

PART No  
**172.25.009-1**

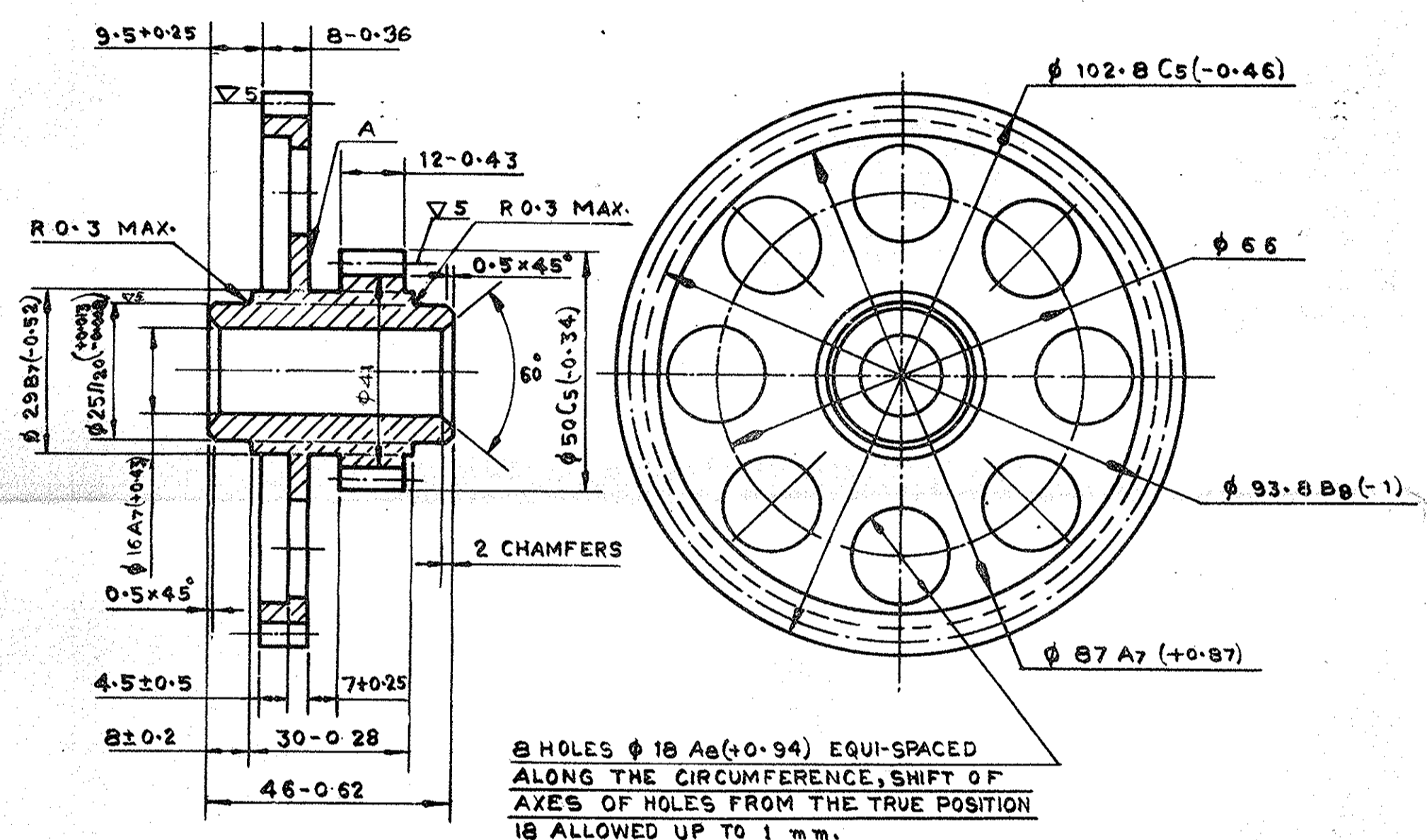
ALT MATL:- STEEL 708 M 40 TO BS: 970 Pt 1: 1983  
COATING:- PHOSPHATING TO JSS-0465-01: 1993,  
CLASS III, FINISH 13(?)

