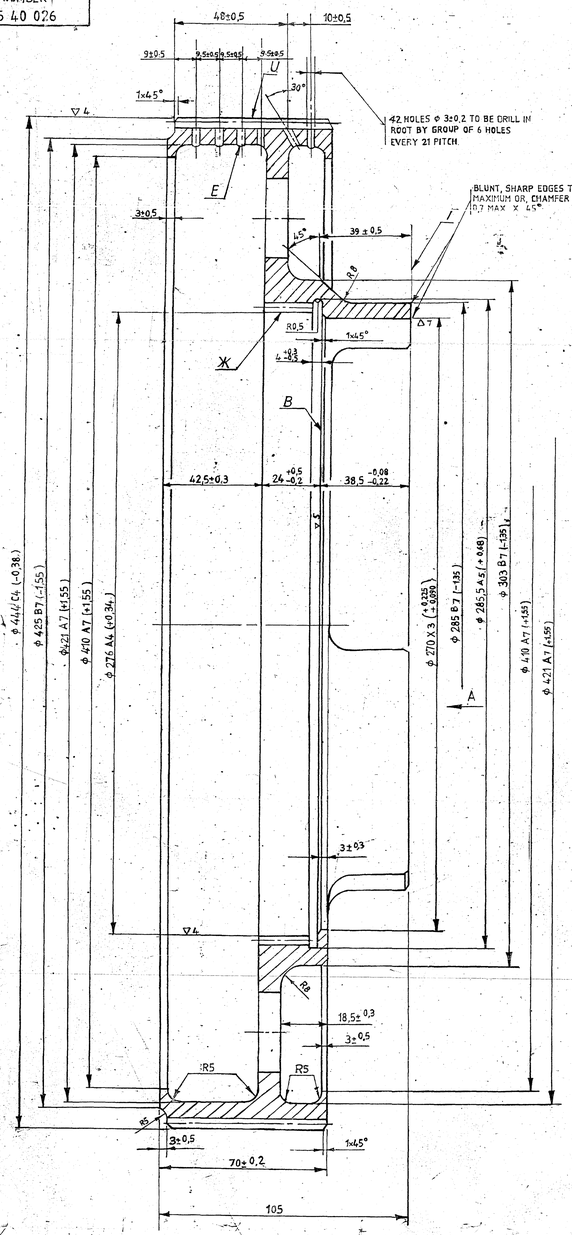
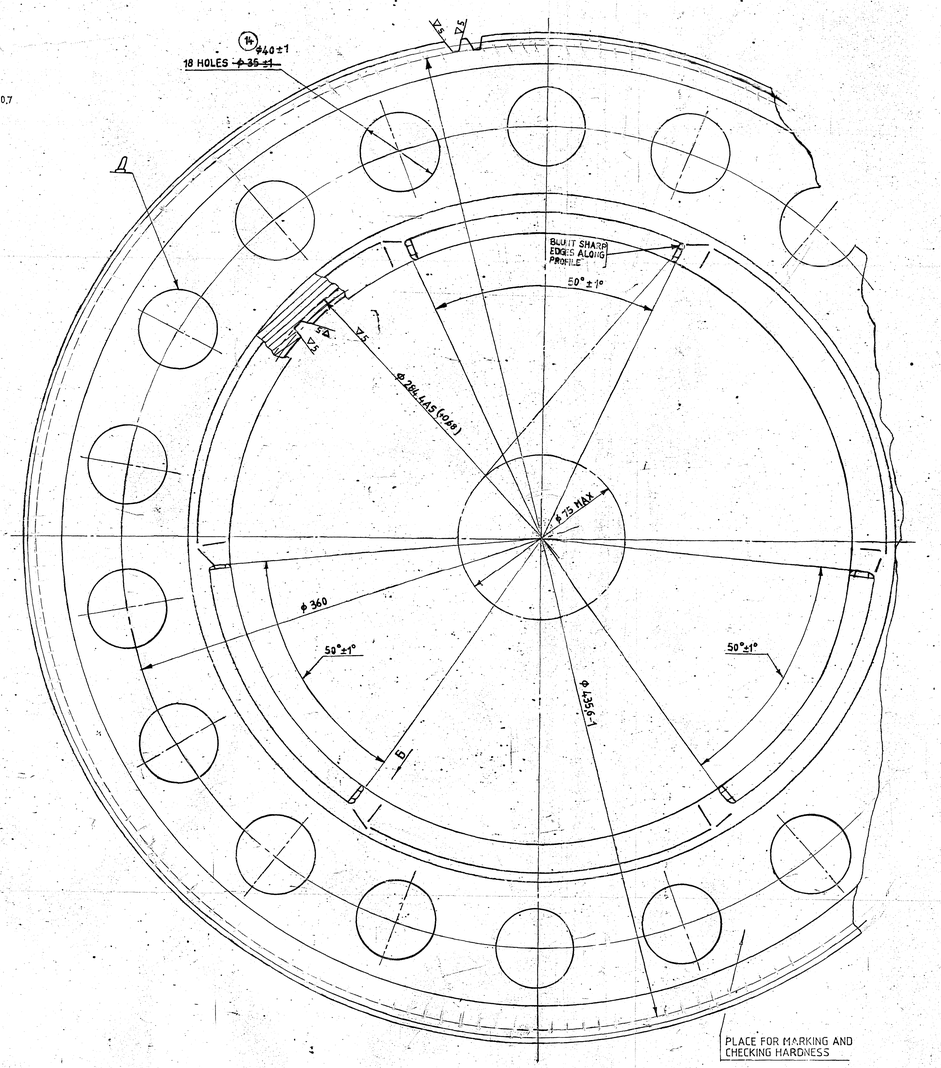
AVNL_27 NOV 2013

