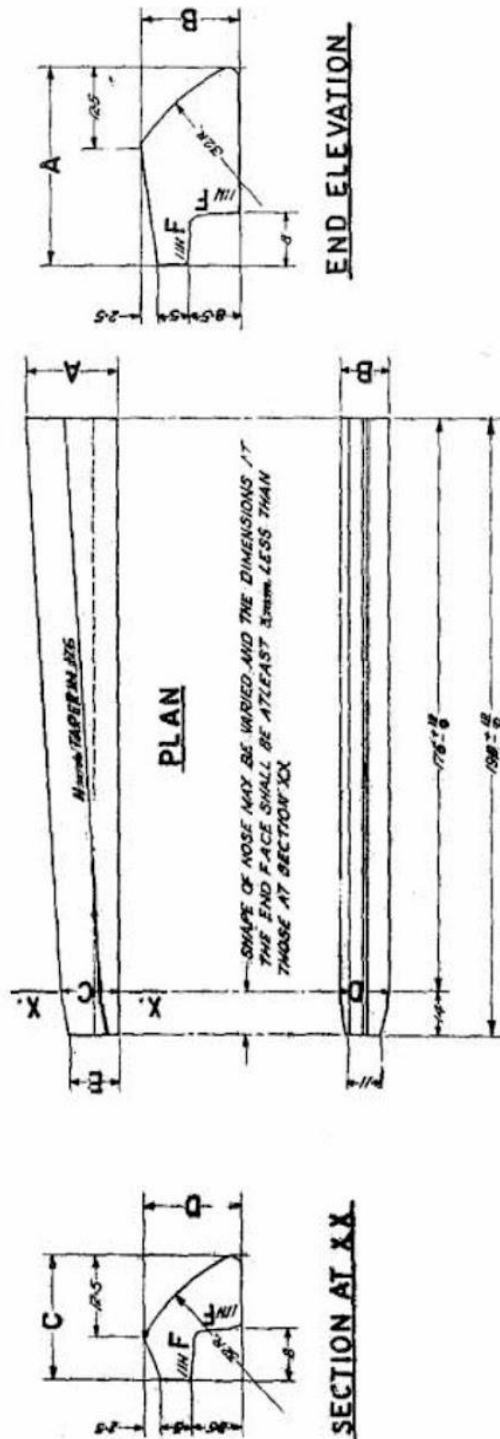
SECTION ON A.A.

SECTION ON Y.Y.

PART NUMBERS AND DIMENSIONS

RAIL SECTION	GAUGE	PART NUMBER	WEIGHT OF 100 JAWS IN Kg. (APPROX.)	D I M E N S I O N S (mm)												
				A	B	C	D	E	F	G	H	J	K	L	M	
52 kg.	B.G.	RD-52/1801	—	41.5	13.5	11.7	15	22.1	12	35.1	70	30	30	7.5	17.5	

SPECIAL KEY

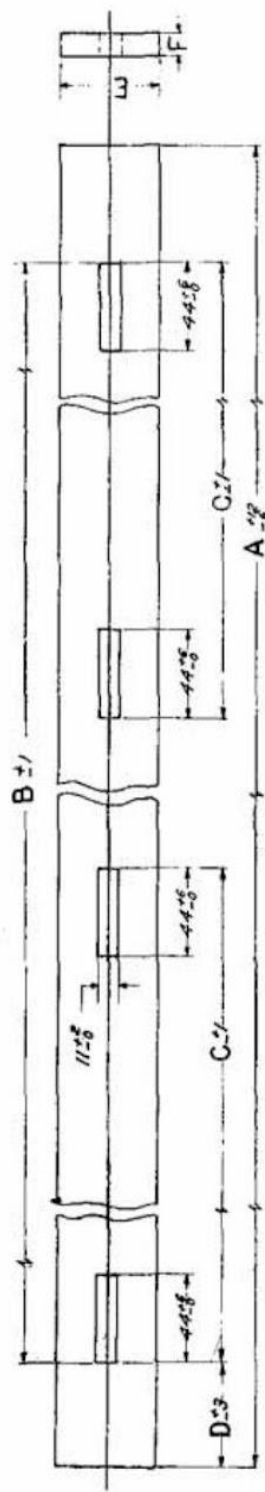


ELEVATION

PART NUMBERS AND DIMENSIONS

RAIL SECTION	PART NUMBER	WT. OF 100 KEYS IN 1/2" CAP (APPROX)	DIMENSIONS					
			A	B	C	D	E	F
60R-52 1/8	7-10011	35	30	16	19	16	16	12

(M.S. TIE BARS)



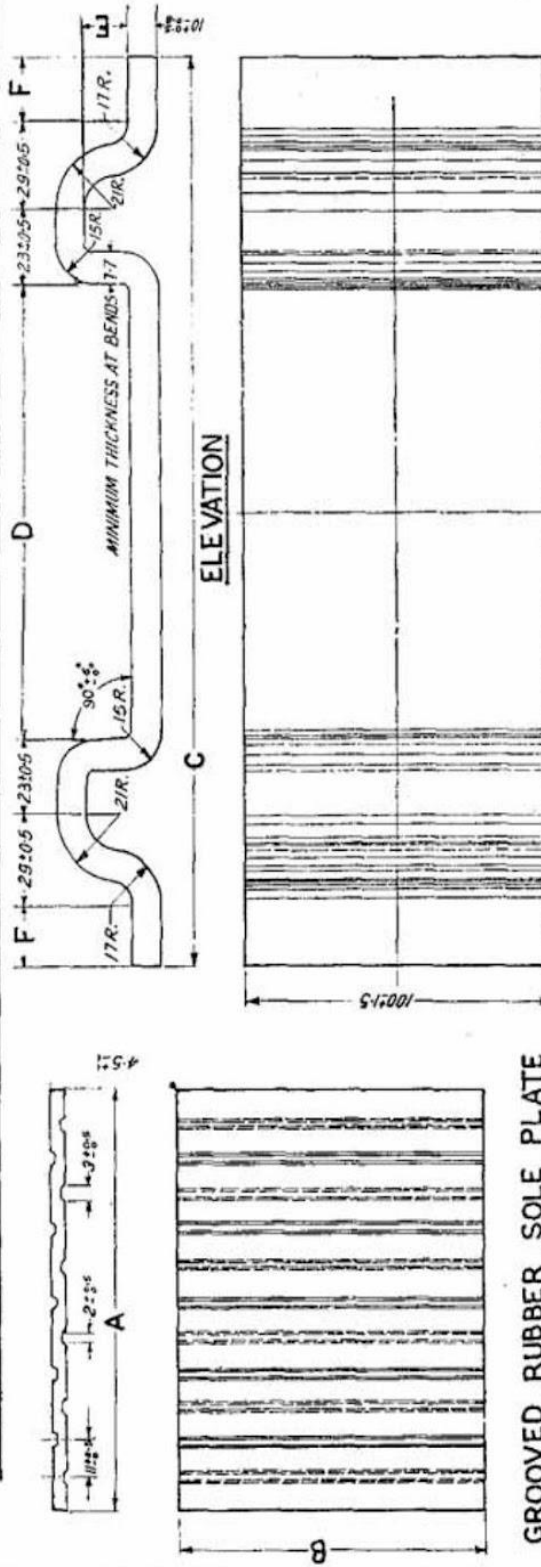
SF 6
SHEET 2 OF 2

PART NUMBERS AND MAIN DIMENSIONS

PART NUMBER	GAUGE	WEIGHT IN KG.	D I M E N S I O N S (mm)					
			A	B	C	D	E	F
T 404 (M)	B.G.	12.62	2720	2618	857	50	50	12
RDS07T-2368	M.G.	8.996	1950	1839.5	755	55	50	12
T 433 (M)	M.G.	6.45	1870	1778	705	45	45	10

GROOVED RUBBER SOLE PLATE & STEEL RAIL PADS FOR S.T. SLEEPER B.G.

SF 6A
SHEET 1 OF 1



GROOVED RUBBER SOLE PLATE

PLAN

STEEL RAIL PAD FOR NON TRACK CIRCUITED LINES

TABLE OF DIMENSIONS

THE VALUES OF RADII GIVEN IN THE ABOVE SKETCH OF STEEL RAIL PAD ARE NOMINAL. THEIR TOLERANCES MAY VARY FOR DIFFERENT RAIL SECTIONS.

RAIL SECTION	GROOVED RUBBER SOLE PLATES		STEEL RAIL PADS			
	PART NUMBER	D I M E N S I O N S (mm)	PART NUMBER	D I M E N S I O N S (mm)		
		A		B	C	D
UIC 60 kg	RD50/T-2057	145±2	95±5	295±15	154±6	145±15
52 kg & 90 R	RD50/T-2056	130±2	100±5	280±15	138±6	142±15

TABLE SHOWING APPROXIMATE WEIGHTS & QUANTITIES OF

SLEEPERS & FASTENINGS

RAIL LENGTH IN METRES		Nº OF ORDINARY SLEEPERS		WEIGHT IN TONNES PER TRACK KILOMETRE OF SLEEPERS OF VARIOUS TYPES											
	PER RAIL LENGTH OF TRACK	PER TRACK KILOMETRE	STEEL TROUGH SLEEPERS			CAST IRON SLEEPERS (C.S.I.9 TYPE)						WOODEN SLEEPERS			
			WITH SPRING STEEL LOOSE JAWS									WITH SPIKES ONLY			
												WITH M.S. BEARING PLATES (CANTED)			
			M.G.			M.G.						B.G.			
			UIC 60kg	52 kg 90R.	75R.	90R.	75R.	90R.	75R.	52 kg 90R.	UIC 60kg	ANY RAIL SECTION	ANY RAIL SECTION	UIC 60kg	M.G.
9	11	1222	99.94	91.48	43.83	43.49				124.85		115.96	54.76	87.76	42.72
10	12	1200	98.14	89.84	43.04	42.71				122.62		113.87	53.78	86.18	41.95
11	13	1182	96.66	88.49	42.40	42.07				120.78		112.16	52.97	84.89	41.32
12	14	1167	95.44	87.37	41.86	41.53				119.24		110.74	52.30	83.81	40.79
13	15	1154	94.97	86.39	41.39	41.07				117.92		109.51	51.72	82.88	40.34
9	12	1333	109.01	99.79	47.81	47.44				136.21		126.49	59.74	95.73	46.60
10	13	1300	106.31	97.32	46.63	46.27				132.83		123.36	58.26	93.36	45.44
11	14	1273	104.11	95.30	45.66	45.31				130.08		120.80	57.05	91.43	44.50
12	15	1250	102.23	93.58	44.84	44.49				127.73		118.62	56.02	89.77	43.69
13	16	1231	100.67	92.16	44.16	43.81				125.78		116.81	55.17	88.41	43.03
9	13	1444	118.09	108.10	51.80	51.39				147.55		137.02	64.71	103.71	50.48
10	14	1400	114.49	104.81	50.22	49.83				143.05		132.85	62.74	100.55	48.94
11	15	1364	111.55	102.11	48.93	48.54				139.37		129.43	61.13	97.96	47.68
12	16	1333	109.01	99.79	47.81	47.44				136.21		126.49	59.74	95.73	46.60
13	17	1308	106.97	97.92	46.92	46.55				133.65		124.12	58.62	93.94	45.72

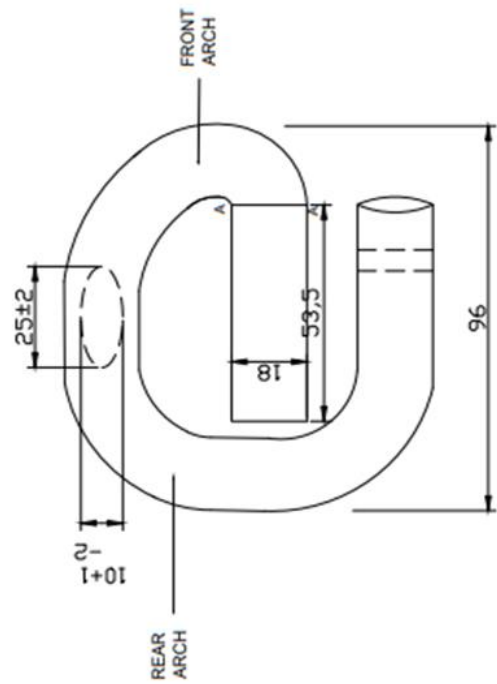
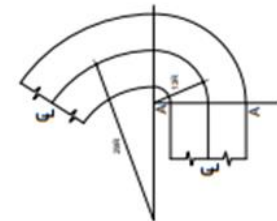
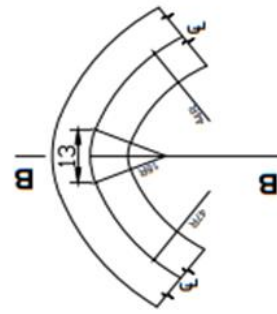
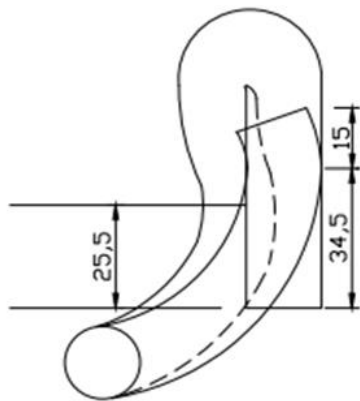
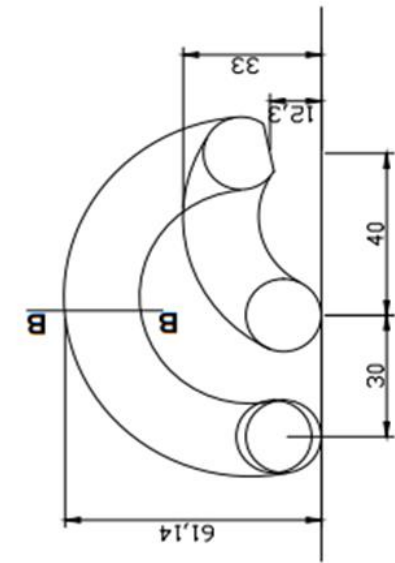
SF 7
SHEET 10F2

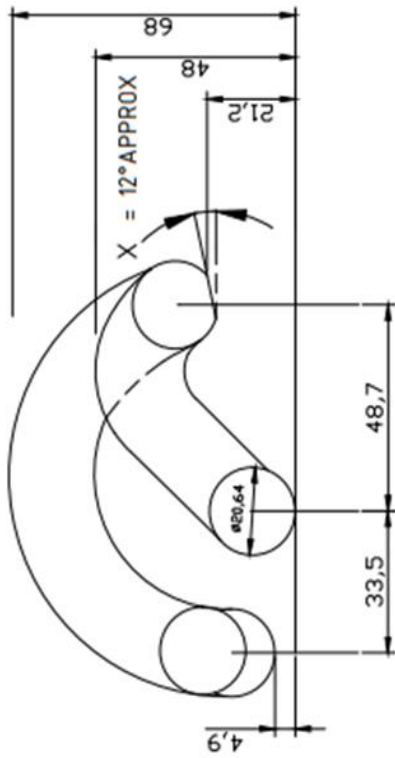
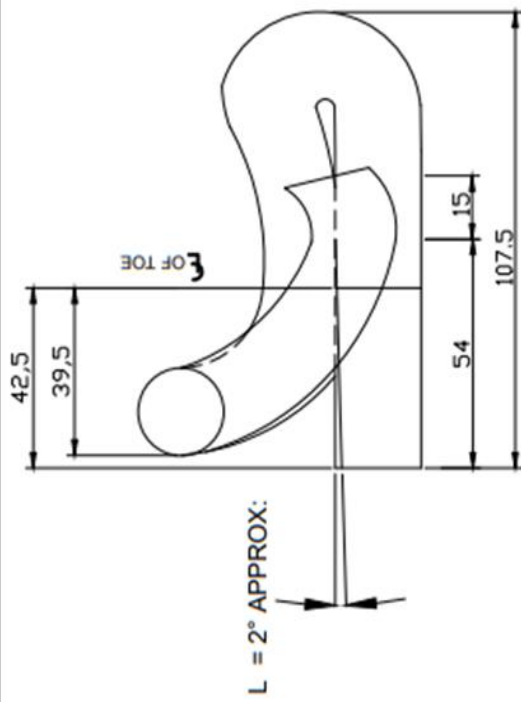
SF 7

SHEET 2 OF 2

9	14	1556		127.25	116.49	55.81	55.38	158.99		90.09	91.70	147.65	69.73	111.75	54.39	54.39
10	15	1500		122.67	112.30	53.81	53.39	153.27		86.85	88.40	142.34	67.22	107.73	52.43	52.43
11	16	1455		118.99	108.93	52.19	51.78	148.67		84.24	85.74	138.07	65.20	104.50	50.86	50.86
12	17	1417		115.88	106.08	50.83	50.43	144.79		82.04	83.50	134.46	63.50	101.77	49.53	49.53
13	18	1385		113.27	103.69	49.68	49.29	141.52		80.19	81.62	131.43	62.07	99.47	48.41	48.41
9	15	1667		136.33	124.80	59.80	59.33	170.33		96.52	98.24	158.18	74.70	119.72	58.27	58.27
10	16	1600		130.85	119.78	57.39	56.94	163.49		92.64	94.29	151.83	71.70	114.91	55.93	55.93
11	17	1545		126.35	115.66	55.42	54.99	157.87		89.46	91.05	146.61	69.24	110.96	54.01	54.01
12	18	1500		122.67	112.30	53.81	53.39	153.27		86.85	88.40	142.34	67.22	107.73	52.43	52.43
13	19	1462		119.56	109.45	52.44	52.03	149.39		84.65	86.16	138.73	65.52	105.00	51.11	51.11
9	16	1778		145.40	133.11	63.78	63.28	181.68		102.35	104.78	168.72	79.68	127.69	62.15	62.15
10	17	1700		139.03	127.27	60.98	60.50	173.71		98.43	100.18	161.32	76.18	122.09	59.42	59.42
11	18	1636		133.79	122.47	58.68	58.23	167.17		94.72	96.41	155.24	73.32	117.50	57.19	57.19
12	19	1583		129.46	118.51	56.78	56.34	161.75		91.66	93.29	150.21	70.94	113.69	55.33	55.33
13	20	1538		125.78	115.13	55.17	54.74	157.15		89.05	90.63	145.94	68.92	110.46	53.76	53.76

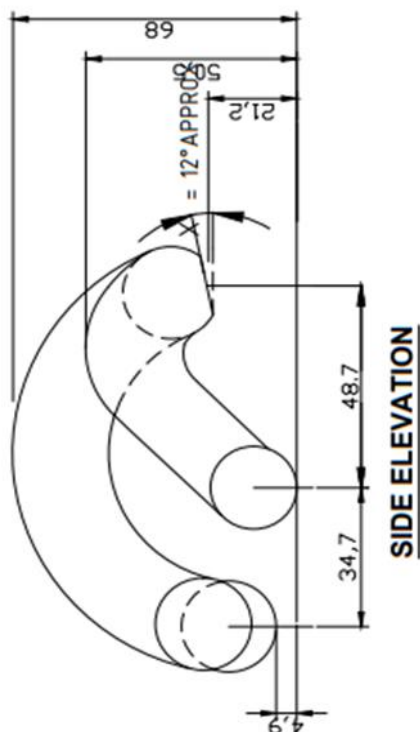
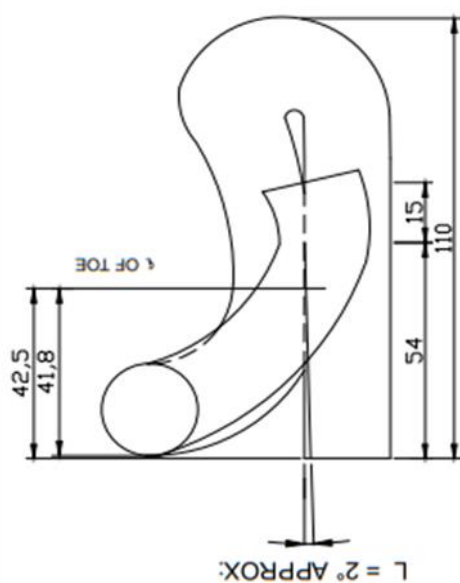
1. THE NUMBER OF DOGSPIKES/RAIL SCREW PER SLEEPER VARIES BETWEEN 4 & 8 DEPENDING ON REQUIREMENT OF THE TRACK ON VARIOUS RAILWAYS. AN AVERAGE OF 6 DOGSPIKES/RAIL SCREW PER SLEEPER HAS BEEN ALLOWED IN THESE CALCULATIONS. IN THE CASE OF C.I. BEARING PLATES USING ROUNDSPIKES/PLATE SCREW, 8 SPIKES/SCREWS PER SLEEPER SHOULD BE ADOPTED FOR CALCULATIONS.
2. SLEEPERS WITH BEARING PLATES HAVE BEEN ASSUMED TO BE OF SOFT WOOD E.G. DEODAR @ 640 kg/m³ WHEREAS THOSE WITHOUT BEARING PLATES HAVE BEEN ASSUMED TO BE OF HARD WOOD E.G. SAL @ 1041-21 kg/m³.
3. THESE CALCULATIONS ARE BASED UPON THE COMPONENTS WITH DOG SPIKES/ROUND SPIKES ONLY. FOR RAIL SCREWS/PLATE SCREWS CALCULATION WILL DIFFER.





ELEVATION

PLAN

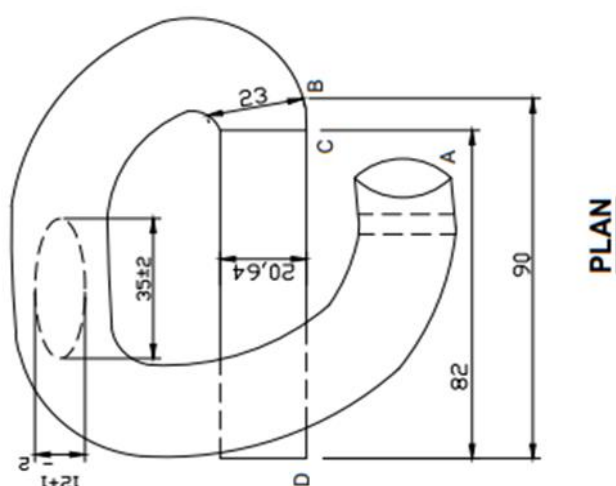


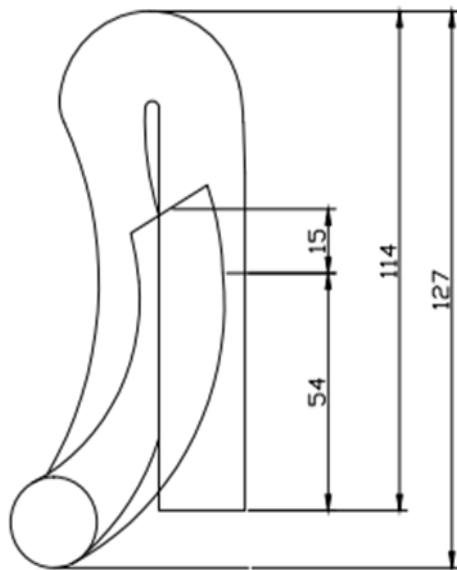
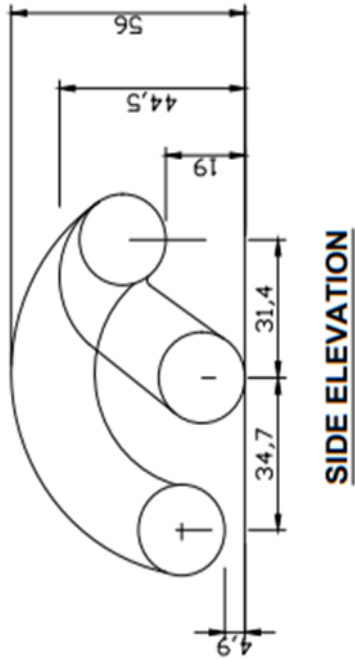
DIAMETER:

A-B = 23mm

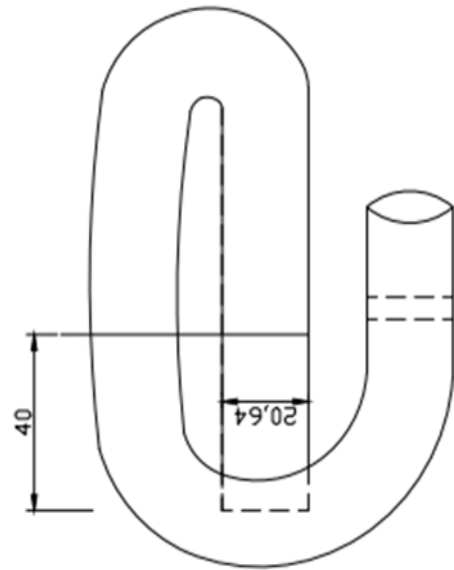
B-C = PRECISION TAPERING OF DIAMETER
FROM 23mm TO 20,64mm TO BE DONE
BY HYDRO COPYING TURNING MACHINE IN A
LENGTH OF 8mm ON THE STRIGHT CUT BAR

C-D = UNIFORM DIA: OF 20,64 mm TO BE ACHIEVED
BY TURNING USING HYDRO COPYING MACHINE



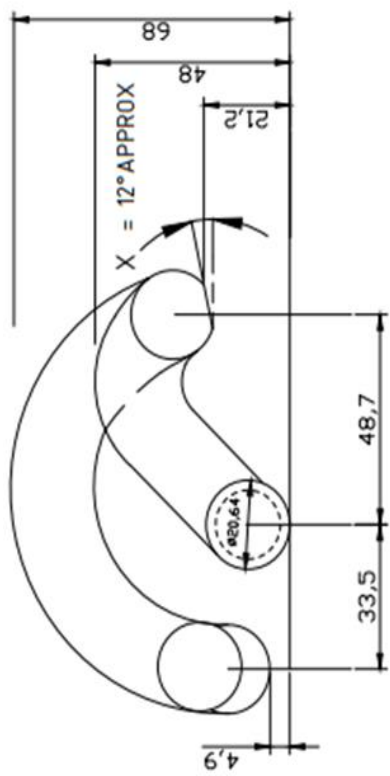
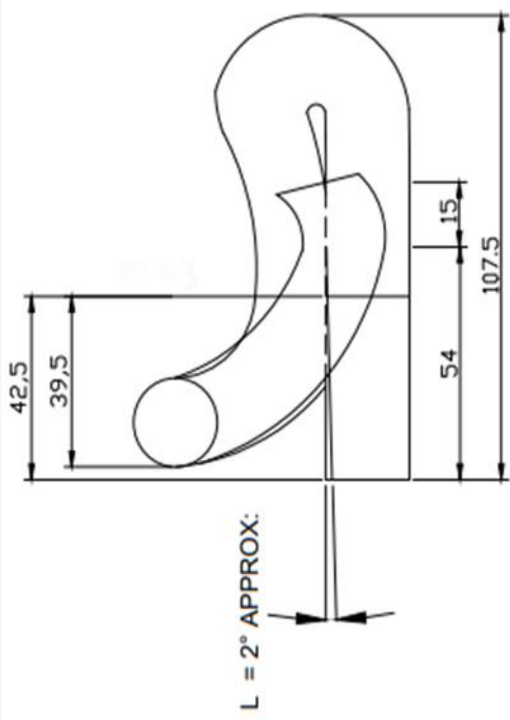


ELEVATION



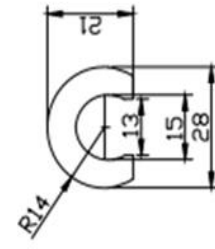
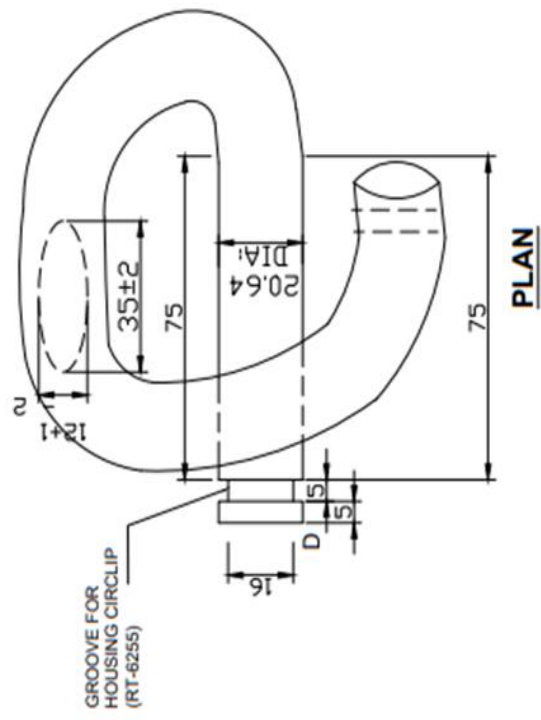
PLAN

RDSO/T-6254-6255
(Anti Theft ERC)



ELEVATION

SIDE ELEVATION

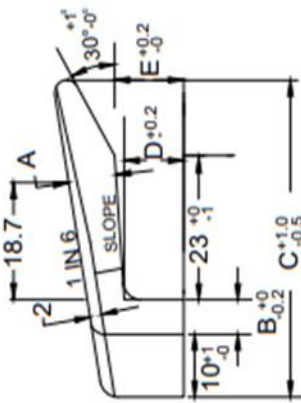


ELEVATION

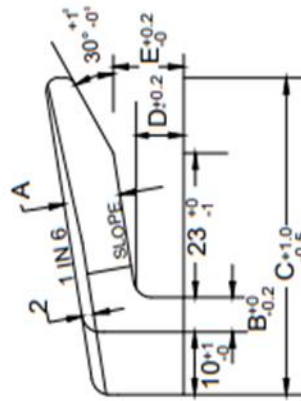


PLAN

PLAN



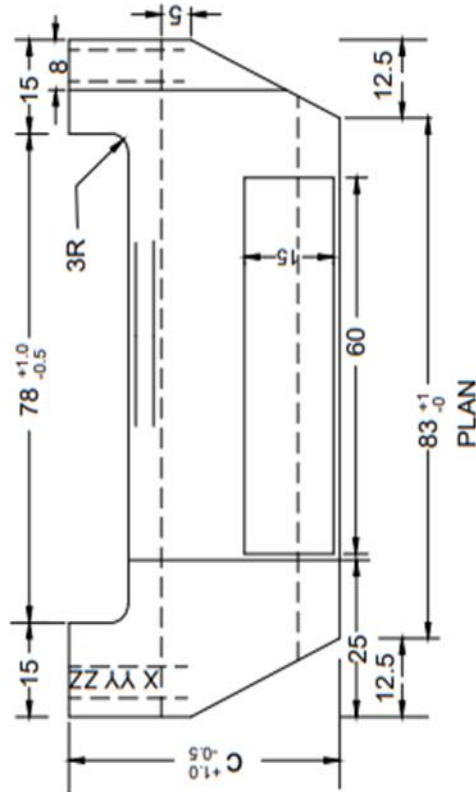
SIDE ELEVATION
FOR 60 Kg. U.I.C. RAIL



SIDE ELEVATION
FOR 52 Kg. RAIL



ELEVATION



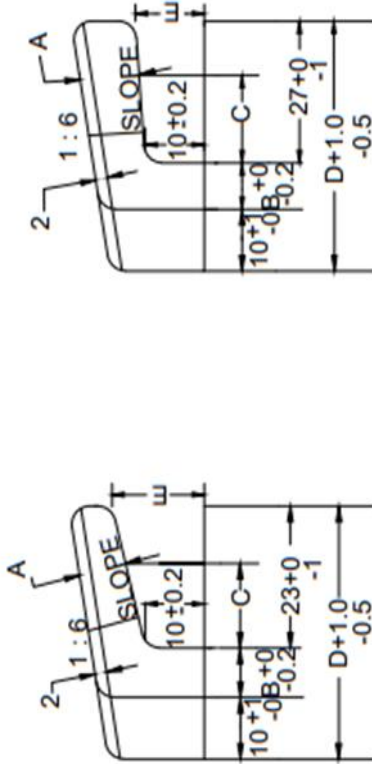
PLAN

SCHEME FOR SCREEN PRINTING FOR GFN LINER AND COLOUR FOR HVN LINER

S.No.	LINER DRG. No.	COLOUR BAND	PRINT OF COLOUR BAND	COLOUR OF HVN LINER
1.	RDSO/T-3706	WHITE	LOT No. XYZ, 60 Kg. RAIL ON 60 Kg. SLEEPER	BROWN RED RAL NO. 3011
2.	RDSO/T-3707	YELLOW	LOT No. XYZ, 52 Kg. RAIL ON 60 Kg. SLEEPER(GS)	MINT GREEN RAL NO. 6029
3.	RDSO/T-3708	LIGHT GREEN	LOT No. XYZ, 52 Kg. RAIL ON 60 Kg. SLEEPER(NGS)	COBALT BLUE RAL NO. 5013

S.No.	USED WITH SLEEPER NO.	RAIL SECTION	DRG.NO./PART NO.	IDENTIFICATION MARK	A	B	C	D	E	SLOPE
1.	RDSO/T-2496	60Kg. UIC/60E1	RDSO/T-3706	60 Kg.	8.0	5.5	50.5	10.0	11.65	1 IN 14
2.	RDSO/T-2496	52 Kg.	RDSO/T-3707	52 Kg.G.S.	9.5	9.0	54.0	8.0	11.84	1 IN 6
3.			RDSO/T-3708	52 Kg. N.G.S.	10.5	15.0	60.0	8.0	11.84	1 IN 6

SF 9A
SHEET 2 OF 5

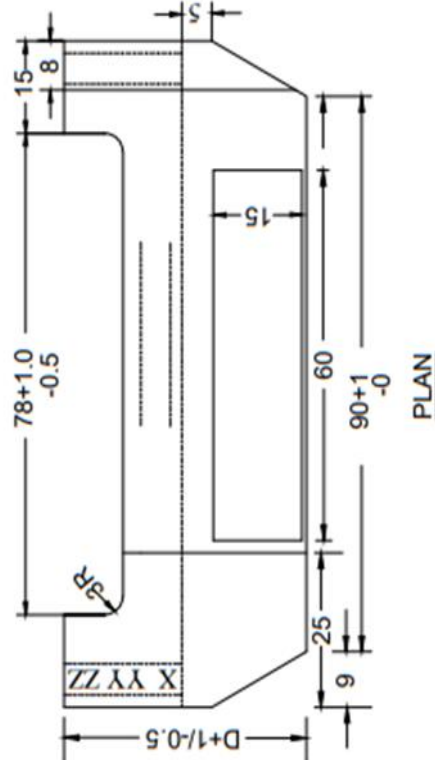
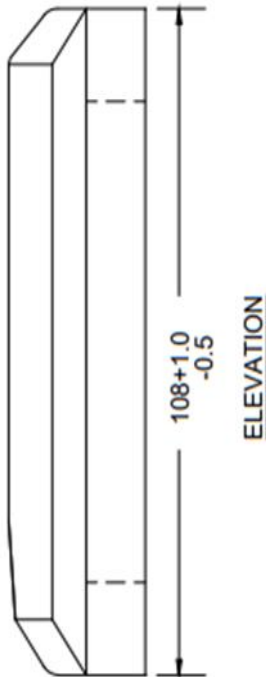


SIDE ELEVATION
GFN LINER FOR 60Kg UIC RAIL

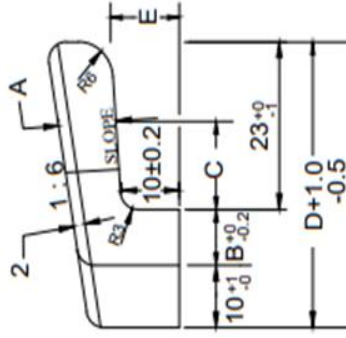
SIDE ELEVATION
GFN LINER FOR 136RE RAIL

SCHEME FOR SCREEN PRINTING FOR GFN LINER AND COLOUR CODE FOR HVN LINER

S.No.	LINER DRG. No.	COLOUR BAND	PRINT ON COLOUR BAND	COLOUR OF HVN LINER
1	RDSO/T-6937	SKY BLUE	LOT No. XYZ, 141/136RE ON 141RE SLEEPER	BROWN RED (RAL NO. 3011)
2	RDSO/T-6938	LIGHT BROWN	LOT No. XYZ, 60Kg RAIL ON 141RE SLEEPER(GS)	MINT GREEN (RAL NO. 6029)
3	RDSO/T-6939	GRAY	LOT No. XYZ, 60Kg RAIL ON 141RE SLEEPER(NGS)	COBALT BLUE (RAL NO. 5013)



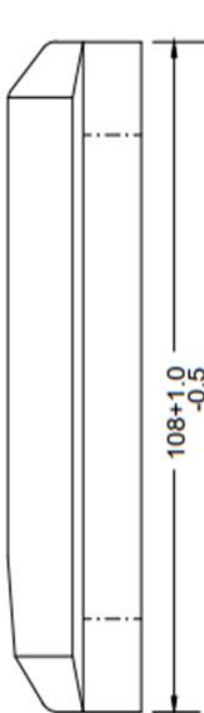
S.No.	USED WITH SLEEPER NO.	RAIL SECTION	DRG: NO./ PART NO.	IDENTIFICATION MARK	A	B	C	D	E	SLOPE
1.	141/136RE	141/136RE	RDSO/T-6937	141/136 RE	8.0	8.0	13.7	45.0	16.7	1 IN 4
2.	RDSO/T-7008/ 60Kg UIC/ 60E1	60Kg UIC/ 60E1	RDSO/T-6938	60Kg GS	10.0	7.5	14.2	44.50	11.9	1 IN 14
3.	RDSO/T-8527		RDSO/T-6939	60Kg NGS	10.3	10.9	10.8	43.90	11.9	1 IN 14



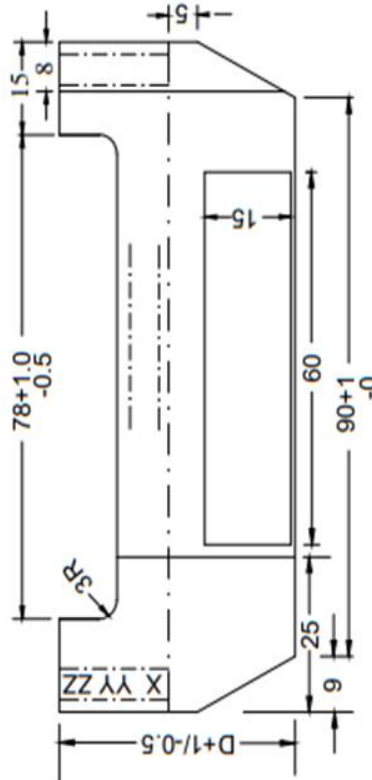
SIDE ELEVATION
LINER FOR 60Kg UIC RAIL

SCHEME FOR SCREEN PRINTING FOR GFN LINER AND COLOUR CODE FOR HVN LINER

S.No.	LINER DRG. No.	COLOUR BAND	PRINT ON COLOUR BAND	COLOUR OF HVN LINER
1	RDSO/T-8222	YELLOW	LOT No. XYZ, 60Kg RAIL ON 141 RE SLEEPER(GS)	MINT GREEN (RAL NO. 6029)
2	RDSO/T-8223	PINK	LOT No. XYZ, 60Kg RAIL ON 141 RE SLEEPER(NGS)	COBALT BLUE (RAL NO. 5013)

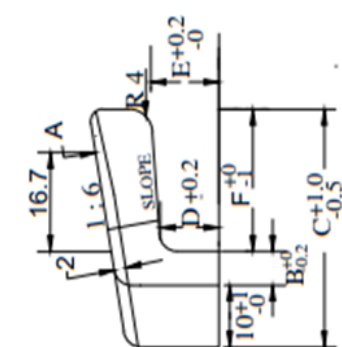


ELEVATION

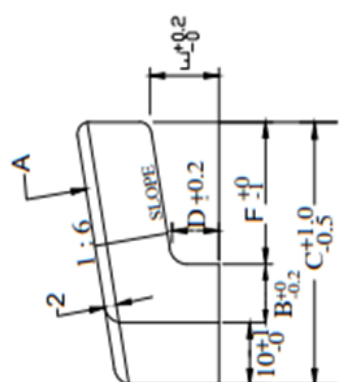


PLAN

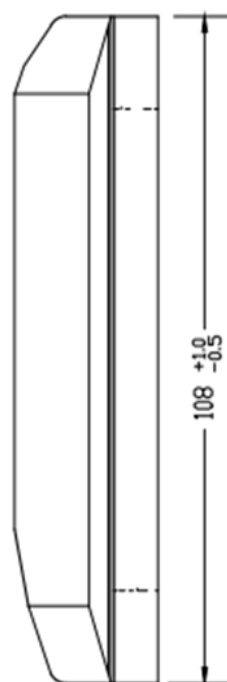
S.No.	USED WITH SLEEPER NO.	RAIL SECTION	DRG: NO./ PART NO.	IDENTIFICATION MARK	A	B	C	D	E	SLOPE
1	RDSO/T-7008 (GAUGE-1676)	60Kg UIC/60E1	RDSO/T-8222	60Kg (GS)	10.0	9.0	12.7	42	11.64	1 IN 14
2			RDSO/T-8223	60Kg (NGS)	10.3	9.4	12.3	42.4	11.64	1 IN 14



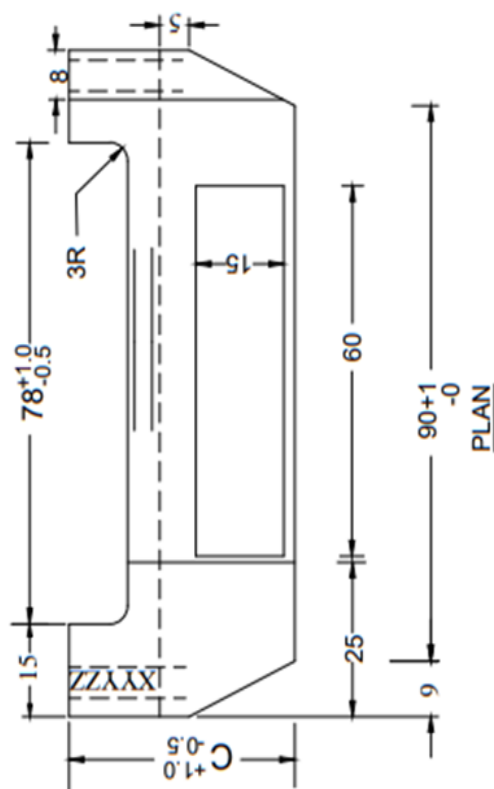
SIDE ELEVATION
FOR 60 Kg. (UIC)/60E1 RAIL



SIDE ELEVATION
FOR 52 Kg. RAIL



ELEVATION

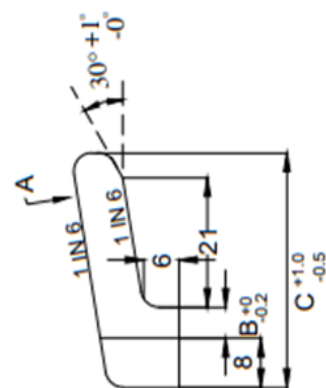


PLAN

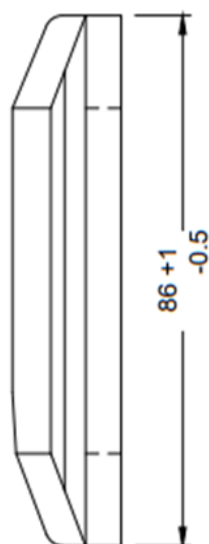
SCHEME FOR SCREEN PRINTING FOR GFN LINER AND COLOUR CODE FOR HVN LINER

S.No.	LINER DRG. No.	COLOUR BAND	PRINT OF COLOUR BAND	COLOUR OF HVN LINER
1.	RDSO/T-8751	RED	LOT No. XYZ, 60 Kg. RAIL ON 52 Kg./60 Kg. WIDER SLEEPER	BROWN RED RAL NO. 3011
2.	RDSO/T-8752	YELLOW	LOT No. XYZ, 52 Kg. RAIL ON 52 Kg./60 Kg. WIDER SLEEPER GS	MINT GREEN RAL NO. 6029
3.	RDSO/T-8753	LIGHT GREEN	LOT No. XYZ, 52 Kg. RAIL ON 52 Kg./60 Kg. WIDER SLEEPER NGS	COBALT BLUE RAL NO. 5013

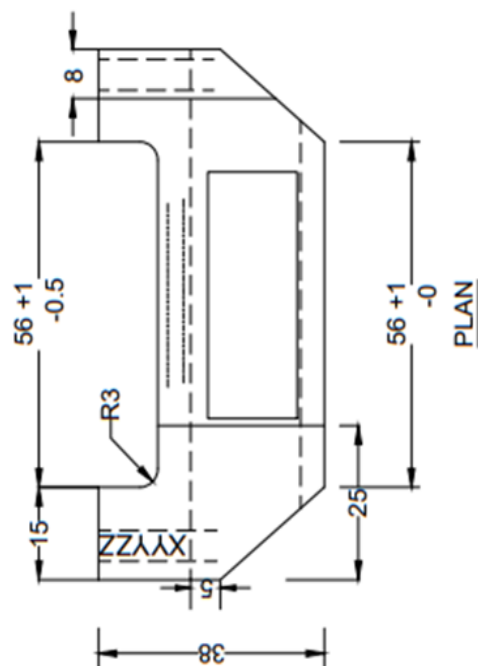
S.No.	USED WITH SLEEPER NO.	RAIL SECTION	DRG:NO./PART NO.	IDENTIFICATION MARK	A	B	C	D	E	F	SLOPE
1.		60KgUIC/60E1	RDSO/T-8751	60 Kg.	9.9	5.5	42.5	10.0	11.9	27.0	1 IN 14
2.	RDSO/T-8746	52 Kg.	RDSO/T-8752	52 Kg.G.S.	11.5	9.0	42.0	8.0	11.8	23.0	1 IN 6
3.		52 Kg.	RDSO/T-8753	52 Kg. N.G.S.	12.5	15.0	48.0	8.0	11.8	23.0	1 IN 6



SIDE ELEVATION



ELEVATION

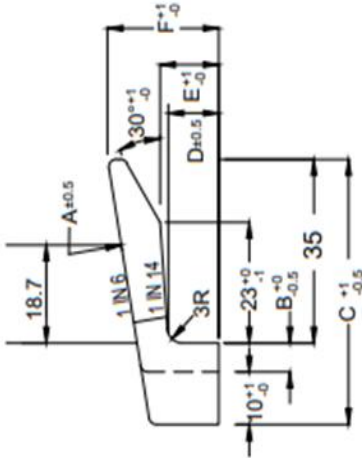


PLAN

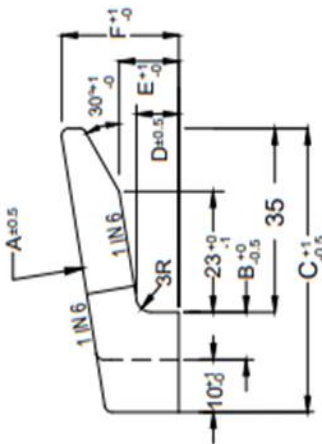
SCHEME FOR SCREEN PRINTING AND COLOUR FOR HVN LINER

S.No.	LINER DRG. NO.	COLOUR BAND	PRINT ON COLOUR BAND	COLOUR OF HVN LINER
1	RT-8335	RED	LOT No. XYZ,	BROWN RED RAL NO. 3011
2	RT-8336	BLUE	LOT No. XYZ,	MINT GREEN RAL NO. 6029
3	RT-8337	GREEN	LOT No. XYZ,	COBALT BLUE RAL NO. 5013

S.No.	USED WITH SLEEPER NO.	RAIL SECTION	DRG:NO./ PART NO.	A	B	C
1	RDSO/T-8333	75 R	RDSO/T-8335	8.0	5.0	38.0
2			RDSO/T-8336	8.0	6.0	39.0
3			RDSO/T-8337	8.0	7.0	40.0



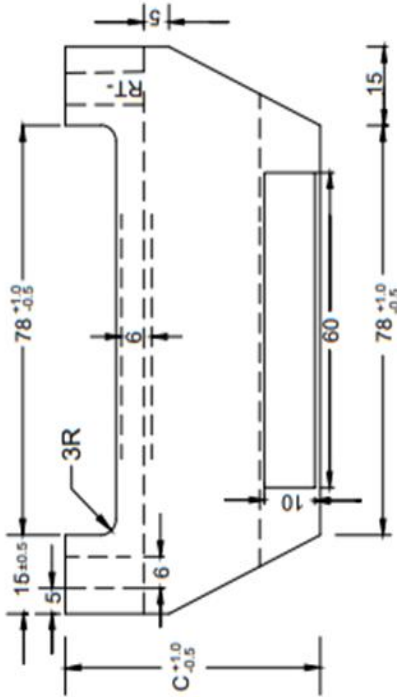
FOR 60 Kg UIC RAIL



FOR 52 Kg RAIL



ELEVATION

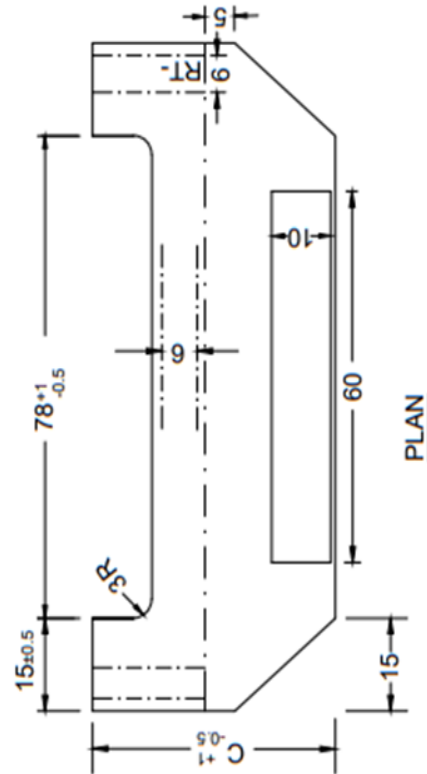
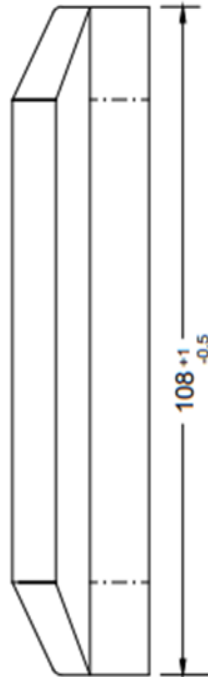
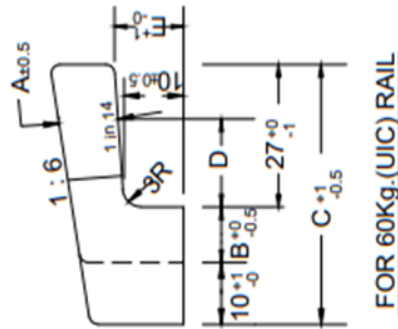
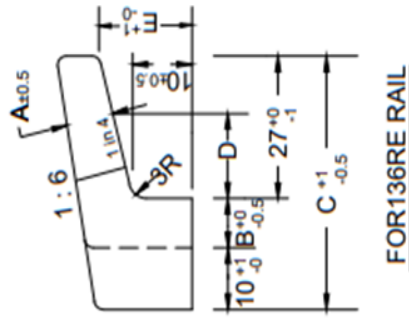


PLAN

TABLE OF DIMENSIONS

S.No	LINER DRG. No	COLOUR BAND	RAIL	SLEEPER	PRINT ON COLOUR BAND
1.	RDSO/T-3741	YELLOW	52 Kg.	60 Kg.	52 Kg. RAIL ON 60 Kg. SLEEPER (GS)
2.	RDSO/T-3742	GREEN	52 Kg.	60 Kg.	52 Kg. RAIL ON 60 Kg. SLEEPER (NGS)

S.No.	USED WITH SLEEPER NO.	RAIL SECTION	DRG:NO.	IDENTIFICATION MARK	A	B	C	D	E	F
1		60 Kg UIC	RDSO/T-3740	60 Kg.	8.0	5.5	50.5	10.0	11.65	22.04
2	RDSO/T-2496	52 Kg	RDSO/T-3741	52 Kg. GS	9.5	9.0	54.0	8.0	11.84	23.46
3		52 Kg	RDSO/T-3742	52 Kg. NGS	10.5	15.0	60.0	8.0	11.84	24.46

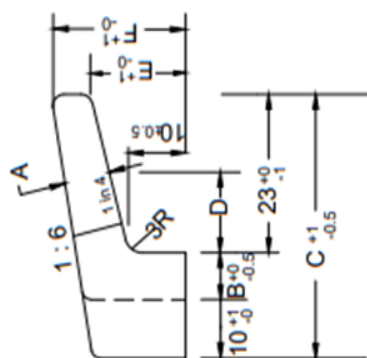


SCHEME FOR SCREEN PRINTING

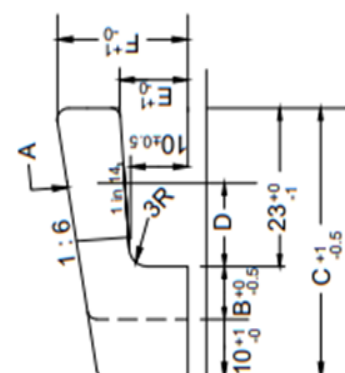
S.No.	LINER DRG. NO.	COLOUR BAND	RAIL	SLEEPER	PRINT ON COLOUR BAND
1	RDSO/T-8616	BLUE	60Kg.	136RE	60Kg (UIC) RAIL ON 136 RE SLEEPER(GS)
2	RDSO/T-8617	BROWN	60Kg.	136RE	60Kg (UIC) RAIL ON 136 RE SLEEPER(NGS)

TABLE OF DIMENSIONS

S.No.	USED WITH SLEEPER NO.	RAIL SECTION	DRG. NO.	IDENTIFICATION MARK	A	B	C	D	E
1	RDSO/T-7008/ RDSO/T-8527	60Kg UIC/ 60 E1	RDSO/T-8616	60Kg GS	10.0	7.5	44.5	14.2	11.90
2			RDSO/T-8617	60Kg NGS	10.3	10.9	47.9	10.8	11.90
3		136RE	RDSO/T-8618	136RE	8.0	8.0	45.0	13.7	16.70



FOR 60Kg (UIC) RAIL



FOR 136RE RAIL

SCHEME FOR SCREEN PRINTING

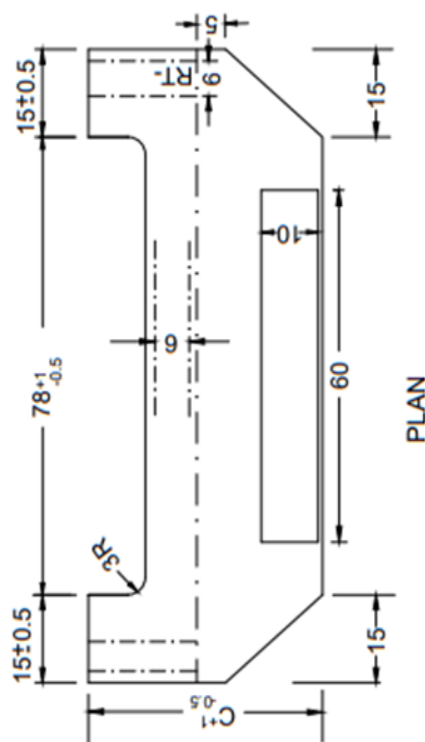
S.No.	LINER DRG. No.	COLOUR BAND	PRINT ON COLOUR BAND
1	RDSO/T-8254	YELLOW	60Kg (UIC) RAIL ON 136 RE SLEEPER(GS)
2	RDSO/T-8255	GREEN	60Kg (UIC) RAIL ON 136 RE SLEEPER(NGS)

TABLE OF DIMENSIONS

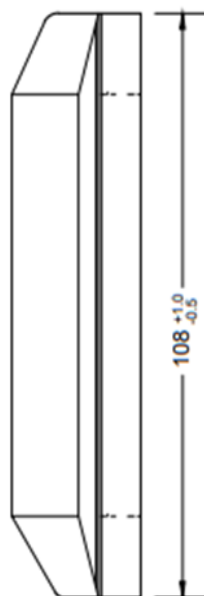
S.No.	USED WITH SLEEPER NO.	RAIL SECTION	DRG. NO.	IDENTIFICATION MARK	A	B	C	D	E	F
1	RDSO/T-7008 (GAUGE-1676)	60Kg UIC/ 60 E1	RDSO/T-8254	60Kg GS	10.0	9.0	42.0	12.7	11.64	22.72
2			RDSO/T-8255	60Kg NGS	10.3	9.4	42.4	12.3	11.64	23.06
3		136RE	RDSO/T-8256	136RE	8.0	8.0	41.0	13.7	15.75	23.06



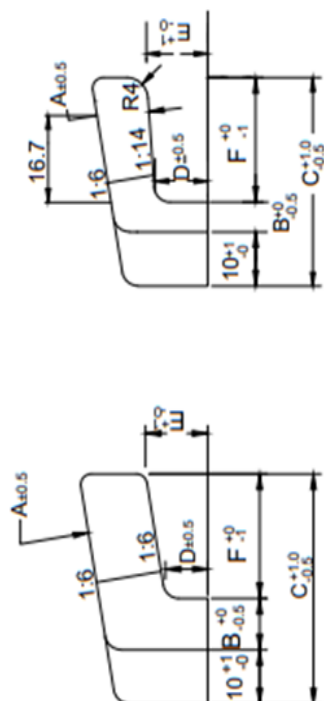
ELEVATION



PLAN

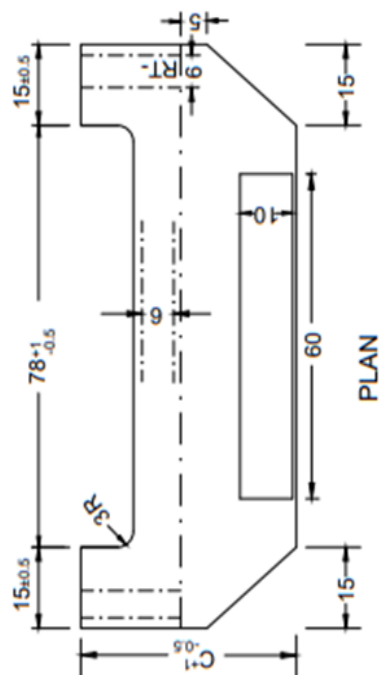


ELEVATION



FOR 52Kg.RAIL

FOR 60Kg.(UIC)/60E1 RAIL



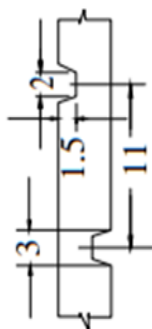
PLAN

SCHEME FOR SCREEN PRINTING

S.No.	LINER DRG. No.	COLOUR BAND	RAIL	PRINT ON COLOUR BAND
1	RDSO/T-8749	WHITE	52Kg	52Kg RAIL ON 60Kg./52 Kg. WIDER SLEEPER(GS)
2	RDSO/T-8750	GREEN	52Kg	52Kg RAIL ON 60Kg./52 Kg. WIDER SLEEPER(NGS)

TABLE OF DIMENSIONS

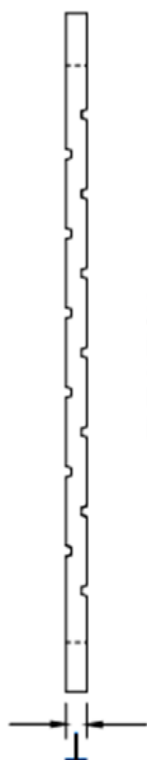
S.No.	USED WITH SLEEPER NO.	RAIL SECTION	DRG. NO.	IDENTIFICATION MARK	A	B	C	D	E	F
1.	RDSO/T-8748	60Kg.UIC/60E1	RDSO/T-8748	60 Kg.	9.9	5.5	42.5	10.0	11.9	27.0
2.		52 Kg.	RDSO/T-8749	52 Kg. G.S.	11.5	9.0	42.0	8.0	11.8	23.0
3.			RDSO/T-8750	52 Kg. N.G.S.	12.5	15.0	48.0	8.0	11.8	23.0



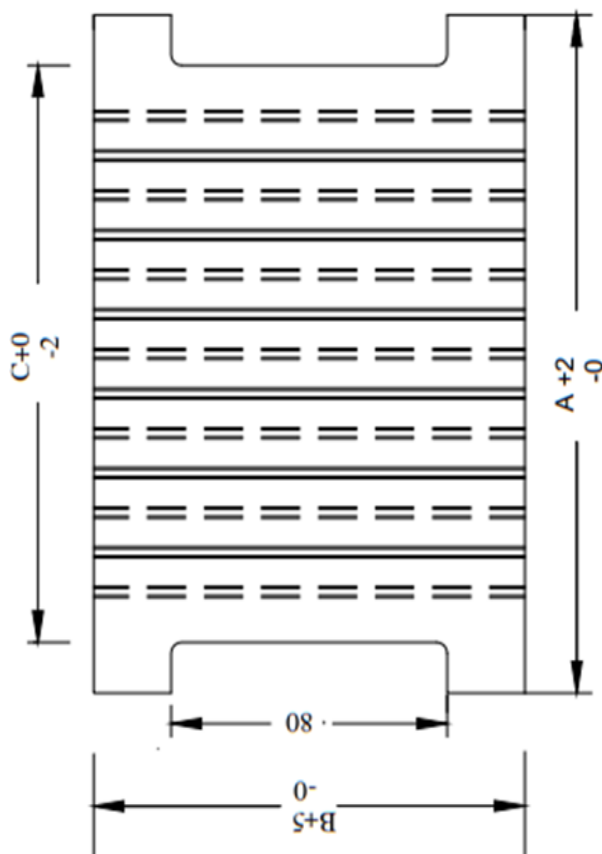
DETAIL OF GROOVES

Parts Numbers & Main Dimensions of GRSP

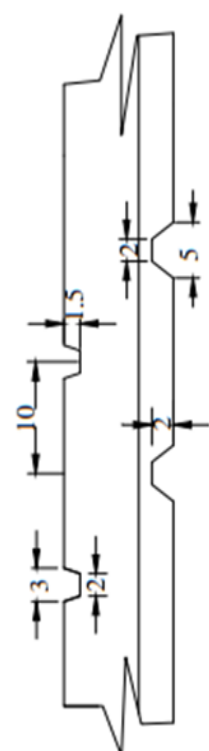
S.No.	Drawing No.	Used with PSC Sleeper	Rail section	DIMENSION			
				A	B	C	Thickness (T)
1	RT-3703	RT-2495	52 Kg	175	125	146	6
2	RT-3711	RT-2496	60Kg/60E1/ 52Kg	188	125	160	6
3	RT-3709	RT-2496	60Kg	188	125	160	10



ELEVATION



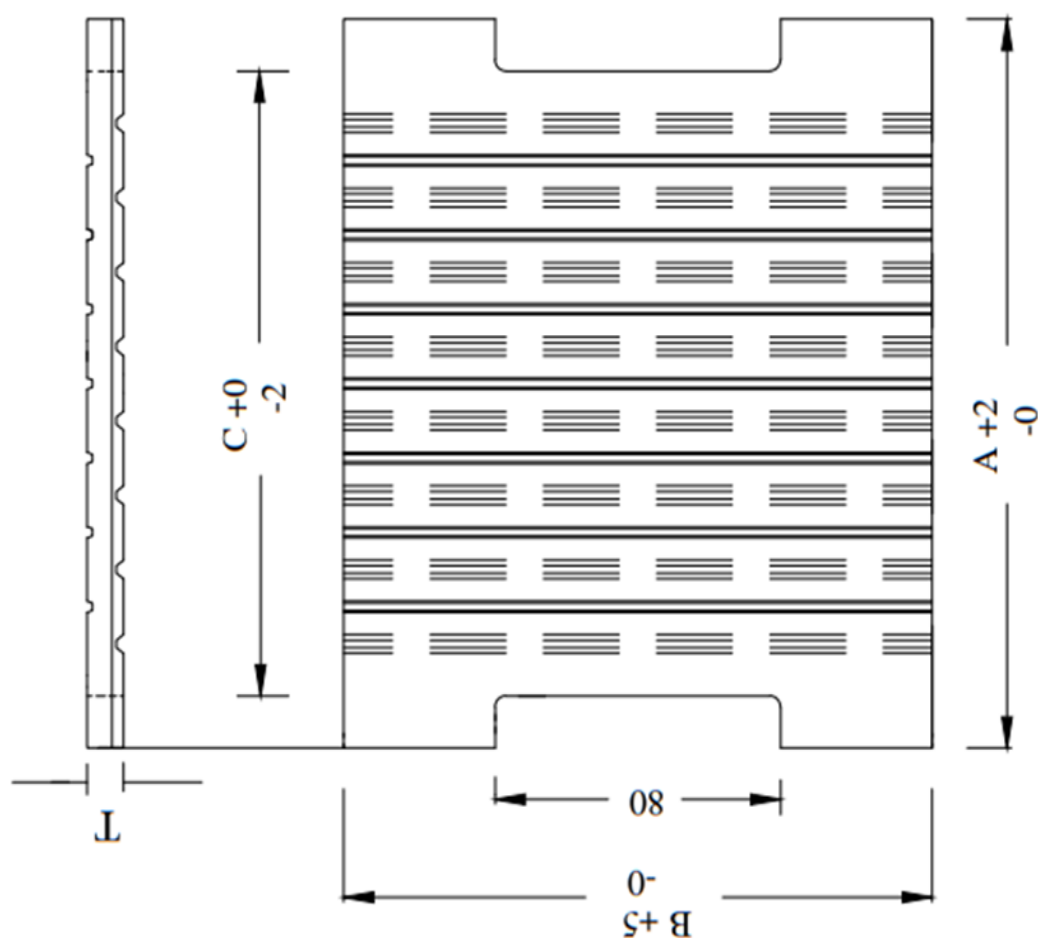
PLAN



DETAILS OF GROOVE

Parts Numbers & Main Dimensions of CGRSP

S.NO.	Drawing No.	Used with PSC Sleeper	Rail section	DIMENSION			
				A	B	C	Thickness (T)
1	RT-8327	RT-2495	52 Kg	175	125	146	6.2
2	RT-6618	RT-2496	60Kg/52Kg	188	125	160	6.2
3	RT-7010	RT-7008	60Kg/136RE	196	125	160	10
4	RT-8528	RT-8527	60Kg/136RE	196	185	160	10
5	RT-8747	RT-8746	60Kg/52Kg	188	185	168	10





Nylon Cord Reinforced GRSP



TABLE SHOWING DETAILS OF PSC SLEEPERS AND FASTENINGS

GAUGE	DESCRIPTION	PSC Sleeper	RAIL SECTION	Insert	Elastic Rail Clip	Rail Pad (CGRSP/GRSP)	Metal Liner	GFN Liner
		Drawing No.						
BG	PSC Sleeper (1673 mm)	RT-2496	60 Kg UIC/60E1	RT-381	RT-3701/RT-5919	RT-6618/RT-3711	RT-3740	RT-3706
			52 Kg	RT-381	RT-3701/RT-5919	RT-6618/RT-3711	RT-3741/RT-3742	RT-3707/RT-3708
	PSC Sleeper (1673 mm)	RT-2495	52 Kg	RT-381	RT-3701/RT-5919	RT-8327/RT-3703	RT-3738	RT-3702
	25t PSC Sleeper (1673 mm)	RT-7008	60 Kg UIC/60E1	RT-6901	RT-5919	RT-7010	RT-8616(GS) RT-8617(NGS)	RT-6938(GS) RT-6939(NGS)
			136 RE	RT-6901	RT-5919	RT-7010	RT-8618	RT-6937
	DFCCIL PSC Sleeper (1676 mm)	RT-7008	60 Kg UIC/60E1	RT-6901	RT-5919	RT-7010	RT-8254(GS) RT-8255(NGS)	RT-8222(GS) RT-8223(NGS)
			136 RE	RT-6901	RT-5919	RT-7010	RT-8256	-
	WIDER PSC Sleeper (1673 mm)	RT-8527	60 Kg UIC/60E1	RT-6901	RT-5919	RT-8528	RT-8616(GS) RT-8617(NGS)	RT-6938(GS) RT-6939(NGS)
			136 RE	RT-6901	RT-5919	RT-8528	RT-8618	RT-6937
		RT-8746	60 Kg UIC/60E1	RT-6901	RT-5919	RT-8747	RT-8748	RT-8751
			52 Kg	RT-6901	RT-5919	RT-8747	RT-8749(GS) RT-8750(NGS)	RT-8752(GS) RT-8753(NGS)
NG	PSC Sleeper (762 mm)	RT-8333	75R	RT-3087	RT-3722	RT-8338	-	RT-8335

* RT-5919 ↔ ERC Mk-V
RT-3701 ↔ ERC Mk-III
RT-3722 ↔ ERC Mk-II

GRSP ↔ Grooved Rubber Sole Plate
CGRSP ↔ Composite Grooved Rubber Sole Plate

(RT-RDSO/T)

TABLE SHOWING DETAILS OF ELASTIC RAIL CLIPS USED ON IR

Drawing No.	Type of Clip	Dia(mm) (Tolerances as Per Clause 4.9)	Minimum Weight of Clip (g).	Toe Deflection (mm)	Toe Load Range(kg) Clause 7.8	Contact of Surface for Flat Toe Clips Clause 7.6.2	
						Major Axis (mm) Minimum	Minor Axis (mm) Minimum
1	2	3	4	5	6	7	8
RDSO/T-1892	ERC Round Toe	20.64	-	11.4	645-800	-	-
RDSO/T-3700	ERC Flat Toe	20.64	-	11.4	645-800	28	9.5
RDSO/T-3701	ERC MK-III Flat Toe	20.64	904	13.5	850-1100	28	9.5
RDSO/T-3722	ERC MK-II Flat Toe	18.0	589	11.2	700-900	20	8
RDSO/T-5919	ERC Mk-V	23.00 and 20.64 For Central Leg Portion	1068	13.5	1200-1500	28	9.5
RDSO/T-8258	ERC-J	20.64	904	8.5	650(Min)	Bearing Length 15-20 mm	
RDSO/T-6254 RDSO/T-6255	Anti Theft ERC & Circlip	20.64 -	925 10	13.5	850-1100	28	9.5

CHAPTER III

CAST IRON SLEEPERS

S.N.	Description	Pages	Page No
1.	Brief notes on cast iron sleepers	SCa & SCb	93
2.	CST-9 type plate sleepers, BG & MG	SC1	95
3.	Reversed jaw CST-9 plate sleepers, BG & MG	SC2	99

Brief notes on cast iron sleepers

CST-9 type plate sleeper: This sleeper is the last of the series of experimental sleepers designed and tried out on railways between the years 1926 and 1935 under the recommendations of the Track Standards Committee and contains the best features of its fore-runners and also includes as a unique feature two pockets for retaining packed ballast (somewhat after the principle of the bowl or pot). It has been extensively used since 1935 and its comparatively satisfactory behaviour has resulted in the withdrawal of all previous designs. The drawings for the CST-9 plate sleepers have been standardised.

Some of the other salient features of this sleeper are:

1. A long through tiebar which is fastened to the plate by means of four standard cotters; (the alternative type with a short tiebar, gibs and cotters has been withdrawn as it was found to be not quite efficient).
2. The rail seat, which is canted 1 in 20, is only 114 mm wide (along the rail) and this narrow bearing tends to reduce the rocking of the sleeper plate under the wave motion of the rail.
3. A single two-way key is provided on the gauge side jaw, any small adjustment in the gauge being obtained by altering the relative position of four cotters.
4. By virtue of the double tapered jaw and the two-way key the direction of the key can be fixed to suit that of the creep in the track
5. Apart from the lateral stability provided by the keying up of the ballast in the pockets a keel is provided centrally along the rail to give additional anchorage.
6. The sleeper provides bearing area approximately equal to the effective bearing area of the standard main line wooden sleeper.