▽ 3 (▽)

बोली गई सही प्रति  
CERTIFIED CORRECT COPY OF  
मुद्रित रेखाचित्र की  
SEALLET DRAWING AS ON

कृते  
FOR CONTROLLER OF QUALITY  
आश्वासन (अ वा आ) आवडि कने  
ASSURANCE (AVA) AVADI CHENNA 54

MODULE	m	2	2
NUMBER OF TEETH	Z	23	50
PROFILE ANGLE	$\alpha$	20°	20°
CO-EFFICIENT OF	ADDENDUM	f'	1.0
	DEDENDUM	f''	1.25
FILLET RADIUS	r <sub>f</sub>	1.0.5	1.0.5
ADDENDUM MODIFICATION COEFFICIENT	$\xi$	0	-0.3
DEGREE OF ACCURACY AS PER GOST 1643-56	-	CM 9 X	CT 9 X
BASE TANGENT LENGTH	L	15.404 - 0.115 - 0.235	39.368 - 0.140 - 0.280
TOLERANCE FOR VARIATION IN BASE TANGENT LENGTH	$\delta_{0L}$	0.240	0.240
TOLERANCE ON	TOTAL COMPOSITE ERROR DOUBLE FLANK	$\delta_{00}$	0.110
	TOOTH-TO-TOOTH COMPOSITE ERROR DOUBLE FLANK	$\delta_{\alpha 0}$	0.026
TOTAL ERROR OF DISTORTION	$\delta_{B0}$	46	100
REFERENCE DIAMETER	A	0.042	0.075



- NOTES:-
- RELATIVE TO CENTRES ALLOWED ARE:-  
(a) RUN OUT OF TOOTHED RIM UP TO 0.1 mm.  
(b) RUN OUT OF SURFACES  $\phi$  25 UP TO 0.07 mm.  
(c) ON SURFACES  $\phi$  25 FOR PASSING OUT OF GRINDING WHEEL, GROOVE UP TO 0.5 mm DEEP AND 2 mm WIDE IS ALLOWED.
  - TO BE HEATED. BHN 302-255 (DIA OF INDENTATION 3.5-3.8) TO BE CHECKED ON BLANK.
  - UNSPECIFIED RADII FROM TOOL UP TO R 1 mm ARE ALLOWED.
  - RELATIVE POSITION OF GEAR TEETH IS OPTIONAL.
  - COATING: OXIDIZING, PHOSPHATING, OIL FINISHED.
  - ON A SECTION OF SURFACE A, BOUNDED BY  $\phi$  29 AND  $\phi$  55, PROJECTION UP TO 0.3 mm IS ALLOWED.

29-3-09	0041-AVA	DS CAT No. ADDED	
22-10-03	18014-W	HINDI NOMEN. ADDED.	
14-2-94	17904-W	ALT MATL & COATING NOTE ADDED.	
4-6-92	17314-W	REF AMDT LIST No. 7, BOOK 172M IN THE MAIN VIEW, THE DIMENSION OF THICKNESS B-C 3E WAS B-0.2	
12-1-89	16722-W	VA RADII DIMNS & NOTES ADDED & DELETED	
14-11-87		RETRACED WITHOUT CHANGE	
DATE	AUTHORITY	ZONE	NATURE
AMENDMENTS			
DRG SEALED:- D C (1) No. 16480-W			
DATE:- 28-10-86 D O CQA (W)			

