APPENDIX "A"

PRICE SCHEDULE OF ARTICLES TO BE SUPPLIED

(Amount in: Euro)

Sr. No.	Description of Articles	Qty	CFR/ Yangon Basis	
			Unit Price (Euro)	Total Amount (Euro)
1	Rail Clip	800,000 Nos		
2	SG Cast Iron Inserts	2,400,000 Nos		
3	3mm Øx 3PlyHT Steel Strand	2,800 MTons		
4	Fibre Pad	1,200,000 Nos		
5	Nylon Liner	2,400,000 Nos		
6	Steel Wedges	267,000 Pairs		
7	18mmØ Spring Steel Round	2,000 MTons		
	Total (CFR Yangon Basis) Euro			

(1) Manufacturer -

-

(2) Country of Origin -

(3) Warranty Period - 12 Months

(4) Delivery Period - 3 Months

(5) Shipment -

(6) Port of Shipment -

(7) Delivery and Document - As per INCOTERMS (2000)

Signature of Supplier

APPENDIX "B"

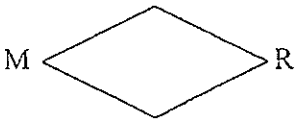
MYANMAR RAILWAYS

PACKING & MARKING INSTRUCTIONS

1. The Articles shall be packed in sufficiently durable packing material to withstand overseas shipmentand tropical conditions and also to ensure against handling at both ends.
2. Each package shall contain uniform quantity of the same kind and size of stores.
3. Cases crates cartons, etc. shall be of the following standard sizes, wherever possible:
   (a) 24" x 20" x 19-1/2"
   (b) 24" x 20" x 21-1/2"
   (c) 24" x 40" x 21-1/8"
   (d) 28" x 40" x 43"
4. A packing list showing description, quantity, weight and dimension of the stores enclosed in each package shall be placed invariably inside each package.

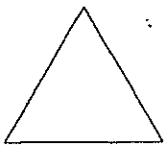
MARKING ON THE PACKAGES

5. Each package is to be marked as follows:

(a) 

MYAN – RAILS

The suitable size of marking (a) should be in the middle of one side under which Order Number and Country of Origin are to be given.

(b) 

An equilateral Triangle in Red colour proportionate to the package should be marked below the above marking (a).

6. In addition to the above, each package shall be marked to show:
   (a) Description and Quantity
   (b) Net Weight of contents
   (c) Gross Weight of contents
   (d) Dimensions
   (e) Invoice Number

7. The package number, i.e the quantity of package relating to one invoice will be numbered separately. If the number of packages relating to one invoice amounts to 100 packages, these 100 packages will be numbered as under:

The number 1 package will be numbered: 1 of 100

The number 2 packages will be numbered: 2 of 100 and so on.

8. One copy of the invoice will be enclosed in the No.1 package:

location of the invoice)
)
enclosed in the package) "INVOICE HERE"
)
will be indicated thus:)

9. Other packages in respect of dangerous, inflammable and fragile stores, etc. will in addition to the above, bear markings in accordance with the regulations of the shipping and insurance organizations concerned.

10. Material Markings:

_____
_____
_____
_____

11. The Value of each item of Spare Parts and Accessories should be mentioned in the INVOICE.

APPENDIX "C"

SHIPMENT AND DELIVERY SCHEDULE

1. The Delivery of the Articles as per items stated in **Appendix "A"** shall be CFR Yangon Basis within **(3) Three months** after the receipt of Letter of Credit Ocean vessel payable by the Supplier.

APPENDIX "D"

SPECIMEN GUARANTEE FOR PERFORMANCE THROUGH THE MYANMA FOREIGN TRADE BANK, YANGON BANK GUARANTEE FORM

To:

The Managing Director,
Myanma Railways,
Nay Pyi Taw,
MYANMAR.

We ,.....hereby and unconditionally guarantee to pay to you an amount up to **Euro - - - - - - - - - (Euro - - - - - - - - - - - only)** equivalent to **(10%)** ten per cent of the total net Contract amount of **Euro - - - - - - - (Euro - only)** for the supply of **Raw Materials for Concrete Sleeper Production** to the Myanma Railways as per Contract No. - - - - - - - dated ....., Payment shall be made in whole or in part to you on your first written demand through Myanma Foreign Trade Bank, Yangon accompanied by your written statement that **Messrs.** - has failed or refused to perform or execute any terms and conditions of this Contract.

This Guarantee shall remain valid until successful completion of the Contract as after (12) Twelve months from the date of Provisional Acceptance of the Last Consignment of the Articles.

On expiry this letter of guarantee shall be returned to us for cancellation.

Bank

(Appendix 'E')

BID BOND FORM

WHERE AS .....
(hereinafter called "the bidder")has submited its bid dated .....for
the supply of .....(hereinafter called
"the Bid") .....
KNOW ALL MEN by these presents that We, ... Name of Bank .....
.....
having our registered office at .....(ADDRESS OF BANK) .....
are bound onto the office of Managing Director, Myanma Railways,Nay Pyi Taw Union of Myanmar (hereinafter called " the Purchaser") in the sum of .....
for which payment well and truly to be made to the said Purchaser,the Bank binds ifself,its successors and assigns by these presents,Sealed with the Common Seal of the said Bank this ..... day of 2010

THE CONDITIONS OF THIS OBLIGATION ARE;

1 If the Bidder withdraws its bid,during the period of bid validity specified by the Bidder on the Bid Form; or

2 If the Bidder,having been notified of the acceptance of its bid by the Purchaser during the period of bid validity.

(a) fails of refuses to excute the Contract Form,if required:or

(b) fails of refuses to furnish the Performance Guarantee,in accordance with the instruction to Bidders;

We undertake to pay to the Purchaser up to the amount upon receipt of its first written demand,without the Purchaser will note that amount claimed by it, is due to it owing to the occcrrence of one or both of the two conditions,Sprcifying the occurred condition of conditions.

This guarantee will remain in force up to and including (30) thirty days after the period of bid validity,and demand in respect there of should reach the Bank not later than the above date.

Signature of Bank

TECHNICAL SPECIFICATION FOR ELASTIC RAIL CLIPS AS PER INDIAN RAILWAY STANDARD

FORWARD

This specification conforms to be Indian Railway Standards specification for elastic rail clips [ERC] issued under the serial no. T-31-1992 [third revision] or equivalent or superior standard and our drawing.

SCOPE

This standard covers the specification including technical requirement, inspection and testing procedure of ERC, hereinafter referred as 'ERC'. Inspection will also include inspection of raw materials for manufacture of ERC. Contract awarding party has been referred as 'Purchaser' and its nominated agency/representative as 'Inspection Agency'. The firm entrusted with manufacture and supply of clips, is referred to as 'Manufacturer'.

TECHNICAL SPECIFICATION OF THE RAW MATERIAL

SILICO MANGANESE spring steel as rolled bars to grade 55 Si7 of IS:3195 – 1992 or equivalent or better shall be used in the manufacture of ERC. The technical specification of as rolled steel bars relate to supply condition of the bars in the as rolled and straight condition for hot forging.

Steel shall be manufactured by any process of steel making except the Bessemer process. It shall be followed by secondary refining or vacuum melting.

The size of ingots, billets or continuous cast billets for any given size of finished steel product shall be such that a min. reduction ratio of 16:1 from the min. cross sectional area of the ingot billet or continuous cast billets to the max. cross sectional area of the product is ensured.

The raw material may be inspected by the purchaser/his inspection agency for inspection of clips at his discretion. The inspection will be carried out in accordance with IS:228 or spectrographically, IS 4163-1982, IS 150-1983 and IS 6396 – 1983 or with any equivalent or better standard of inspection.

MANUFACTURE OF CLIPS

The clips shall be manufactured from as rolled silico-manganese spring steel rounds as per technical specification [reference para 3] by not forming shall be subsequently oil hardened and tempered to give uniform hardness across the section. The ERC shall shall be manufactured as per details and tests stipulated hereinafter.

MARKING

All ERC shall bear stamping to indicate last two digits of the year of manufacture and initials of Manufacturer.

LOT AND SAMPLE SIZE FOR TESTING

For the purpose of testing the number of ERC manufactured from the same heat no. of raw materials, heat treated in a similar manner in a day subject to a maximum of 10000 nos using continuous type temperature controlled furnace or clips manufactured in one shift in a day and heat treated in a similar manner shall form a lot of testing.

The test samples for different tests shall be drawn at random from each lot.

The clip shall be offered for inspection.

TESTS

Chemical analysis. One sample of ERC from the production of each lot shall be tested for chemical analysis for determination of carbon, silicon, manganese, sulphur and phosphorus of the sample shall be spectographically analysed as per relevant part number of IS:228 or as per any equivalent standard. The sample shall confirm to the requirements of chemical composition with permissible variation as stipulated hereinunder.

ELEMENT	*COMPOSITION [%]*	*PERMISSIBLE VARIATION [%]*
CARBON	0.50 – 0.60	+/- 0.03
MANGANESE	0.80 – 1.00	+/- 0.04
SILICON	1.50 – 2.00	+/- 0.03
SULPHUR	0.04 MAX	+/- 0.005
PHOSPHORUS	0.04 MAX	+/- 0.005

If the chemical composition does not conform to the specified chemical composition the lot shall be rejected.

Hardness test. The sample clips shall be tested for hardness in accordance with IS 586-68 or any equivalent or better standard Rockwell hardness test [B&C scales] for steel or 'IS 1501 [Part – I] – 1984' or any equivalent or better standard Rockwell hardness test for steel' or 'IS:1500-1983' or any equivalent or better standard Brinell hardness test for steel' and shall conform to the following as the case may be :

Hardness	Hardness number
RC	40 – 44
HV	380 – 435
HB	375 - 415

DECARBURISATION TEST

The ERC shall be microscopically examined at magnification x 100 for decarburisation as per IS:6396-1983 or any equivalent or better standard. The average total depth of decarburisation [Partial + complete] of five deepest decarburised zones of each sample clip shall not be more than 0.25 mm for acceptance of material.

Sample size will be 5% of that for hardness test, and the sample ERC drawn accordingly will constitute the first sample.

