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भारत सरकार

रक्षा मंत्रालय

(गुणता आश्वासन महानिदेशालय)

GOVERNMENT OF INDIA

MINISTRY OF DEFENCE

(DGQA ORGANISATION)

SARATH

QUALITY ASSURANCE INSTRUCTIONS

NO. CQA(ICV)/QAI/017

FOR

TRUCKS

DRAWING NO. 675-35-Cb9

ISSUED BY

गुणता आश्वासन नियंत्रणालय (स्पत्न सेना लडाकू वाहन)

रक्षा उत्पादन तथा आपूर्ति विभाग

रक्षा मंत्रालय

वेदुमैलारम (आं.प्र) -५०२ २०५.

CONTROLLERATE OF QUALITY ASSURANCE (INFANTRY COMBAT VEHICLES)
DEPARTMENT OF DEFENCE PRODUCTION & SUPPLIES
MINISTRY OF DEFENCE
YEDDUMAILARAM 502 205

ISSUE: JAN 96

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QUALITY ASSURANCE INSTRUCTIONS

FOR

TRACKS

DRAWING NO. 675-35-Gb9

CONTROLLERATE OF QUALITY ASSURANCE

INFANTRY COMBAT VEHICLES

YEDDUMAILARAM - 502 205

ADDITIONS/AMENDMENTS

Sl No	Page & Para	Brief description of Additions/ Amendments	Date on which addition/ amendments made	Authority letter Number

QUALITY ASSURANCE INSTRUCTIONS FOR TRACKS
DRAWING NO.675-35-Cb9

1. INTRODUCTION : These Quality Assurance Instructions are the property of Government of India. These are based on the acceptance standards and methods generally in vogue and has been compiled for guidance of the inspector during inspection to ensure that the stores accepted are qualitatively meeting the service requirements. This QAI deals with the constructional requirements, pilot and bulk inspection requirements for determining the quality and performance of track assy.

1.1 This QAI is liable for amendment as and when required by the Controller, CQA(ICV). During inspection, if the inspector finds any points which could be included in the QAI, the same may plesse be brought to the notice of the Controller, CQA(ICV) for consideration and inclusion in the QAI. Before commencing the inspection, the inspector will make himself fully conversant with the terms and conditions of the contract, applicable drawings, specifications and other literature.

1.2 The earlier indigenous supplies of tracks were as per drawing No.675-35-Cb7. In this version of the tracks, the grousers on the track shoes were straight and the steel needle in rubber bushes of the pins were not present. In the latest design to drg.No.675-35-Cb9, the grousers have been inclined for better ground grip and steel needles have been introduced in the rubber bushes to provide for an electrical path to the ground in order to reduce interference in radio communication. The 25 dia bore of the clamp has been given a negative tolerance in order to prevent the lateral sliding of the clamps on the pins.

2. DESCRIPTION : Tracks (Code No.35) form a part of Track Driving System. The track is an endless chain that consists of eighty five track shoes hinge jointed by rubberised bushed pins, clamps and bolts. The track shoe is forging made of high tensile steel. The track shoe has two through holes in which rubberised pins are inserted. Two track guides are welded on the track shoe. These guides prevent the track from going off the road wheels and support rollers. The ends

Contd... 2

of the pins of adjacent shoes are linked by clamps. The flexibility of the rubberised pins permits the adjacent track shoe to be turned through a small angle relative to each other.

2.1 The track shoe outer surface is provided with grousers for improving the ground grip of the track shoe.

2.2 The details of drawing Nos, material specifications with properties are given in appendix-'A'. The details of dimensions of impact test piece are given at appendix-'B'.

2.3 The properties of rubber used for rubberised metallic pins are given in appendix-'C'. The acceptance standards, unacceptable surface defects and required markings are also given in this appendix.

3. QUALITY ASSURANCE PROVISIONS : The supplier is responsible for satisfactory performance of the tracks during usage and for the performance of all inspection requirements specified herein. Inspection records and heat treatment charts should be made available for perusal by the inspector.

4. METHOD OF INSPECTION

4.1 Pilot Samples : Quantity one vehicle set of pilot samples of track shoe assembly will be required to be submitted by the manufacturer for approval of DGQA before commencing bulk production. Spares clamps bolts and track shoes (about 20 Nos) may be submitted in addition to one vehicle set to meet requirements due to breakage, misplacement, etc., during trials. The pilot samples and subsequent bulk will be inspected as per the details given below.

4.2 The tests required to be carried out on pilot/bulk are given in the following table :

TABLE : 1

Ser. No.	Type of Inspection	Sampling Size	
		Pilot	Bulk
1.	Visual Inspection	100%	100%

Contd... 3

Ser. No.	Type of Inspection	Sampling Size Pilot	Sampling Size Bulk
2.	Dimensions		
	a) Critical dimensions	100%	100%
	b) Other dimensions	100%	10%
3.	Chemical composition	Each batch/ heat of raw material	Each batch/ heat of raw material
4.	Macro structure of raw material	-do-	-do-
5.	Testing of Mechanical Properties		
	a) Track shoes (Impact strength & hardness)	1 test bar for everyheat treatment batch. 100% forgings for hardness (after heat treatment)	1 test bar for every heat. In addition, 100% forgings need hardness checking by manufacturer & records maintained. 10% of forgings may be checked by inspector.
	b) Clamps, bolts & pins (UTS, YS, % Elongn, Impact strength & hardness)	1 test bar for every heat treatment batch. 100% of clamps, pins & bolts for hardness.	1 test bar for every heat treatment batch 100% of clamps, pins & bolts for hardness.
	c) Bend test for track pins	1 pin per heat	1 pin per heat.
	d) Micro structure for track shoes/clamps/bolts/pins	Every heat treatment batch.	Every heat treatment batch.
6.	Tests on rubber used for track pins		
	a) Physical properties	Each mix.	Each mix.
	b) Low temperature brittleness	Each batch of prodn.	One batch per month.
	c) Bond strength of rubbeised pins	-do-	Each batch of prodn.
	d) Flexing test	1 pin from every batch.	1 pin from every batch.

Contd... 4

Ser. No.	Type of Inspection	Sampling Size	
		Pilot	Bulk
7.	Electrical continuity after fitment of pins to track shoes	100%	100%
8.	Weight	100%	100%
9.	Identification, preservation and packing	100%	100%
10.	Fitment & performance trials	one set of tracks	As and when considered necessary.

4.2.1 Details of Inspection

4.2.1.1 Visual Inspection : The track assy shall be inspected visually to ensure that workmanship of all the connected components is satisfactory. No sharp edges are allowed. No welding defects are permissible at the welded joints. Check that the bolts thread and the bearing surface are lubricated with grease. Check any other visual defects which impair the functional aspects of the assy.

4.2.1.2 Dimensions : Dimensions of the individual parts may be checked before assy. on random basis. The dimensions should conform to drawing requirements. Bulk should be checked for overall dimensions. Sketches showing important parameters to be checked are given at the end of this QAI as appendix-'D' for ready reference. However for details, concerned drawings shall be referred.