DRAWN:- CHD:- ASSY DRG:-  
TRACED:- *Baraj* CHD:- *RMS* DATE:-  
C/D MAN D O AHSP FOR CQA (W) ESTD MASS:- 0.38


GROUP No. F121  
40001 KA 16  
CQA(AVA)AVADI  
DESIGN NO  
PART No  
**172.25.009-1**  
DS CAT No  
3020-015413

**CLUSTER GEAR**  
क्लस्टर गियर

**MACHINED COMPONENTS (GROUP -V)**

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 V)  <i>Total items = 39 Nos</i>	TECHNOLOGY-1				
		Turning	CNC Turning machine suitable to accommodate component upto 150 mm diameter with 0.010mm accuracy			
		Milling & Drilling	HMC and/or VMC suitable to the components upto the size 630mm diameter with 0.010 accuracy			
		Gear Hobbing	Gear Hobbing of Mod 8 x cutting $\phi$ 250 with gear cutting accuracy of class of Din 7 or better accuracy			
		Grinding	Internal/ External /Surface grinding machine as per component requirement with 0.010mm accuracy			
		Gear Grinding	Generation and/ or Profile type Gear grinding machine to accommodate Mod 8 x 200mm gear with gear grinding accuracy class of Din 5 or better accuracy			
		Broaching		Broaching as per component requirement		
TECHNOLOGY-2						
		Honing		Honing for Dia 20mm to 100mm with accuracy of 0.002 mm.		
		Heat Treatment		Carburising, Hardening, Induction Hardening & Tempering furnace with Oil quenching facility suitable to the components		
		Protection coating		Oxidising , Phosphating suitable to the components		

  
(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 VI)	TECHNOLOGY-3	Raw material				
		TEST / INSPECTION-1	3D CMM	3D CMM 300 x 300mm			
			Surface Roughness Tester		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.	Surface Roughness Tester for Ra & Rz values	
			Gauges		Vernier Caliper, Groove Vernier, Gear tooth Micrometer, Radius gauge, Feeler Gauge etc. suitable to the requirement of the components		
TEST / INSPECTION-2	Hardness measurement				Roll tester with required master gears Profile projector with 10x magnification 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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(NEERAJ KUMAR)  
QA-RIG(OE)

(ANIMESH PAIK)  
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(K:DURAIRAJ)  
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## MACHINED COMPONENTS (GROUP -V)

Sl No	LF No	Drawing No	Nomenclature
1	6106208025	172.25.008-A	GEAR
2	6106208026	172.25.009-1	CLUSTER GEAR ✓
3	6106208027	172.25.010-1	CLUSTER GEAR
4	6106208028	172.25.011-1	GEAR
5	6106851038	172.25.092	GEAR ✓
6	6101025012	172.25.105	GEAR STEEL 38XC
7	6106209017	172.26.014-1	SHAFT
8	6106209018	172.26.016-1	GEAR ✓
9	6106209011	172.26.020CB	CLUSTER GEAR
10	6106210116	172.27.128	GEAR WHEEL
11	6106211061	172.28.007-1	GEAR
12	6106208046	172.28.009-1	GEAR
13	6106211063	172.28.012-2	CLUSTER GEAR ✓
14	6106211064	172.28.013	GEAR
15	6106211066	172.28.015-1	GEAR
16	6101028039	172.28.015-2	GEAR
17	6106211067	172.28.016-2A	GEAR
18	6106401033	172.40.025	PLANET III TRAIN
19	6106401040	172.40.040-1	SUN GEAR II TRAIN
20	6106401049	172.40.204-2	DELIVERY PUMP GEAR
21	6106401074	172.40.240	GEAR, IDLE
22	6101040039	172.40.305	2ND SUN GEAR
23	6101040045	172.40.312	PLANET PINION Z=15
24	6101040046	172.40.313	PLANET PINION
25	6106404013	172.43.006	PLANET PINION
26	6101043007	172.43.016	PLANET PINION
27	6106407035	172.46.053	GEAR OF DELIVERY PUMP
28	6106407047	172.46.078	GEAR, DRIVE
29	6106407049	172.46.080	GEAR SUCTION PUMP
30	6106407057	172.46.088	GEAR, SUCTION PUMP
31	6106401104	175.40.004	RIGHT HAND GEAR WHEEL
32	6106401105	175.40.005	GEAR L.H.
33	6106401164	175.40.138	PLANET
34	6106401165	175.40.139	PLANET
35	6106401166	175.40.140	PLANET IV TRAIN
36	6101023081	176.23.111	GEAR
37	6101023059	176.23.112	GEAR
38	6106401203	432.40.184-4	LEFT HAND GEAR OF CONTROL LINKAGE
39	6106113089	434.23.127	DRUM, DRIVEN