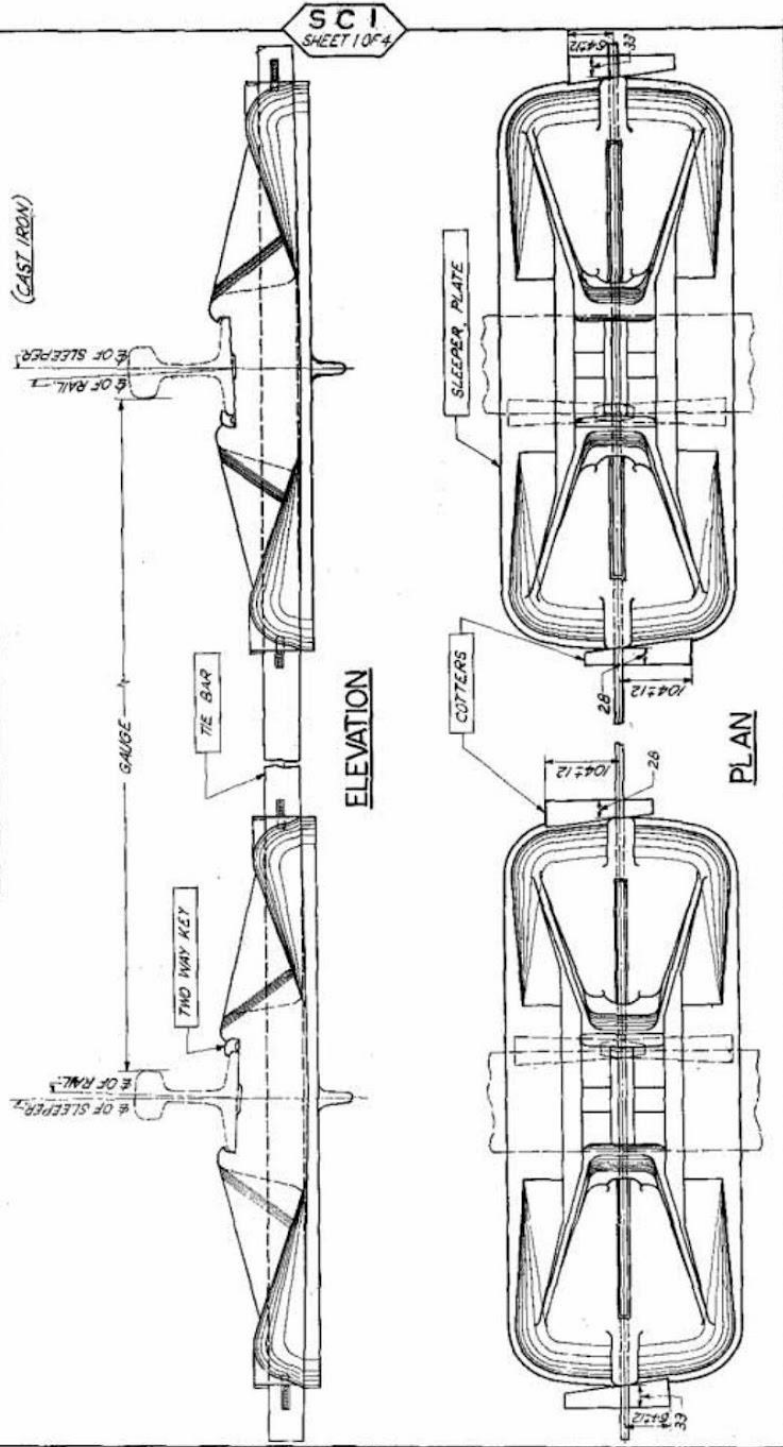
These sleepers have also been designed with the key side jaw reversed in position, i.e. on the outside of the rail, and serve as an antisabotage measure, when a few of this latter type are introduced in each rail length. They prevent the rail being removed without the removal of the tiebar fastenings.

The ordinary and the reversed jaw types of CST-9 sleepers are detailed on pages SC1 in 4 sheets and SC2 in 4 sheets respectively and the main dimensions and part numbers relevant to the various rail sections are tabulated. Designs have been prepared for 52kg, 90R and 75R BG, 90R, 75R, 60R and 50R MG rail sections.

Specification No.IRS T-7 is to be referred for CST-9 type of sleepers.

C.S.T 9 TYPE ASSEMBLY OF SLEEPER

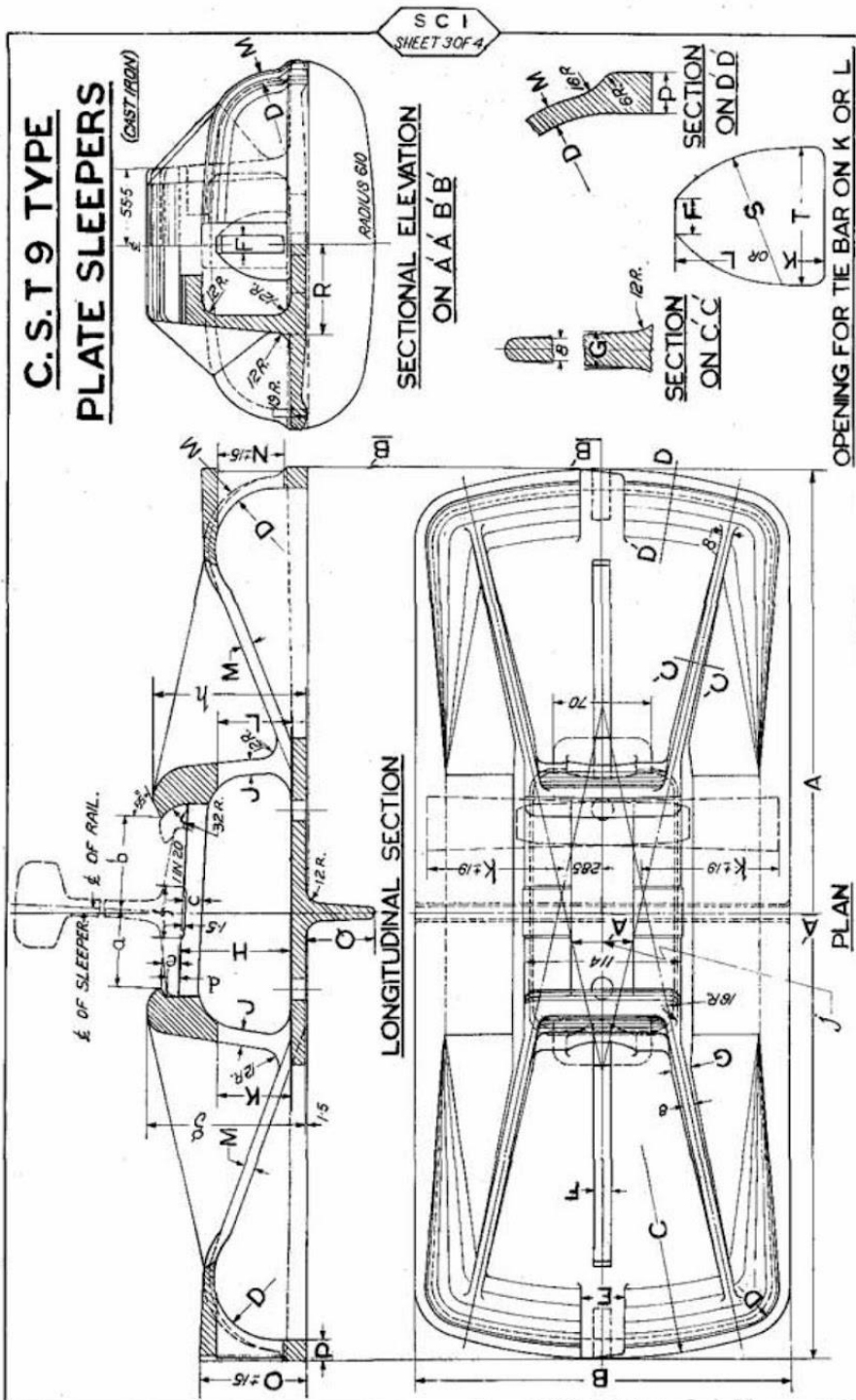
(CAST IRON)



PART NUMBERS AND WEIGHTS

RAIL SECTION	GAUGE	ASSEMBLY DRG-NR	PART NUMBERS				APPROX. WEIGHT (kg)				
			PLATE	TIE BAR	TWO WAY KEY	COTTER	PLATES (2)	TIE BAR (1)	TWO WAY KEYS (2)	COTTERS (4)	COMP- SLEEPER
UIC 60 kg	B.G.										
52 kg & 90R	B.G.	TA 9 (M)	T478 (M)	T 404 (M)	T 405 (M)	T401 (M) OR T421 (M) OR T424 (M) OR T425 (M)	87.10	12.62	0.97	1.48	102.17
75R	B.G.	TA 20051	T10246	T404 (M)	T405 (M)	D0		12.62	0.97	1.48	
90R	M.G.	RDS01F-2367	RDS01F-2366	RDS01F-2368	T405 (M)	D0	69.00	8.996	0.97	1.48	80.446
75R	M.G.	TA 20 (M)	T 498 (M)	T433 (M)	T405 (M)	D0	49.00	6.45	0.97	1.48	57.90
60R	M.G.	TA 20077	T10257	T433 (M)	T413 (M)	D0	50.14	6.45	0.86	1.48	58.93
50R	M.G.	TA 20078	T10258	T433 (M)	T413 (M)	D0		6.45	0.86	1.48	

C.S.T 9 TYPE PLATE SLEEPERS



MAIN DIMENSIONS OF PLATES

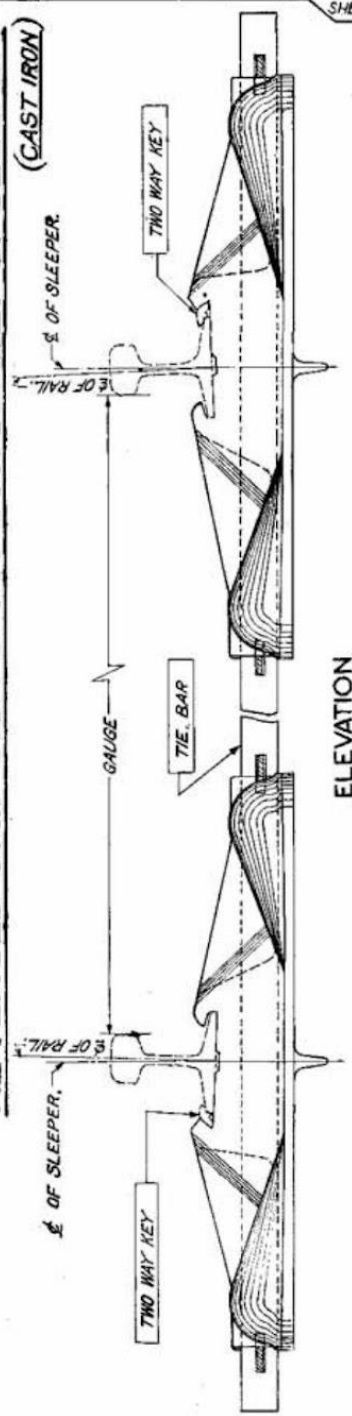
GAUGE	RAIL SECTION	D I M E N S I O N S (mm)																		
		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T
B.G.	UIC 60kg.																			
	52kg, 90R, 75R	800	330	516	51	38	16	19	102	12.5	68	64	9.5	54	89	17.5	51	87	60	51
M.G.	90R.	700	300	510	50	38	16	16	95	12	68	64	8.5	54	86	16	50	75	60	51
	75R, 60R & 50R	650	270	362	45	32	13	14	81	11	54	54	8	48	77	15	50	65	50	50

DIMENSIONS AT RAIL SEATS

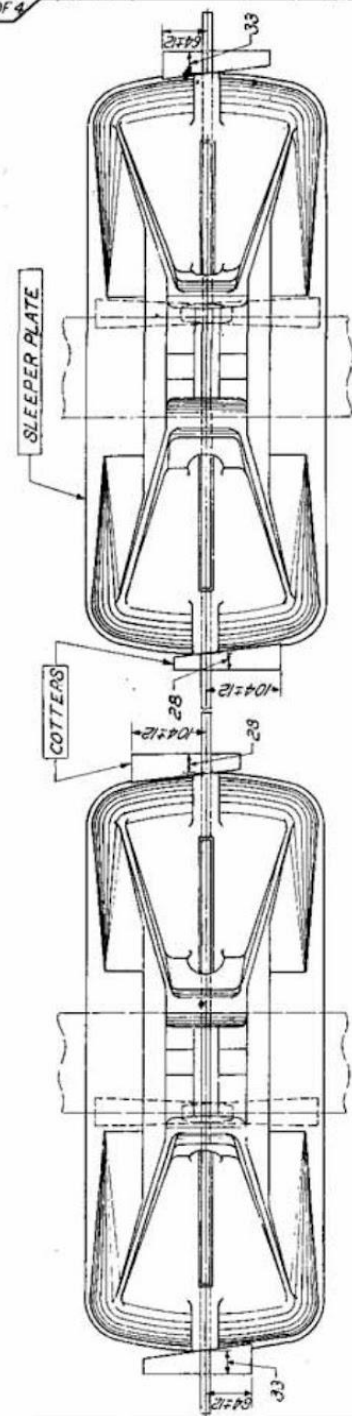
RAIL SECTION	GAUGE	PART No.	D I M E N S I O N S (mm)										
			a	b	c	d	e	f	g	h	j	k	
UIC 60kg.													
52 kg & 90R	B.G.	T 478 (M)	63.5	76	17	11	14	35	140	137	32	128	
75 R.	B.G.	T 102-4.6	53	72	17	10.5	13.5	48	140	137	45	128	
90 R.	M.G.	R25q/K-2368	63.5	76	16	11	14	35	133	130	32	128	
75 R.	M.G.	T 498 (M)	59	66	14	10	13	38	114	111	45	128	
60 R.	M.G.	T 102.57	50	62	14	8	11	38	114	111	45	128	
50 R.	M.G.	T 102.58	42	62.3	14	8	11	38	114	111	45	76	

REVERSED JAW C.S.T 9 TYPE ASSEMBLY OF SLEEPER

(CAST IRON)



ELEVATION



PLAN

S C 2
SHEET 10F 4

PART NUMBERS AND WEIGHTS

RAIL SECTION	GAUGE	ASSEMBLY DRG NR.	PART NUMBERS				APPROX. WEIGHT (Kg.)				
			PLATE	TIE BAR	TWO WAY KEY	COTTER	PLATES (2)	TIE BAR (1)	TWO WAY KEYS (2)	COTTERS (4)	COMP. SLEEPER
UIC 60 kg											
52 kg & 90 R.	B.G.	TA 20001	T 10221	T 404(M)	T 405(M)	T 401(M) OR T 423(M) OR T 424(M) OR T 422 (R)	87-10	12-62	0-97	1-48	102-17
75 R.	B.G.	TA 20002	T 10222	T 404(M)	T 405(M)	DO		12-62	0-97	1-48	
90 R.	M.G.	RD507-2664	RD507-2663	RD5072368	T 405(M)	DO		8-96	0-97	1-48	
75 R.	M.G.	TA 32 (N)	T 439(M)	T 433(M)	T 405 (M)	DO	49-00	6-45	0-97	1-48	57-90
60 R.	M.G.	TA 20027	T 10232	T 433(M)	T 413 (M)	DO	51-00	6-45	0-86	1-48	53-79
50 R.	M.G.	TA 20028	T 10233	T 433(M)	T 413 (M)	DO		6-45	0-86	1-48	

**REVERSED JAW C.S.T. 9
TYPE PLATE SLEEPERS**
(CAST IRON)

LONGITUDINAL SECTION

PLAN

SECTIONAL ELEVATION

SECTION ON A.A.B.B.

SECTION ON C.C.

SECTION ON D.D.

OPENING FOR TIE BAR ON K OR L

**SC 2
SHEET 30F4**

Technical drawing of a Reversed Jaw C.S.T. 9 Type Plate Sleepers, showing longitudinal section, plan, and sectional elevation views with dimensions and labels.

MAIN DIMENSIONS OF PLATES

GAUGE	RAIL SECTION	D I M E N S I O N S (mm)																		
		A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T
B.G.	UIC 60 kg.																			
	52 kg, 90 R, 75 R	800	330	516	51	38	16	19	102	125	68	64	95	54	89	175	51	87	60	51
M.G.	90 R.	700	300	510	50	38	16	16	96	12	68	64	85	54	86	16	50	75	60	51
	75 R, 60 R, 50 R	650	270	362	45	32	13	14	81	11	54	54	8	48	77	15	50	65	50	50

DIMENSIONS AT RAIL SEATS

RAIL SECTION	GAUGE	PART NUMBER	D I M E N S I O N S (mm)													
			a	b	c	d	e	f	g	h	j	k	l	m	n	
UIC 60kg	B.G.															
52kg,90 R.	B.G.	T 10221	76	47	17	11	14	35	16	16	146	114	32	128	213	
75 R.	B.G.	T 10222	66	47.6	17	10.5	13.5	48	15	15	145	113	45	128	165	
90 R.	M.G.	P23017-2663	76	47	16	11	14	35	16	16	140	111	32	128	213	
75 R.	M.G.	T 439 (M)	72	42.1	14	10	13	38	14	14	120	92	45	128	16	
60 R.	M.G.	T 10232	62	39	14	8	11	38	12.5	12.5	120	92	45	128	16	
50 R.	M.G.	T 10233	56.3	38	14	8	11	38	13	11	120	92	45	76	15	

CHAPTER IV
STEEL TROUGH SLEEPERS

S.N.	Description	Pages	Page No.
1.	Brief notes on steel sleepers	SSa & SSb	104
2.	Steel trough sleepers – Broad and Metre Gauge for use with loose-jaws and two-way keys	SS1	106
3.	Steel sleepers for turnouts -Broad and Metre Gauge for use with loose jaws and two-way keys	SS2	110
4.	Steel trough sleeper-Broad Gauge for use with elastic rail clips	SS3	112

Brief notes on steel sleepers

Steel trough sleepers (Main Line): There are two different rolled sections of sleeper plates from which the standard sleepers for the various BG and MG rail sections are pressed to a suitable trough shape with the rail seat canted 1 in 20, i.e.:

1. Plate 13mm thick at rails seat, for 52kg and 90R (BG), weighing 28.66 kg/metre length.
2. Plate 9mm thick at rail seat, for 75 R, 60R & 50R (MG) weighing 17.55 kg/metre length.

In these sleepers, holes are drilled or punched in the plate to accommodate loose jaws. For loose jaw refer sheet 1 of page SF5 and its relevant note in Chapter II.

Standard two-way keys vide page SF5 sheet 2 and its relevant notes in Chapter II are used with the loose jaw types of sleeper. The over size keys as per page SF5 sheet 3 are also used when holes get elongated.

The sleeper to drawing No.460(M) with drilled or punched holes and having rolled section of 13mm thickness at rail seat and the modified loose jaws referred at page SF5A sheet 1, along with its relevant note in Chapter II can be used for 52 kg rail section.

The details of the rolled sections, main dimensions and weights and properties of the sleepers and also the dimensions of the rail seat which differ for each rail section, together with part numbers, are tabulated with reference to the various explanatory sketches on pages SS1 in 4 sheets.

Steel sleepers for turnouts, BG and MG: A special rolled section of sleeper which needs no pressing except for splaying out the ends, has been designed for BG turnouts and is detailed on IRS Drg.No.T 455(M). This sleeper is available in lengths suitable for cutting into the various lengths of turnout sleepers. The thickness of the plate at the rail seat is 13 mm so that spring type loose jaws for 52kg and 90R rails can be made use of. The weight of this sleeper per metre length is approximately 35.50 kg as against 28.66 kg per metre length of the standard BG main line trough sleeper for

52 kg and 90 R and is considerably stronger than the latter.

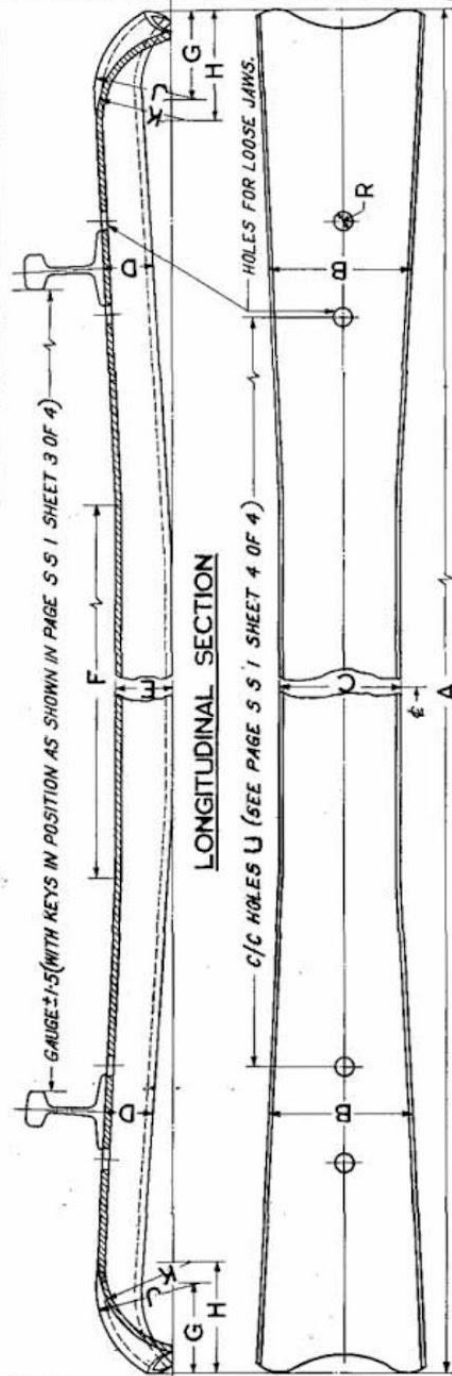
In the case of turnouts for MG, the rolled plate available is detailed on IRS Drg. No. T-358(M). The thickness of the plate at the rail seat is 9mm and spring steel loose jaw T-419(M) have been found to suit in the case of 75R rail. For 60R and 50R rails, spring steel loose jaws to Drg. No. T10002 shall have to be used. The weight of this sleeper is approximately 23.60 kg/metre length and the table of the sleeper is pressed 150mm flat to provide a seat for the uncanted rail.

Details of the sleeper section for broad gauge as well as metre gauge are given on pages SS2 in 2 sheets, where sleeper and the hole spacing to suit the various rail sections have been tabulated with reference to the sketches showing the general arrangement.

Specification No. IRS T-9 is to be referred for steel sleepers.

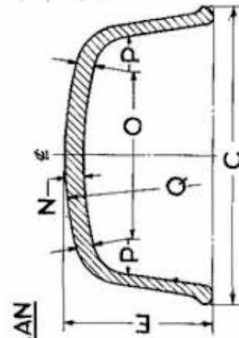
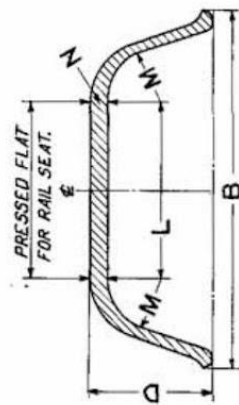
Steel trough sleepers with elastic rail clips BG: The steel rail pad of requisite size matching that of the rail foot is welded on the steel trough sleeper at an appropriate place as indicated on page SF6A sheet 1. A rubber sole plate is interposed between the rail foot and top of the sleeper to impart elasticity to the assembly. The elastic rail clips driven into position complete the assembly. Details are shown on page SS3.

B. G. & M. G. STEEL TROUGH SLEEPERS



SSI
SHEET 1 OF 4

PLAN



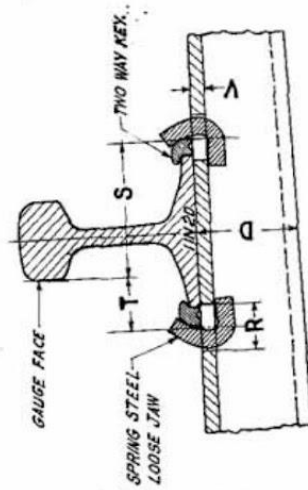
PART NUMBERS & MAIN DIMENSIONS

RAIL SECTION	GAUGE	APPROX. WT OF EACH TROUGH	PART NUMBER	D I M E N S I O N S (mm)																
				A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R
52Kg & 90R.	B.G.	78.69kg	T 460(M)	2680	257	216	89	106	900	162	200	190	165	127	38	13	121	25	305	365
75R, 60R & 50R.	M.G.	93.01kg	T 10271 T 10272 T 10277	1830	215	206	79	95	610	136	165	152	143	102	25	9	78	31	140	32

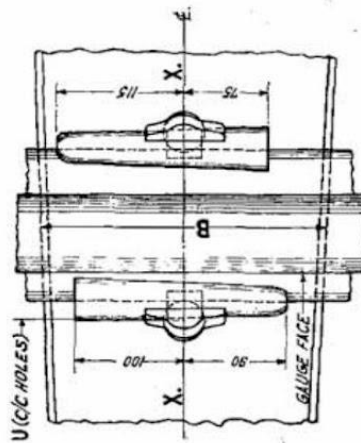
PROPERTIES

RAIL SECTION	GAUGE	APPROX. WT OF EACH TROUGH	PART NUMBER	AT RAIL SEAT			AT CENTRE		
				M ₁ CM ³	Z ₁ CM ³	Z ₂ CM ³	M ₂ CM ³	Z ₂ CM ³	Z ₁ CM ³
52Kg & 90R.	B.G.	78.69kg	T 460(M)	379	102	3856	249	111	5273
75R, 60R & 50R.	M.G.	93.01kg	T 10271 T 10272 T 10277	172	6946	3172	112.8	35.1	17.95

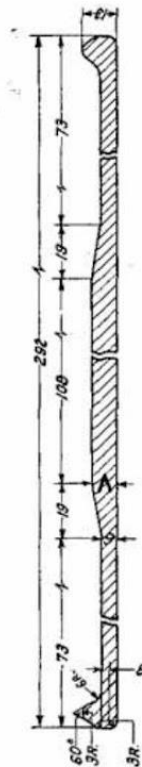
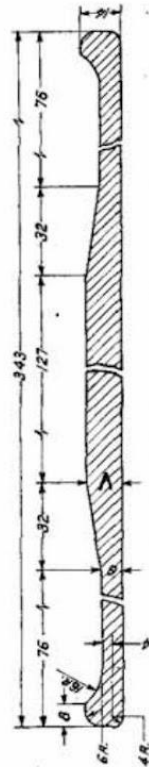
B.G. & M. G. STEEL TROUGH SLEEPERS



SECTION ON X.X.



PLAN AT RAIL SEAT



PART NUMBERS AND MAIN DIMENSIONS

RAIL SECTION	GAUGE	PART NUMBER	TWO WAY KEY	SPRING STEEL LOOSE JAW	D I M E N S I O N S (mm)					
					B	D	R	S	T	U V
52kg 890R.	B.G.	T 460(M)	T 405(M)	T 415(M)	257	89	36.5	118.5	50.5	1586.5 13
75R.	M.G.	T 10271	T 405(M)	T 419(M)	215	79	32	109	47	917 9
60R.	M.G.	T 10272	T 413(M)	T 10002	215	79	32	101	43	924 9
50R.	M.G.	T 10277	T 413(M)	T 10002	215	79	32	93	40	929 9

PART NUMBERS & MAIN DIMENSIONS

RAIL SECTION	GAUGE	PART NUMBERS			D I M E N S I O N S (mm)										
		SECTION FOR TURN OUT SLEEPERS	TWO WAY KEY	SPRING STEEL LOOSE UNW	A	B	C	D	E	F	G	H	J	K	L
51kg390R.	B.G.	T 455(M)	T 405(M)	T 416(M)	36.5	169	50.5	118.5	360	130	95	180	180	286	75
75R.	M.G.	T 358(M)	T 405(M)	T 419(M)	32	156	47	109	300	115	85	150	150	240	65
60R.	M.G.	T 358(M)	T 413(M)	T 10002	32	144	43	101	300	115	85	150	150	240	65
50R.	M.G.	T 358(M)	T 413(M)	T 10002	32	133	40	93	300	115	85	150	150	240	65

PROPERTIES

RAIL SECTION	GAUGE	APPROX. WT OF RAIL SECTION (PER METRE)	PART NUMBER	AT RAIL SEAT		AT CENTRE			
				M ₁ CM ⁴	Z _e CM ³	M ₂ CM ⁴	Z _e CM ³	Z _e CM ³	Z _L CM ³
52kg 890R.	B.G.	85.5kg	T 455(M)	391	144.73	391	57.19	144.79	57.19
75R, 60R & 50R.	M.G.	23.6kg	T 358(M)	220.43	83.37	220.43	37.64	83.37	37.64

METHOD OF UTILISING STEEL TROUGH SLEEPER WITH ELASTIC RAIL CLIPS

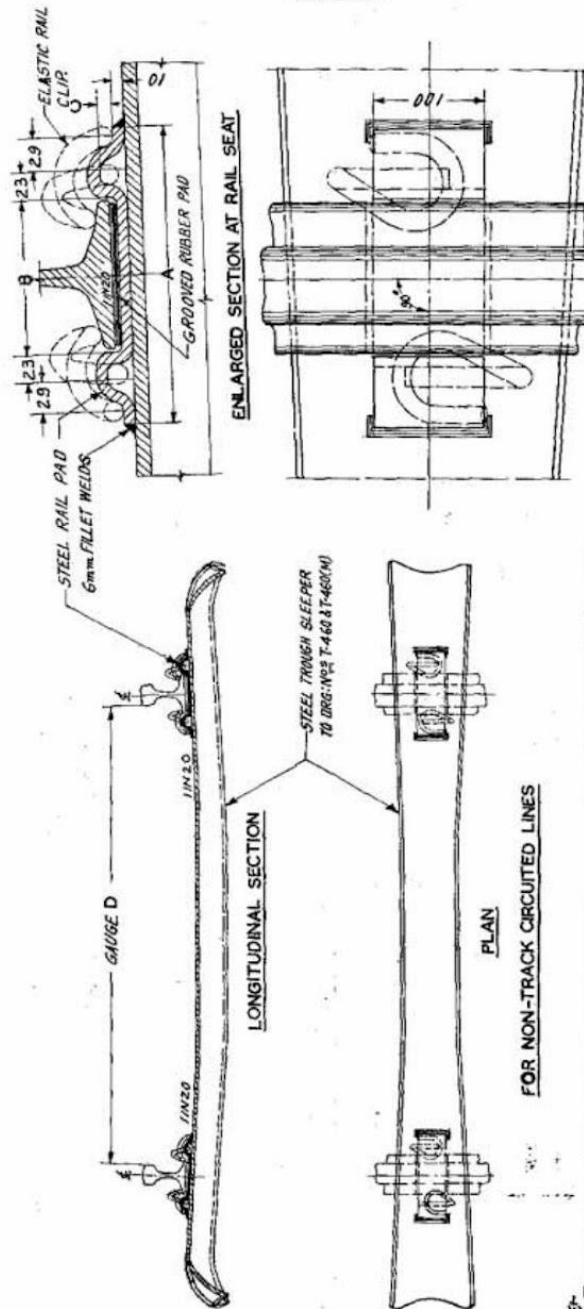


TABLE OF DIMENSIONS

RAIL SECTION	DRAWING NUMBER	DIMENSIONS (mm)			
		A	B	C	D
UIC 60 kg	RDS0/T-1029	295	154	14.5	1673 ± 1.5
52 kg & 90 N	RDS0/T-361	280	138	14	1676 ± 1.5

CHAPTER V

TURNOUTS, SWITCHES AND CROSSINGS

S.N.	Description	Pages	Page No.
1.	Brief notes and general definition	TSCa to TSCf	115
2.	Table of assemblies, sub-assemblies and their parts	TSC	121
3.	Definition	TSC 1	125
4.	Main dimensions of turnouts (BG)	TSC 2	127
5.	Main dimensions for setting out turnouts (BG)	TSC 3	129
6.	Rail lengths of turnouts (BG)	TSC 4	131
7.	1 in 8 ½ CMS crossing (BG)	TSC 5 to TSC 6	133
8.	1 in 12 CMS Crossing (BG)	TSC 7	137
9.	1 in 16 CMS crossing (BG)	TSC 8	139
10.	1 in 20 CMS crossing (BG)	TSC 9	140
11.	Over -riding curved switch for 1 in 8 ½ turnouts (BG)	TSC 10	141
12.	Thick web curved switch for 1 in 8 ½ turnouts (BG)	TSC 11	143
13.	Over -riding curved switch for 1 in 12 turnouts (BG)	TSC 12	144
14.	Thick web curved switch for 1 in 12 turnouts (BG)	TSC 13	146
15.	Over- riding curved switch for 1 in 16 turnouts (BG)	TSC 14	147
16.	Thick web curved switch for 1 in 16 turnouts (BG)	TSC 15	148
17.	Over- riding curved switch for 1 in 20 turnouts (BG)	TSC 16	149
18.	Bolts and turned bolts for points & crossings	TSC 17	150
19.	Spherical washers for points & crossings	TSC 18	153
20.	Special check rail (BG)	TSC 19	154
21.	Extended switch tie plate (BG)	TSC 20	156
22.	Leading & following insulated stretcher bars (BG)	TSC 21	157
23.	Slide chair for 1 in 12 turnout 60 Kg	TSC 22	158

24.	Spring Setting device for Thick web switch (BG)	TSC 23	159
25.	M.S lug for leading stretcher bar for (BG)	TSC 24	161
26.	Special bearing plates for points & crossings	TSC 25	162
27.	Over -riding R.H Derailing switch for 1 in 12 turnouts (BG)	TSC 26	163
28.	Over -riding curved switch(symmetrical splits) for 1 in 12 turnouts (BG)	TSC 27	164
29.	1 in 8 ½ Weldable CMS crossing (BG)	TSC 28	165
30.	1 in 12 Weldable CMS crossing (BG)	TSC 29	166

Brief notes and general definitions: Crossings, switches and turnouts are the essential adjuncts of a track structure which are provided at the intersection of two tracks to permit the rolling stock to pass from one track to another. The smooth passage of the rolling stock from one track to another depends among other factors on the angle of the crossing which is kept as small as possible for high speed traffic on the running lines. On the Indian Railways, for sizes of crossings, namely, 1 in 8 ½, 1 in 12, 1 in 16 and 1 in 20 are used.

There are different methods of denoting the angle of the crossing. In IR it is denoted by a number which is cotangent of the angle. Thus when a crossing is stated to be 1 in 12, the cotangent of the angle of crossing is 12. The various terms used in the layouts are briefly defined as follows:-

Turnout: is an arrangement of points and crossings with lead rails by means of which rolling-stock may be diverted from one track to another.

Lead of turnout: is the distance from the theoretical nose of the crossing to the heel of the switch measured along the straight.

Overall length: is the distance from the end of stock rail Joint (SRJ) to the heel of the crossing measured along the straight.

Theoretical nose of crossing: is the theoretical point of intersection of the gauge lines of a crossing, which is used as a reference point for all calculations. The actual nose of crossing is the point at which the spread between the gauge lines of a crossing is sufficient to allow for an adequate thickness of the point, from consideration of manufacture and strength.

Throat of a crossing: is the point at which the converging wings of a crossing are closest.

Tongue rail: is a tapered movable rail, a pair of which with necessary connections and fittings forms a switch. The running rail against which a tongue rail operates is a stock rail. A pair of tongue rails with their stock rails are commonly known as “Points”.

Heel of switch: is an imaginary point midway between the end of the lead rail and the tongue rail. In case of fixed heel switches, it is a point at the centre of the heel block itself.

Divergence: The divergence at the heel of the switch is the distance between the gauge lines of stock rail and the tongue rail or in other words, it is the clearance between these two rails plus the width of the tongue rail head.

Switch angle: is the angle between the gauge lines of the tongue rail and stock rail (in the closed position). It is also called entry angle in the case of curved switches.

Theoretical toe of switch: is the point of intersection of the gauge lines of a tongue rail and its stock rail meet in closed position. The actual toe of switch is the point at which the spread between the gauge lines of a switch rail and its stock rail is sufficient to allow for an adequate thickness of the point, from consideration of manufacture and strength.

Tables of Main dimensions of turnouts: The main dimensions of turnouts are:

Gauge	(G)
Crossing angle	(W)
Lead of turnout	(Z)
Distance of actual noses of crossing to heel	(S)
Length of Straight portion of crossing from the actual noses to the tangent point of turnout.	(Q)
Radius of turnout with straight switch	(R)
Radius of turnout with curved switch	(R1)
Divergence at heel of switch	(X)
Switch angle	(V)
Distance of theoretical toe of switch to heel	(Y)
Distance of actual toe of switch to heel	(T)
Overall Length of turnout	(L)

These dimensions have been given in page TSC2 for the various turnouts. The lead of the turnout and its radius are the most important of the turnout dimensions to be computed and the method followed in computing these dimensions are given in Chapter XI

Tables of rail lengths for turnouts: The lengths of the rails connecting the points with the crossing known as lead rails have been given in page TSC4.

Cast Manganese Steel (CMS) crossings: In order to afford better wear resisting properties and to reduce the cost of maintenance and frequent renewals, Cast Manganese Steel crossings are being increasingly used on heavy traffic density sections. Drawings standardized for various types of CMS crossing layout for being used in ordinary turnouts are listed in page TSC 1.

Weldable Cast Manganese Steel Crossings: Weldable CMS Crossing, manufactured by welding of CMS crossing with normal UTS/R-260 grade rail using an intermediate piece. Weldable CMS crossing (WCMS) consists of 3 parts i.e., the CMS crossing casting, an intermediate piece and connecting rail. The rail is first welded to the intermediate piece which in turn is welded to CMS crossing casting. Weldable CMS Crossing eliminates the use of fishplate joints, therefore, it is a step towards provision of continuous welded rail track. This results in better transition between rail and crossing with gradual variation of inertia, requirement lesser maintenance efforts, resulting into increase life span.

Type of Switches:

Switches are of three types:

- (a) The ordinary switches in which the foot of the stock rail is planed in order to accommodate the tongue rail. These type of switches are no longer used over IR.
- (b) Over-riding switches in which the foot of the tongue rail is planed so that it over-rides the foot of the stock rail, which is maintained of full section.
- (c) Thick web Switches which are manufactured using 60E1A1 Asymmetric rail section.

Over-riding type of switches have been standardized on the Indian Railways and are being used predominantly since long back. The advantages claimed in the adoption of the over-riding type of switches are as under:-

- (a) The stock rail being uncut is very much stronger.
- (b) As all the work of manufacture will be confined to the tongue rail, the cost of planning the tongue rail is lesser than the cost of planning both tongue and stock rail.
- (c) Although the tongue rail in the over-riding switch may appear to be weaker than that in the ordinary switch, it is supported by the stock rail for the whole of the weakened portion of its length and the combined strength of the two rails between sleepers is greater than that of the tongue alone in the undercut switch.

Another important feature of the over-riding switch is that the head of the tongue rail for part of its length is higher than that of the stock rail by 6mm, as this reduces the amount of undercut in the foot of the tongue rail. The difference in level is adjusted by putting in special machined bearing plates behind the heel.

THICK WEB SWITCH: On Indian Railways, new high speed lines are being laid to cater for demand of increasing traffic density. In various Zonal Railways high speed turnouts with thick web switches are being installed.

Salient features of Thick Web Switch (TWS)

- The switch opening is of 160 mm as against of 115 mm of ordinary switches.
- The web of the switches is made thicker to make them strong enough to withstand load of train at high speeds.

Symmetrical splits: In a symmetrical split, the centre line of crossing is placed along the centre line of the main track so that its heel diverges along two separate tracks having equal radii of curvature. The effect being to halven the crossing angle and the degree of curvature of the lead curves so as to permit speeds higher than what could be allowed over an ordinary turn-out having the same switch and crossing angles

The following important design features differentiate a symmetrical split layout from an ordinary turnout:

- (i) The degree of curvature of the through track and the turnout track in symmetrical splits are equal.
- (ii) For given turnout data, the radius of a symmetrical split is nearly double the length of an ordinary turnout radius.
- (iii) Both stock rails in the switch of a symmetrical split are given a bend each at the theoretical toe, as against only one bend in the ordinary turnout.
- (iv) All the sleepers in the symmetrical splits are perpendicular to the centre line of the layout.

Derailing Switch: Derailing Switch in station yard is a device to isolate a particular line from adjacent running lines to avoid infringement by train or a part of train which overshoots signal or escapes from yard. The derailing switch should be so located that when a train derails over it, the same does not infringe the adjacent track. A derailing switch so located between running tracks, does not serve the purpose for which it is provided as on derailment, a stock is likely to infringe the adjacent running line.

Bolts for points and crossings: All the bolts for points and crossings are usually of the same diameter as fish bolts for the same section of rail and are also provided with fish bolt nuts to obviate the use of any separate spanners. It is not practicable to include the details of all types of bolts in this Manual. However, the salient details and drawing numbers of 25mm and 22 mm dia bolts for points and crossings are given in page TSC 17.

Spherical washers: To obviate the necessity of holding stocks of a number of varying MS sections to suit the different positions in which tapered washers have to be used, spherical washers have been designed consisting of two pieces in spherical contact which will adjust themselves to allow for any deviation of the bolt in either horizontal or vertical direction and has the effect of centralizing the load on the bolt for any angle. Page TSC 18 gives the important dimensions.

Check rails for turnouts: Page TSC 19 contain information pertaining to the dimensions of check rails used with crossings for the various sections of rails. Check rails are so designed as to give the minimum clearance when used with crossings for the various sections of rails but should any appreciable side wear take place, the check rail can be moved-in towards the running rail by removing one or both of the 3 mm packing's provided with the distance blocks between the check rail and the running rail.

Tie plates: Tie plates are provided at the toe of switches to ensure exact gauge. Page TSC 20 given the dimensions and the numbers of the drawings for the insulated tie plates for use in acute crossings and switches of track circuited sections. Fibre plates and bushes are used to provide the insulation.

Stretcher bars: Page TSC 21 give the leading dimensions and the drawing numbers of leading and following stretcher bars for curved switches 1 in 12 turnouts 52 Kg.

Slide chairs: Page TSC 22 give dimensions of slide chairs for over-riding switches for 1 in 12 turnout 60 Kg. These slide chairs have pressed up 'lands' on which the switch rail slides when the switches are operated.

Typical MS flat bearing plates: Drawings have been prepared for the MS flat bearing plates used for various rail sections on turnouts. The number of such plates being very large, it is not practicable to give the leading dimensions for all.

Spring Setting Device (SSD): The spring setting device ensures the correct setting of the switch rail. It helps in getting the required flange way clearance between the open tongue and stock rails at all times and that too up to the junction of Rail Heads (J.O.H)

ASSEMBLIES AND SUB ASSEMBLIES IN TURNOUTS SWITCHES AND CROSSING						
GAUGE	CROSSING	RAIL SECTION	DESCRIPTION	LAYOUTS	SWITCH	CROSSING
				PSC	PSC	PSC
B.G.	1 IN 8½	UIC60Kg	6400 mm Over Riding curved switch	RDSO/T- 4865	RDSO/T-4966	RDSO/T-4967
			6400mm curved Thick web switch	RDSO/T-6279	RDSO/T-6280	RDSO/T-4967
			6400mm OR Right hand derailing switch	RDSO/T-6068	-	-
			6400mm OR Left hand derailing switch	RDSO/T-8007	-	-
			6400mm OR Symmetrical split switch	RDSO/T-5353	RDSO/T-5354	RDSO/T-4967
		52Kg	6400 mm over riding curved switch	RDSO/T-4865	RDSO/T-4866	RDSO/T-4867
			6400mm OR Right hand derailing switch	RDSO/T-5836	-	-
			6400mm OR Left hand derailing switch	RDSO/T-8523	-	-
			6400mm OR symmetrical split switch	RDSO/T-5353	RDSO/T-5354	RDSO/T-4867
	1 IN 12	60 kg	10125mm Over Riding curved switch	RDSO/T-4218	RDSO/T-4219	RDSO/T-4220
			10125mm Thick web curved switch	RDSO/T-6154	RDSO/T-6155	RDSO/T-4220
			10125mmOR Right hand derailing switch	RDSO/T-8089	-	-
			10125mm OR Symmetrical splits switch	RDSO/T-5553	RDSO/T-5554	RDSO/T-4220
		52Kg	10125 mm over riding curved switch	RDSO/T-4732	RDSO/T-4733	RDSO/T-4734
			10125mm OR right hand derailing switch	RDSO/T-8522	-	-
			10125mm OR Symmetrical splits switch	RDSO/T-5553	RDSO/T-5554	RDSO/T-4734
		60kg	11200mm over-riding curved switch	RDSO/T-5691	RDSO/T-5692	RDSO/T-5693
			11200mm Thick web curved switch	RDSO/T-7075	RDSO/T-7076	RDSO/T-5693
	1 IN 20	60kg	12460mm over-riding curved switch	RDSO/T-5858	RDSO/T-5859	RDSO/T-5860

*OR Means = Over Riding Switch

TSC
SHEET 1 OF 4

ASSEMBLIES AND SUB ASSEMBLIES IN TURNOUTS SWITCHES AND CROSSING (NG)								
GAUGE	CROSSING	RAIL SECTION	DESCRIPTION	LAYOUTS	SWITCHES		CROSSINGS	
				WOODEN	WOODEN	PAGE No	WOODEN	PAGE No.
N.G.	1 IN 8 ½	60R.	4115mm SWITCH STRAIGHT, LOOSE HEEL. (SHORT SWITCH)	TA 20604	TA 20606	TSC 12	TA 20605	TSC 7
	1 IN 12	60R.	5485mm SWITCH STRAIGHT, FIXED HEEL.(LONG SWITCH)	TA 20601	TA 20603	TSC 13	TA 20602	TSC 9

TSC
SHEET 2 OF 4

			SWITCH SUB ASSEMBLIES AND MAIN PARTS							
GAUGE	CROSSING	RAIL SECTION	SWITCH LENGTH (mm)	SWITCH SUB ASSEMBLIES FOR CONCRETE SLEEPER						
				SUB-ASSEMBLIES	SLIDE CHAIR	Leading Stretcher BAR	First following Stretcher BAR	Second following Stretcher BAR	Third following Stretcher BAR	Insulated Tie plate
BG	1 IN 8½	60 KG	6400mm over-riding curved switch	RDSO/T-4966	RDSO/T-4968	RDSO/T-4981 & T-4982	RDSO/T-4983 & T-4984	RDSO/T-4985 & T-4986	-----	RDSO/T-5360 to T-5360/2
			6400mm curved Thick web switch	RDSO/T-6280	RDSO/T-6288	----	-----	---	-----	RDSO/T-6281 TO T-6281/2
		52 KG	6400mm overriding curved switch	RDSO/T-4866	RDSO/T-5813	RDSO/T-4885 & T-4886	RDSO/T-4887 & T-4888	RDSO/T-4889 & T-4890	-----	RDSO/T-5812 to T-5812/2
	1 IN 12	60 KG	10125mm over-riding curved switch	RDSO/T-4219	RDSO/T-4596	RDSO/T-3649 & /T-3650	RDSO/T-3651 & T-3652	RDSO/T-3653 & T-3654	RDSO/T-3655 & T-3656	RDSO/T-5204 TO T-5204/2
			10125mm curved Thick web switch	RDSO/T-6155	RDSO/T-6166	-----	-----	-----	-----	RDSO/T-6156 TOT-6156/2 & T-6275/1 TO T-6275/2
		52 KG	10125mm over-riding curved switch	RDSO/T-4733	RDSO/T-4735	RDSOT-4764 & T-4765	RDSO/T-4766 & T-4767	RDSO/T-4768 & T-4769	RDSO/T-4770 & T-4771	RDSO/T-5203 To T-5203/2
	1 IN 16	60k g	11200mm Over-riding curved switch	RDSO/T-5692	RDSO/T-4596	RDSO/T-5712 & T-5713	RDSO/T-5714 & T-5715	RDSO/T-5716 & T-5717	RDSO/T-5718 & T-5719	RDSO/T-5204 To 5204/2
			11200mm curved Thick web switch	RDSO/T-7076	RDSO/T-6166	RDSO/T-7077 & T-7078	RDSO/T-7079 & T-7080	RDSO/T-7081 & T-7082	RDSO/T-7083 & T-7084	RDSO/T-6156 & T-6156/2
	1 IN 20	60 KG	12460mm over-riding curved switch	RDSO/T-5859	RDSO/T-4596	RDSO/T-5885 & T-5886	RDSO/T-5887 & T-5888	RDSO/T-5889 & T-5890	RDSO/T-5891 & T-5892	RDSO/T-5914 TO 5914/2

CROSSING SUB-ASSEMBLIES AND MAIN PARTS

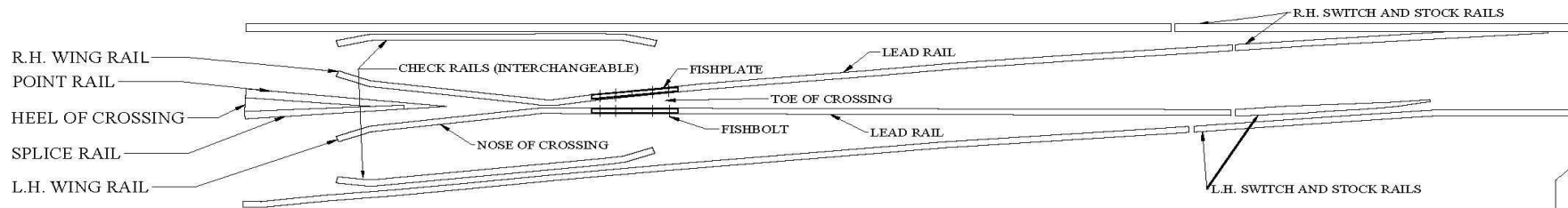
GAUGE	CROSSING	RAIL SECTION	CROSSING SUB ASSEMBLIES ON PSC SLEEPER	CHECK RAIL
B.G.	1 IN 8 ½	UIC60KG	RDSO/T-4967	RDSO/T-4018
		52 KG	RDSO/T-4867	RDSO/T-4773
BG	1 IN 12	UIC60Kg	RDSO/T-4220	RDSO/T-4018
		52KG	RDSO/T-4734	RDSO/T-4773
BG	1 IN 16	UIC60Kg	RDSO/T-5693	RDSO/T-4018
BG	1 IN 20	UIC60Kg	RDSO/T-5860	RDSO/T-4018

TSC
SHEET 4 OF 4

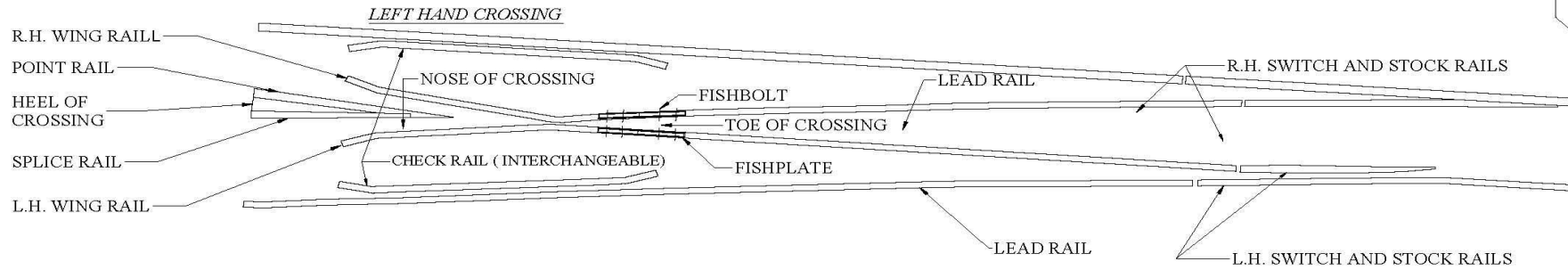
DEFINITIONS OF TURNOUTS

CROSSINGS AND SWITCHES

LEFT HAND CROSSING



LEFT HAND TURNOUT



RIGHT HAND TURNOUT

TSC 1
SHEET 1 OF 2

DEFINITIONS:-

STANDING AT THE TOE OF THE SWITCH AND FACING THE CROSSING:-

A LEFT HAND TURN OUT DIVERTS A TRAIN TO THE LEFT OF STRAIGHT MAIN LINE OR OF THE MORE IMPORTANT LINE IN THE CASE OF A TURNOUT FROM A CURVE.

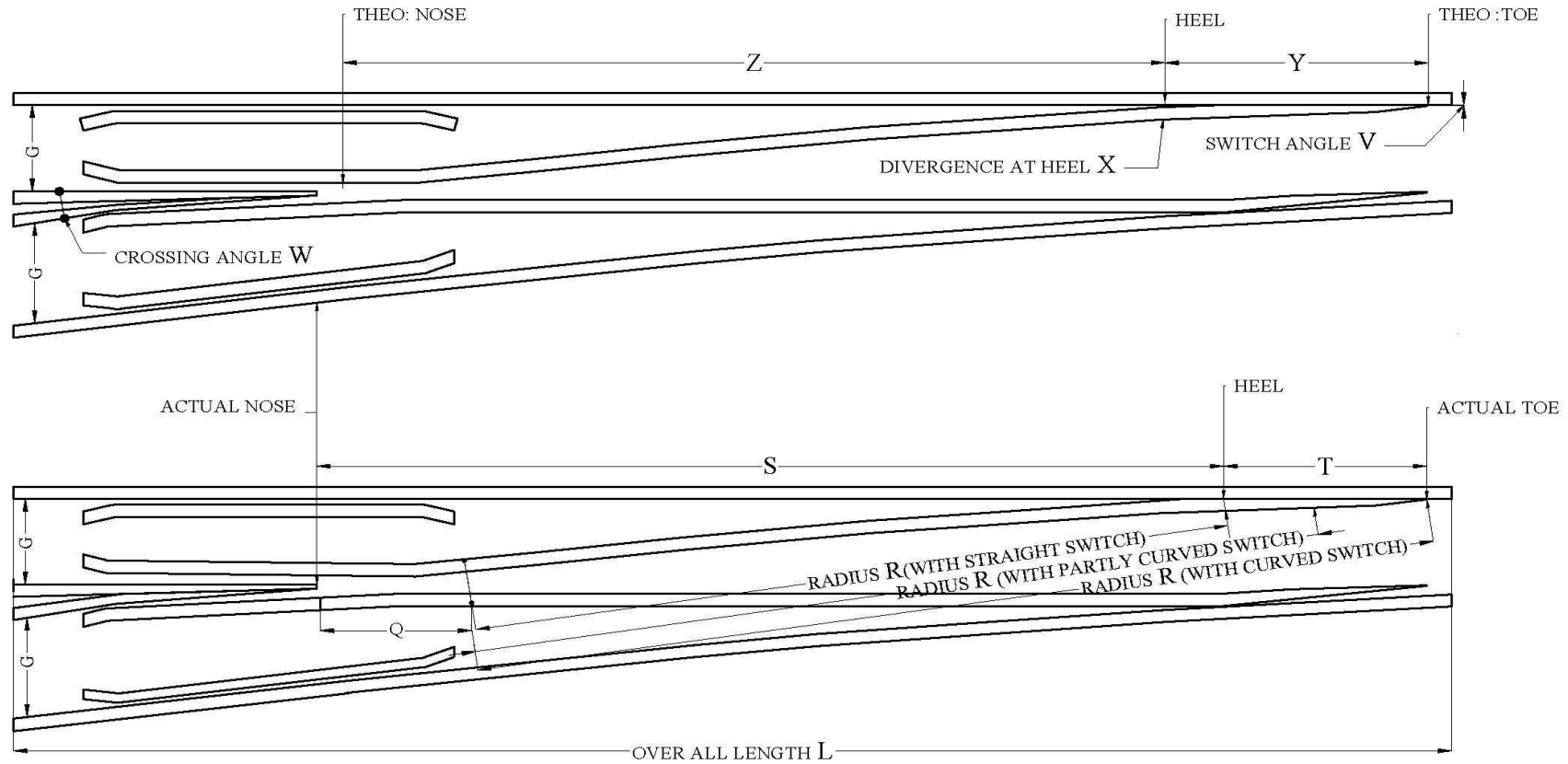
A RIGHT HAND TURNOUT DIVERTS A TRAIN TO THE RIGHT OF THE STRAIGHT MAIN LINE OR OF THE MORE IMPORTANT LINE IN THE CASE OF A TURNOUT FROM A CURVE.

THE LEFT HAND SWITCH & STOCK RAILS ARE ON THE OBSERVER'S LEFT.

THE RIGHT HAND SWITCH STOCK RAILS ARE ON THE OBSERVER'S RIGHT.

TSC 1
SHEET 2 OF 2

MAIN DIMENSIONS OF TURNOUTS (B.G.)



SHEET 1 OF 2

TSC 2

TABLE OF MAIN DIMENSION															
GAUGE	CROSSING NUMBER	RAILS SECTION	DRAWIN G NUMBER	DIMENSIONS											TYPE OF OVER RIDING SWITCH
				Z	Y	V	W	S	T	R	R1	X	Q	L	
BG	1IN 8 ½	60KG	RDSO/T-4865	18395	6839	0°46’59”	6°42’35”	18536	6400	-	232260	182	1225	28613	CURVED FIXED HEEL
	1IN12	60KG	RDSO/T-4218	25831	10125	0°20’0”	4°45’49”	26101	10125	-	441360	175	1745	39975	CURVED FIXED HEEL
	1IN16	60KG	RDSO/T-5691	35720	11200	0°20’0”	3°34’35”	36038	11200	-	784993	145	1900	51582	CURVED FIXED HEEL
	1IN20	60KG	RDSO/T-5858	46027	12460	0°20’0”	2°51’45”	—	12460	-	1283100	133	1980	63924	CURVED FIXED HEEL

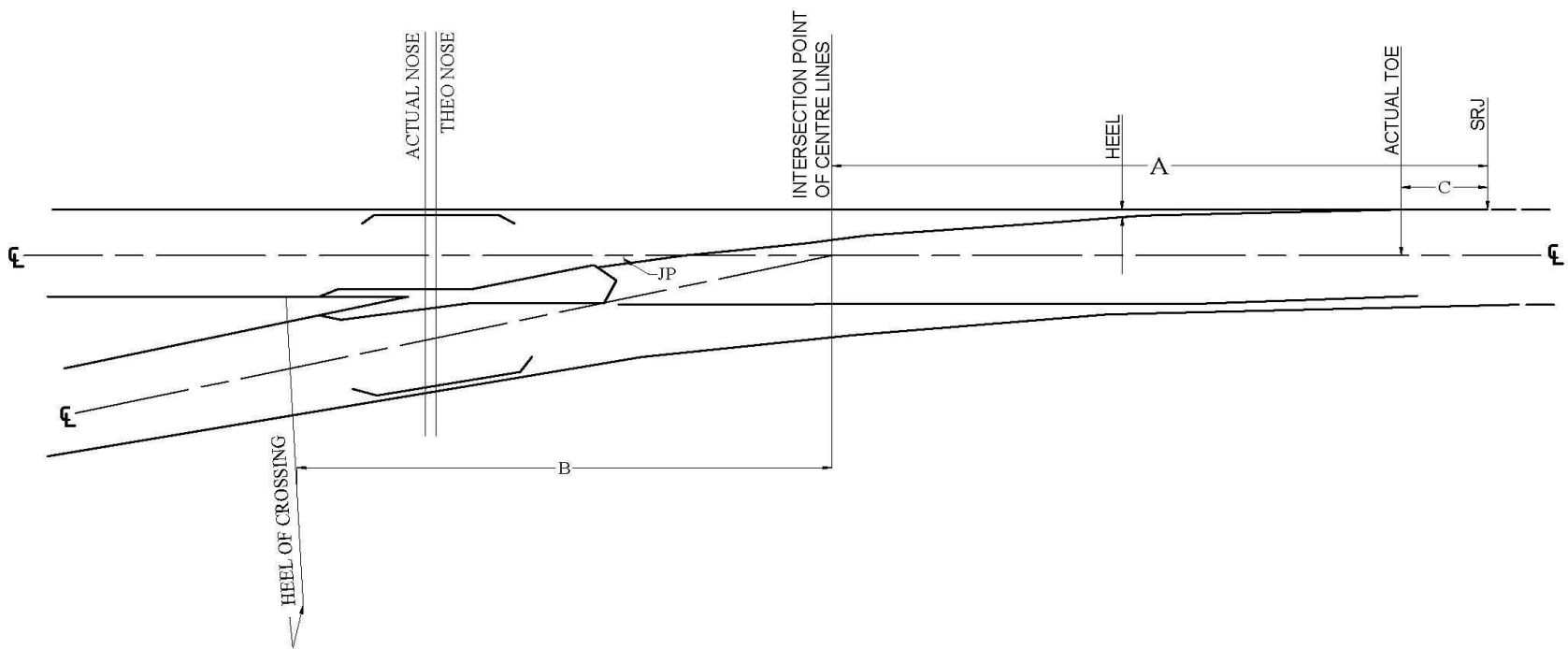
SHEET 2 OF 2

TSC 2

TSC 2

SHEET 2 OF 2

TABLE OF MAIN DIMENSION FOR SETTING OUT TURNOUT (B.G.)



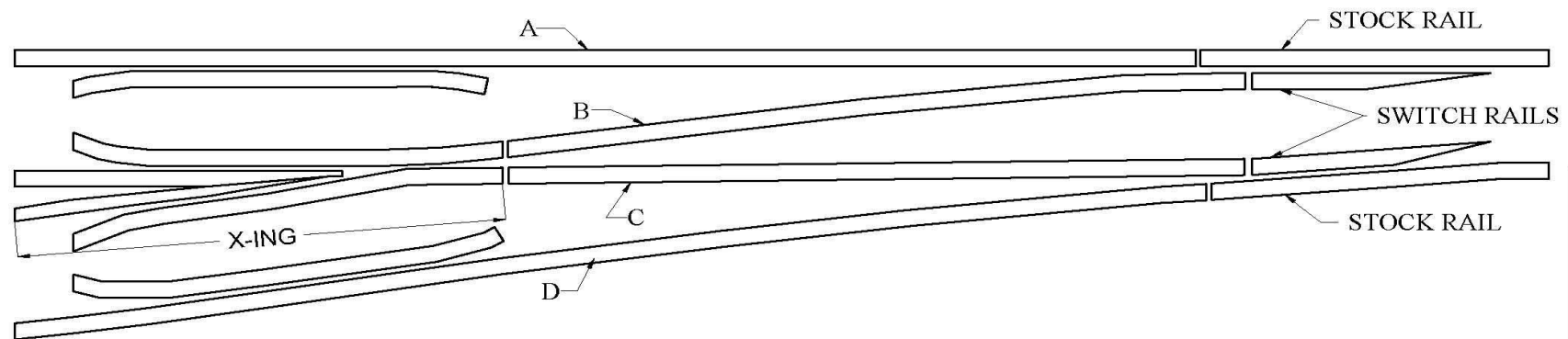
SHEET 1 OF 2

TSC 3

TABLE FOR MAIN DIMENSIONS							
GAUGE	CROSSONG NUMBER	RAIL SECTION	ASSEMBLY DRAWING NUMBER	DIMENSIONS			TYPES OF OVERRIDING SWITCH
BG				A	B	C	
	1IN 8 ½	UIC60KG	RDSO/T-4865	12025	19786	1500	CURVED FIXED HEEL
	1IN 12	UIC60KG	RDSO/T-4218	16989	28412	1144	CURVED FIXED HEEL
	1 IN 16	UIC60KG	RDSO/T-5691	20970	39558	844	CURVED FIXED HEEL
	1 IN 20	UIC60KG	RDSO/T-5858	25850	47181	844	CURVED FIXED HEEL

TSC 3
SHEET 2 OF 2

RAIL LENGTHS OF TURNOUTS (DIAGRAM OF L.H. TURNOUT)



NOTE:-
RAILS FOR R.H. TURNOUTS SAME AS FOR L.H. DIMENSION MARKED THUS ____ W
ARE WELDED RAILS WITH MATCHED JOINTS ON EITHER SIDES.