4.2.1.3 The distance between the guides (150 ± 1.5 mm) is to be checked and controlled on 100% basis.

4.2.1.4 The threaded dimensions M27x1.5x6H and M27x1.5x6h of clamp and bolt respectively shall be checked before heat treatment. The $25.0^{-0.085}_{-0.130}$ dia holes in the clamps shall be checked before cutting of the slot.

4.2.1.5 Check the tightening torque of the bolts at random. Specified value is 40^{+8}_{-0} kgfm. It is preferable to maintain at 45 kgfm.

Contd... 5

4.2.1.6 Track links to drawing No.765-35-Cb104Ch may be checked by using steel pins and connectors for a relative turning of atleast 45° towards the grouser and atleast 26° in the reverse direction.

4.3 Materials

4.3.1 Chemical Composition : Material test specimen drawn from each batch are to be tested for chemical analysis as per the relevant specifications. The results shall conform to specified values. Records maintained by the firm on material checks may be verified periodically during bulk inspection.

4.3.2 Matro structure for track shoe and guide material Grade 20XГ CHM to TY 14-1-2320-78: The macro structure of the steel used for track shoe and guide shall not indicate presence of shrink holes, porosity, blisters, cracks, slag inclusions and flakes visible to the naked eye. This shall be ensured by the manufacturer at raw material stage so that use of quality steel is ensured for the production of track shoes.

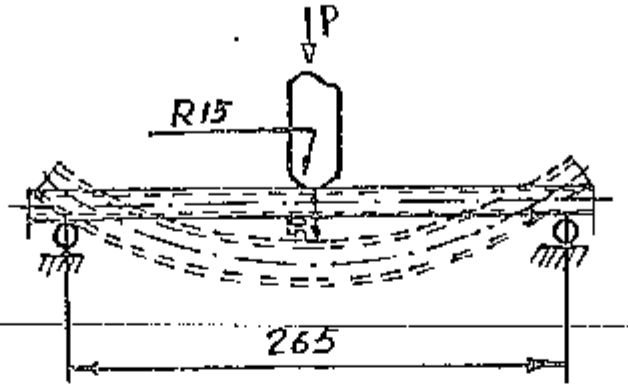
4.3.3 Mechanical testing of heat treated test bars : The test bars representing each heat treatment batch shall be heat treated alongwith the components. These test bars when tested shall give test results conforming to specified values. Details of heat treatment cycles in the form of charts are given at appendix-'E' for ready reference.

4.3.4 "The micro structure shall comprise decay products of austenite, needle and sorbitic structure and fine austenite martensite sections. It means that the structure shall contain basically tempered martensite with minute amounts of retained austenite and martensite finely dispersed in the matrix. Presence of the martensite is not allowed. It means that presence of appreciable amounts of Martensite (which may result due to insufficient tempering of the steel) is not allowed".

4.4 Bend test of track pin Drg.No.675-35-13 after heat treatment : Representative samples of track pins after heat treatment shall be subjected to bending test as shown in the following sketch. After the bend test the track

Contd... 6

pin shall be visually examined for any damage or breakage/ cracks which shall be a cause for rejection.



4.5 Rubber material for rubberised pin

4.5.1 Properties of Rubber : Representative test slab when tested after vulcanisation shall have physical properties as specified in appendix-'C'.

4.5.2 Temperature brittleness of rubber : Representative samples of rubber shall be tested for temperature brittleness of rubber at $-50^{\circ}C$ as per GOST 7912-74. Brief details of this test are given at appendix-'F' for ready reference.

4.5.3 Bond strength : Bond strength when tested on a suitable test fixture shall not be less than 5 kgf/cm. Speed of separation shall be maintained at 100 ± 15 mm/min or 50 ± 15 mm/min which shall be mentioned in the report. Averageof 6 readings on a pin shall be taken as the obtained value of bond strength. The test procedure is given in TY-10542-77.

4.5.4 Bench Operation (flexing) Test : Therepresentative track pins shall be fitted to track links and two such links are connected to each other as per drg No.675-35-Ch123Cb with the help of clamps and bolts maintaining included angle of $166 \pm 2^{\circ}$. A suitable test equipment shall be made to operate these links as per the condition given below :

(a)	Angle of swivelling of pin	-- $10^{\circ} + 1^{\circ}$ on both directions
(b)	Radial load on the pin during test	-- 1000 $\pm$ 10 kgf
(c)	Test speed	-- 300 cycles/min
(d)	No of cycles	-- 1 lakh

Contd...7

After completion of this test, the rubberised pin under test shall be removed and examined. Bond separation or failure of rubber shall be cause for rejection.

4.6 Electrical Continuity Test : After the pins are assembled with the track shoes, electrical continuity should be checked between track pin and track shoe with the help of multimeter.

4.7 Weight : Since control on weight of the complete assy is very important, each vehicle set of track shall be weighed and recorded. All components used in pilot and 10% of the components used in bulk shall be checked for weight.

4.8 Fitment & Performance Trials : One vehicle set of pilot samples selected for the trials should be fitted on a tank and subjected to field trials as given below :

4.8.1 One complete vehicle set is to be fitted on one vehicle.

4.8.2 The vehicle should be subjected for drift test, rigerous cross country tests, gradient and running at various speeds. If possible floatation test also be carried out. The vehicle shall be run for 1000 km.

4.8.3 After the first 100 km of trial, the bolts shall be tightened as given below :

4.8.3.1 The tracks shall be removed from the vehicle and laid on flat surface.

4.8.3.2 Clean and wash the track with water.

4.8.3.3 Loosen the bolts where the clamp has slided/become loose.

4.8.3.4 Push the clamp into correct position.

4.8.3.5 Tighten the bolt to the required torque (40-48 kgfm preferably 45 kgfm) while maintaining the included angle to 166° with the template.

4.8.3.6 Other bolts (where the clamps have not become loose) shall also be tightened to 45 kgfm torque.

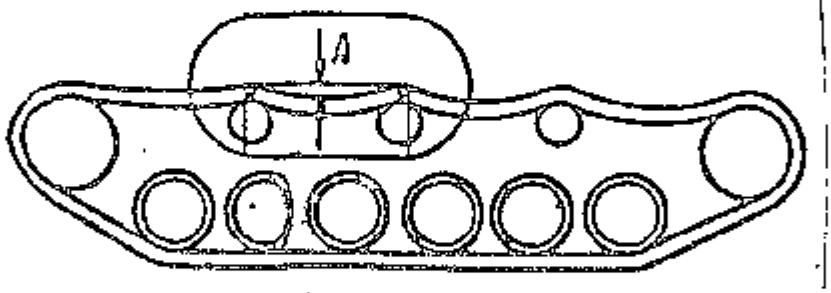
4.8.4 After each days run, the tracks should be examined for cracks or other defects.