DRAWING NUMBER
175 40 026



VIEW - 'A'



EXPLANATORY NOTE :-

13. REFERENCE MATERIAL QUOTED :-
STRUCTURAL CHROMIUM SILICON ALLOY STEEL GOOD QUALITY. GRADE 38XC GOST 4543-71

14. a) CHEMICAL COMPOSITION : AS PER STEEL GRADE 38XC GOST 4543-71

GRADE OF STEEL	CONTENT OF ELEMENTS %					
	C	Si	Mn	Cr	S	P
					MAX	
38XC	0,34-0,42	1,0-1,4	0,30-0,60	1,30-1,60	0,035	0,035

RESIDUAL CONTENT OF COPPER AND NICKEL SHOULD NOT EXCEED 0,30 % EACH.

b) MECHANICAL PROPERTIES : AS PER STEEL GRADE 38 X C GOST 4543-71

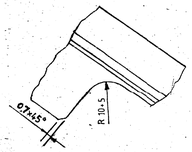
GRADE OF STEEL	TENSILE STRENGTH Kgf/mm²	YIELD POINT Kgf/mm²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kg m/Cm²
	MINIMUM				
38XC	95	75	12	50	7

GEAR RIM	—	Ж	Ц
MODULE	m	3	3
NUMBER OF TEETH	Z	93	147
BASE RACK: PROFILE ANGLE	α	20°	20°
BASE RACK: COEFFICIENT OF ADDENDUM	f'	0,5	0,7
BASE RACK: COEFFICIENT OF DEDENDUM	f''	0,9	0,9
BASE RACK: FILLET RADIUS	r	1+0,3	0,3 MAX OR CHAMFER 0,3×45°
COEFFICIENT OF ADDENDUM MODIFICATION	ξ	0	0
ACCURACY AS PER GOST 1643-56	—	—	—
BASE TANGENT LENGTH	L	96,894 -0,85 -1,10	152.304 -0.6 -0.7
TOLERANCE FOR BASE TANGENT LENGTH	δL	0,1	0,15
COMPOSITE ERROR TOTAL	Δ_{ed}	—	—
DOUBLE FLANK TOOTH TO TOOTH	Δ_{fd}	—	—
TOTAL ERROR OF DISTORTION	δB_0	0,026	—
REFERANCE DIAMETER	d	279	441
DESIGNATION OF DRAWING OF MATING COMPONENT	—	432 40 022-3 / 432 40 008C63	