All the sample ERC tested in the first sample must pass the test for acceptance of the lot. In case, more than one clips fails, the lot will be rejected. If only one ERC fails in the first sample, a second ERC will be drawn such that the sample size is twice the sample size of the first sample. All the ERC in the second sample of ERC shall be tested and each ERC shall pass the test for acceptance of the lot, i.e. in case one ERC fails the lot will be rejected.

FREEDOM FROM DEFECTS

Sample ERC will be checked for freedom from defects and should be free from harmful surface defects such as seams, laps, rough or jagged and imperfect edges. The sample ERC shall also be examined for the heterogeneity of steel and freedom from internal defects by the micro-etching process as per IS:7739[Part V] 1976 or any equivalent or better standard.

Sample of clips and acceptance /rejection of the lot for freedom from defects will be as 6.3.2 and 6.3.3 above.

INCLUSION RATING

Minimum sample size for test shall be six. The sample ERC of the decarburisation test and additional samples required to make up the number to six, depending upon the lot size, shall be taken up for testing for inclusion rating. The inclusion rating of the material of the ERC shall determine as per IS:4163-1982 or any equivalent or better standard shall not be worse that than 2:5 A,B,C,D both for thick and thin series at fig 2 of IS:4163-1982 or any equivalent or better standard.

DIMENSION

The sample ERC shall be checked for the dimensions by means of inspection gauge as per approved drawing of the purchaser and shall meet with the requirement of dimensions and tolerance as provided in the drawings of inspection gauge.

APPLICATION AND DEFLECTION TEST

The sample ERC shall be tested by driving into a rail fastening assembly in a fixture, which deflects the ERC to the same extent as in the rail fastening assembly as approved by the puchaser. The ERC shall then be removed from the fixture checked for compliance with the dimension an tolerance as per clause 6.6.1.

TOE LOAD TEST

The sample ERC shall be tested for toe load, with the help of toe load test arrangement as approved by the purchaser. The sample shall be tested at 11.2 mm deflection and shall give a toe load at 700-1000 kg.

FINAL INSPECTION/TESTING & DOCUMENTATION

We shall carry out the final inspection and testing internally in accordance with the plan of testing given under 'tests' clause 6 hereinabove , and shall maintain the records of test results methodically.

PROTECTION

After inspection and approval, ERC shall be cleaned off from dust & rust and protected with surface treatment by dipping in Double boiled linseed oil or any better standard rust preventing compound approved by the purchaser.

PACKING

The clips shall be shipped per EXPORT WORTHY packing to ensure that there is no loss or damage to the clips during transit.

Each bag shall be stitched properly having a tag mentioning item name, quanity, and shipping mark. And containing abt 50 clips per bag.

TEST FACILITIES

We shall be required to install all necessary test facilities for inspection of clips in a separate well lit, clean & properly ventilated laboratory room provided with easily maintainable floor and platfrom.

INSPECTION GAUGES

The inspection gauges for dimension and configuration check should be as per drawing of the purchaser. The manufacturer shall submit three sets of inspection gauges for the approval of inspecting officer. Out of these, one set of inspection gauges should be used as master gauge and should be preserved safely by the clip manufacturer. The second set shall he used by the Inspecting office. The third set will be retained by the purchaser for internal quality checks, the firm should use an additional set of gauges.

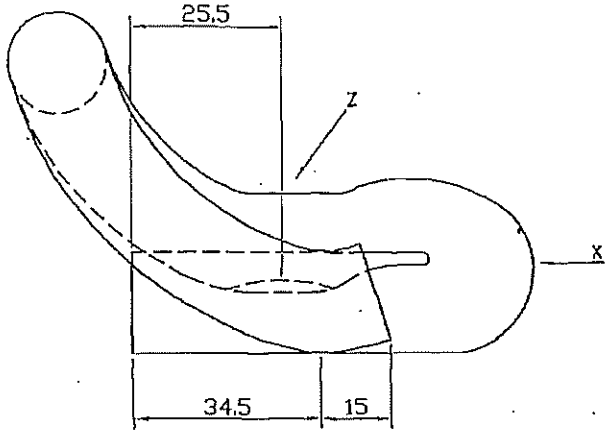
DISPOSAL OF REJECTED CLIPS

The rejected clips shall be cut in two picecs by the manufacturer using oxy-acetylene flame and shall then be disposed of as scrap.

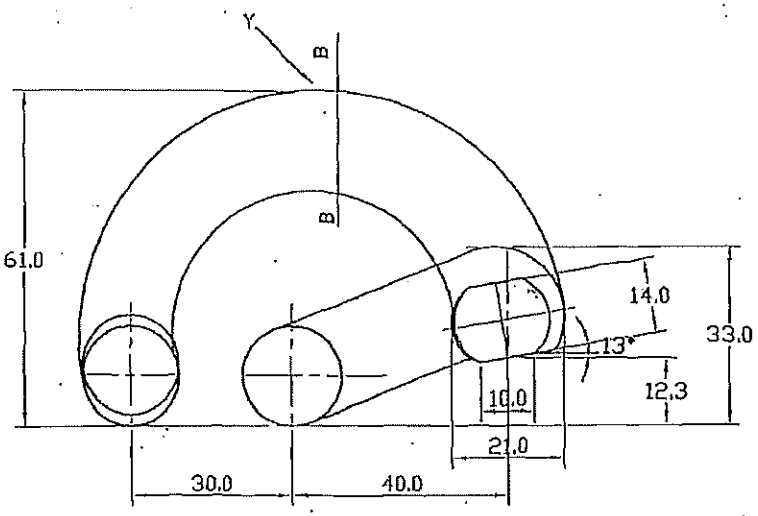
GENERAL

The manufacturer will furnish, at his cost, the clips require for all tests and shall also provide necessary man-power and shall also provide facilities for carrying out test at his works.

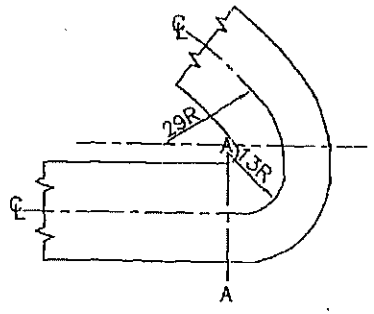
The purchaser/inspecting officer shall be given free access to the works of manufacturer at all reasonable times and shall be at liberty to inspect the manufacture at any stage and to call for any records, pertaining to manufacture, which shall be made available to him within reasonable time.



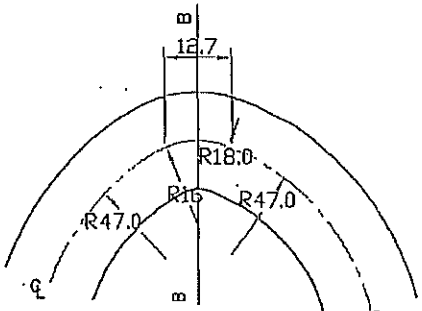
ELEVATION



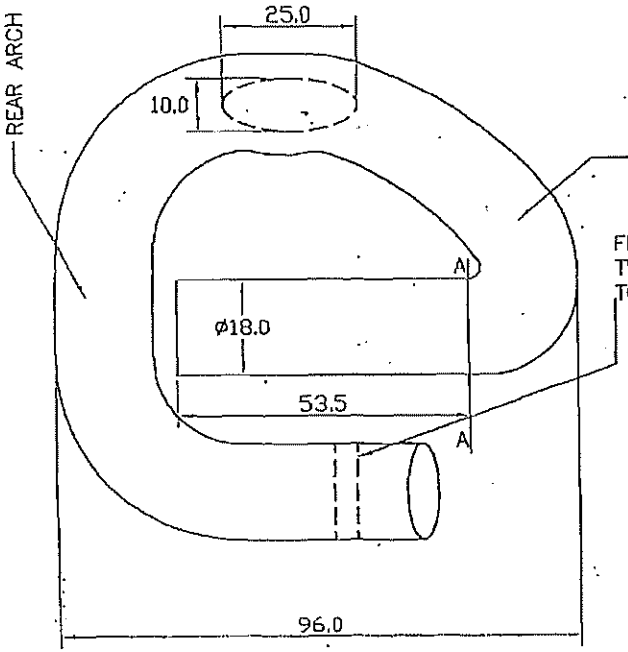
VIEW ON 'X'



VIEW ON 'Y'
FOR FRONT ARCH



VIEW ON 'Z'
FOR REAR ARCH



PLAN

FIRM'S INITIALS OR TRADE MARK AND LAST TWO DIGITS OF YEAR OF MANUFACTURE TO BE STAMPED HERE

3. THE DIA: OF FINISHED CLIP MEASURED AT CENTRAL LEG SHALL BE 18±0.8 mm.

2. CLIP SHALL BE CHECKED WITH INSPECTION GAUGE AS PER DRG.No.RDSO/T-3737.

1. ALL DIMENSIONS ARE IN MILLIMETRES.

MYANMAR RAILWAYS CIVIL ENGINEERING DEPARTMENT	
ELASTIC RAIL CLIP, MK-II WITH FLAT TOE	
DRG.NO.	SHEET :1 OF 1

Specification for Spherodial Graphite Cast Iron Insert embedded in Concrete Sleeper

IRS S.NO. T-46-1996

Foreward

The SGCI inserts is a fastening system facilitating to hold the ERC in the manner to suit the objective and smooth running of the train.

Scope

This standard covers the manufacture, approval of samples and internal checking/testing in for quality assurance, offering material for inspection, testing and inspection and packing of cast iron inserts for concrete sleepers here in after referred to as 'INSERTS'. Drawing of inserts and their checking gauges shall be available for reference at the manufactures works.

Material

The material for inserts shall generally conform to the requirements of Grade SG 500/7 of IS:1856-1991 " Iron castings with spheroidal or nodular graphite-specification.

Marking

Casting shall be accurately moulded in accordance with the working drawing. enclosed with our proposal offer with the addition of such letters, figures and marks as may be specified therein.

Manufacture

Patterns

The pattern shall be made of metal or araldite.

All patterns shall be match-plated for moulding. It shall be ensured that there is no looseness between bushes and pins.

The patterns shall be checked periodically, not later than production of 1.0 lakhs inserts. However, if dimension defect is observed, then defective pattern shall be fully rectified and documented.