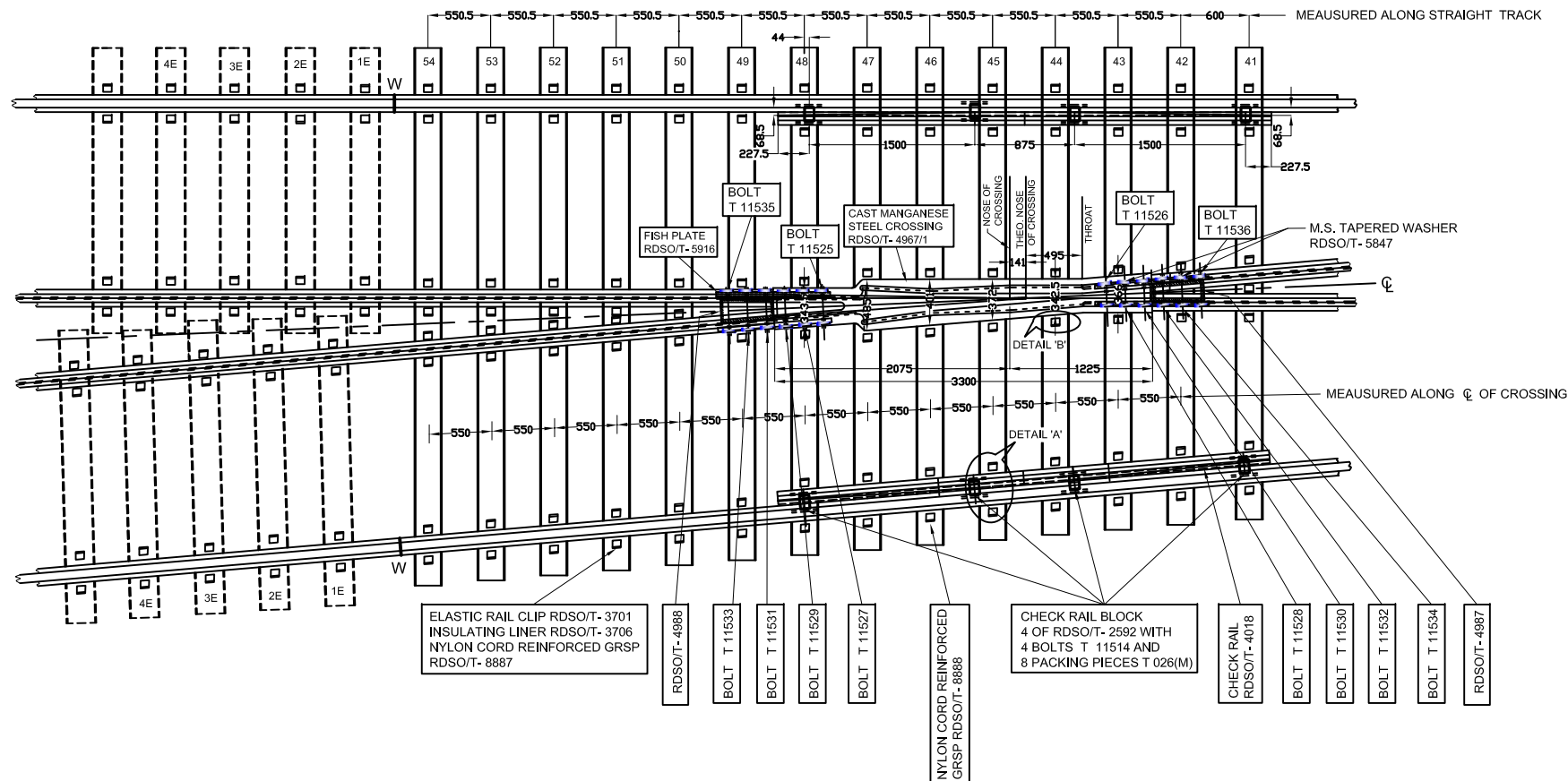
SHEET 1 OF 2

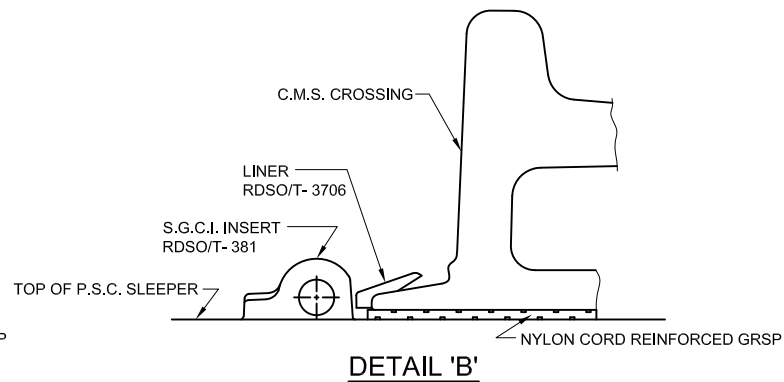
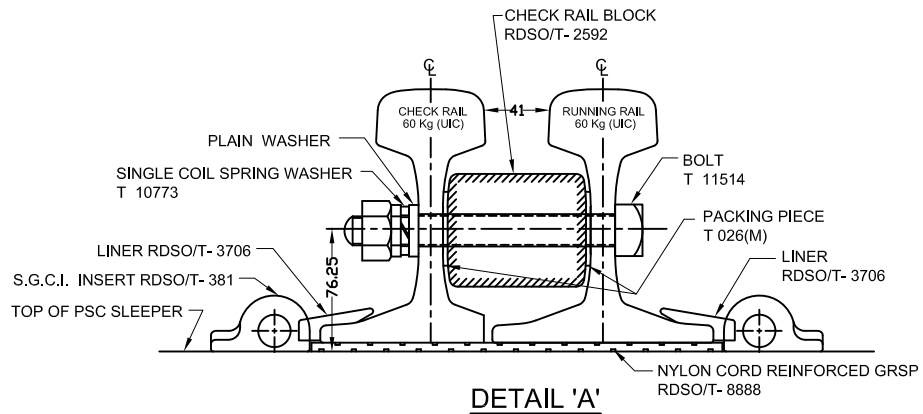
TSC4

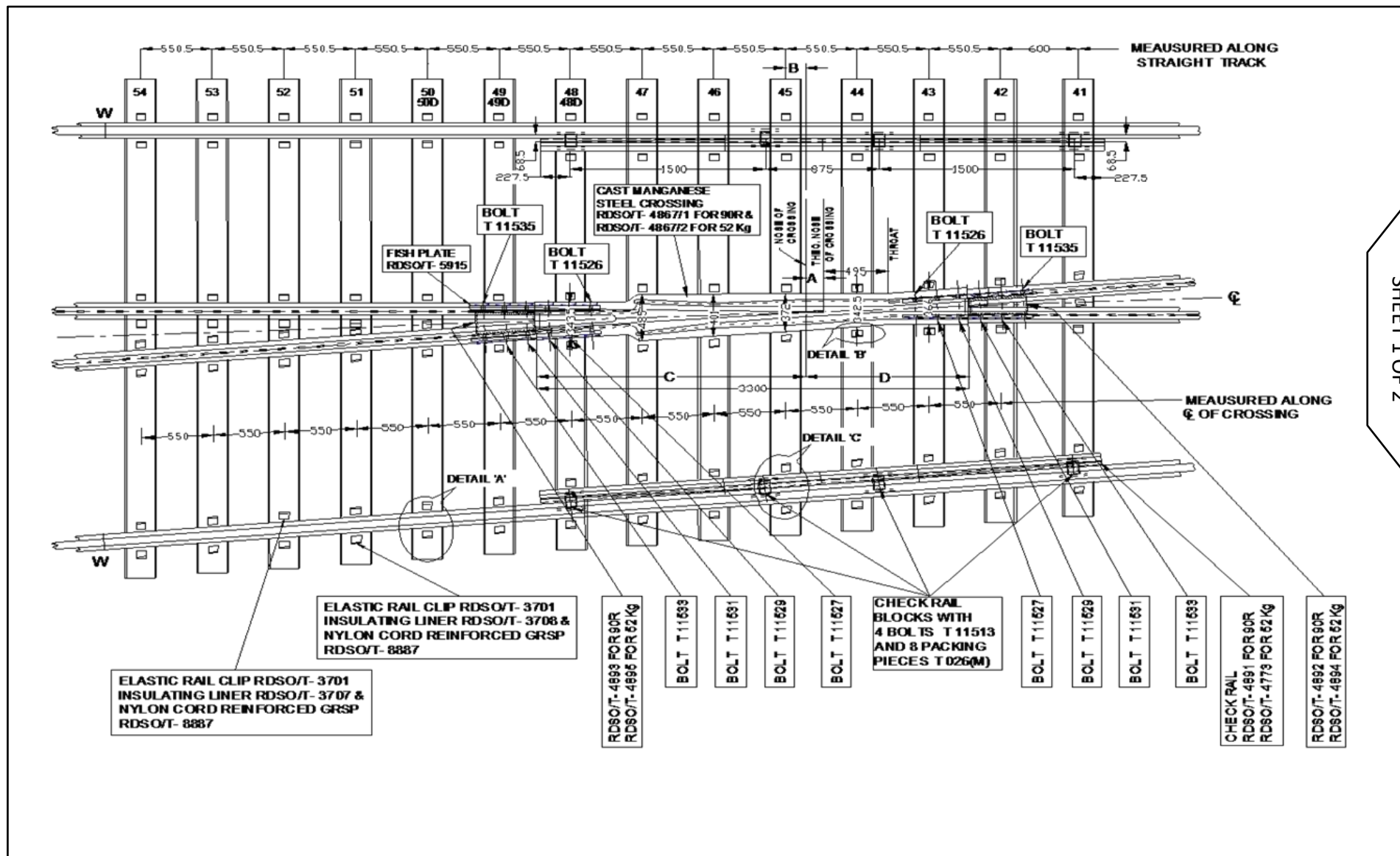
TABLE OF LEAD RAIL

RAIL SECTION	GAUGE	CROSSING NUMBER	DRAWING NUMBER	TYPES OF SLEEPER	TYPES OF SWITCH	OVERALL RAIL LENGTH			LENGTHS (mm)			
						X-ING	STOCK	SWITCH	A	B	C	D
UIC 60KG	BG	1 IN 8.5	RDSO/T-4865	PSC	CURVED FIXED HEEL	3300	12800	11900	19113	11855	11813	18966
			RDSO/T-6279	PSC	THICK WEB CURVED SWITCH	3300	12800	7620	19113	16135	16093	18966
UIC 60KG	BG	1IN12	RDSO/T-4218	PSC	CURVED FIXED HEEL	4350	13000	12356	26975	22100	22052	26884
			RDSO/T-6154	PSC	THICK WEB CURVED SWITCH	4350	13000	12480	26975	21976	21928	26884
UIC 60KG	BG	1IN16	RDSO/T-5691	PSC	CURVED FIXED HEEL	5400	12700	12935	38882	32388	32349	38815
			RDSO/T-7075	PSC	THICK WEB CURVED SWITCH	5400	12700	12935	38882	32388	32349	38815
UIC 60KG	BG	1IN20	RDSO/T-5858	PSC	CURVED FIXED HEEL	6200	12870	13000	51054	43866	43837	51080

1 IN 8.5 CMS CROSSING B.G. (1673 mm) FOR 60 kg (UIC) DRAWING No. RDSO/T- 4967







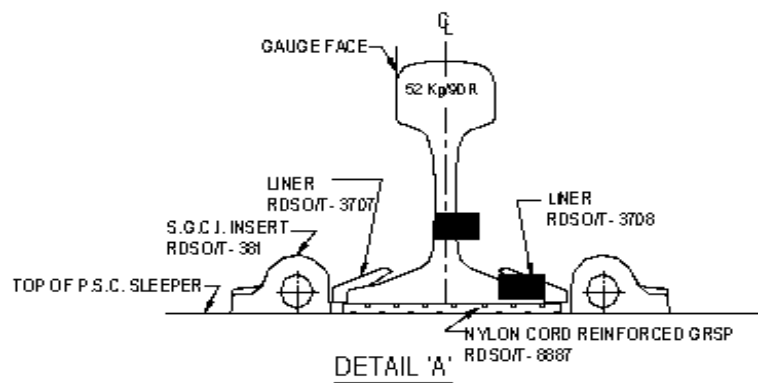
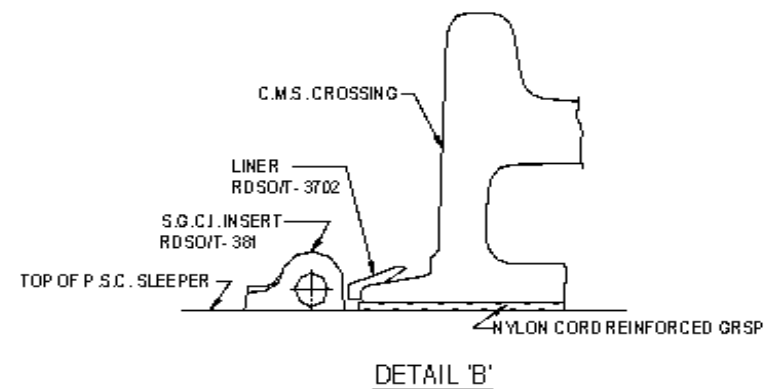
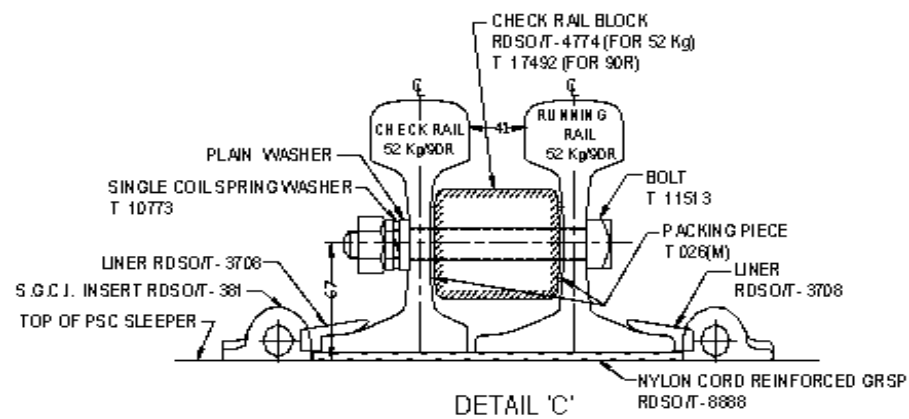
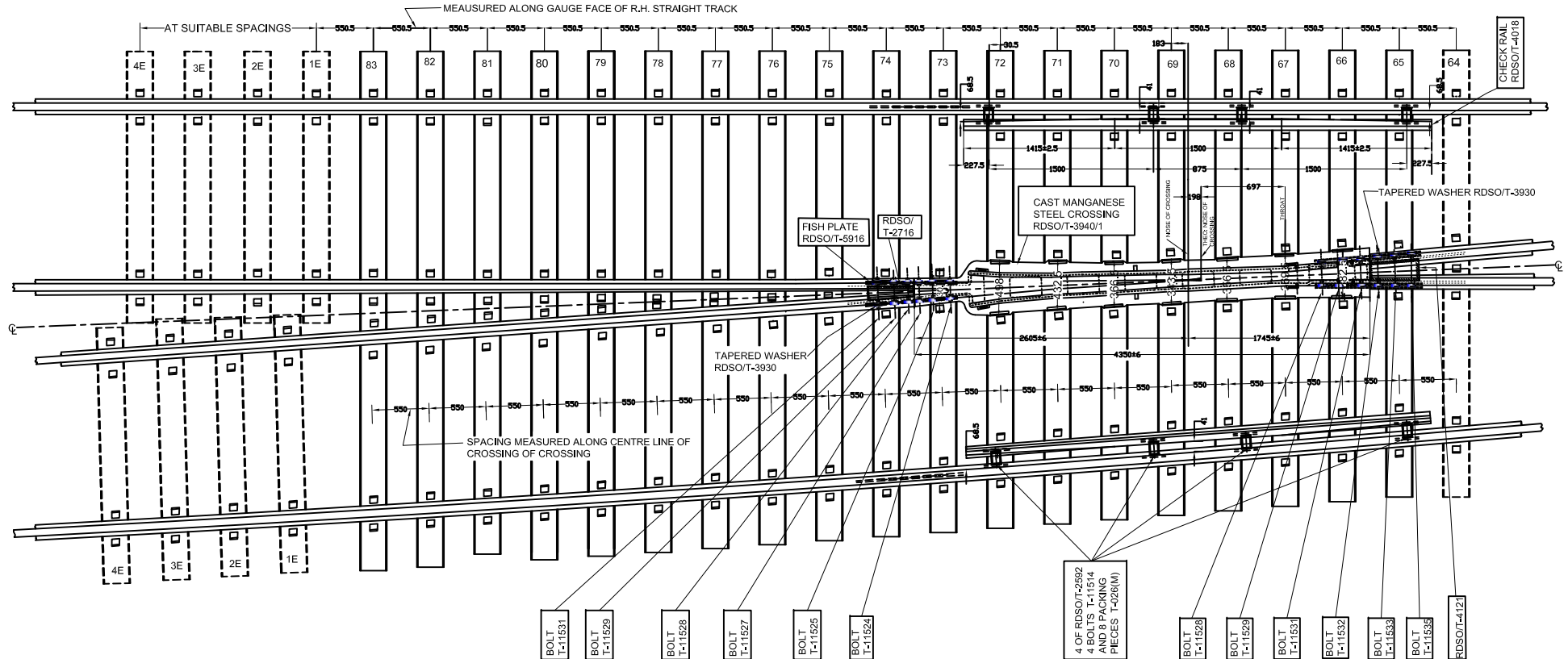


TABLE OF DIMENSIONS

RAIL SECTION	DIMENSIONS IN mm			
	A	B	C	D
52 Kg	132	160	2084	1216
90R	119	173	2097	1203

1 IN 12 CMS CROSSING B.G. (1673 mm) FOR 60 kg (UIC) DRAWING No. RDSO/T- 4220

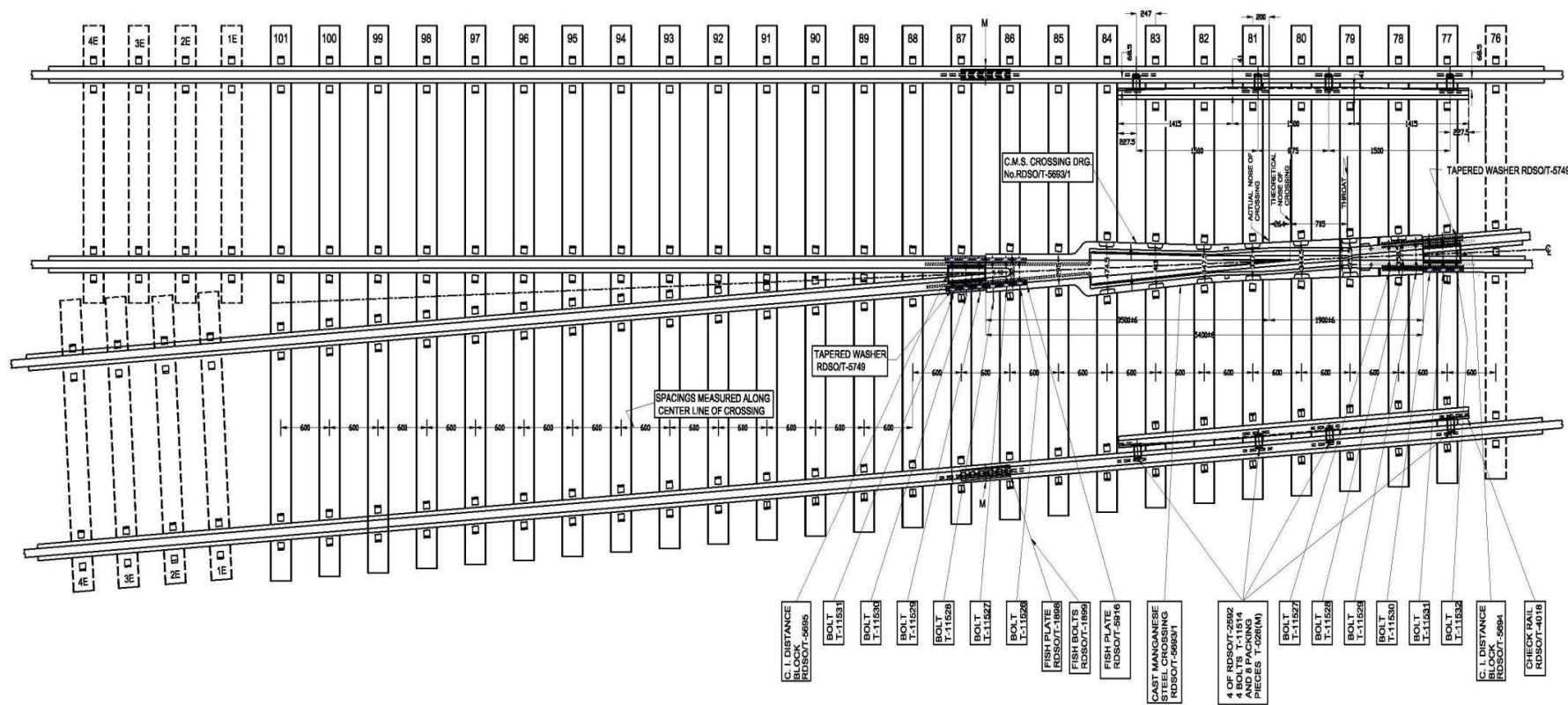


TSC 7
SHEET 1 OF 2

TSC7
SHEET 2 OF 2



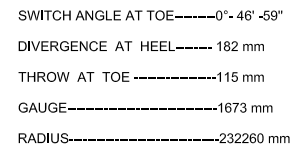
1 in 16 CMS CROSSING B.G.(1673mm) FOR 60 Kg (UIC) DRAWING NO.RDSO/T-5693



TSC 8

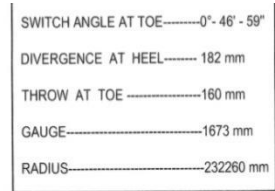
TSC 10
SHEET 1 OF 2

TSC 10
SHEET 2 OF 2



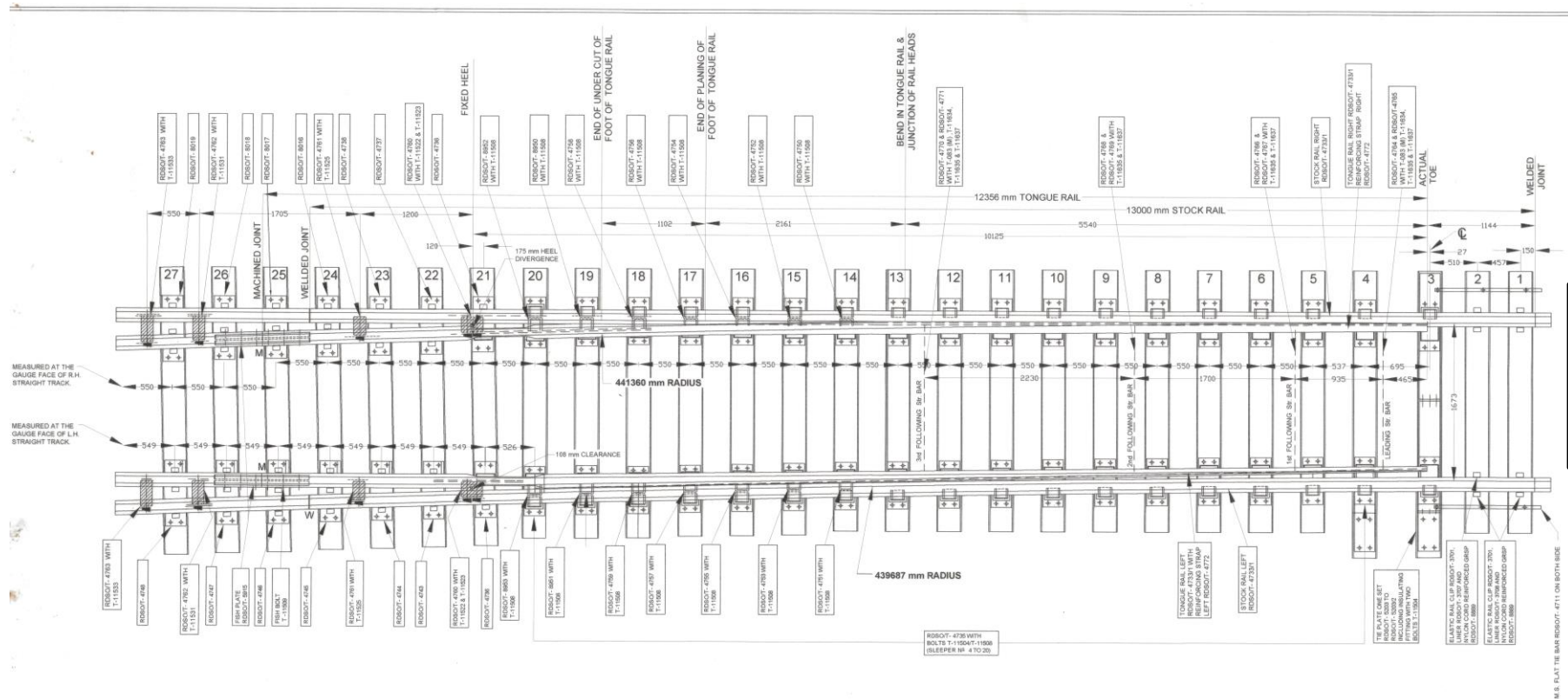
RAIL SECTION	DIMENSIONS IN mm						
	A	B	C	D	E	F	G
52 Kg	3023	3377	2237	1503	1175	1133	1069

(FOR 1 IN 8 ½ TURNOUT)



TSC 11

**OVER-RIDING CURVED SWITCH B.G.(1673mm) FOR 52 Kg UIC ON PSC SLEEPER DRAWING NO.RDSO/T-4733
(FOR 1 IN 12 TURNOUT)**



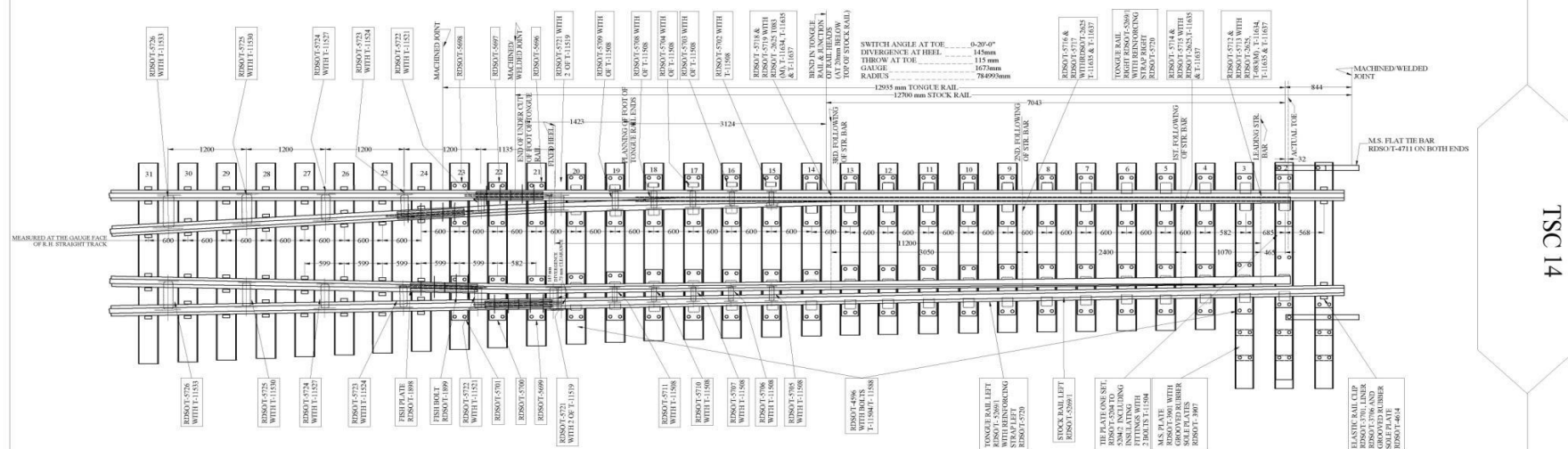
TSC 12
SHEET 2 OF 2

TSC 13

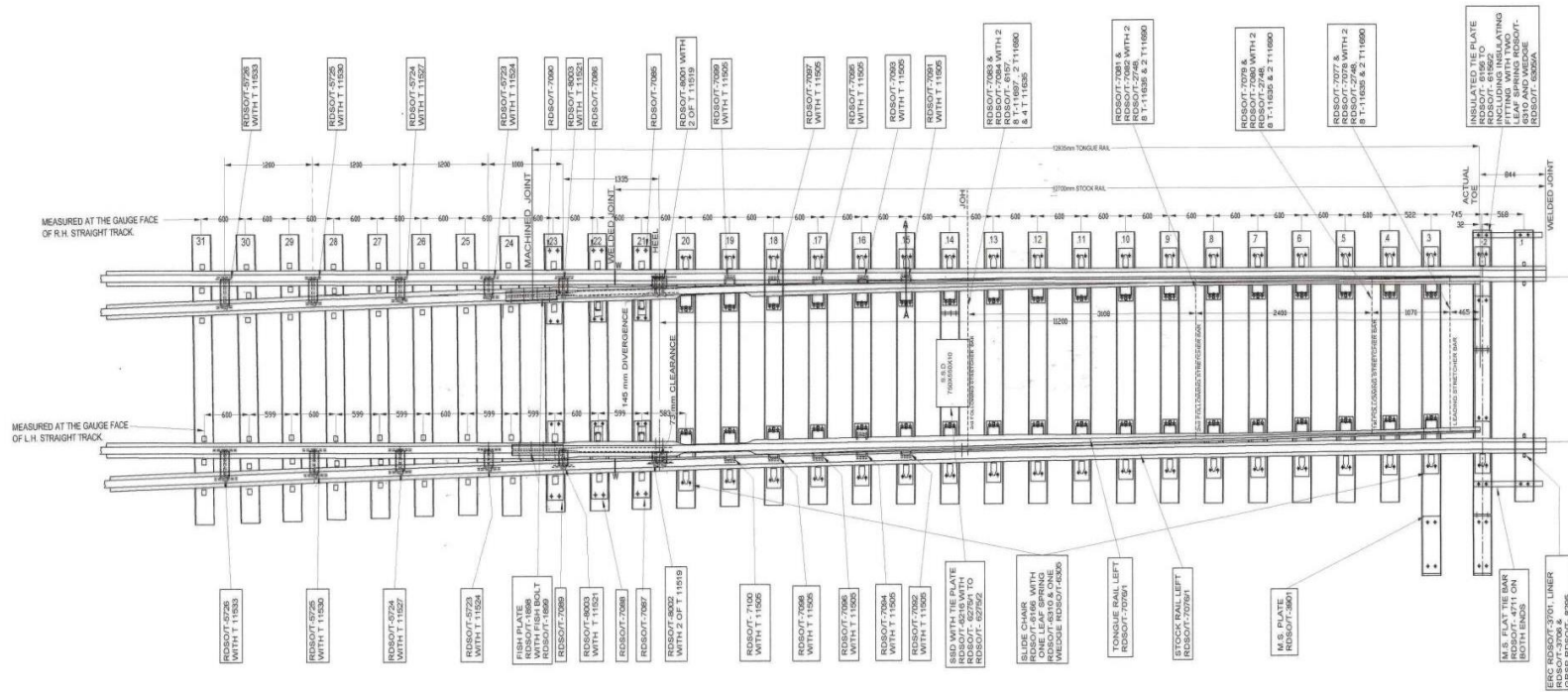
RADIUS-----441360 mm



(FOR 1 IN 16 TURNOUT)



SWITCH ANGLE AT TOE	0°-20°-0°
DIVERGENCE AT HEEL	145 mm
THROW AT TOE	160 mm
GAUGE	1673 mm
RADIUS	784993 mm

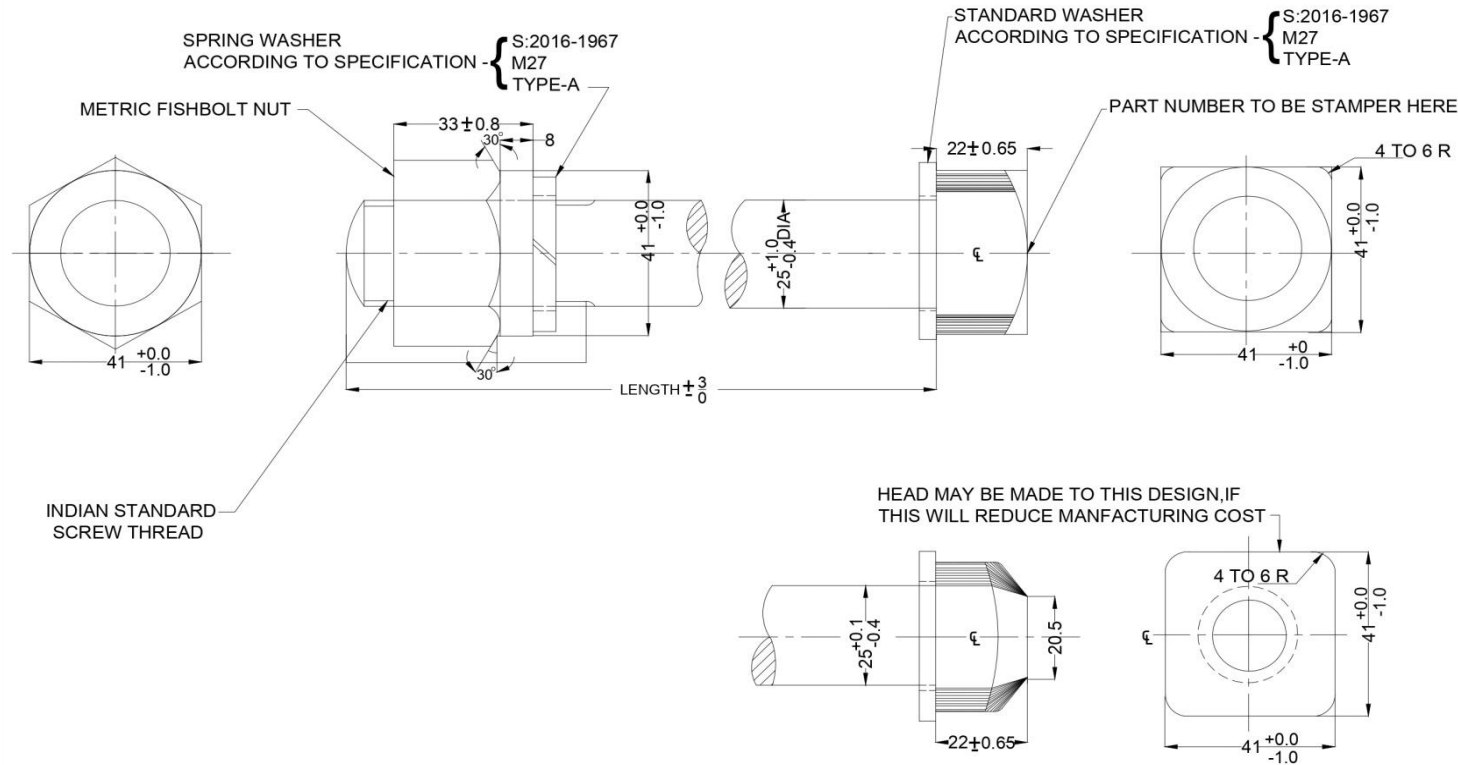


148

TSC 16



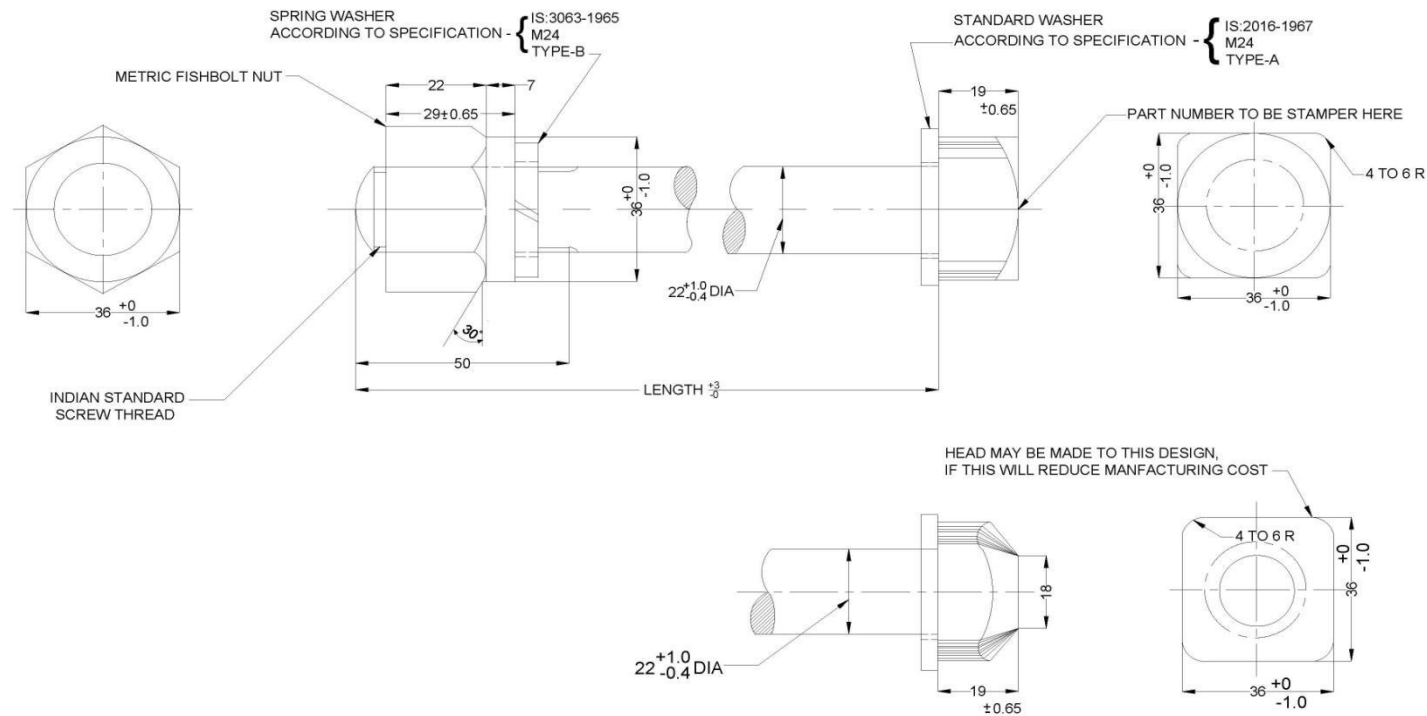
25mm DIA : BOLTS FOR POINTS & CROSSINGS



PART NUMBER	LENGTH
T11504	90
T11505	100
T11506	110
T11507	120
T11508	130
T11509	140
T11510	150
T11511	160
T11512	170
T11513	180
T11514	190
T11515	200
T11516	210
T11517	220
T11518	230
T11519	240
T11520	250
T11521	260
T11522	270
T11523	280
T11524	290
T11525	300
T11526	310
T11527	320
T11528	330
T11529	340
T11530	350
T11531	360
T11532	370
T11533	380
T11534	390
T11535	400
T11536	410
T11537	420
T11538	430
T11539	440
T11540	450
T11541	460
T11542	470
T11543	480
T11544	490
T11545	500
T11546	510
T11547	520
T11548	530
T11549	540

2. LATEST ALTERATION NUMBER SHALL BE CHECKED BEFORE PLACING ORDER.
1. ALL DIMENSIONS ARE IN MILLIMETERS.

22mm DIA : BOLTS FOR POINTS & CROSSINGS

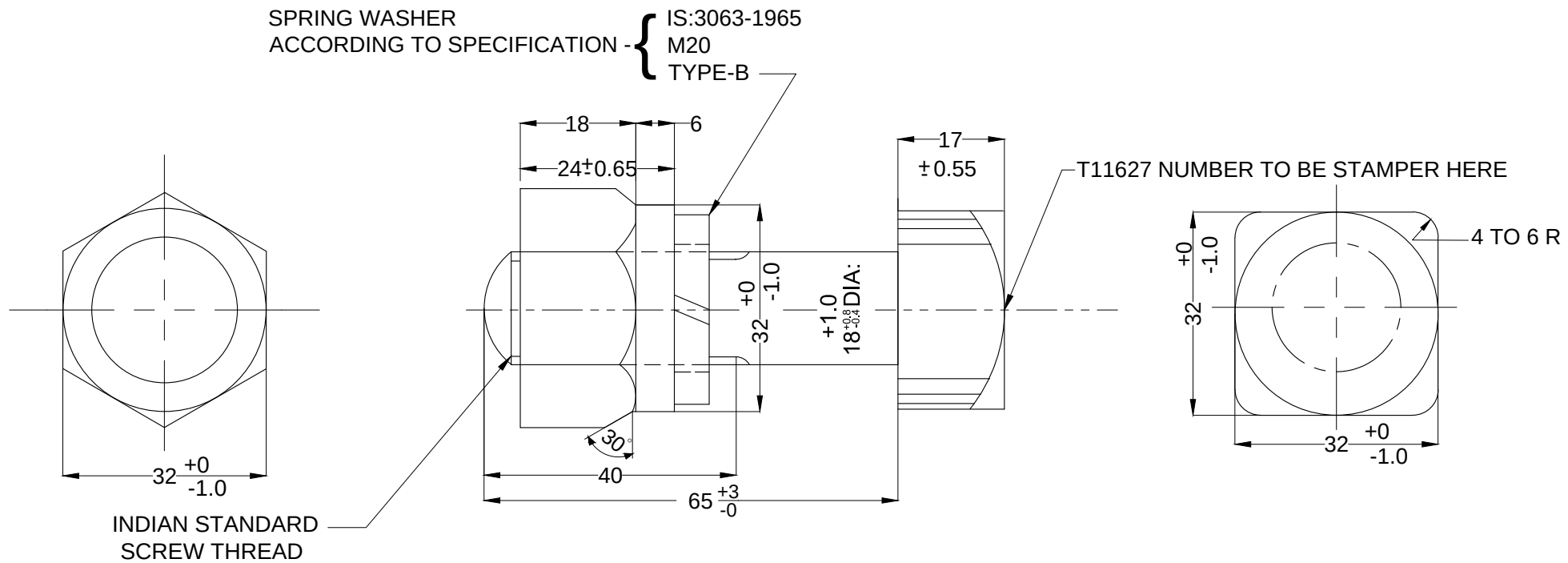


PART NUMBER	LENGTH
T11550	110
T11551	120
T11552	130
T11553	140
T11554	150
T11555	160
T11556	170
T11557	180
T11558	190
T11559	200
T11560	210
T11561	220
T11562	230
T11563	240
T11564	250
T11565	260
T11566	270
T11567	280
T11568	290
T11569	300
T11570	310
T11571	320
T11572	330
T11573	340
T11574	350
T11575	360
T11576	370
T11577	380
T11578	390
T11579	400
T11580	410
T11581	420
T11582	430
T11583	440
T11584	450
T11585	460
T11586	470

SHEET 2 OF 3

TSC 17

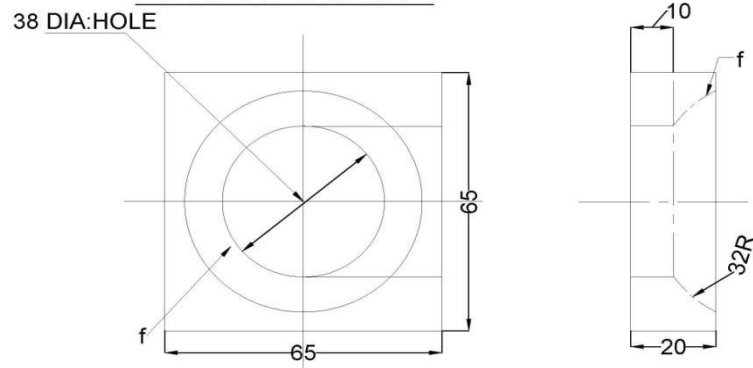
18 X 65 mm STOP BOLT RDSO/T-11627 FOR POINTS & CROSSINGS



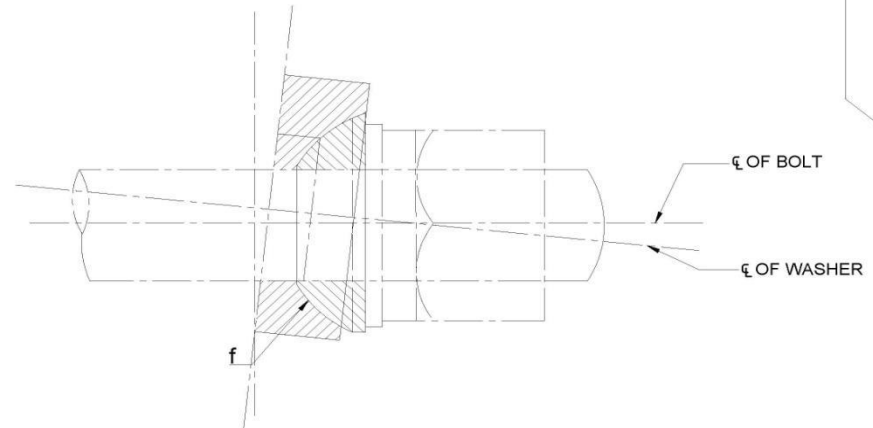
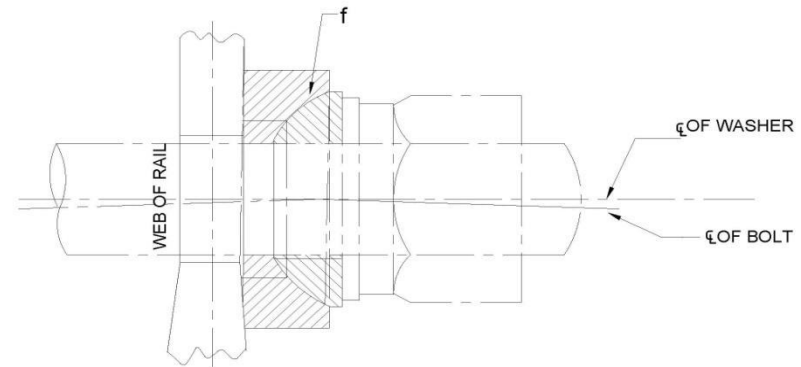
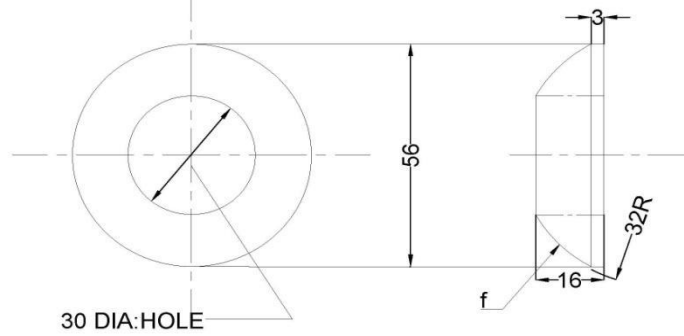
TSC 17
SHEET 3 OF 3

SPHERICAL WASHER RDSO /T -023(M)

LOWER WASHER

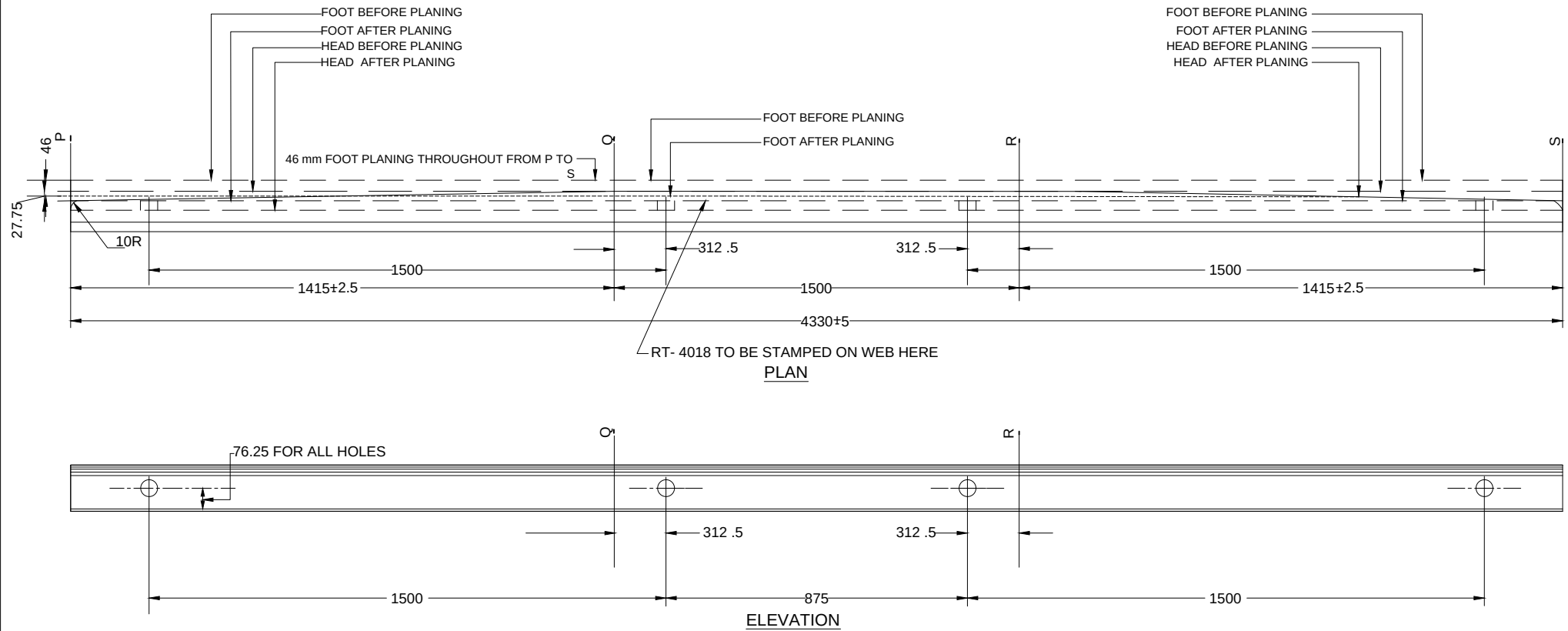


UPPER WASHER



TSC 18

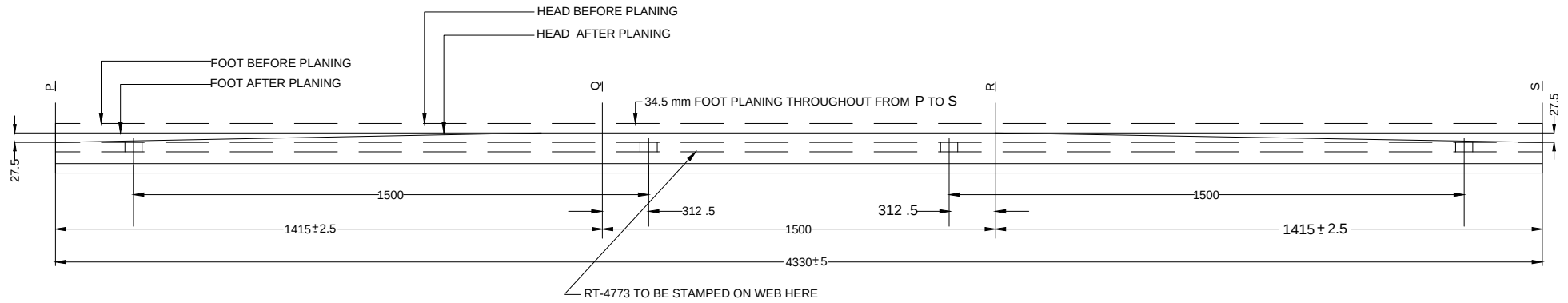
SPECIAL CHECK RAIL FOR 1 IN 12 60 Kg (UIC) B.G CROSSING ON PSC SLEEPER DRAWING NO. RDSO/T- 4018



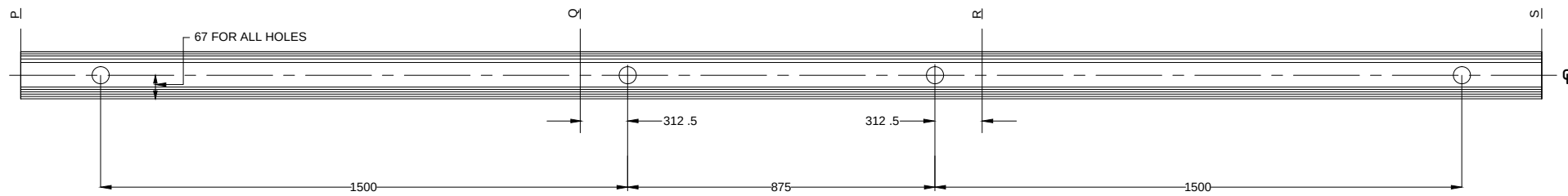
SHEET 1 OF 2

TSC 19

CHECK RAIL FOR 1 IN 8.5 ,1 IN 12 & 1 IN 16 CROSSING B.G FOR 52 KG ON PSC SLEEPER DRAWING NO. RDSO/T - 4773



PLAN

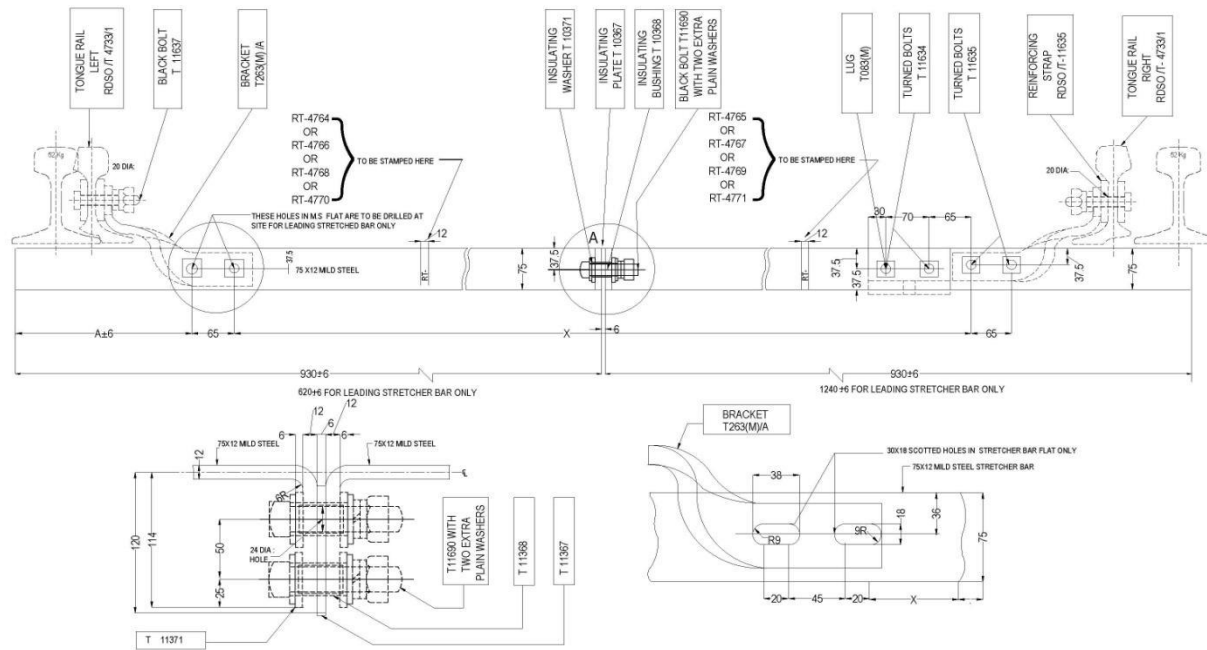


ELEVATION

TSC 20



INSULATED STRETCHER BAR FOR 1 IN 12 TURNOUT B.G 52 KG RDSO/T -4764 TO RDSO/T -4771



CDETAIL OF INSULATED JOINT AT (A)

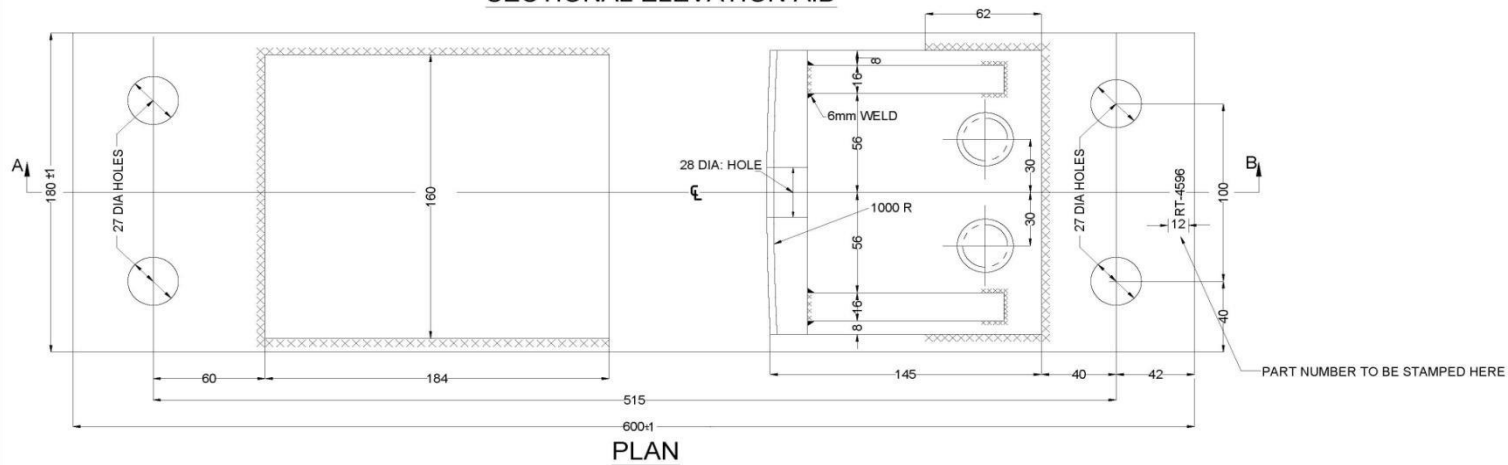
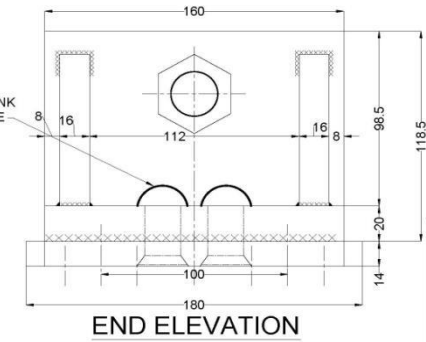
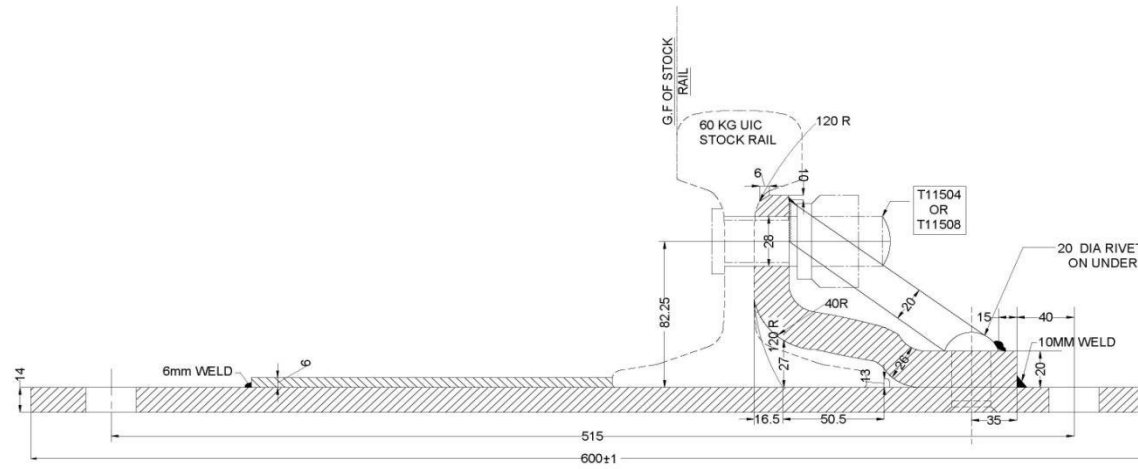
DETAIL AT (Z)
(FOR 3RD FOLLOWING STRETCHER ONLY)

TABLE OF DIMENSIONS

DRG: N 2	DIMENSIONS(mm)			REMARKS
	A	B	X	
RDSO/T-4764 & RDSO/T-4765	315	1530.5	1100.5	LEADING STRETCHER BAR
RDSO/T-4766 & RDSO/T-4767	307.5	1545	1115	1 ST FOLLOWING STRETCHER BAR
RDSO/T-4768 & RDSO/T-4769	297.0	1566	1136	2 ND FOLLOWING STRETCHER BAR
RDSO/T-4770 & RDSO/T-4771	290.50	1579	1149	3 RD FOLLOWING STRETCHER BAR (WITH SLOTTED HOLES)

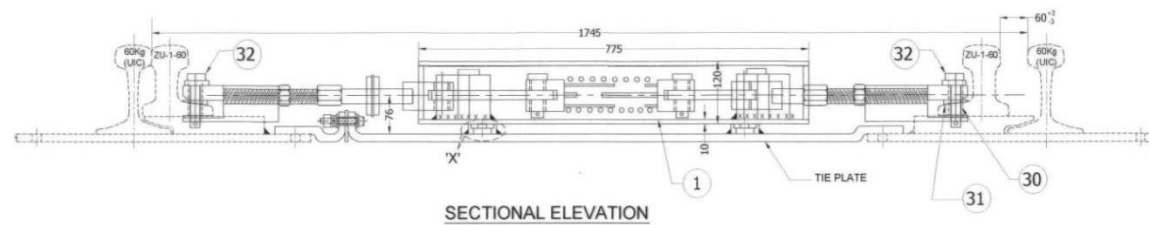
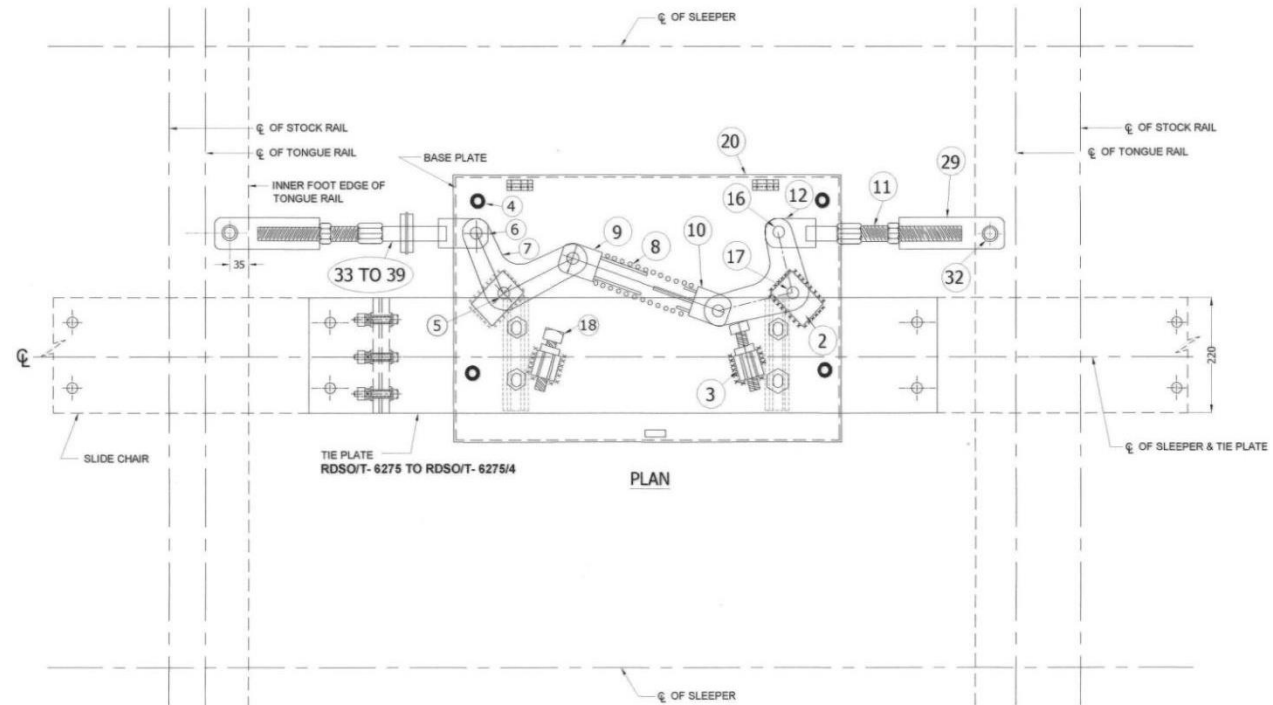
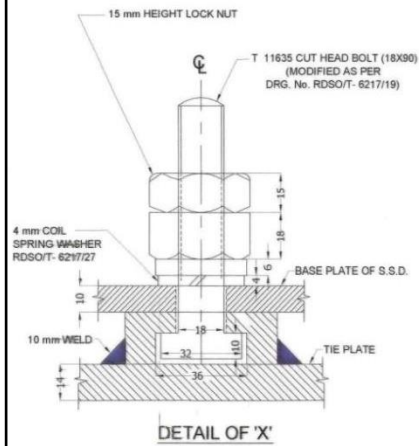
TSC 21

SLIDE CHAIR FOR I IN 12 TURNOUT (60 KG) RDSO/T-4596



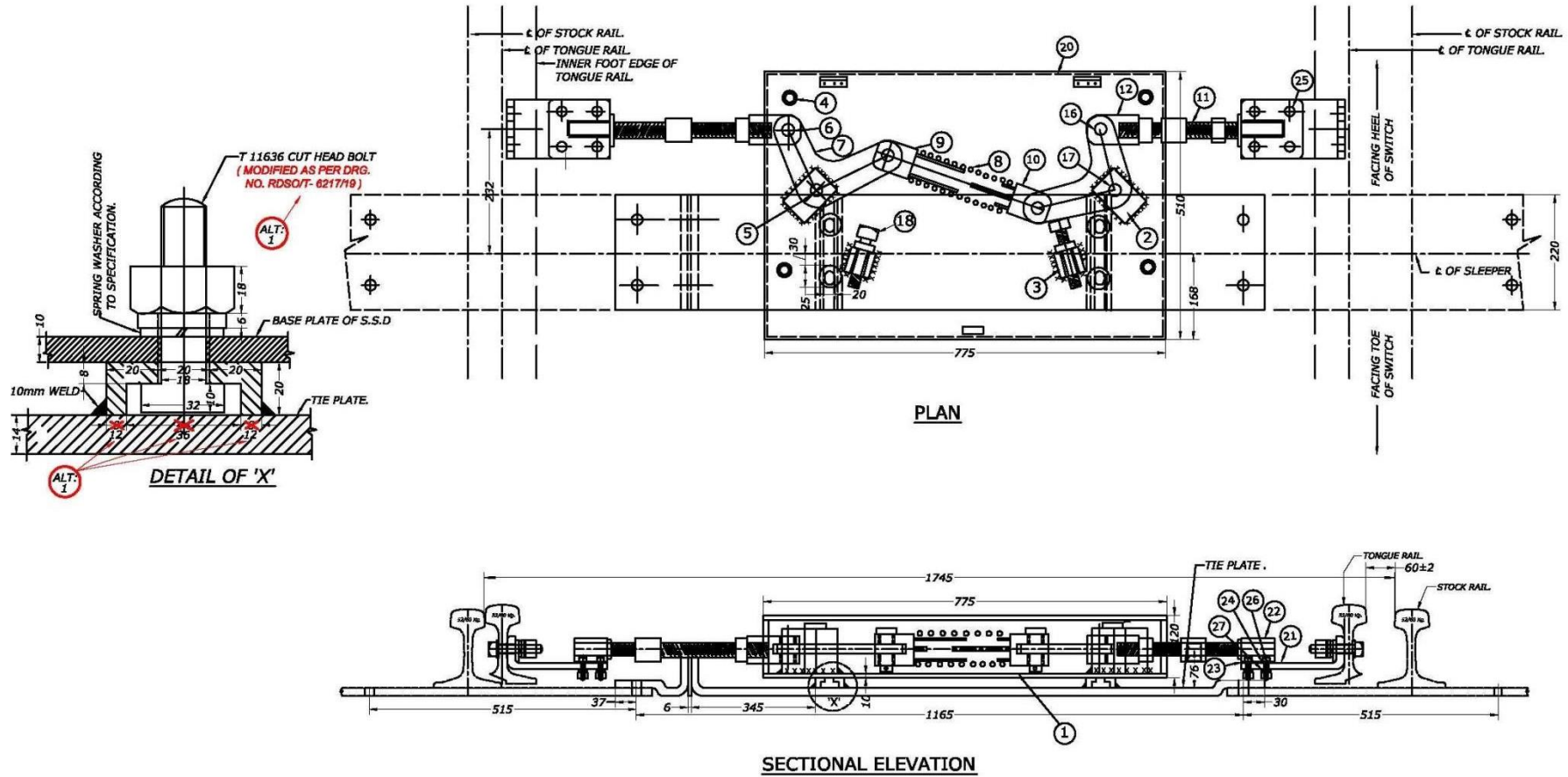
TSC 22

SPRING SETTING DEVICE FOR THICK WEB SWITCHES RDSO/T-6216



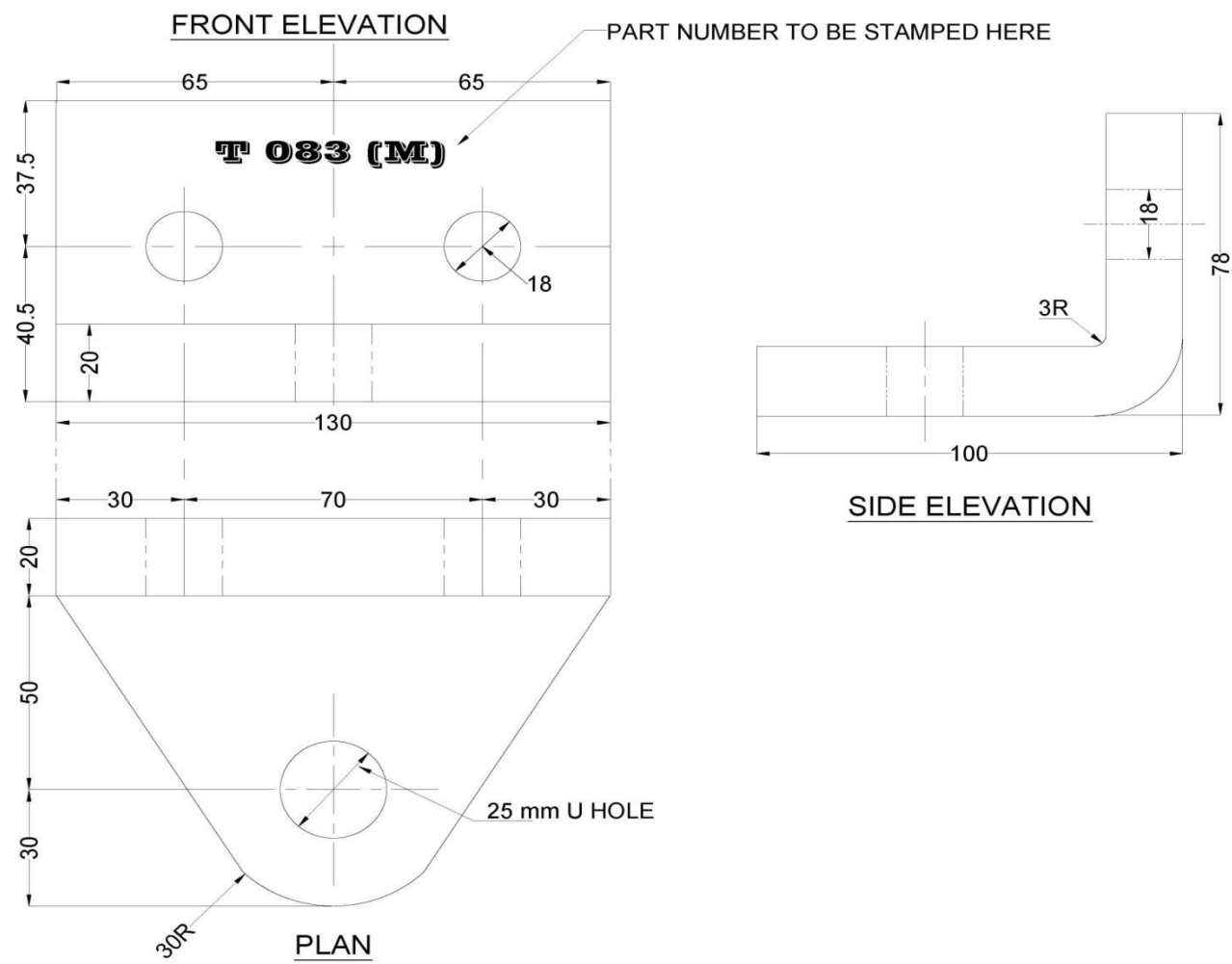
TSC 23
SHEET 1 OF 2

SPRING SETTING DEVICE(SSD) FOR O.R.CURVED SWITCHES B.G.(1673mm) FOR 60 Kg.(UIC)/52 Kg RDSO/T-6945



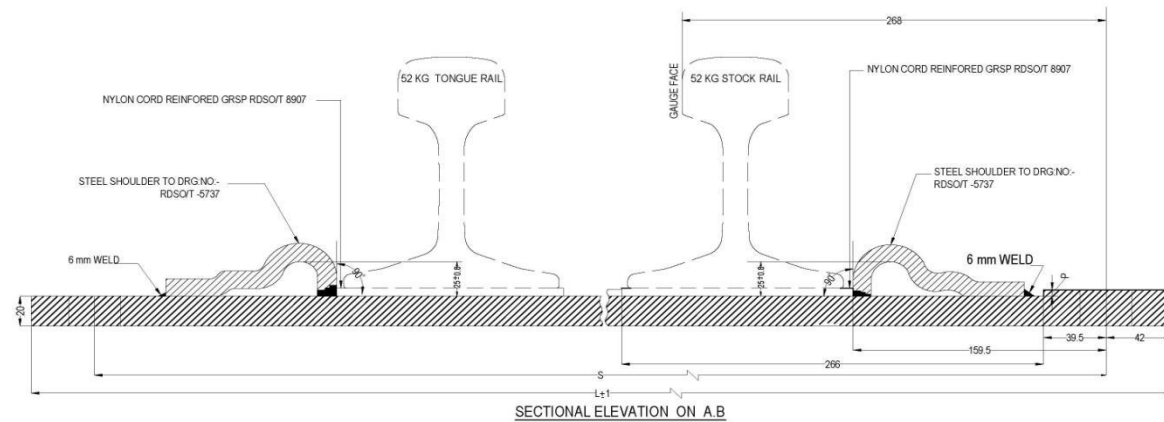
TSC 23
SHEET 2 OF 2

M.S LUG FOR LEADING STRTCHER BAR B.G.

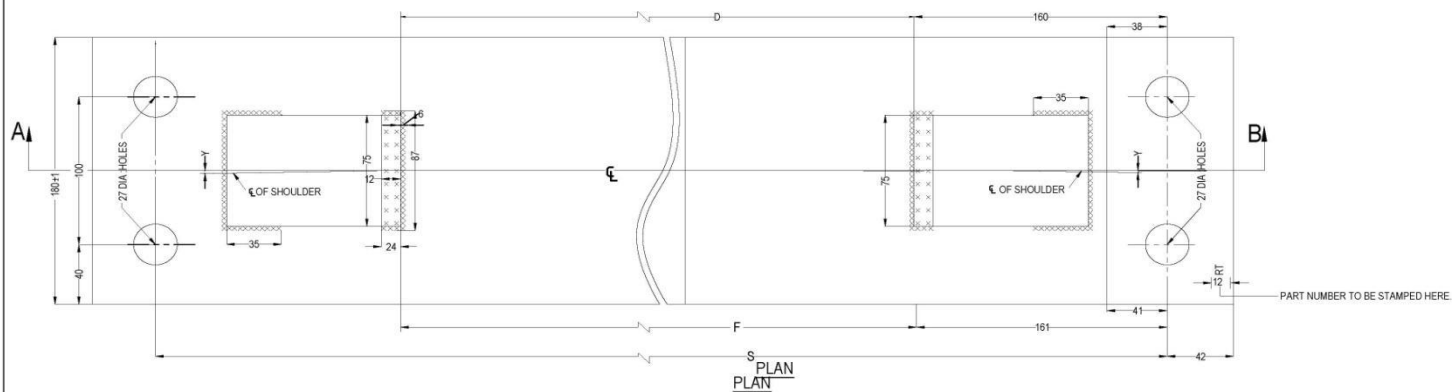


TSC 24

SPECIAL BEARING PLATE FOR 1 IN 12 TURUOUT FOR 52 KG RDSO T - 4737 TO RDSO/T - 4742

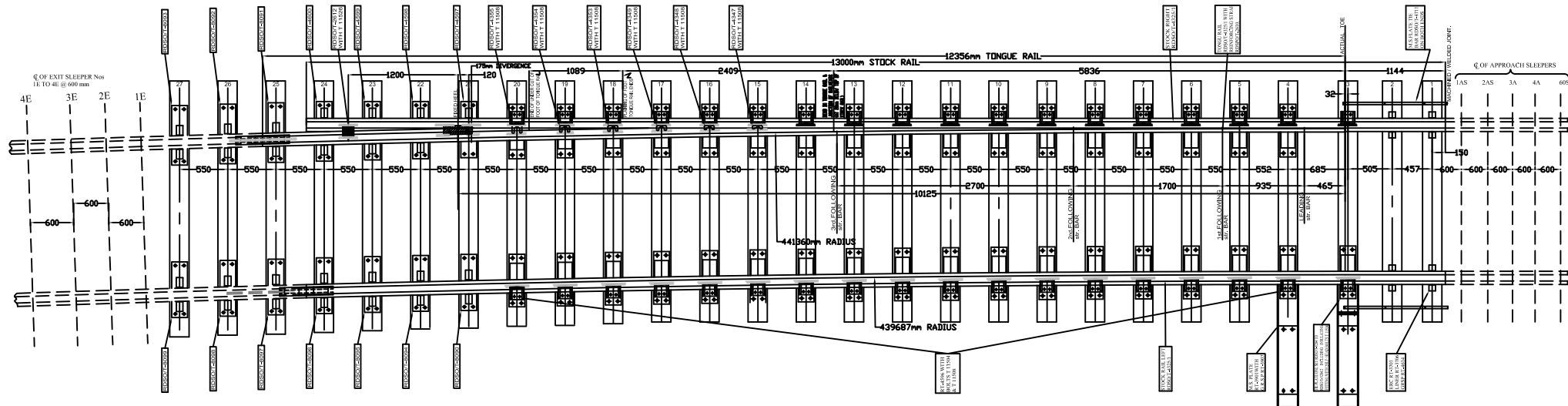


SLEEPER NO. :-	PART NO. :-	DIMENSIONS (MM)					
		S	D	F	P	Y	L
22	RDSO/T-4737	707	340.5	335	6	1.64	790
23	RDSO/T-4738	707	357	351.5	5	1.70	790
24	RDSO/T-4739	707	374.5	369	4	1.77	790
25	RDSO/T-4740	762	393	387	3	1.84	845
26	RDSO/T-4741	762	411.5	405.5	2	1.91	845
27	RDSO/T-4742	762	431	424.5	1	1.98	845

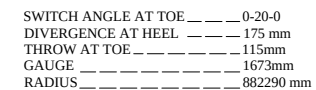


TSC 25

TSC 26



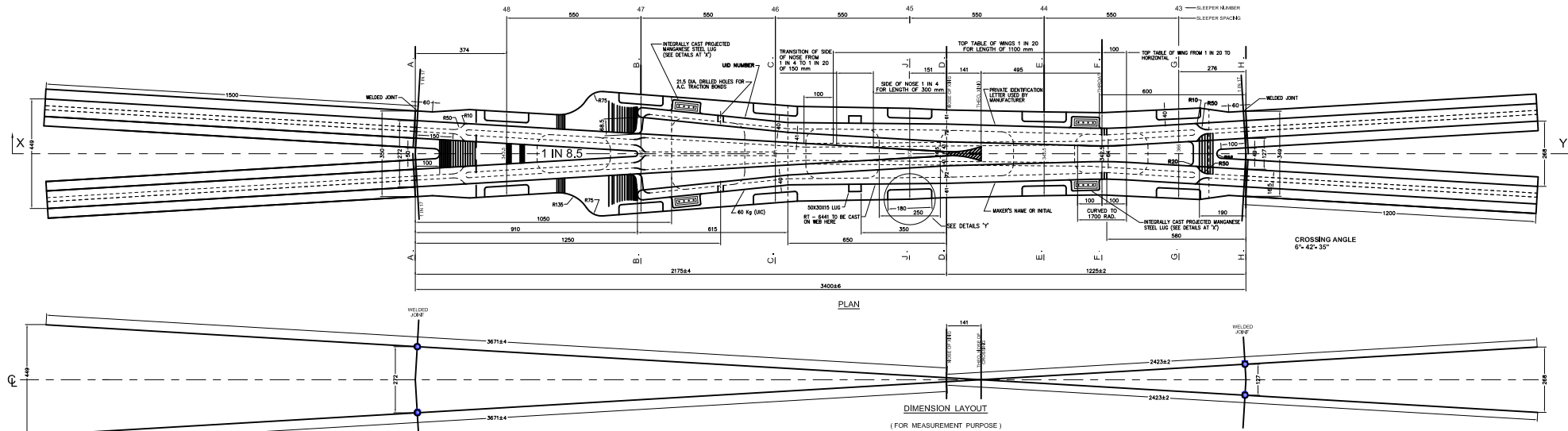
RDSO/T-5554



SHEET 1 OF 1

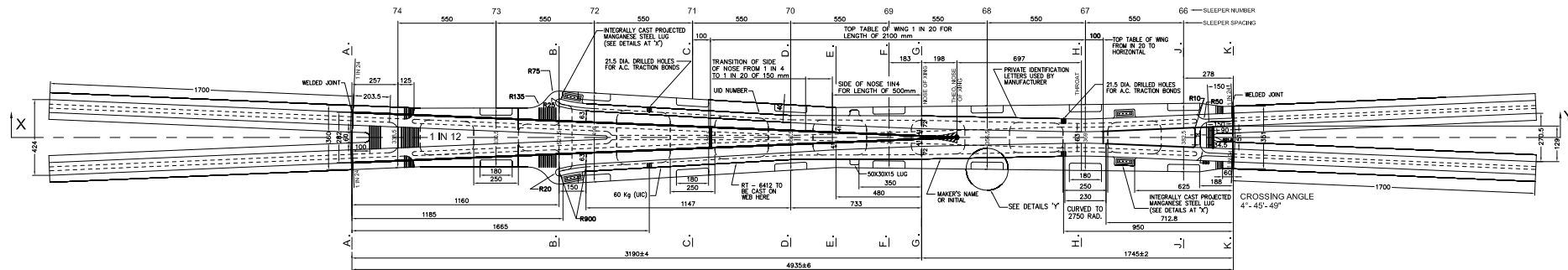
TSC 27

1 IN 8.5 WELDABLE CMS CROSSING B.G. FOR 60 kg (UIC)/60E1 ON PSC SLEEPERS RDSO/T- 6441

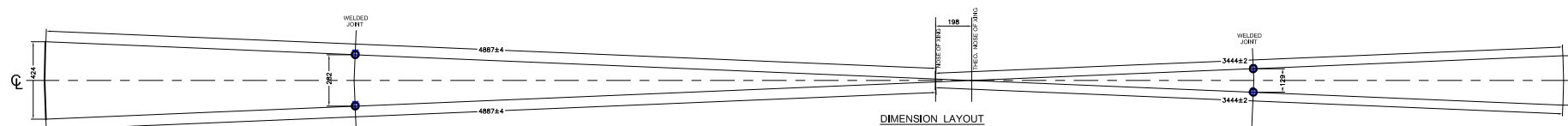


TSC 28

1 IN 12 WELDABLE CMS CROSSING B.G. FOR 60 kg (UIC)/60E1 ON PSC SLEEPERS RDSO/T- 6412



PLAN



DIMENSION LAYOUT

(FOR MEASUREMENT PURPOSE)

TSC 29

CHAPTER VI
DIAMONDS AND SLIPS

S.N.	Description	Pages	Page No
1.	Brief note	DSa - DSe	169
2.	Table of assemblies, sub- assemblies and their parts	DS1	174
3.	Definitions of diamonds and slips	DS2	177
4.	Main dimensions of diamonds and slips	DS3	179
5.	Main dimensions of movable switch diamonds and slips	DS3	180
6.	Rail lengths for diamonds & slips	DS4	183
7.	1 in 8.5, 60 kg obtuse Xing for with & without slip	DS5 (SHEET 1)	186
8.	1 in 8.5, 60 kg Acute Xing for with & without slip	DS5 (SHEET 2 & 3)	187
9.	1 in 8.5, 52 kg obtuse Xing for with & without slip	DS5 (SHEET 4)	189
10.	1 in 8.5, 52 kg Acute Xing for with & without slip	DS5 (SHEET 5 & 6)	190
11.	1 in 10, 60 kg obtuse Xing for with slip	DS5 (SHEET 7)	192
12.	1 in 10, 60 kg Acute Xing for with slip	DS5 (SHEET 8)	193
13.	Intermediate portion for 1 in 8.5, 60 kg diamond crossing with & without slip for B.G.	DS6 (SHEET 1-3)	194
14.	Intermediate portion for 1 in 8.5, 52 kg diamond crossing with & without slip for B.G.	DS6 (SHEET 4-6)	197
15.	Intermediate portion for 1 in 10, 60 kg diamond crossing with Single & double slip for B.G.	DS6 (SHEET 7-8)	200
16.	Position of spherical washers in fixed type heel switches for diamonds with slips	DS7	202
17.	Insulated Tie plate for diamond with & without slip	DS8 (SHEET 1 & 2)	203
18.	Insulated stretcher bar (Leading, 1 st following & 2 nd following)	DS9 (SHEET 1 & 2)	205
19.	Check Rail for 1 in 8.5, 60 kg diamond xing with & without slip	DS10 (SHEET 1)	207

20.	Check rails for 1 in 8.5, 52 kg diamond xing with & without slip	DS10 (SHEET 2)	208
21.	Special Slide chairs	DS11 (SHEET 1 & 2)	209
22.	Special flat bearing plate	DS12 (SHEET 1 & 2)	211

Brief notes on Diamonds and Slips

General Definitions: When one track crosses another at an angle, a diamond is formed comprising of two acute and two obtuse crossings, page DS2 shows the layout of a diamond crossing.