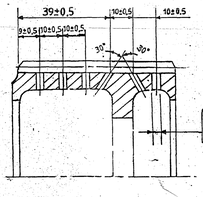
1. TO BE HEAT TREATED. BHN = 341 TO 285 (DIA OF INDENTATION 3,3 TO 3,6)
2. PERMISSIBLE RELATIVE TO CYLINDRICAL SURFACE ϕ 2.70 X 3 AND FACE " Г " ARE,
   a) MAXIMUM PLAY OF TIPS OF TEETH ϕ 444 C4 AND ϕ 276 A4 OF 0,2 mm
   b) MAXIMUM END PLAY OF FACE " B " : 0,15 mm.
   c) MAXIMUM RUN OUT OF OTHER CYLINDRICAL SURFACES 0,3 mm.
3. TEETH Z = 93 ARE TO BE CHECKED FOR INTERCHANGEABILITY BY MEANS OF COMPLEX GAUGE WITH BASE TANGENT LENGTH OF 97,6 ±0,04 AND ALIGNED FOR ϕ 270 X 3, THE TOLERANCE FOR BASE TANGENT LENGTH OF GAUGE IS 0,05 mm
4. CHECKING OF TEETH FOR VARIATION IN DEPTH MAY BE ALTERNATIVE TO CHECKS OF TEETH Z = 147 PERFORMED WITH TOOTH GAUGE, VARIATION IN PTH OF ANY PAIR OF TEETH SHOULD NOT EXCEED 0,3 mm
5. POSITION OF HOLES ϕ 35 RELATIVE TO 3 END FACE GROOVES IS OPTIONAL.
6. MAXIMUM DISPLACEMENT OF AXES OF HOLES " A " FROM THE TRUE POSITION IS 0,5 mm, THE HOLES ARE TO BE EQUALLY SPACED ON CIRCLE,
7. MAXIMUM DISPLACEMENT OF HOLE " E " FROM THE TRUE POSITION IS WITHIN THE LIMITS OF WIDTH OF THE TOOTH SPACE,
   MARKS LEFT BY DRILL ON THE SIDE SURFACE OF TOOTH M = 3 AT A DEPTH OF NOT MORE THAN 1 mm FROM TOOTH ROOT ARE PERMISSIBLE
9. TO BE STATICALLY BALANCED. UNBALANCING WEIGHT SHOULD NOT EXCEED 5 GRAMMES PER R 220 mm, WHILE BALANCING IT IS PERMITTED TO DRILL THROUGH HOLES ϕ 10 mm, MAXIMUN ON THE SURFACE, LIMITED BY DIAMETERS ϕ 375 AND 410, IN THIS CASE, THE WALL THICKNESS BETWEEN THE HOLES FOR BALANCING AND ADJACENT HOLE ϕ 35 SHOULD BE ATLEAST 10 mm.
10. SURFACE FINISH. ∇ 4 IS PERMITTED ON FACE " B " ON DIAMETER MORE THAN ϕ 276.
11. COATING : OXIDO PHOSPHATING.
12. THREE END FACE PROJECTIONS ARE EQUALLY SPACED ALONG CIRCLE, MAXIMUM DISPLACEMENT FROM THE TRUE POSITION IS 1°.

NOTE :-
BEFORE MAKING A TOOTH GAUGE THE RUN OUT OF PITCH CIRCLE OF TEETH Z = 93 MAY BE CHECKED BY USING A ROLLER. IN THIS CASE, THE MAXIMUM RUN OUT OF PITCH CIRCLE AT ROLLER IS 0,15 mm.

VIEW 'Б'



ALTERNATE DRILLING OF 42 HOLES ϕ 3 ± 0.2



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

EST. WT. 14 ~~12.0 Kg~~ 12.525 Kg

TO BE STAMPED OR MARKED WHERE INDICATED THUS ⊕ LETTERS

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTERWISE STATED MACHINED CORNERS TO HAVE R OUTSIDE & INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

ISSUE	DATE	NATURE OF AMENDMENTS
14	18.11.88	Amdt List 6/8 BOOK-7

DRN
CHD
TCD
APPD
DATE 19-11-96
SCALE - 1:1
DIMENSIONS IN mm
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102 - 69
ALL THREADS TO CONFORM TO

MATERIAL :- STEEL 38XC GOST 4543-71

USED ON :- 172 40 023 CB

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI

TITLE : DRUM.

