

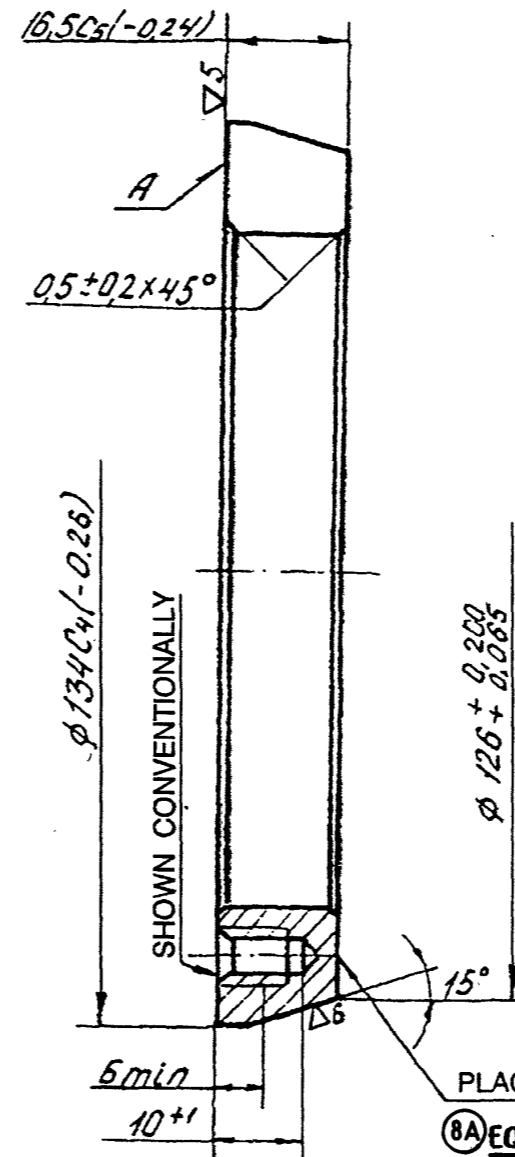
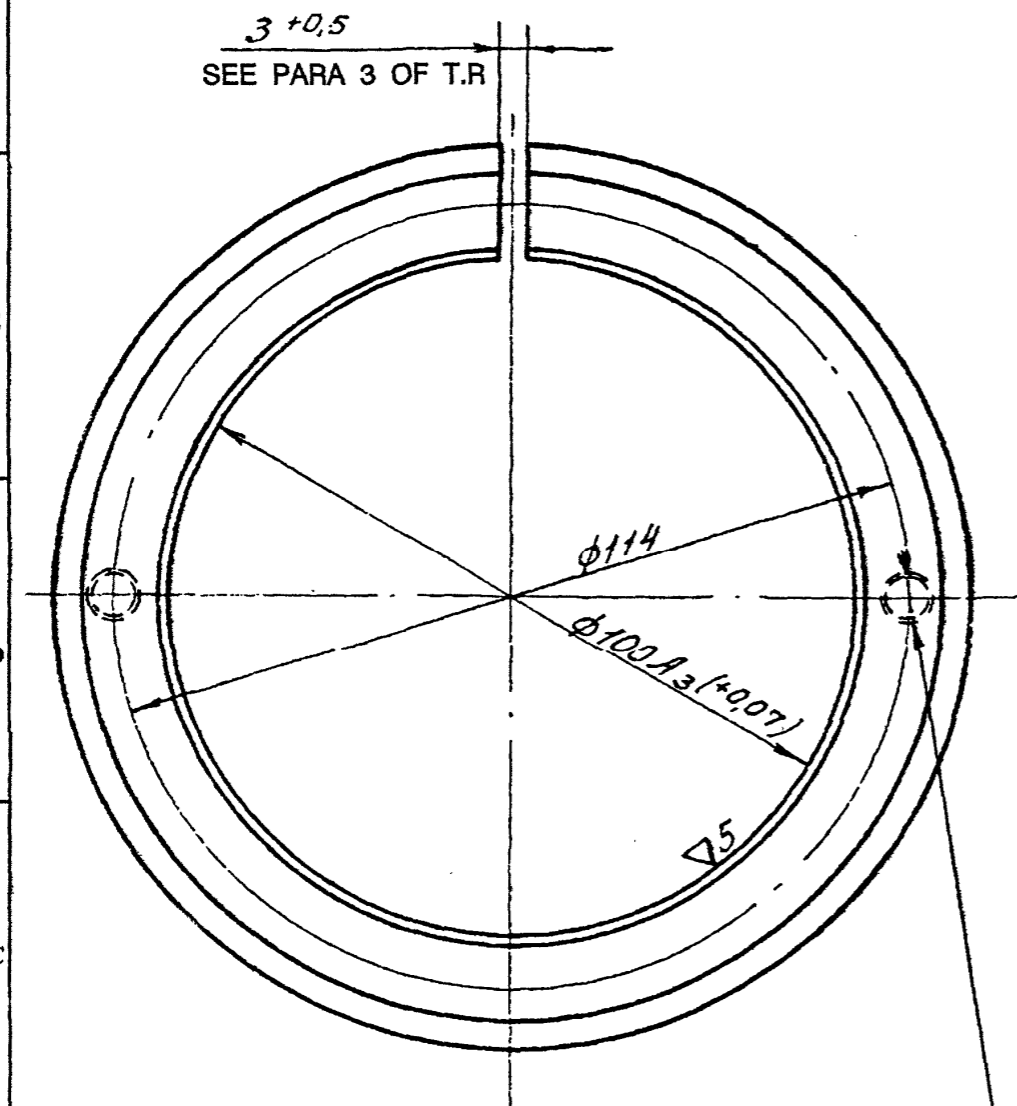
DRAWING NUMBER
172.45.009