When two tracks cross one another at right angles, a square crossing is required. Square crossings are to be avoided since the gaps in the running rails for wheel flanges being opposite to each other, cause severe jolting to vehicles resulting in rapid wear of the crossings and damage to rolling stock on account of the heavy impact.

When the angle of intersection is very acute for a diamond crossing, the possibility of a derailment becomes greater because the noses of the two obtuse crossings are nearly opposite each other and the excessive gap at the elbows causes a perceptible “drop” of the wheels running over the diamond. On the Indian Railways it has, therefore, been laid down that diamond crossings should not normally be flatter or less acute than 1 in 8 ½.

When a vehicle passes over a diamond crossing there is an inherent risk of a derailment owing to large gap at the elbow of the obtuse crossing and due to the possibility of a wheel, particularly of a small diameter, being deflected to the wrong side of the nose. A method of eliminating this risk, it is to make the point rails of the obtuse crossing move in the same way as the tongue rails of switches, these point rails being suitably joined together by stretcher bars. Such an arrangement is known as a movable switch diamond and is shown in page DS2 (Sheet 2 of 2). The main dimensions are indicated in page DS3 (Sheet 2&3). In this case, the gaps in the obtuse crossing are avoided and a continuous surface is provided for the movement of the wheel along the switch and the elbow rails.

Apart from the hazard of derailments, the location of fixed diamonds on a straight on the main line causes rough running at high speeds and consequent wear of track and rolling stock.

The substitute of fixed diamonds by movable switch diamonds at such locations would contribute to smooth running at high speeds. With switch diamonds, it should also be possible to permit the use of diamonds flatter than 1 in 8 ½.

If tracks are to be so arranged that a train on one track may normally cross another track but when required, it may also be diverted to that track, an arrangement known as a diamond crossing with slips is installed. This is made possible by the inclusion of two or four pairs of switches with the connecting lead rails. When such diversion is permitted in one way, the arrangement is known as single slips and if it is permitted in both ways, the arrangement is known as double slips. Page DS2 (Sheet 1 of 2) also shows the layout of diamond crossing with single and a diamond crossing with double slips.

The standard method adopted in denoting the angle of an ordinary crossing in IRS design is also followed in the case of diamond crossings.

The various terms defined in Chapter V of this Manual apply equally to the acute crossings of a diamond crossing and switches of a slip. The same definitions generally apply also to the obtuse crossings but with the following slight modifications:

Theoretical nose of obtuse crossing is the theoretical point of intersection of the gauge lines of a crossing which is used as a reference point for all calculations. The actual nose of the crossing is the tip of the point rail at which the thickness is adequate from considerations of manufacture and strength.

Throat of obtuse crossing is the point at which the converging elbow rail and the check rail of an obtuse crossing are closest.

Main Dimensions of Diamonds and Slips:

The main dimensions of diamonds and slips are:

Gauge	(G)
Crossing angle	(Z)
Distance between actual noses of point rails of an obtuse crossing	(X)
Distance between theoretical noses of the acute and obtuse crossings	(A)
Distance between actual noses of the acute and obtuse crossings	(B)
Distance between actual and theoretical toes of switches in slips	(C)
Distance between the theoretical nose of acute crossings and theoretical toe of the nearest pair of switches in slips	(D)
Angle of switch in slips	(Y)
Length of switch in slips	(H)
Radius of slips (outer rail)	(M)
Radius of slips (Inner rail)	(N)
Distance between actual noses of the two acute crossings	(P)

These dimensions are given in pages DS3 (Sheet 1 & 2) for diamonds and slips and DS3 (Sheet 3 & 4) for movable switch diamonds and slips.

Rail Lengths for Diamonds and Slips:

The length of rails connecting the acute and obtuse crossings of diamonds and switches in slips are given in pages DS4.

Obtuse Crossings B.G.:

Pages DS5 contain information pertaining to dimension of obtuse crossing The salient features of the design of IRS obtuse crossings are:

- (a) The thickness of the actual nose of crossing is generally kept equal to the thickness of the web of the rail section.
- (b) If the path of a wheel tyre is traced across the flange way gap of an obtuse crossing, it will be seen that the contact area on the elbow rail, which is the running rail, progressively narrows and the increasing concentration of load has a tendency to cause heavy wear on the elbow rails opposite the nose. The latter also receives heavy impacts from the wheels and is quickly battered down. There is a tendency for the passing wheel to "drop in" leaving the elbow and riding on to the nose due to the 1 in 20 coning of the tyre. To counteract these tendencies, the point rails of an obtuse crossing are planed down by 6 mm at the nose and this planning is run out in a distance of 90 mm.

Spherical Washers in Fixed Heel: In certain cases viz: for 52kg and UIC 60 kg rail sections, there is an infringement in fixing spherical washers due to the fins of fish plates. The spherical washers in such cases should be machined and used with packing pieces.

The spherical washers required to be provided in the intermediate portion of fixed heel and loose heel type switches should always be provided on the left side of the facing direction as has been shown in pages DS7.

Insulated Tie Plates: Details of insulated tie plates with bracket used in switches in slips are given in pages DS8 for diamond crossing with & without slip.

Stretcher Bars: Insulated leading stretcher, 1st following stretcher bar & 2nd following stretcher bars used in BG for diamond with single slips double slips are shown in pages DS9.

Check Rails: Pages DS10 contain information pertaining to dimensions of check rails used with 1 in 8 ½ diamond crossing for BG.

Slide Chairs: Pages DS11 contain information pertaining to the dimensions of typical slide chairs used in BG for diamond and switch diamonds with slips. Page DS 11 (Sheet 2 of 2) for table of drawing number.

Special Flat Bearing Plate: Details of special flat bearing plate used in switches in slips are given in pages DS 12 for diamond crossing with & without slip.

ASSEMBLIES AND SUB-ASSEMBLIES IN DIAMOND AND SLIPS

	Crossings	Rail Section	Description	Assembles	Sub Assembles		
				Layout Drawing no.	Intermediate Portion drawing	Obtuse Crossing	Acute crossing
B.G.	1 IN 8.5	60 kg (UIC)	Diamond crossing without slip	RDSO/T-6492	RDSO/ T-6492	RDSO/ T-6495	RDSO/ T-4967
			Diamond crossing with single slips	RDSO/T-6493	RDSO/ T-6493		
			Diamond crossing with double slips	RDSO/T-6494	RDSO/ T-6494		
		52 KG	Diamond crossing without slip	RDSO/T-5362	RDSO/ T-5362	RDSO/ T-5265	RDSO/ T-4867
			Diamond crossing with single slips	RDSO/T-5363	RDSO/ T-5363		
			Diamond crossing with double slips	RDSO/T-5364	RDSO/ T-5364		
	1 IN 10	52 KG	Movable switch Diamond crossing with single slip	RDSO/T-6877	RDSO/ T-6877	RDSO/ T-6878	RDSO/ T-6649
			Movable switch Diamond crossing with double slip	RDSO/T-6889	RDSO/T-6889		

DS 1
SHEET 1 OF 3

SUB ASSEMBLIES AND MAIN PARTS FOR DIAMONDS AND SLIPS

GAUGE	CROSSING	RAIL SECTION	INTERMEDIATE PORTION						OBTUSE CROSSING	ACUTE CROSSING		
			ASSEMBLY DRAWING NUMBER	TIE PLATE	SLIDE CHAIR	STRETCHER BARS			ASSEMBLY DRAWING	ASSEMBLY DRAWING	CHECK RAIL	
						LEADING	1 st FOLLOWING	2 nd FOLLOWING				
B.G.	1 IN 8.5	60 kg	RDSO/T-6492 (without slip)	THESE PART ARE NOT REQUIRED FOR SUB ASSEMBLY						RDSO/T-6495	RDSO/T-4967	RDSO/T-6577
			RDSO/T-6493 (single slip)	RDSO/T-6496 TO RDSO/T-6499	RDSO/T-6528 TO RDSO/T-6533 & RDSO/T-6512 TO RDSO/T-6513	RDSO/T-6500TO RDSO/T-6501	RDSO/T-6504 TO RDSO/T-6505	RDSO/T-6506 TO RDSO/T-6507				
			RDSO/T-6494 (double slip)	RDSO/T-6496 TO RDSO/T-6499	RDSO/T-6528 TO RDSO/T-6533 & RDSO/T-6512 TO RDSO/T-6513	RDSO/T-6500TO RDSO/T-6503	RDSO/T-6504 TO RDSO/T-6505 & RDSO/T-6508 TO RDSO/T-6509	RDSO/T-6506 TO RDSO/T-6507 & RDSO/T-65010 TO RDSO/T-6511				
		52 kg	RDSO/T-5362 (without slip)	THESE PART ARE NOT REQUIRED FOR SUB ASSEMBLY						RDSO/T-5265	RDSO/T-4867	RDSO/T-5424
			RDSO/T-5363 (single slip)	RDSO/T-5365 TO RDSO/T-5368		RDSO/T-5383 TO RDSO/T-5388, RDSO/T-5376	RDSO/T-5389 TO RDSO/T-5390	RDSO/T-5372 ,RDSO/T-5372/1	RDSO/T-5374 & RDSO/T-5374/1			
			RDSO/T-5364 (double slip)	RDSO/T-5365 to RDSO/T-5368		RDSO/T-5376 ,RDSO/T-5383 to RDSO/T-5388	RDSO/T-5369 TO RDSO/T-5371	RDSO/T-5369 TO RDSO/T-5371	RDSO/T-5372 TO RDSO/T-5372/1, RDSO/T-5373 TO RDSO/T-5373/1			

DS 1
SHEET 2 OF 3

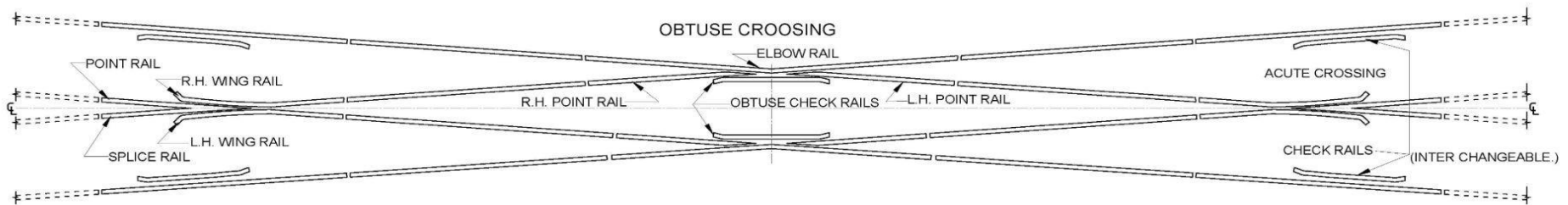
SUB ASSEMBLIES AND MAIN PARTS FOR MOVABLE DIAMONDS WITH SLIPS

GAUGE	CROSSING	RAIL SECTI ON	ASSEMB LY DRAWIN G NUMBE R	TIE PLATE	SLIDE CHAIR	STRETCHER			Heel Block	OBTUSE CROSSING SWITCH TYPE				ACUTE CROSSI NG
						BARS				ASSEMB LY DRAWIN G	SWITC H	Stretcher bar		
						LEADI NG	1 st FOLLOWI NG	2 nd FOLLOWI NG				LEADI NG	1 st FOLLOWI NG	
B.G.	1 IN 10	52 kg	RDSO/T-6877 (single slip)	RDSO/T-6881 to RDSO/T-6881/4	RDSO/T-5383,RDSO /T-5384 , RDSO/T-5387 &RDSO/T-5387/1	RDSO/ T-6882 & RDSO/ T-6882/1	RDSO/T-6883 & RDSO/T-6883/1	RDSO/T-6884 & RDSO/T-6884/1	RDSO /T-6685	RDSO/T-6878	RDSO/ T-6877	RDSO/ T-6675 & RDSO/ T-6675/1	RDSO/T-6676 & RDSO/T-6676/1	RDSO/T-6649
			RDSO/T-6889 (double slip)	RDSO/T-6881 to RDSO/T-6881/	RDSO/T-5383,RDSO /T-5384,	RDSO/ T-6894 & RDSO/ T-6894/1 RDSO/ T-8215 & RDSO/ T-8215/1	RDSO/T-6895 & RDSO/T-6895/1 RDSO/T-8216 & RDSO/T-8216/1	RDSO/T-6895/2 & RDSO/T-6895/2 RDSO/T-8217 & RDSO/T-8217/1	RDSO /T-6685	RDSO/T-6890	RDSO/ T-6889	RDSO/ T-6675 & RDSO/ T-6675/1	RDSO/T-6676 & RDSO/T-6676/1	

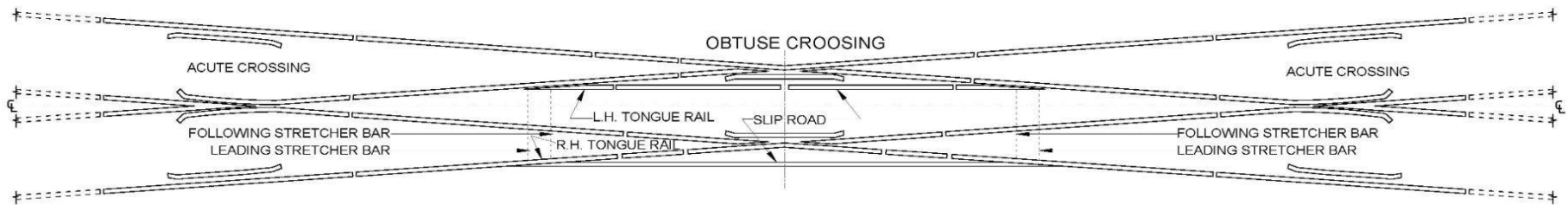
DS 1
SHEET 3 OF 3

DEFINITION OF DIAMONDS & SLIP

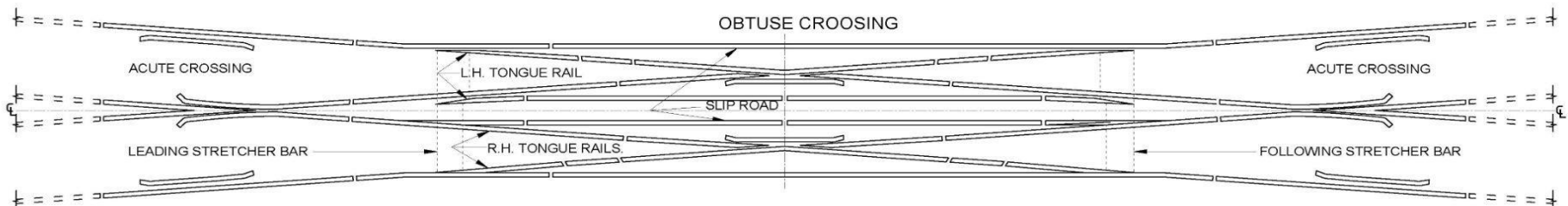
DIAMOND CROSSING



DIAMOND CROSSING WITH SINGLE SLIPS.



DIAMOND CROSSING WITH DOUBLE SLIPS

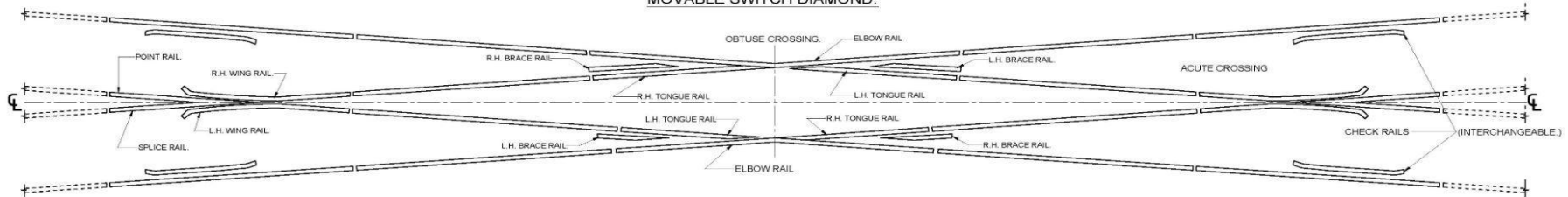


SHEET 1 OF 2

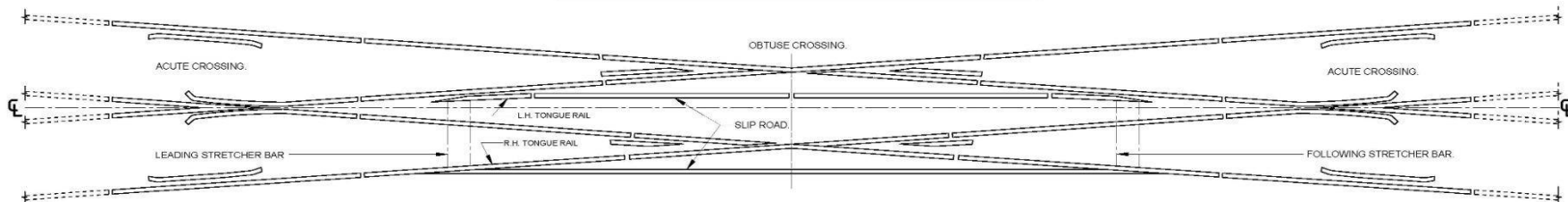
DS2

DEFINITION OF MOVABLE DIAMONDS & SLIP DIAMONDS & SLIP

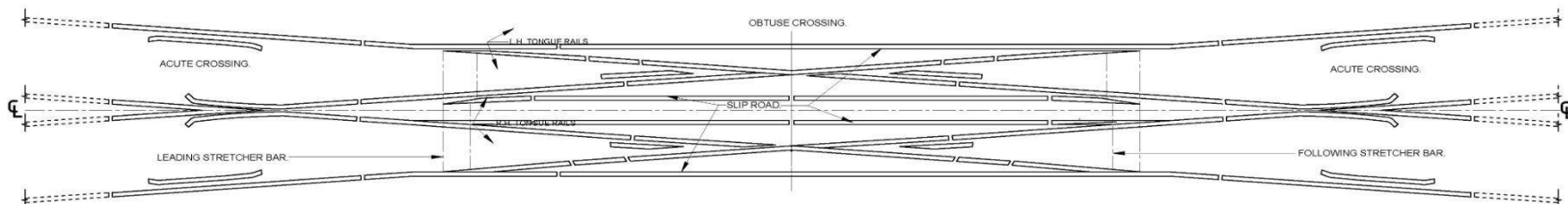
MOVABLE SWITCH DIAMOND.



MOVABLE SWITCH DIAMOND WITH SINGLE SLIPS.

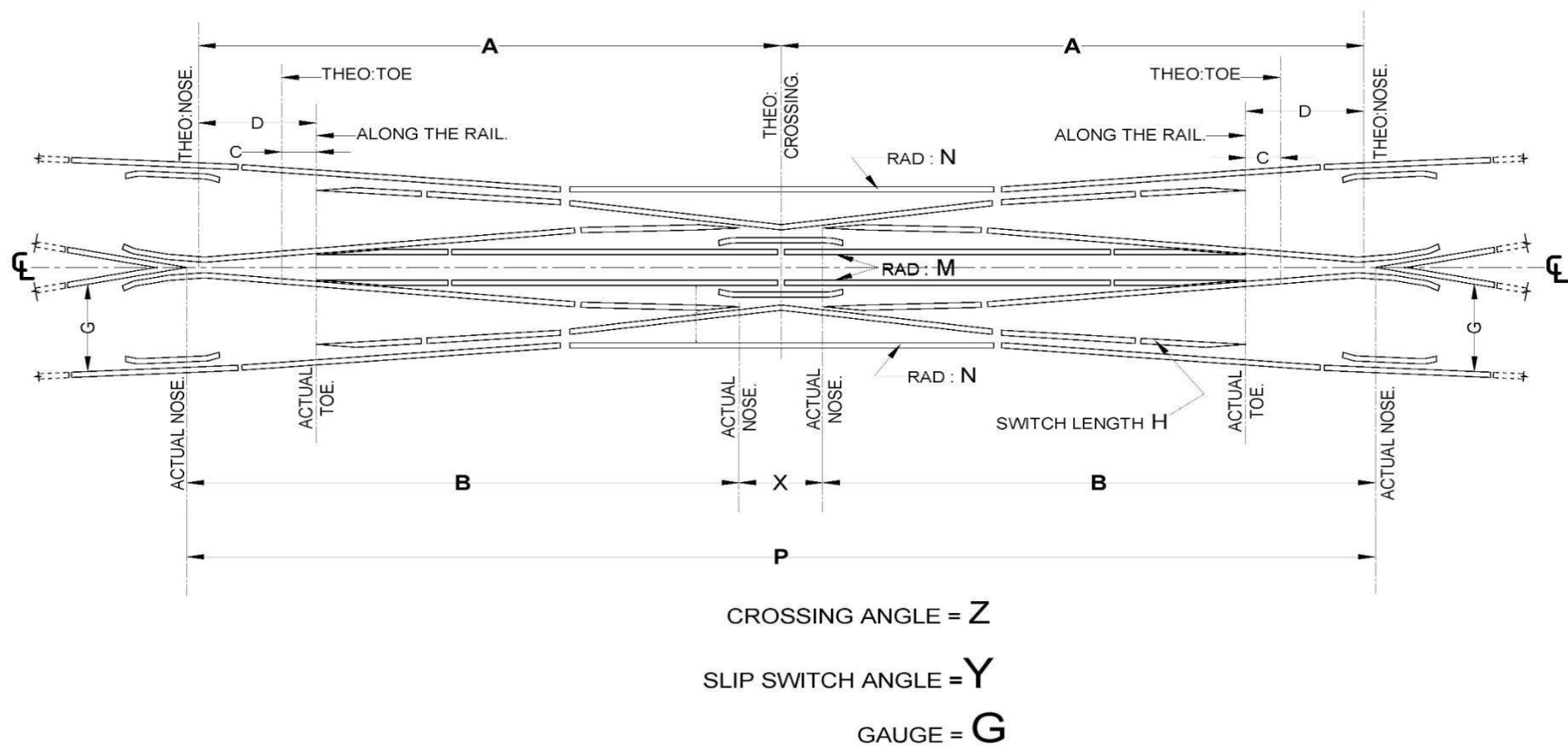


MOVABLE SWITCH DIAMOND WITH DOUBLE SLIPS.



DS2
SHEET 2 OF 2

MAIN DIMENSIONS OF 1 IN 8.5 DIAMONDS WITH AND WITHOUT SLIPS



SHEET 1 OF 4

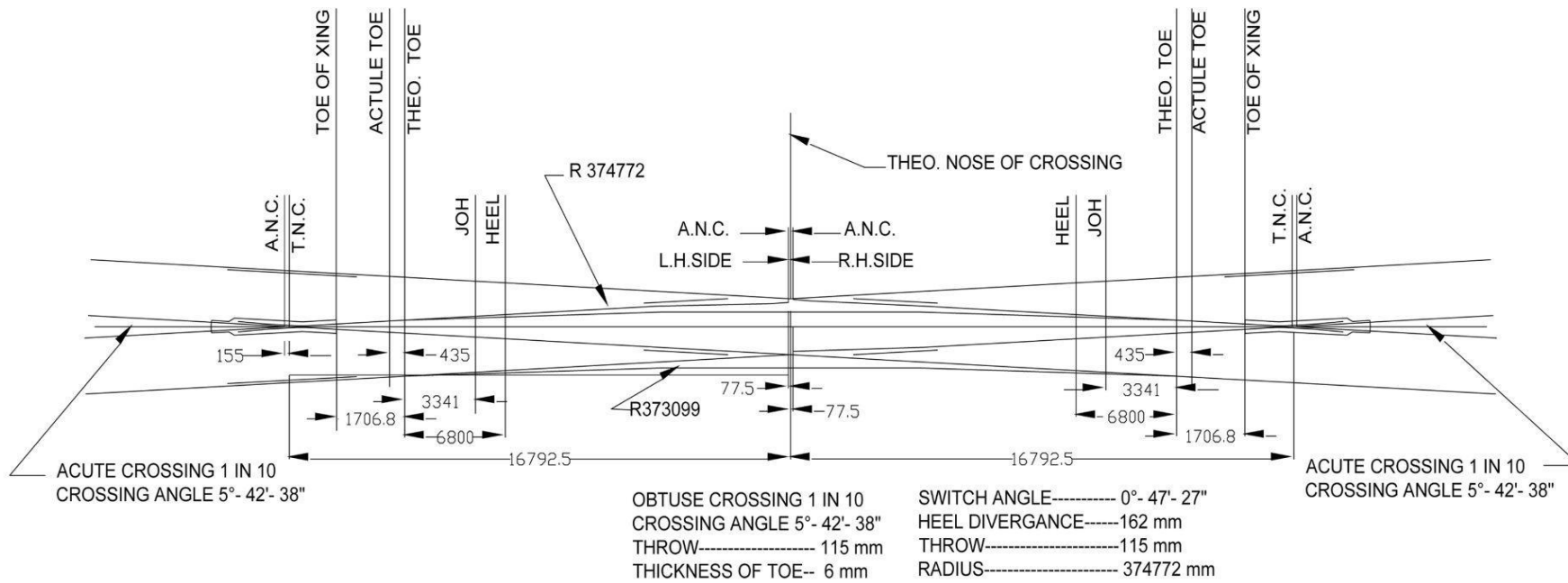
DS3

TABLE OF DIMENSIONS

CROSSING	RAIL SECTION	GAUGE	ASSEMBLY DRG NO.	DIMENSIONS										
				A	B	C	D	M	N	Z	Y	H	X	P
1 IN 8.5	UIC 60KG	B.G.	RDSO/T-6494	14294	13965	435	2150	261840	260167	6°- 42'-35"	0°-47'-27"	7000	940	29810
	52KG		RDSO/T-5364	14294	13957	435	2150	261840	260167	6°- 42'-35"	1°- 34'-27"	7000	938	29790
1 IN 10	52KG		RDSO/T-6889	16792.5	16870	435	----	373099	374772	5°- 42'-38"	0°-47'-27"	-----	155	33894

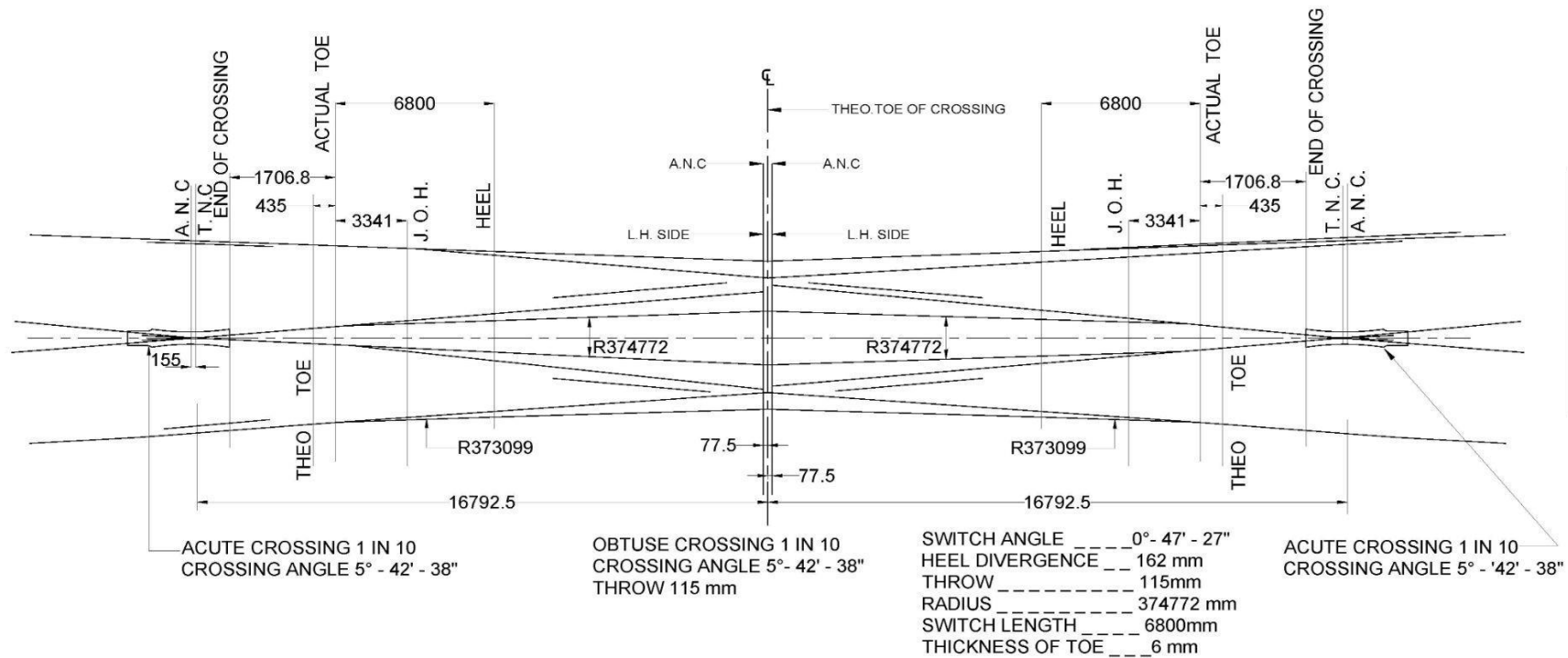
DS 3
SHEET 2 OF 4

MAIN DIMENSIONS OF 1 IN 10 MOVABLE SWITCH DIAMONDS WITH SINGLE SLIPS



DS3
SHEET 3 OF 4

MAIN DIMENSIONS OF 1 IN 10 MOVABLE SWITCH DIAMONDS WITH DOUBLE SLIPS



SHEET 4 OF 4

DS3

LENGTH OF RAILS FOR DIAMOND CROSSINGS WITHOUT SLIPS

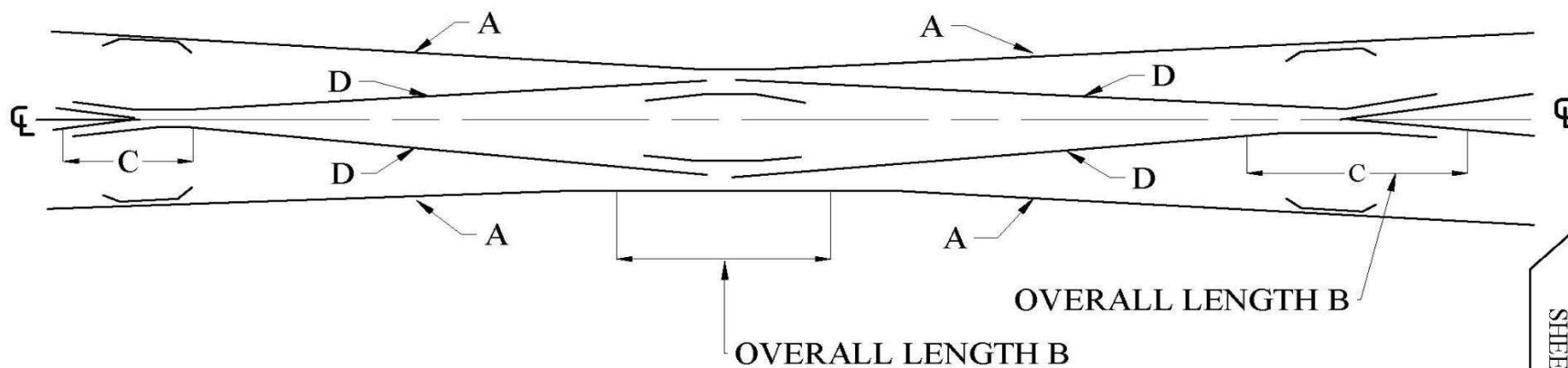


TABLE OF DIMENSIONS

RAIL SECTION	CROSSING ANGLE	ASSEMBLY DRG No.	DIMENSIONS			
			A	B	C	D
UIC 60 KG	1 IN 8.5	RDSO/T-6492	9240	4200	3300	11140
52 KG		RDSO/T-5362	9240	4200	3300	11140

DS4
SHEET 1 OF 3

LENGTH OF RAILS FOR 1 IN 8.5 DIAMOND CROSSINGS SINGLE SLIPS

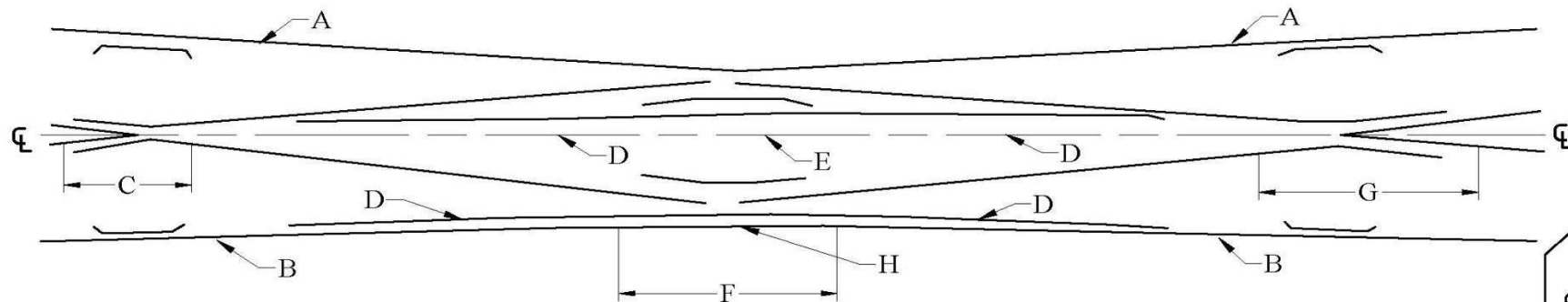


TABLE OF DIMENSIONS

RAIL SECTION	ASSEMBLY DRG NO.	DIMENSIONS							
		A	B	C	D	E	F	G	H
UIC 60KG	RDSO/T-6493	9240	13000	11140	9637	4170	4200	3300	8365
52 KG	RDSO/ T-5363	9240	13000	11140	9637	4170	4200	3300	8365

DS 4
SHEET 2 OF 3

LENGTH OF RAILS IN B.G. 1 IN 8.5 DIAMOND CROSSINGS WITH DOUBLE SLIPS.

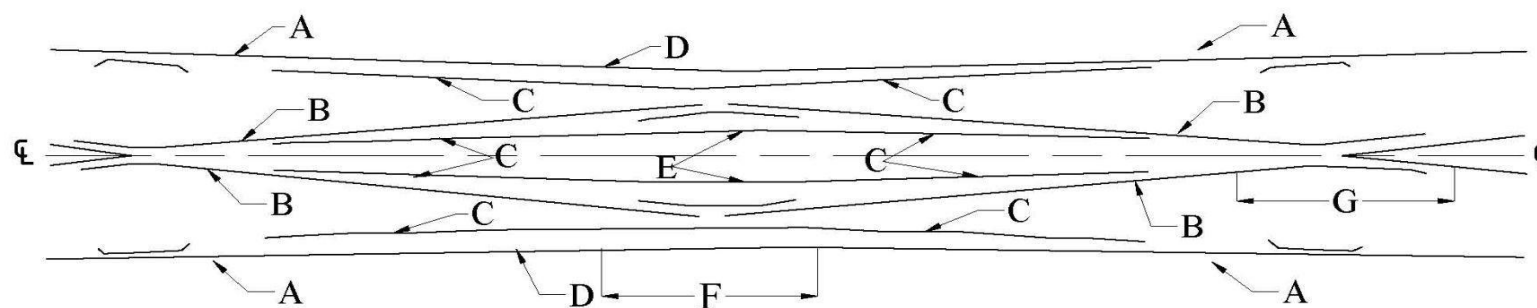
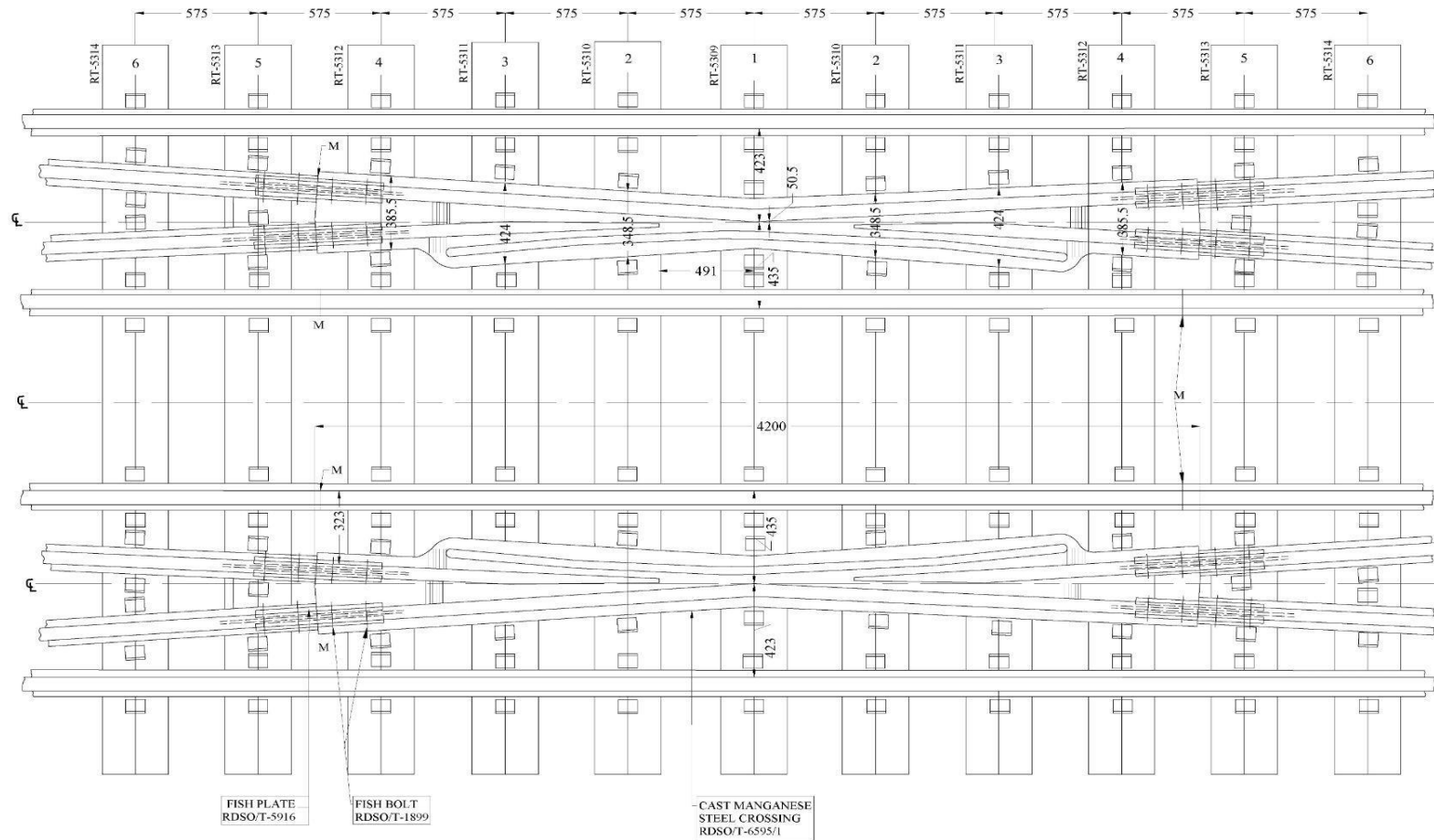


TABLE OF DIMENSIONS

RAIL SECTION	ASSEMBLY DRG NO.	DIMENSIONS						
		A	B	C	D	E	F	G
UIC 60KG	RDSO/T-6494	13000	11140	9637	8365	4170	4200	3300
52 KG	RDSO/T-5364	13000	11140	9637	8365	4170	4200	3300

DS 4
SHEET 3 OF 3

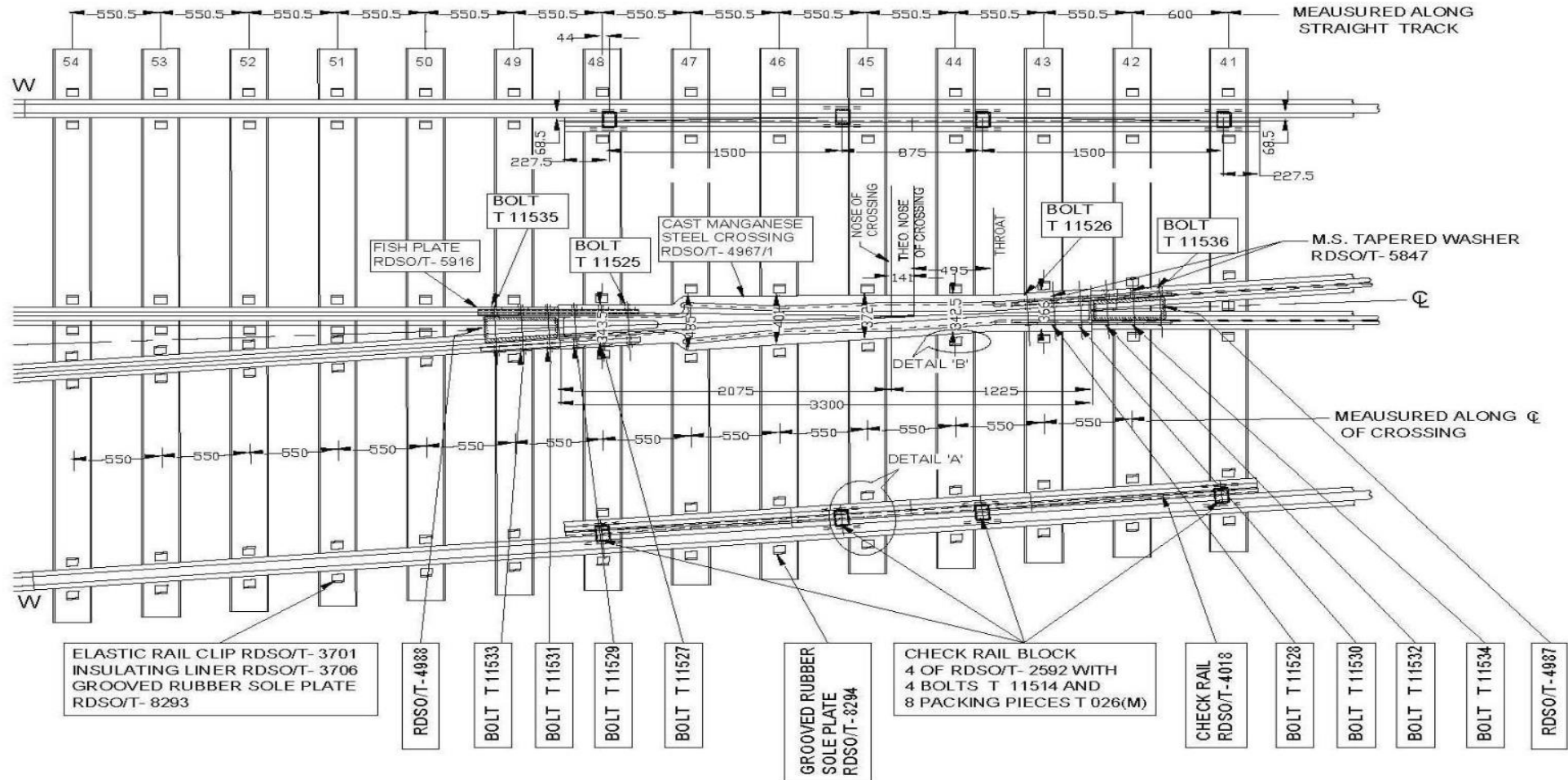
**1 IN 8.5 52 Kg OBTUSE CMS CROSSING FOR DIAMOND WITH & WITHOUT SLIPS FOR 60 Kg (UIC) TO
DRAWING NO. RDSO/T-6495**



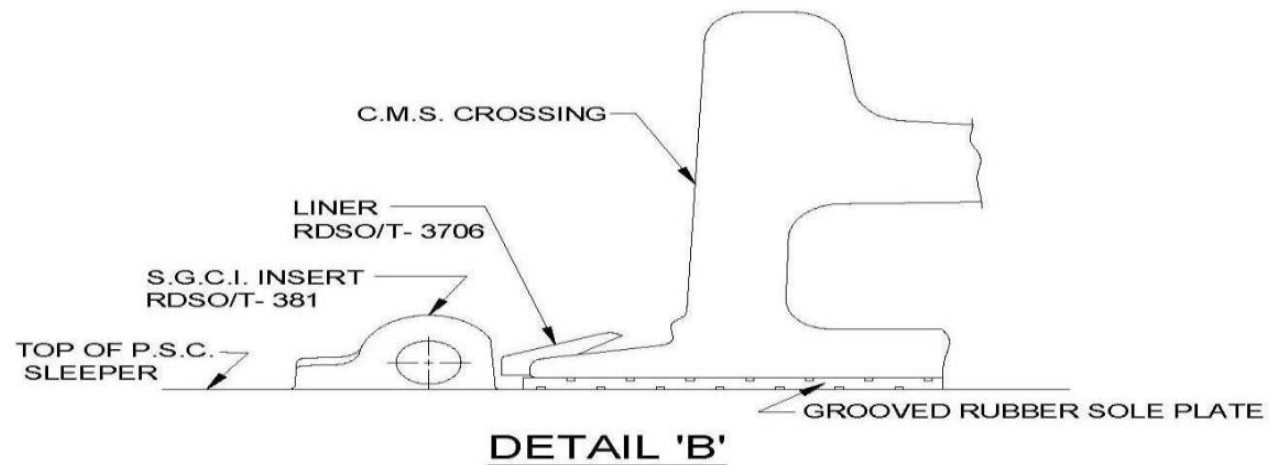
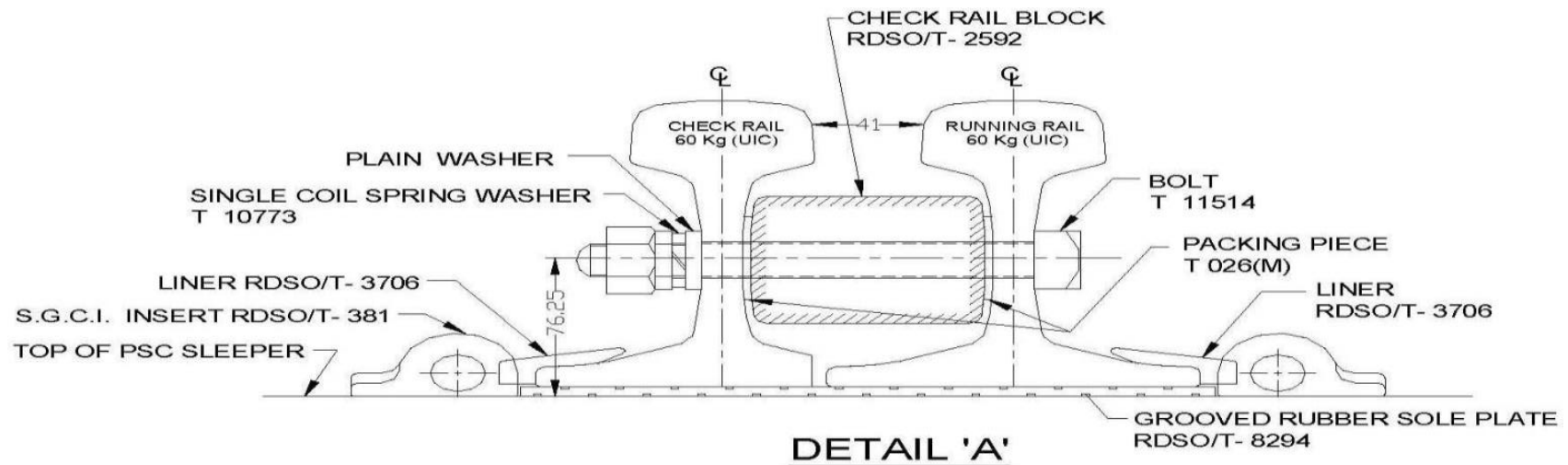
SHEET 1 OF 8

DS5

1 IN 8.5, 60 KG ACUTE CROSSING FOR DIAMOND WITH & WITHOUT SLIP TO DRAWING NO. RDSO/T-4967



DS 5
SHEET 2 OF 8



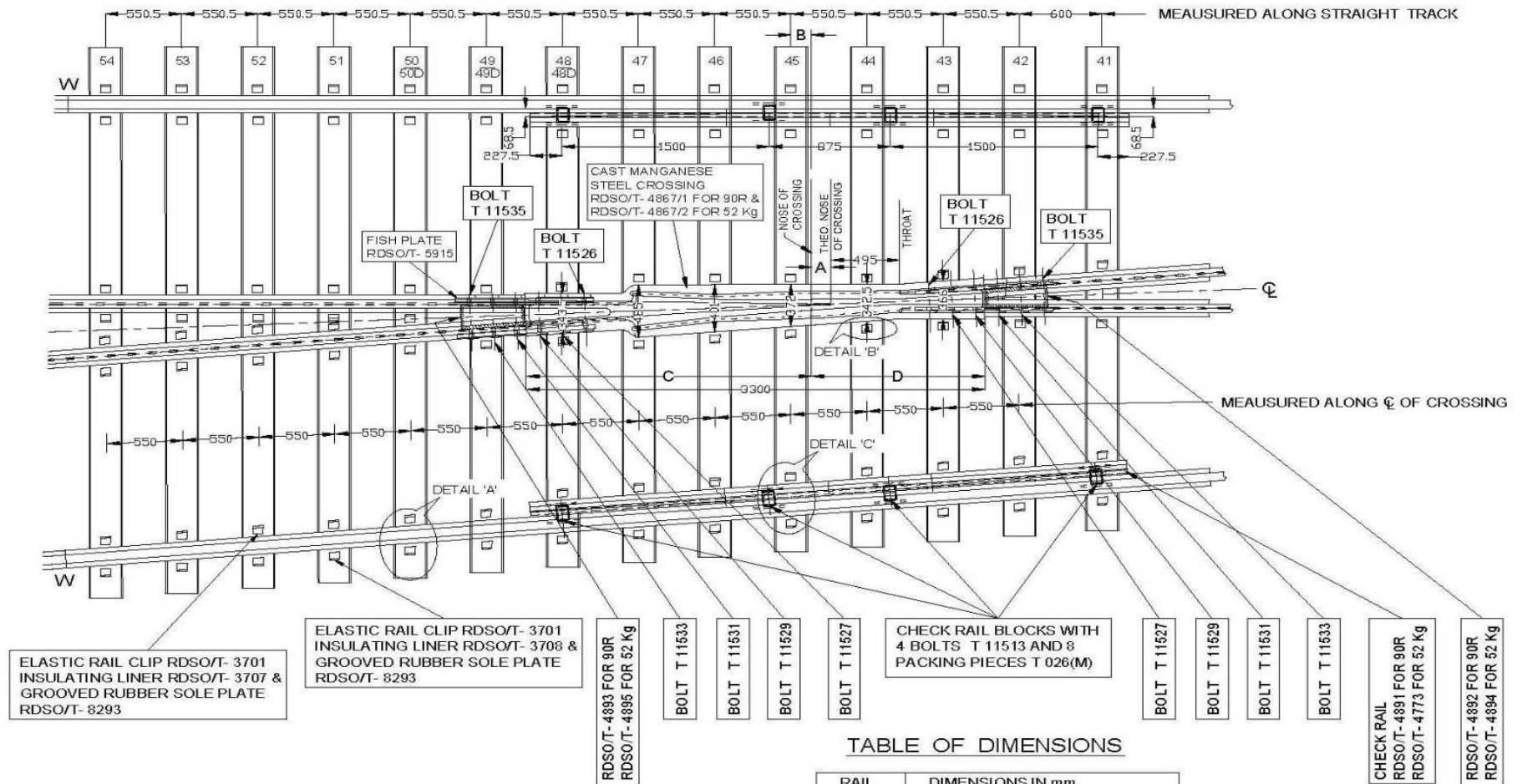
1 IN 8.5 CMS OBTUSE CROSSING FOR DIAMOND WITH & WITHOUT SLIPS FOR 52 Kg TO DRAWING NO. RDSO/T-5265



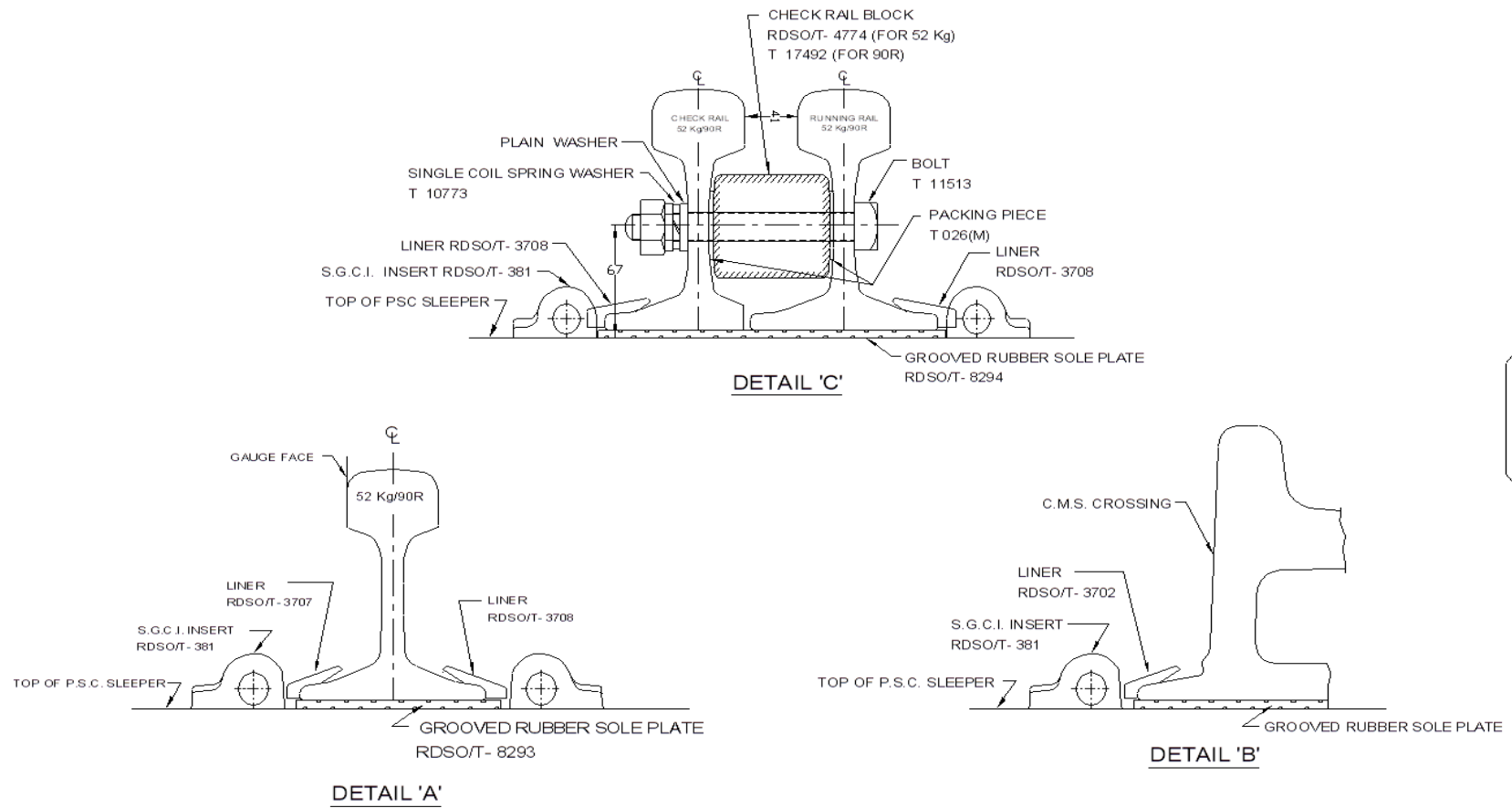
SHEET 4 OF 8

DS5

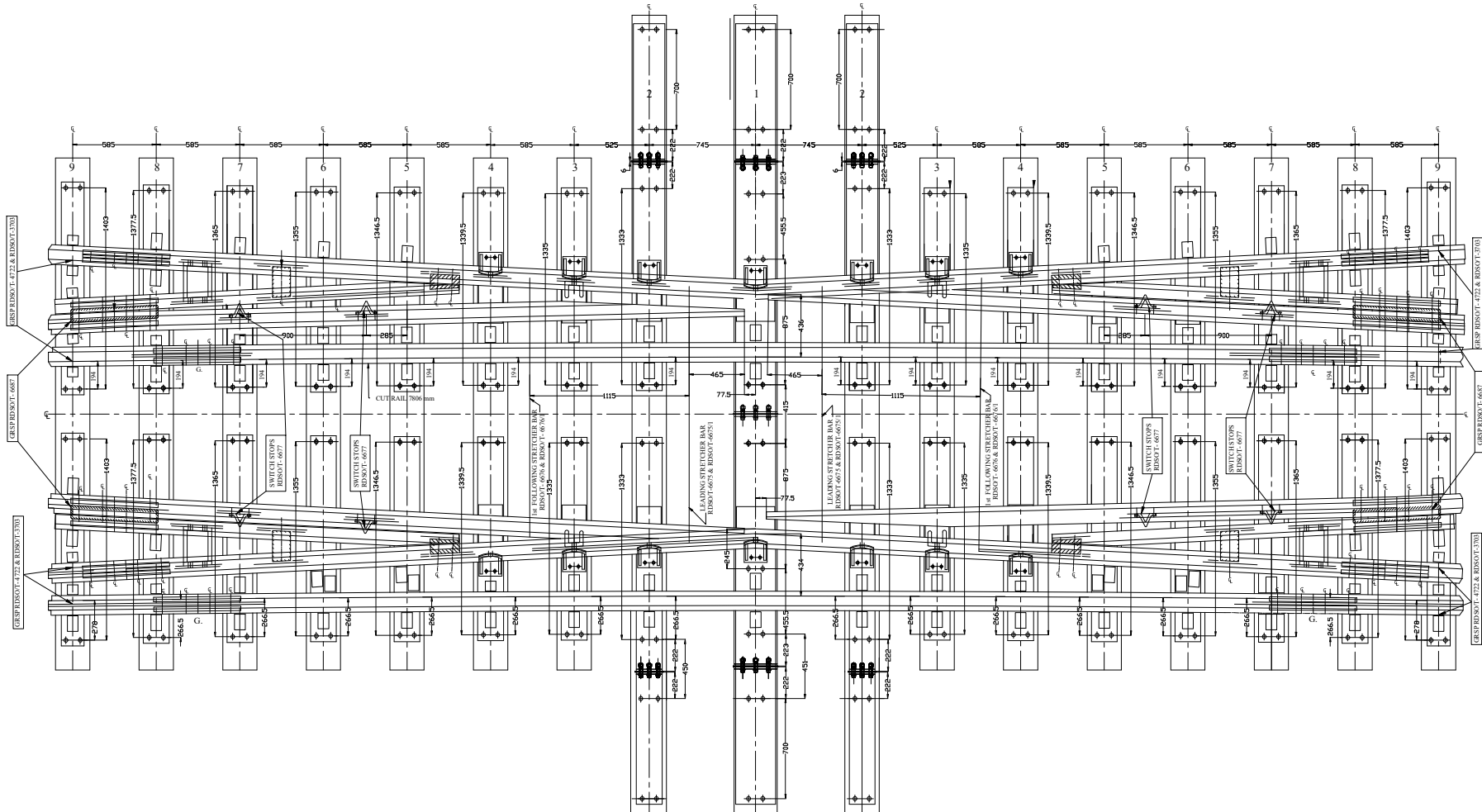
1 IN 8.5, 52 Kg ACUTE CROSSING FOR DIAMOND WITH & WITHOUT SLIP TO DRAWING NO. RDSO/T-4867



DS 5
SHEET 5 OF 8



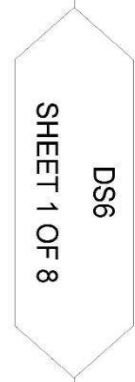
1 IN 10 , 60 KG OBTUSE XING FOR MOVABLE DIAMOND WITH SINGLE & DOUBLE SLIP TO DRAWING NO. RDSO/T-6878



SHEET 7 OF 8

DS5

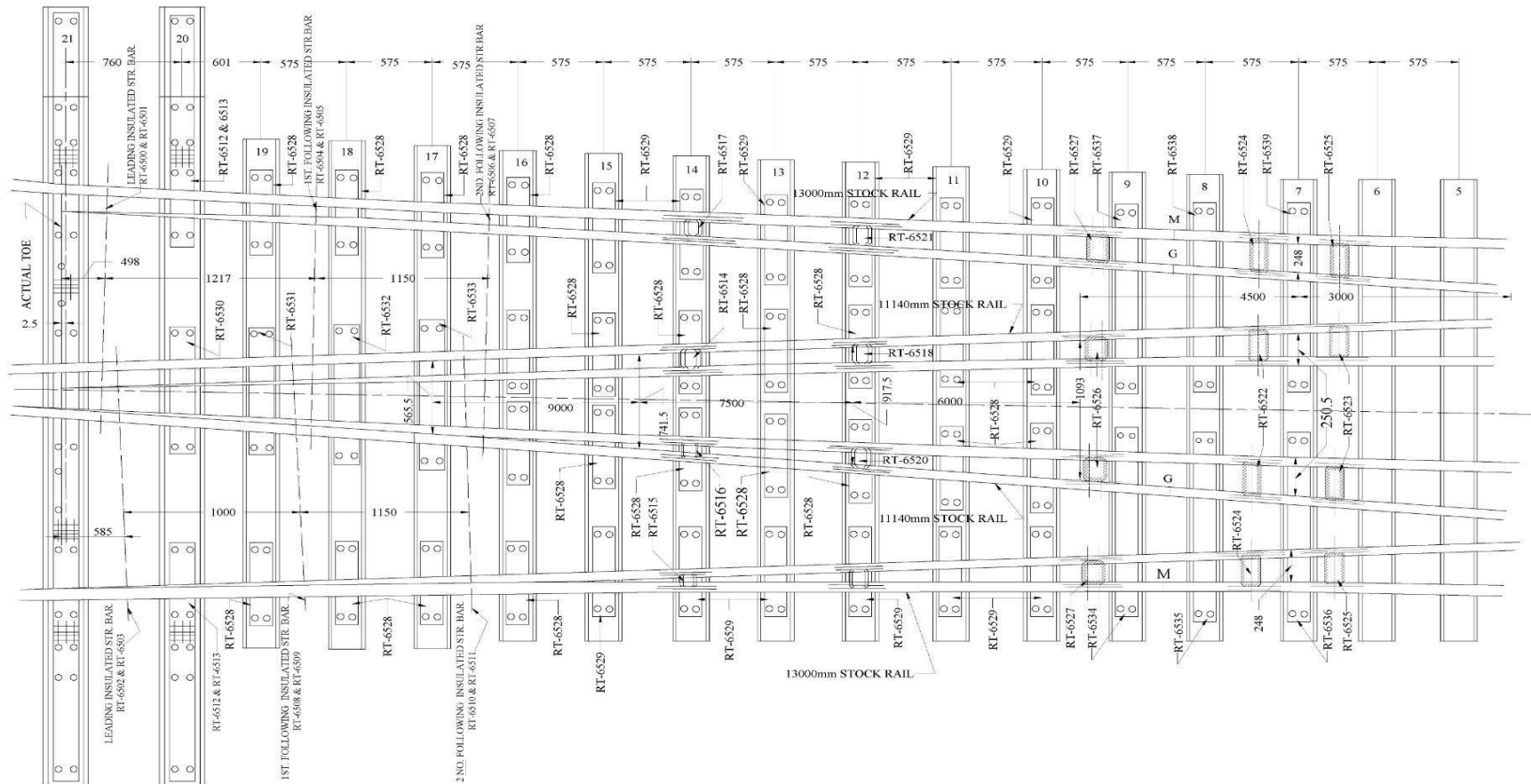
DS6
SHEET 1 OF 8



DS6
SHEET 2 OF 8



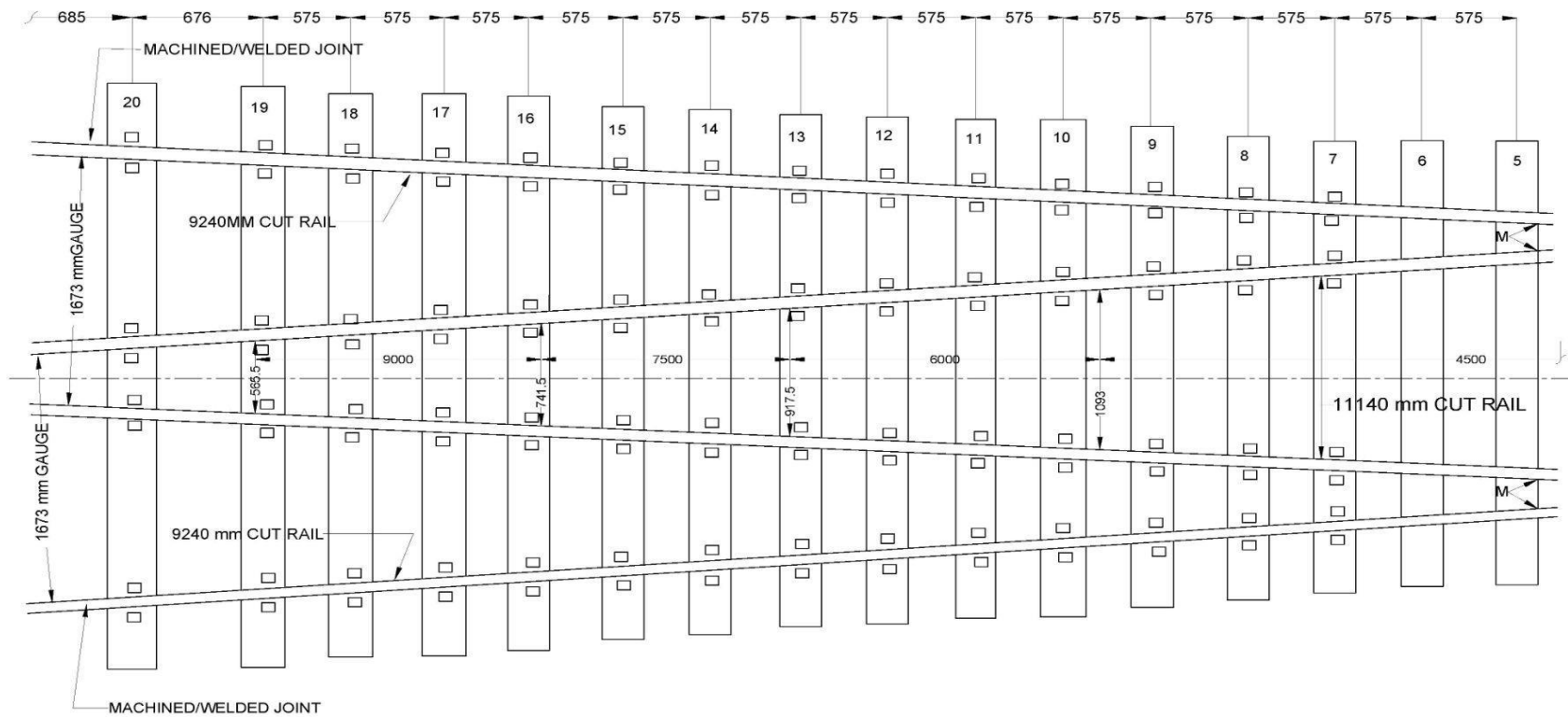
INTERMEDIATE PORTION FOR 1 IN 8.5, 60 Kg DIAMOND XING WITH DOUBLE SLIP FOR B.G. TO DRG. NO. RDSO/T-6494



SHEET 3 OF 8

DS6

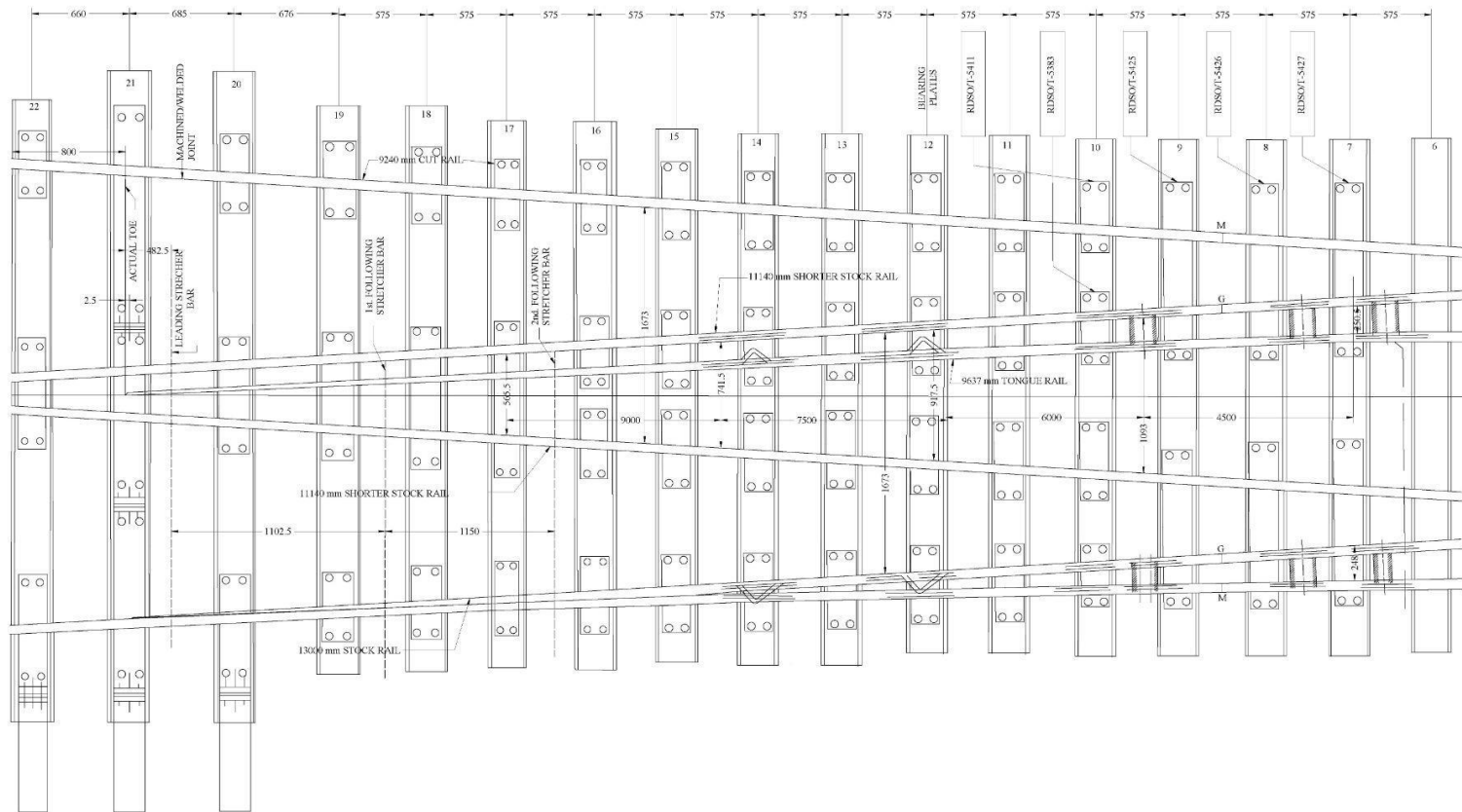
INTERMEDIATE PORTION 1 IN 8.5, 52 Kg DIAMOND CROSSING WITHOUT SLIP FOR B.G. RDSO/T- 5362