D S CAT NUMBER

DRAWING NUMBER 175 40 026

"COMMON TO BLT" DRG RE-INDIANISED BASED ON ISSUE - 14

E-77 13

RESTRICTED
(DRAFT/PROVISIONAL)
QUALITY ASSURANCE PLAN

FOR

(DRUM)

DRG.NO.175.40.026

(LF NO: 6206401128)

No.HVF/T-72/QAP/40/DRUM/244215-00

ISSUE No: 00 **DATE: DEC-2023**

QUALITY ASSURANCE (RIG–OP)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

DRUM

DRG. NO. 175.40.026

PREPARED BY

(C.NANDA KUMAR)
JWM/QA (RIG-OE&OH)

REVIEWED BY

(AWNEESH YADAV)
JWM/QA (RIG-OP/TA)

APPROVED BY

(NEERAJ KUMAR)
JT.GM/QA (RIG-OP)

ISSUED BY

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

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1. IMPORTANT NOTES

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 Chief 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/specifications/GOST issued along with the contract, the latter only will prevail.

2. INTRODUCTION

1. This quality plan lays down the inspection and testing procedure to be carried out on the component **DRUM TO DRG.NO.175.40.026** 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 Chief 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

This QAP is aimed at standardizing the Inspection procedure and acceptance norm for **DRUM TO DRG.NO:175.40.026.**

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 **DRUM TO DRG.NO.175.40.026** 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 Chief 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 responsibility of the vendor to obtain copy of QAP and give the statement of compliance that the vendor will follow QAP. However, CGM/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 technical documents for manufacturing (includes details about material, casting/forging, welding, machining, heat processes, QAP against relevant items of this assembly, etc. and up to final inspection) the components like GOST/Drawing/Specification, Technical data book, process sheet etc., and technical instructions on the subject item is to be obtained by the contractor from AHSP through DDO/HVF.

b) Any clarification required on these documents to be obtained from the Inspecting Authority i.e. The Chief General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. Equivalents 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:

Brief Technical description on Higher Assembly.

The Drum is used in manufacturing 172.40.023 СБСВ - CARRIER of final Gear Boxes of Tank.

Note: Vendor/Contractor may use approved alternate material, if any specified in

7. LIST OF DRAWINGS:

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	175.40.026	DRUM	-

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

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	175.40.026	DRUM	STEEL 38XC GOST 4543-71	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. (If applicable).

(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
	Acceptance test (as below)		
(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 (including Chemical, Mechanical & Physical properties)	1 No	1 No. or qty as specified in specification, GOST for each batch of raw material or heat treatment lot / As required for confirmation of material.
(iv)	Pressure testing	-----	------
(v)	Machining/Fitment/ Performance trial on higher assembly / Tank	01 No.	01 No. per batch / As required by HVF.
vi)	Interchangeability Test	01 No.	01 No. per batch / As required by HVF.
vii)	Calibration Reports/Certificates of Test stand/Jigs/ Equipment's/Fixtures/ Gauges/Mandrels/etc.	100 %	100 %
viii)	Marking/Identification	100%	100%
ix)	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 including geometrical parameters 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. DRUM TO DRG.NO:175.40.026

1. All dimensions including geometrical parameters shall be confirmed as per drawing/specification
2. Surface finish/Roughness should be confirmed as per drawing and specification by appropriate method of machining/manufacturing.
3. For admissible alternate method for manufacture in dimensions/material if any, refer drawing/GOST/specification.
4. Spline / Gear details dimensions including profile shall be confirmed as per drawing.
5. Place for marking and checking hardness refer drawing.

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 DRUM TO DRG.NO:175.40.026

a) The component should be manufactured from STEEL 38XC TO GOST 4543-71.

b) Chemical properties: As per STEEL GRADE 38XC TO 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 GRADE 38XC TO GOST 4543 –71.

Yield point, N/mm^2 / (kgf/mm^2)	Ultimate strength, N/mm^2 (Kgf/mm^2)	Elongation %	Relative reduction of area %	Impact strength KCU / (Kgm/cm^2)
Not less than				
735 (75)	930 (95)	12	50	69 (7)

Note: For details of other properties & parameters refer GOST 4543-71.