Heat treatment

The inserts may be supplied without heat treatment if the specified mechanical properties are achieved without heat treatment. If the specified properties are not achieved after heat treatment with magnesium alloy, inserts along with test samples can be heat treated, the heat treatment cycle shall be decided by the manufacture. Heat treatment shall be done in thermostatically controlled electric furnaces fitted with automatic temperature recorder. In case, automatic temperature recorders are not provided , a better option shall be adopted.

If the heat treatment is done, the inserts cast in on heat shall be heat treated entirely in one heat treatment cycle. Depending on the capacity of heat treatment furnace, full material of different heats shall be heat treated together.

Loading in heat treatment furnace shall be done in systematic way melt heat wise. Material shall be loaded evenly to avoid distortion of inserts/test samples.

Temperature records shall be maintained heat treatment batch wise. Records of heats included in a particular heat treatment batch shall also be maintained.

Finishing

Further, processing e.g. shot blasting and grinding of the inserts shall be done separately for each heat to rule out the possibility of mix up of inserts of different batches.

Gating projection shall be finished smooth as per drawing.

Approval for Rule manufacture

We shall make few trial casting with the aim of development of inserts, the casting shall be thoroughly checked for dimension, weight, metallurgical properties and chemical composition. If on examination any change in pattern of gating, risers and runners, and method of molding is found necessary. It shall be carried out. The same procedure shall be repeated till all aspects of manufacture technology get corrected.

When the procedure is perfected, we shall call the purchaser or their inspector to check and approve of the sample. If the samples are found satisfactory dimensionally and metallurgically, the bulk manufacture of inserts shall be allowed. Inspection/testing charges for inspection of firm, checking of gauges, making and testing of samples etc., shall be borne by the manufacturer.

Internal inspection testing and quality control
Brinell hardness testing machine shall be checked daily with standard test block before start of the work.

Calibration of tensile testing machines shall be got done from a reputed and approved firm atleast once in a year and test certificates maintained for scrutiny by the inspecting officer.

Soundness of casting shall be checked to ensure freedom from harmful defects by sectioning atleast one insert per heat.

100% inserts shall be subjected to visual, dimensional and weight check and records of the same shall be kept heatwise. During visual examination inserts which do not have clear identification mark as per drawing shall also be removed.

Every insert shall be given hammer blow with 2kg hammer. Only sound inserts which do not break with blow shall be offered for inspection.

Offer for inspection
Inserts which are satisfactory metallurgicallly, dimensionally, by weight and with clear identification markings shall only be offered for inspection.

One set of inspection jig and gauge shall be kept for exclusive use of inspecting officer. Height gauge, surface table, clamps and vernier etc. shall also be made available for checking the accuracy of the gauges.

Metallurgical inspection

Batch
Insert cast together from the same heat and if necessary, heat treated together in the same heat treatment cycle shall comprise one batch.

Chemical Composition
Phosphorus content of one inserts from each batch shall be checked and shall not exceed 0.12% when tested in accordance with IS:228[Part 3]-1987.

Provisional test bars
Provision of test samples shall be made as per IS:1865-1991. All test samples shall be cast separately and heat number shall be cast on the test samples.

Tensile test
Dimensions of tensile test bars machined out of test samples shall be as per IS:1865 – 1991

Mechanical property of inserts

Tensile strength [min]	:	500 N/mm²
Elongation [min]	:	7%

Hardness test
Brinell hardness test shall be carried out on the end face of all the inserts reselected for tensile test and hardness shall vary between 170 – 241 BHN

16 - 23 R.C

Internal Soundness
One insert from each batch shall be subjected to destruction test by sectioning in order to ensure internal soundness

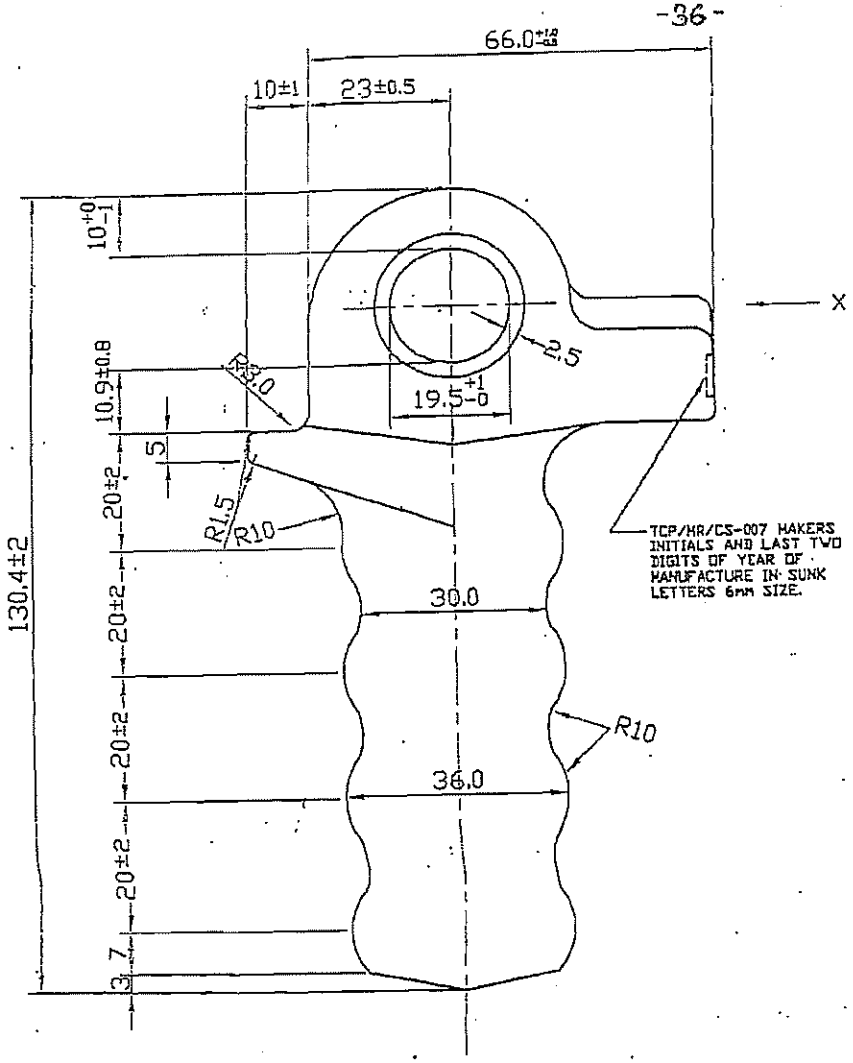
Dimensional Check
Before inserts are offered for inspection, we shall arrange to check 100% inserts for dimensions.

The approved Jigs shall only be used for checking dimensions of inserts.

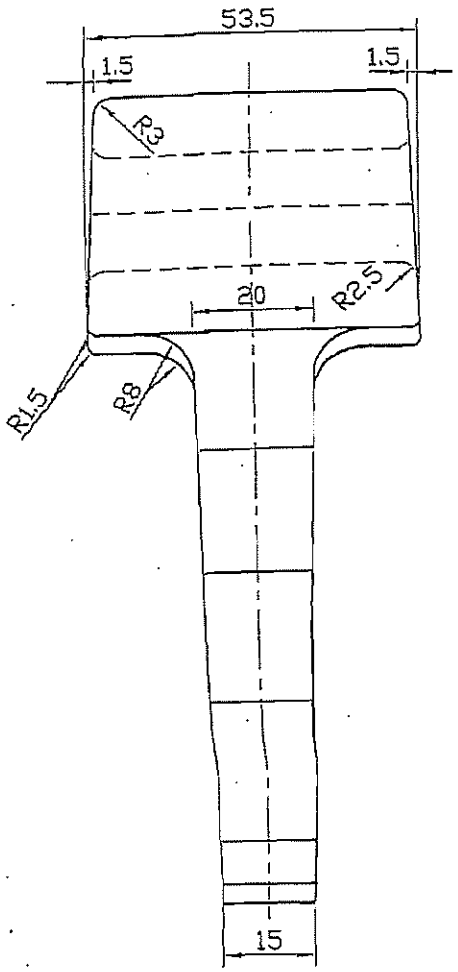
Out of each lot, 50 sample inserts are selected at random and checked for dimensional accuracy. Depending upon number of defective inserts action shall be taken as suited appropriate.

Gating Projection
Gating projection beyond tolerance shown in the drawing will be accounted for dimensional defect.

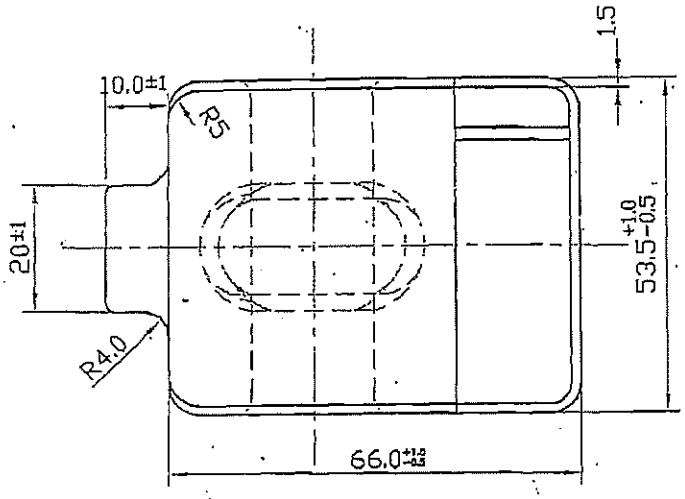
Test facilities
We shall supply the samples required for testing free of charges and shall at own cost furnish and prepare the necessary test pieces and supply labour, appliances, machinery and plants for such testing, as may be required at our premises before despatch, in accordance with this specification.