SHEET 4 OF 8

DS6

INTERMEDIATE PORTION FOR 1 IN 8.5, 52 kg DIAMOND CROSSING WITH SINGLE SLIP FOR B.G. RDSO/T-5363



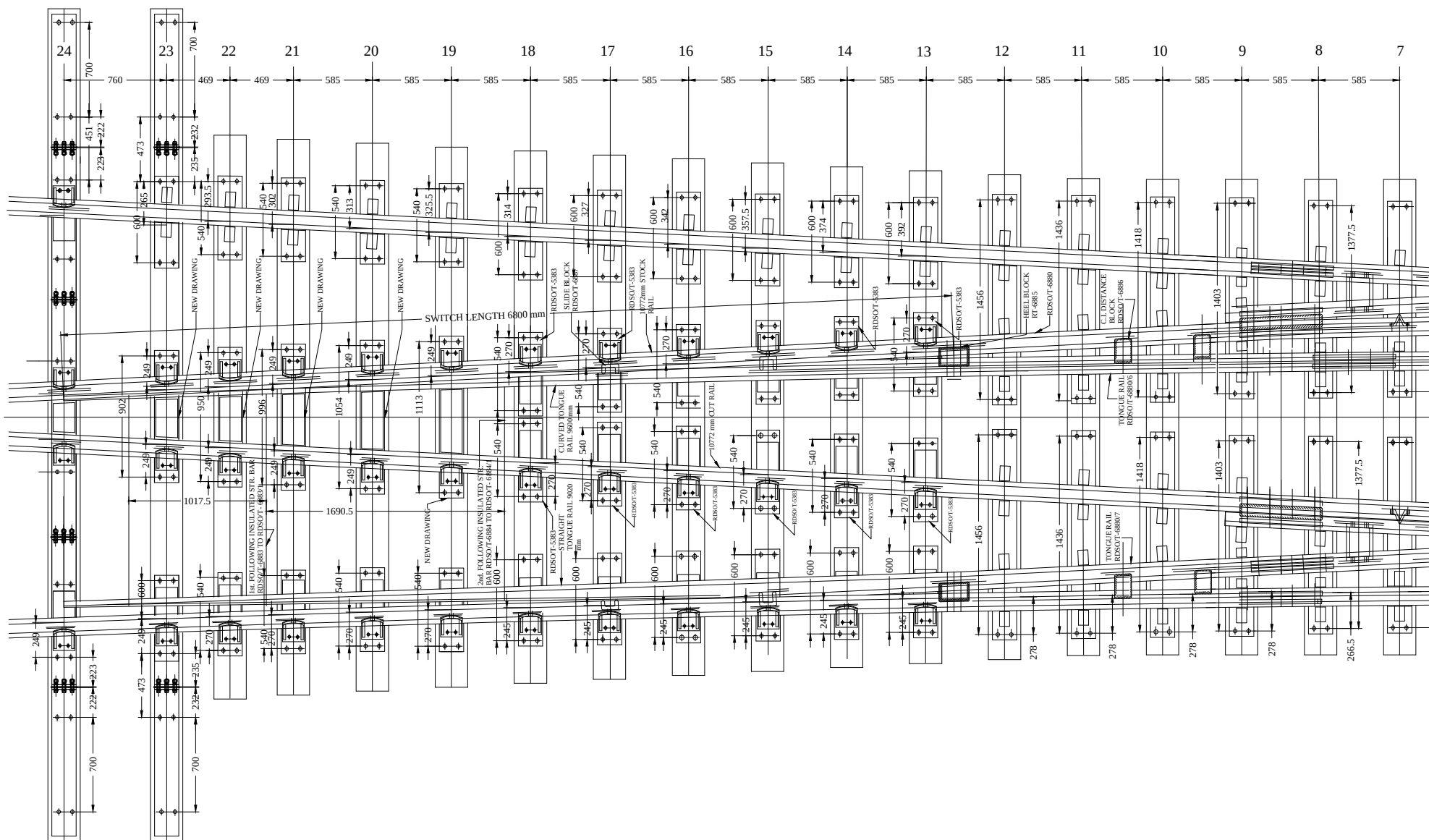
SHEET 5 OF 8

DS6

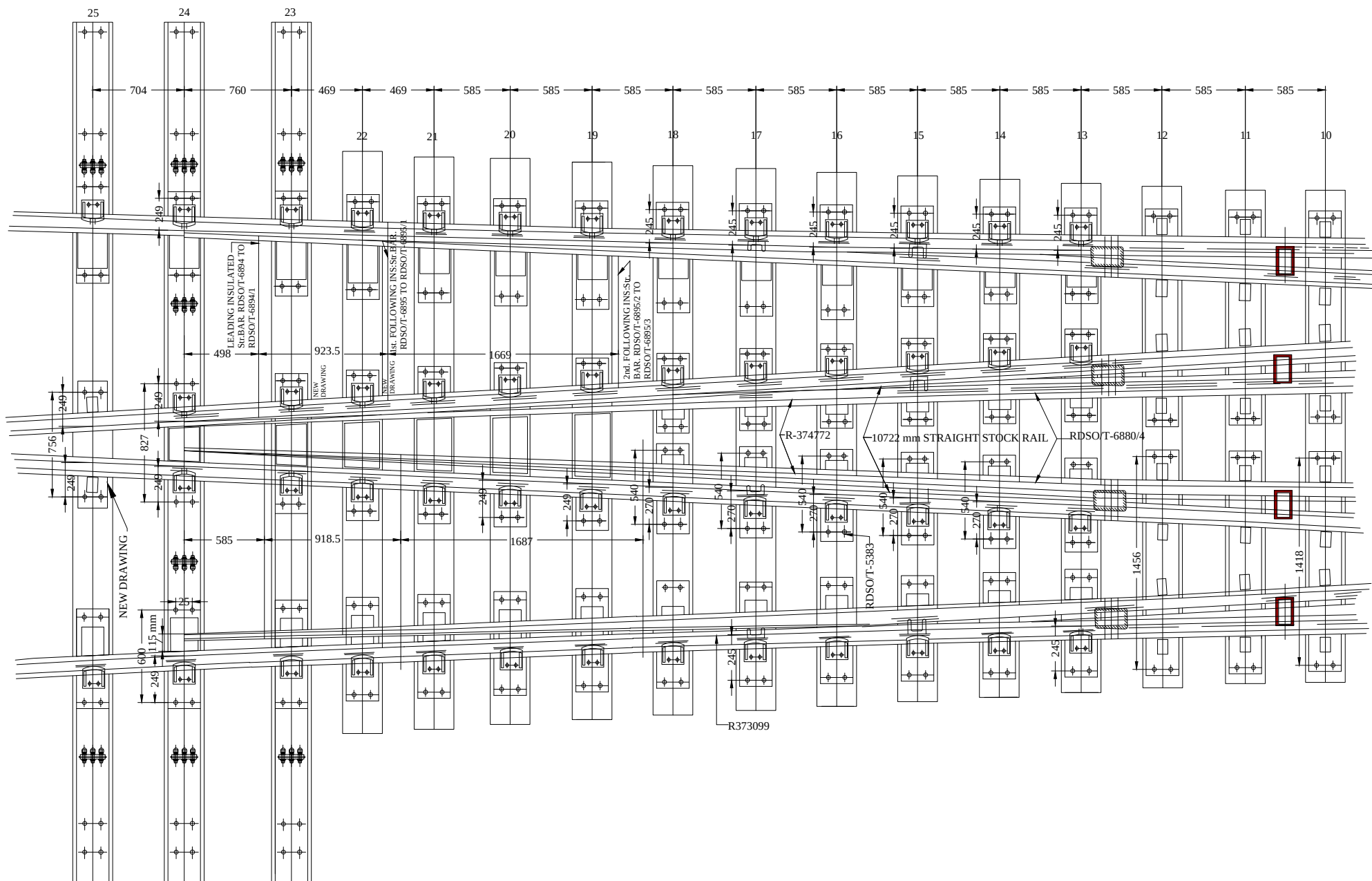
DS 6
SHEET 6 OF 8



INTERMEDIATE PORTION FOR 1 IN 10 MOVABLE DIAMOND XING WITH SINGLE SLIP FOR B.G., 60 KG RDSO/T-6877



INTERMEDIATE PORTION FOR 1 IN 10 MOVABLE DIAMOND XING WITH SINGLE SLIP FOR B.G., 60 KG RDSO/T-6889



SHEET 8 OF 8

DS6

POSITION OF SPHERICAL WASHER IN FIXED HEEL FOR DIAMOND CROSSING WITH SLIPS

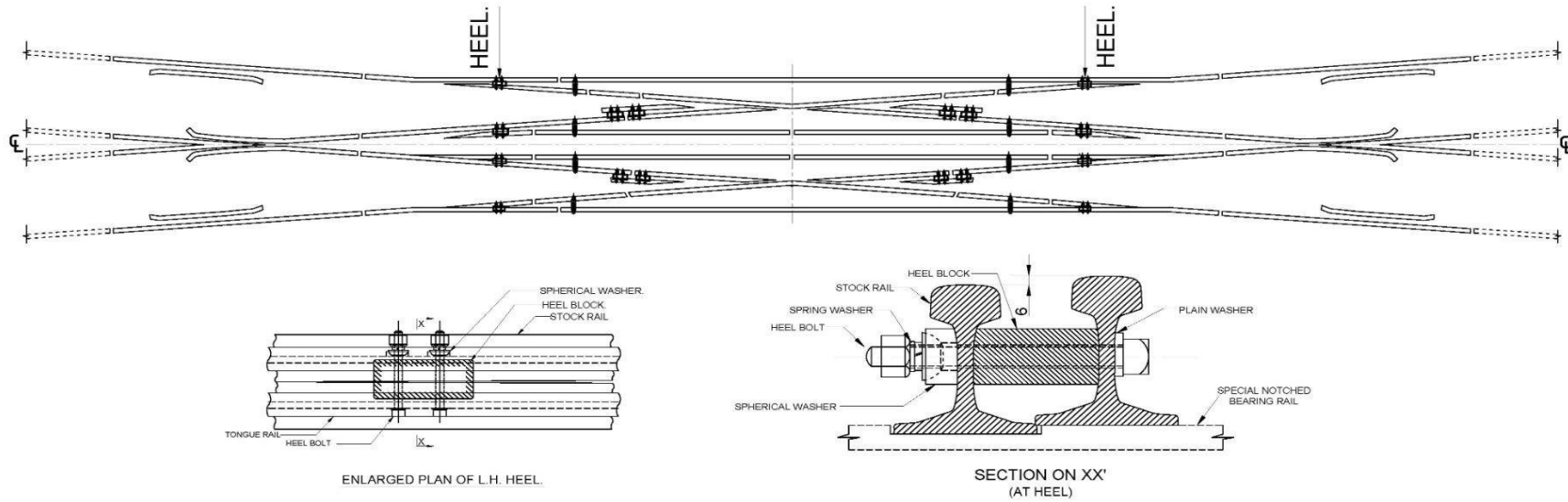


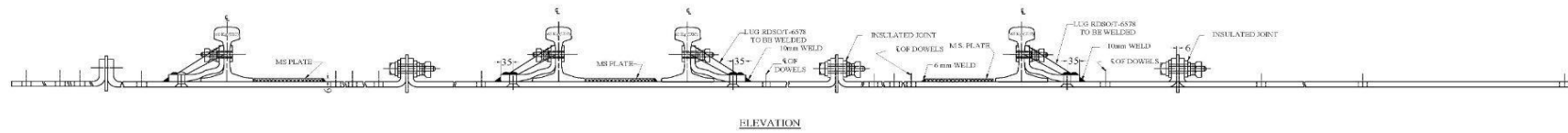
TABLE OF HEEL BLOCK WITH SPHERICAL WASHER FOR DIAMOND CROSSING WITH SLIPS:

GAUGE	CROSSING ANGLE/ SECTION	HEEL BLOCK
B.G.	1 IN 8.5, 60 KG (UIC)	RDSO/T-6526 & RDSO/T-6527
	1 IN 8.5, 52 KG	RDSO/T-5399
	1 in 10 MOVABLE SWITCH DIAMOND, 52kg	RDSO/T-6885

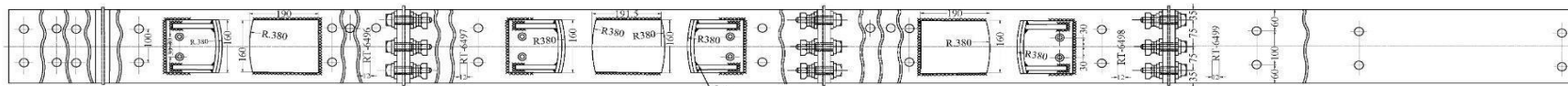
SHEET 1 OF 1

DS7

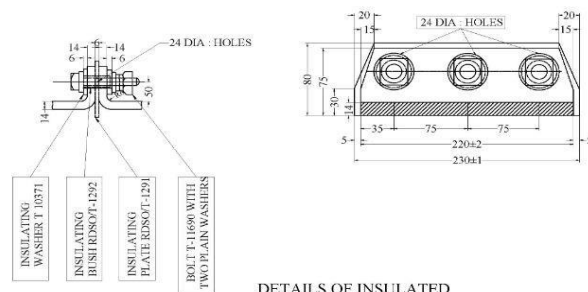
INSULATED TIE PLATE EXTENDED FOR 1 IN 8.5 B.G. 60 KG (UIC) DIAMOND CROSSING WITH SLIPS



ELEVATION



PLAN



DETAILS OF INSULATED JOINTS

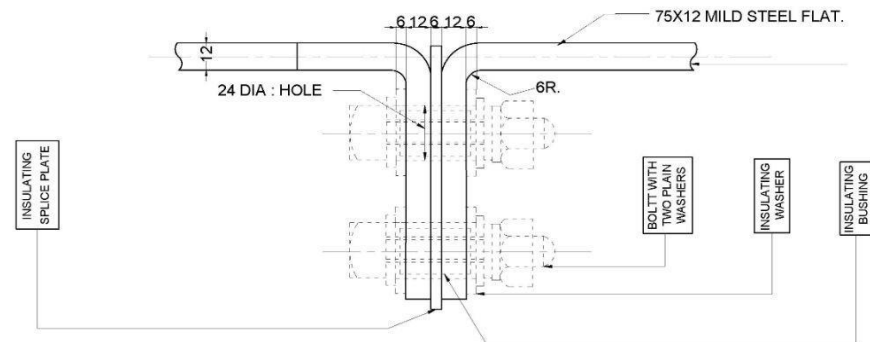
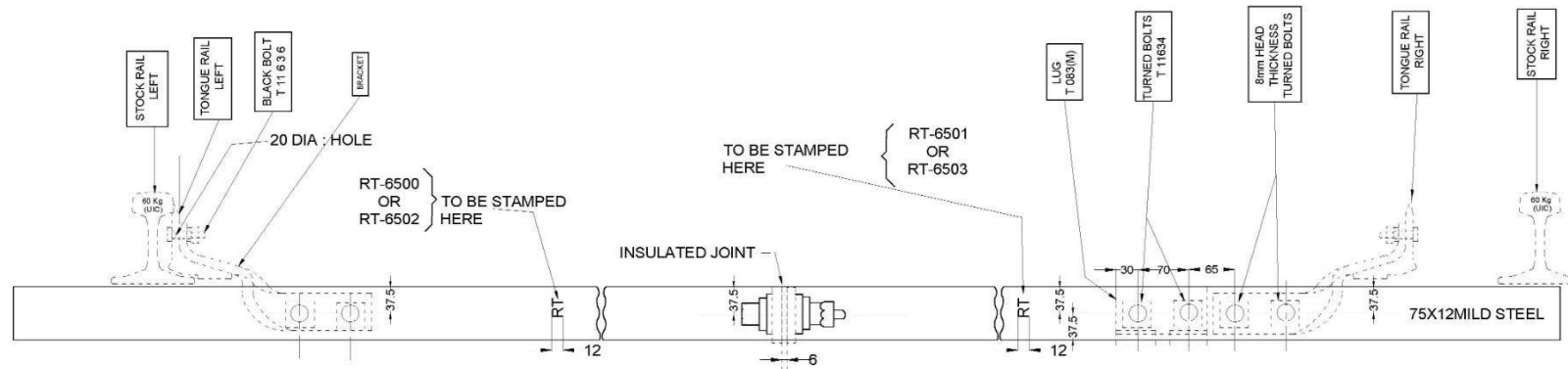
DS8
SHEET 1 OF 2

TABLE FOR INSULATED TIE PLATE EXTENDED FOR DIAMOND CROSSING WITH SLIPS

GAUGE	CROSSING ANGLE/ SECTION	DRAWING NO.
B.G.	1 IN 8.5, 60 KG (UIC)	RDSO/T-6496 TO RDSO/T-6499
	1 IN 8.5, 52 KG	RDSO/T-5365 TO RDSO/T-5368
	1 in 10 MOVABLE SWITCH DIAMOND, 52 kg	RDSO/T-6881 TO RDSO/T-6881/4

DS 8
SHEET 2 OF 2

INSULATED STRETCHER BAR FOR DOUBLE SLIPS FOR B.G. 60KG (UIC)



DETAIL OF INSULATED JOINT

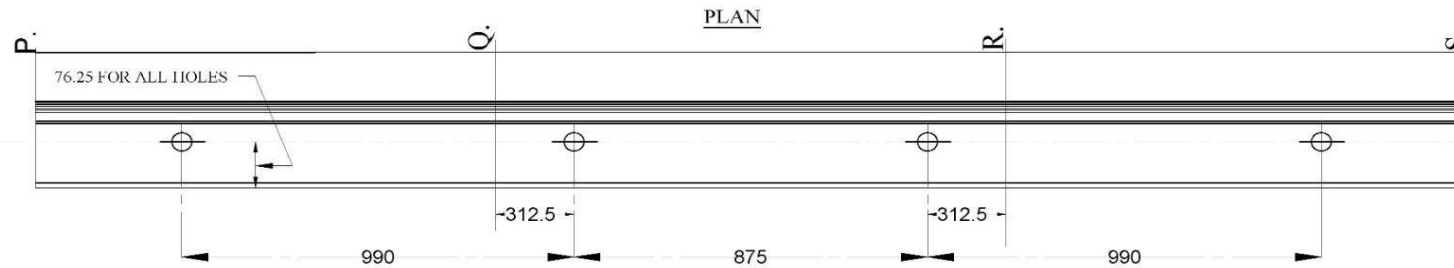
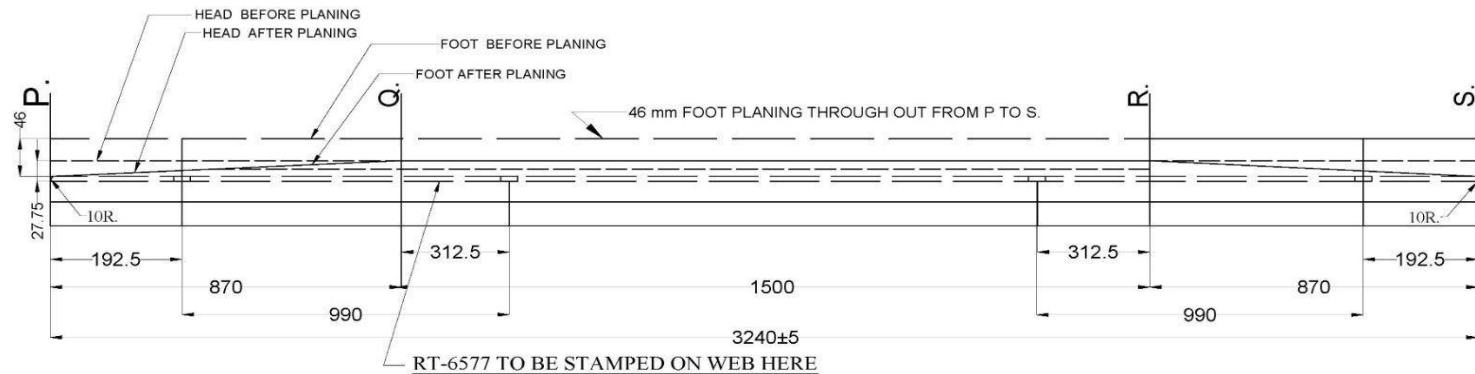
SHEET 1 OF 2

DS9

TABLE OF STRETCHER BAR FOR DIAMOND CROSSING WITH SINGLE & DOUBLE SLIPS:

GAUGE	CROSSING ANGLE/ SECTION	STRETCHER BAR	DRAWING NO.
B.G.	1 IN 8.5, 60 KG (UIC)	LEADING ST. BAR	RDSO/T-6500 TO RDSO/T-6503
		1 ST FOLLOWING ST. BAR	RDSO/T-6504 TO RDSO/T-6505 AND RDSO/T-6508 TO RDSO/T-6509
		2 nd FOLLOWING ST. BAR	RDSO/T-6506 TO RDSO/T-6507 AND RDSO/T-6510 TO RDSO/T-6511
	1 IN 8.5, 52 KG	LEADING ST. BAR	RDSO/T-5369 TO RDSO/T-5371
		1 ST FOLLOWING ST. BAR	RDSO/T-5372 TO RDSO/T-5372/1 AND RDSO/T-5373 TO RDSO/T-5373/1
		2 nd FOLLOWING ST. BAR	RDSO/T-5374 TO RDSO/T-5374/1 AND RDSO/T-5375 TO RDSO/T-5375/4
	1 IN 10 MOVABLE SWITCH DIAMOND, 52 kg	LEADING ST. BAR	RDSO/T- 8215 & RDSO/T-8215/1 AND RDSO/T- 6894 & RDSO/T-6894/1
		1 ST FOLLOWING ST. BAR	RDSO/T- 8216 & RDSO/T-8216/1 AND RDSO/T- 6895 & RDSO/T-6895/1
		2 nd FOLLOWING ST. BAR	RDSO/T- 8217 & RDSO/T-8217/1 AND RDSO/T- 6895/2 & RDSO/T-6895/3

MACHINED HEAD RAIL FOR 1 IN 8.5,60 Kg (UIC)DIAMOND WITH SINGLE SLIP TO DRG NO. RDSO/ T - 6577

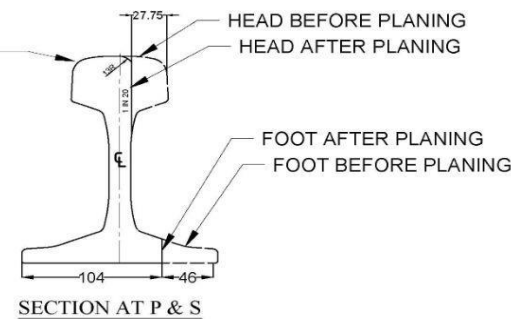
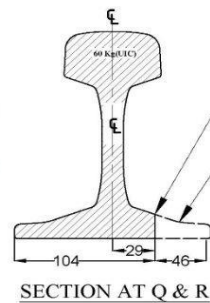


GENERAL NOTE ON THE DESIGN

BEND
NO BEND IS REQUIRED

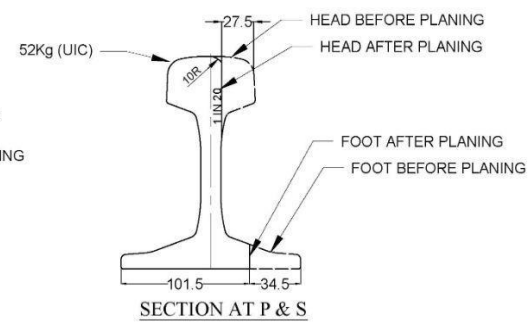
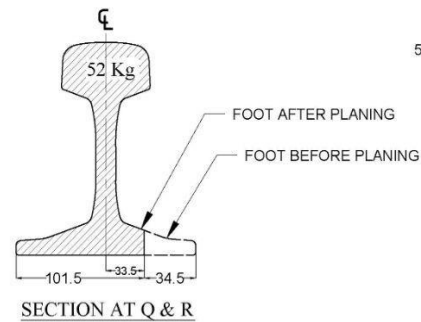
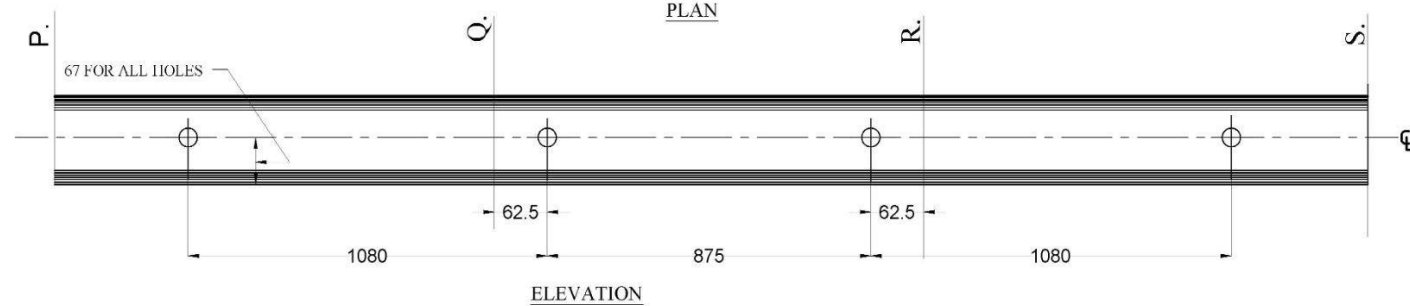
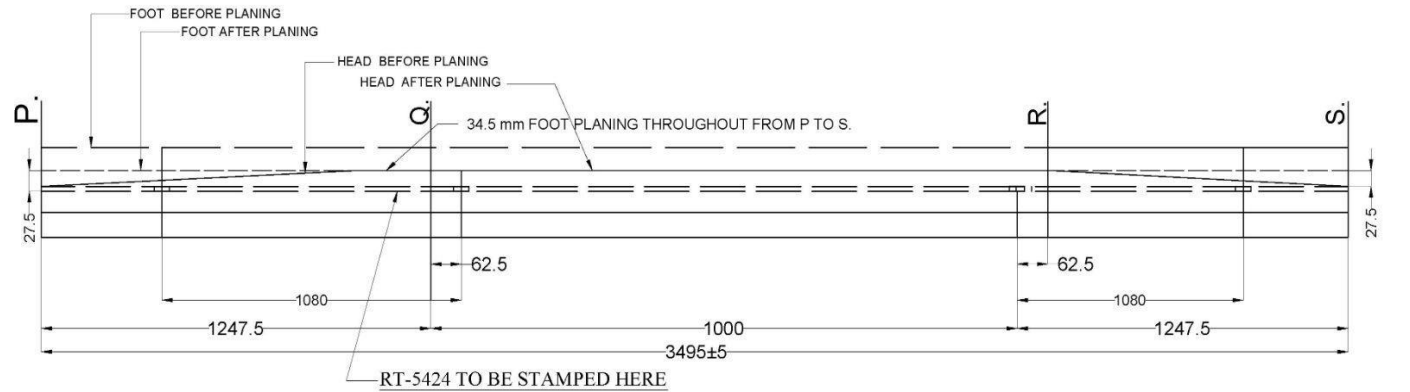
PLANING

- (i) **INSIDE FOOT** :- THE INSIDE FOOT IS PLANED VERTICALLY STRAIGHT FROM 'P' TO 'S' SO THAT THE PLANED PORTION IS 46 mm FROM EDGE OF THE FOOT AS SHOWN IN THE END ELEVATION AND SECTION BELOW.
- (ii) **OUTSIDE FOOT** :- NO PLANING IS REQUIRED
- (iii) **INSIDE HEAD** :- THE INSIDE HEAD IS PLANED AS A SLOPE OF 1 IN 20 EXTENDING FROM 0 mm AT 'Q' AND 'R' TO 27.75 mm AT 'P' AND 'S' AT THE TOP TABLE OF THE CHECK RAIL AS SHOWN IN END ELEVATION AT 'P' AND 'S'
- (iv) **OUTSIDE HEAD** :- NO PLANING IS REQUIRED



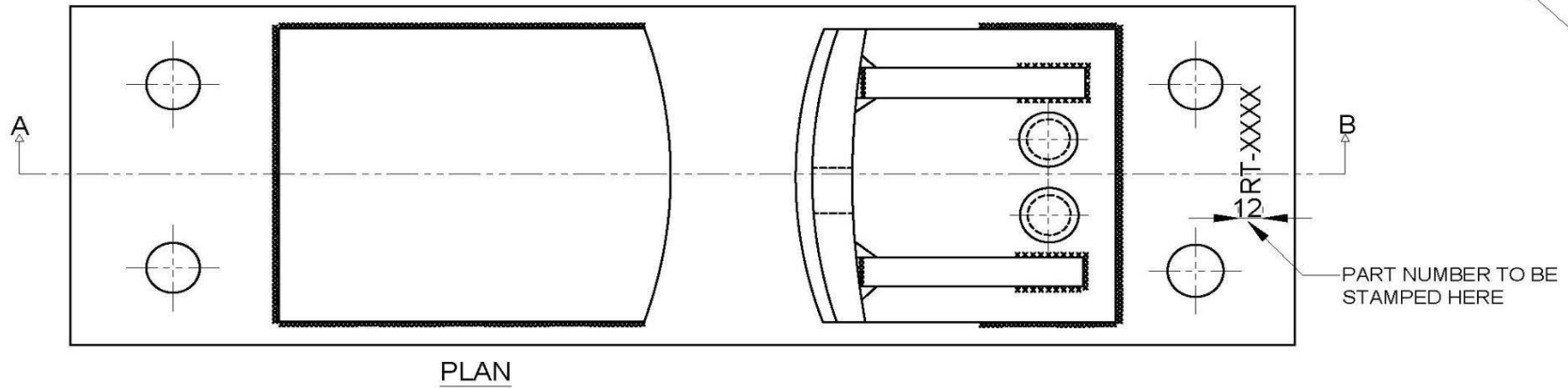
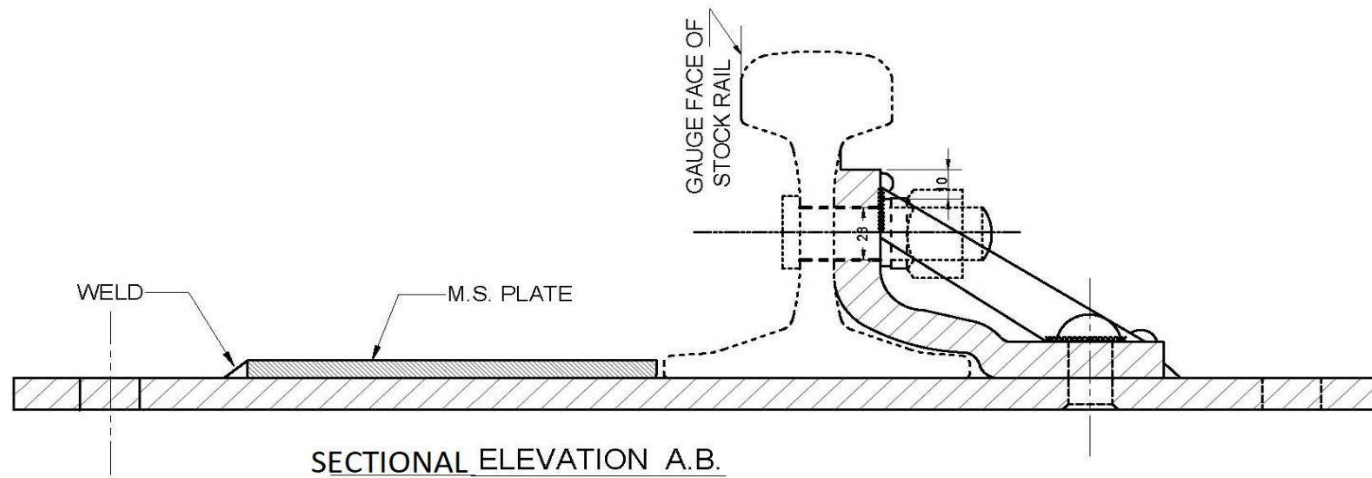
DS10
SHEET 1 OF 2

MACHINED HEAD RAIL FOR 1 IN 8.5, 52 KG DIAMOND WITH SLIP TO DRG NO. RDSO/ T-5424



DS10
SHEET 2 OF 2

SPECIAL SLIDE CHAIR FOR DIAMOND CROSSING WITH SINGLE & DOUBLE SLIPS



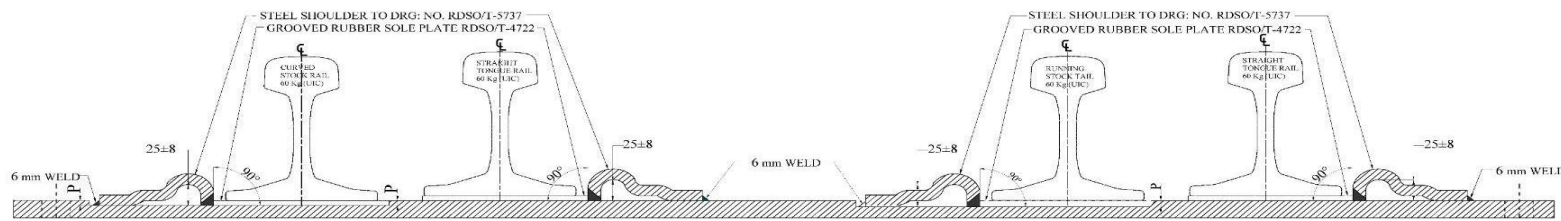
DS 11
SHEET 1 OF 2

TABLE OF SPECIAL SLIDE CHAIR FOR DIAMOND CROSSING WITH SINGLE & DOUBLE SLIPS:

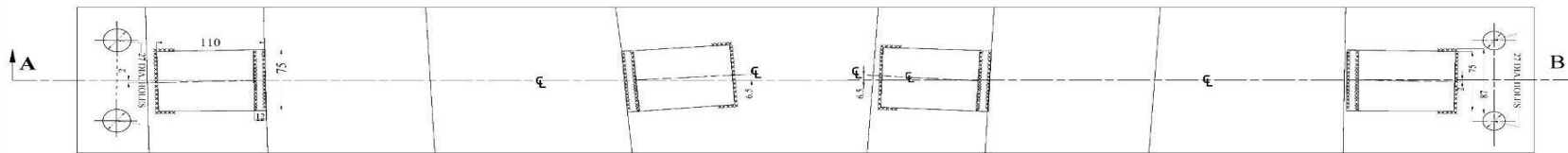
GAUGE	CROSSING ANGLE/ SECTION	PART NAME	DRAWING NO.
B.G.	1 IN 8.5, 60 KG (UIC)	SLIDE CHAIR M.S.	RDSO/T-6528
		SLIDE CHAIR M.S.	RDSO/T-6529
		SLIDE CHAIR M.S.	RDSO/T-6530 TO RDSO/T-6533
		SLIDE CHAIR M.S. EXTENDED	RDSO/T-6512 & RDSO/T-6513
	1 IN 8.5, 52 KG	SLIDE CHAIR M.S.	RDSO/T-5376
		SLIDE CHAIR M.S.	RDSO/T-5383
		SLIDE CHAIR M.S.	RDSO/T-5384
		SLIDE CHAIR M.S.	RDSO/T-5385 TO RDSO/T-5388
	1 in 10 MOVABLE SWITCH DIAMOND, 52 kg	SLIDE CHAIR M.S.	RDSO/T-5383
		SLIDE CHAIR M.S.	RDSO/T-5384

DS 11
SHEET 2 OF 2

SPECIAL FLAT BEARING PLATE FOR DIAMOND CROSSING WITH SINGLE & DOUBLE SLIPS



SECTIONAL ELEVATION ON A.B.



PLAN

DS 12
SHEET 1
OF 2

TABLE OF SPECIAL FLAT BEARING PLATE FOR DIAMOND CROSSING WITH SINGLE & DOUBLE SLIPS

GAUGE	CROSSING ANGLE/ SECTION	SPECIAL FLAT BEARING PLATE DRAWING NO.
B.G.	1 IN 8.5, 60 KG (UIC)	RDSO/T-6534 TO RDSO/T-6539
		RDSO/T-6546
		RDSO/T-6558
		RDSO/T-6576
	1 IN 8.5, 52 KG	RDSO/T-5393 TO RDSO/T-5398
		RDSO/T-5593

CHAPTER VII
SCISSORS AND ORDINARY CROSSOVERS

S.N.	Description	Pages	Page No.
1.	Brief notes and general definitions	SXa to SXc	214
2.	Assembly, Sub Assembly & their parts	SX 1 (SHEET 1 TO 4)	217
3.	Definitions of scissors and ordinary crossovers and tables of their assemblies, sub-assemblies & parts	SX 2 (SHEET 1 & 2)	221
4.	Main dimensions of scissors crossovers, 4725 mm track centres B.G.	SX 3	223
5.	Length of rails for 1 in 8.5 scissors crossovers, 4725 mm track centres B.G.	SX 4 (SHEET 1)	224
6.	Length of rails for 1 in 12 scissors crossovers, 4725 mm track centres BG.	SX 4 (SHEET 2)	225
7.	1 in 8.5 and 1 in 4.25 crossings for scissors crossovers, 4725 mm track centres B.G.	SX 5 (SHEET 1 TO 8)	226
8.	1 in 12 and 1 in 6 crossings for scissors crossovers, 4725 mm track centres BG.	SX 6 (SHEET 1 TO 8)	234
9.	Special Check rail (raised) for 1 in 12 crossing (RDSO/T- 4018)	SX 7 (SHEET 1)	242
10.	Special check rail for 1 in 4.25 Acute CMS crossing (RDSO/T- 8548)	SX 7 (SHEET 2)	243
11.	Extended Tie plate for 1 in 8.5, 60 kg scissors cross-over (RDSO/T- 5360 To RDSO/T- 5360/2)	SX 8 (SHEET 1)	244
12.	Extended Tie plate for 1 in 12, 60 kg scissors cross-over (RDSO/T- 5204 To RDSO/T- 5204/2)	SX 8 (SHEET 2)	245
13.	Main Dimensions of Scissors Crossover 7100 mm track centres with curved switches B.G.	SX 9 (SHEET 1 TO 3)	246
14.	10125 mm Over-Riding curved switch 1 in 12, 60 Kg (UIC) (RDSO/T- 4219)	SX 10	249
15.	6400 mm Over-Riding curved switch 1 in 8.5, 60 Kg (UIC) (RDSO/T- 4966)	SX 11	250

Brief Notes on Diamonds and Slips

Crossover: A crossover means connection between two adjacent and continuous tracks. It comprises two sets of turnouts which are interconnected by generally a straight track. A crossover may either be left handed or right handed and it may have two crossings of equal or unequal angles; depending upon the local requirements. All the crossovers, included in this chapter are, however, left handed with crossings of equal angle and have a straight connecting track in between the two crossings.

Scissors crossover: When two crossovers are so arranged as to form a diamond crossing at their point of intersection, the arrangement is known as a scissors crossover. In other words, a scissors crossover is a combination of four turnouts and one diamond. It provides access, usually between the two adjacent parallel tracks, for the rolling stock, from either direction. The scissors crossovers included in this Chapter are with crossings of equal number and are therefore symmetrical about the longitudinal and transverse axes through centre of the scissors crossover.

Acute crossings for scissors: The acute crossings on the main track of scissors crossovers are the same as used in the turnouts of equivalent angle given in Chapter V. But, with the difference that in the case of scissors the sleepers in the crossing portion are perpendicular to the main track instead of the centre line of the crossing as is the case in turnouts. In some cases the sleeper spacings and the special bearing plates are also changed to accommodate the special requirements of other acute crossings required for the diamond portion, depending upon the track centres and location of joints.

Table of main dimensions of scissors & ordinary crossovers:

(a) The main dimensions of ordinary crossovers are:

Track Centres	(G)
Angle of crossing	(Z)
Switch angle	(H)
Radius of turnout	(M)
Distance of actual toe of switch to heel	(L)
Distance of theoretical toe of switch to heel	(B)
Distance of actual toe or switch to end of stock rail	(K)
Distance of theoretical toe of switch to end of stock rail	(A)
Length of straight from actual nose of crossing to the tangent point along rail	(J)
Lead of the turnout	(C)
Distance of actual nose of crossing to heel	(P)
Distance between actual noses of acute crossings	(Q)
Distance between theoretical noses of acute crossings	(D)
Distance between actual and theoretical noses of crossings	(E)
Distance between actual nose and end of the toe of crossing	(S)
Distance between actual and theoretical toe of switch	(F)
Overall length of the crossing	(R)
Overall length of the cross-over	(Y)

(b) The main dimensions of scissors crossovers are:

Track centres	(G)
Angle of acute crossing on main track	(Z)
Angle of acute and obtuse crossing in diamonds	(O)
Switch angle	(H)
Radius of turnout	(M)
Distance between actual noses of point rails of an obtuse crossing	(R)
Distance between theoretical noses of acute and obtuse crossings	(F&D)
Distance between actual noses of the acute and obtuse crossings	(S)
Distance of actual toe of switch to heel	(L)
Distance of theoretical toe of switch to heel	(B)
Distance of actual toe of switch to end of stock rail	(K)
Distance of theoretical toe of switch to end of stock rail	(A)
Length of straight from actual nose of crossing to the tangent point along rail	(J)
Lead of turnout	(C)
Distance of actual nose of crossing to heel	(P)
Distance between actual noses of acute crossings	(Q)
Distance between theoretical noses of acute crossings	(E)
Overall length of scissors crossover	(Y)

ASSEMBLIES AND SUB-ASSEMBLIES IN SCISSORS CROSSOVERS FOR DIFFERENT TRACK CENTRES

GAUGE	DESCRIPTION	TRACK CENTRES	CROSSING	RAIL SECTION	ASSEMBLIES	SUB-ASSEMBLIES			
						MAIN ACUTE CROSSING	SCISSORS ACUTE CROSSING	OBTUSE CROSSING	SWITCH
						DRAWING No.	DRAWING No.	DRAWING No.	DRAWING No.
B.G.	SCISSORS CROSSOVERS WITH CURVED SWITCHES	4725	1 IN 8.5	60 kg	RDSO/T- 6092	RDSO/T- 6096 AND RDSO/T- 6093	RDSO/T- 6099	RDSO/T- 6102	RDSO/T- 4966
			1 IN 12	60 kg	RDSO/T- 8109	RDSO/T- 8110 AND RDSO/T- 8113	RDSO/T- 8116	RDSO/T- 8119	RDSO/T- 4219
	SCISSORS CROSSOVERS WITH CURVED SWITCHES	7100	1 IN 8.5	60 kg	RDSO/T- 8539	RDSO/T- 4967	RDSO/T- 8540	RDSO/T- 6102	RDSO/T- 4966

SX 1
SHEET 1 OF 4

CROSSING SUB-ASSEMBLIES AND MAIN PARTS

GAUGE	TRACK CENTRES	CROSSING	RAIL SECTION	MAIN ACUTE CROSSING		SCISSORS ACUTE CROSSING		OBTUSE CROSSING
				SUB ASSEMBLY DRAWING No.	CHECK RAILS	SUB ASSEMBLY DRAWING No.	CHECK RAILS	
					TAPERED		VEE	
					DRAWING No.	ORDINARY	DRAWING No.	SUB ASSEMBLY DRAWING No.
B.G.	4725	1 IN 8.5	60 kg	RDSO/T- 6093 AND RDSO/T- 6096	RDSO/T- 4018 (RAISED)	RDSO/T- 6099	--	RDSO/T- 6102
		1 IN 12	60 kg	RDSO/T- 8110 AND RDSO/T- 8113	RDSO/T- 4018 (RAISED)	RDSO/T- 8116	--	RDSO/T- 8119
	7100	1 IN 8.5	60 kg	RDSO/T- 4967	RDSO/T- 4018	RDSO/T- 8540	RDSO/T- 8548	RDSO/T- 6102

ASSEMBLIES AND SUB-ASSEMBLIES IN CROSS-OVERS

GAUGE	CROSSING	TRACK CENTRES	RAIL SECTION	DESCRIPTION	LAYOUT	CROSSING	SWITCH
					DRAWING No.	DRAWING No.	DRAWING No.
B.G.	1 IN 8.5	4725	60 kg	CROSSOVER WITH 6400 mm CURVED SWITCHES	RDSO/T- 6092	RDSO/T- 6093, RDSO/T- 6096, RDSO/T- 6099 AND RDSO/T- 6102	RDSO/T- 4966
		7100	60 kg	CROSSOVER WITH 6400 mm CURVED SWITCHES	RDSO/T- 8539	RDSO/T- 8540, RDSO/T- 4967 AND RDSO/T- 6102	RDSO/T- 4966
	1 IN 12	4725	60 kg	CROSSOVER WITH 10125 mm CURVED SWITCHES	RDSO/T- 8109	RDSO/T- 8110, RDSO/T- 8113, RDSO/T- 8116 AND RDSO/T- 8119	RDSO/T- 4219

SX 1
SHEET 3 OF 4

CROSSING & SWITCH SUB-ASSEMBLIES AND MAIN PARTS

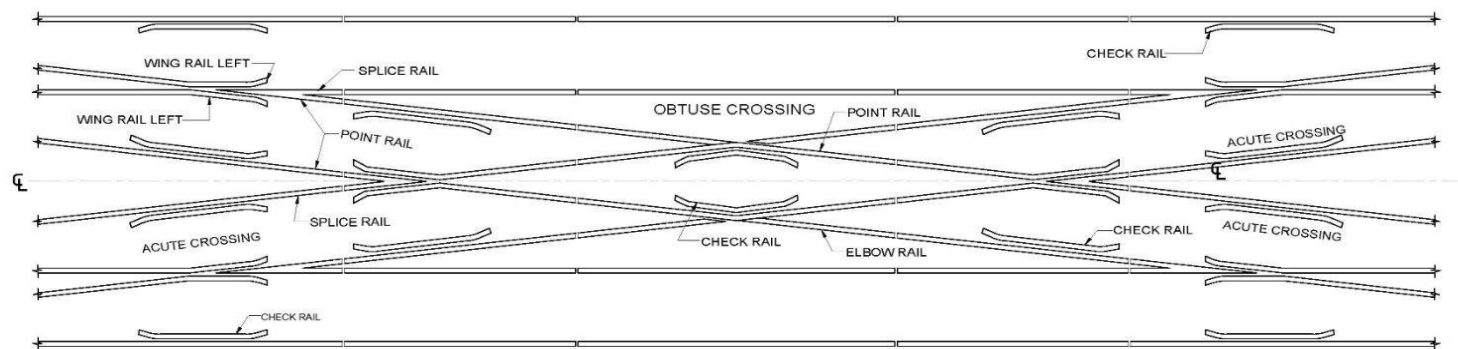
GAUGE	TRACK CENTRES	CROSSING	RAIL SECTI ON	CROSSING		SWITCH		STRETCHER BARS				BRACKETS M.S.
				DRAWING No.	CHECK RAIL	DRAWING No.	SLIDE CHAIR	ORDINARY			FOR ORDINARY STR. BAR	
								LEADING	FOLLOWING			
									1ST	2ND		3RD
B.G.	4725	1 IN 8.5	60 kg	RDSO/T- 6093, RDSO/T- 6096, RDSO/T- 6099 AND RDSO/T- 6102	RDSO/T- 4018 FOR RDSO/T- 6093 AND RDSO/T- 6096	RDSO/T- 4966	RDSO/T - 4968	RDSO/T- 4981 & RDSO/T- 4982	RDSO/T- 4983 & RDSO/T- 4984	RDSO/T- 4985 & RDSO/T- 4986	--	T 10741
		1 IN 12	60 kg	RDSO/T- 8110, RDSO/T- 8113, RDSO/T- 8116 AND RDSO/T- 8119	RDSO/T- 4018 FOR RDSO/T- 8110 AND RDSO/T- 8113	RDSO/T- 4219	RDSO/T - 4596	RDSO/T- 3649 & RDSO/T- 3650	RDSO/T- 3651 & RDSO/T- 3652	RDSO/T- 3653 & RDSO/T- 3654	RDSO/T - 3655 & RDSO/T - 3656	RDSO/T- 2625
	7100	1 IN 8.5	60 kg	RDSO/T- 8540, RDSO/T- 4967 AND RDSO/T- 6102	RDSO/T- 4018 FOR RDSO/T- 4967 AND RDSO/T- 8548 FOR RDSO/T- 8540	RDSO/T- 4966	RDSO/T - 4968	RDSO/T- 4981 & RDSO/T- 4982	RDSO/T- 4983 & RDSO/T- 4984	RDSO/T- 4985 & RDSO/T- 4986	--	T 10741

SHEET 4 OF 4

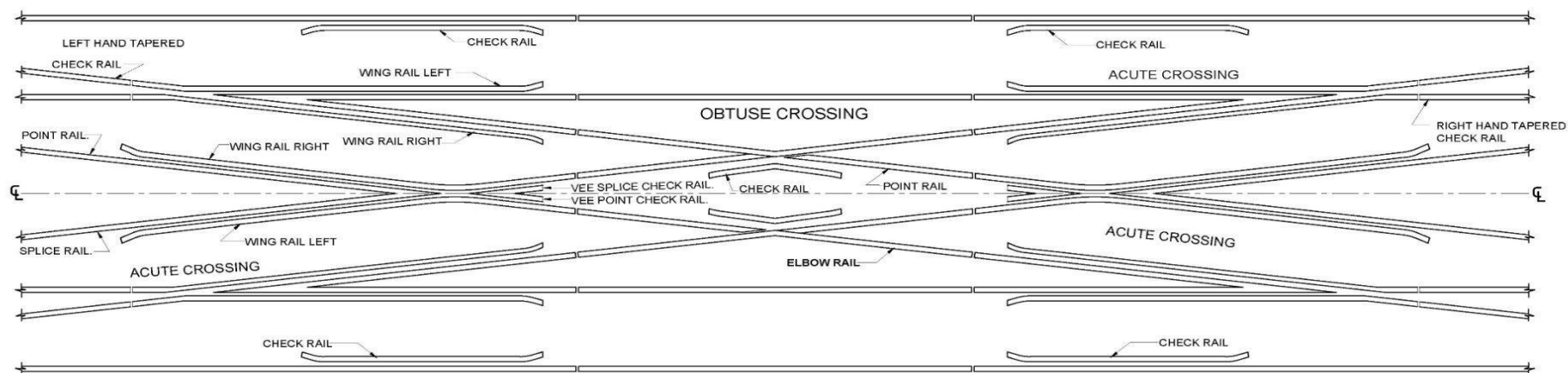
SX 1

DEFINITIONS OF SCISSORS CROSSOVERS

SCISSORS CROSSOVER WITH ORDINARY CHECK RAILS



SCISSORS CROSSOVER WITH SPECIAL CHECK RAILS

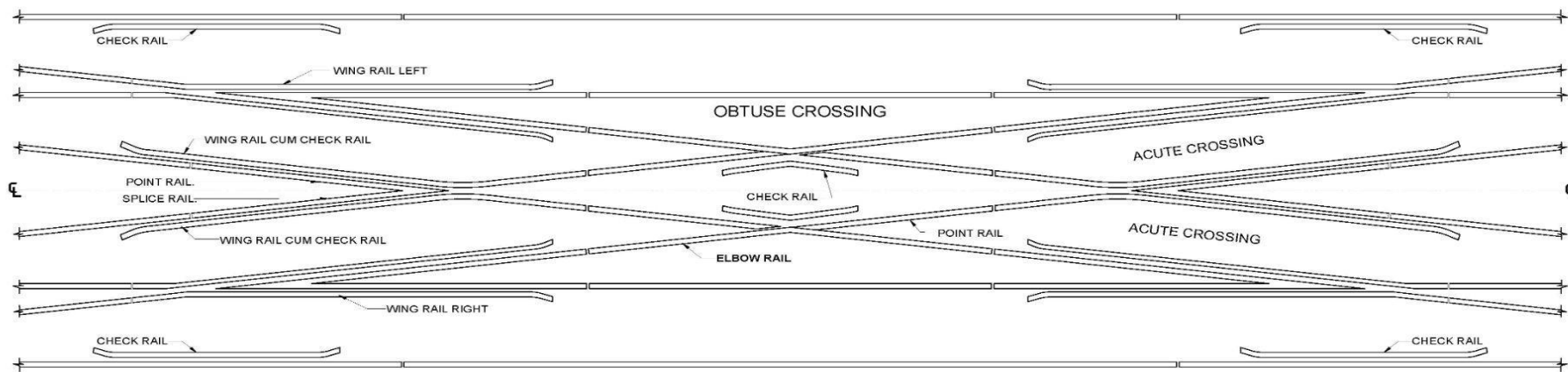


SHEET 1 OF 2

SX2

DEFINITIONS OF SCISSORS CROSSOVERS

SCISSORS CROSSOVER WITH SPECIAL WING CUM CHECK RAILS



SHEET 2 OF 2

SX2

MAIN DIMENSIONS FOR SCISSORS CROSSOVERS
4725 mm TRACK CENTRES WITH CURVED SWITCHES B.G.

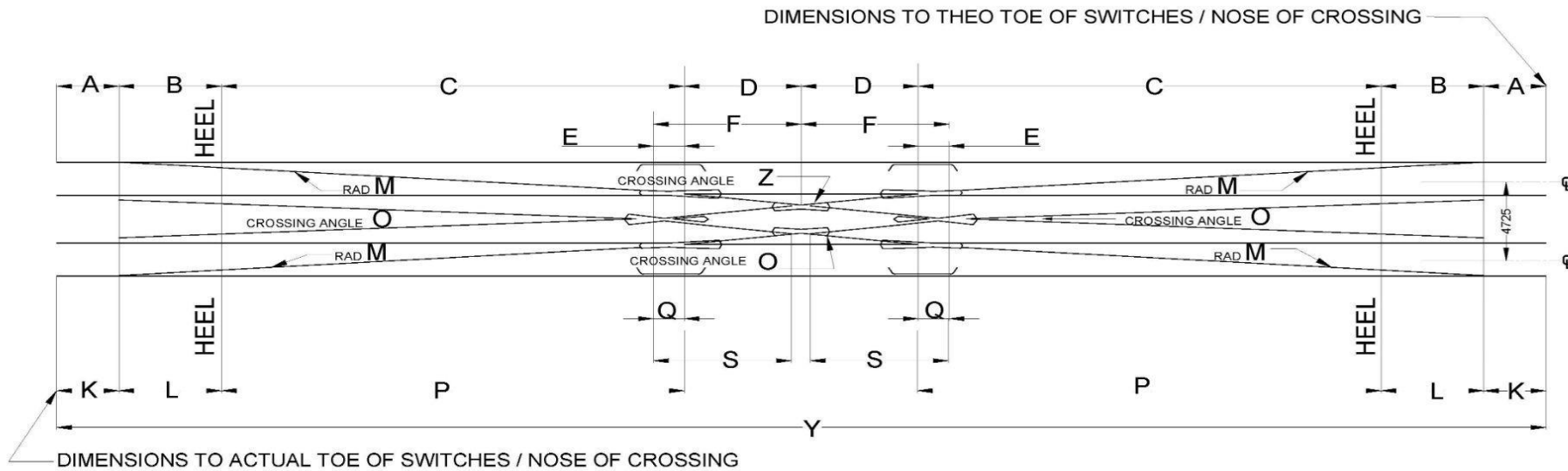


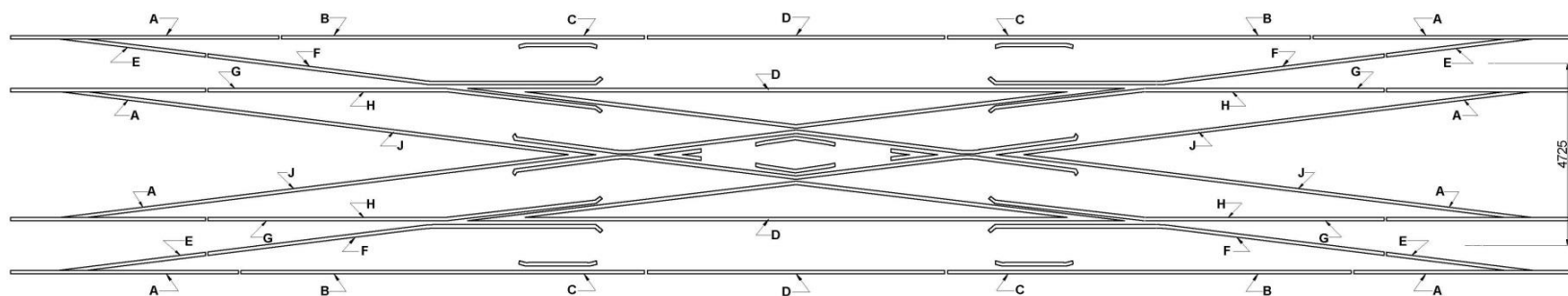
TABLE OF MAIN DIMENSIONS

RAIL SECTION	ASSEMBLY DRAWING No.	CROSSING	DIMENSIONS (mm)								
			A	B	C	D	E	F	J	K	L
60 kg	RDSO/T- 6092	1 IN 8.5	1500	6400	18395	5812	1347	7159	981	1500	6400
60 kg	RDSO/T- 8109	1 IN 12	1144	10125	25831	8239	1833.5	10072.5	2068.5	1144	10125

TABLE OF MAIN DIMENSIONS

RAIL SECTION	ASSEMBLY DRAWING No.	CROSSING	DIMENSIONS (mm)								
			P	Q	R	S	M	O	Z	H	Y
60 kg	RDSO/T- 6092	1 IN 8.5	18536	1561	491	6986.5	232260	13°25'10"	6°42'35"	0°46'59"	64214
60 kg	RDSO/T- 8109	1 IN 12	26029	2130.5	692	9825.5	441360	9°31'38"	4°45'49"	0°20'0"	90678

LENGTH OF RAILS FOR 1 IN 8 $\frac{1}{2}$ SCISSORS CROSSOVERS
4725 mm TRACK CENTRES WITH CURVED SWITCHES B.G.

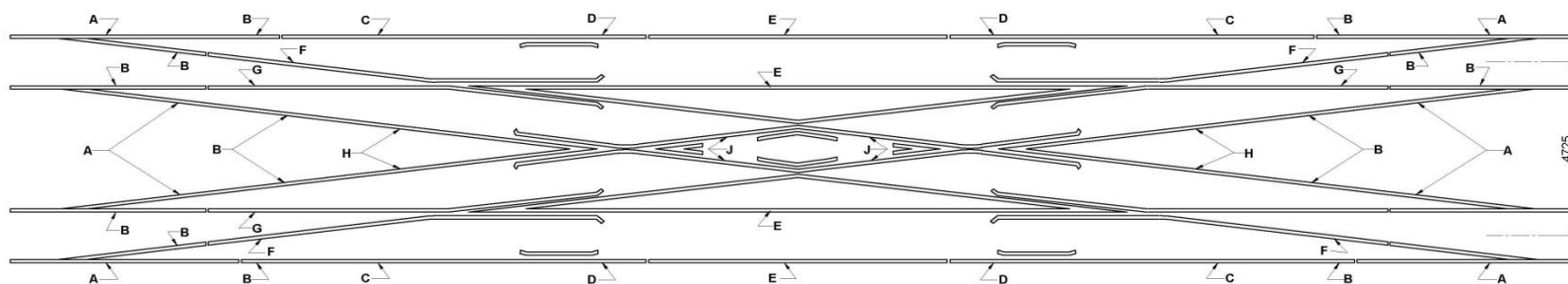


SX4
SHEET 1

TABLE OF RAIL LENGTHS

RAIL SECTION	ASSEMBLY DRAWING No.	DIMENSIONS (mm)									
		A	B	C	D	E	F	G	H	J	
60kg	RDSO/T - 6092	12800	6501	12564	13000	11900	10866	11900	10798	12800	

LENGTH OF RAILS FOR 1 IN 12 SCISSORS CROSSOVERS
4725 mm TRACK CENTRES WITH CURVED SWITCHES B.G.



SHEET 2

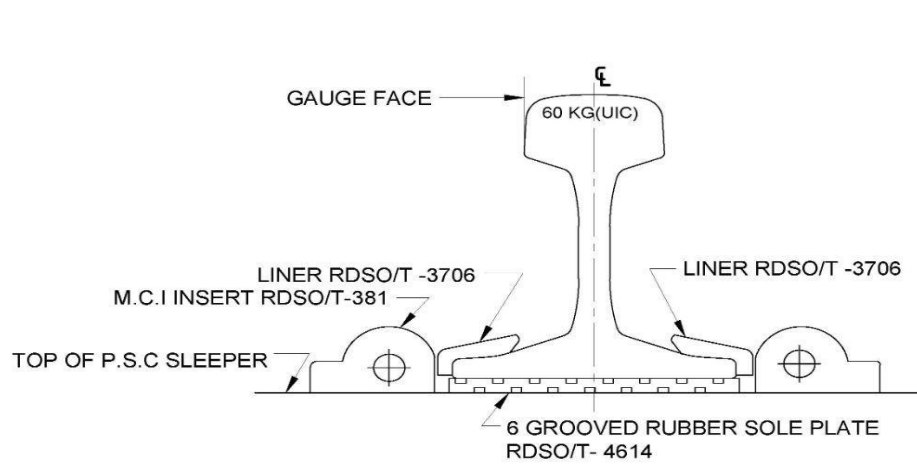
SX4

TABLE OF RAIL LENGTHS

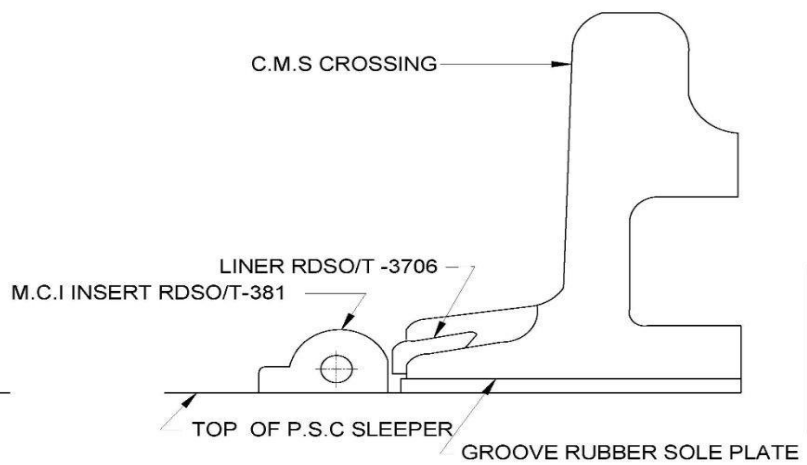
RAIL SECTION	ASSEMBLY DRAWING No.	DIMENSIONS (mm)								
		A	B	C	D	E	F	G	H	J
60kg	RDSO/T- 8109	12356	12650	6667	9411	7066	12800	12720	7700	5612

SX5
SHEET 1 OF 8





DETAIL-'A'



DETAIL-'B'

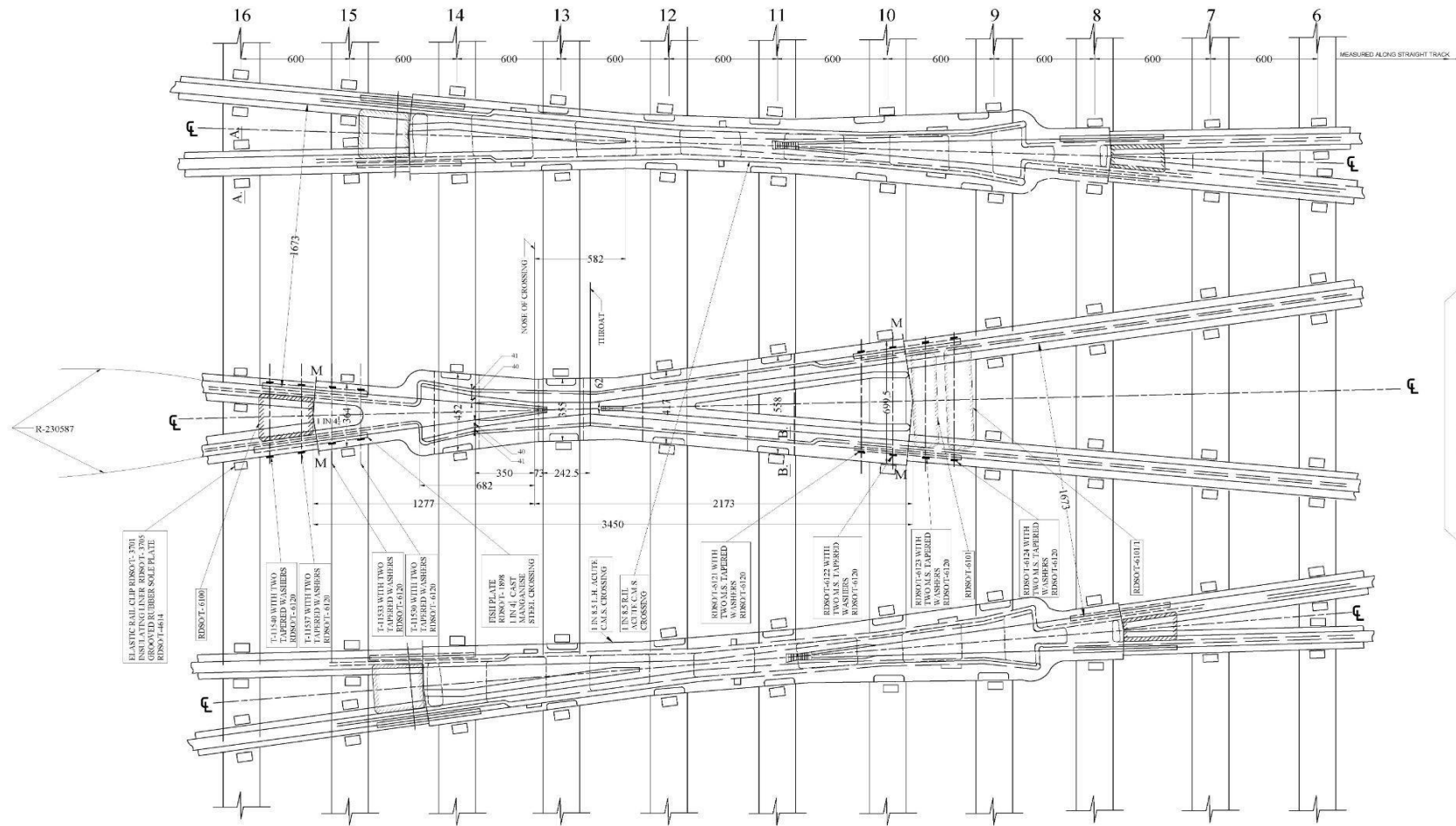
SHEET 2 OF 8

SX5

SHEET 3 OF 8

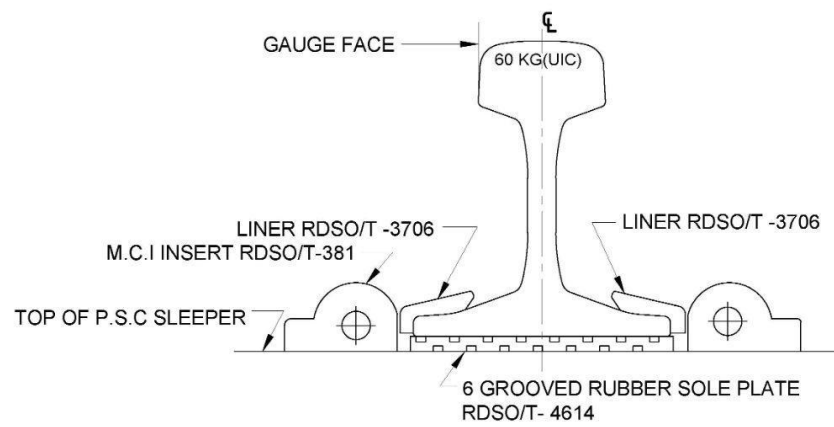


TYPICAL 1 IN 4.25 ACUTE CROSSING FOR SCISSORS 4725 mm TRACK CENTERS B.G. (RDSO/T-6099)

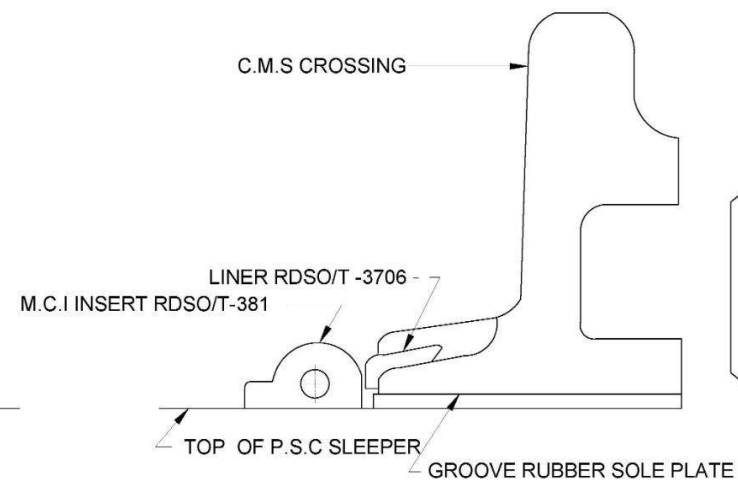


SHEET 5 OF 8

SX5



DETAIL-'A'

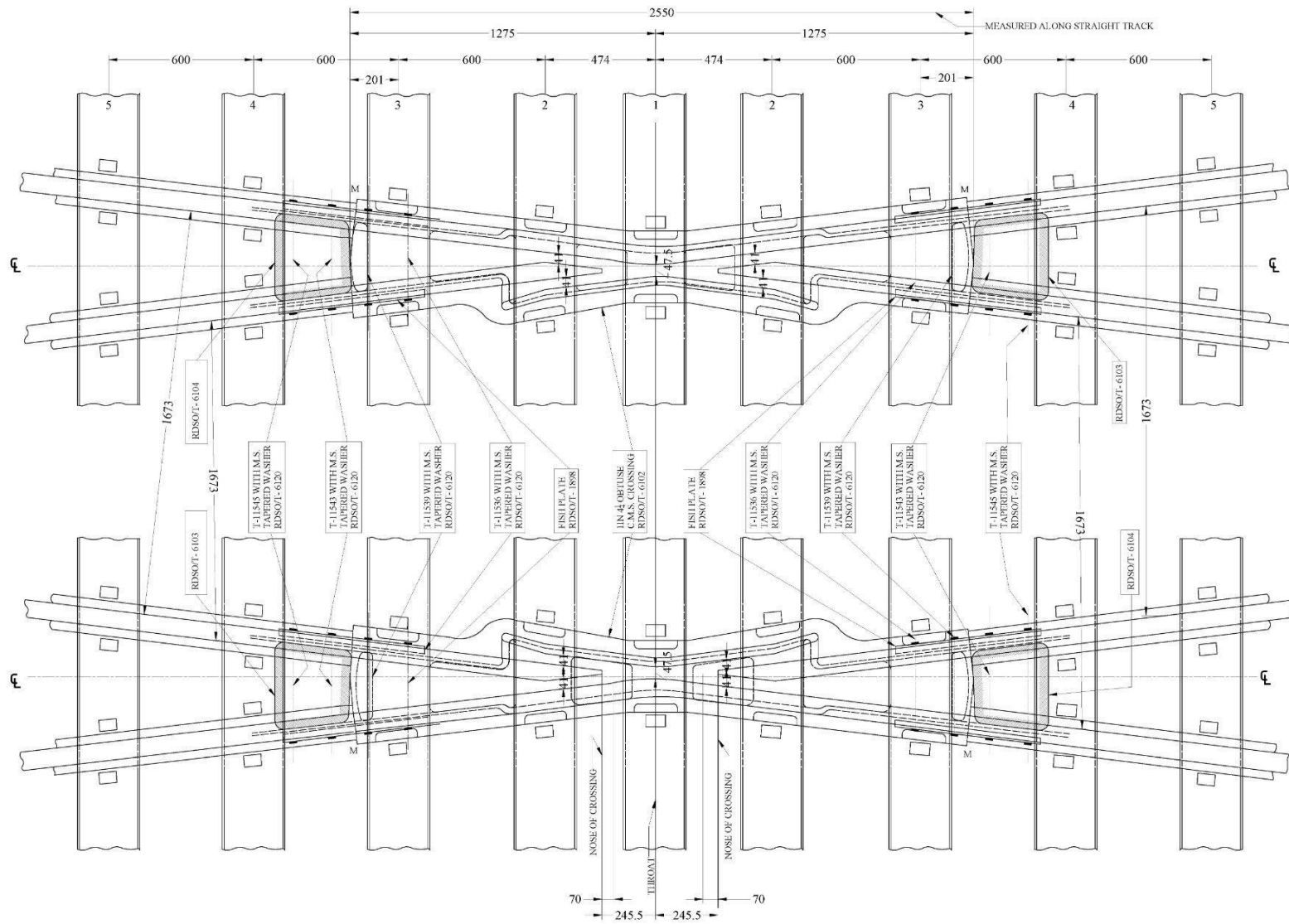


DETAIL-'B'