Contd... 8

4.8.5 The track tension is to be checked periodically and adjusted to the specified tension.

4.8.6 The track tension check is done as given below.

Place the vehicle on the level hard ground without braking. The vehicle is supplied with 3 pins for the measurement of track tension. Place two pins, one each on the track pin holes which are coming over the first end second top rollers and the third pin in the hole of track pin in the middle of first and second top rollers. A thread is to be placed over the two extreme pins and held tightly. The distance between the middle pin top to the thread will determine the track tension. The specified value of track tension is 6-8mm (See sketch below).



4.8.7 In case the track is getting loose frequently the same should be tightened to the specified tension and records of such tension adjastment should be maintained and communicated to AHSP.

4.8.8 The condition of rubber bushes should also be examined regularly and a record of number of rubber bushes found defective should be maintained and communicated to AHSP.

4.8.9 Condemnation limits of track and its components (for information only).

I. Complete track - 675-35-Cb9

a) Wear of grousers to the extent of 9 mm, ie., when the grouser height is reduced to 1 mm.

b) Through wear of the clamps.

Contd... 9

c) Through wear of track shoe run ways (the surface which rubs against bogie wheel rubber).

d) Damaged rubber bushes in forty or more hinges (determined by protrusion of rubber from the track shoe eye) in one track of 85 links.

II. Track shoe with rubberised pins 675-35-Cb124

a) Breakage of track pin or horn.

b) Damaged rubber in the hinge.

c) Cracks and fractures of the track shoe.

d) Wear of track pins excluding reliable fastening of the links.

e) Wear of grousers as given in I (a) above.

III. Clamp 675-35-14

a) Wear of clamp surface in places of contact with drive sprocket teeth in excess of permissible (nominal 9.5 mm, through wear upto track pin is permissible).

b) Wear of clamp bores ($25.0^{-0.085}_{-0.130}$) to the increased dia of 25.15 mm.

c) Cracks at any place of clamp.

IV. Rubberised track pin 675-35-Cb119

a) Excessive wear on ends of pin.

b) Damage to rubber bushes.

c) Cracks on track pins.

V. Bolt 675-35-15

a) Cracks and breakage of bolt.

4.8.10 The track will be examined at periodical intervals for loosening of the bolts and loosening/sliding of the clamps. If these defects are abnormally high, these shall be recorded and investigated.

Contd... 10

5. MARKING : The following markings are to be ensured :

5.1 Track Links : Drg No.765-35-2 location is indicated in the drawing. Size of letter - 5 mm.

i) Manufacturer's name or trademark
ii) Drawing No.or short code No.
iii) Melt No.of raw material
iv) Forging batch number
v) Month and year of manufacture
vi) Heat treatment batch No.(Punch mark)

5.2 Track Pin : Drg No.675-35-13

Location - at the end faces

i) Manufacturer's trademark
ii) Raw material batch No.
iii) Heat treatment batch No.

5.3 Drg No 675-35-14 Clamp and 675-35-15 Bolts
(i) Manufacturer's Trade mark (for identification purpose)
(ii) Heat treatment Batch No.

For rubber portion please refer appendix-'C'.

6. PAINTING : After acceptance by the inspector the track assembly shall be properly cleaned and coated with primer and then painted with enamel olive green paint.

7. PACKING : The track shoes shall be assembled in wraps of 85 shoes or of a smaller number as agreed to by the consignee. The wraps should be placed in wooden crates suitably designed to prevent damage. Each crate shall have the following markings :-

i) Manufacturer's name or trademark
ii) Supply order number and date
iii) Month and year of manufacture
iv) Number of track shoe assemblies
v) Weight

NOTE : The wrap of 85 track links should be rolled with a minimum ID of 560 mm.

Appendix A

Ser. No.	Item	Drawing No.	Material specn & Grade	CHEMICAL COMPOSITION %									MECHANICAL PROPERTIES						Remarks
				C	Mn	Si	Ni	Cr	Mo	Cu	S	P	Yield stress kgf/mm²	UTS kgf/mm²	% E	% RA	Impact strength kgfm/cm² U-Notch £	Hardness BHN	Hardness HRC	
													Min.							
1.	Track Shoe	765-35-2	TY-14-1-2320-78-Steel 20XГ CHM (TBM)	0.18 to 0.24	0.90 to 1.20	1.20 to 1.50	0.90 to 1.20	0.60 to 0.90	0.10 to 0.15	0.30 max.	0.035 max.	0.035 max.	--	-	-	-	10	387 to 477	41 to 49	Forging
2.	Guide	765-35-19 (Assy Drg 765-35-Cb104Cb)																		
3.	Track Pin	675-35-13 (Assy Drg.ie., with rubberised bushes 675-35-Cb119Cb	GOST 4543-71 Steel 38XC	0.34 to 0.42	0.30 to 0.60	1.00 to 1.40	0.30 max.	1.30 to 1.60	-	0.30 max.	0.035 max.	0.035 max.	115	130	10	30	7	387 to 477	41 to 49	$
4.	Connector	675-35-14	-do-																	
5.	Bolt *	675-35-15	-do-																	#
6.	Needle	675-35-18	Wire II 0.8 GOST 9389-75	Carbon spring steel									215 to 260							

NOTE : In case any alternate materials are specified in the supply order, properties should conform to such specified materials.

£ : For details of test piece dimensions for impact test please refer Appendix-'B'.