ELEVATION



SIDE VIEW



PLAN

NOTE:-

1. ALL DIMENSIONS ARE IN MILIMETRES.
2. ALL SHARP CORNERS TO BE ROUNDED OFF TO A RADIUS OF 1.5 MM WHEREVER NOT SHOWN.
3. THE DIMENSIONS OF THE INSERT ARE TO BE CHECKED BY SUITABLE JIG TO DRG. NO. RDSO/T-3433/ALT-1.
4. DIMENSIONS OF 30.0±0.8, 9.5±0.8 & 10±0.8mm FOR CONTROLLING POSITION OF APEX OF HOLE CIRCLE SHALL BE STRICTLY ADHERED TO.
5. A TOLERANCE OF ±0.5 MM SHALL APPLY WHEREVER NOT SHOWN.

MYANMAR RAILWAYS
CIVIL ENGINEERING DEPARTMENT

SGCI INSERT FOR USE WITH ELASTIC RAIL CLIP TCPL/MR/T012	
DRG.NO :	SHEET :1 OF 1

Appendix-(B-3)

SPECIFICATION FOR UNCOATED STRESS RELIEVED STRAND FOR PRESTRESSED CONCRETE SLEEPERS

FORWARD

0.1
The Indian Standard (First revision) was adopted by the Indian Standards Institution on 14 March, 1983, after the draft finalised by the Joint Sectional Committee for Concrete Reinforcement has been approved by the Civil – Engineering Division Council.

0.2
This standard was first published in 1970 to cover the requirements of stands used in prestressed concrete work. The present revision has been taken up with a view to incorporating modifications found necessary as a result of use of this standard both by manufacturers and users.

0.3
The significant modifications incorporated in this revision are in respect of provisions relating to physical requirements of nominal mass of strand and proof load and the sample size for tensile test. Further, SI units have been adopted in the revision and references to related Indian Standard appearing in the standard have been updated.

0.4
In the formulation of this standard, due weightage has been given to International co-ordination among the standards and practices prevailing in different countries in additions to relating it to the practices in the field in this country.

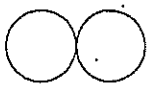
0.5
For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test shall be rounded off in accordance with IS: 2-1960. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

IS: 6006 – 1983

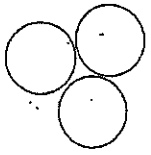
1
SCOPE

1.1
This standard covers the requirements for manufacture, supply and testing of uncoated, stress relieved, high tensile steel strands for use in prestressed concrete. The following types of strands are covered :

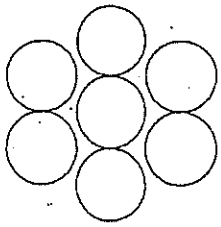
[a] Two wire strand.



[b] Three wire strand



[c] Seven wire strand class 1 & class 2



3. MANUFACTURE

3.1 Wire

3.1.1

The base metal shall be carbon steel of such quality that when drawn to suitable round wire sizes and fabricated into proper strand sizes and properly stress relieved after stranding, shall have the properties and characteristics as prescribed in this specification.

3.1.2

The element wire to be used for strand shall be cold-drawn from plain carbon steel (ref. 3.1.1) and shall contain not more than 0.050% of sulphur and not more than 0.050% of phosphorus, when tested in accordance with relevant parts of IS:228.

3.1.2.1

The wire used in the manufacture of the strand shall be well and cleanly drawn to the specified dimensions and shall be sound and free from splits, surface flaws, piping, and other defects likely to impair its use in the manufacture of the strand and the performance of the strand in prestressed concrete.

3.2 Strand

The seven wire strand shall have a centre wire at least 1½% greater in diameter than all surrounding wires enclosed tightly by six helically placed outer wires with a uniform length of lay of at least 12 times but not than 16 times of the nominal diameter of the strand. The length of lay for the two and three strands shall be uniform throughout and shall be 24 to 36 times the diameter of elements wire. The wire in the strand shall be so formed that they shall not unravel when the strand is cut and they shall not fly out of position when the strand is cut without seizing.

3.3. Joints

3.3.1

There shall be no strand joints or strand splices in any length of the completed strand unless specifically permitted by the purchaser.

3.3.2

During process of manufacture of individual wires for stranding, welding is permitted only prior to or at the last heat treatment (Patenting).

3.3.3

During fabrication of the 7 wire strand, butt-welded joints may be made in the individual wires, provided there is not more than one such joint in any 45 m section of the completed strand.

3.4

Stress Relieving of strand – After stranding all strands shall be subjected to a stress – relieving. Stress relieving shall be carried out as a continuous process on a length of strand by uncoiling and running through any suitable form of heating to produce the prescribed mechanical properties. Tempers colours, which may result from the stress-relieving operation, shall be considered normal for the finished appearance of the strand.

After stress relieving, the strand shall be reformed into coils or wound on to reel, having core diameter of sufficient size and in any case not less than 600 mm to ensure that the strand will lay out straight.

3.5 Workmanship and finish

The finished strand shall be uniform in diameter and shall be free from injurious flaws and imperfections. The strand shall not be oiled or greased. Slight rusting; provided it is not sufficient to cause pits visible to the naked eye, shall not be a cause for rejection.

4. Size and designation

4.1 Two wire strand – The nominal diameter, the nominal cross section area and the nominal mass per unit length of the strand shall be as given in Table 1.

4.1.1The two wire strand shall be designated by the number of element wires (plies) and the diameter of the element wire making the strand, for example, 2 ply 2mm strand will mean a strand consisting of two element wires of diameter 2.0 mm each.

4.2 Three wire strand – The nominal diameter, the nominal cross-sectional area and the nominal mass per unit length of the strand shall be as given in Table 1.

4.2.1 The three wire strand shall be designated by the number of element wires (piles) and the diameter of the element wire making the strand, for example, 3 ply 3 mm strand will mean a strand consisting of three element wires of diameter 3.0 mm each.

Table 1 –

Dimension, Tolerance and Mass of two and three wire strands (Clause 4.1, 4.2 & 5.1)

Designation	Nominal diameter of element wire	Tolerance on diameter of element wire	Nominal cross sectional area of strands	Nominal mass of strand
1	2	3	4	5
	mm	*mm*	*mm²*	*Kg/m*
2 ply 2 mm	2.0	±0.03	6.28	0.0493
2 ply 3 mm	3.0	±0.03	14.14	0.111
3 ply 3 mm	3.0	±0.03	21.21	0.166

4.3 Seven wire strand – The nominal diameter, nominal cross sectional area and nominal mass per unit length of the strand shall be as given in Table 2.

4.3.1 The nominal diameter of strand shall be measured across the crown of the wires.

4.3.2 The seven strand wire shall be designated by the approximate overall diameter of the strand and number of element wires (plies) making the strand, for example, 6.3mm 7 ply strand will mean a strand of approximate diameter 6.3 mm and made out of seven (six outer and one central) wires.

5. Tolerances

5.1 The tolerance on the nomimal diameter of the element wire in case of two wire and three strands and the tolerance on the nominal diameter of the strand in case of seven wire strand shall be as given in Table 1 and 2 respectively.

Table 2 –

Dimension, Tolerance and Mass of two and three wire strands. Clause 4.3 & 5.1.

Designation	Nominal diameter of element wire	Tolerance on diameter of element wire	Nominal cross sectional area of strands	Nominal mass of strand
1	2	3	4	5
	mm	*mm*	*mm²*	*Kg/m*
6.3mm 7 ply	6.3	±0.04	25.1	0.195
7.9mm 7 ply	9.7	±0.04	37.	0.295
9.5mm 7 ply	9.5	±0.04	51.6	0.408
11.1mm 7 ply	11.1	±0.04	70.3	0.555
12.7mm 7 ply	12.7	±0.04	92.9	0.730
15.2mm 7 ply	15.2	±0.04	138.7	1.094
9.5mm 7 ply	9.5	+0.66 -0.15	54.8	0.435
11.1mm 7 ply	11.1	+0.04 -0.15	74.2	0.585
12.7mm 7 ply	12.7	+0.04 -0.15	98.7	0.775
15.2mm 7 ply	15.2	+0.04 -0.15	140.0	1.102

6. Physical requirement

6.1 Breaking strength – The breaking load of finished stress relieved strand determined in accordance with the result, shall not be less than, the value given in Table 3.

6.1.1 Test in which fracture of any of the wires occur within a distance of 3mm from the jaws of the machine shall be discarded, if the result do not comply with the requirements of this specification.

6.2 Proof of Load – The 0.2% proof load of the strand tested in accordance with hereinafter clause, shall be not less than the values specified in Table 3.

6.3 Elongation – Elongation of the strand measured on a gauge length of not less than 600 mm by means of a suitable extensometer.

TABLE 3 – Minimum Breaking Load
(Clauses 6.1, 6.2 & 7.2.1)

Class	Designation	Breaking Load	0.2% Proof Load
1	2	3	4
		N	*N*
-	2 ply 2 mm	12 750	10 840
	2 ply 3 mm	25 500	21 670
	3 ply 3 mm	38 250	32 460
1	6.3mm 7 ply	44 480	37 810
	7.9mm 7 ply	68 950	58 600
	9.5mm 7 ply	93 410	79 400
	11.1mm 7 ply	124 540	105 860
	12.7mm 7 ply	164 580	139 900
	15.2mm 7 ply	226 860	192 830
2	9.5mm 7 ply	102 310	86 960
	11.1mm 7 ply	137 890	117 210
	12.5mm 7 ply	183 710	156 150
	15.2mm 7 ply	261 440	222 230

Attached to the test piece shall be not less than 3.5% immediately prior to fracture of any of the component wire (see 7.3).

6.4
Relaxation – The relaxation stress in the wire, when tested in accordance with 7.4 shall not exceed 5% of the initial stress as specified in 7.4 at the end of 1000 h. Alternatively the manufacturer shall provide proof that the quality of wire supplied in such as to comply with this requirement.

6.4.1.
When it is not possible to conduct 1000 h relaxation test, the wire may be accepted on the basis of 100h relaxation test provided the manufacture furnishes proof establishing a relation between relaxation stress values at 1000 h and 100 h and provided that the relaxation stress at 100h is not more than 3.50% of the initial stress as specified in 7.4.

7. TESTS

7.1
Tensile Test – The breaking load shall be determined in accordance with IS: 1521-1972.

7.2
Test of Proof Load – Proof load shall be determined in accordance with IS: 1521- 1972.

7.2.1.
The load at 1.0% extension method may be used to be agreed between the manufacture and the purchaser. In this test, an initial load equivalent to 10% of required minimum breaking strength as prescribed in Table 3 shall be applied to the test piece and a sensitive extensometer then attached. The dial of the latter shall be adjusted to read 0.001 mm/mm of the gauge length to represent the extension due to the initial load.