SHEET 6 OF 8

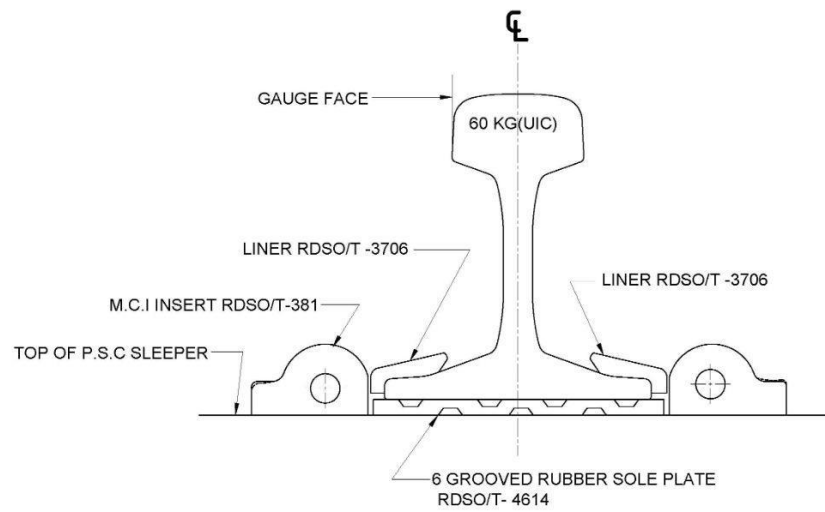
SX5

1 IN 4.25 OBTUSE CROSSING FOR SCISSORS 4725 mm TRACK CENTRES B.G. (RDSO/T- 6102)

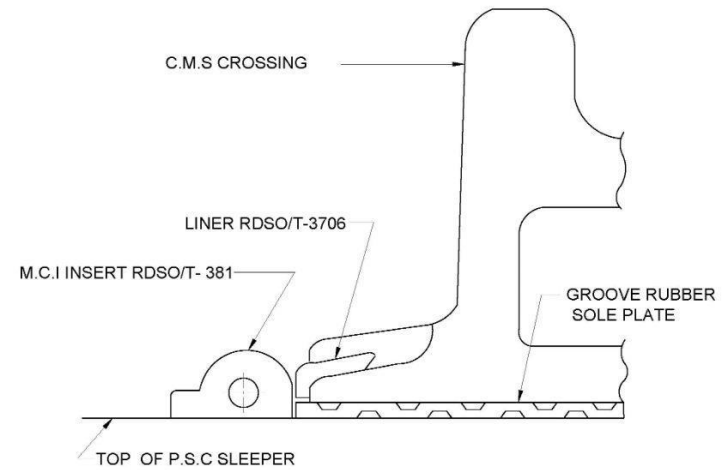


SHEET 7 OF 8

SX5



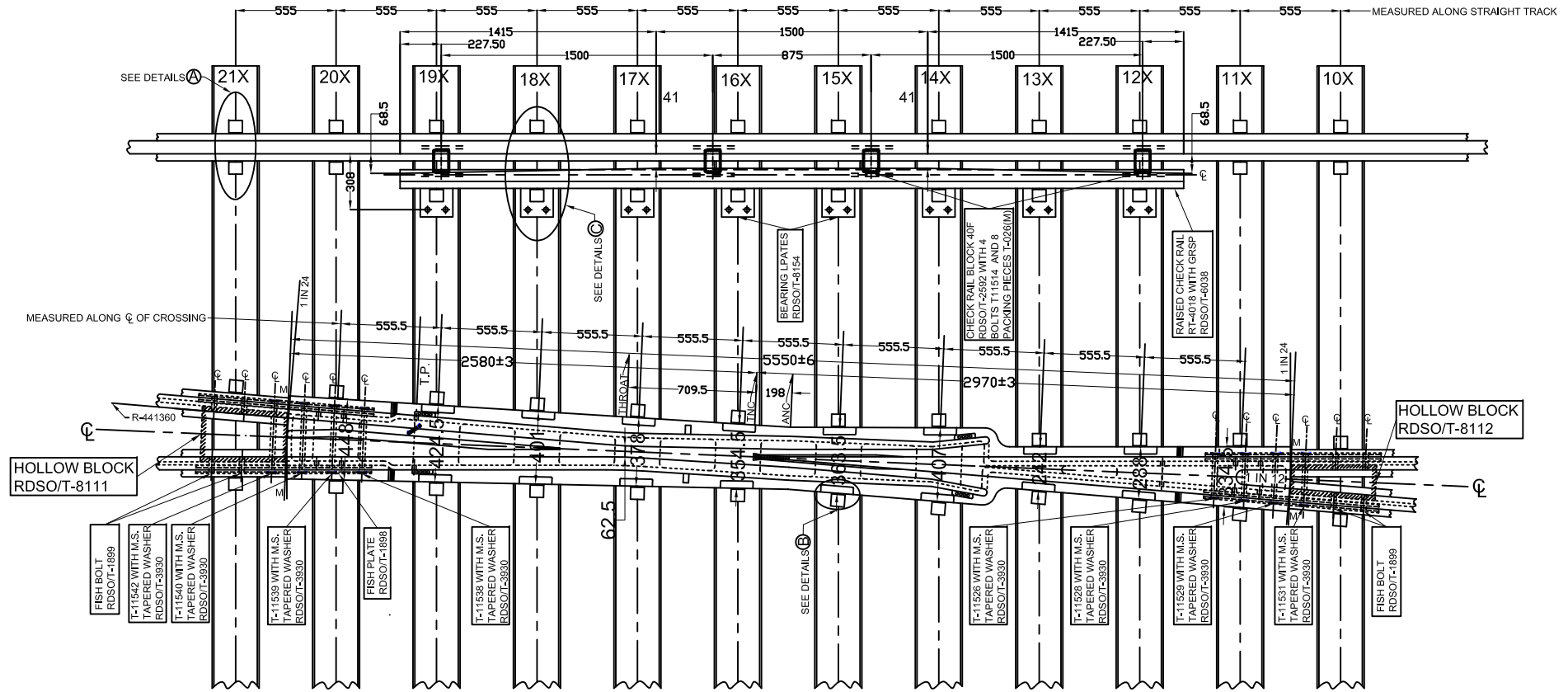
DETAIL-'A'

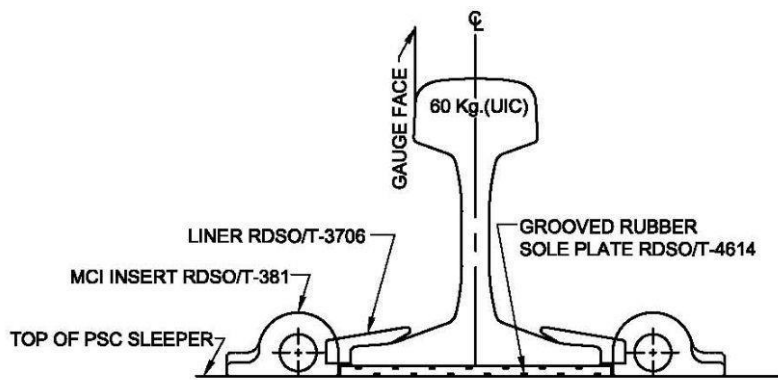


DETAIL-'B'

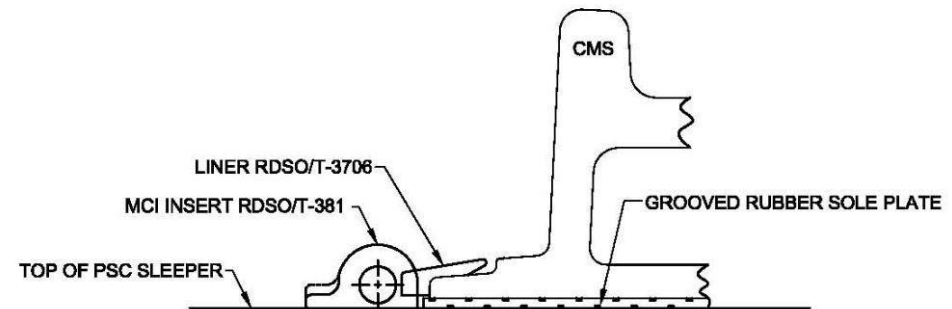
SX5
SHEET 8 OF 8

1 IN 12 R.H. ACUTE CMS CROSSING FOR SCISSORS 4725 mm TRACK CENTRES B.G. (RDSO/T- 8110)

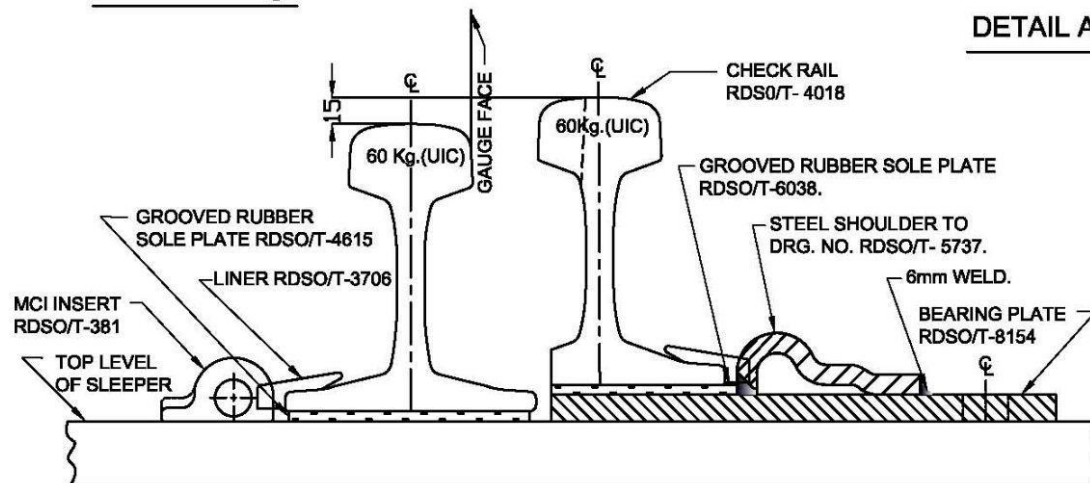




DETAIL AT **(A)**



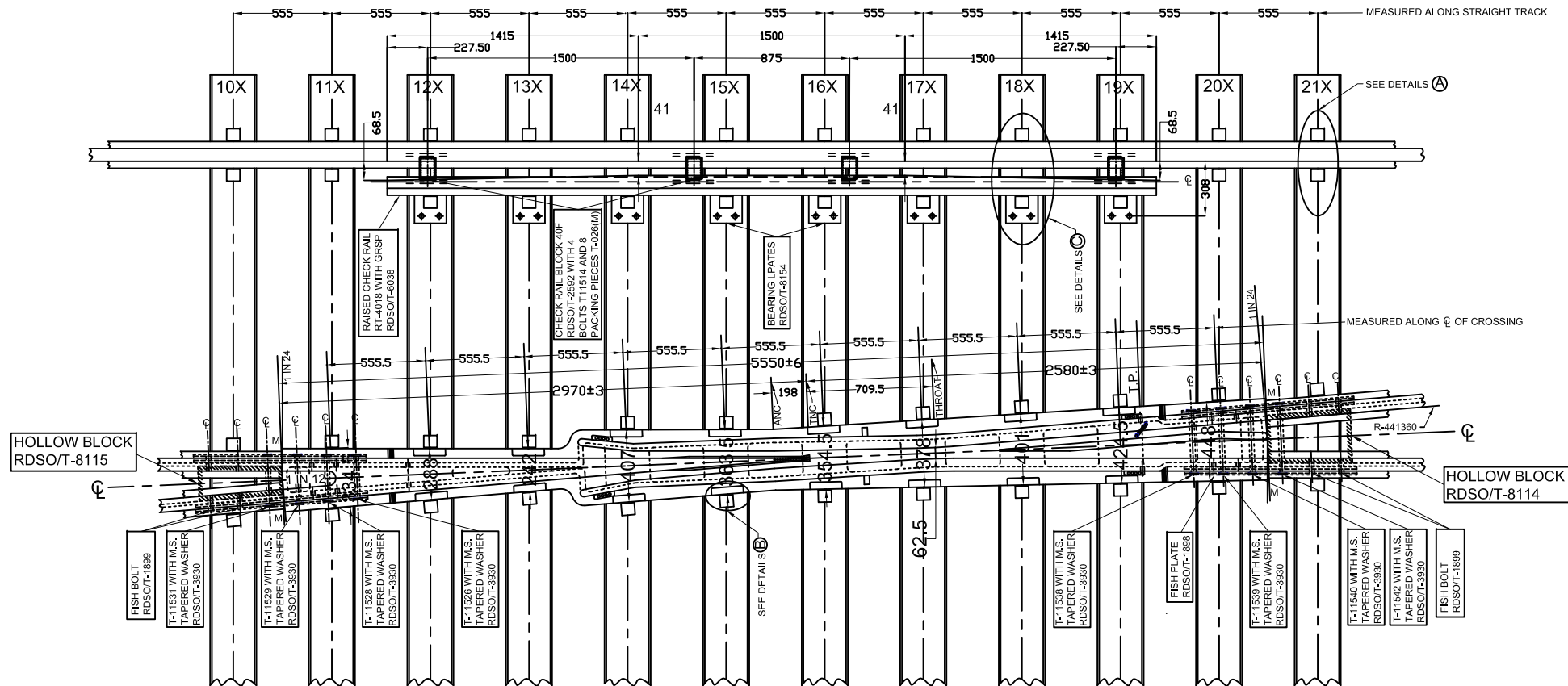
DETAIL AT **(B)**

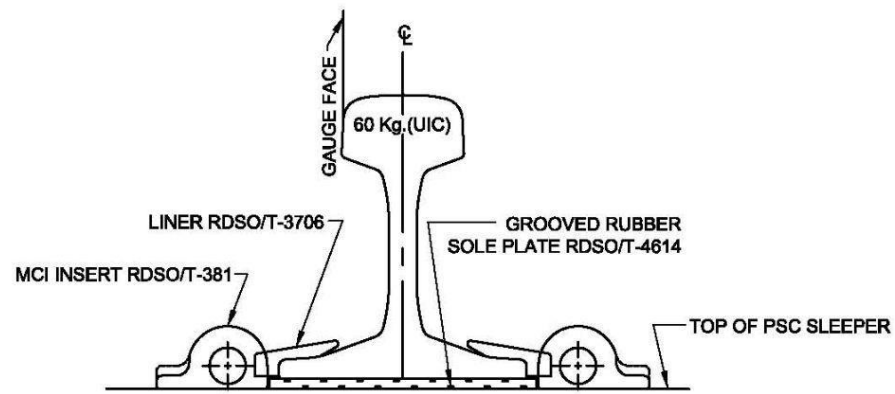


DETAIL AT **(C)**

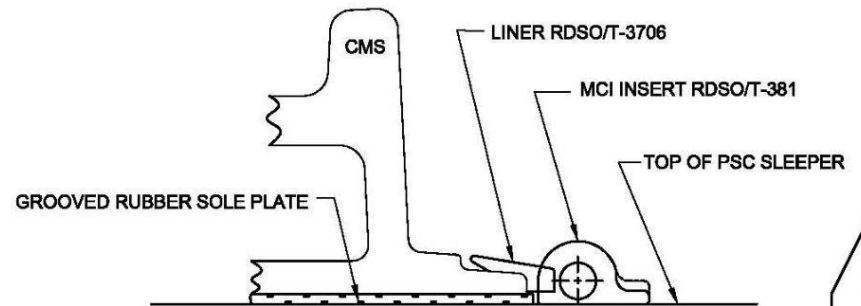
SX 6
SHEET 2 OF 8

1 IN 12 L.H. ACUTE CMS CROSSING FOR SCISSORS 4725 mm TRACK CENTRES B.G. (RDSO/T- 8113)

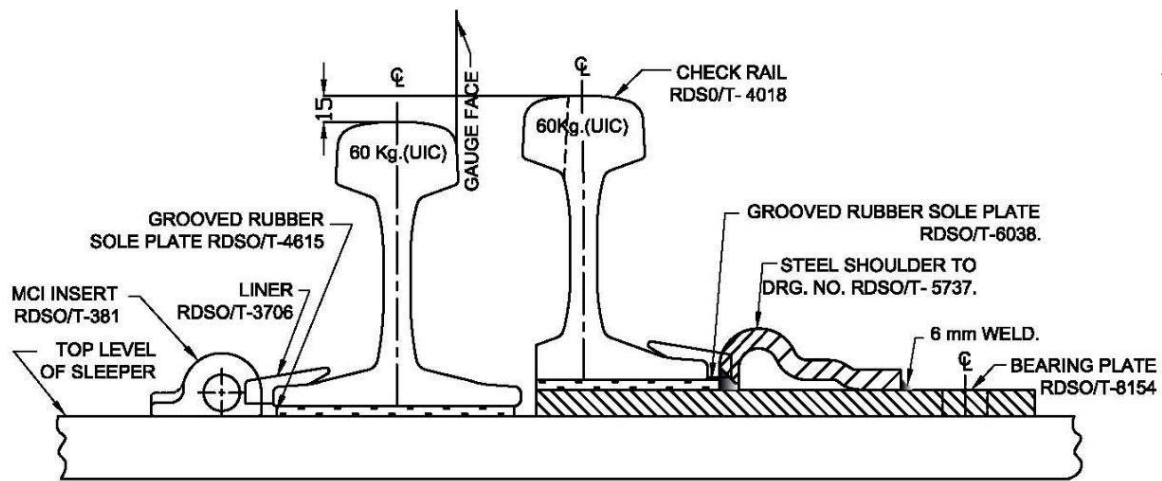




DETAIL AT (A)



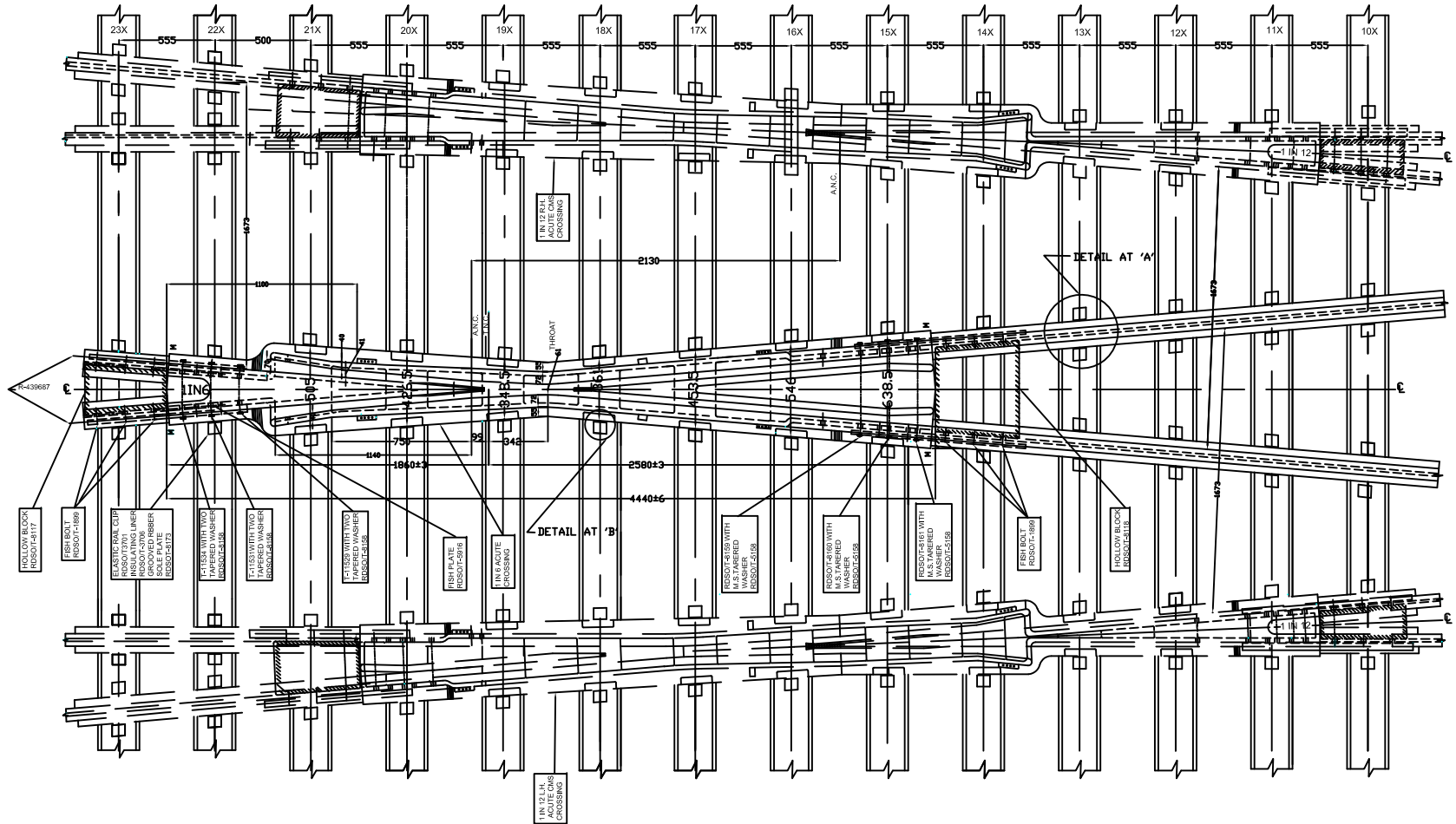
DETAIL AT (B)

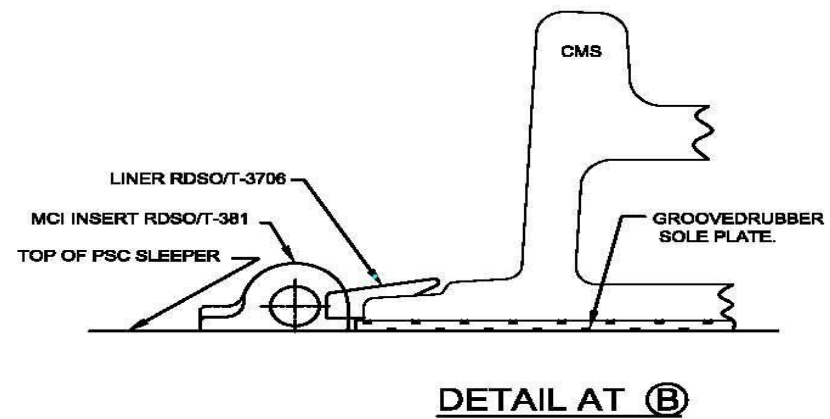
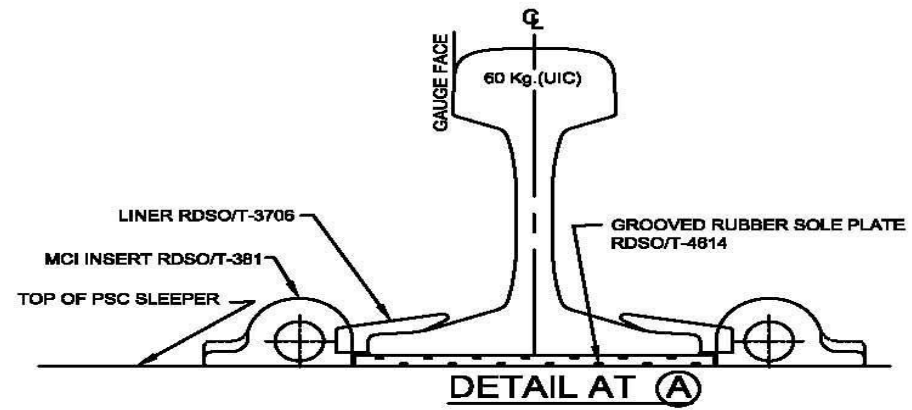


DETAIL AT (C)

SX 6
SHEET 4 OF 8

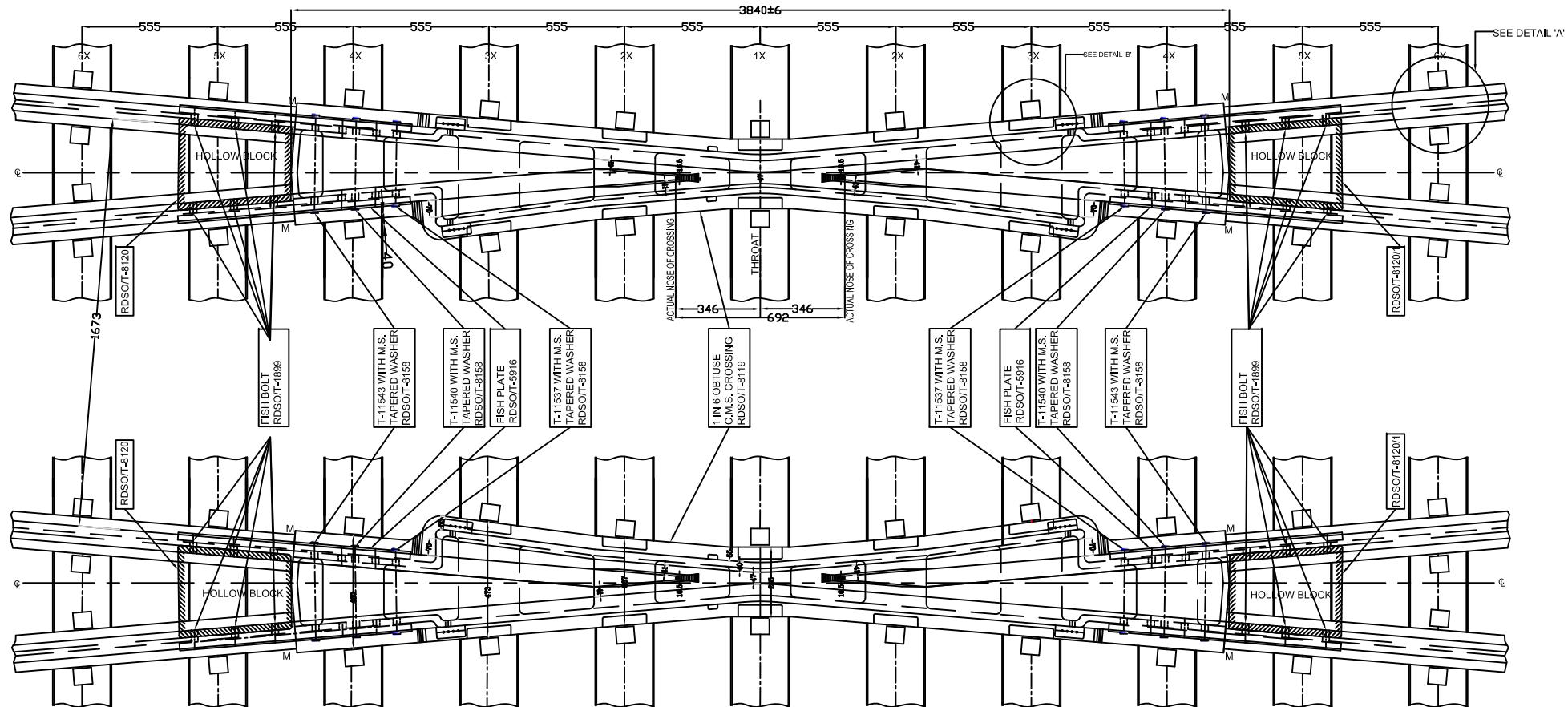
1 IN 6 ACUTE CMS CROSSING FOR SCISSORS 4725 mm TRACK CENTRES B.G. (RDSO/T- 8116)



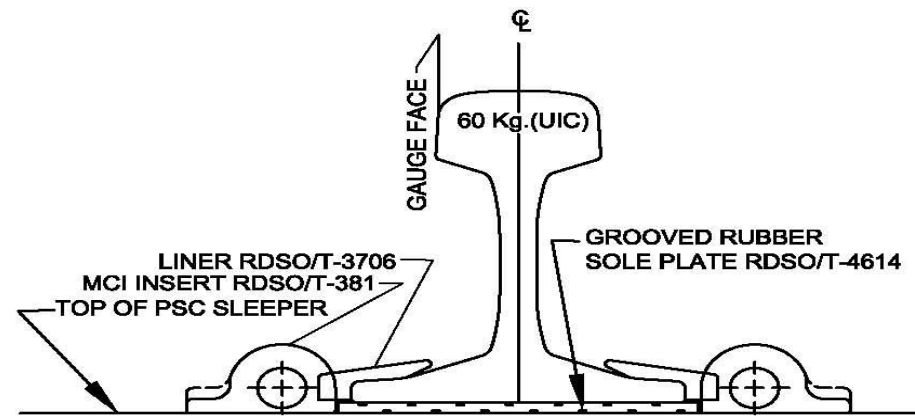


SX 6
SHEET 6 OF 8

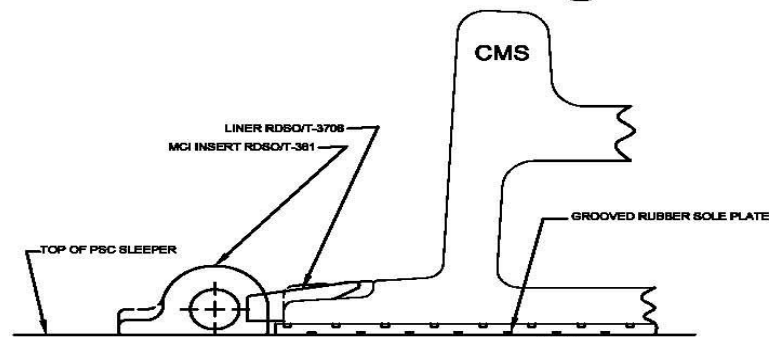
1 IN 6 OBTUSE CMS CROSSING FOR SCISSORS 4725 mm TRACK CENTRES B.G. (RDSO/T- 8119)



SX 6
SHEET 7 OF 8



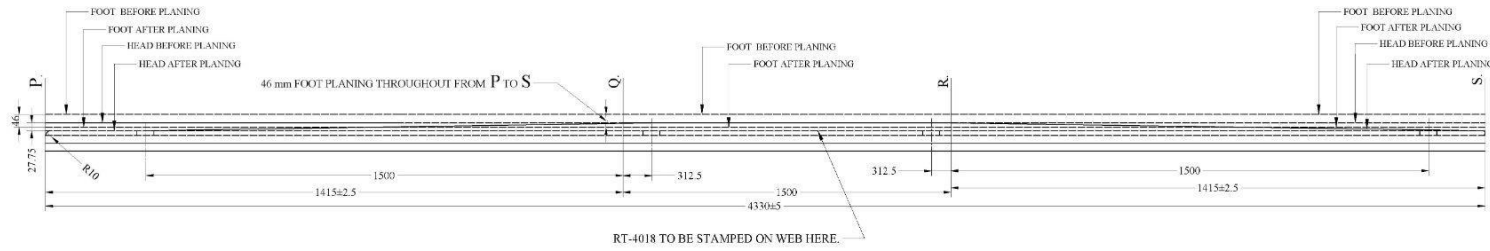
DETAIL AT (A)



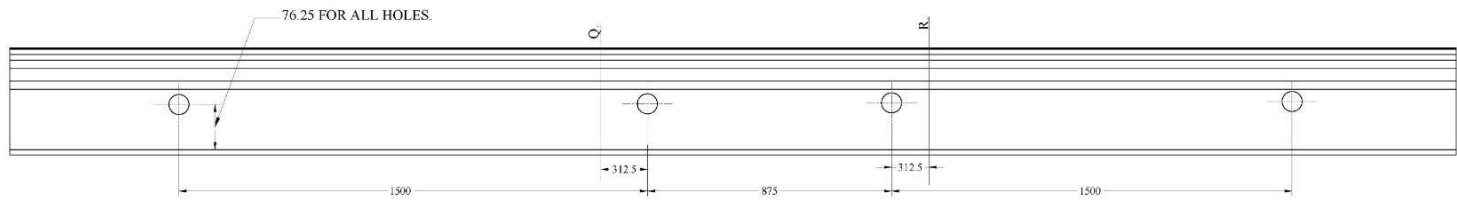
DETAIL AT (B)

SX 6
SHEET 8 OF 8

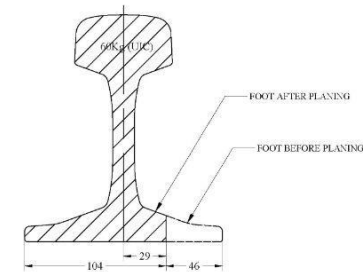
SPECIAL CHECK RAIL (RAISED) FOR 1 IN 12 CROSSING (RDSO/T-4018)



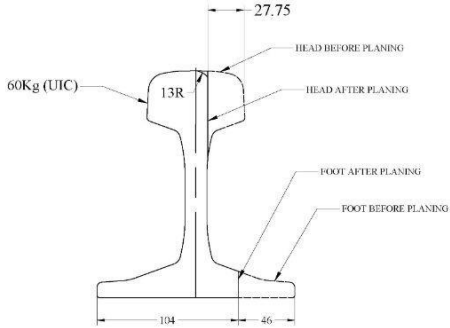
PLAN



ELEVATION



SECTION AT Q & R

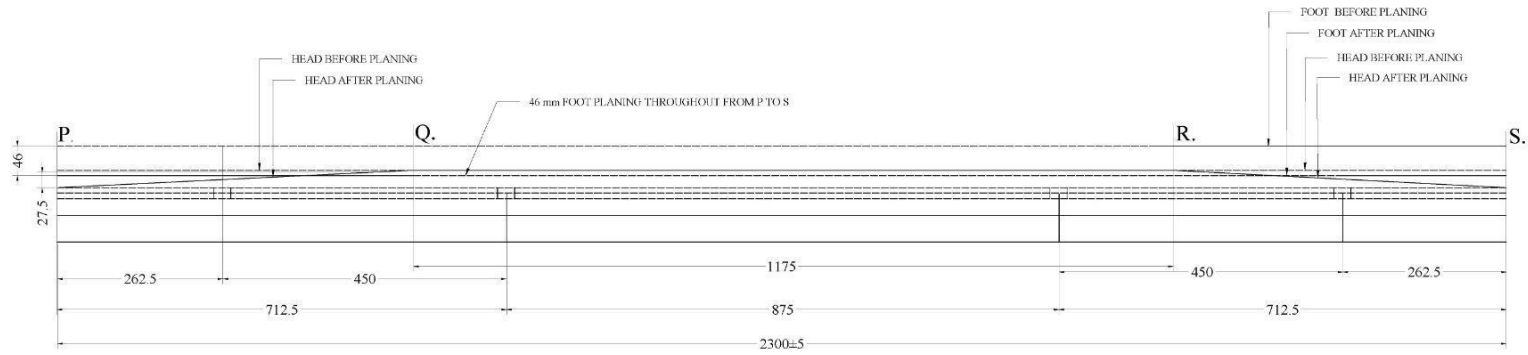


END ELEVATION AT P & S

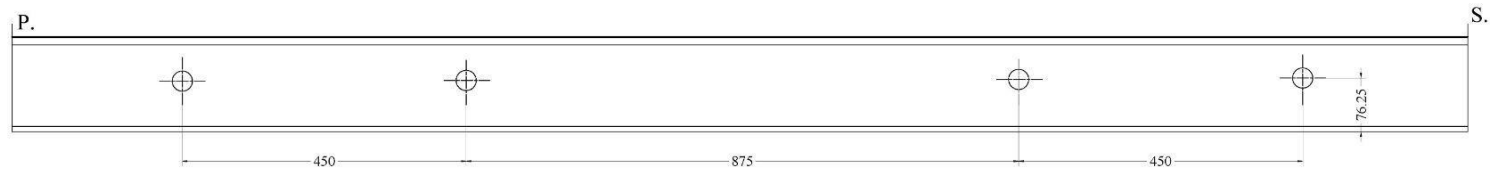
SHEET 1 OF 2

SX7

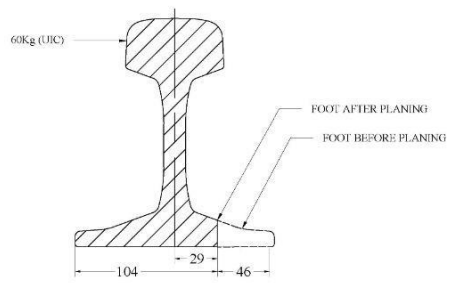
SPECIAL CHECK RAIL FOR 1 IN 4.25 ACUTE CMS CROSSING (RDSO/T- 8548)



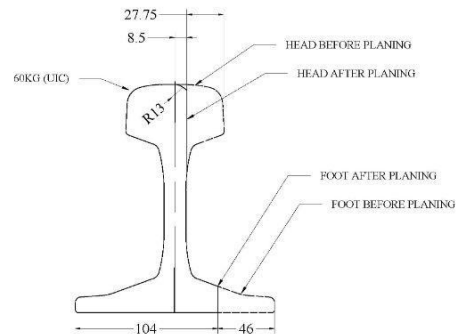
PLAN



ELEVATION



SECTION AT Q & R



SECTION AT P & S

SHEET 2 OF 2

SX7

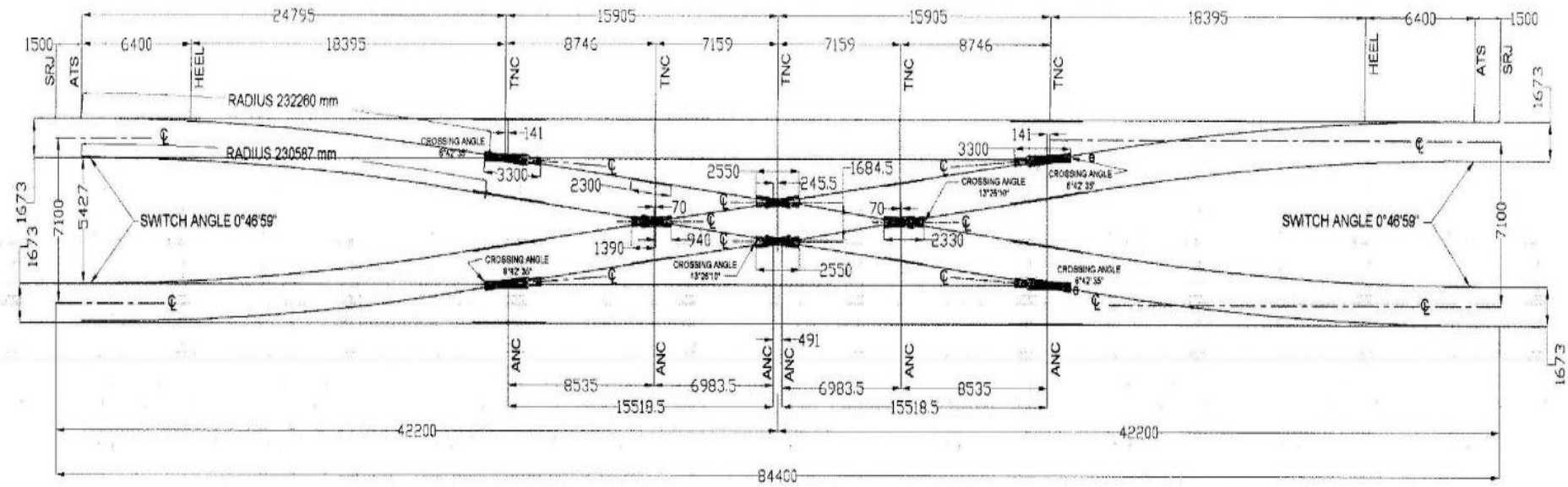
SX8
SHEET 1 OF 2



SX8
SHEET 2 OF 2

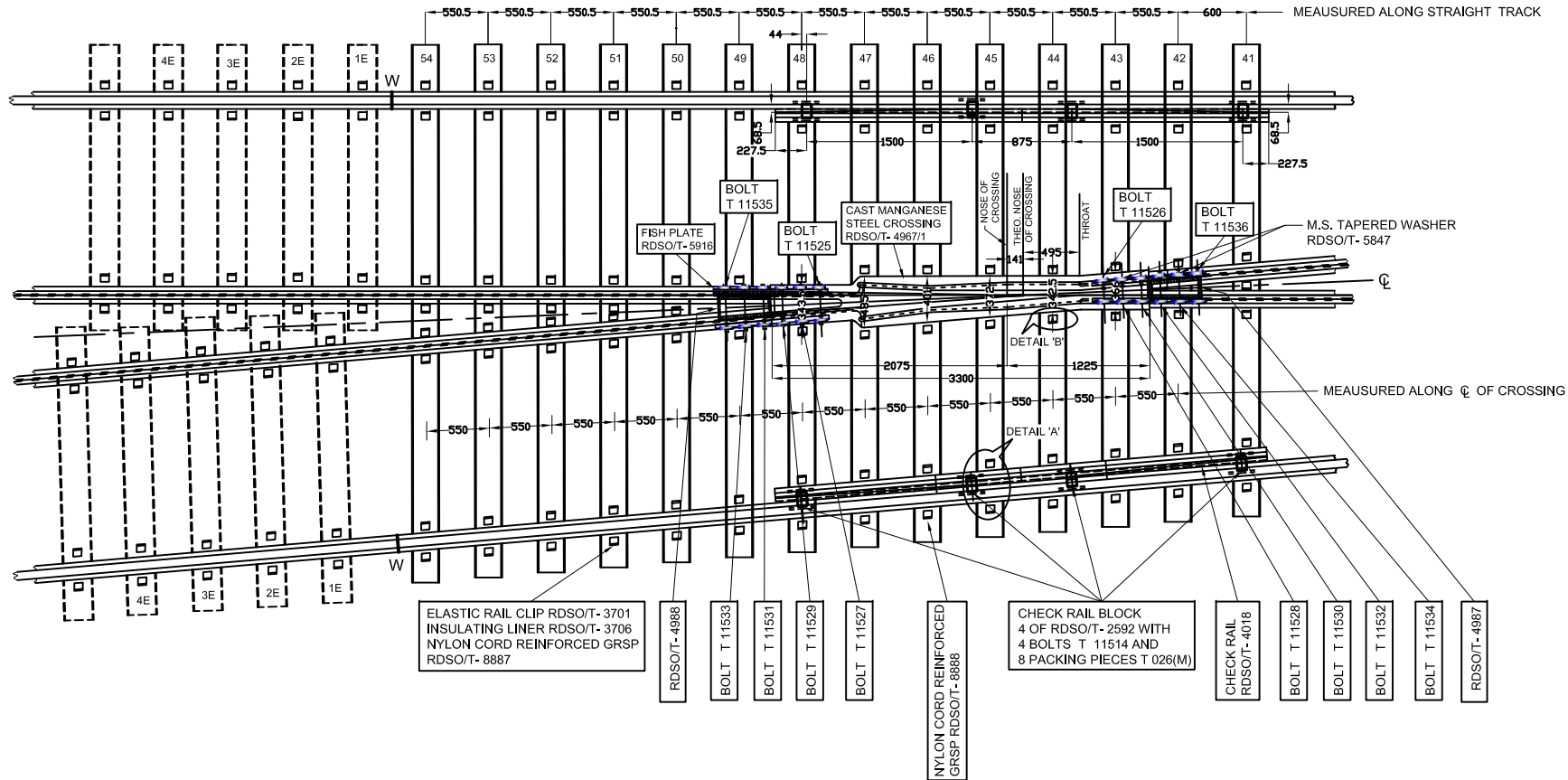


7100 mm TRACK CENTRES WITH CURVED SWITCHES B.G. (RDSO/T- 8539)



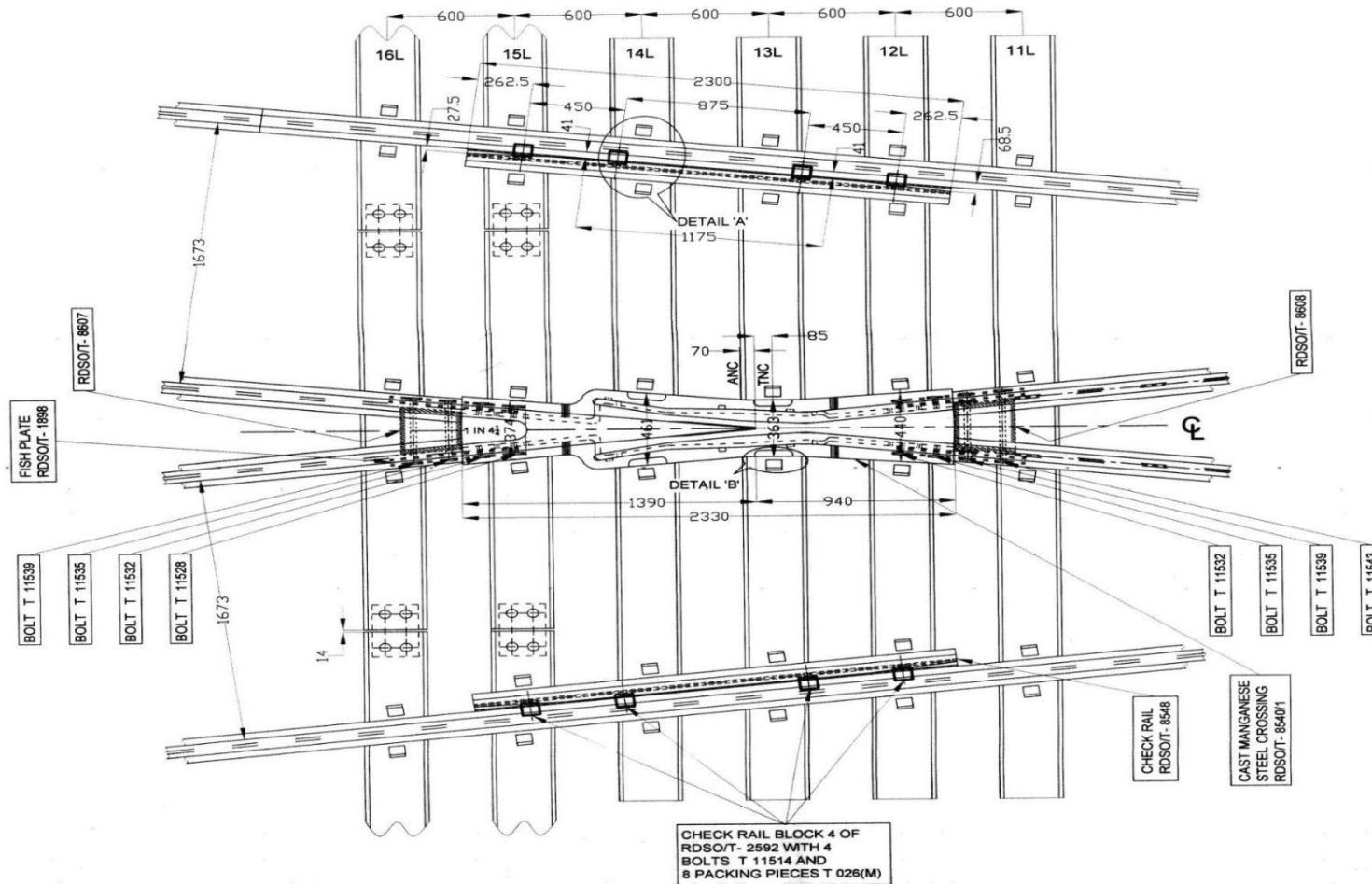
Sx 9

1 IN 8.5 CMS CROSSING B.G. FOR 60 kg (UIC) DRAWING No. RDSO/T- 4967



SX 9
ET 2 OF 3

1 in 4.25 acute CMS crossing for scissors cross-over RDSO/T- 8540 (7100 mm track centre)



SX 10



SWITCH ANGLE AT TOE-----0°- 20'- 0"

DIVERGENCE AT HEEL----- 175 mm

THROW AT TOE -----115 mm

GAUGE-----1673 mm

RADIUS-----441360 mm

SX 11



CHAPTER VIII
PRESTRESSED CONCRETE SLEEPERS

S.N.	Description	Pages	Page No.
1.	Brief note on prestressed concrete sleepers	SPCa to SPCb	252
2.	Normal PSC Sleepers	SPC1	254
3.	Wider PSC Sleepers	SPC2	256
4.	HTS arrangement for BG turnout PSC Sleeper	SPC3	258
5.	SGCI Insert to Drg. No. RDSO/T-381	SPC4	259
6.	SGCI Insert to Drg. No. RDSO/T-6901	SPC5	260
7.	Concrete Sleepers for special locations	SPC6	261
8.	Design details of Turnout Concrete Sleepers	SPC7	263
9.	Design details of Concrete Sleepers for 1:8.5 Diamond X-ing	SPC8	264
10.	Design details of Concrete Sleepers for 1:8.5 Scissors Crossover & 1:12 Scissors Crossover	SPC9	265
11.	Wider PSC Sleepers for main line and special locations for 25T axle load with 60 Kg (UIC)/60E1 & 52 Kg rail for BG	SPC10	267
12.	Concrete Sleepers for main line and special locations for 25T axle load for BG(1676 MM) (For use in DFC)	SPC11	269

Brief notes on prestressed concrete sleepers

Prestressed Concrete Sleepers:

Development of prestressed concrete sleepers for Broad Gauge (BG) for use with 52kg rail section & 60kg UIC rail section have been the result of evolution of concrete sleepers based on experience and field trials with other earlier designs.

The following Prestressed concrete sleepers for broad gauge (BG) have been designed. PSC sleeper to drawing no. RDSO/T-2495 & 2496 has been designed for 22.5t axle load to suit 52 kg & 60 kg UIC rails. PSC sleeper to drawing no. RDSO/T-7008, RDSO/T-8527 & RT-8746 have been designed for 25t axle load to suit 136RE / 60 kg UIC/60E1 rails and 60 kg UIC/60E1 / 52 kg rails respectively.

In addition to above for 22.5t axle load, different designs of prestressed concrete sleepers for special locations such as Level Crossings, Curves, Ballasted deck bridges and Bridge approaches, SEJ and for turnouts (i.e. 1:8.5, 1:12, 1:16, 1:20) are being manufactured and laid in track on IR.

For 25t axle load, different designs of prestressed concrete sleepers for special locations such as Level Crossings, Curves, Ballasted deck bridges and Bridge approaches, SEJ are being manufactured and laid in track on IR.

These sleepers are of pretensioned type and can be manufactured by long line or stress bench methods. These designs utilise 3 ply, 3mm diameter HTS strands with an ultimate tensile strength of 184 kg/mm² and a minimum 15 day concrete cube strength of 55 N/mm² or 60 N/mm². Details of the prestressed concrete sleepers are furnished on page SPC1 sheet 1 & 2 and SPC2 sheet 1 & 2 and for other designs, relevant detailed drawings may be referred to. For turnout sleepers either 3ply, 3mm strands or 7 ply, 9.5 mm strands may be used. HTS arrangement for turnout sleepers is furnished on page SPC3. Details of special location sleeper, Turnout & Special layouts are furnished on pages SPC6 to SPC12.

This sleeper is cast with spheroidal graphite cast iron (SGCI) inserts for use with elastic rail clips along with grooved rubber sole plate and insulating/Non insulating liners.

Distances shown in drawings between outer to outer inserts, are based on nominal gauge of 1673 mm. For manufacture of PSC main line sleepers, refer specification No. IRS T-39 and for manufacture of PSC Turnout sleepers, refer specification No. IRS T-45.

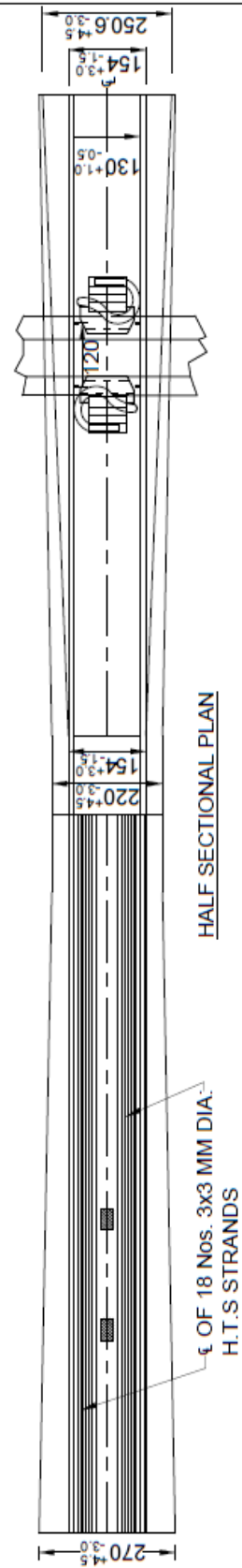
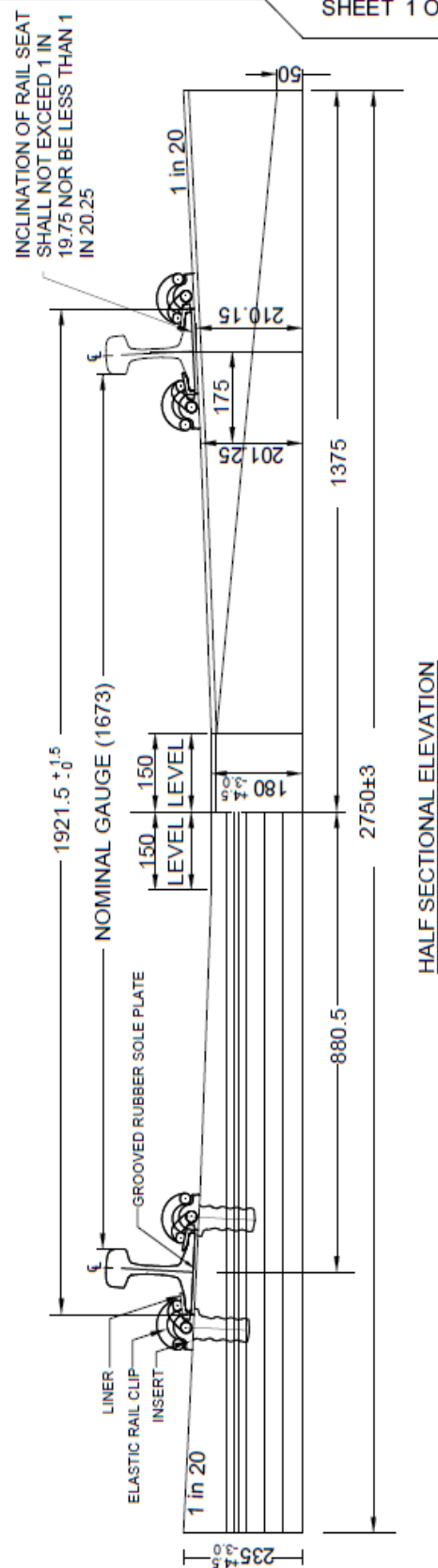
Inserts:

The Inserts are manufactured with the spheroidal graphite cast iron conforming to the Grade SG 500/7 of IS: 1865-1991 “Iron Castings with spheroidal or nodular graphite – specification”. SGCI inserts integrally cast with PSC sleepers. The stem of the insert which is embedded into PSC sleepers is suitably designed to offer adequate pullout resistance. SGCI inserts are to be manufactured to meet the requirements of IRS Specification No.T-46.

Inserts for use with 6mm rail pad or 10mm rail pad, differ in dimension of apex hole height, with respect to sleeper top at rail seat. Apex hole height is suitably designed to obtain a desired toe deflection of ERC. For details and critical dimensions of the inserts are shown on page SPC4 and SPC5 may be referred.

NORMAL PSC SLEEPERS

SPC 1
SHEET 1 OF 2



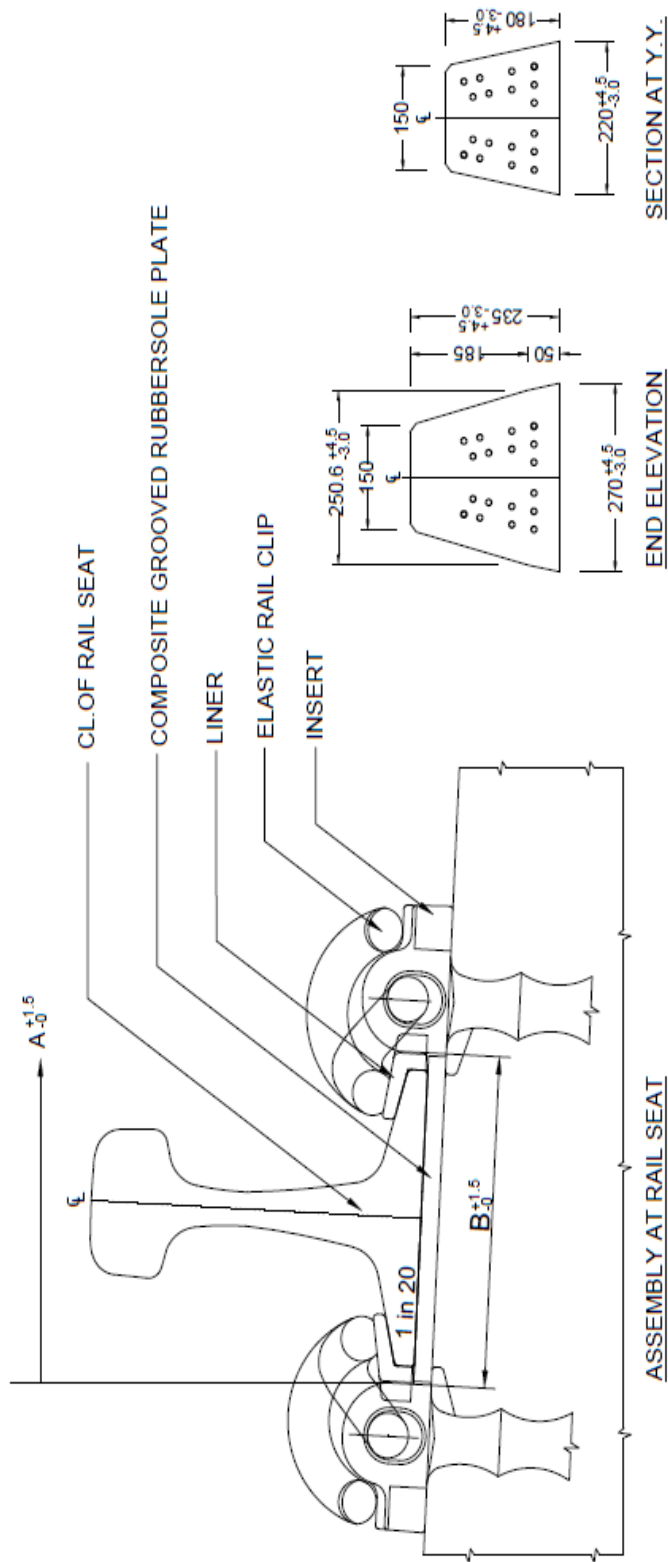
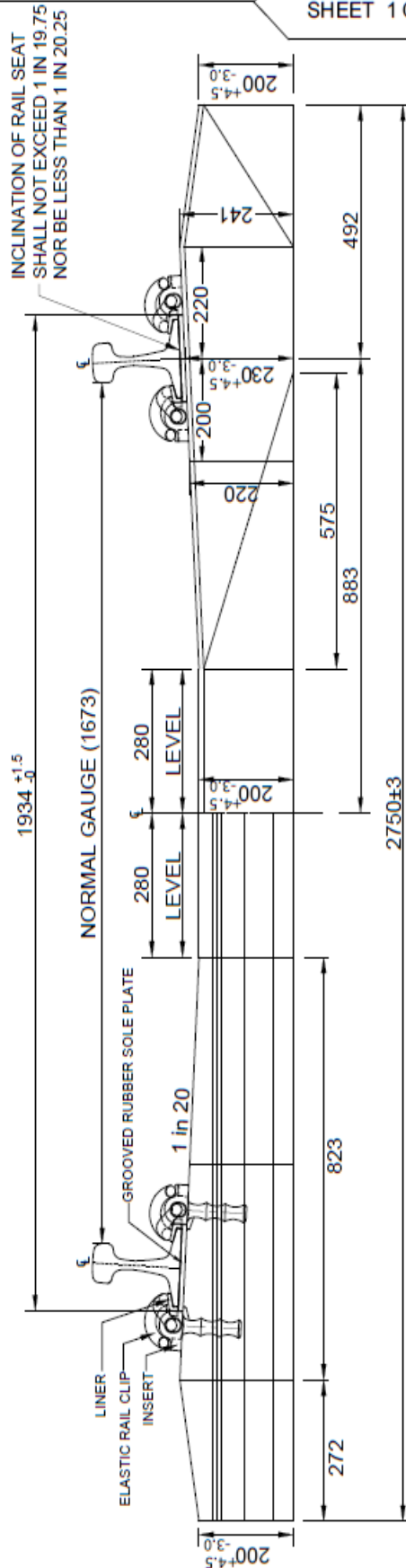


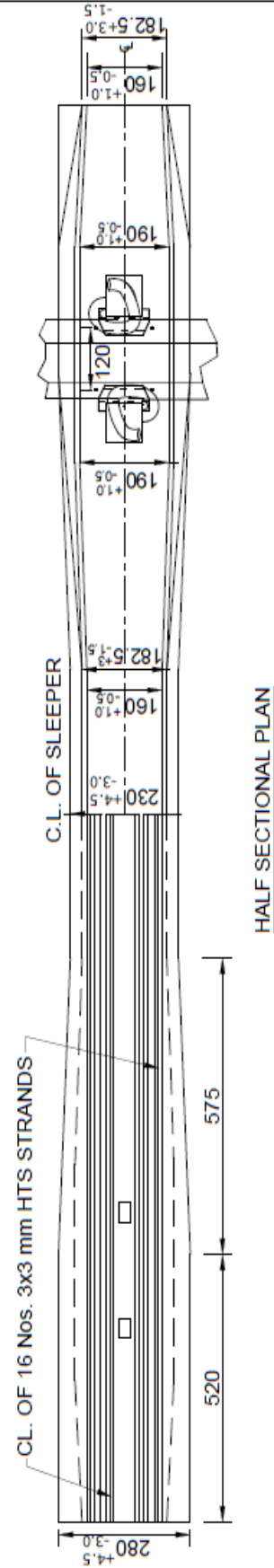
TABLE OF MAIN DIMENSIONS

RAIL SECTION	DRAWING NUMBER	DIMENSIONS (mm)		VOLUME OF CONCRETE SLEEPER (CM ³)	WEIGHT PER SLEEPER EXCL FASTENINGS (KG)
		A	B		
60 KG UIC	RDSO/T-2496	1921.5	162.0	108900	267
60 KG UIC/136 RE	RDSO/T-7008	1934.0	170.4	108900	267

WIDER PSC SLEEPERS

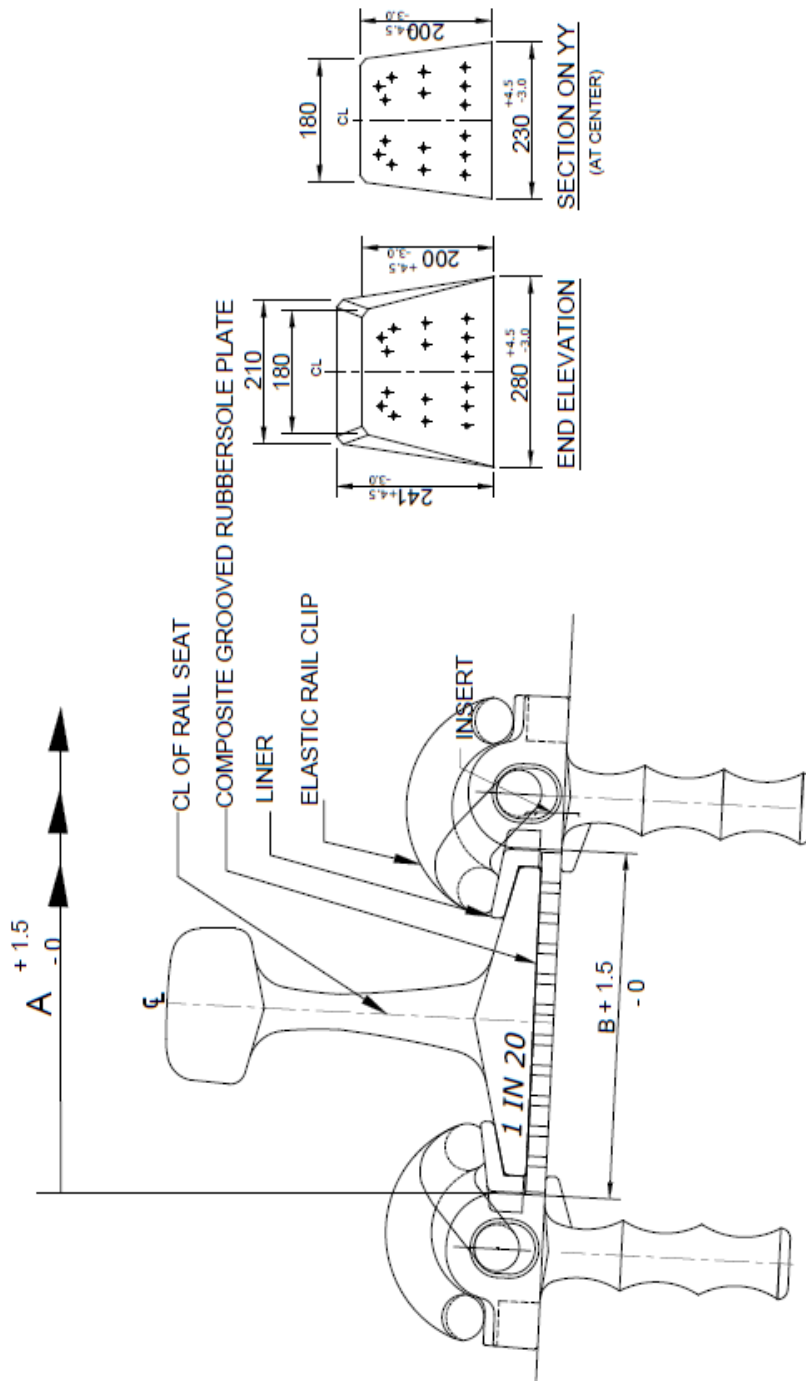


HALF SECTIONAL ELEVATION



HALF SECTIONAL PLAN

RDSO/T-8527

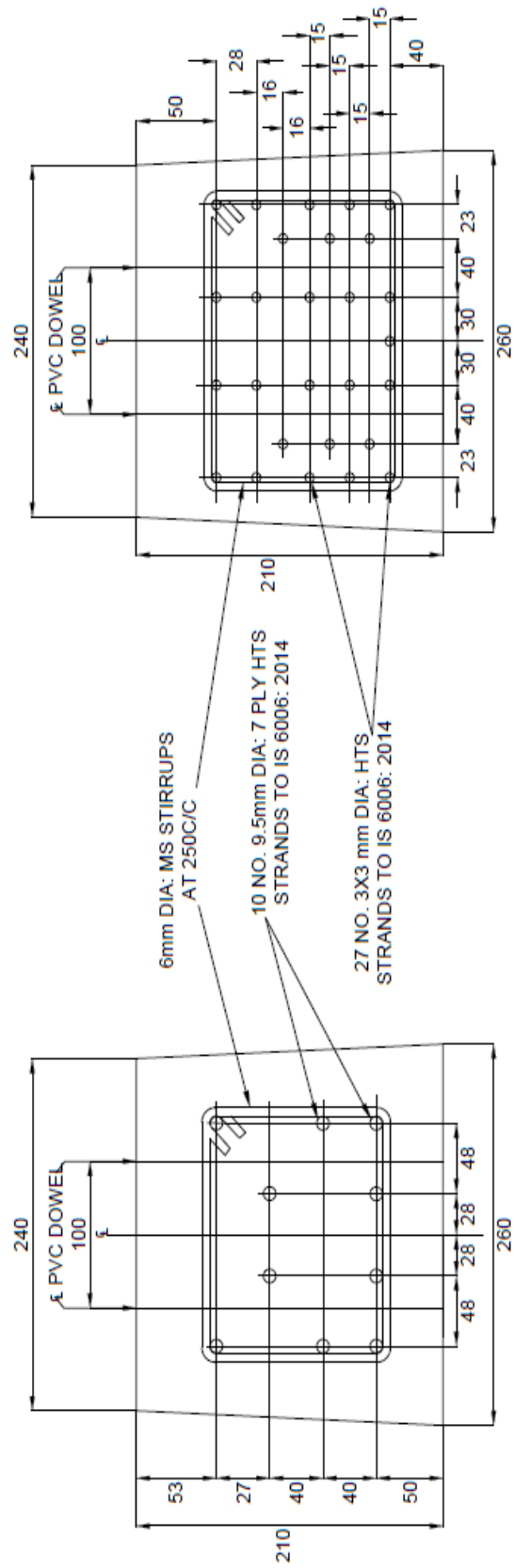


ASSEMBLY AT RAIL SEAT

TABLE OF MAIN DIMENSIONS

RAIL SECTION	DRAWING NUMBER	DIMENSIONS		VOLUME OF CONCRETE SLEEPER IN CM ³	WEIGHT PER SLEEPER EXCL FASTENINGS IN KG
		A	B		
60 KG UIC/136 RE	RDSO/T-8527	1934	170.4	136237.5	333.78
60 KG UIC	RDSO/T-8746	1921.5	162.0	136237.5	333.78

HTS ARRANGEMENT FOR B.G. TURNOUT PSC SLEEPER(RT-4217)



ITEM	3X3mm DIA: HTS	9.5mm DIA: HTS
WEIGHT OF HTS PER METER IN kg	4.482	4.350
WEIGHT OF EACH STIRRUP IN kg	0.173	0.171
INITIAL PRESTRESSED FORCE IN EACH STRAND(KN)	27	72

Nominal Weight - 1.55 kg

[illegible]



CONCRETE SLEEPERS FOR SPECIAL LOCATIONS

Location	Rail Section	Drawing No.	Remarks
Level crossing	60kg/52kg	RDSO/T-4148-4148-A	-
Switch expansion joint	(i) -do-	RDSO/T-4149	with 120 mm gap
	(ii) 60 kg	RDSO/T-6253	with 300 mm gap
Curves	60 kg	RDSO/T-3670	Slack gauge up to 1681 mm obtained by using liners of different thickness.
Curves	60 kg	RDSO/T-4170-4173	4 different sleepers for gauge 1675, 1677, 1679 & 1681 mm with the use of normal liners.
Curves (MG)	90R	RDSO/T-4909-4913	4 different sleepers with gauge 1002, 1004, 1006 & 1008 mm
Curves with check rails	60kg with 52 kg check rail	RDSO/T-4183- 4186	Specially designed for KK line with 75 mm clearance
Curves with check rails	60 kg with 52 kg check rail	RDSO/T-6896-6899	With check rail clearance of 65 mm
Curve with check rails	52 kg with 52 kg/90R check rail	RDSO/T-5738 to 5740	Gauge widening up to 1679 mm
For ballasted deck bridges	(a) 60 kg	RDSO/T-4088-4097	With 52 kg guard rail.
	(b) 52 kg	-do-	With 52 kg/90R guard rail
For rail joints (MG)	90 R	RDSO/T-4779	On mainline sleeper, ERC Mk. II clip to be used in reverse position.