14) PERFORMANCES/ACCEPTANCE TEST/TR POINTS OF DRUM TO DRG.NO: 175.40.026

(The following shall be ensured/followed during manufacturing the components)

1. TO BE HEAT TREATED. BHN = 341 TO 285 (DIA OF INDENTATION 3.3 TO 3.6)
2. PERMISSIBLE RELATIVE TO CYLINDRICAL SURFACE ϕ 270 X 3 AND FACE " Г " ARE,
   a) MAXIMUM PLAY OF TIPS OF TEETH ϕ 444 C4 AND ϕ 276 A4 OF 0,2 mm
   b) MAXIMUM END PLAY OF FACE " B " : 0,15 mm.
   C) MAXIMUM RUN OUT OF OTHER CYLINDRICAL SURFACES 0,3 mm.
3. TEETH Z = 93 ARE TO BE CHECKED FOR INTERCHANGEABILITY BY MEANS OF COMPLEX GAUGE WITH BASE TANGENT LENGTH OF 97.6 ±0,04 AND ALIGNED FOR ϕ 270 X 3. THE TOLERANCE FOR BASE TANGENT LENGTH OF GAUGE IS 0,05 mm
4. CHECKING OF TEETH FOR VARIATION IN DEPTH MAY BE ALTERNATIVE TO CHECKS OF TEETH Z = 147 PERFORMED WITH TOOTH GAUGE, VARIATION IN PTH OF ANY PAIR OF TEETH SHOULD NOT EXCEED 0,3 mm
5. POSITION OF HOLES ϕ 35 RELATIVE TO 3 END FACE GROOVES IS OPTIONAL,
6. MAXIMUM DISPLACEMENT OF AXES OF HOLES " A " FROM THE TRUE POSITION IS 0.5 mm, THE HOLES ARE TO BE EQUALLY SPACED ON CIRCLE,
7. MAXIMUM DISPLACEMENT OF HOLE " E " FROM THE TRUE POSITION IS WITHIN THE LIMITS OF WIDTH OF THE TOOTH SPACE,
   MARKS LEFT BY DRILL ON THE SIDE SURFACE OF TOOTH M = 3 AT A DEPTH OF NOT MORE THAN 1 mm FROM TOOTH ROOT ARE PERMISSIBLE
9. TO BE STATICALLY BALANCED. UNBALANCING WEIGHT SHOULD NOT EXCEED 5 GRAMMES PER R 220 mm, WHILE BALANCING IT IS PERMITTED TO DRILL THROUGH HOLES ϕ 10 mm, MAXIMUM ON THE SURFACE, LIMITED BY DIAMETERS ϕ 375 AND 410, IN THIS CASE, THE WALL THICKNESS BETWEEN THE HOLES FOR BALANCING AND ADJACENT HOLE ϕ 35 SHOULD BE ATLEAST 10 mm.
10. SURFACE FINISH. ∇ 4 IS PERMITTED ON FACE " B " ON DIAMETER MORE THAN ϕ 276,
11. COATING : OXIDO PHOSPHATING,
12. THREE END FACE PROJECTIONS ARE EQUALLY SPACED ALONG CIRCLE, MAXIMUM DISPLACEMENT FROM THE TRUE POSITION IS 1°.

NOTE :-

BEFORE MAKING A TOOTH GAUGE THE RUN OUT OF PITCH CIRCLE OF TEETH Z = 93 MAY BE CHECKED BY USING A ROLLER, IN THIS CASE, THE MAXIMUM RUN OUT OF PITCH CIRCLE AT ROLLER IS 0,15 mm,