The load shall be increased untill the extensometer shows an extension corresponding to 1.0%. The load at this extension shall not be less than the minimum 0.2% proof load specified in table 3.

1st amendment – Alternatively the load at 1.0% extension method may also be determined.

7.3.
Elongation Test - The elongation shall be determined in accordance with IS : 1521 – 1972.

7.4. Test for relaxation – if required by the purchaser, the manufacturer shall provide evidence from records of tests of similar strand that the relaxation of load from an initial stress of 70% of the specified min. tensile strength (calculated from the min. specified breaking load and the nominal cross-sectional area strand) conform to that specified in 6.4. During the whole period of test that temperature shall be maintained within the range 20 +/-2°C. The initial load shall be applied in a period of 5 minutes and shall than be held constant for a further period of one minute. Thereafter no adjustment of load shall be made, and load relaxation readings shall commence from the end of the sixth minute. On no account shall the test specimen be overstressed.

8 – SAMPLING & CRITERIA FOR CONFORMITY

8.1. Selection of test samples –
test samples of sufficient length to permit the tests for breaking load and elongation shall be cut from one end of every fifth coil, but sample size shall not be less than 2 from each lot. A further length shall be cut from each fifth coil or part of 5 coils for the determination of proof load.

8.1.1.
All test pieces shall be selected by the purchaser or his authorised representative. The test piece shall not be detached from the coil or length of strand, except in the presence of the purchaser or his authorised represenatative.

8.1.2.
Before test pieces are selected, the manufacture or supplier shall furnish the purchaser or his authorised representative with copies of the mill records giving number of coils in each cast with size as well as the identification marks, whereby each coil can be identified.

8.2 Retest
Should any sample fail any of the tests, by agreement between manufactured and purchaser, two additional test samples from the same end of the same coil shall be taken and subjected to the test or tests in which the original sample failed. Should both additional test samples pass the test or tests, the coil from which they were taken shall be deemed to comply with the requirements of this standard. Should either of them fail, the coil shall be deemed not to comply.

8.3. if ten% or more of the selected coils fail to fulfil the requirements of the standard, the parcel from which they are taken shall be deemed not to comply with this standard.

9. Delivery, Inspection and testing facilities.

9.1
Unless otherwise specified general requirements relating to the supply of material, inspection and testing shall conform to IS:1387 – 1967.

9.2
No material shall be despatched from works premises prior to its bring certified by the purchaser or his authorised represenatative as having fulfilled the tests and requirements laid down in this standard except where the coil or reel containing the strand is marked with the ISI or equivalent certification mark.

9.3
The purchaser or its authorised representative shall be at liberty to inspect and verity the steel maker's certificate of cast analysis at the premises of the manufacturer or supplier, when the purchaser requires an actual analysis of finished material, this shall be made at a place agreed to between the purchaser and the manufacturer or supplier.

9.4
Manufacturer's Certificate – In the case of strands which have not been inspected at the manufacturers work or at supplier's end, shall provide the purchaser with the certificate stating the process of manufacture and also the test sheet signed by the manufacturer giving the result of each mechanical test, 0.2% proof load and the chemical composition , if required. Each test sheet shall indicate the number or identification mark of the cast to which it applies, corresponding to the number or identification mark to be found on the material.

10. PACKING, IDENTIFICATOIN MARKING

10.1.
Unless otherwise agreed to between purchaser and seller the strand shall be supplied as indicated in 10.1.1 or 10.1.2.

10.1.1.
Strands shall be wound into traversed layered coils having an internal diameter of a size as specified in 3.4. These coils shall be securely strapped to prevent distortion of the coil in transit and unless otherwise specified the coils shall be protected against damage in transit by wrapping with hessian.

10.1.2.
Strands shall be coiled on to suitable reels having a core diameter of not less than 600mm.

10.2.
The manufacturer or supplier shall have coils of strands marked in such a way that all finished strand can be traced to the cast from which they were made. Every facility shall be given to the purchaser or his represenatative for tracing the strands to the cast from which they were made. Each coil shall carry a label giving the following details :

[a] Size of strand.
[b] The coil number
[c] Class, where applicable.

10.2.1
Each coil should be suitably marked with the ISI mark in which case the concerned test certificate shall also bear the standard mark.

AMENDMENT NO. 1 [NOV, 1984]

First Revision

Corrigenda

Table 2 , Col 3, 2nd entry – Substitute 7.9 for 9.7.

Table 3, Col 2, 12th entry – Substitute 12.7 mm 7 ply for 12.5 mm 7 ply.

(BSMDC 8)

AMENDMENT NO. 2 [JAN, 1988]

First Revision

Clause 2.6
Production length – The max length of strand that can be manufactured without or with welds (see 3.3) being made after drawing in any of its component wire.

Table 2

Dimension, Tolerance and Mass of two and three wire strands

Designation	Nominal diameter of element wire	Tolerance on diameter of element wire	Nominal cross sectional area of strands	Nominal mass of strand
1	2	3	4	5
	mm	*mm*	*mm²*	*Kg/m*
6.3mm 7 ply	6.3	±0.04	23.2	0.182
7.9mm 7 ply	7.9	±0.04	37.4	0.294
9.5mm 7 ply	9.5	±0.04	51.6	0.405
11.1mm 7 ply	11.1	±0.04	69.7	0.548
12.7mm 7 ply	12.7	±0.04	92.9	0.730
15.2mm 7 ply	15.2	±0.04	139.4	1.094
9.5mm 7 ply	9.5	+0.66 -0.15	54.8	0.432
11.1mm 7 ply	11.1	+0.04 -0.15	74.2	0.582
12.7mm 7 ply	12.7	+0.04 -0.15	98.7	0.775
15.2mm 7 ply	15.2	+0.04 -0.15	140.0	1.102

AMENDMENT NO. 3 [JUNE, 1993]

First Revision

Clause 6.3

Elongation of strand shall not be less than 3.5% and shall be measured on a gauge length of not less than 200mm for 2 ply and 3 ply strands and not less than 600mm for 7 ply strands.

The elongation shall be measured by a suitable extensometer which is attached to the test piece, after an initial load equivalent to10% of the required min. breaking load as specified in table 3 has been applied.

Following an extension of 1%, the extensometer may be removed and loading continued to ultimate failure. The elongation value is then determined by the movement between the jaw gripping the test piece on the new base length of jaw to jaw distance to which will be added the value of 1% determined by the extensometer.

Table 3 – Following to be inserted below the table :

The modulus of elasticity is to be taken as 195 ±10KN/mm², unless otherwise indicated by the manufacturer.

AMENDMENT NO. 4 [JUNE, 1997]

First Revision

Clause 2.4
Length of lay – The distance (measured along a straight line parallel to the strand) in which a wire forms one-complete helix.

Clause 3.1.2
0.040% for 0.050%.

Clause 3.3.2
Delete last word 'Patenting'.

Clause 8.1.
For 7 ply strand coils, test samples of sufficient length to permit the tests for breaking load, proof load and elongation shall be selected, at random, from a group of 5 coils; but sample size shall not be less than 2 from each lot.

For2 ply and 3 ply strand coils, test samples shall be selected at random from each lot in accordance with following table :

No of coils in the lot	No of coils to be selected
Up to 25	3
26 to 65	4
66 to 180	5
181 to 300	7
301 and above	10

Clause 10.1.2 – Append to this clause

Clause 10.1.3. by mutual agreement between the purchaser and the manufacturer, water soluble oil may be applied on strands.

Specifications of Fibre Pad

1. **Fibre Pad** : Moulded in High Density Polyethylene

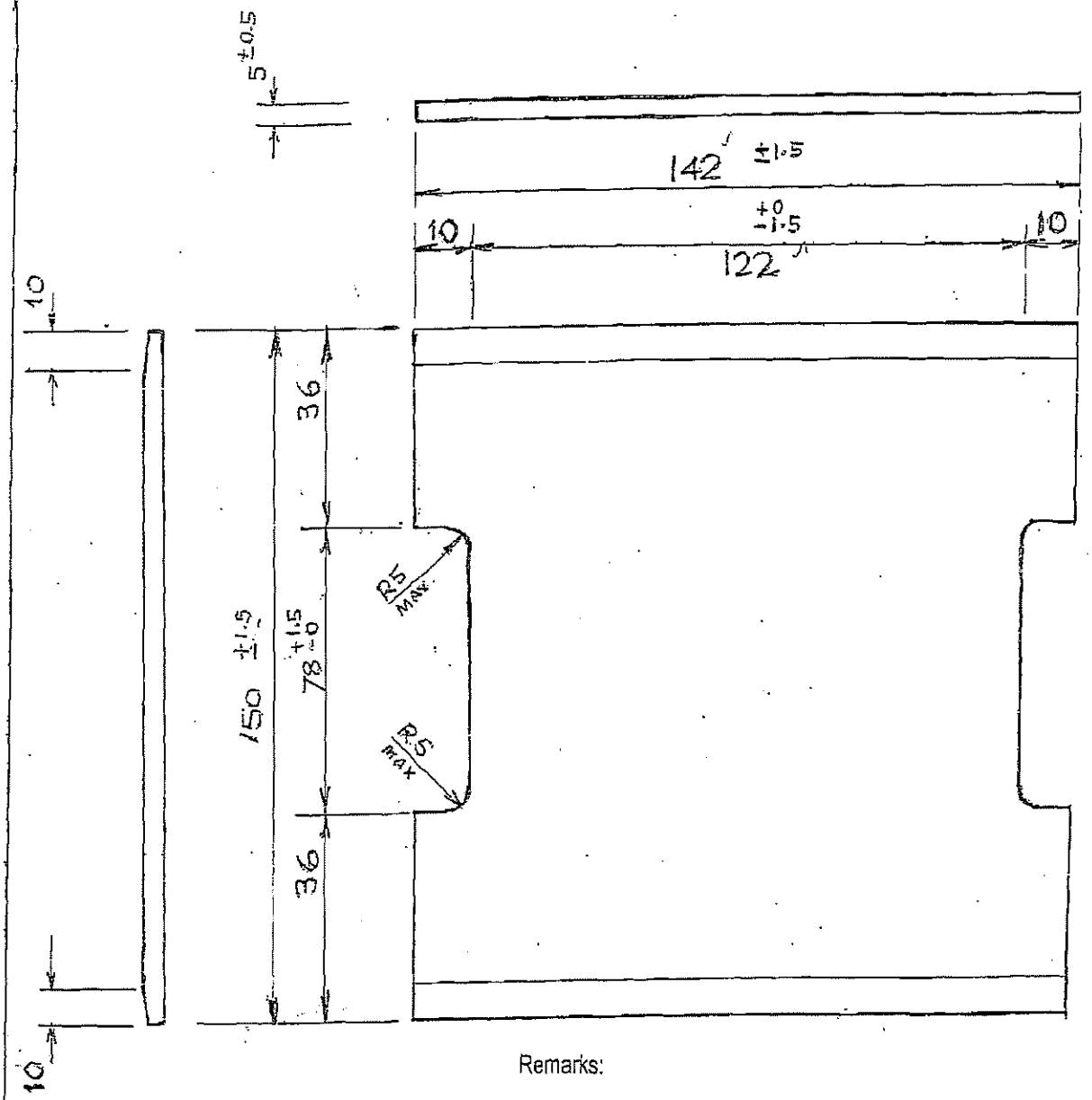
2. **Raw Material**: The raw material shall be high density polyethylene with physical and moulding characteristics complying with the following requirements :