SHEET No 1 OF 1

▽3 (▽)

B. Jayavelu, JTO(D)
 25-10-06

"COMMON TO T-90" & BLT
 DRG RE-INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE:-7



1. BEFORE CUTTING, PERMISSIBLE TO CYLINDRICAL SURFACE $\phi 100 A_3$ ARE :
 - a) RUN OUT OF THE CONIC SURFACE OF 0.1 mm MAXIMUM.
 - b) END PLAY OF FACE "A" OF 0.1 mm MAXIMUM.
2. THE COMPONENT SHOULD BE FREE FROM BURRS, DENTS, SCORES AND OTHER SURFACE DEFECTS.
3. THE COMPONENT SHOULD BE CUT AFTER GRINDING, CHAMFER $0.25 \times 45^\circ$ IS TO BE MADE ON SLIT EDGES.
4. SHIFT OF THE CUT RELATIVE TO THE COMPONENT AXIS SHOULD NOT EXCEED 0.5 mm.
5. DIMENSION $3 +0.5$ IS TO BE CHECKED ON THE MANDREL HAVING $\phi 100 C - 0.023$.
6. NON SQUARENESS OF AXIS OF THREADED HOLES M8 IN RELATION TO FACE "A" SHOULD NOT EXCEED 0.3 mm.
7. THREADED HOLES ARE TO BE COUNTERSUNK AT AN ANGLE OF 90° TO 120° UPTO THE MAJOR DIAMETER OF THREAD.
8. CONE IS TO BE CHECKED BY BLUEING IN ACCORDANCE
- ⑧ WITH SPECIFICATIONS 175.45-TY: DRAWING 172.45.051cbCb FOR SPARE PARTS, THE CONE IS TO BE CHECKED BY BLUEING WITH A GAUGE. THE IMPRINT SHOULD COVER ATLEAST 50% OF THE CONE SURFACE.

⑧A EQUIVALENT MATERIAL: CuAl10Fe3Mn2 to IS: 10569-2005 (or) AB1 to IS: 305-81

NOTE: Mechanical Properties of Equivalent Material shall be as per Drawing/OEM Material Specification.

PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION

EST WT (Kg) TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)
0.6

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT SIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE

				DRN	Sd/=
				CHD	Sd/=
				APPD	Sd/=
				DATE	
				SCALE :-	1:1
				DIMENSIONS IN mm	
				TOLERANCE ON DIMNS	UNLESS OTHERWISE STATED IS 2102 69
8A	15.5.23	DC (I) No: CQA(HV)/T-72/C-0022/2023		ALL THREADS TO CONFORM TO IS: 4218 Pt IV	
8		AMDT LIST No 4 OF 1986			
ISSUE	DATE	NATURE OF AMENDMENTS			

MATERIAL :- Bp AЖMU 10-3-1.5 GOST 18175-72	USED ON :- 175.45cbCb- 172.45.051cbCb
CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
TITLE :- CONE FRONT	
D S CAT NUMBER	DRAWING NUMBER 172.45.009

F-86
9
SIZE A3

**RESTRICTED
(DRAFT / PROVISIONAL)
QUALITY ASSURANCE PLAN**

FOR

(CONE FRONT)

DRG.NO.172.45.009

(LF NO: 6206406029)

No: HVF/T-72C/QAP/45/CONE FRONT/241630- 00

ISSUE No: 00

DATE: OCT – 2021

QUALITY ASSURANCE (RIG-SUB ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

CONE FRONT

DRG. NO. 172.45.009

PREPARED BY


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ISSUED BY

QUALITY ASSURANCE (RIG- SUB ASSEMBLY)
HEAVY VEHICLES FACTORY
AVADI CHENNAI – 600 054

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1.IMPORTANT NOTE

Note-1

This is only a provisional and will be amended from time to time according to the requirement. No addition, deletion and reproduction will be done without permission of The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 54.

Note –2

Any instruction contained in this does not prejudice the terms and conditions of the contract what so ever. In case of any contradiction between the contents of this QAP and the clause in the contract, the latter will prevail.

Note-3

The stores should be manufactured strictly only as per the drawings supplied by the Inspection Authority and not as per the samples, if any received by the manufacturer for guidance purpose.

Note-4

Any amendment issued by the Inspection Authority shall be incorporated in the QAP and the records for the amendments carried out should be maintained as per the Performa at Appendix-“A”.

Note-5

In case of any contradiction between the contents of this QAP and drawings issued along with the contract, the latter will prevail.

2.INTRODUCTION

1. This quality plan lays down the inspection and testing procedure to be carried out on the component **CONE FRONT TO DRG.NO 172.45.009** being procured indigenously. This is prepared, based on the acceptance standards and inspection parameters laid down in collaborators documents and on the inspection test standards followed in respect of similar indigenious items.
2. This QAP is the property of Government of India and is liable for amendments as and when required. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054, is the inspecting Authority for this assembly. Any query / clarification on the content of this QAP shall be referred to this Factory. Any departure from these instructions is allowed only after written approval from the above authority. Notwithstanding the tests indicated in this QAP, the inspecting Officer has the right to carry out any test to check conformance to the paper particulars quoted in the Supply Order, which he may consider necessary to satisfy himself about the stores which he has to accept.

3.AIM

The QAP is aimed at standardizing the Inspection procedure and acceptance norm for **CONE FRONT TO DRG.NO: 172.45.009**.

It also aims at giving adequate information to the manufacturer on the quality requirements so that the required quality control methods are established. This is also meant to guide authorized Inspection Officer in his routine inspection and to set out main points to which his attention must be drawn to ensure that the accepted stores meet the stipulated standards.

4. SCOPE:

This QAP outlines in general terms, the checks and methods to be used during inspection of **CONE FRONT TO DRG. NO. 172.45.009** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

For inspection purpose, only the latest issue of this QAP will be made applicable and copies of this QAP can be obtained from the issuing authority i.e. The Sr. General Manager, Heavy Vehicles Factory, Avadi, and Chennai.

Note:

- i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.
- ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.
- iii. In case of S.O, it is the responsible of the vendor to obtained copy of QAP and give the statement of compliance that the vendor will follow QAP. However, GM/HVF reserves the right to revise/update the QAP from time to time.