GEAR/SPLINE DETAILS

GEAR RIM		—	*	u
MODULE		m	3	3
NUMBER OF TEETH		Z	93	147
BASE RACK	PROFILE ANGLE	α	20°	20°
	COEFFICIENT OF ADDENDUM	f'	0,5	0,7
	COEFFICIENT OF DEDENDUM	f''	0,9	0,9
	FILLET RADIUS	ρ	1 + 0,3	0,3 MAX OR CHAMFER 0,3 × 45°
COEFFICIENT OF ADDENDUM MODIFICATION		ξ	0	0
ACCURACY AS PER GOST 1643-56		—	—	—
BASE TANGENT LENGTH		L	96,898 +0,85 +1,10	152,304 -0,4 -0,7
TOLERANCE FOR BASE TANGENT LENGTH		δ_L	0,1	0,15
COMPOSITE ERROR	TOTAL	Δ_a	—	—
DOUBLE FLANK	TOOTH TO TOOTH	Δ_d	—	—
TOTAL ERROR OF DISTORTION		δB_0	0,026	—
REFERANCE DIAMETER		d	279	441
DESIGNATION OF DRAWING OF MATING COMPONENT		—	432 40 022-3	432 40 088C6 3

Explanatory Note

1. The components and assemblies undergo many manufacturing processes such as Casting, Forging, machining, welding, heat treatment processes painting, coatings, assembling, inspection process and other applicable parameters as indicated in the relevant Documents such as process/TD Books/Drawings/Specifications/GOST related manufacturing this component/Assembly.

2. 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.

3. Firm shall submit details of manufacturing process and inspection details of the components individually/sub-assemblies/assemblies to HVF.

4. If required/applicable HVF shall witness/verify stage wise inspection /process details during manufacturing of the components.

5. The component may be subject to endurance test, when fitted in higher assembly as specified in process / illustration /TD book.

6. Apart from above, all other relevant test for acceptance of the component (i.e. heat treatment process, heat treatment cycles, etc.) as specified in GOST / Specification / drawing / TD book shall be carried out by the firm and the report/ certificates shall be submitted to HVF.

7. Firm has to follow the manufacturing details/parameters for producing the component as specified in the technical data / process book and confirm as per the TD/Process Book. The inspection reports carried out for the same is to be submitted to HVF. HVF will carry out verification for cross confirmation if required.
8. **Forging of component**

During forging of component the instructions of manufacturing should be strictly followed.

a) All billets/blooms should be used for manufacturing forgings should be melt wise. The forgings made should be clearly marked to avoid mix up with those melts from other melts.
b) Copies of all test certificates of chemistry, grain size, inclusion, microstructure and physical properties etc. as obtained from steel suppliers along with the test certificates are to be submitted.
c) The forging should satisfy the required chemical and physical properties, microstructure, grain size, inclusions rating, hardenability, etc.

d) After normalizing or hardening & tempering, as the case may be, the firms are advised in their own interest to check the microstructure and satisfy themselves for its correctness.
e) In case of normalized forgings, it has been observed that sometimes microstructure is having banded structure and difficulties are experienced in machining the components, hence banded structure will not be accepted and firms are advised to ensure proper microstructure free from banding.
f) The forging should be free from any cracks, firm should ensure the same.

15) FITMENT AND PERFORMANCE TEST:

a. Pilot samples should be checked for fitment/machining trials 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. The component should be free from any defects after machining in trial and should be in line with the parameters as specified in the GOST/drawing and Specification.
c. The component should be clean, free from distortion, cracks and other harmful defects.
d. Components will be cleared for bulk supplies only after acceptance of the components in machining trials at HVF.

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, Equipments, 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(Refer Drawing).

19) PRESERVATION CHECK

a) Preservative coatings are to be strictly adhered to as called for in the drawing. However, equivalent BIS/ IS 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 sheet or bags.

21) DOCUMENTATION

1. Firm has to maintain all the documents as per QAP with respect to the Sl.No. Of components to have traceability.

2. 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.

3. The testing/inspection responsibility to test all the parameters as per QAP and drawing specifications as mentioned in Annexure -A (enclosed).

4. Documents to be submitted as Pre inspection reports (PIR) by firm for individual component and for assembly components.

Sl. No	Documents
1	Chemical analysis (NABL)
2	Mechanical properties (NABL)
3	Pre-forming process
4	Coating/Varnish certification (wherever applicable),
5	Calibration reports of instruments and gauges etc.
6	100% Dimensional inspection reports (Including geometrical features, spline and gear profiles.)
7	Pressure test (leakage test) if applicable,
8	Hardness checks reports

9	Radiography test reports of individual components.
10	Crack Testing (Magnetic Particle test) reports
11	Guarantee/ Warranty Certificate.(Final)
12	Service and maintenance instructions (If applicable). (Final)
13	Undertaking letter / Certificate of Conformance (As applicable). (Final)
14	Other relevant reports for acceptance of the item as specified in GOST/ Specification / drawings etc.