   Density
   Test method DIN 53479 0.948 ~ 0.970 gm /cm^3
   Reduced specific Viscosity
   Test method ISO / R 1191 1.3 ~ 2.5 dl / g.
   Melt Flow Index
   Test method DIN 53735 up to 9.0 g/10 min.
   Tensile Strength (Yield Stress)
   Test method DIN 53455 min 2300 N /cm^2
   Elongation at Yield
   Test method DIN 53455 9 % ~ 17 %

3. **Moulded Pads**

   Tensile Strength
   Sample cut from moulded pad, test method DIN 53455 .
   Sample size 4 Test speed 50 mm /min.
   Min Tensile Strength 2300 N / cm^2
   Pencentage Elongation at Break
   Min Elongation 100 %
   Hardness
   Measured at five points all at least 1 cm from edge of pad.
   Test method DIN 53505 min 58 ~ 64 Shore D.
   Electrical Resistance (Volume Resistivity)
   Test method DIN 53482 with 10 million Ohm cm.
   Dimensional Accuracy
   All samples shall comform to the dimensions and tolerances detailed on Drawing.
   Visual Inspection
   The surface shall be clean and free from any evidence of gassing or burning.
   The sprue and any flashes shall be cleanly cut off.

4. **Responsibility for Tests** : The tests detailed, shall be carried out by the moulder or a mutually acceptable independent testing authority.



Remarks:

(1) All dimension are in millimeter.

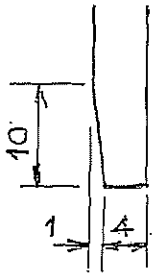
(2) Flatness of pad on both surfaces must be within 3 mm.

(3) Weight = 0.103 kg (0.227 lb)

(4) Colour coded = Black

(5) Tensile strength (Yield Strength) = 2300 N/cm^2

(6) Elongation (at Yield) = 9 % ~ 17 %



ENLARGED VIEW OF TAPER

MYANMAR RAILWAYS	
CIVIL ENGINEERING DEPARTMENT	
RAIL PAD (FIBRE PAD) FOR BS 75 R RAIL FASTENING ASSEMBLIES (NON-INSULATED)	
SCALE N.T.S	DRG. NO. MR / RP - 01 DATED. 5-12-2007

Appendix-(IP-5)

Government of India
Ministry of Railways
(Railway Board)

Indian Railway Standard Specification for Glass filled Nylon-66 Insulating liners

S. No. T-44-95

0. FOREWORD

0.1 The specification was originally issued in 1980. In its first revision in 1987, the tensile and cross-breaking strength values were revised.

0.2 In the second revision of the provisional specification issued in 1993, the acceptance tests earlier required to be conducted on 'as moulded specimens" were specified to be conducted on liners after the conditioning, except that the cross-breaking load, test shall be done on "as moulded" liners.

0.3 For deciding whether a particular requirement of this standard is complied with, the final value observed or calculated expressing the results of a test or analysis, shall be rounded off in accordance with IS:2. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

0.4 The IRS-Specification (provisional)-1993 second revision was discussed in the 66th Track Standards Committee meeting and as approved by the Railway Board, the specification has been issued under the fixed Serial No. T-44-1995 with minor modification in clause 4.3.2 in the present form.

1. SCOPE

This specification covers the requirements, method of tests and sampling for Glass filled nylon-66 insulating liners interposed between the rail and the Elastic Rail Clips in rail fastening assembly mainly to provide electrical insulation.

2. TERMINOLOGY

1. GFN-66: It is glass filled nylon-66.

2. As moulded specimen:

   It is defined as that specimen which upon immediate removal from the mould is sealed in a container impermeable to moisture/water vapour.

3. Dry weight:

   It refers to the weight of the 'as moulded specimen'.

4. Conditioning:

   It is the process which consists in keeping the liners immersed in boiling water for period sufficient for the liner to absorb specified percentage of water.

5. Type tests:

   These refer to the tests given in Table-1 of this specification to be conducted on 'as moulded test specimen' to assess the moulding capability/process control of a firm for quality assurance.

6. Pre-acceptance tests:

   These refer to the tests which are required to be conducted on the test specimen before according clearance to the firm for bulk production of liners.

7. Acceptance tests:

   These refer to the tests conducted on the liners for purpose of acceptance/rejection of the liners during inspection.

3. REFERENCE DOCUMENTS:

3.1 This standard refers to the following/BS/IS/ASTM specifications. These should be available at the manufacturer's work for reference.

	Standard	Title
1.	BS 2782 part 1-1976	Method 123 B. Determination of the Melting Point of Polymides. OR Method 123 A. Determination of Melting Point of Synthetic resins (capillary tube method)
2.	BS 2782 part 6-1980	Method 620 A. Determination of density of solid plastics excluding cellular plastics (immersion method)
3.	BS 2782 part 2-1982	Method 230 A. Determination of volume resistivity.
4.	IS:1998-1962 (re-printed 1981)	Method of test for thermosetting synthetic resin bounded laminated sheets.
5.	ASTM-D-785 1965 (re-approved 1981)	Standard test method for Rockwell hardness of plastics and electrical insulating materials.
6.	ASTM D-638 1984	Standard test method for tensile properties of plastics.
7.	ASTM D-149 1981	Standard test method for dielectric breakdown voltage and dielectric strength of solid electrical insulating materials at commercial power frequency.
8.	IS:2-1960	Rules for rounding off numerical values.

3.2 The specific provision in this standard will over-ride these in the above specification where these are not in conformity with one another. Any specific requirement given in the drawing of the liner will over-ride the relevant provision of this standard specification.

3.3 RDSO drawings relevant to the liner under production should be available for reference at the manufacturer's works.

4. MANUFACTURE

4.1 MATERIAL

4.1.1 The material used for manufacture of insulating liners shall be glass filled nylon 66 (GFN-66) black moulding granules with about 33% glass filler. Addition of black colourants during moulding of liners is not permitted and the reconstituted or recovered materials shall not be used for the manufacture of liners.

4.1.2 The physical properties of GFN-66 material used for the manufacture of nylon mouldings shall confirm to the requirements given against S. No. 1,2,3 of Table 1. Other properties as given in Table 1 refer to the as moulded test specimen of GFN-66 material.

TABLE-1

S. No.	Property	Units	Values	Test method
1.	Melting point	°C	258-268	BS 2782 Pt.1-1976 Method 123B or 123A
2.	Specific gravity	--	1.38-1.40	BS 2782 Pt.6-1980 Method 620A
3.	Glass filler	%	30-35	Appendix III
4.	Hardness Rockwell	'R'	110 (min)	ASTM D-785-1965
5.	Tensile strength	Kg/mm^2	17.5 (min)	ASTM D-638-1984
6.	Elongation at break	%	10 (max)	-do-
7.	Cross-breaking strength	Kg/mm^2	20.0 (min)	IS:1998-1962
8.	Dielectric strength	KV/mm	11 (min)	ASTM D-149-1981
9.	Volume resistivity	Ohm. Cm	10^8 (min)	BS 2782 Pt.2-1982 Method 230A

4.2 MANUFACTURING PROCESS

4.2.1 The glass filled nylon-66 liners shall be manufactured by automatic screw type injection moulding machine.

4.2.2 The liner shall be conditioned by immersing in boiling water for adequate time to ensure minimum 3% absorption of water as provided in para 7.7 (iii).

4.3 MARKING: Each nylon moulding shall be legibly embossed in 3mm letters and figures with manufacturer's initials, Last two digits of year of manufacture and part number as shown in RDSO drawing.

4.3 FREEDOM FROM DEFECTS:

The surface of the nylon liners shall be smooth, sound and free from moulding defects such as bubbles, splash marks, burn marks, voids, surface sinking, crazing and blistering of the surface, windows, weld lines, laminations, jotting and cracks. All edges shall be neatly finished and free from flash.

5 PRE-ACCEPTANCE TESTS

5.1 Type tests

These tests shall be conducted on 'as moulded test specimen', as per scheme of testing given in Appendix I. The results of testing shall conform to the values given in Table 1

5.2 Product testing:

5.2.1 All tests, except cross breaking load and water absorption tests, shall be conducted on conditioned liners as per scheme of testing given in Appendix I (B). The results of the tests shall conform to the requirements of clauses 7.1 to 7.7.

5.2.2 The cross breaking load tests shall be conducted as per method of test given i.e. Appendix II. Each test value shall conform to the requirement of test value given in Appendix II.