5. DOCUMENTS:

- a) On placement of firm supply order, One set of relevant specification and technical instructions on the subject item can be obtained by the contractor from AHSP through DDO/HVF
- b) Any clarification required on these documents should be obtained from the Inspecting Authority i.e. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. Equivalentents to the collaborators specifications and standards will be decided only by the Inspecting Authority and should not be unilaterally decided. For any change in the specifications, standards or written approval, any alterations in specification can be affected and not otherwise.
- c) The process instruction sheets supplied by the collaborators are available with the Authority Holding Sealed Particulars, i.e. The Controllerate of Quality Assurance (Heavy Vehicles), Avadi, Chennai for the reference. The relevant process sheets may be studied at the premises of the AHSP after obtaining necessary permission.
- d) The supplier after scrutiny of the concerned process sheets and connected paper particulars should establish the necessary production and inspection facilities. Particularly the inspection test rigs, stands, fixtures, template, gauges etc should

be provided as recommended in these process sheets. If process sheet / Process Book is not available the details particulars/parameters available in the drawings to be strictly adhered.

6. ITEM USED ON:

1. 172.45.051CBCB - DRIVING COUPLING WITH CONES ASSY.

7. LIST OF DRAWINGS:

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	172.45.009	CONE FRONT	-

8. BILL OF MATERIALS: (Individual items as mentioned in table to Para 7)

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	172.45.009	CONE FRONT	Бр АЖМу 10-3-1.5 GOST 18175-72.	1

Note: Vendor/Contractor may use approved alternate material if any specified in drawing/specification. *Also refer Para 13.

9. CONDITIONS OF USE / STORAGE INSTRUCTIONS

This assembly/item should be properly packed to protect from transit / handling damage and influence of atmospheric precipitations. In addition, the following parameters should be ensured:

- (a) The threaded parts if any should be covered with suitable plastic caps to prevent damages.
- (b) If the item consists of assemblies, each assembly should be packed separately.
- (c) The stores are to be suitably covered for preventing ingress of dust and Dirt/entry of sunlight / moisture.
- (d) The packaging slip shall contains
 - (i) Certificate of testing- NABL Certificate.
 - (ii) Guarantee/ Warranty Certificate.
 - (iii) Service and maintenance instructions.
 - (iv) Delivery Slip with Inspector's Acceptance Mark.
- (e) The stores are not permitted to be stored together with oils. Petrol, acids, alkaline and other substances to avoid damage to the metal / rubber components.

10. SAMPLING PLAN :

Sl. No.	Sampling Plan	Pilot *	Bulk
(i)	Visual Inspection	100%	100%
(ii)	Dimensional Inspection	100%	General Inspection level III, single sampling, Normal Inspection, AQL 2.5 of IS 2500 (Part-I)-2000
(iii)	Material Inspection	1 No	1 No. for each batch of raw material or heat treatment lot as required by specifications.
(iv)	Acceptance test	100%	100%
(v)	Pressure testing	-----	-----
(vi)	Machining / Fitment / Performance trial on higher assembly / Tank	02 Nos.	-----
vii)	Interchangeability Test	02 Nos.	02 Nos. per batch on randomly basis, except selective assembly.
viii)	Test stand/Jigs/ Fixtures/Gauges/Man drels/etc.	100 %	100 %
ix)	Marking/Identification	100%	100%
x)	Packing/ Preservation	100%	100%

Note:-

* This clause is applicable if mentioned in supply order or project sanction order.

A New (First time supplier of this item) supplier should obtain clearance from HVF for bulk production which will be issued only after inspection/evaluation of pilot samples by HVF.

11. VISUAL INSPECTION [Sampling plan as per Para- 10 (i)]

The stores are to be visually examined on 100 % of pilot /bulk and same should be free from any defects and all the finishing requirements shall satisfy as indicated in technical conditions of the assembly / component drawing.

The components shall be checked for the following and should be free from the defects:

- Defects in construction
- Cracks/Dents/Scratches
- Fitment of all components
- Presence of foreign particles
- Moisture and dust

- Corrosion of metal parts
- Mechanical imperfections & distortion
- Any form of deterioration of material and finishing.

Packing and preservation should be ensured as per drawings/relevant TY specification (To be ensured on receipt at consignee end).

12. DIMENSIONAL CHECK [Sampling plan as per Para- 10(ii)]

The dimensions of individual component, sub assembly and major assembly shall be checked and ensured as per respective drawing. Dimensional check should be carried out as per sampling plan. However, the inspecting authority/rep. may at his discretion, tighten the inspection level and acceptance quality level on the critical items and adopt check point during manufacture.