22) <u>REFERENCE:</u>

a) Drawing No: 175.40.026
b) Drawing No: 172.40.023 СБСВ - CARRIER.
c) Material specification as per drawing: STEEL 38XC GOST 4543-71.
d) GOST 4543-71.
e) All other relevant Documents(process/TD Books/Drawings/Specifications/GOST related manufacturing this component/Assembly

SL. NO.	CATEGORY	ASSEMBLY/ SUB ASSEMBLY	TESTS/ INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	DRUM TO DRG. NO 175.40.026	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.
2		Pre inspection reports (PIR) of firm	Firm has to produce all the document as per QAP	As per the relevant drawing/specification/TD book/process book and QAP.	Confirm to relevant drawing/specification/TD book/process book and QAP as per bill of material	P	V	R	100% by firm/ vendor.
3		Dimensional checks	Dimensions as per the drawing	Refer drawing / QAP Para no: 12.1	Confirm to drawing and QAP Para no: 12.1	P	W/P	R	100% by firm/ vendor & SP followed by HVF.
4		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/P	R	As per SP of HVF by firm and SP followed by HVF
5		Hardness Checks	Hardness BHN 341 TO 285 (Dia of indentation 3.3 .... 3.6)	Refer QAP Para no: 14(1)	Confirm to QAP Para no: 14(1)	P	W/V/P	R	100% by firm/ vendor & SP followed by HVF.
6		Coating Checks	OXIDO PHOSPHATING	Refer QAP Para no: 14(11)	Confirm to QAP Para no:14(11)	P	W/V/P	R	100% by firm/ vendor & SP followed by HVF.
7		Marking / traceability	Marking / traceability	Refer QAP Para no: 18 & Refer drawing	Confirm to QAP Para no: 18 & Refer drawing	P	V	R	100% by firm/ vendor.
8		Preservation & packing	Preservation & packing	Refer QAP Para no 19 & 20	Confirm to QAP Para no 19 & 20	P	V	R	100% by firm/ vendor.
9		Other relevant test for acceptance of item / Specification / process / TD book.	As per drawing/specification/TD book/ Process Book GOST	Refer drawing/specification TD book/ Process Book GOST	Confirm to drawing/specification/GOST	P	W/V/P	R	As per SP of HVF by firm and SP followed by HVF.

Note:

For conformity of the items (Chemical/Physical/Mechanical properties).

1. 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 and shall not be used in production further.
2. For cross conformation of material, manufacturer has to submit sufficient quantity (as specified in GOST/Specification/supply order) test sample pieces for the items used / test slab and button for rubber items / HVF will draw samples from supplied lot for Witnessing/Verify/Perform(W/V/P) at HVF premises. In case of non-compliance to standards, entire lot will be rejected as per the Terms and Conditions.
3. All other relevant tests as specified in GOST/specification/drawing is to be carried out by firm and to be confirmed.