CONCRETE SLEEPERS FOR SPECIAL LOCATIONS

Location	Rail Section	Drawing No.	Remarks
Shallow sleeper	60 kg	RDSO/T-4852	For location with restricted headway.
Mixed gauge (3- rail seat) (BG & MG)	52 kg/ 90 R	RDSO/T-4857	Specially developed for Southern Railway
Mixed gauge (3 rail seat)(BG & MG)	60 kg	RDSO/T-6256	Specially developed for gauge conversion
Shallow sleeper	60 kg	RDSO/T-8326	For location with restricted headway with guard rail for tunnels.
Re-railing Ramp	52kg	RDSO/T-6420- 6440	Re-Railing Ramp for Bridge approaches.
Re-railing Ramp	60 kg	RDSO/T-8265-8291	Re-Railing Ramp for Bridge approaches

DESIGN DETAILS OF TURNOUT CONCRETE SLEEPERS

Gauge (mm)	Turn out type	Rail section	LH/RH fan shaped (FS)	Brief description	No. of sleepers excluding approach sleepers	Drawing No. of Layout	Drawing No. of Sleeper	Remarks
1673	1:12	60 kg	FS	Switch : 10125 mm Xing : CMS	83	RT-4218	RT-4512 to RT-4594	Current
1673	1:12	52 kg	FS	Switch : 10125 mm Xing : CMS	83	RT-4732	do RT-4512	Current
1673	1:8.5	60 kg	FS	Switch : 6400 mm Xing : CMS	54	RT-4865	RT-4793 to 4844 & RT-4512	Current
1673	1:8.5	52kg	FS	Switch : 6400 mm Xing : CMS	54	RT-4865	do	Current
1673	1:8.5	90 R	FS	Switch : 6400 mm Xing : CMS	54	RT-4865	do	Current
1673	1:16	60 kg	FS	Switch : 11200 mm Xing : CMS	101	RT-5691	RT-4513 to 4517, RT-5595 to 5690	Current
1673	1:20	60 kg	FS	Switch 12460 mm Xing : CMS	120	RT-5858	RT-4513 to 4517 RT-4921 to 6035	Current
1673	1:8.5	52 kg 60 kg	RH/LH	Derailing switch	22	RT-5836 RT-6068	RT-4512 RT-4793 to 4806 RT-6770 to 6775 RT-6776 to 6781	Current For RH For LH
Meter Gauge								
1000	1:12	90R 52kg		Switch : 7130 mm Xing : CMS	53	RT-4623 RT-6450 RT-6327	RT-4631 to 4683	Current

DESIGN DETAILS OF CONCRETE SLEEPERS FOR 1 : 8.5 DIAMOND X-ING

Gauge (mm)	Turnout Type	Rail Section	Brief Description	No. of Sleepers	Drawing No. of Layout	Drawing No. of Sleeper
1673	1 : 8.5	52 Kg	Without slip	a) Diamond 41 b) 1 : 8.5 14x2 c) Exit 4x4	RT-5362	RT-5331 to 5351 RT-4831 to 4844 RT-5471 to 5474
1673	1 : 8.5	52 Kg	Single slip	a) Diamond 43 b) 1 : 8.5 13x2 c) Exit 5x4	RT-5363	RT-5309 to 5330 RT-4832 to 4844 RT-5471 to 5474 & RT-4786
1673	1 : 8.5	52 Kg	Double slip	a) Diamond 43 b) 1 : 8.5 13x2 c) Exit 5x4	RT-5364	RT-5309 to 5330 RT-4832 to 4844 RT-5471 to 5474 & RT-4786

DESIGN DETAILS OF CONCRETE SLEEPERS FOR 1: 8.5 SCISSORS CROSSOVER
(Track centres 4725 mm)

Gauge (mm)	Turnout Type	Rail Section	Brief Description	No. of Sleepers	Drawing No. of Layout	Drawing No. of Sleeper
1673	1 : 8.5	60 Kg	X-ing : 1:8.5 LH & RH Acute CMS, 1:4.25 Acute & Obtuse CMS Switch : - 6400 mm	a) S.X-Over 39 b) 1:8.5 34x4 c) Approach 5x4	RT-6092	RT-6126 to 6145 RT-4512 & RT-4793 to 4824 RT-4786 to 4790

DESIGN DETAILS OF CONCRETE SLEEPERS FOR 1: 12 SCISSORS CROSSOVER
(Track centres 4725 mm)

Gauge (mm)	Turnout Type	Rail Section	Brief Description	No. of Sleepers	Drawing No. of Layout	Drawing No. of Sleeper
1673	1:12	60 kg	X-ing 1:12 LH& RH actue CMS 1:6 actue & Obtuse CMS Switch :10125	a) S-X-Over:63 b) 1:12 :51×4 c)Approach:5×4	RT-8109	RT-8174 to RT-8205 RT-4512 to RT-4562 RT-4786 to RT-4790

**WIDER PSC SLEEPERS FOR MAIN LINE AND SPECIAL LOCATIONS FOR 25T AXLE LOAD
WITH 60 KG (UIC) / 60E1 & 52 KG RAIL FOR BG**

Location	Rail section	Drawing No.	Remarks
Main Line Sleeper	60 kg / 60E1/ 52 kg	RT-8746	Wider PSC sleeper for 25 t axle load for 60 kg (UIC)/60E1 & 52 kg rails
Level Crossing	60 kg / 60E1/ 52 kg	RT-8969	Wider PSC sleeper for level crossing for 60 kg (UIC)/60E1 & 52 kg running rail with 52 kg check rail for 25 t axle load
Guard Rail	60 kg / 60E1/ 52 kg	RT-8970	Wider PSC sleeper for 25 t axle load for 60 kg (UIC)/60E1 & 52 kg running rails with 60 kg (UIC)/60E1 & 52 kg Guard rail for use on ballasted deck bridges
Bridge Approaches	60 kg / 60E1/ 52 kg	RT-8971 to RT-8978	Wider PSC sleeper for 25 t axle load for B.G. 60 kg (UIC)/60E1 & 52 kg running rail with 60 kg (UIC)/60E1 & 52 kg Guard rail on bridges approaches
Curve sleeper	60 kg / 60E1/ 52 kg	RT-8979 to RT-8982	Wider PSC sleeper for sharp curve (of radius less than 350m) for 25 t axle load for 60 kg (UIC)/60E1 & 52 kg rails
Rail seat assembly for Level Crossing	60 kg /60E1	RT-8983	Check rail assembly for level crossing on PSC sleeper with 60 kg (UIC)/60E1 running rail and 52 kg check rail for 25 t axle load B.G
Rail seat assembly for Level Crossing	52 kg	RT-8984	Check rail assembly for level crossing on PSC sleeper with 52 kg running rail and 52 kg check rail for 25 t axle load B.G.
CI Bracket for Fixing Check Rail in Level Crossing	52 kg	RT-8985	CI bracket for 52 kg check rail to be used on wider PSC sleeper with 60 kg (UIC)/ 60E1 running rail for 25t axle load B.G.
CI Bracket for Fixing Check Rail in Level Crossing	52 kg	RT-8986	CI bracket for 52 kg check rail to be used on wider PSC sleeper with 52 kg running rail for 25t axle load B.G.

WIDER PSC SLEEPERS FOR MAIN LINE AND SPECIAL LOCATIONS FOR 25T AXLE LOAD WITH 136 RE & 60 KG (UIC) RAILS FOR BG

Location	Rail section	Drawing No.	Remarks
Main Line Sleeper	60 kg/ 136 RE	RT-8527	Wider PSC sleeper for 25 t axle load for BG on 60 kg (UIC)/136 RE Rails
Switch Expansion Joints	60 kg (UIC)	RT-4149	Existing SEJ sleeper is to be used on the section with wider sleeper
Level Crossing	60 kg	RT-8671	Wider PSC sleeper for level crossing with 60 kg (UIC) running rail and 52 kg check rail for 25t axle load B.G.
Rail seat assembly for Level Crossing	60 kg	RT-8226	Rail seat assembly for level crossing on wider PSC sleeper with 60 kg (UIC) running rail for 25 t axle load BG
CI Bracket for Fixing Check Rail in Level Crossing	52 kg	RT-8227	CI bracket for 52 kg rail to be used on PSC with 60kg(UIC). Running Rail for 25t axle load BG
Guard Rail	60 kg	RT-8672	Wider PSC sleeper for 60 kg (UIC)/136RE Running rail and 60 kg (UIC) Guard for 25t axle load for BG
Bridge Approaches	60 kg	RT-8673 to RT-8680	Wider PSC sleeper for 25t axle load for 60 kg (UIC)/136RE running rail and 60 kg (UIC) guard rail on Bridge approaches
Curve sleeper	60 kg	RT-8621 to RT-8624	Wider PSC curve sleeper for 25t axle load for 60 kg (UIC) / 136 RE running rail and 60 kg (UIC) guard rail on Bridge approaches
Sharp Curves on Bridges with check rail (52kg) & gaurd rail	60 kg	RT-8757 (A to D)	Wider PSC sleeper for sharp curves on bridges with check rail (52kg) & Gaurd rail (52kg) arrangement for B.G. 60kg (UIC) running rail for more than 5° curves

**CONCRETE SLEEPERS FOR MAIN LINE AND SPECIAL LOCATIONS FOR 25T AXLE LOAD FOR BG
(1676MM)
(FOR USE IN DFC)**

Location	Rail section	Drawing no.	Remarks
Main line sleeper	60 kg/136 RE	RT-7008 alt.1	PSC sleeper for 25 t axle load for BG on 136 RE Rails.
Switch Expansion Joints.	60 kg(UIC)	RT-8224	PSC for SEJ for long welded rails for 25t axle B.G 1676 mm, 60 kg (UIC)
Level Crossing	60kg/52kg	RT-8225	PSC sleeper for level crossing with 60kg(UIC) running rail and 52 kg check rail for 25t axle load B.G.(1676mm)
Rail seat assembly for Level Crossing	60kg	RT-8226	Rail seat assembly for level crossing on PSC sleeper with 60 kg(UIC).Running rail for 25 t axle load BG(1676mm)
CI Bracket for Fixing Check Rail in Level Crossing	60 kg/52kg	RT-8227	CI bracket for 52 kg rail to be used on PSC with 60kg(UIC).Running Rail for 25t axle load BG(1676mm)
Guard Rail	60 kg	RT-8228	PSC sleeper for 60 kg(UIC) Running rail and 60 kg (UIC) Guard for 25t axle load for BG 1676mm.
Guard Rail	60 kg	RT-8229 to RT-8237	PSC sleeper for 25t axle load for 60 kg (UIC) running rail and 60 kg(UIC) guard rail on Bridge approaches

CHAPTER IX

SWITCH EXPANSION JOINTS (SEJ)

S.N.	Description	Pages	Page No.
1.	Definitions	SEJa	271
2.	Table for assembly & Part Drawings for various type of SEJ	SEJ1	272
3.	Layout Drawing of 60 kg ISEJ (80mm Max gap) to Drg. No. RDSO/T-6902	SEJ2	273
4.	Layout Drawing of 52 kg ISEJ (80mm Max gap) to Drg. No. RDSO/T-6914	SEJ3	274
5.	Layout Drawing of 60 kg ISEJ (65mm Max gap) to Drg. No. RDSO/T-6922	SEJ4	275
6.	Layout Drawing of 52 kg ISEJ (65mm Max gap) to Drg. No. RDSO/T-6930	SEJ5	276
7.	Layout Drawing of Combination SEJ (80mm Max gap) to Drg. No. RDSO/T-6782	SEJ6	277
8.	Layout Drawing of 60 kg TWSEJ (up to 100mm movement) to Drg. No. RDSO/T-8822	SEJ7	278
9.	Layout Drawing of 60 kg ISEJ (190mm Max gap) for bridge approaches to Drg. No. RDSO/T-6263	SEJ8	279

Definitions:

LWR: Long Welded Rail (LWR) is a welded rail, the central part of which does not undergo any longitudinal movement due to temperature variations. A length of welded rail greater than 250m on Broad Gauge will normally function as LWR. The maximum length of LWR under Indian conditions shall normally be restricted to one block section.

Breathing Length: The length at each end of LWR/CWR, which is subjected to expansion/contraction on account of temperature variations.

De-stressing: An operation undertaken with or without rail tensor to secure stress free conditions in the LWR/CWR at the desired/specified rail temperature.

Switch Expansion Joint: Switch Expansion Joint (SEJ) is an expansion joint installed at each end of LWR/CWR to permit expansion/contraction of the adjoining breathing lengths due to temperature variations.

Rail Temperature: Temperature of the rail as recorded by an approved type of rail thermometer at site. It differs from the ambient temperature, which is the temperature of air in shade at that place, as reported by the Meteorological Department.

Mean Rail Temperature (tm): The average of the maximum and minimum rail temperature recorded during the year. tm is fixed locally wherever rail temperature records are available for a reasonable period of five years.

Installation Temperature (ti) : The average rail temperature, during the process of fastening the rails to the sleepers, at the time of installation of SWR/LWR/CWR.

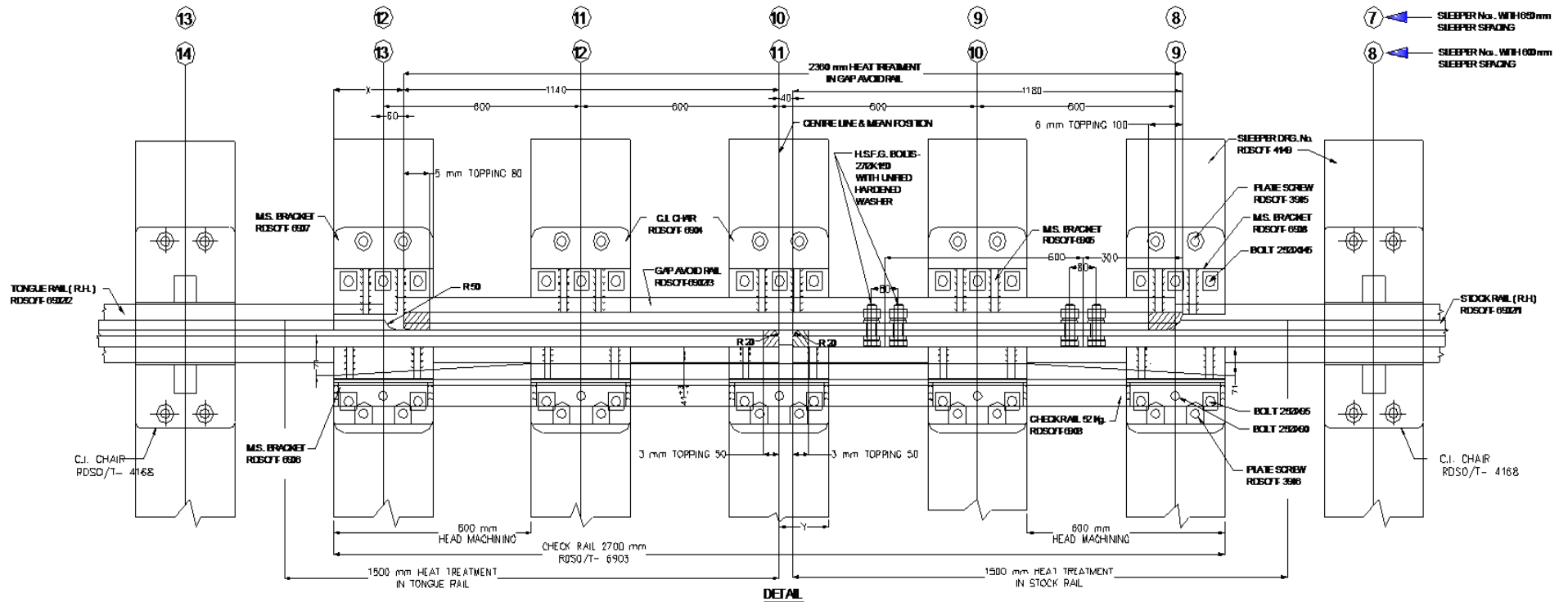
Destressing Temperature (td): Destressing Temperature (td) is the average rail temperature during the period of fastening the rails to the sleepers after destressing LWR without the use of rail tensor.

Assembly & Part Drawings for various type of Switch Expansion Joints (SEJ)

Gauge	Rail Section	Assembly Drawings	Drawing No.	MS Bracket (GF)	MS Bracket (NGF)	CI Chair	Bearing Plate
BG	60 Kg	SEJ (80mm Max gap)	RDSO/T-4165	RDSO/T-2657	RDSO/T-2656 RDSO/T-2658	RDSO/T-4166 to RDSO/T-4168	-
	52 Kg	SEJ (80mm Max gap)	RDSO/T-4160	RDSO/T-4181	RDSO/T-4180 RDSO/T-4182	RDSO/T-4161 to RDSO/T-4163	-
	60 Kg	SEJ (190mm Max gap) For Bridge approaches	RDSO/T-6263	RDSO/T-6268	RDSO/T-6267 RDSO/T-6269	RDSO/T-4168 RDSO/T-6265 RDSO/T-6266	-
	60 Kg	ISEJ (80mm Max gap)	RDSO/T-6902	RDSO/T-6906	RDSO/T-6905, RDSO/T-6907, RDSO/T-6908	RDSO/T-6904, RDSO/T-4168	-
	52 Kg	ISEJ (80mm Max gap)	RDSO/T-6914	RDSO/T-6917	RDSO/T-6916, RDSO/T-6918, RDSO/T-6919	RDSO/T-6915, RDSO/T-4163	-
	60 Kg	ISEJ (65mm Max gap)	RDSO/T-6922	RDSO/T-6925	RDSO/T-6924, RDSO/T-6926	RDSO/T-6923, RDSO/T-4168	-
	52 Kg	ISEJ (65mm Max gap)	RDSO/T-6930	RDSO/T-6934	RDSO/T-6932, RDSO/T-6933	RDSO/T-6931, RDSO/T-4163	-
	60 Kg	ISEJ (80mm Max gap) for curves $> 2^0$ to 4^0	RDSO/T-8924	RDSO/T-6906	RDSO/T-6905, RDSO/T-6907, RDSO/T-6908	RDSO/T-6904, RDSO/T-4168	-
	60 Kg	ISEJ (65mm Max gap) for curves $> 2^0$ to 4^0	RDSO/T-8926	RDSO/T-6925	RDSO/T-6924, RDSO/T-6926	RDSO/T-6923, RDSO/T-4168	-
	60 Kg & 52 Kg	Combination SEJ (80mm Max Gap)	RDSO/T-6782	RDSO/T-8512, RDSO/T-2657	RDSO/T-8309 to RDSO/T-8312	RDSO/T-4163, RDSO/T-4166 to RDSO/T-4168	-
	60 Kg	Thick web SEJ (TWSEJ) up to 100mm movement	RDSO/T-8822	-	-	-	RDSO/T- 8823 to RDSO/T- 8836

SEJ 1

Layout Drawing of 60 kg ISEJ (80mm Max gap) to Drg. No. RDSO/T-6902

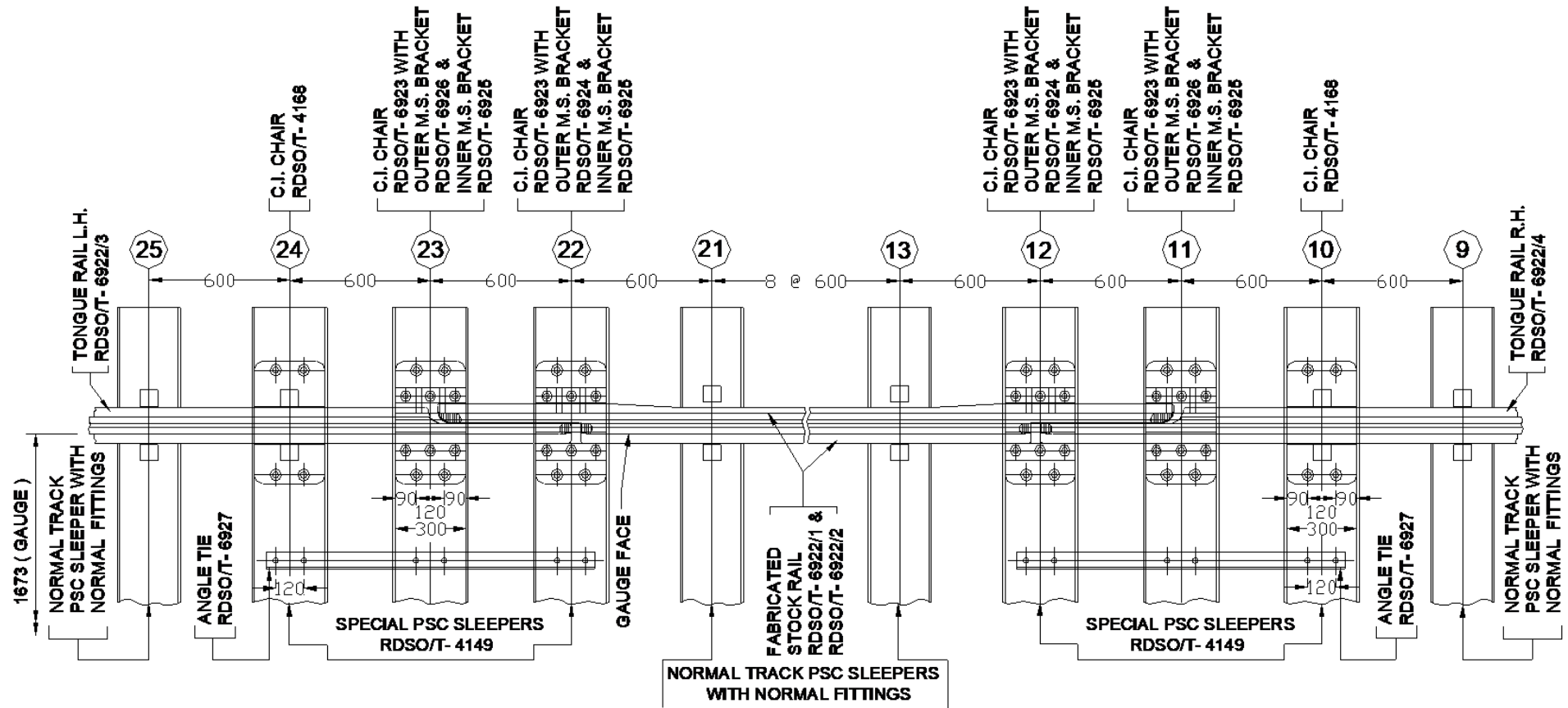


SEJ 2

SEJ 3

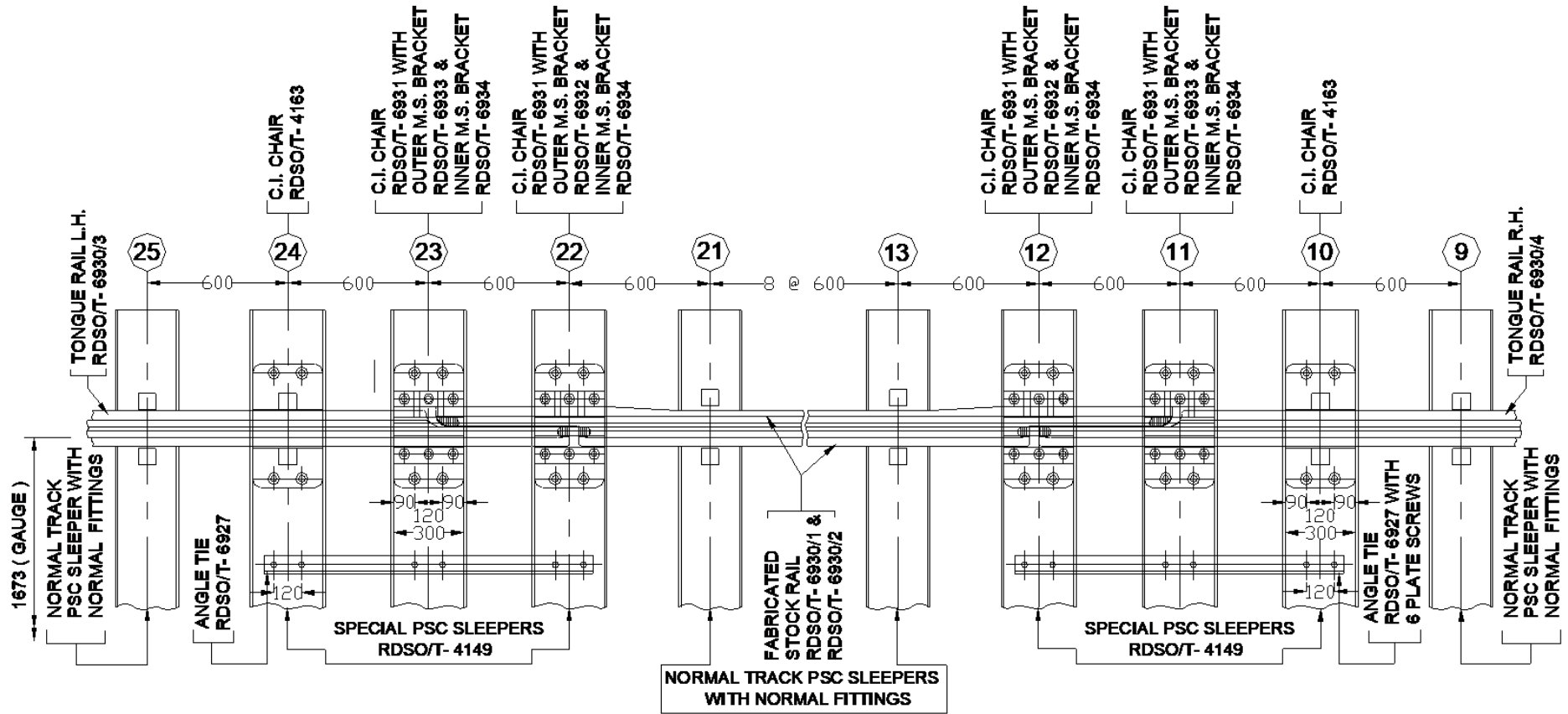


Layout Drawing of 60 kg ISEJ (65mm Max gap) to Drg. No. RDSO/T-6922



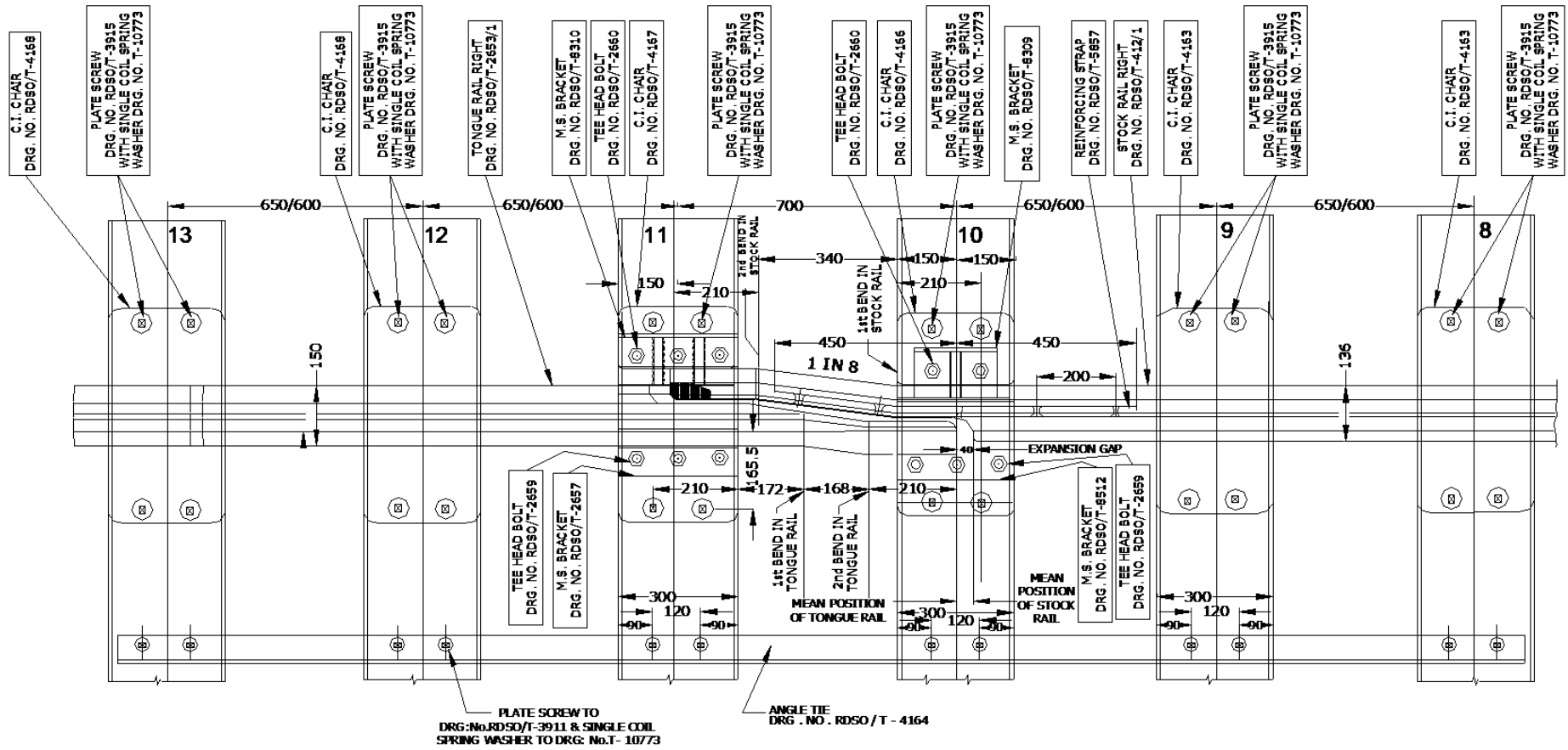
SEJ 4

Layout Drawing of 52 kg ISEJ (65mm Max gap) to Drg. No. RDSO/T-6930



SEJ 5

Layout Drawing of Combination SEJ (80mm Max gap) to Drg. No. RDSO/T-6782

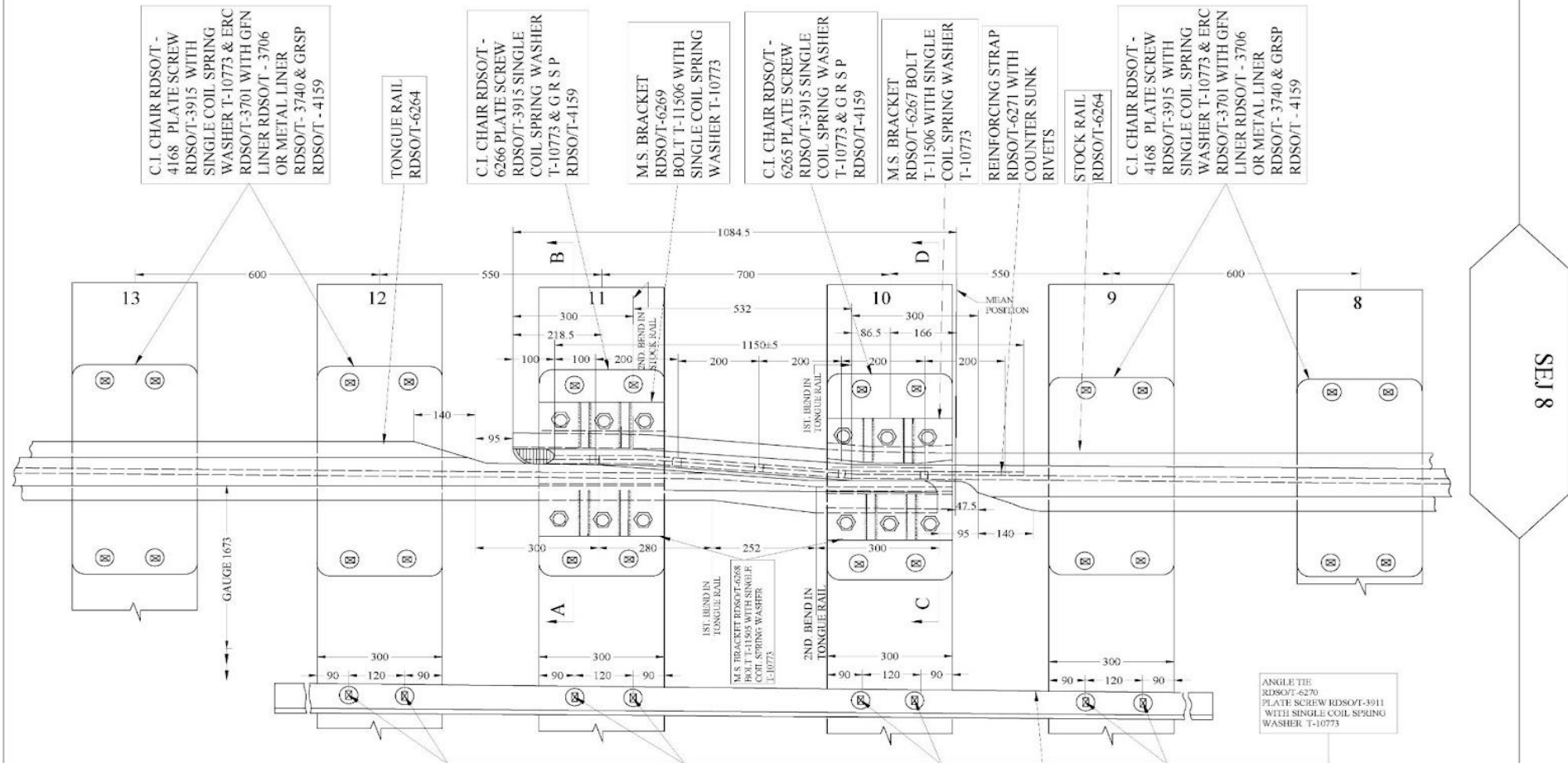


SEJ 6

SEJ 7



Layout Drawing of 60 kg SEJ (190mm max gap) for Bridge approaches to Drg. No. RDSO/T-6263



CHAPTER X -

TRACK TOOLS AND MISCELLANEOUS DRAWINGS

SN.	Content	Pages	Page No.
1.	Brief Notes	TMCa to TMCc	281
2.	Table of track tools and miscellaneous drawings	TMC 1	284
(A) Track Tools			
1.	Non-infringing track jacks	TMC 2	286
2.	Solid box spanners	TMC 3	290
3.	Rail gauges	TMC 4	291
4.	Spirit levels	TMC 5	293
5.	Level-cum-gauge	TMC 6	294
(B) Miscellaneous Drawings			
1.	Glued insulated rail joints	TMC 7	295
2.	Point screw clamps	TMC 8	301
2.	Visibility test objects	TMC 9	302
3.	15 tonne dip lorry	TMC 10	304
5.	Spring point levers – self-reversing (still handle)	TMC 11	306

Brief notes**(A) Track tools**

Non-infringing type jack: Track lifting jacks can be used with advantage at places where considerable lengths of track need lifting. The track jack shown in pages TMC2 is safe for lifting loads upto 5 tonnes. A noteworthy feature of its design is the trip arrangement by which the track can be dropped instantaneously in the face of an approaching train, without risking any infringement to the moving dimensions.

A number of moving parts of the track jack such as pawl, ratchet, wheel, gear of quadrant, rack etc. are suitably case hardened by carburising. The degree and depth of hardness in each case depends upon the requirements set out in their respective specifications.

It is the usual practice to use track jacks in pairs so that both the rails are lifted simultaneously. Care should, however be taken to see that the jacks are fixed on the outside of the track.

Solid box spanner: The salient dimensions and drawing numbers of two sizes of solid box spanners are given at page TMC3. Box spanner to drawing No. Y 76(M) is meant to be used for 20mm dia plate screws and 20mm dia rail screws whilst the other one to drawing No.RDSO/T-492 is designed for use with 22mm dia rail screws. In both cases, it is recommended that an 18mm dia, 600mm long tommy bar be used as a lever through the top hole for working the spanner.

Rail gauges and levels: Fixed jaw type rail gauges for broad gauge and metre gauge tracks are shown in pages TMC4. The flat section gauges are lighter than the square section gauges. Rail gauges to drawing No. Y1 (M) and Y2 (M) have their ends bent upwards to facilitate handling.

Spirit levels used for measuring cross levels of track have either metallic body or a wooden case with protective brass sheets on top and bottom. Pages TMC5 give their main dimensions and drawing numbers. It may be noted that the sensitivity range for 2mm run of the air bell in the bubble tube should be 0°-2'-30".

A level-cum-gauge effectively combines the functions of a level and a gauge. One of the tips of the gauge is moveable and represents the tight or slack gauge on a graduated scale. When worn out, the tips can be replaced. The difference between the cross-levels of the two rails can be read on a graduated ramp by placing a 20mmx30mmx200mm long spirit level over it. Pages TMC6 show the level-cum- gauge for broad gauge and metre gauge track.

Glued insulated rail joints: An interlocked yard may have several track circuits depending upon the number of berthing tracks, point zones and number of signals, siding etc. Each track circuit has to be bifurcated physically from the adjacent track circuit by means of insulated rail joints. Glued Insulated Rail Joints bifurcate track circuit physically and electrically too.

Manufacturing of Glued Insulated Rail Joints: The Glued Insulated Rail Joints are fabricated in workshop and ‘Re-Furbishing of Existing Glued Insulated Rail Joints & In-situ Fabrication of Glued Insulated Rail Joints’ is done on Track sites. There are two types of glued joints namely G3 (L) type having six bolts and G3(S) type having four bolts. G3 (L) type glued joints are for use in LWR track in all the temperature zones and G3 (S) type joints are for use in fishplated track as well as in SWR track. Presently glued joints with 6 mm thick end posts are in use. The insulating components viz. end post, liner and bush are made from fiberglass cloth and epoxy resin. Defective Glued Joints can be refurbished in-situ. The drawings/ sketches are placed at TMC 7 Sheet 1 to 6. G3(L) type and G3(S) type of glued joints can be manufactured from different rail sections as per drawing numbers given below: -

End post thickness	Rail Section	Drawing No.	
		G3(L) Type	G3(S) Type
6 mm	52Kg	RDSO/T- 671	RDSO/T- 1259
	60Kg /60E1	RDSO/T- 2572	RDSO/T-2576

The ‘Manual for Glued Insulated Rail Joints’ was issued in 1998. After incorporating the Correction Slips, Manual’s First Reprint has been issued in the year 2022.

Point screw clamps: Point screw clamps shown in RDSO/T-6274 & RDSO/T- 6274/4 are designed for 60 kg and 52 kg rails. When the clamp is put in position and tightened, the tongue and stock rails are firmly held together between one end of the bracket and the shoe of the spindle. The clamp should be fixed on the points in such a way so that the handle remains on the outside of the stock rail.

Visibility test objects: Pages TMC9 give the salient dimensions and drawing numbers of the two types of visibility test objects included in this chapter. One of these is a channel post welded on to a base plate fixed to the foundation concrete by means of four 16mm dia holding down bolts. A lamp bracket is fixed on the top of the post which carries the signal lamp. The alternative type of the visibility test object is a pre-cast reinforced concrete post 125mm square in section. The post is fixed directly into the cement concrete foundation cast-in-situ. There is no objection to using rail posts or posts of any suitable material by the railways for the visibility test objects.

The depth of the foundations in all cases may be increased than those given in the drawings by the railway administrations, to suite ground conditions.

15 Tonne dip lorry: The 15 tonne dip lorry shown at pages TMC10 can be used for BG as well as MG tracks by suitably altering the length of axles and the chassis channels. The length of the dip lorry can also be varied to suit the length of the consignment by varying the length of the connecting rods between the two bogies.

It may be noticed that the handle and the braking arrangement are provided to only one of the two bogies of the dip lorry.

Spring point lever-self-reversing (still handle): A self-reversing point lever enables the points to be moved in either direction by turning the handle in the same direction from a fixed position. It also holds the tongue rail under pressure so that the possibility of a gap between the tongue and the stock rail are minimized. The salient dimensions of a self-reversing type spring points lever for broad gauge are given.

MISCELLANEOUS DRAWINGS INCLUDED IN CHAPTER X (PART B)

DESCRIPTION	GAUGE	ASSEMBLY DRAWING NUMBER			DESCRIPTION OF MAIN PART-5	PART NUMBERS	PAGE No.	REMARKS
GLUED INSULATED RAIL JOINTS	B.G.	G ₃ L TYPE	G ₃ S TYPE	RAIL SECTION	DETAILS OF STEEL FISH-PLATES, INSULATING LINERS, END POSTS, BUSH AND PUNCHED PLAIN WASHER ETC.	SEPARATE PART NUMBER NOT ALLOTTED	TMC 8	
				ON				
	RDSO/T-2572	RDSO/T-2576	UIC 60/60E					
	RDSO/T-671	RDSO/T-1259	1 52kg					
VISIBILITY TEST OBJECTS	-	MA 3037. MA 3038 (PRE CAST RCC)			-	-	TMC 9	
15 TONNE DIP LORRY	BG& MG	MA 3041			-	-	TMC 10	
POINT SCREW CLAMPS	B.G.	RDSO/T-6274 TO 6274/4			BRACKET SEREWEDED EYE SPINDLE SHOES HANDLE BAR KNOB HASP	-	TMC 11	
	M.G.							
SPRING POINT LEVER – SELF REVERSING (STILL NANDLE)	B.G.	MA 3040			HANDLE M133, CRANK M134, PLUNGER M135, SPRING ROD M136, FULCRUM BLOCK M137, HELICAL SPRING M140, PINS M141, M143, M144, BOX M142		TMC 12	

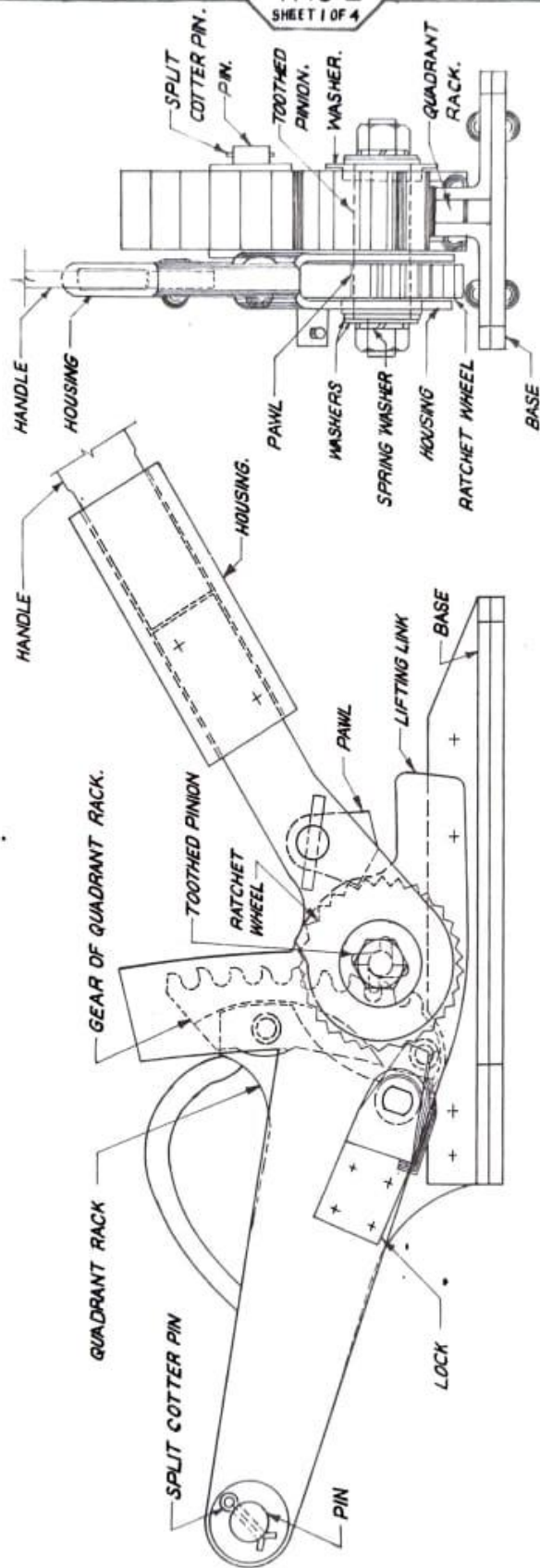
ISI SPECIFICATIONS AND DRAWINGS OF TRACK TOOLS ADOPTED BY THE INDIAN RAILWAYS

DESCRIPTION OF ITEMS	ISI SPECIFICATIONS	ISI SPECIFICATIONS FOR WOODEN HANDLES
PICKS AND BREASTERS	IS : 273 - 1973	IS : 2892 – 1964
GENERAL PURPOSE SHOVELS	IS : 274-1966 (PART I)	IS : 2897 – 1965
HEAT TREATED SHOVELS	IS : 274 -1966 (PART II)	IS : 2897 – 1965
ADZES	IS : 663 - 1964	IS : 2893 – 1964
CROW BARS AND NO CLAW BARS	IS : 704 - 1968	-
HAND HAMMERS	IS : 841 - 1968	IS : 4953 – 1973
POWRAHS	IS : 1759 - 1961	-
TRACK SPANNERS	IS : 4485 - 1962	-
RAIL TONGS	IS : 6000 - 1971	-
BALLAST RACKS	IS : 5991 - 1971	-
CARPENTERS AVGERS	IS : 2852 – 1964	IS : 2896 – 1965
CHISELS	IS : 402 – 1974	-
BALLAST FORKS	IS : 4506 – 1968	-
STEEL STRAIGHT EDGES	IS : 2220 – 1962	-
WOOD WORKING CHISELS AND GAUGES	IS : 1930 – 1975 (PART I TO X)	IS : 2894 – 1965

NOTE:-

1. IS: 620 – 1975 FOR GENERAL REQUIREMENTS FOR WOODEN TOOLS, HANDLES (THIRD REVISION)
2. IS: 2891 – 1964 FOR WOODEN HANDLES FOR FELLING AXES
3. IS: 2895 – 1965 FOR WOODEN HANDLES FOR ENGINEERS FILES

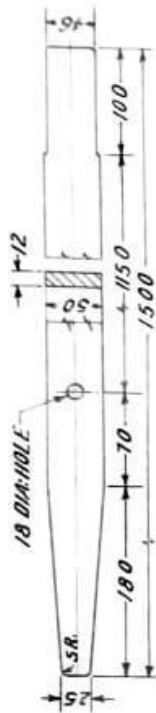
NON-INFRINGEMENT TRACK JACKS



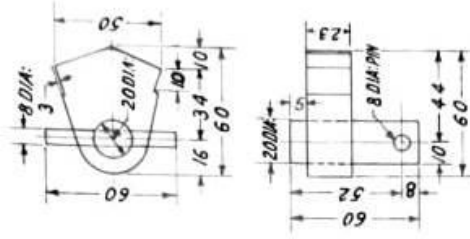
FRONT ELEVATION

SIDE ELEVATION

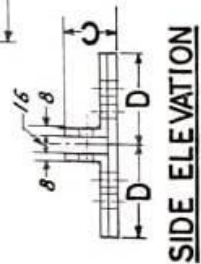
TMC 2
SHEET 1 OF 4



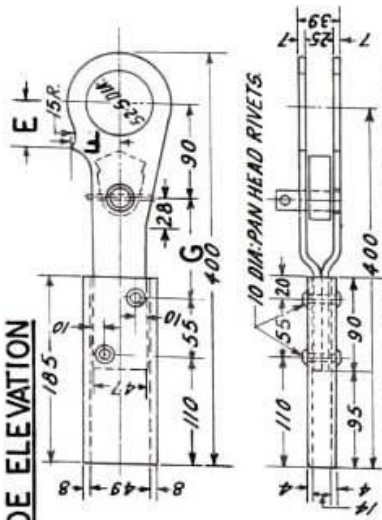
DETAILS OF HANDLE



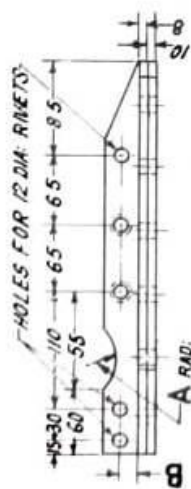
DETAILS OF PAWL



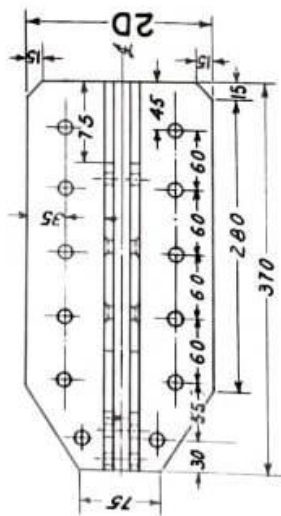
SIDE ELEVATION



DETAILS OF HOUSING FOR
PAWL AND RATCHET WHEEL



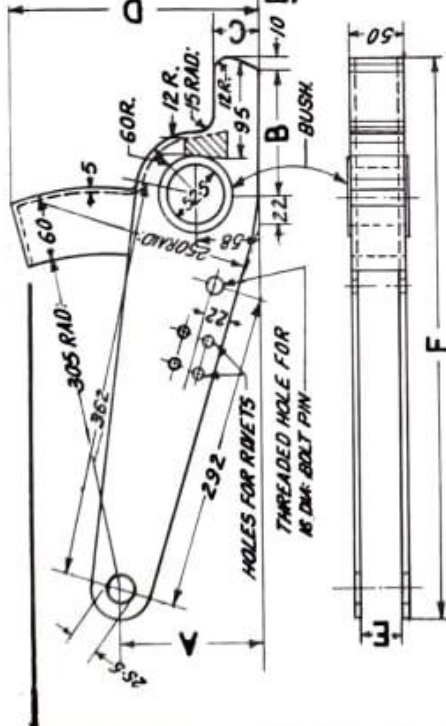
FRONT ELEVATION



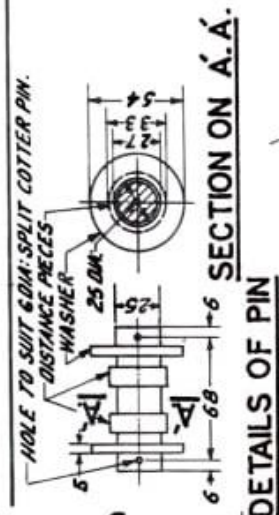
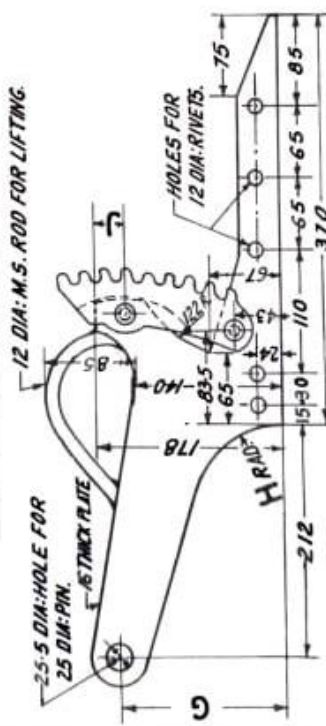
DETAILS OF BASE PLATE

TABLE OF DIMENSIONS

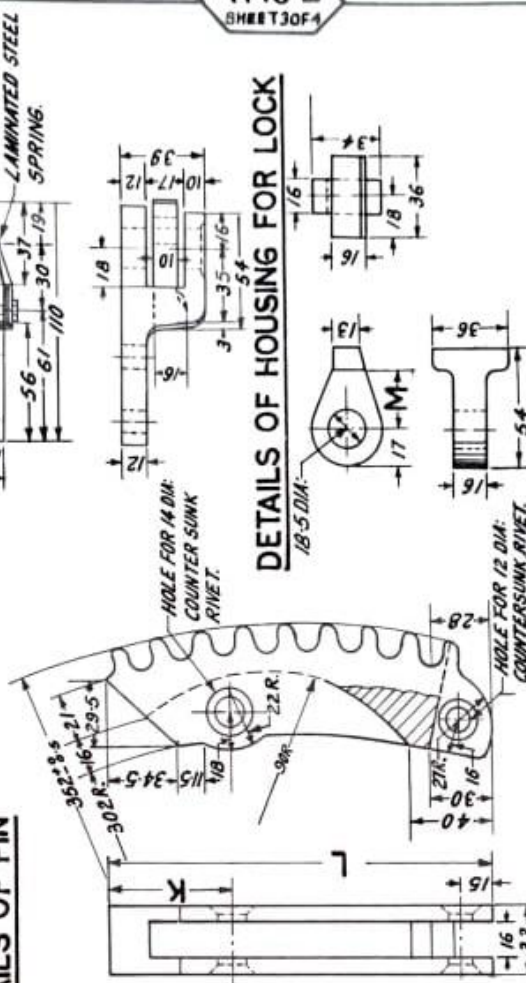
GAUGE	DRAWING NUMBER	D I M E N S I O N S (mm)				DRAWING NUMBER	D I M E N S I O N S (mm)		
		A	B	C	D		E	F	G
B.G.	RD50/7-440/1	40	16	50	87.5	RD50/7-440/4	40	40	95



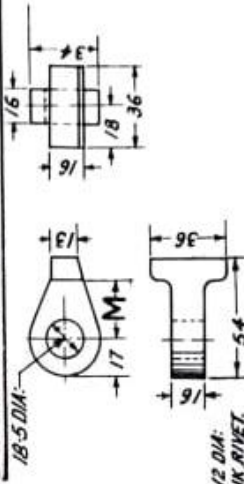
DETAILS OF LIFTING LINK



DETAILS OF PIN



DETAILS OF HOUSING FOR LOCK

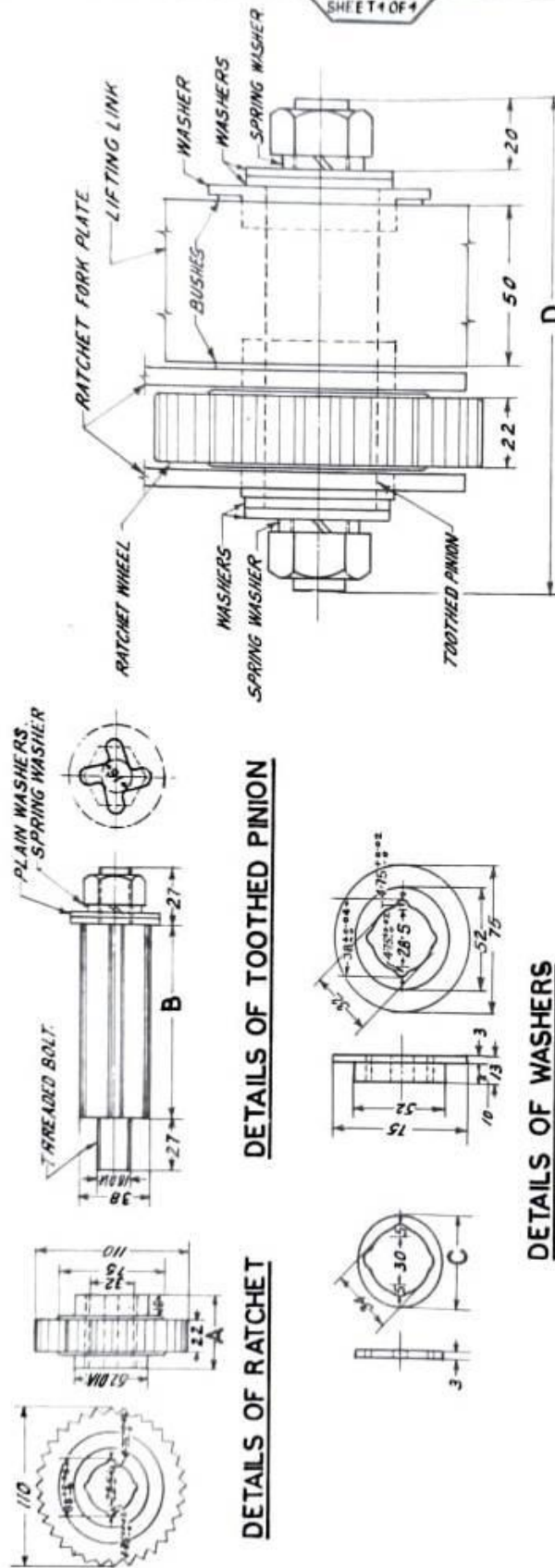


DETAILS OF LOCK

GEAR OF QUADRANT RACK

TABLE OF DIMENSIONS

GAUGE	DRAWING NUMBER	D I M E N S I O N S (mm)						DRAWING NUMBER	D I M E N S I O N S (mm)			DRAWING NUMBER	D I M E N S I O N S (mm)		DRAWING NUMBER	D I M E N S I O N S (mm)
		A	B	C	D	E	F		G	H	J		K	L		
B.G.	RD50IT-44013	130	120	42	230	38	515	RD50IT-44014	155	90	30	65	125	RD50IT-44015	27	

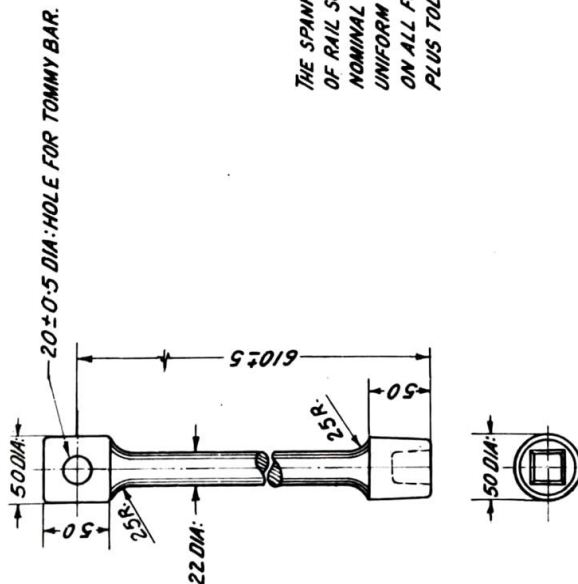


ASSEMBLY OF PINION RATCHET AND WASHERS

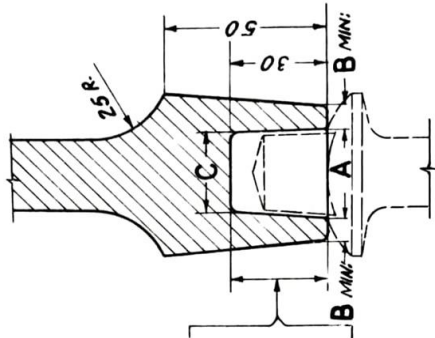
TABLE OF DIMENSIONS

GAUGE	ASSEMBLY DRAWING NUMBER	D I M E N S I O N S			
		A	B	C	D
B. G.	RD507-440	49.5	100	50	154

SOLID BOX SPANNER



PLAN OF SPANNER WELL



DETAIL OF SPANNER WELL

TABLE OF DIMENSIONS

DRAWING NUMBER	DIMENSIONS (mm)			REMARKS
	A	B	C	
Y-76(M)	19 ± 0.4	8	16 ± 0.4	FOR USE WITH RAIL / PLATE SCREWS.
R050(T)-492	27 ± 0.4	7	24 ± 0.4	FOR USE WITH 22 mm DIA. RAIL SCREWS.

RAIL GAUGES

(FLAT SECTION)

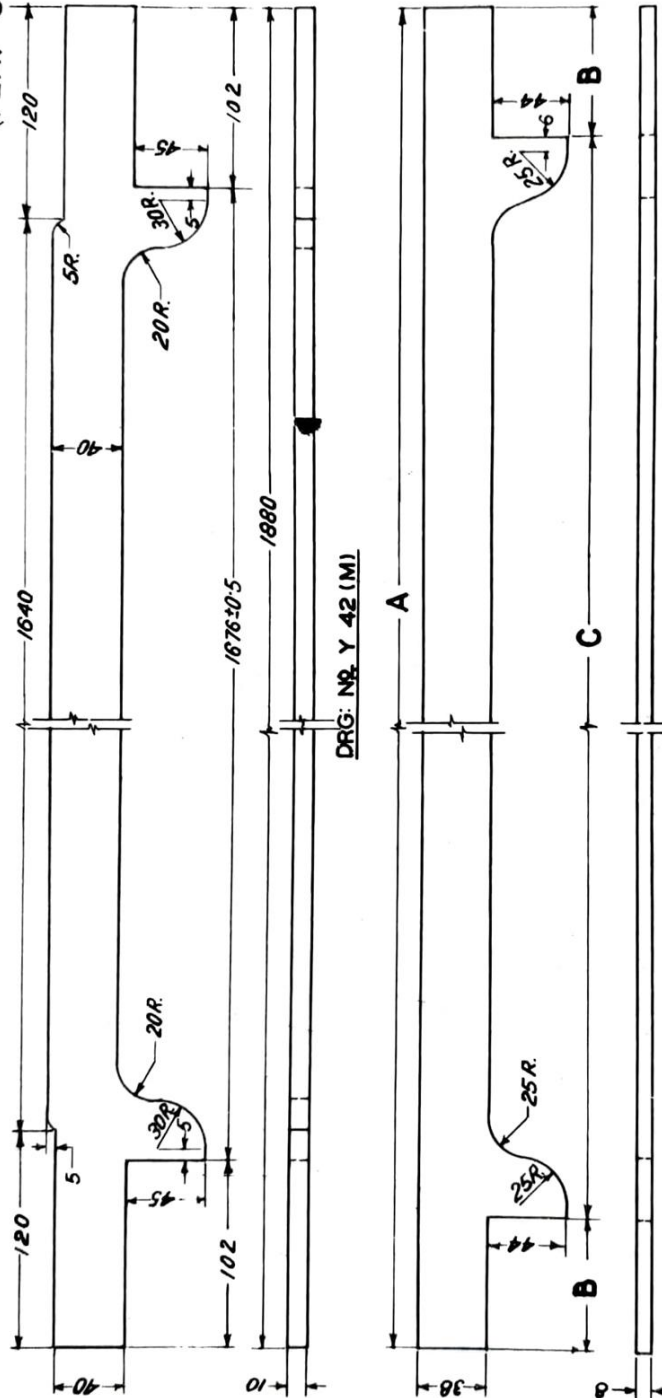
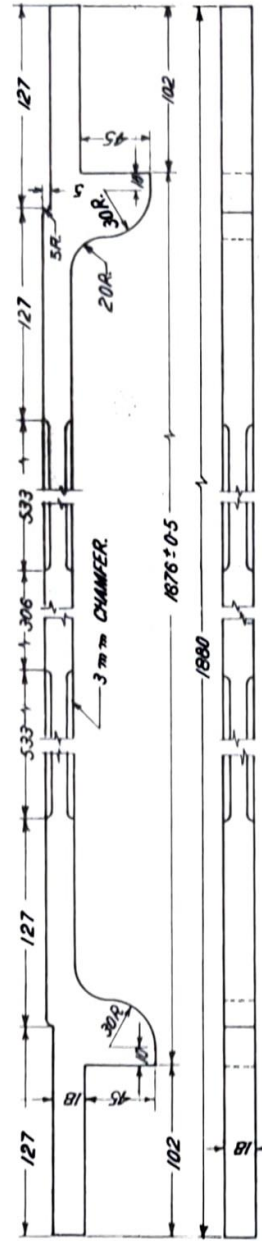


TABLE OF DIMENSIONS

GAUGE	DRAWING NUMBER	DIMENSIONS (mm)			WEIGHT EACH (kg)
		A	B	C	
B.G.	Y 4 (M)	1830	77	1676±0.5	4.53
M.G.	Y 3 (M)	1150	75	1000±0.5	2.91

RAIL GAUGES



DRG: N2 Y41 (M)
(SQUARE SECTION)

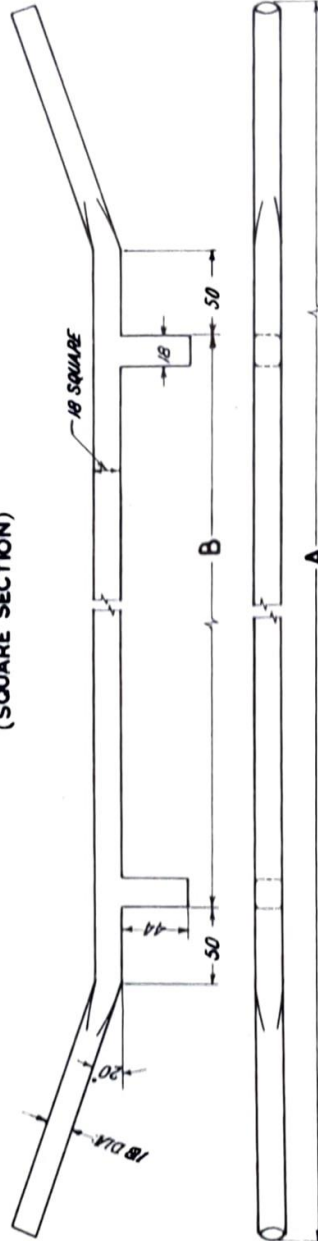
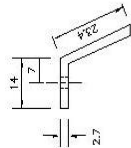
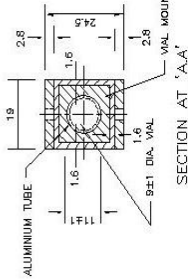


TABLE OF DIMENSIONS

GAUGE	DRAWING NUMBER	DIMENSIONS (mm)		WEIGHT (kg)
		A	B	
B. G.	Y2 (M)	2080	1876 ± 0.5	5.38
M. G.	Y1 (M)	1400	1000 ± 0.5	3.66

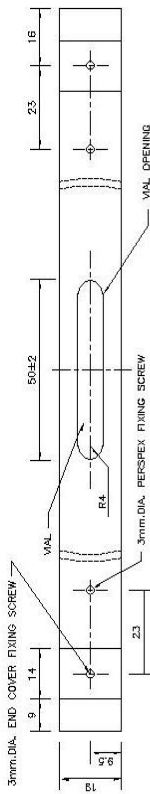
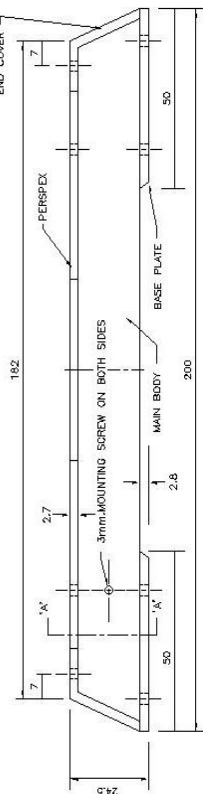
SHEET 1 OF 1

5 DETAILS OF END COVER

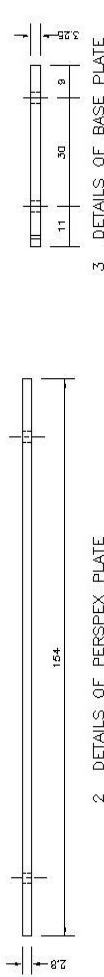
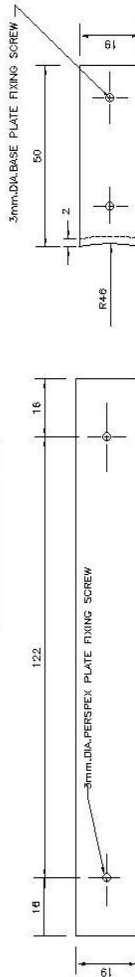
THIS DRAWING IS THE PROPERTY OF
RESEARCH DESIGNS AND STANDARDS ORGANISATION
(MINISTRY OF RAILWAYS)
LUCKNOW-228011-INDIA

ITEM NO.	DESCRIPTION	MATERIAL	SPECIFICATIONS	QTY	UNIT	PRICE	TOTAL
1.	END COVER	PLASTIC	AS PER R/S/O	2			
2.	BUBBLE TUBE	GLASS	AS PER R/S/O	1			
3.	BASE PLATE	BRASS	DO -	2			
4.	PERSPEX PLATE	PERSPEX	DO -	1			
5.	MAIN BODY	ALUMINIUM	DO -	1			

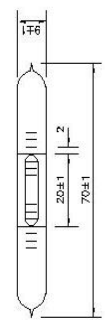
	R.	D.	S.	O.
	<u>SPIRIT LEVEL</u> 200mm. LONG			
	CANID./SUP ^{SR} .			
	REV'D.			
ITION	AUTH DRG. No. TM/2004			



1 DETAILS OF MAIN BODY



2 DETAILS OF PERSPEX PLATE



4 DETAILS OF BUBBLE TUBE

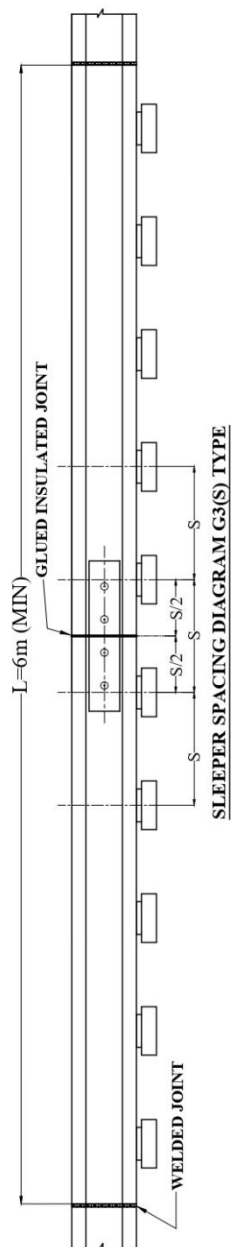
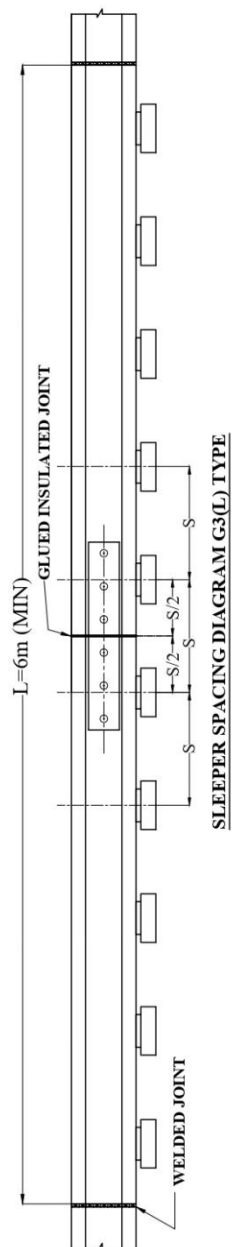
4. THE SENSITIVITY RANGE FOR 2mm. RUN OF THE AIR BELL IN BUBBLE TUBE SHALL BE 0-2'-30".
3. EACH LEVEL SHALL BE SUPPLIED IN A GAUGE CUM LEVEL BOX TYPE WOODEN CASE OR BOX.
2. THIS DESIGN IS SUITABLE FOR USE IN GAUGE CUM LEVEL BOX TYPE (B.G.)
1. ALL DIMENSIONS ARE IN MILLIMETRES.

AS PER RDSO SPECIFICATIONS FOR SPIRIT LEVEL	1:1	SCALE	ALT
---	-----	-------	-----

NOTES

DR. BY:	Q. P. KAPOOR	PLT. BY:	Dr. D. P. MALHOTRA	APPROVED BY
CH. BY:	PREM KUMAR	COM. BY:	ARBIND KUMAR	

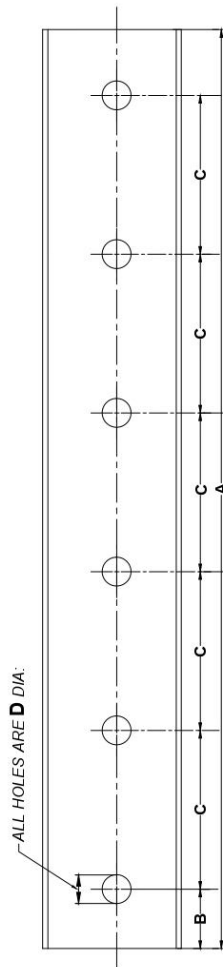
GLUED INSULATED RAIL JOINTS



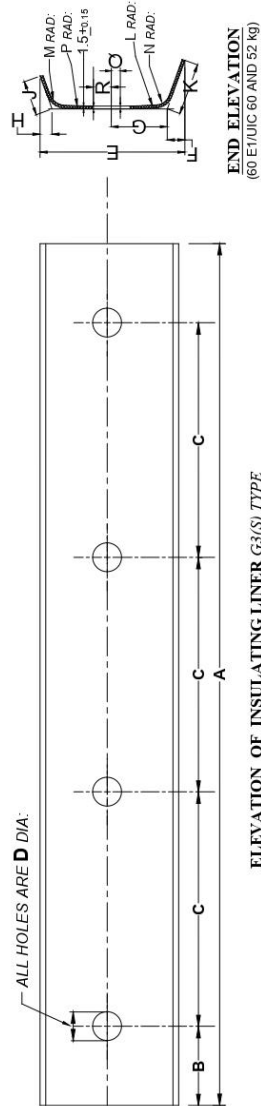
NOTE:-
THE RAIL PIECE SELECTED FOR INSULATED RAIL JOINT SHOULD BE PERFECTLY STRAIGHT AND TESTED ULTRASONICALLY TO ENSURE THAT IT IS FREE FROM INTERNAL MANUFACTURING DEFECTS. THE RAIL ENDS SHALL BE SQUARE, PLAIN AND SMOOTH.
THE THERMIT WELDING OF ENDS SHOULD BE DONE CAREFULLY SO AS TO ENSURE THAT THE GLUED JOINT IS NOT HEATED DIRECTLY OR INDIRECTLY.



SECTION AT X-X.