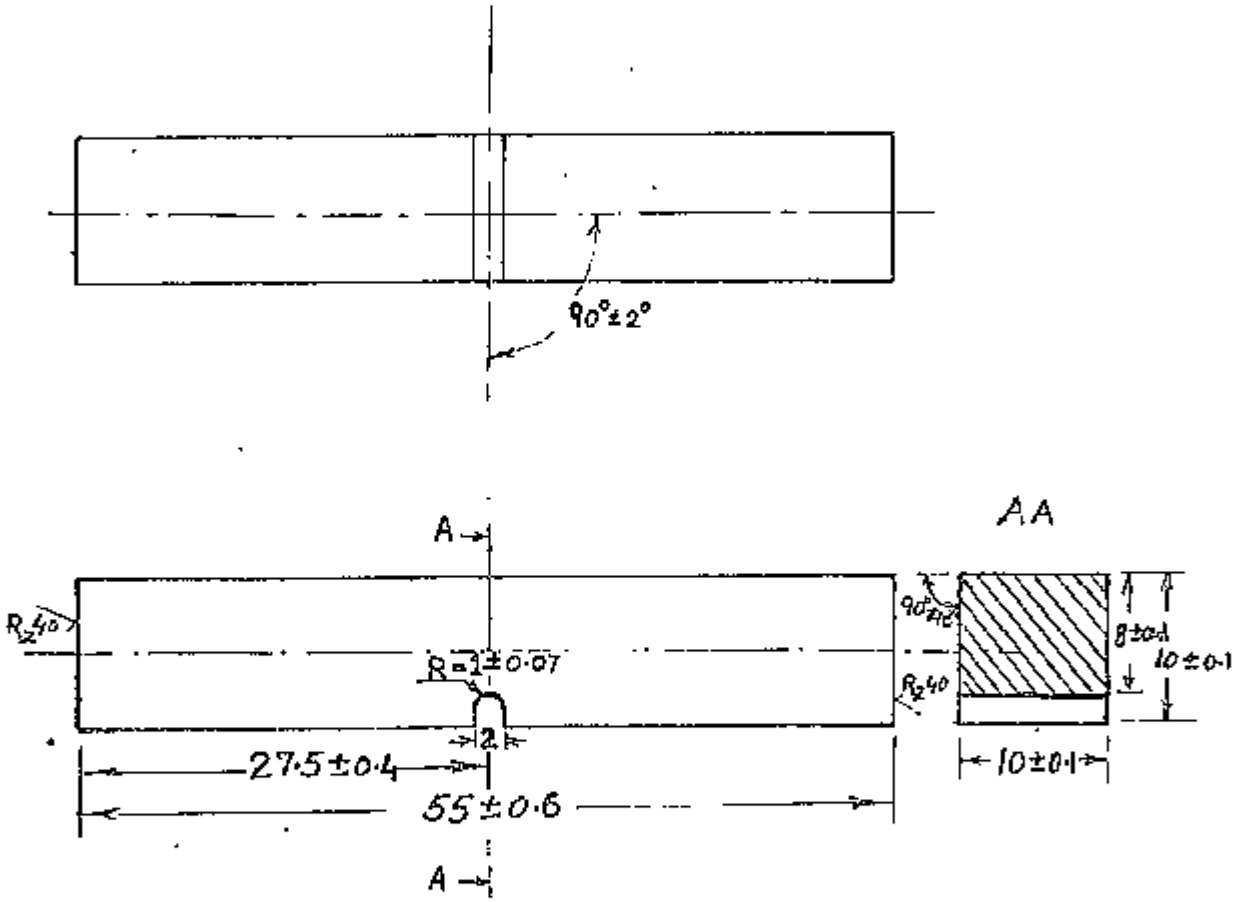
* : Cadmium plated to 9µm thickness and Hardness should be 363 to 444 BHN as specified in dwg (Ref Appx 'D' Sheet 4')

$: Mechanical properties obtained on heat treated test bar as per heat treatment cycle given in appendix-'E' Sheet.2

: The steel wire used should meet the requirement of number of twists and number of bends as per the tests specified in GOST 9389-75 (No.of twists 17 and No. of bends 12).

APPENDIX-'B'

DETAILS OF IMPACT TEST SPECIMEN TYPE 1 AS PER GOST 9454-78



NOTE : 1. TEST PIECE AXIS SHOULD BE SAME AS FOR BAR

2. TEST TEMPERATURE 20 ± 10°C

APPENDIX-'C'
Sheet 1

EXTRACT FROM TY 10542-77

RUBBERISED METALLIC PINS

1. The rubber used for the subject pin should have the following properties :

(a)	Nominal tensile strength kgf/cm^2	..	260min.
(b)	Relative rupture elongation %	..	500 min.
(c)	Relative residual strain after rupture %	..	45 max.
(d)	Hardness IRHD	..	67 ± 5
	Shore 'A' - Drgrees	..	65 ± 5
(e)	Brittleness temperature °C	..	- 50
(f)	Rubber to metal bond strength kgf/cm	..	5.0 min.

2. The following surface defects on the rubberised pins are not acceptable :

(a) No bubles, porosity, cracks, mechanical damages and faulty moulding

(b) Foreign inclusions and traces due to their fall out of a dimension not exceeding 0.3 mm.

(c) Imprints from the mould with a height and depth exceeding 0.75 mm.

(d) Rubber flash on outer surface of pins of a thickness exceeding 1 mm.

(e) Rubber flash on inner surfaces

(f) Spew along the external perimeter of rubber and on the pins along mould parting line of a thickness exceeding 0.5mm and height exceeding 1.5mm

(g) Displacement along mould parting line exceeding 0.5 mm

(h) Recesses to a depth and width exceeding 0.5 mm and a length exceeding 3 mm numbered more than 1 per one ring

(j) Separation

3. Acceptance Rules :

(a) All the tests to determine the qualities required as per para 1 are to be conducted as per approved sampling plan

Contd... 2

(b) Rubber to metal bond strength shall be determined on all the 6 rings of pin and average calculated.

(c) Double sampling plan should be followed in case of unsatisfactory results in first samples and these results are final.

4. Marking :

(a The following markings are to be made :