5.2.3 The dimensions shall be checked by means of inspection gauges as per RDSO drawings.

6 ACCEPTANCE TESTS

Tests given under clause 7.1, 7.2, 7.3, 7.4, 7.5, 7.6 & 7.7 shall be conducted after conditioning of liners. Test under clause 7.8 shall be conducted on 'as moulded' liners by whcihc, for each lot of 10,000 liners or part thereof before conditioning, the manufacturer shall retain 10 liners and the test shall be conducted on any three liners for acceptance of the material.

6.1 **Lot size:** For purpose of inspection of the liners, 10,000 nos. of liners or part thereof duly conditioned shall form a lot.

6.2 **Sample size:** The sample size for tests shall be as given in each test. The samples for different tests shall be drawn at random from each lot.

7. TESTS

Tests as given under clause 7.1 to 7.4 shall be conducted on any three of the five sample liners as drawn for internal cavity test under clause 7.5.

7.1 Melting point:

Three sample liners per lot shall be checked for melting point of the materials of the liners. For acceptance of the lot, each individual sample shall pass the requirement of the test value given in Table-1 when tested in accordance with the relevant standard given in Table-1.

7.2 Specific gravity:

Three sample liners per lot shall be checked for specific gravity of the material of the liners. For acceptance of the lot, each individual sample shall pass the requirement of the test value given in Table-1 when tested in accordance with the relevant standard given in Table-1.

7.3 Glass filler:

Three sample liners per lot shall be checked for glass filler (percent) of the material of the liners. For acceptance of the lot, each individual sample shall pass the requirement of test value given in Table-1 when tested and calculated in accordance with the method given in Appendix III.

7.4 Hardness test: (Method of testing as per ASTN D-785-1965)

Three sample liners per lot shall be checked for hardness (Rockwell) of the liners at three different locations on the surface of the liners. For acceptance of the lot each individuals value on the three sample liners shall not be less than 100 Rockwell

7.5. Internal cavity test:

Five sample liners per lot shall be checked for internal cavities. On sectioning along "y-y" shown in the PLAN of the liner in fig. 1, no sample liner shall reveal any internal cavities when examined visually or with the help of a magnifying glass, for acceptance of the lot.

7.6 Dimensional check:

7.6.1 (i) Dimensional checking shall be done with approved inspection gauges as per RDSO drawings. For acceptance, each sample liner should pass the recruitment of the gauges. Sampling shall be done as per 7.6.1 (ii).

(ii) Sampling

(a) Two percent liners per lot shall be checked for dimensions in the first 1,00,000 liners of one design manufactured by a firm

(b) 0.5 percent liners per lot shall be checked for dimensions consequent to 1,00,000 liners of one design being found satisfactory. In case, any lot is rejected for dimensions, two percent liners per lot shall be checked from next lot onwards till 1,00,000 liners (in one or more lots) are found satisfactory, and thereafter the sampling rate shall be 0.5 percent per lot again.

7.7 Percent water absorption test:

(i) Three sets, each set consisting of 10 liners, shall form the sample for this test. Average weight of each set shall be considered individually as eight of liner after conditioning.

(ii) For calculation of percent water absorption of liners, the dry weight of liners shall be the average weight of 10 liners, as in para 6 and retained by the manufacturer before conditioning.

(iii) For acceptance of the lot, the percent water absorption for the three sets considered individually shall not be less than 3% when calculated in the manner given in Appendix IV

7.8 Cross-breaking load test:

Three samples of liners drawn from 10 liners of each lot retained by the manufacturer before conditioning, shall be tested and accepted as explained in clause 5.2 2 above

8. RE-TEST:

8.1 Should any of the test specimen fail in either melting point or specific gravity or glass filler percent, no re-testing shall be undertaken

8.2 Should only one test sample fail in Hardness for internal cavity or cross breaking load, twice the number of samples drawn earlier for testing, shall be tested for that particular test in which the earlier sample failed. In this re-testing all the samples should pass the test value for acceptance of the lot represented by these samples.

8.3 Should any one test sample fail in dimensions, the manufacturer may re-offer the liners lotwise after sorting out the defectives. The re-offered lot shall be inspected for all tests in terms of acceptance test clause 7

8.4 Should the liners fail in percent water absorption, the liners may be re-conditioned and re-offered for inspection. The re-offered lot shall be inspected for all tests in terms of acceptance test clause 7.

9. FINAL INSPECTION/TESTING AND DOCUMENTATION:

The manufacturer shall carry out the final inspection and testing internally in accordance with the plan of testing given under the acceptance test clause and shall maintain the records as per Appendix V to Appendix VII, to ensure that the liners have passed the inspection certificate.

10. PACKING:

10.1 The liners shall be put in poly-bags which in turn shall be put in sturdy cartons and sealed, each carton containing not more than 1000 liners so as to avoid loss or damage during transit. The cartons shall be put into sturdy gunny bags to avoid damage during transit

10.2 For transportation by road, the sealed cartons containing the liners shall be transported in a vehicle exclusively for the liners and no other consignments shall be loaded with the liners in the same vehicle

11. TEST FACILITIES:

The liner manufacturer shall be required to install all the necessary test facilities for inspection of liners in a separate well lit, clean and properly ventilated laboratory room provided with easily maintainable floor and platform

12. INSPECTION GAUGES:

The inspection gauges for dimensional check shall conform to RDSO drawings. The manufacturer shall submit two sets of inspection gauges for the approval of inspecting authority. One set shall be used as 'Master gauge' and shall be preserval safely by the liner manufacturer. The second set shall be for use by the inspecting official. For internal quality control, the firm should use an additional set of gauges as per drawings.

13. DISPOSAL OF REJECTED LINERS:

The rejected liners shall be cut into pieces and made un-usable.

14. REPORT

The inspection official shall report the test observations in the format of Appendix V to VII.

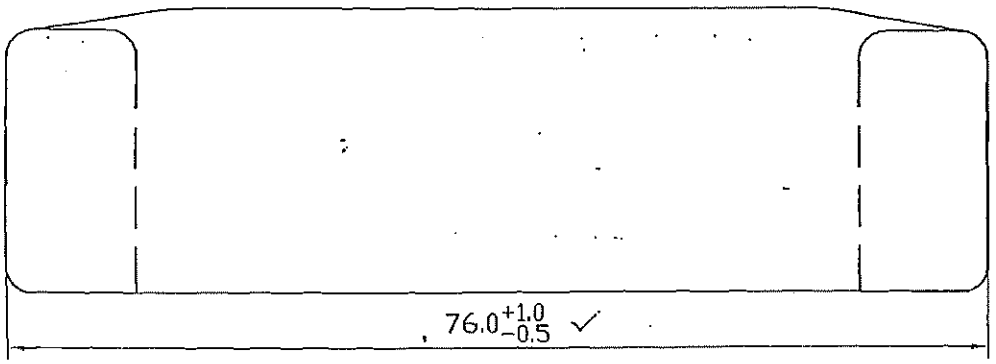
15. GENERAL

15.1 The liner manufacturer shall furnish, at his cost, the liners required for all tests and shall provide necessary manpower and facilities for carrying out tests at his cost.

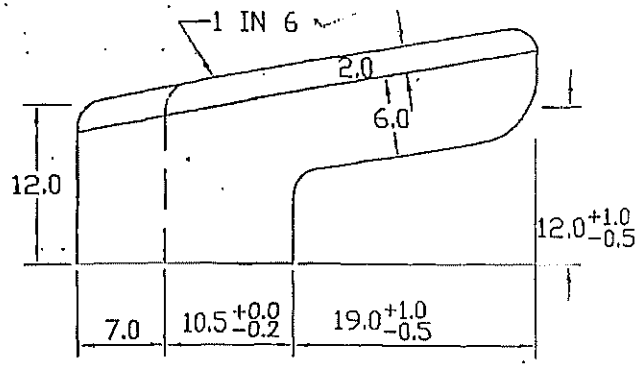
15.2 Purchaser/inspecting officer or his representative shall have free access to the works of the manufacturer at all reasonable times and shall be at liberty to inspect the manufacture at any stage and to call for records, pertaining to manufacture which shall be made available to him within reasonable time.

15.3 Type tests may be repeated at any stage during currency of the contract, at the discretion of the inspecting authority.

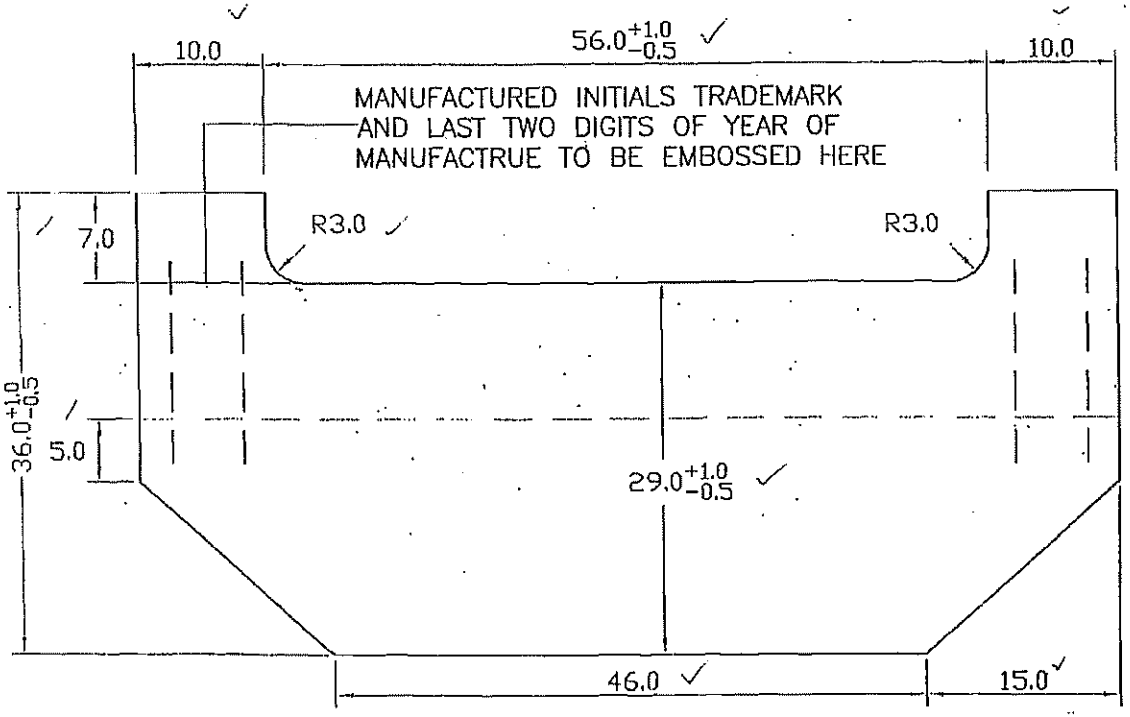
15.4 The material shall be offered for inspection as per call letter given in Appendix VIII.