*[Handwritten Signature]*

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

**FOR**

**(CLUSTER GEAR)**

**DRG.NO. 172.25.009-1**

**(LF NO: 6206208026)**

**No HVF/T-72C/QAP/25/CLUSTER GEAR/243307 - 00**

**ISSUE No: 00**

**DATE: DEC- 2021**

**QUALITY ASSURANCE (RIG-SUB ASSEMBLY)**

**HEAVY VEHICLES FACTORY**

**AVADI CHENNAI – 600 054**

**QUALITY ASSURANCE PLAN (QAP)**

**FOR**


**CLUSTER GEAR**

**DRG. NO. 172.25.009-1**


PREPARED BY

  
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(HANUMANTHA RAO GOLLA)  
JWM/QA (RIG-SA / TA)

APPROVED BY

  
( SUBHAM BNLWAN )  
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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 **CLUSTER GEAR TO DRG.NO 172.25.009-1** 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 indigenous 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 **CLUSTER GEAR TO DRG.NO:172.25.009-1**.



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 **CLUSTER GEAR TO DRG. NO. 172.25.009-1** 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:**

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. Equivalent 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:**

-----

**7. LIST OF DRAWINGS:**

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	172.25.009-1	CLUSTER GEAR	-

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

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	172.25.009-1	CLUSTER GEAR	STEEL 38XC GOST 4543-61	1

**Note:** Vendor / Contractor may use approved alternate material if any specified in drawing/ specification.\* Also refer Para no.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
  - (v) Undertaking letter / certificate of conformance (As applicable).
- (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	01 No.	01 No. per batch/As required.
vii)	Interchangeability Test	02 Nos.	02 Nos. per batch on randomly basis, except selective assembly.
viii)	Test stand/Jigs/ Fixtures/Gauges/Mandrels/etc.	100 %	100 %
ix)	Marking/Identification	100%	100%
x)	Packing/ Preservation	100%	100%

### Note:-

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 CLUSTER GEAR TO DRG.NO 172.25.009-1

1. All dimensions should be confirmed as per drawing.
2. Equi spaced along the circumference, shift of axes of holes from the true position is allowed up to 1 mm (Refer Drawing).
3. Surface finish / Roughness of items should be ensured as per drawing and specification.
4. 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 CLUSTER GEAR TO DRG.NO.172.25.009-1

- a) The component should be manufactured from STEEL 38XC GOST 4543-61.
- b) **Chemical properties:** As per STEEL 38XC GOST 4543-61 & GOST 4543-71.

Grade	CONTENT OF ELEMENTS%							
	C	Si	Mn	Cr	S	P	Cu	Ni
	MAX							
38XC	0.34 to 0.42	1.00 to 1.40	0.30 to 0.60	1.30 to 1.60	0.035	0.035	0.30	0.30

Note: For mass fraction of other elements refer GOST 4543-71.

c) Mechanical properties: As per STEEL 38XC GOST 4543-61 & GOST 4543-71.