(a) Drawing Number

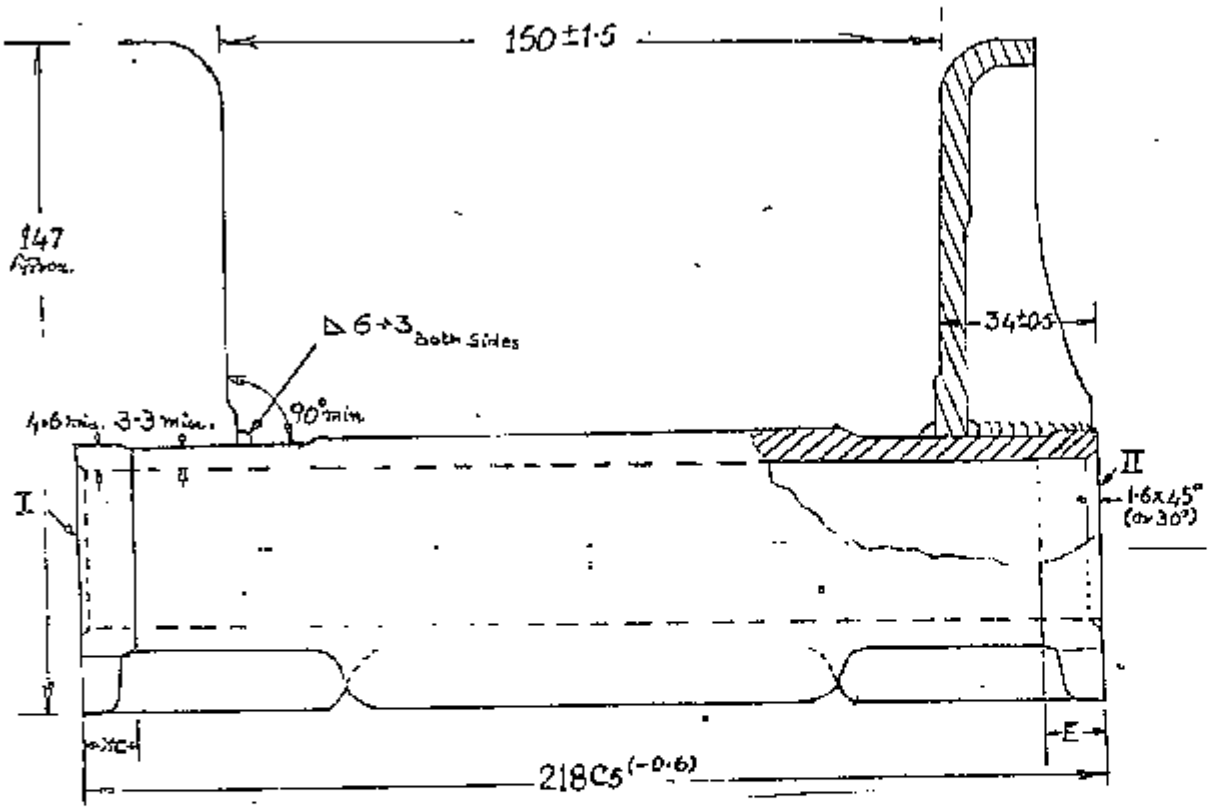
(b) Manufacturer's name or trademark

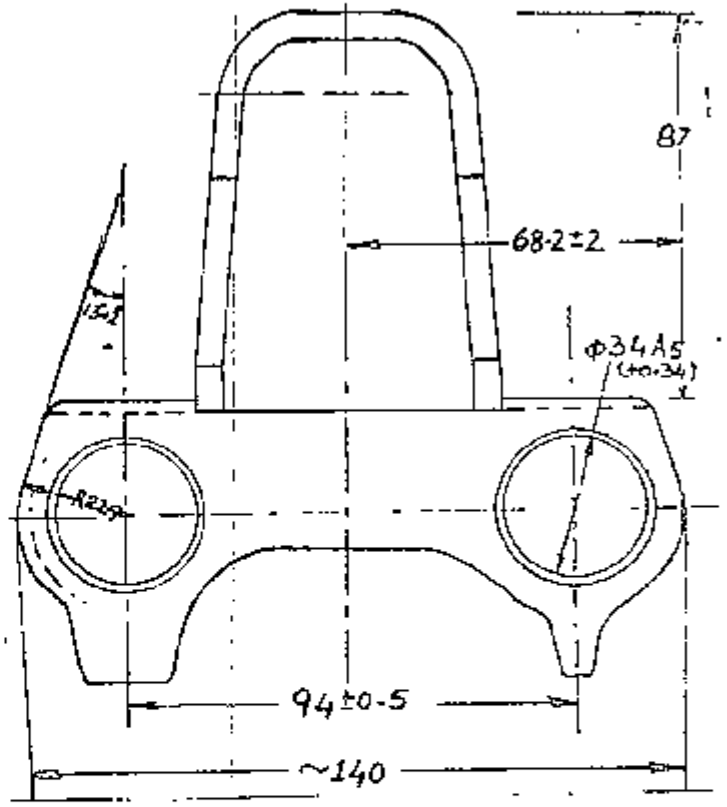
(c) Brand of rubber

(d) Batch number

(e) Month and year of manufacture.

(f) Acceptance mark

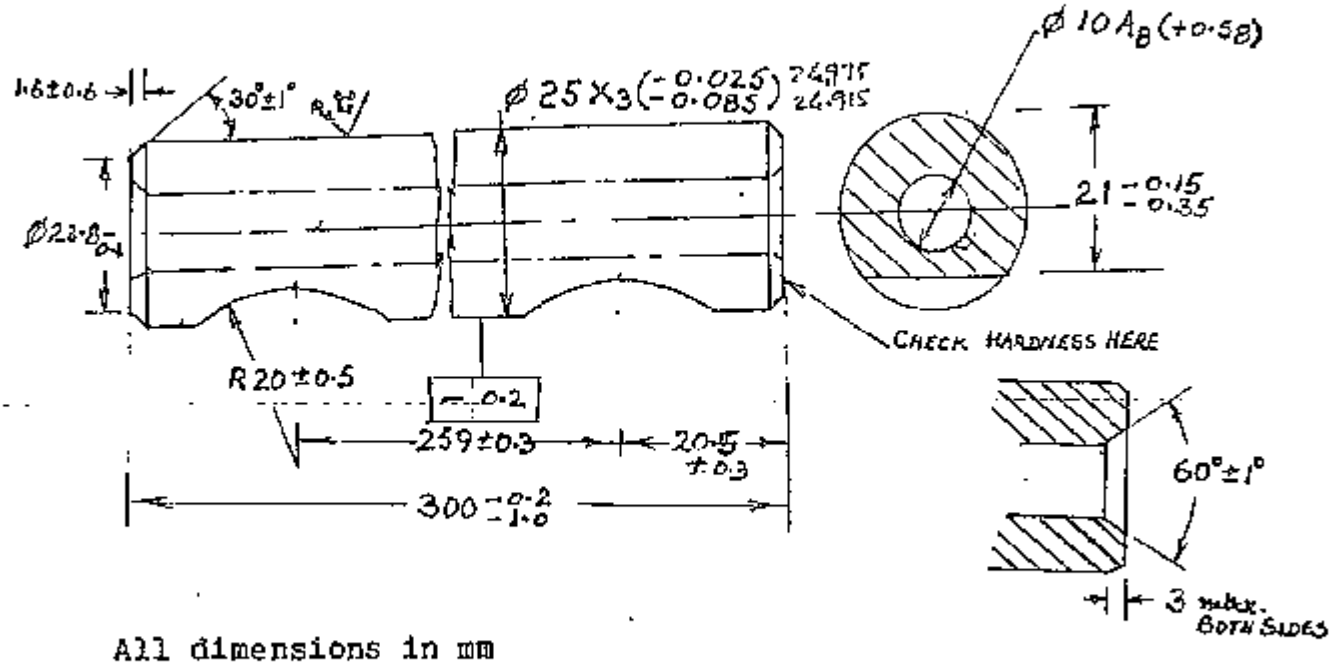




1. Difference of α and E should not exceed 1.5mm (α and E are approximately 9 mm)
2. Non squareness of surfaces I and II should not be more than 0.5 mm.
3. Non-parallelity and Skewness of axis of bores Ø 34.0 should not exceed 0.5 mm.
4. Hole dia - Ø 34 A5 (+0.34) after heat treatment.
5. Local thickness of wall should not be less than 3.3mm
6. Thickness of shoulder should not be less than 4.6mm
7. Black spots and tool marks are not allowed in the hole Ø34. Cracks, fins and scales are not allowed in the holes.
8. Track shoe should be joined with any other track shoe through pin and clamp and ensured relative turning to side of lug atleast 45° and return 26° min.
9. Hardness 477-388 BHN
10. Weight - 4.711 kg