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

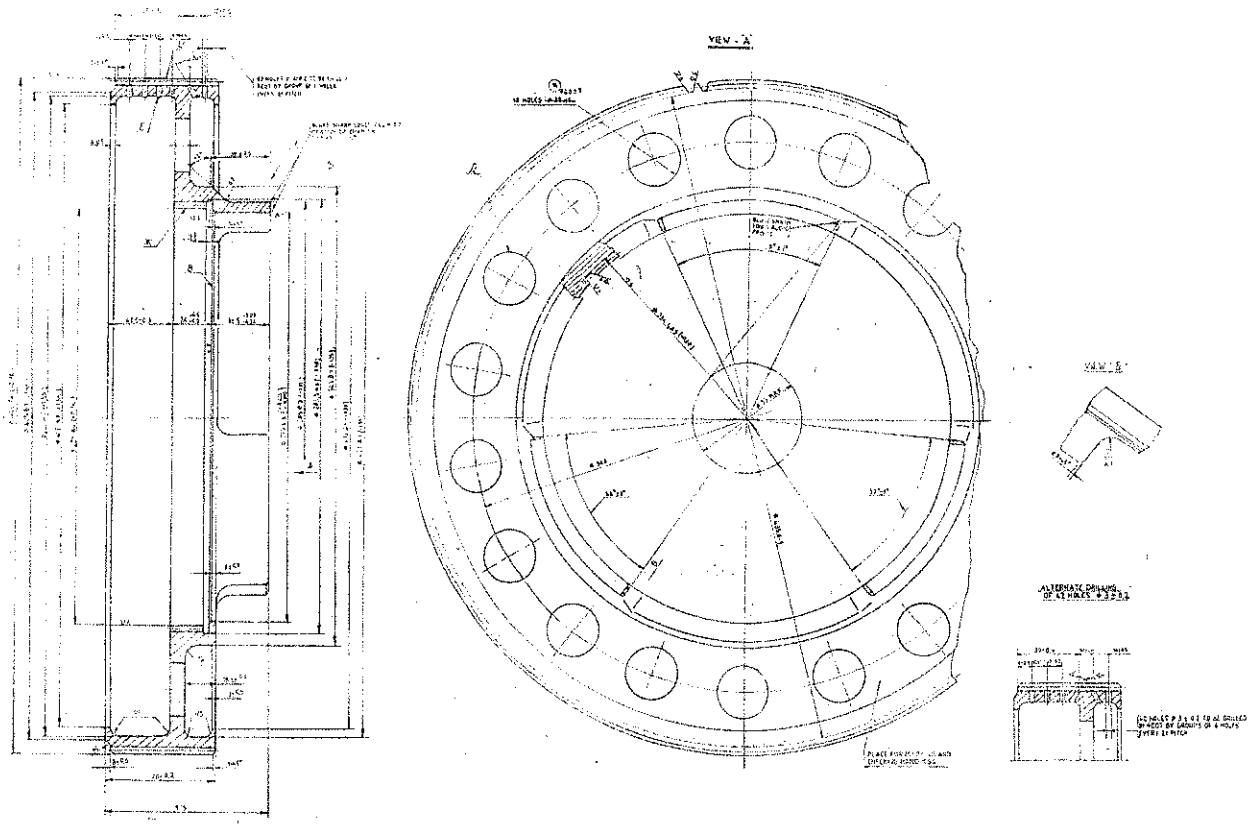

FIG: DRUM TO DRG.NO.175.40.026
(For reference only)

RECORD OF AMENDMENTS

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

MACHINED COMPONENTS (GROUP -IV)

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 possesed by the vendor in his premises or out sourced (Self declaration to be submitted)	FIRM Comp-liance (Y/N)	Remarks
1	Components as per enclosed list of Machined Components (Group IV) Total items = 47 Nos	TECHNOLOGY-I	Turning	CNC Turning dia 600mm suitable to accommodate component of diameter in the range of dia 250 to 600mm with 0.010mm accuracy			
			Milling & Drilling	HMC and/or VMC suitable to the components upto the size 630mm diameterwith 0.010 accuracy			
			Gear Hobbing		Gear Hobbing of Mod 3 x cutting ø400 with gear cutting accuracy of class of Din 7 or better accuracy		
			Gear Shaping		Gear Shaping of Mod 5 with gear cutting accuracy of class of Din 7 or better accuracy.		
		TECHNOLOGY-3	Hardening & Tempering		Hardening & Tempering furnace with Oil quenching facility		
			Protection coating		Oxidising Plant		
		TECHNOLOGY-4	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 possesed by the vendor in his premises or out sourced (Self declaration to be submitted)	FIRM Comp-liance (Y/N)	Remarks
1	Components as per enclosed list of Machined Components (Group IV)	**TEST / INSPECTION-1**	3D CMM	3D CMM 500 x 500mm.			
			Gear Profile Tester		Gear Profile Tester (Max module 5)		
			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	Gear Teeth Micrometer, 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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WM/QA(NF& QMSC)

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WM/TRG-II,HT & EP

(K.DURAIRAJ)
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(J.P.SINGH)
GM-OPERATONS I

Alt to **(NEERAJ KUMAR)**
QA-RIG(OE)

(ANIMESH PAIK)
DGM/CA,TRG & RG