12.1 CONE FRONT TO DRG.NO 172.45.009

All dimensions should be confirmed as per drawing.

SI. No.	Drawing Dimensions
1.	$\phi 100A_3^{(+0.07)}$ mm
2.	$3^{+0.5}$ mm
3.	$\phi 114$ mm
4.	M8-7H (2 Holes) (Shift of hole from true position should not exceed 2 mm).
5.	$16.5C_{5(-0.24)}$ mm
6.	$0.5 \pm 0.2 \times 45^\circ$
7.	$\phi 134C_{4(-0.26)}$ mm
8.	$\phi 126 (+0.200 / +0.065)$ mm
9.	6 mm Min
10.	10^{+1} mm
11.	15°
12.	Place for marking (Refer Drawing)
13.	Shown conventionally (Refer Drawing)
14.	Surface finish and roughness of the item should be ensured as per the drawing and specification.

Refer drawing / specification for admissible alternate manufacture in dimensions / material if any specified for the component.

13) MATERIAL CHECKS [SAMPLING PLAN AS PARA – 10 (iii)].

Material specimen / test bars of the components shall be in conformity as per the material mentioned in the relevant documents/drawing. NABL test reports for all the parameters as per relevant specifications to be submitted. Test

samples to be submitted by the vendor to HVF, if required. The material check will be carried out as per sampling plan.* However, if the manufacturer proposes any alternative material at the stage of tender enquiry, the same has to be approved and a written concurrence should be obtained from AHSP through DDO/HVF, before usage of such materials.

13.1 CONE FRONT TO DRG.NO 172.45.009

- a) The component should be manufactured from $\text{Bp AKMu 10-3-1.5 GOST 18175-72}$.
- b) **Chemical properties:** As per $\text{Bp AKMu 10-3-1.5 GOST 18175-72}$ (superseded by GOST 18175-78).

Code of grade	CONTENT OF ELEMENTS %									
	Mass fraction of base component				Mass fraction of admixtures, is not more than					
	Al	Cu	Fe	Mg	Tin	Lead	silicon	P	Zinc	All
Bp AKMu 10-3-1.5	9.0 to 11.0	Remaining	2.0 to 4.0	1.0 to 2.0	0.1	0.03	0.1	0.01	0.5	0.7

Note: For mass fraction of other elements refer GOST 18175-78.

- c) **Mechanical properties:** As per $\text{Bp AKMu 10-3-1.5 GOST 18175-72}$.

For details refer $\text{Bp AKMu 10-3-1.5 GOST 18175-72}$.

14) PERFORMANCES/ACCEPTANCETEST: CONE FRONT TO DRG.NO:172.45.009

1. BEFORE CUTTING, PERMISSIBLE TO CYLINDRICAL SURFACE Ø 100 A_3 ARE :
 - a) RUN OUT OF THE CONIC SURFACE OF 0.1 mm MAXIMUM.
 - b) END PLAY OF FACE "A" OF 0.1 mm MAXIMUM.
2. THE COMPONENT SHOULD BE FREE FROM BURRS, DENTS, SCORES AND OTHER SURFACE DEFECTS.
3. THE COMPONENT SHOULD BE CUT AFTER GRINDING, CHAMFER $0.25 \times 45^\circ$ IS TO BE MADE ON SLIT EDGES.
4. SHIFT OF THE CUT RELATIVE TO THE COMPONENT AXIS SHOULD NOT EXCEED 0.5 mm.
5. DIMENSION $3^{+0.5}$ IS TO BE CHECKED ON THE MANDREL HAVING Ø 100 C - 0.023 .

6. NON SQUARENESS OF AXIS OF THREADED HOLES M8 IN RELATION TO FACE "A" SHOULD NOT EXCEED 0.3 mm.
7. THREADED HOLES ARE TO BE COUNTERSUNK AT AN ANGLE OF 90° TO 120° UPTO THE MAJOR DIAMETER OF THREAD.
8. CONE IS TO BE CHECKED BY BLUEING IN ACCORDANCE WITH SPECIFICATIONS ~~175.45 TY~~ DRAWING 172.45.051cbCb FOR SPARE PARTS, THE CONE IS TO BE CHECKED BY BLUEING WITH A GAUGE. THE IMPRINT SHOULD COVER ATLEAST 50.% OF THE CONE SURFACE.