Appendix-'D' Sheet-2

675 - 35 - 13 PIN

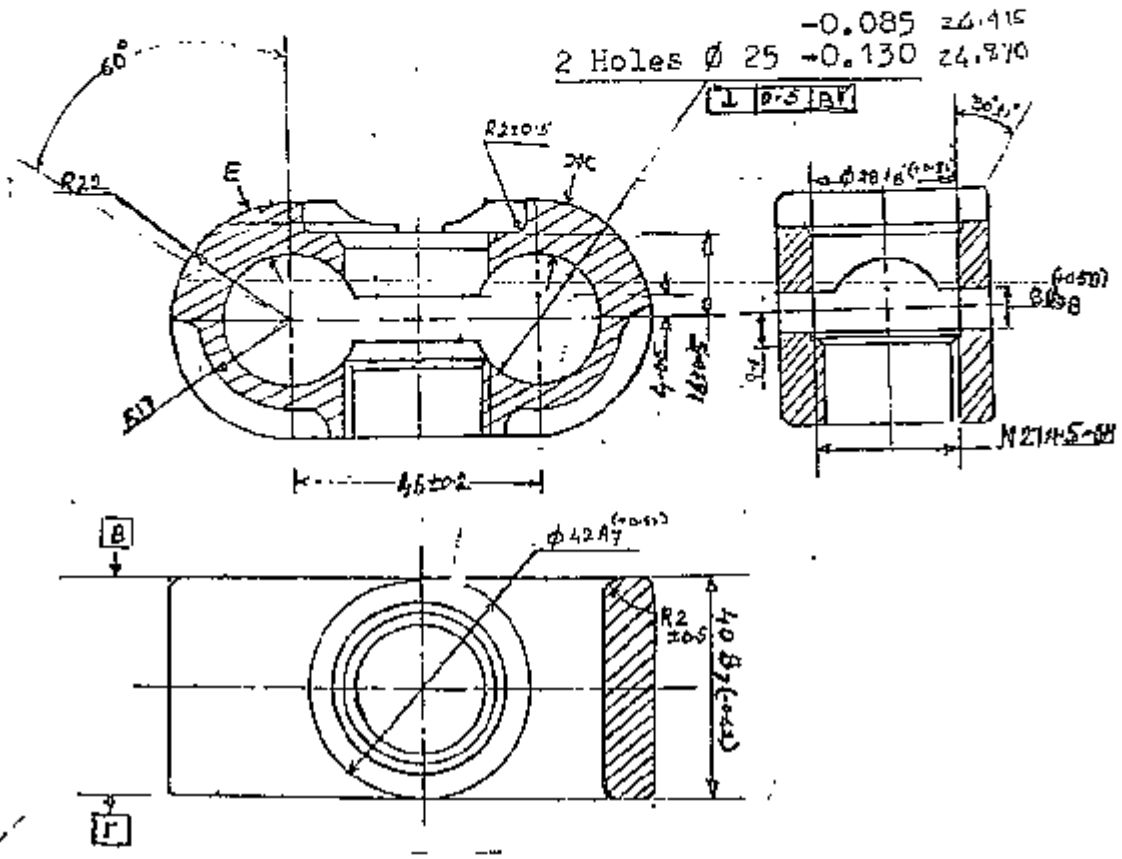


All dimensions in mm

1. Straighten if bending is more than 0.2 mm.
2. Difference of wall thickness at end faces should not exceed 0.5 mm.
3. Hardness 387 - 477 BHN.
4. After heat treatment size Ø25X3 may decrease by 0.03mm or increase by 0.025mm over the entire length.
5. Oil spots and other contaminations are not permissible. Scales, corrosion, paint or alkali are not allowed.
6. Burrs, sharp edges, cracks or nicks on the end faces are not permissible.
7. Mechanical properties & microstructure are as per TTM-29-75. (See appendix-'A' & clause 4.3.4 of QAI).
8. Conduct bend test of one track pin per every heat treatment batch as per TTM-29-75. (See clause 4.4 of QAI).
9. Weight 0.945 kg.

Appendix-D Sheet No. 3

675-35-14 CLAMP

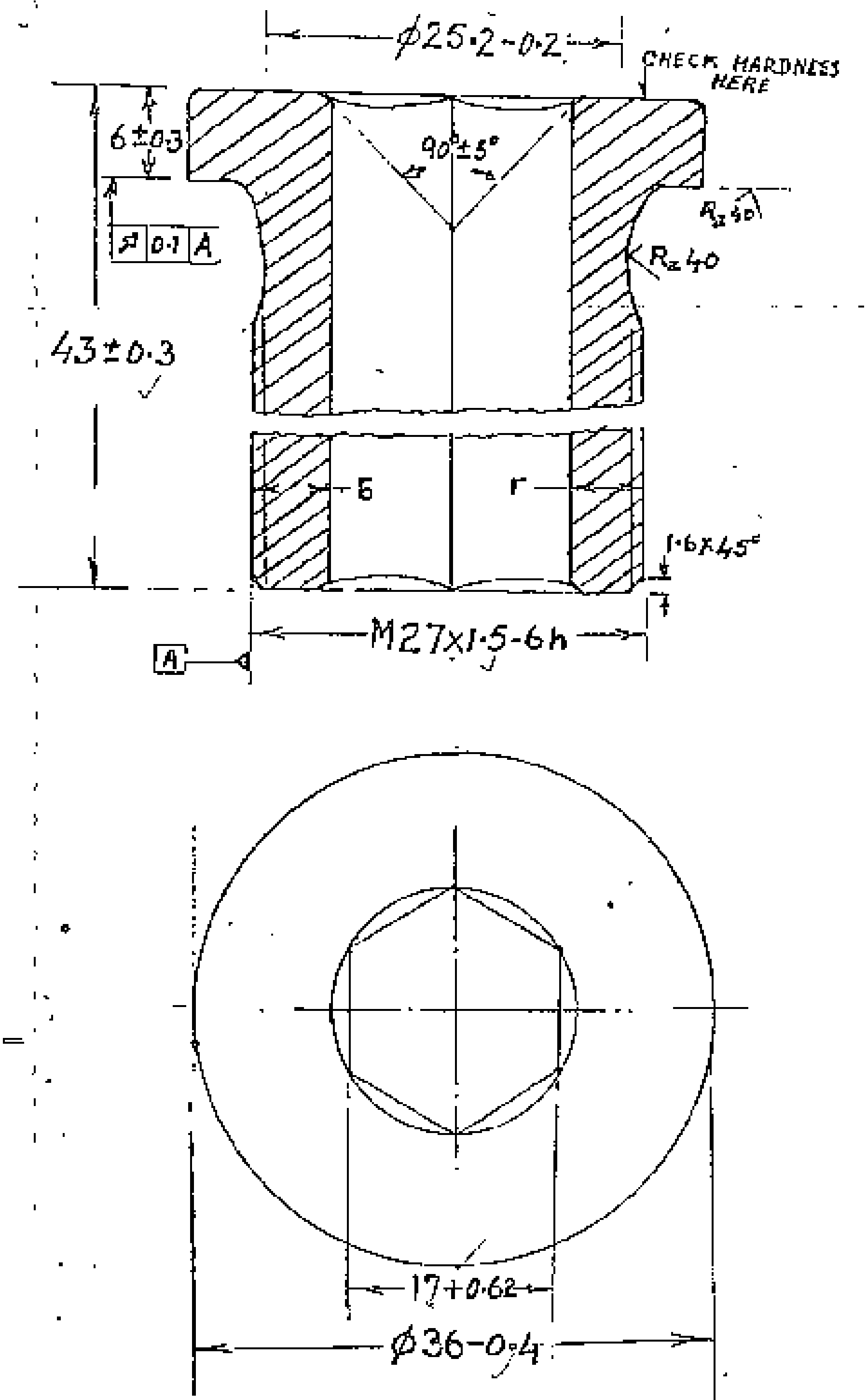


All dimensions in mm

1. Check holes $\emptyset 25A_3$ before cutting $8A_8$ slot.
2. Check thread M27x1.5 6H before heat treatment.
3. Difference of sizes E & C should not exceed 2mm for 60°. /check
4. Radii should be provided wherever specified.
5. Cracks, nicks and scales are not allowed.
6. Hardness - 387 to 477 BHN
   (Alternate 41-49 HRc)
7. Mechanical properties and microstructure requirements are as per TTM29-75 (See appx-'A' & clause 4.3.4 of QAI)
8. Complete outer surface should have shot-blast impressions.
9. Weight 0.5 kg