Grade	Yield point, (kgf/mm <sup>2</sup> )	Ultimate strength, (Kgf/mm <sup>2</sup> )	Elongation %	Relative reduction of area %	Impact strength (Kgm/cm <sup>2</sup> )
	Not less than				
38XC	75	95	12	50	7

Note: For other properties refer GOST 4543-71

**14) PERFORMANCES / ACCEPTANCE TEST: CLUSTER GEAR TO DRG.NO:172.25.009-1**

1. RELATIVE TO CENTRES ALLOWED ARE:-
  - (a) RUNOUT OF TOOTHED RIM UP TO 0.1 mm.
  - (b) RUNOUT OF SURFACES  $\phi$  25 UP TO 0.07 mm.
  - (c) ON SURFACES  $\phi$  25 FOR PASSING OUT OF GRINDING WHEEL, GROOVE UP TO 0.5 mm DEEP AND 2 mm WIDE IS ALLOWED.
2. TO BE HEATED. BHN 302-255 (DIA OF INDENTATION 3.5-3.8) TO BE CHECKED ON BLANK.
3. UNSPECIFIED RADII FROM TOOL UP TO R 1 mm ARE ALLOWED.
4. RELATIVE POSITION OF GEAR TEETH IS OPTIONAL.
5. COATING: OXIDIZING, PHOSPHATING, OIL FINISHED.
6. ON A SECTION OF SURFACE A, BOUNDED BY  $\phi$  29 AND  $\phi$  55, PROJECTION UP TO 0.3 mm IS ALLOWED.

**GEAR DETAILS:**

MODULE		m	2	2
NUMBER OF TEETH		Z	23	50
BASIC RACK	PROFILE ANGLE		$\alpha$	20°
	CO-EFFICIENT OF	ADDENDUM	f'	1.0
		DEDENDUM	f''	1.25
	FILLET RADIUS		z <sub>i</sub>	1-0.5
ADDENDUM MODIFICATION COEFFICIENT		$\xi$	0	-0.3
DEGREE OF ACCURACY AS PER GOST 1643-56		-	CM9X	CT9X
BASE TANGENT LENGTH		L	15.404 - 0.115 - 0.235	39.368 - 0.149 - 0.280
TOLERANCE FOR VARIATION IN BASE TANGENT LENGTH		$\delta_{0L}$	0.240	0.240
TOLERANCE ON	TOTAL COMPOSITE ERROR DOUBLE FLANK		$\delta_{\Sigma 0}$	0.110
	TOOTH-TO-TOOTH COMPOSITE ERROR DOUBLE FLANK		$\delta_{\Sigma \alpha}$	0.026
TOTAL ERROR OF DISTORTION		$\delta_{B0}$	46	100
REFERENCE DIAMETER		A	0.042	0.075

**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.

**EXPLANATORY NOTE:**

- 1) Stage wise process and inspection of the component as specified in TD Book/ Process Book/ illustration book/specification is to be confirmed by the supplier during manufacturing the components.
- 2) Firm shall submit details of manufacturing process, inspection process and also reports for the same to HVF.
- 3) If required/applicable HVF shall witness/verify stage wise inspection /process details during manufacturing of the components.
- 4) The component may be subject to endurance test, when fitted in higher assembly as specified in process / illustration /TD book.

**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 SI.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. 5. Calibration reports of instruments and 6. 100 % Dimensional inspection reports.

## 22) REFERENCE:

1. Drawing No: 172.25.009-1
2. Material specification as per drawing:  
STEEL 38XC GOST 4543-61.
3. GOST 4543-71 & GOST 4543-61.
4. Alternate material:
  - a) STEEL 708 M40 TO BS: 970 PT 1: 1983.  
(**COATING:** PHOSPHATING TO JSS-0465-01: 1993, CLASS III, FINISH 13(g)).