15) FITMENT AND PERFORMANCE TEST:

- a. Pilot samples should be checked for fitment and Performance test to ascertain the efficacy of the system under different operating conditions by fitting in higher assembly and repeating it for functional checks, wherever required.
- b. Items of Bulk supplies may be subjected to performance trial in tank in case of repeated failure/defects during exploitation.

16) INTERCHANGEABILITY:

The assemblies/component should be interchangeable component wise and assembly wise, except the Component are to be supplied as a set and to be assembled selectively as per sampling plan.

17) CALIBRATION CHECKS

(TEST STANDS/JIGS/FIXTUERS/GAUGES/INSTRUMENTS):

The supplier / Contractor should have suitable Instruments, Test Stand, jigs, fixture, mandrels and gauges to carry out quality checks, to ensure conformance of components/assembly as per drawing and Specification /T.R points.

The supplier / contractor should submit calibration reports for instruments/fixtures/gauges/mandrels etc., which are used during process of inspection activities.

18) MARKING / IDENTIFICATION.

Marking of the items is to be carried out as called for in the relevant drawing, drawing/T.R points.

Inscription if any on the components is to be carried out as called for in the drawing/T.R points. Unless otherwise specified in the drawing/ specification, marking should not be carried out over the components.

For traceability, marking of part No., Manufacturer name, supply order No, Serial No/Qty, batch No. and manufacture date & year are to be carried out. Suitable method can be adopted, provided that the above parameters are legible and considering the parameters mentioned in the drawing and specification.

19) PRESERVATION CHECK

- a) Preservative coatings are to be strictly adhered to as called for in the drawing. However, equivalent BIS Standards can also be followed, subject to the thickness of the coating/preservative is maintained as per the drawing/specification.
- b) Other preservations as necessary to prevent damages due to moisture and dust during process, storage and transit are to be carried out. Conventional Methods can also be resorted to.

20) PACKING CHECK

Components / Assemblies are to be packed separately to avoid damages during transit / handling of the same. Part No. and No. of sets are to be marked on the packing.

Packing and preservation should be ensured as per drawings/relevant TY specification (To be ensured on receipt at consignee end).

Finished products shall be wrapped / packed using black and opaque polyethylene sheet or bags.

21) DOCUMENTATION

- i. Firm has to maintain all the documents as per QAP with respect to the Sl.No.to have traceability.
- ii. Vendor has to submit Bill of materials, Material test reports, Class 'C' /Endurance test reports (wherever specified in drawing/TY specification/QAP) and Complete PIR (pre-inspection report)at the time of offering the item for inspection. HVF will commence inspection only after scrutiny of these documents.
- iii. The testing/inspection responsibility to test all the parameters as per QAP and drawing specifications as mentioned in Annexure -A (enclosed).
- iv. Pre inspection reports (PIR) of firm like, 1. Chemical analysis (NABL Certificate), 2.Mechanical properties (NABL Certificate), 3. Pre-forming process, 4. Coating certification (Wherever applicable), 5. Calibration reports of instruments and 6. 100 % Dimensional inspection reports.

22) REFERENCE:

- a) Drawing No: 172.45.009.
- b) Material specification as per drawing:
Ep AXMu 10-3-1.5 GOST 18175-72.
- c) GOST 18175-72 & GOST 18175-78.