ELEVATION OF INSULATING LINER G3(L) TYPE



ELEVATION OF INSULATING LINER G3(S) TYPE

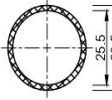
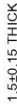
TABLE OF DIMENSIONS

RAIL SECTION	GAUGE	DRAWING NUMBER G3(U)TYPE	DIMENSION (mm)				DRAWING NUMBER G3(S)TYPE	DIMENSION (mm)				DIMENSIONS OF SECTIONS COMMON TO BOTH TYPES (mm)															
			A	B	C	D		A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R			
60E1/UIC60	B.G.	RDSO/T-2572	970	70	166	30	630	RDSO/T-2576	630	66	166	30	119	14.5	47.7	9.5	29.5	44	120	13.5	120	16	16				
52 kg	B.G.	RDSO/T-671	970	70	166	30	630	RDSO/T-1259	630	66	166	30	102.5	12.5	40	8.5	26	38	381	14	12	381	6.5	12.5			

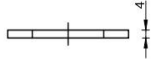
~~SHEET 5 OF 6~~



INSULATING END POSTS



INSULATING BUSH



PUNCHED PLAIN WASHER

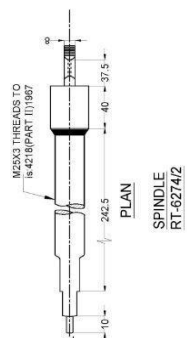
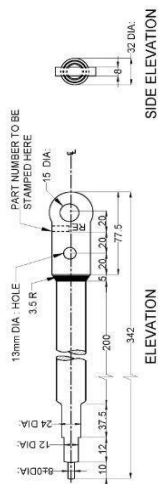
TABLE OF DIMENSIONS

RAIL SECTION	GAUGE	DRAWING NUMBER G3(L) TYPE	DRAWING NUMBER G3(S) TYPE	DIMENSIONS (mm)																
				A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	
60E1	B.G.	RDSO/T-2572	RDSO/T-2576	172	150	72	16.5	51	91	60.25	32	13	4	-	120	7	35	40	19	
UIC 60	B.G.	RDSO/T-2572	RDSO/T-2576	172	150	74.3	16.5	51	91	60.25	32	13	4	-	120	7	35	40	19	
52 kg	B.G.	RDSO/T-671	RDSO/T-1259	156	136	67	15.5	51	77.5	60	19	13	5	13	381	8	22.5	20	19	

TMC 8
SHEET 1



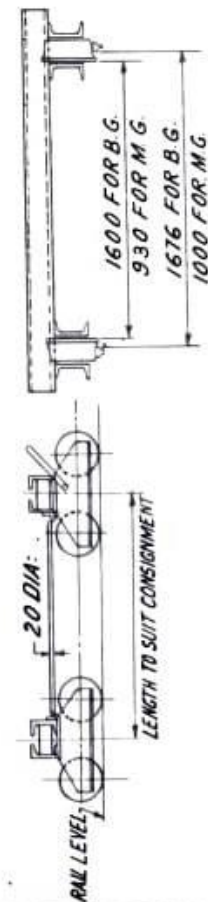
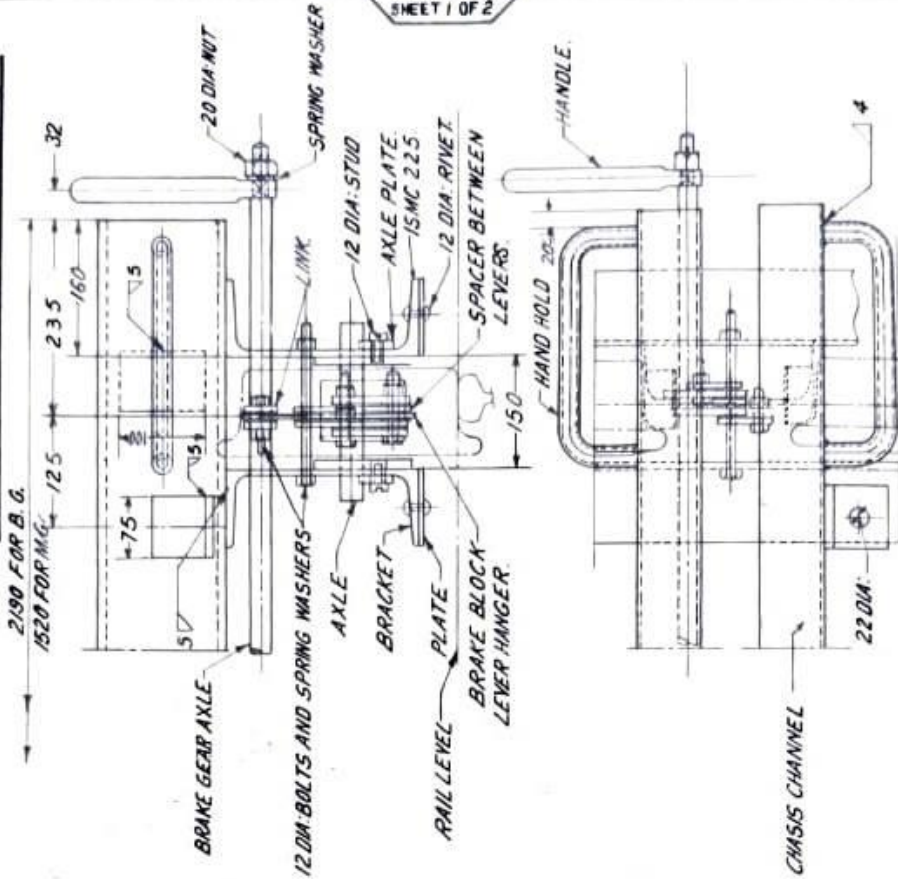
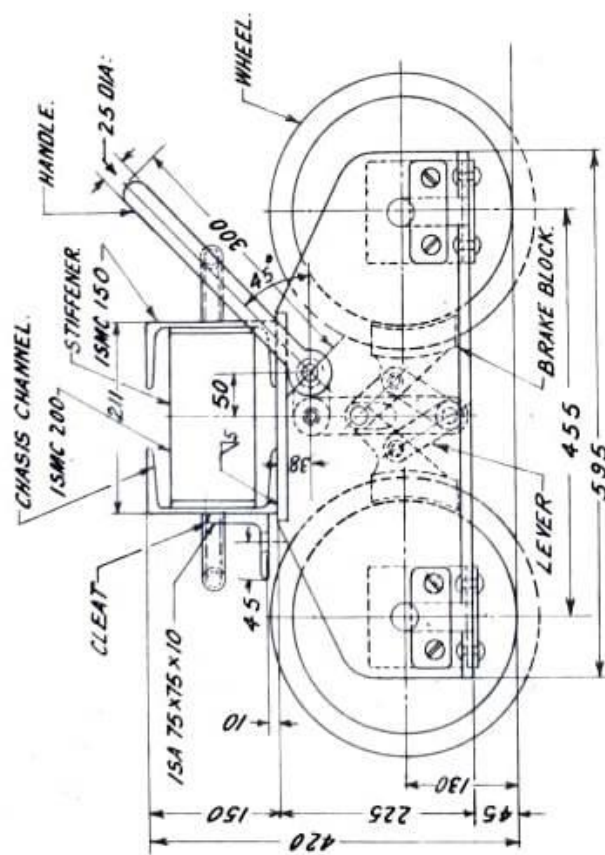
S.NO	ITEM	A	B
1.	THICK WEB SWITCHES	246	96
2.	OTHER D.R. SWITCHES	295	45



[illegible]

15 TONNE DIP LORRY

TMC 10
SHEET 1 OF 2

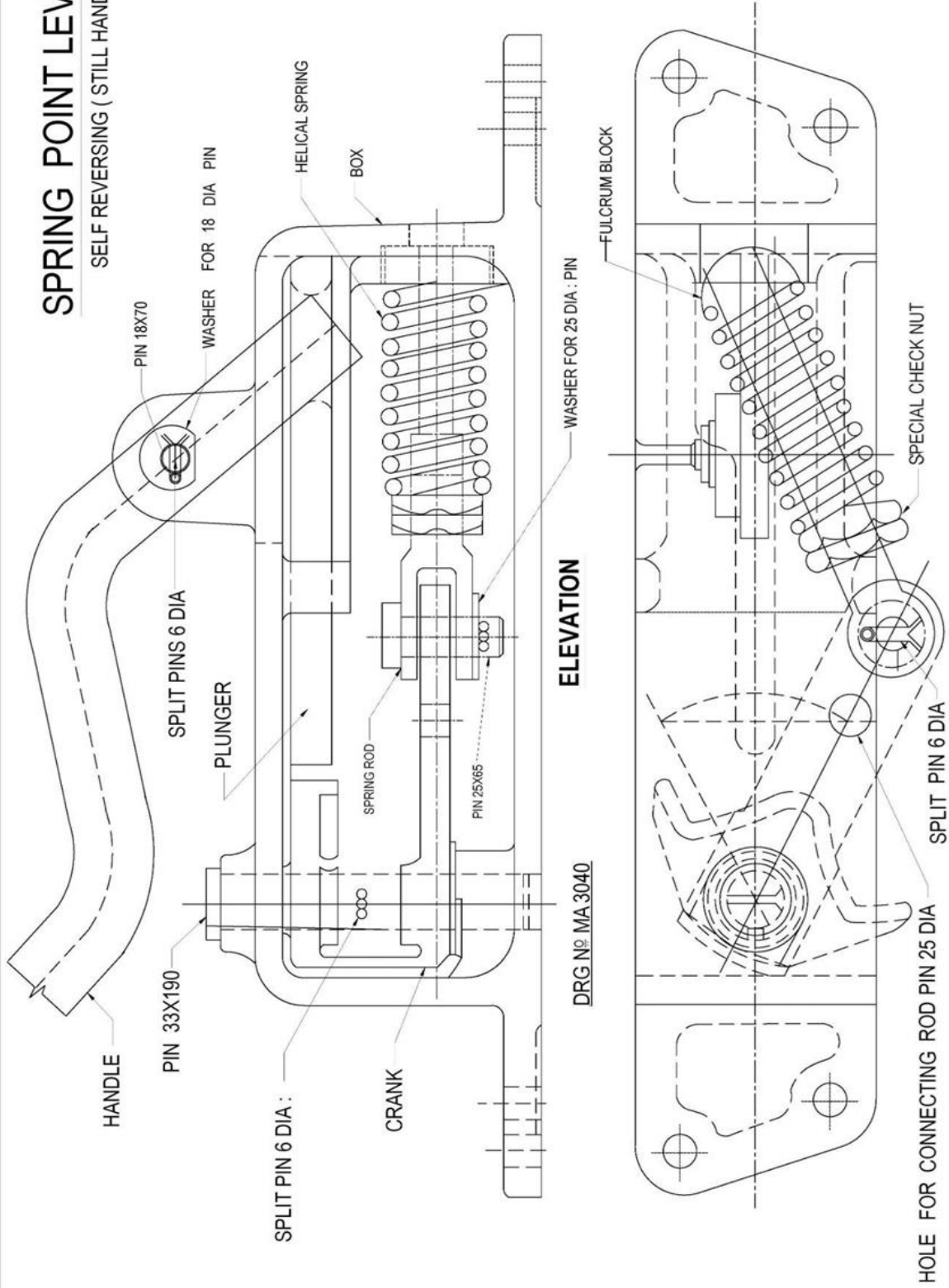


THE DETAIL OF DIP LORRY SHOWN ARE
AS PER DRG: NR. MA 3041.

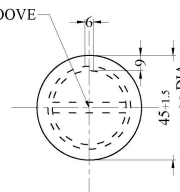
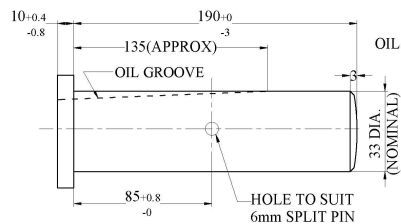
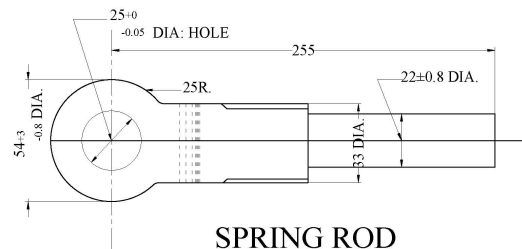
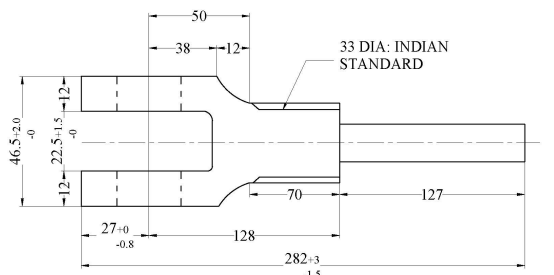
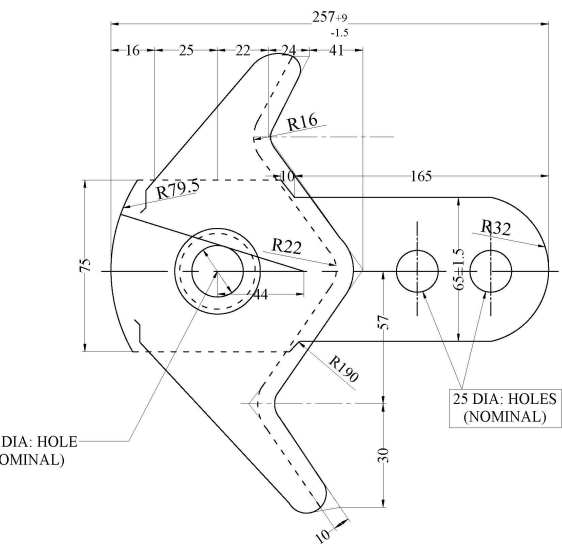


SPRING POINT LEVERS

SELF REVERSING (STILL HANDLE)



PLAN (WITHOUT HANDLE)



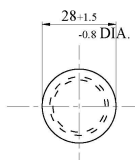
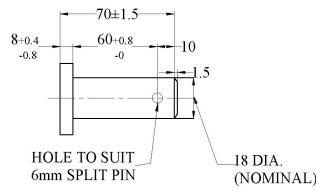
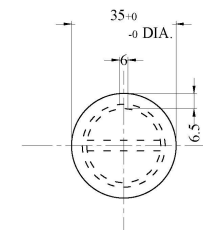
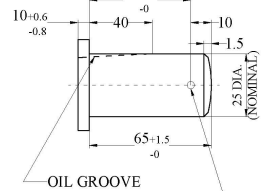
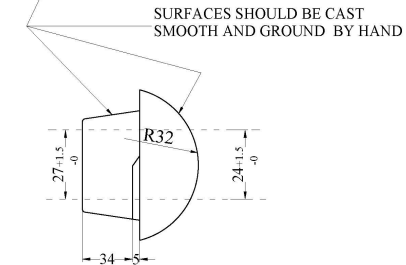
Technical drawing of a mechanical part, showing front and top views with dimensions.

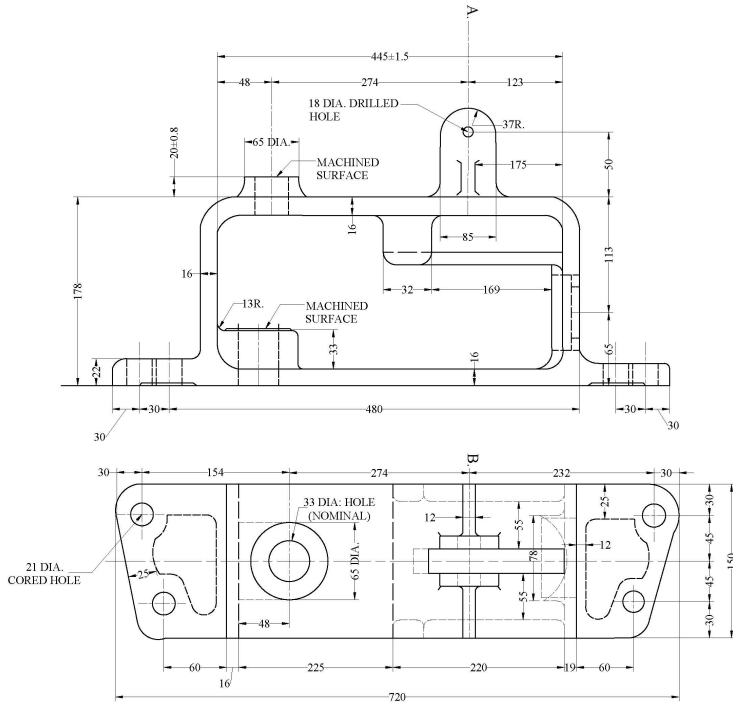
Front View (Left):

- Overall width: 45 ± 0.8
- Inner width: 43 ± 0.8
- Overall height: 66 ± 0.8
- Radius: $R1.3$
- Bottom flange width: 39
- Bottom flange thickness: 27
- Bottom flange outer diameter: 66

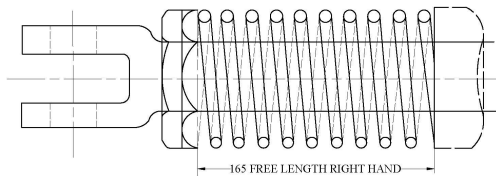
Top View (Right):

- Overall width: 66 ± 0.8
- Inner width: 33
- Inner height: 33
- Radius: $10R$ APPROX.

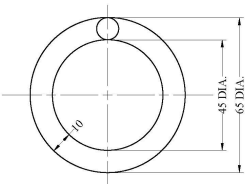




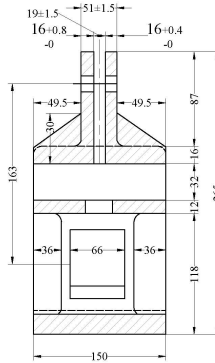
BOX
(DRG: NO M-142)



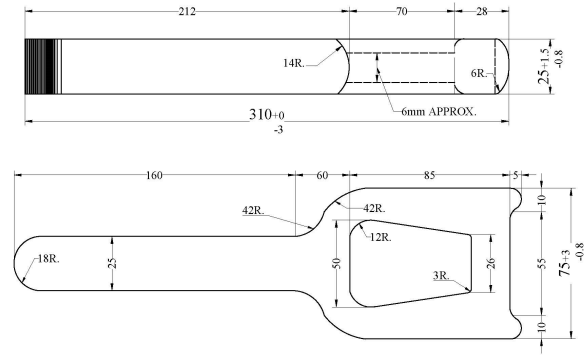
HELICAL SPRING
(DRG: NO M-140)



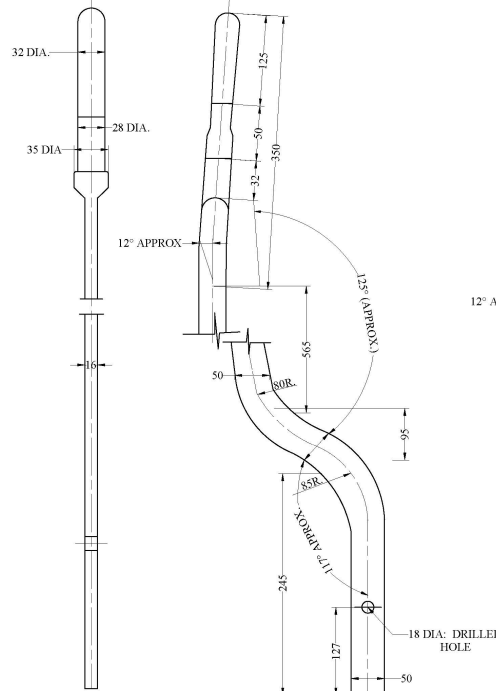
SIDE VIEW



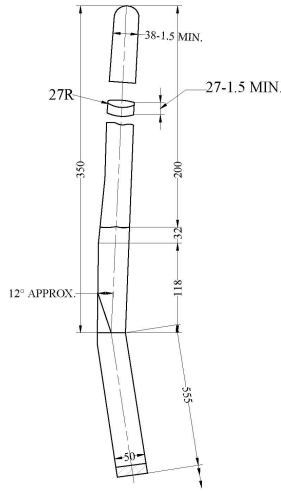
SECTION ON A,B,



PLUNGER
(DRG: NO M-135)



HANDLE
DRG: NO M-133



ALTERNATIVE GRIP FOR HANDLE

CHAPTER XI
TRACK FORMULAE

SN	Description	Page	Page No.
1.	Brief notes on track formulae	TFa-TFb	310
2.	Calculations for lead and radius of turnouts	TF1	312
3.	Calculation for lead and radius of symmetrical splits	TF2	313
4.	Calculations for main distances of cross-overs and diamonds	TF3	314
5.	Calculations of dimensions for distance blocks and M.S flat bearing plates with rail screws	TF4	315
6.	Calculation of bolt lengths for points and crossings	TF5	317

Brief notes on track formulae

Turnouts: As already mentioned in Chapter V on Turnout, Switches and Crossings, the lead and radius are the most important dimensions to be computed in a turnout. A turnout may be laid with a straight switch, a partly curved switch or a fully curved switch. There are slight variations in the formulae used for calculating lead and radius of the turnouts with these alternate type of switches. Page TF1 gives the formulae for calculating these dimensions. The straight lengths 'C' along rail from the theoretical nose of crossing to the tangent point of the lead curve and the heel divergence 'X' are suitable adopted for each turnout, depending upon its crossing length and the switch entry angle.

Symmetrical splits: The lead and radius of a symmetrical split layout are calculated by the formulae used for ordinary turnout except for the change that in computations the values of the crossing angle, the switch entry angle, the heel divergence and the gauge are halved. This nearly doubles the value of radius as compared to an ordinary turnout with the same switch and crossing angles. The modified formulae of lead and radius are given at page TF2.

Cross-overs: The distance 'D' from the theoretical nose of crossing to the theoretical nose of crossing on the main track is a function of crossing angle 'Z', the distance between track centres G1, and the track gauge 'G'. This can be calculated by the formula given at Page TF3. The lead and radius of turnouts are calculated in the same way as given in an earlier para on turnouts. It may be noted that the two turnouts may have equal or different crossing angles.

Scissors cross-overs: In a scissors cross-over, the distance '2A' from the theoretical nose of crossing to the theoretical nose of crossing of acute crossings of diamond, is the gauge 'G' multiplied by the cosecant of the crossing angle 'Z'. Distance '2D' from the theoretical nose of crossing to the theoretical nose of crossing of acute crossings on main track can be calculated by the formulae give at page TF3. The calculations are based on the assumptions that a scissors crossover is symmetrical about the two central axes, all the four turnouts have equal crossing angles and the two main tracks are parallel to each other.

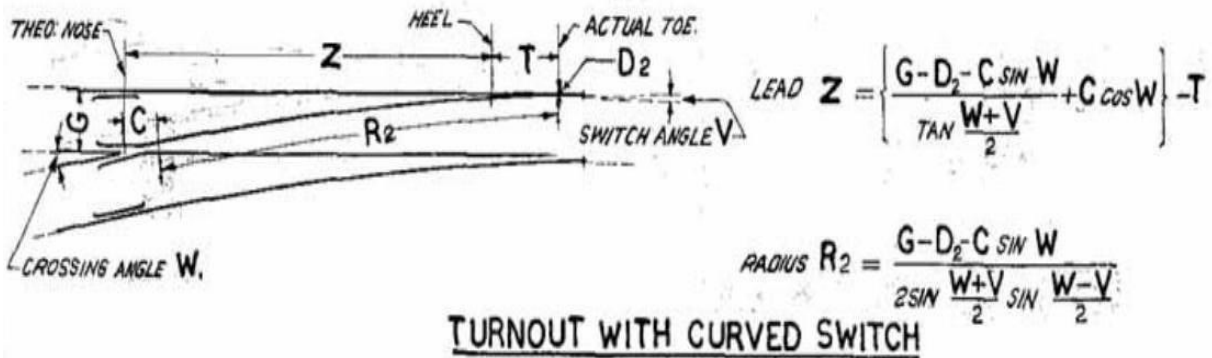
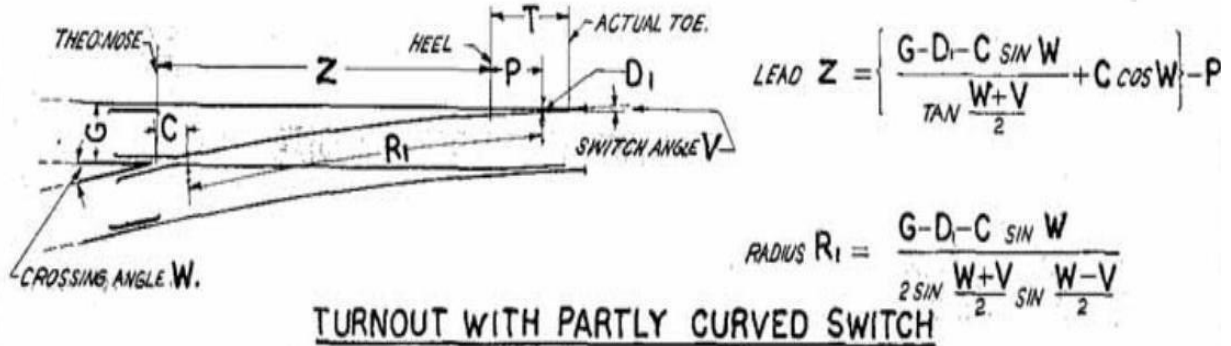
Diamond crossing: The principal dimension required for laying a diamond crossing is the distance 'A' from the theoretical nose of acute crossing to the theoretical nose of obtuse crossing. The formula for calculating this is the one given in an 'the' earlier para on scissors cross-over. The distance 'X' between the acute noses of point rails of obtuse crossing is calculated by the formula given at page TF3. The calculations are based on the assumption that the two tracks crossing each other are of equal gauge.

Distance blocks and M.S. flat bearing plates: The width of distance blocks and the spacing of holes in M.S. flat bearing plates is obtained by adding some constants to the clearance between rail heads. Pages TF4 give the formulae for the calculating these dimensions along with the assumptions made.

Bolts for points and crossings: The grip 'G' of the bolt is the distance between the outside faces of the webs of the outermost rails which it holds. The bolt length 'L' can be calculated by adding a constant to the value of the grip 'G'. The value of the constants depends upon different combinations of plain, spherical or spring washers used and the diameter of the bolt. The table on pages TF5 gives the values of such constants for 22mm and 25mm diameter bolts. These constants are meant to be used for black bolts only.

TF 1
SHEET 1 OF 1

CALCULATIONS FOR LEAD AND RADIUS OF TURNOUTS



Where ,

G = Track Gauge

W = Crossing Angle V = Switch Angle

C = Straight Length along Rail Measured From Theoretical Nose of Crossing To The Tangent Point Of Lead Curve.

X = Divergence at Heel

D_2 = Thickness of Tongue Rail Head at Actual Toe

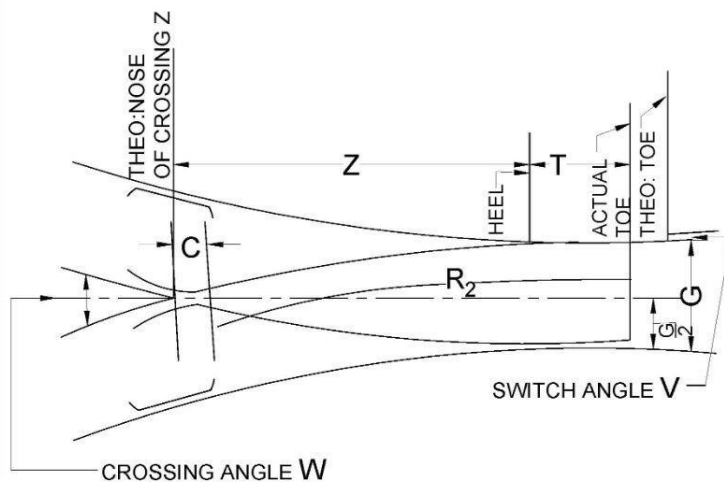
D_1 = Thickness of Tongue Rail Head at Junction of Rail Heads i.e. At the Springing Point of Lead Curve

T = Switch Length i.e. Distance From Heel to Actual Toe of Switch

P = Distance from Springing Point Of Lead Curve to Heel (For Partly Curved Switch Only)

Z = Lead Of Turnout I.E. From Heel to Theo: Nose of Crossing

$R_1, R_2, \& R_3$ = Radii of Lead Curves With Straight Switch, With Partly Curved Switch And With Curved Switch Respectively



SYMMETRICAL SPLITS WITH CURVED SWITCH

CALCULATION FOR LEAD AND RADIUS OF SYMMETRICAL SPLITS

$$\text{LEAD } Z = \left[\frac{\left(\frac{G-D}{2} - C \sin \frac{W}{2} \right)}{\tan \frac{W+V}{4}} + C \cos \frac{W}{2} \right] - T$$

$$\text{RADIUS } R_2 = \frac{\left(\frac{G-D}{2} - C \sin \frac{W}{2} \right)}{2 \sin \frac{W+V}{4} \sin \frac{W-V}{4}}$$

WHERE,
G=TRACK GAUGE

D=THICKNESS OF TONGE RAIL
AT ACTUAL TOE

C=STRAIGHT LENGTH ALONG RAIL
MEASURED FROM THRORETICAL
NOSE OF CROSSING TO THE TANGENT
POINT OF LEAD CURVE

T= SWITCH LENGTH

W=CROSSING ANGLE

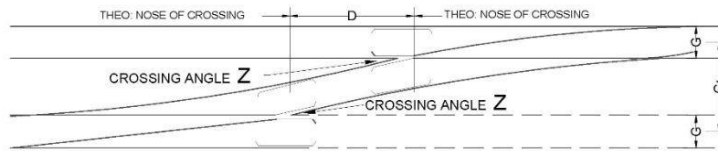
V=SWITCH ANGLE

R_2 = RADIUS WITH CURVED SWITCH

SHEET 1 OF 1

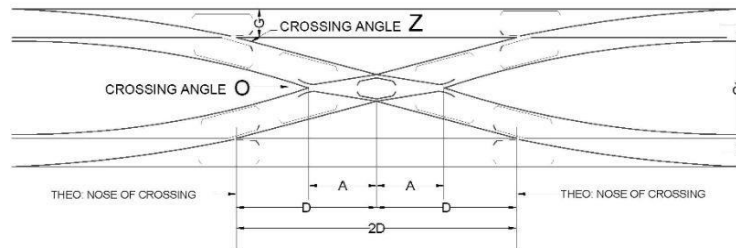
TF2

CALCULATIONS FOR MAIN DISTANCE OF CROSS-OVERS AND DIAMONDS



CROSS -OVER

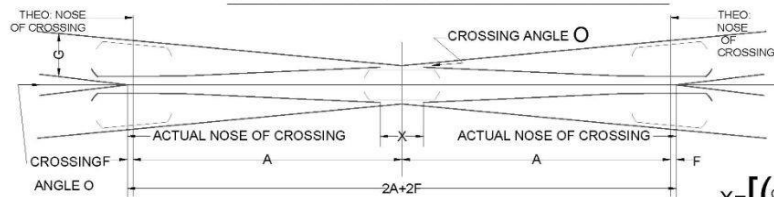
$$D = [G_1 - G \sec Z] \cot Z$$



SCISSORS CROSS -OVERS

$$D = [G_1 - G \sec Z] \cot Z$$

$$2A = G \csc Z$$



DAIMOND CROSSING

$$F = \frac{\text{THICKNESS OF RAIL WEB}}{2} \times \cot \frac{O}{2}$$

$$X = \left[\left(\frac{\text{CLEARANCE AT NOSE}}{2} \right) + \left(\frac{\text{CLEARANCE AT NOSE}}{2} \right) \right] \times \csc \frac{O}{2}$$

Z = CROSSING ANGLE
 G = TRACK GAUGE
 G_1 = DISTANCE BETWEEN TRACK CENTERS.
 D = DISTANCE FROM THEORETICAL NOSE TO CROSSING TO THEORETICAL NOSE OF CROSSING ON MAIN TRACK

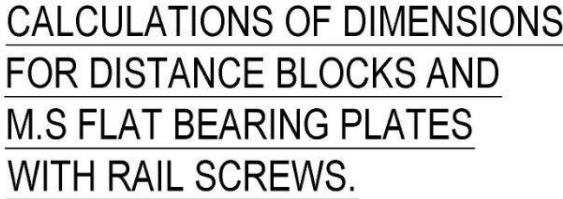
WHERE,
 G = TRACK GAUGE
 G_1 = DISTANCE BETWEEN TRACK CENTERS.
 $2D$ = DISTANCE FROM THEORETICAL NOSE TO CROSSING TO THEORETICAL NOSE OF ACUTE CROSSING ON MAIN TRACK
 Z = CROSSING ANGLE OF ACUTE CROSSING OF TURNOUTS ON MAIN TRACK.
 $2A$ = DISTANCE FROM THEORETICAL NOSE OF CROSSING TO THEORETICAL NOSE OF CROSSING OF ACUTE CROSSING OF DIAMOND.
 O = ANGLE OF ACUTE AND OBTUSE CROSSING IN DIAMOND EQUAL TO '2Z'
 WHERE,

O = ANGLE OF ACUTE AND OBTUSE CROSSING IN DIAMOND.
 F = DISTANCE FROM THEORETICAL NOSE OF CROSSING TO ACTUAL NOSE OF CROSSING.
 G = TRACK GAUGE.
 A = DISTANCE FROM THEORETICAL NOSE OF ACUTE CROSSING TO THEORETICAL NOSE OF OBTUSE CROSSING
 X = DISTANCE BETWEEN ACTUAL NOSES OF POINT RAILS OF OBTUSE CROSSING.

CLEARANCE AT NOSE $\begin{cases} 44 \text{ mm FOR B.G} \\ 41 \text{ mm FOR M.G} \end{cases}$

SHEET 1 OF 1

TF3



Y= CLEARANCE BETWEEN RAIL HEADS
 Θ =CROSSING ANGLE
P= REQUIRED WIDTH OF BLOCK
Q= REQUIRED SPACINGS OF HOLES IN BEARING PLATE

AND, $P = Y+C-D = Y+A$ CONSTANT, FOR DISTANCE BLOCKS NEAR HEELS OF SWITCHES (PROVIDED THE ANGLE SUBTENDED BY THE LEAD RAILS AT THAT POINT IS QUITE SMALL).

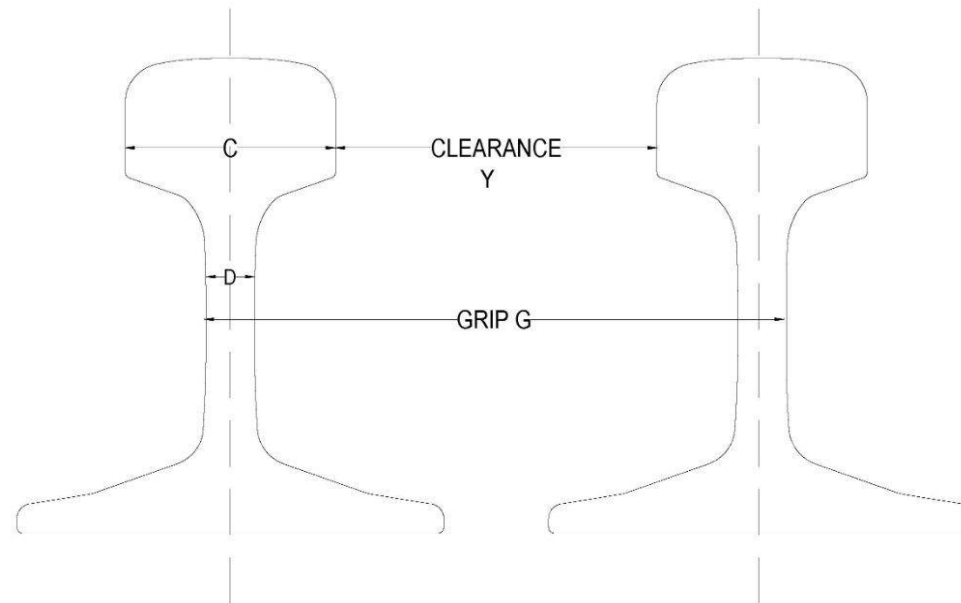
AND, $Q = Y+B+C+24 = Y+A$ CONSTANT, FOR BEARING PLATES NEAR HEELS OF SWITCHES (PROVIDED THE ANGLE SUBTENDED BY THE LEAD RAILS AT THAT POINT IS QUITE SMALL)

TABLE FOR CALCULATING WIDTHS OF DISTANCE BLOCKS & SPACING OF HOLES IN BEARING PLATES

DESCRIPTION OF CROSSING OR SWITCH	WIDTH OF BLOCK = P		SPACING OF HOLES IN BEARING PLATE = Q	
	52 kg	60 E1 (UIC 60)	52 kg	60 E1 (UIC 60)
<i>1 IN 20 CROSSING</i>	-	Y+132.45	-	Y+248.37
<i>1 IN 16 CROSSING</i>	Y+51.5	Y+57.82	Y+227.1	Y+248.40
<i>1 IN 12 CROSSING</i>	Y+51.5	Y+57.85	Y+227.2	Y+248.49
<i>1 IN 8.5 CROSSING</i>	Y+51.5	Y+57.89	Y+227.3	Y+248.68
<i>1 IN 6 CROSSING</i>	Y+51.6	Y+57.99	Y+227.7	Y+249
<i>1 IN 4.25 CROSSING</i>	Y+51.8	Y+58.18	Y+228.4	Y+249.8
<i>11150 mm O.R. SWITCH</i>	-	-	-	-
<i>12460 mm O.R. SWITCH</i>	Y+51.5	Y+57.8	Y+227	Y+248.3
<i>11200 mm O.R. SWITCH</i>	Y+51.5	Y+57.8	Y+227	Y+248.3
<i>10125mm O.R. SWITCH</i>	Y+51.5	Y+57.8	Y+227	Y+248.3
<i>6400mm O.R. SWITCH</i>	Y+51.5	Y+57.8	Y+227	Y+248.3
<i>4725 mm O.R. SWITCH</i>	Y+51.5	Y+57.8	Y+227	Y+248.3
<i>7420 mm O.R. SWITCH</i>	-	-	-	-
<i>6700 mm O.R. SWITCH (PARTIALLY CURVED)</i>	-	-	-	-
<i>5500 mm O.R. SWITCH</i>	-	-	-	-
<i>5485 mm O.R. SWITCH</i>	-	-	-	-
<i>4115 mm O.R. SWITCH</i>	-	-	-	-

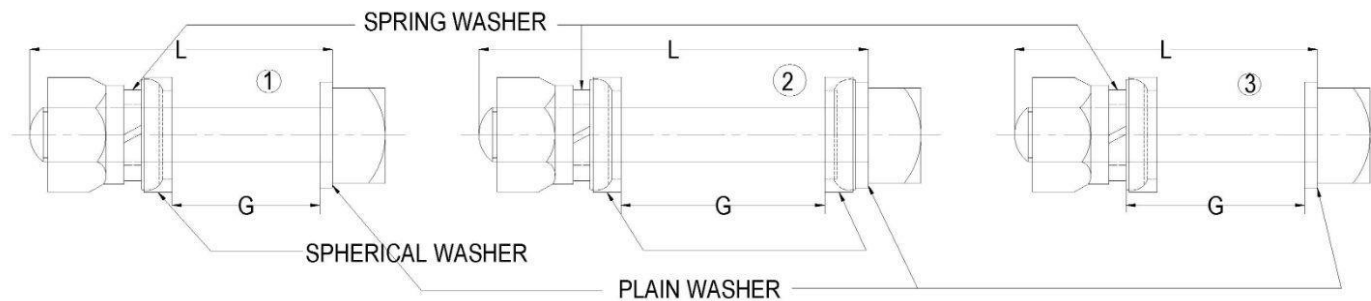
TF 4
SHEET 2 OF 2

BOLTS FOR POINTS & CROSSINGS



$$G = \text{CLEARANCE} + 2 \left(\frac{C}{2} + \frac{D}{2} \right) = \text{CLEARANCE } C + D$$

$$= Y + (C + D)$$



A MINIMUM PROJECTION OF 5mm SHOULD BE WORKED TO AND THE BOLTS CUT OFF.
IN LENGTHS VARYING BY 10 mm i.e., IF THE THEORETICAL LENGTH, INCLUDING THE 5 mm.
PROJECTION, IS 249 mm USE A 250 mm BOLT IF IT IS 251 mm USE A 260 mm BOLT

TABLE SHOWING CALCULATIONS OF BOLT LENGTHS FOR POINTS & CROSSINGS

DESCRIPTION	BOLT LENGTH "L" FOR 25mm DIA :BOLTS	BOLT LENGTH "L" FOR 22mm DIA BOLTS
① SPHERICAL WASHER WITH SPRING WASHER AT ONE END AND PLAIN WASHER AT THE OTHER END .	G +72	G +65
② SPHERICAL WASHER AT BOTH ENDS WITH SPRING WASHER AT ONE	G +95	G +88
③ SPRING WASHER AT ONE END AND PLAIN WASHER AT THE OTHER END .	G +49	G +42

TF 5
SHEET 2 OF 2

Annexure

S.No.	Description	Pages	Page No.
1	Brief Note	ANXa	320
2	Extended Tie Plates (Insulated)	ANX1 (SHEET 1 TO 3)	321
3	Slide chairs	ANX2 (SHEET 1 TO 6)	324

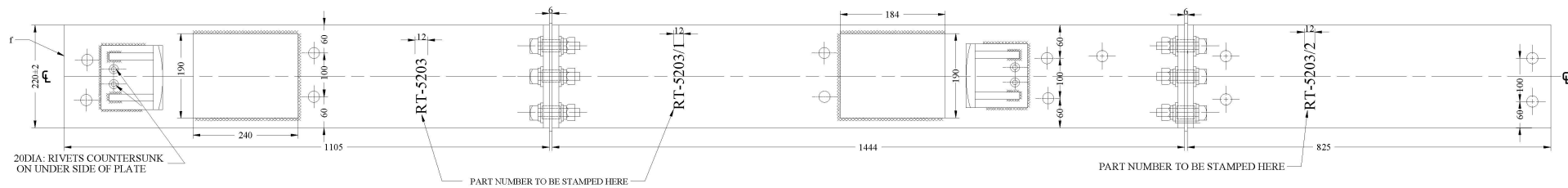
General:

This Annexure gives the layout of tie plates and extended tie plates (insulated) for use with over-riding switches and thick-web switches.

Brief Note:

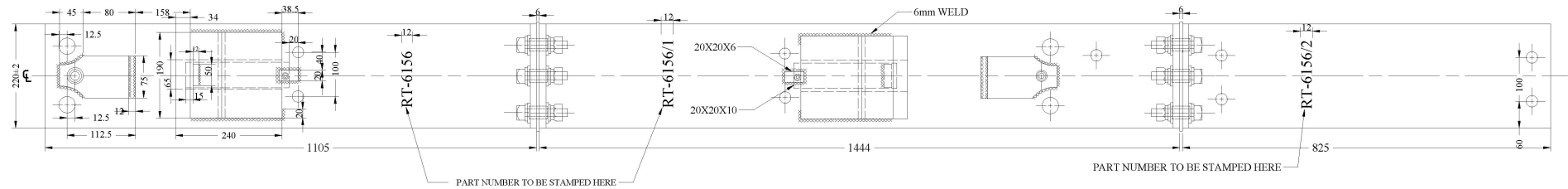
Most of the standards track layout drawings are with PSC sleepers using ERC as sleeper fittings. Presently, Over-riding switches and thick web switches are being used in layout along with Cast Magnese Steel (CMS) Crossings/Weldable CMS Crossings, the details of which are given in previous chapters. The typical arrangement of tongue rail with respect to stock rail in case of over-riding switches as well as thick-web switches is shown in the Annexure.

EXTENDED TIE PLATE (INSULATED) FOR 1 IN 12, 52 Kg B.G. (RDSO/T-5203 TO RDSO/T -5203/2)



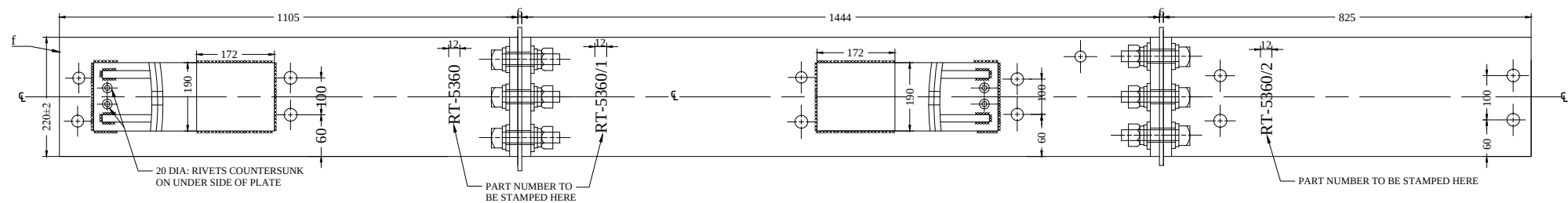
PLAN

EXTENDED TIE PLATE (INSULATED) FOR 1 IN 12, 60 KG TWS B.G. (RDSO/T- 6156 TO RDSO/T -6156/2)



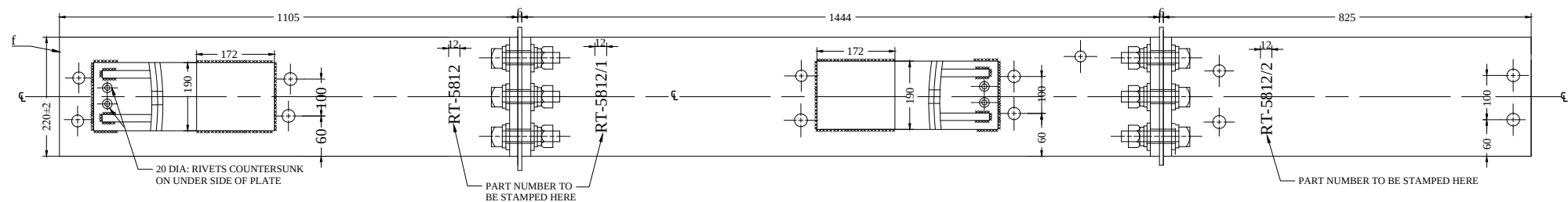
PLAN

EXTENDED TIE PLATE (INSULATED) FOR 1 IN 8.5, 60 Kg B.G. (RDSO/T- 5360 TO RDSO/T- 5360/2)



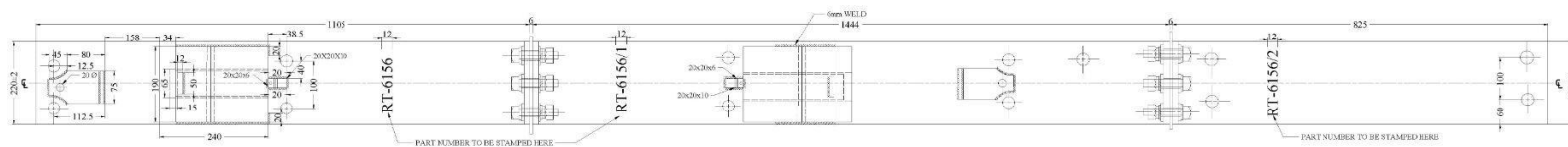
PLAN

EXTENDED TIE PLATE (INSULATED) FOR 1 IN 8.5, 52 Kg B.G. (RDSO/T- 5812 TO RDSO/T- 5812/2)



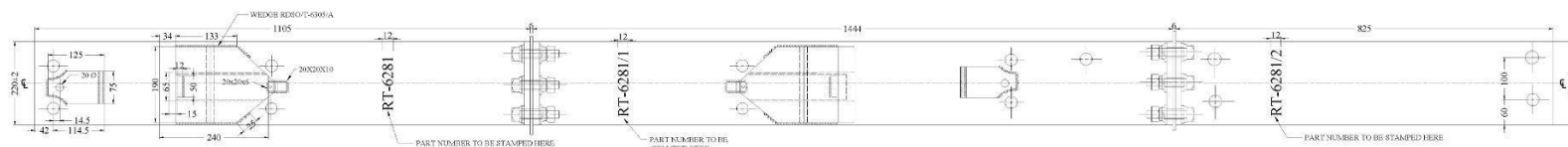
PLAN

EXTENDED TIE PLATE (INSULATED) FOR 1 IN 12, 60 KG TWS B.G. (RDSO/T- 6156 TO RDSO/T- 6156/2)



PLAN

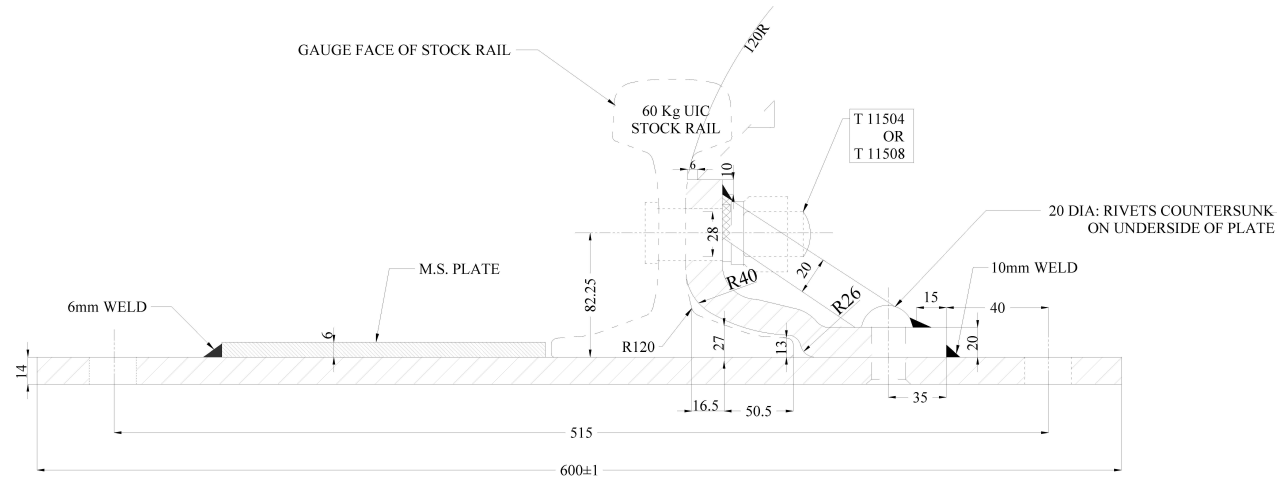
EXTENDED TIE PLATE (INSULATED) FOR 1 IN 8.5, 60 KG TWS B.G. (RDSO/T- 6281 TO RDSO/T- 6281/2)



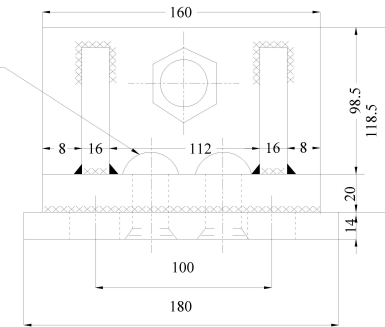
PLAN

ANX 1
SHEET 3 OF 3

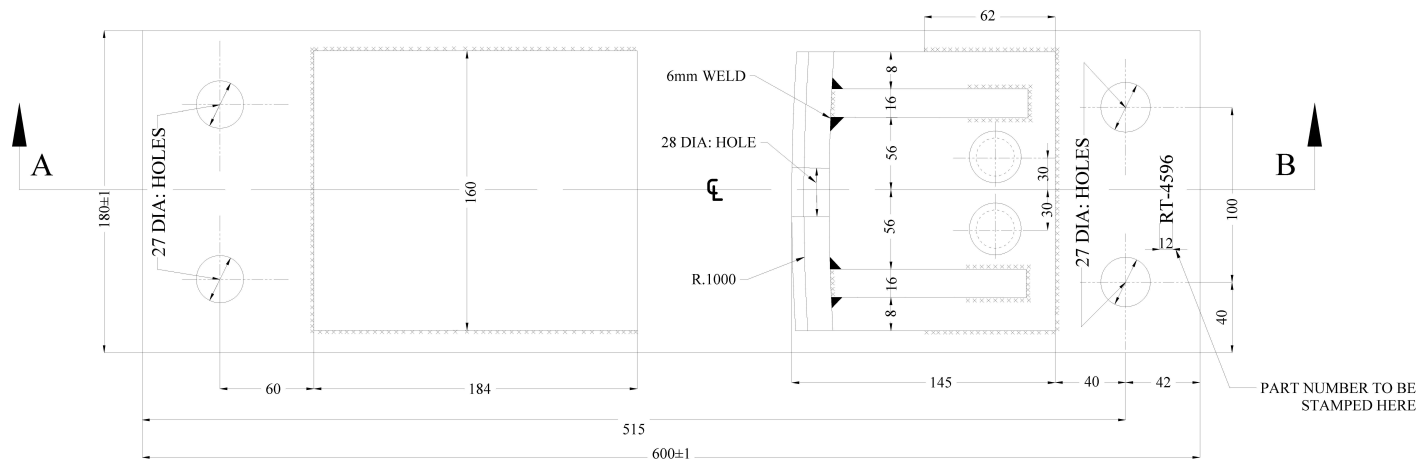
SLIDE CHAIR FOR 1 IN 12, 60 KG B.G. (RDSO/T- 4596)



SECTIONAL ELEVATION ON A.B.

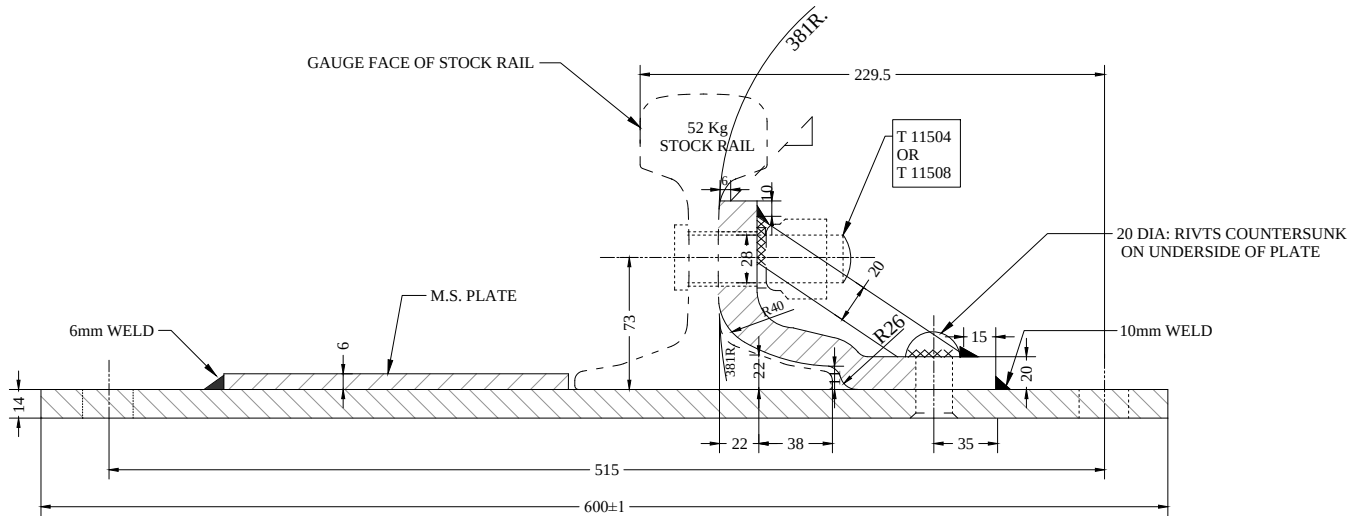


END ELEVATION

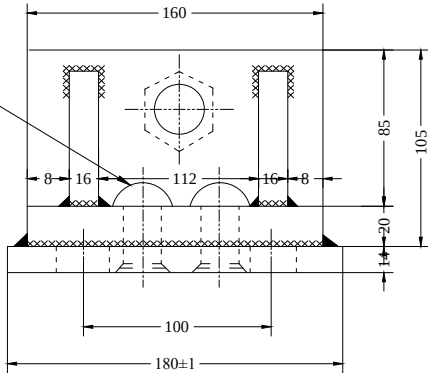


PLAN

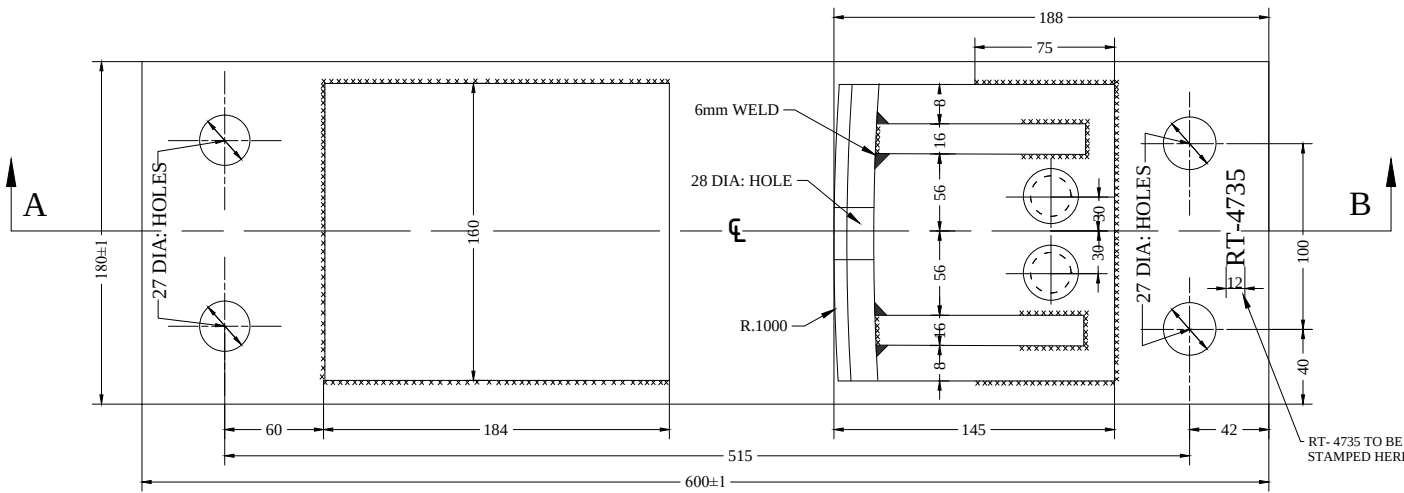
SLIDE CHAIR FOR 1 IN 12, 52 KG B.G. (RDSO/T- 4735)



SECTIONAL ELEVATION ON A.B.

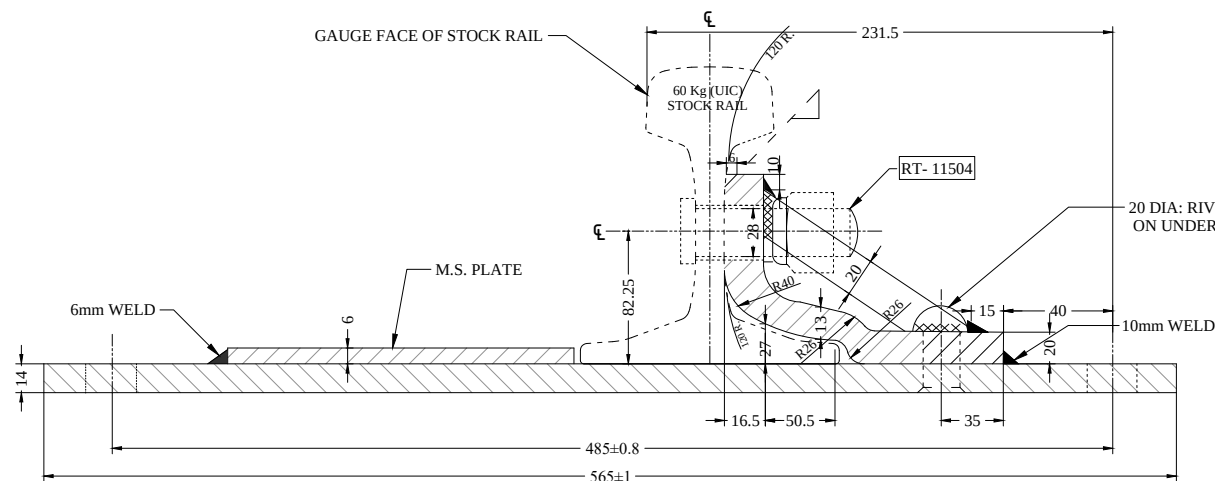


END ELEVATION

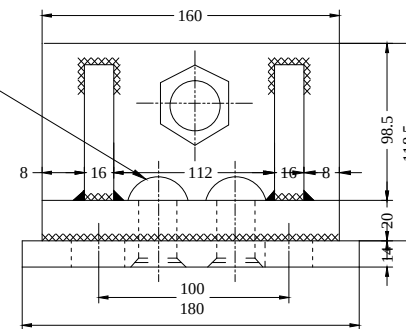


PLAN

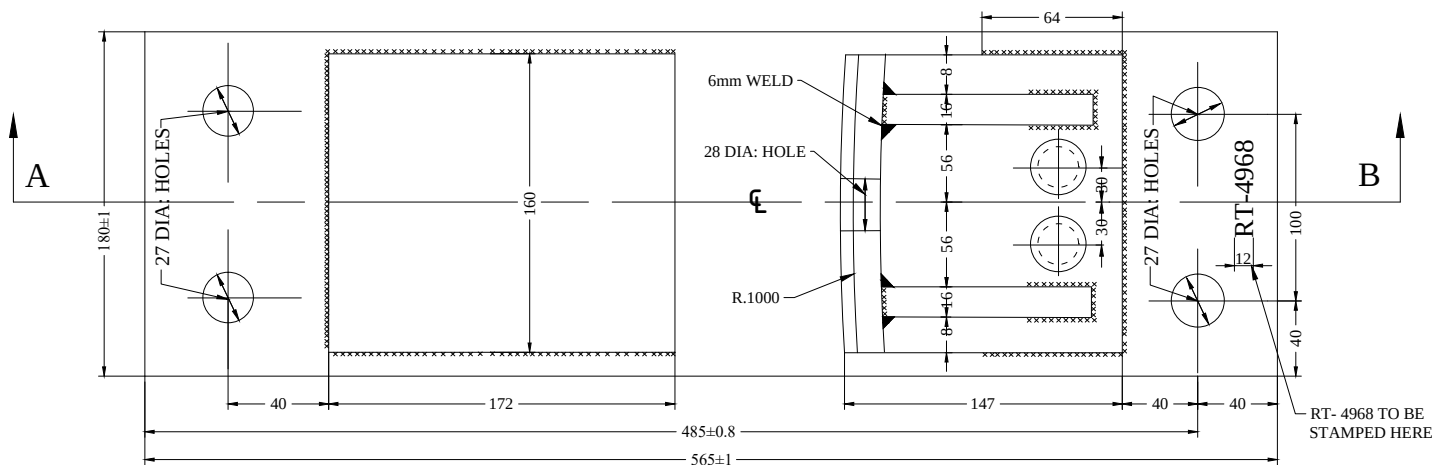
SLIDE CHAIR FOR 1 IN 8.5, OR CURVED SWITCH 60 KG B.G. (RDSO/T- 4968)



SECTIONAL ELEVATION ON A.B.



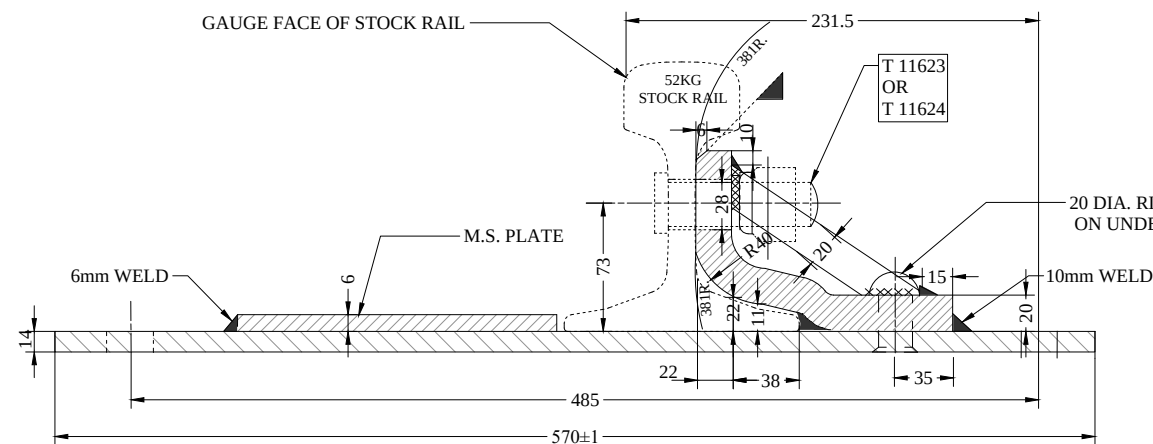
END ELEVATION



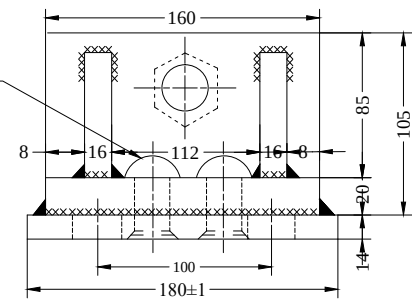
PLAN

ANX 2
SHEET 3 OF 6

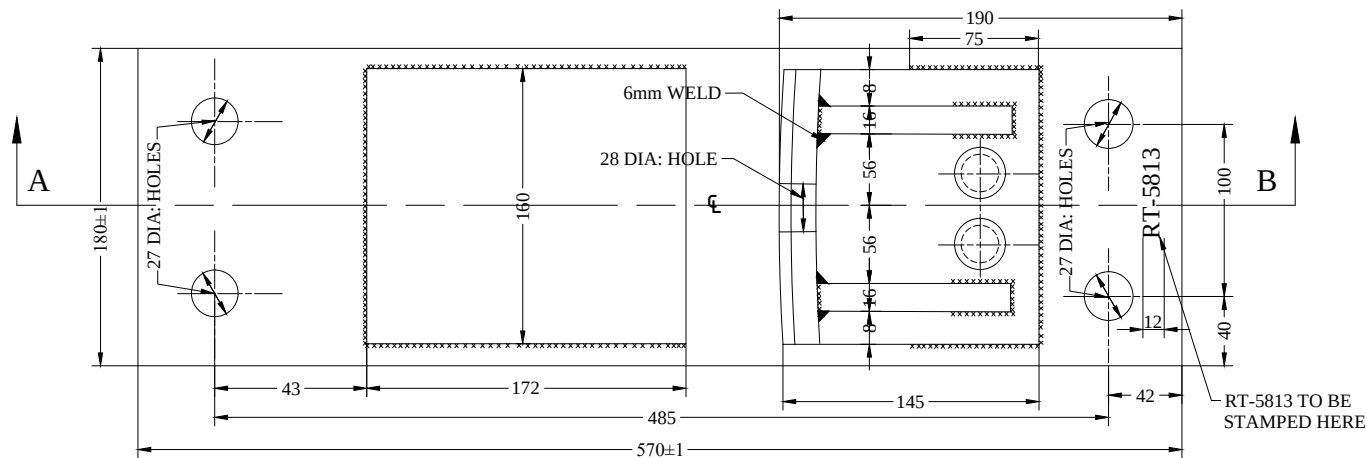
SLIDE CHAIR FOR 1 IN 8.5, 52 KG B.G. (RDSO/T-5813)



SECTION ELEVATION ON A.B.



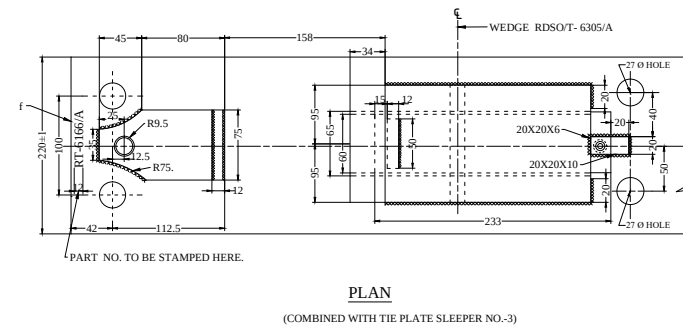
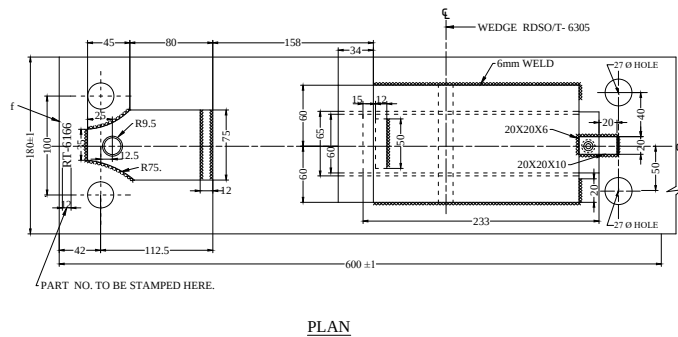
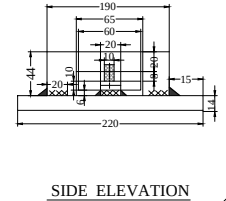
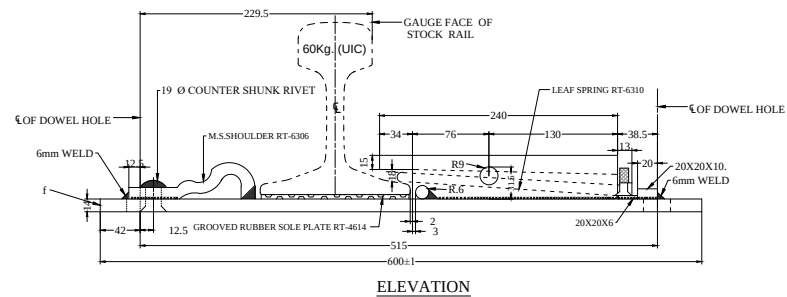
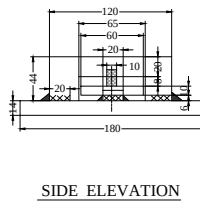
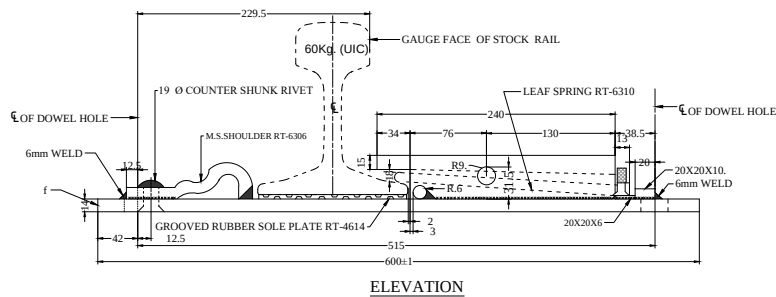
END ELEVATION



PLAN

ANX 2
SHEET 4 OF 6

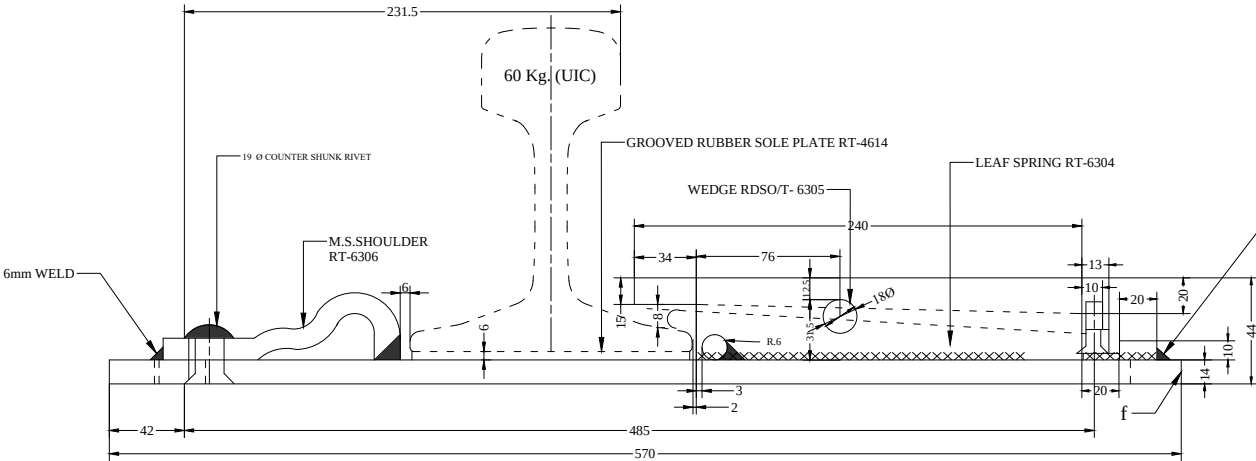
SLIDE CHAIR FOR 1 IN 12, 60 KG TWS B.G. (RDSO/T-6166 & 6166/A)



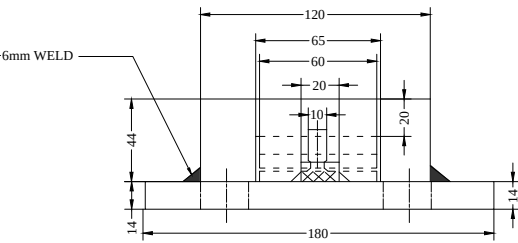
SHEET 5 OF 6

ANX 2

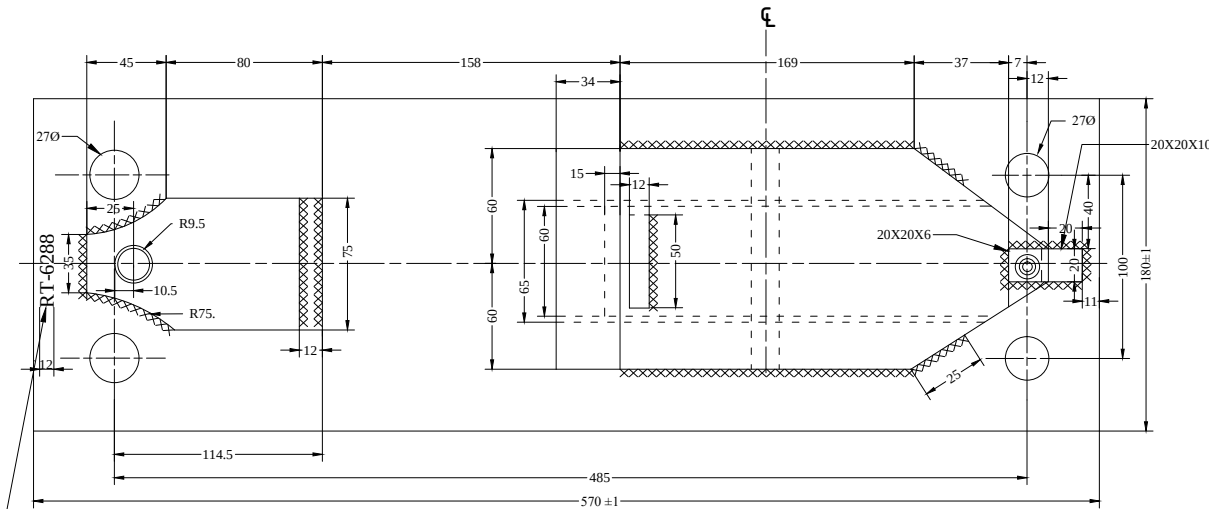
SLIDE CHAIR FOR 1 IN 8.5, 60 Kg TWS B.G. (RDSO/T-6288)



ELEVATION



SIDE ELEVATION



PLAN