Appendix-'D' Sheet-4

675-35-15 - BOLT



1. Check thread before heat treatment for minimum 19mm length, from bottom.

2. Difference of б & r should not exceed 0.4mm.

3. Hardness - 363-444 BHN (37 - 45 HRC) (alternate)

4. Mechanical properties and microstructure requirement are as per TTM-29-75(See appx-'A' & Clause 4.3.4 of QAI

5. Thickness of cadmium plating - 9μ

6. After cadmium plating of the bolts, these should be subjected for removal of hydrogen embrittlement by the following process :

   a) Baking at 180-200°C for 2 to 3 hours.

   b) Keeping the bolts in a solution of potassium di-chromate in water (0.5 to 1.0 g/l) at 90-95°C for 30 to 35 minutes.

7. Weight - 0.120 kg

8. Material - 38XC, ГОСТ 454 -71

All dimensions in mm

Cb/23

675-35-Cb117 - TRACK

1. Check that the bolt is tightened when the angle between two adjecent track links is 166 ± 2°.

2. Check the tightening torque of bolt ; 40 ± 8 kgfm. Preferably 45 kgfm.

3. The wrap of 85 track links should be rolled with a minimum ID of 560 mm.

4. Ensure that lubricant has been applied on the threads and bolt head contact face.

5. Ensure all the track links are fitted in one direction only.

6. Gap between track shoe and face and clamp should not exceed 0.8 mm.

675-35-Cb118 - TRACK SHOE WITH RUBBERISED PINS

Cb/24

1. Ensure only accepted parts are used for assy.

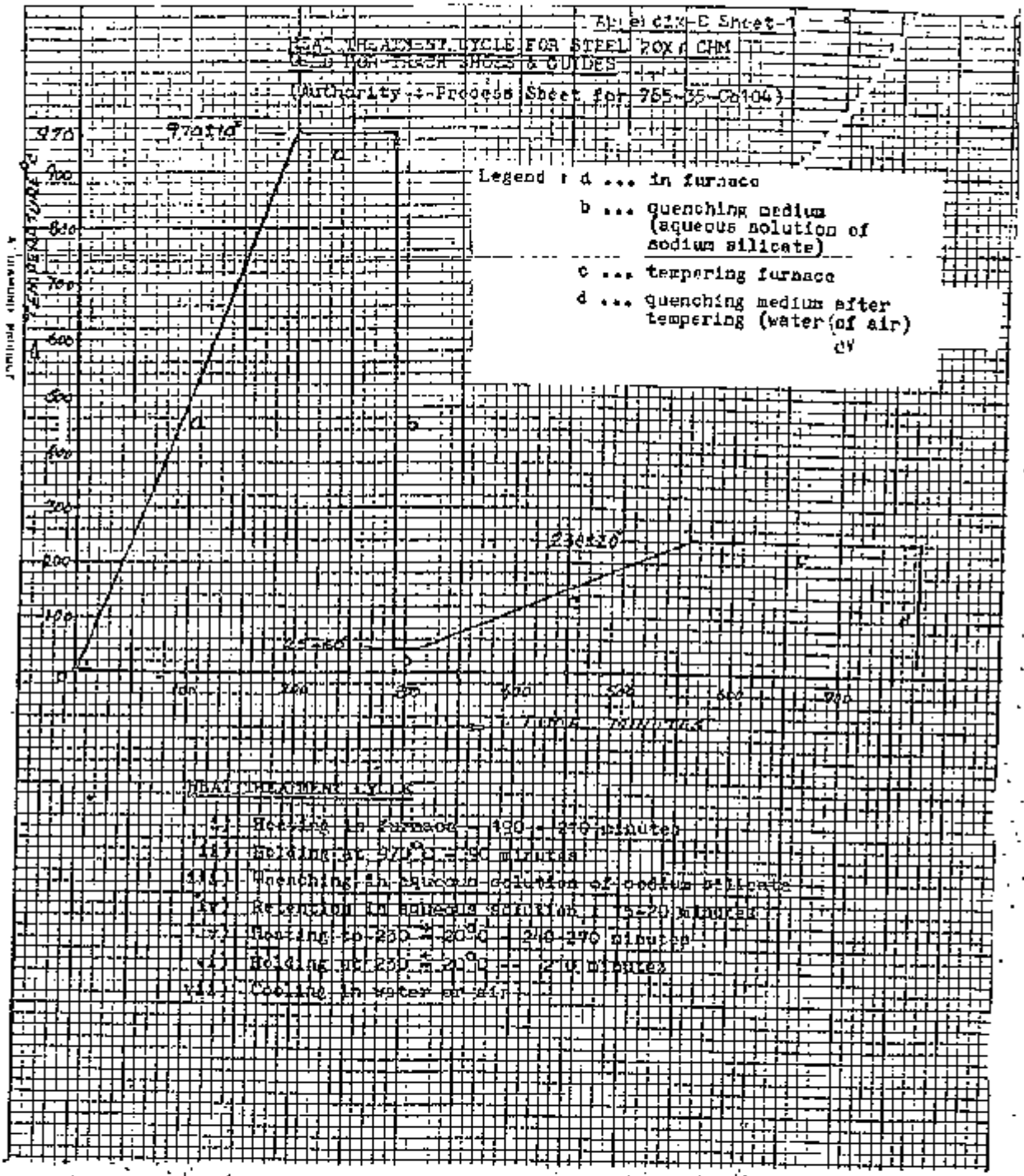
2. Lubricant used during insertion of rubberised pins should consists of 30% castor oil and 70% ethyl alcohol.

3. Difference of size b ie., distance between track shoe end face to track pin end face, should not be more than 2 mm. (measured on both sides of track link).