Sl. NO.	CATEGORY	ASSEMBLY/SU B ASSEMBLY	TESTS/INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	CLUSTER GEAR TO DRG. NO 172.25.009-1	Pre inspection reports (PIR) of firm	Firm has to produced all the document as per Para 21 (iv)	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 4543-71.	All the values to confirm with QAP (Para no: 13.1 (a), (b) & (c))	P	W/V	R	SP followed by HVF.
4		Hardness checks	Hardness BHN 302-255 (Dia of Ind. 3.5-3.8)	Refer QAP Para no: 14(2)	Confirm to QAP Para no: 14(2)	P	V	R	SP followed by HVF.
5		Coating checks	Oxidizing, phosphating, oil finishing.	Refer QAP Para no: 14(5)	Confirm to QAP Para no: 14(5)	P	V	R	SP followed by HVF.
6		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.
7		Marking / traceability	Firm has to make marking / traceability records.	Refer QAP Para no: 18	Confirm to QAP Para no: 18	P	V	R	100% by firm/ vendor.
8		Preservation & packing	Firm has to make Preservation & packing records	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 (W) 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



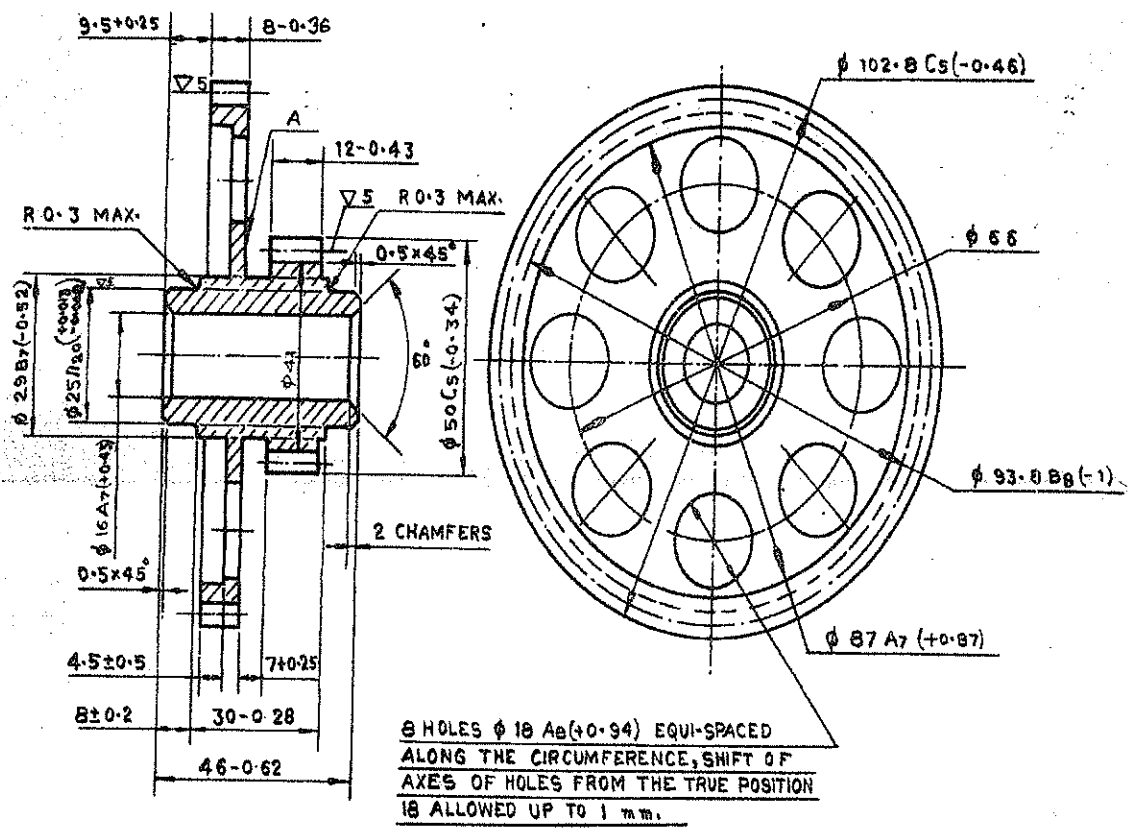


FIG: CLUSTER GEAR TO DRG. NO 172.25.009-1