SL. NO.	CATEGORY	ASSEMBLY/ SUB ASSEMBLY	TESTS/ INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	CONE FRONT TO DRG. NO 172.45.009	Pre inspection reports (PIR) of firm	Firm has to produce all the document as per QAP	As per the relevant drawing and QAP.	Confirm to drawing and QAP as per bill of material	P	V	R	100% by firm/ vendor.
2		Bill of material (BOM)	Firm has to prepare the BOM as per QAP	Refer QAP Para no: 8 or item list.	Confirm to QAP	P	V	R	100% by firm/ vendor.
3		Material tests	Chemical composition & Mechanical / Physical Properties	As per- GOST 18175-72 & GOST 18175-78.	All the values to confirm with QAP (Para no:13.1 (a),(b) & (c))	P	W/V	R	SP followed by HVF.
4		Dimensional checks	Dimensions as per the drawing	Refer drawing / QAP Para no: 12.1	Confirm to drawing and QAP	P	W/P	R	100% by firm/ vendor SP followed by HVF.
5		Marking / traceability	Marking / traceability	Refer QAP Para no:18	Confirm to QAP Para no: 18	P	V	R	100% by firm/ vendor.
6		Preservation & packing	Preservation & packing	Refer QAP Para no 19 & 20	Confirm to QAP Para no 19 & 20	P	V	R	100% by firm/ vendor.

Note:

- For conformity of the items (Chemical/Physical/Mechanical properties).
- One sample per heat / batch shall be tested under NABL Lab/Govt. Approved lab by firm. In case of non-compliance to standards entire lot shall be rejected or not to use in production further.
 - For cross conformation of material, manufacturer has to submit test sample pieces for the items used / test slab and button for rubber items / HVF will draw samples from supplied lot for Witnessing (WV) at HVF premises. In case of non-compliance to standards entire lot will be rejected.