4. Protrusion of rubber beyond track shoe end face should not exceed 1.5 mm.

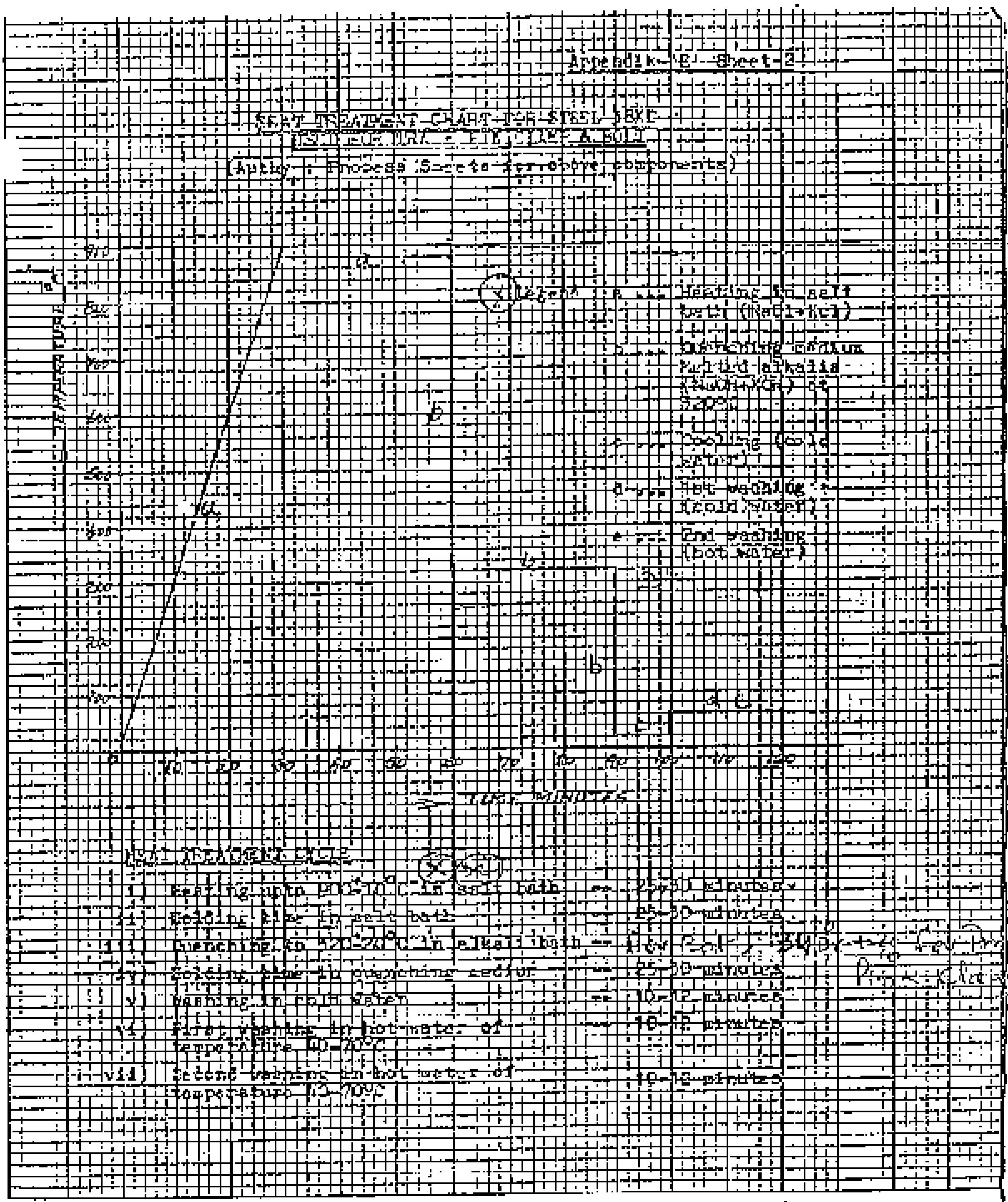
5. Check the angle between radius on the pin with reference to track shoe bore. It should be 96 ± 1.5°.

Appendix-'E' Sheet 1



Pin - 615-35-13
clamp - 615-35-14
Bolt - 615-35-15

Appendix-'E' Sheet 2



Composition of salt bath : 50 ± 10% NaCl and 50 ± 10% KCL

Composition of alkaline bath : 60-70% KOH and 30-40% NaOH

(X) Legend...

(i) Temperature 320°C $^{+20}_{-10}$ for Bolt

(ii) Temperature 340°C $^{+20}_{-10}$ for Track Pin and Clamp.

[illegible] salt bath at a temp 900°C ±10 for 20 to 25 minutes

APPENDIX-'F' Sheet 1

BRIEF ON TESTING PROCEDURE FOR TEMPERATURE BRITTLENESS OF RUBBER AS PER GOST 7912-74

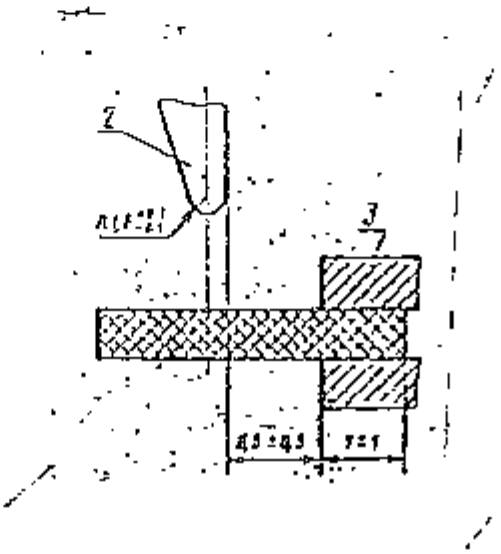
1.	Size of test piece	length	-- 25 ± 1 mm
		width	-- 6.0 ± 0.5 mm
		thickness	-- 2.0 ± 0.2 mm
2.	Number of test pieces to be checked at a time		-- 4 Nos.
3.	Temperature at which the test is to be carried out		-- - 50°C

GENERAL CONDITIONS :

1. The samples are cut in such a way that the direction of their longitudinal axis coincides with the direction of rolling.
2. The test is carried out after 16 hrs but not later than 28 days after vulcanization.
3. Before test, the samples of sheets from which the test pieces are cut are to be conditioned at 23 ± 2°C for atleast 1 hour.
4. Some of the important dimensions of the device used for clamping the test pieces are given in sketch.
5. Coolant temperature in the cryochamber shall be kept well below -50°C. The clamping device shall be kept in the cryochamber at this temperature for atleast 10 minutes before clamping the test pieces.
6. Four test pieces shall be clamped and placed in the cryochamber at -50°C atleast 25 mm below the level of liquid. The test pieces shall be kept in this position for 3 ± 0.5 minutes from the time the temperature -50°C is attained.
7. After the holding time as above is over, the test pieces shall be struck with the striker and the striker pulled back.
8. The clamping device is removed from the chamber, the test pieces unclamped and checked visually.

The sample is considered rejected if defects like splitting of samples into parts, presence of one or more cracks, decomposition or pitting are seen after the test. Samples found free from the above defects shall be bent manually to 90° angle in the same direction in which these were bent in the cryochamber and visually checked for any damage to the samples. In cases of damage to even one sample out of four, the batch of rubber shall be rejected.

Appendix-'F' Sheet 2



Sketch