ELEVATION



SIDE VIEW



PLAN

NOTE:–

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL SHARP EDGES TO BE ROUNDED OFF TO ABOUT 2R EXCEPT WHERE OTHERWISE MENTIONED.
3. SPECIFICATION IRS FOR GLASS FILLED NYLON 66 INSULATING LINER WITH LATEST MODIFICATION.

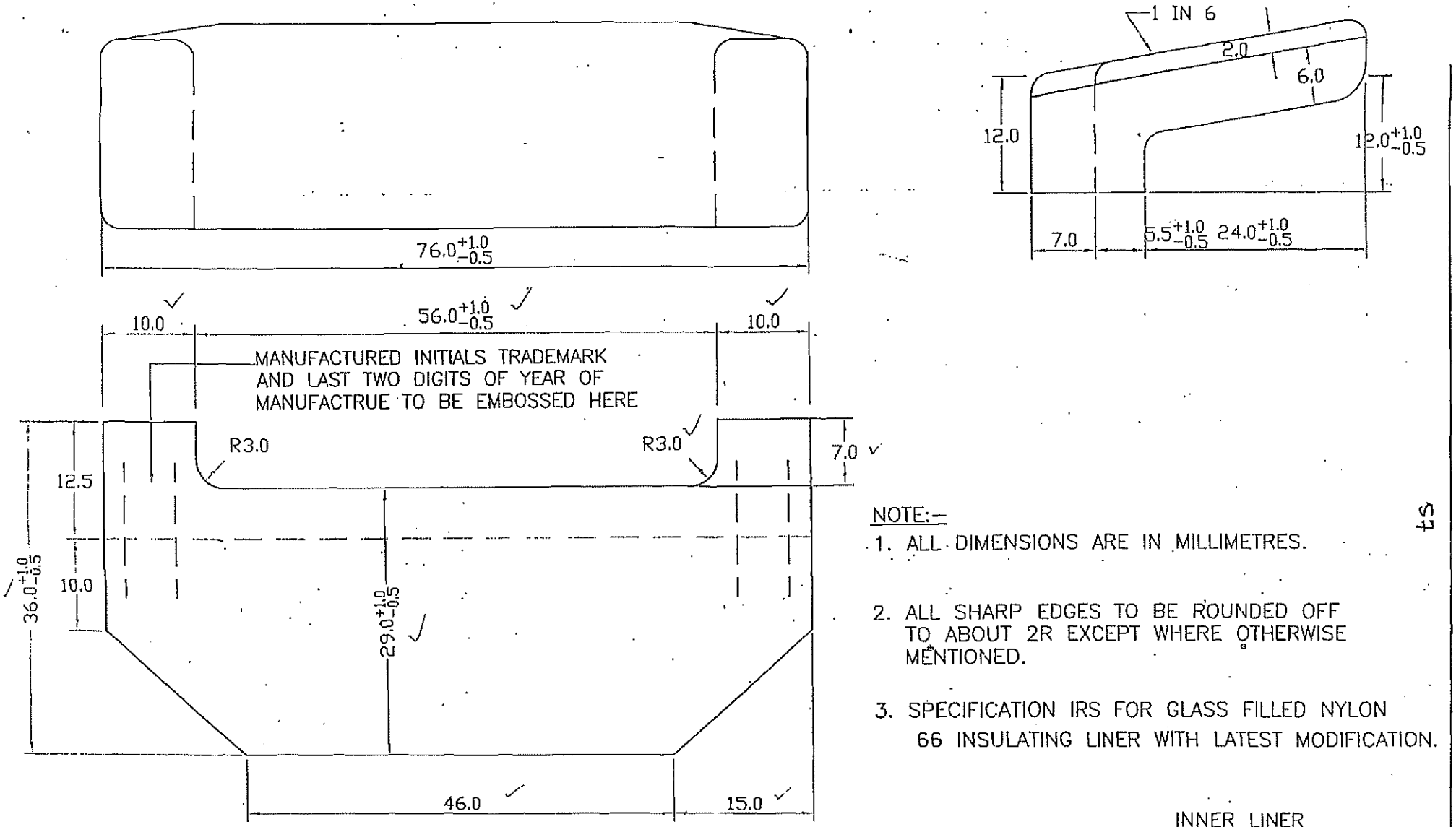
OUTER LINER

MYANMAR RAILWAYS
CIVIL ENGINEERING DEPARTMENT

GLASS FILLED NYLON INSULATING LINER FOR USE WITH 75R RAIL WITH ELASTIC RAIL CLIP MK–II

DRG.NO :

SHEET :1 OF 1



NOTE:–

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL SHARP EDGES TO BE ROUNDED OFF TO ABOUT 2R EXCEPT WHERE OTHERWISE MENTIONED.
3. SPECIFICATION IRS FOR GLASS FILLED NYLON 66 INSULATING LINER WITH LATEST MODIFICATION.

INNER LINER

MYANMAR RAILWAYS
CIVIL ENGINEERING DEPARTMENT

GLASS FILLED NYLON INSULATING LINER FOR USE WITH 75R RAIL WITH ELASTIC RAIL CLIP MK–II	
DRG.NO :	SHEET :1 OF 1

Specifications for Steel Wedges

Open Grips comprise a barrel and wedge.The anchor wedges are manufactured from case of hardened steel.The wedge is in two segments for wires and strands. The segments are held together with an "O" ring or optionally a circlip for wires and strands sizes.Wedges are coarse threaded for maximum grip and ease of cleaning.

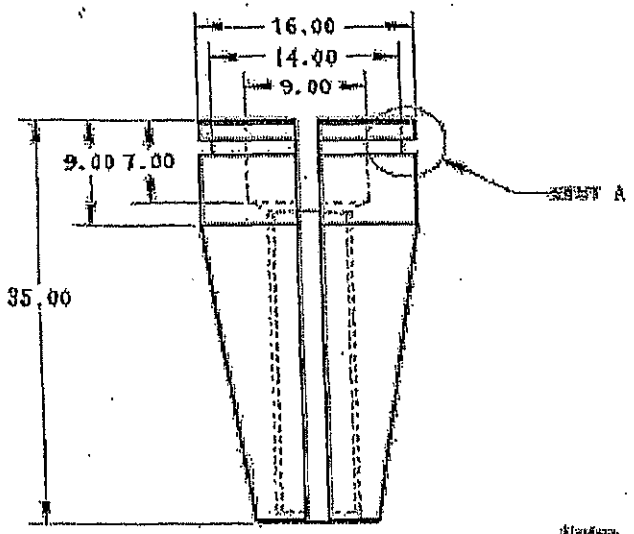
(1) Use of Strand Size: 3mmϕ x 3ply HT Steel Strand

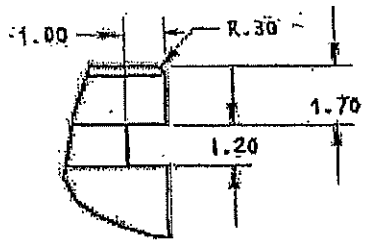
(2) Chemical Composition(%)

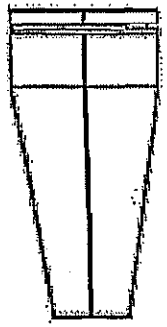
Carbon	-	0.074
Silicon	-	0.240
Manganese	-	0.677
Phosphorus	-	0.068
Sulphur	-	0.026

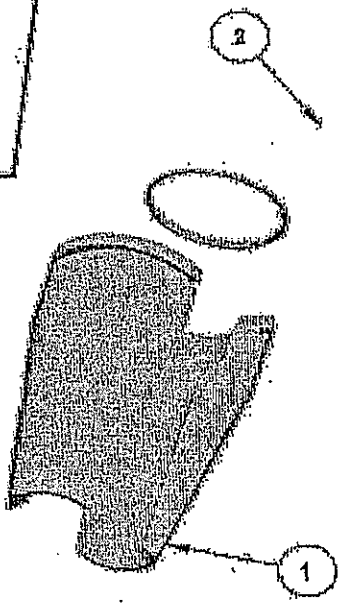
(3) Hardness(Rockwell)

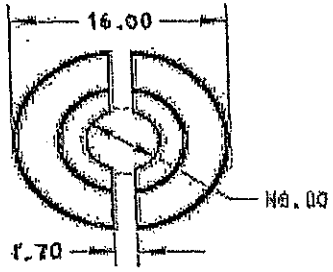
RC - 14~22











Notes:

1. No burrs and acute angle on the surfaces.
2. Zinc plated.
3. Spring Steel Round: φ0.5 x φ12.
   3.1 circles.
   Material: 65Mn.

2	SPRING	PIN	1
1	PIN	PIN	2
NO.	NAME	MATERIAL	REMARK

DRAWING FOR STEEL WEDGES

Specification of 18mm Ø Spring Steel Round Bar

Spring Steel Round Bar	18mm Ø
Unit Weight	2.0 kg/m
Sectional Area	2.545 Cm^2
Length	5.8 Meter (min)
Steel Grade	Silico Manganese Spring Steel 55 Si7 (IS: 3195-92).

Chemical Composition (%)

Element	Composition (%)	Permissible Variation (%)
Carbon	0.50 - 0.60	± 0.03
Manganese	0.80 - 1.0	± 0.04
Silicon	1.50 - 2.0	± 0.03
Sulphur	0.04 (max:)	± 0.005
Phosphorus	0.04 (max:)	± 0.005

Mechanical Properties

Proof Stress 0.2 %	1079 N/mm^2
Tensile Stress	1226 N/mm^2
Elongation	5.5 % (min)
Hardness	HB 270 (min)

Tolerance on Diameter ± 0.3 mm