P- Perform W- Witness V-Verify R-Review SP-Sampling Plan

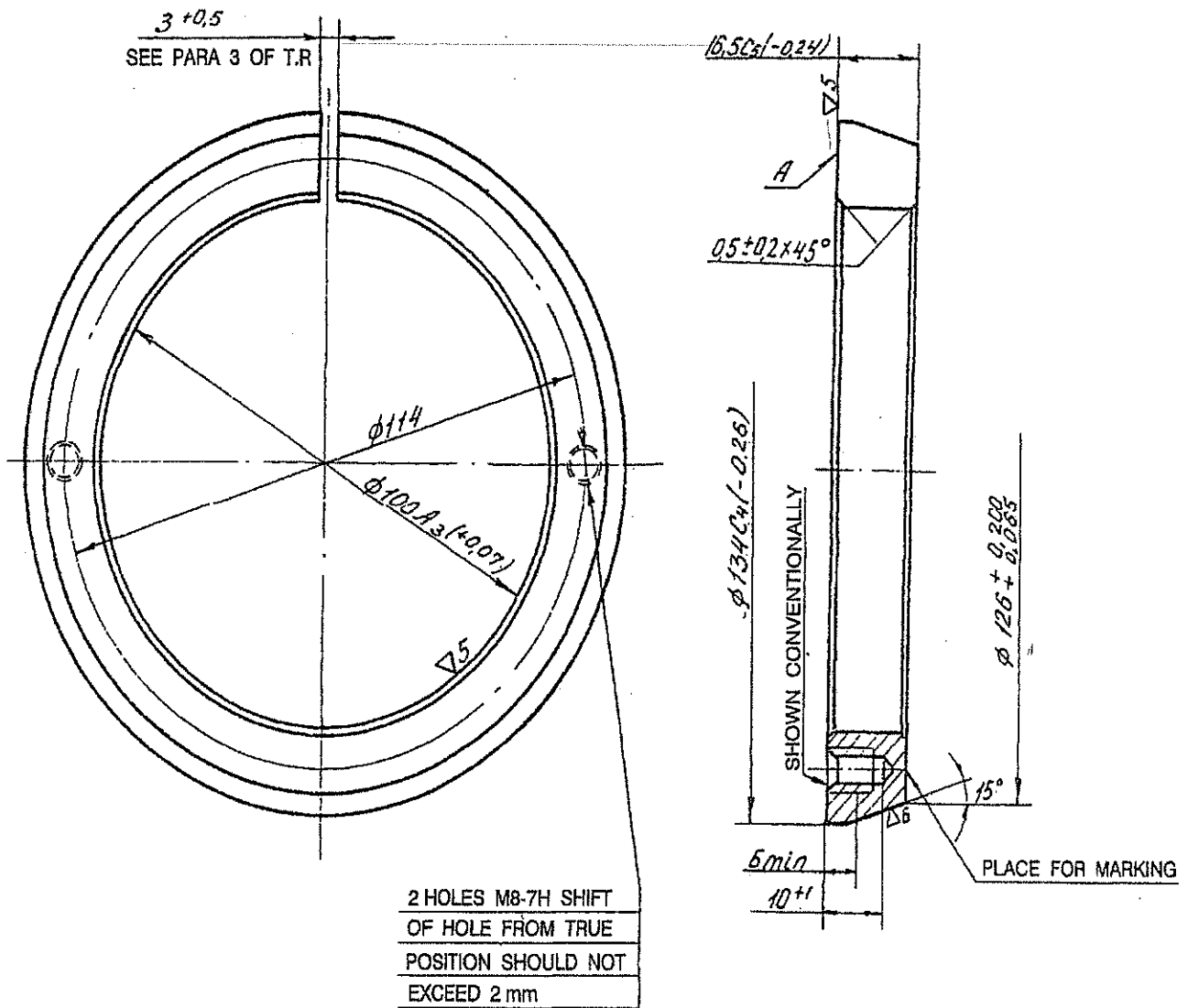


FIG: CONE FRONT TO DRG.NO.172.45.009.

APPENDIX 'A'

RECORD OF AMENDMENTS

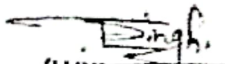
Sl. No	Amendment No. & date	Amended by	Date of Insertion	Initial

TRG V&C

MACHINED COMPONENTS (GROUP -I)

Sl no.	Nomenclature & drawing No.	Manufacturing technology & Testing / Inspection Facilities required to produce the item		Must be possessed by the vendor in his premises (P&M list and testing / inspection equipment list to be submitted)	May be possessed by the vendor in his premises or out sourced (Self declaration to be submitted)	FIRM Compliance (Y/N)	Remarks	
1	Components as per enclosed list of Machined Components (Group I) Total items = 114 Nos	TECHNOLOGY-1	Turning	CNC Turning machine suitable to accommodate components upto dia 100mm diameter with 0.010mm accuracy.				
			Milling & Drilling	HMC/VMC machine suitable to component requirement with 0.010mm accuracy				
			Grinding	Internal/ External /Surface grinding machine as per component requirement upto 0.010mm accuracy				
		TECHNOLOGY-2	Heat Treatment		Carburising, Hardening, Induction Hardening & Tempering furnace with Oil quenching facility suitable to the component;			
			Protection coating		Oxidising, Phosphating, Zinc chromatising, Hard Chromium Plant suitable to the components			
		TECHNOLOGY-3	Raw material		Firm should be capable to arrange the raw material like forging, casting, bar material etc as per drawing specification and standard.			



(D.SATHISH KUMAR)
WM/QA(NF& QMSC)



(LUXMAN SINGH)
WM/TRG-II, HT & EP


(K.DURAIRAJ)
JWM/Trans -II

Sl no.	Nomenclature & drawing No.	Manufacturing technology & Testing / Inspection Facilities required to produce the item		Must be possessed by the vendor in his premises (P&M list and testing / inspection equipment list to be submitted)	May be possessed by the vendor in his premises or out sourced (Self declaration to be submitted)	FIRM Compliance (Y/N)	Remarks
1	Components as per enclosed list of Machined Components (Group I)	TEST / INSPECTION-1	3D CMM	3D CMM 300 x 300 mm			
			Surface Roughness Tester		Surface Roughness Tester for Ra & Rz values		
			Gauges	Standard Gauges for checking Holes and threads suitable to the requirement of the components. Firm should submit the undertaking in this regard that they will create the facilities within 6 months from the date of receipt of order.			
			Measuring Instruments	Vernier Caliper, Groove Vernier, Radius gauge, Feeler Gauge etc. suitable to the requirement of the components			
		TEST / INSPECTION-2	Hardness measurement		Brinell / Rockwell Hardness Tester		

Note : Justification for alternate facilities may be shared to prove that alternate facilities can be utilised to manufacture the item wherever the facilities are mentioned above are not available, but vendor has alternate facilities.


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 GM-OPERATIONS I


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 (ANIMESH PAIK)
 DGM/CA, TRG & RG