

1. Проверить и механические свойства по режиму Т5 ГОСТ 1583-83
2. Требования к отливке по 172 ТУ.
3. Допуски указаны не более 120 в сторону увеличения тела отливки сверх допусков на размеры.
4. Максимальные предельные отклонения на шероховатость и толщину стенок ± 2 мм.
5. Неиспользованные литейные радиусы 20-15 мм.
6. Работы маркировать по ГОСТ 2171-90 на любой неработки поверхности ударным способом или путем отливки шрифта на менее 10-5 ГОСТ 2930-82. Заполнение шрифта и цифр не более 1 мм, выстояние не более 2 мм.
7. Острые кромки паза Ш в месте выхода отверстия 3 скруглить радиусом не более 2 мм.
8. Работы обозначить инструментом.
9. На поверхности А, Б, В, Г, Д, Е, Ж, З, И, К, Л, М, Н, О, П, Р, С, Т, У, Ф, Ц, Ч, Ш, Щ, Э, Ю, Я, допускается наличие риски от инструмента глубиной не более 0,1 мм.
10. Механические работы после механической обработки не более 1 мм.
11. Глубина сверления резьбовых отверстий не более 16 мм. Резьбой канавки должны обжиматься на глубину не менее 3 мм.
12. Величина перегибов в резьбе до отвертки длиной 5, мм не более 3 мм.
13. На поверхности Б и А, допускается канавка для выхода штифта диаметром по ГОСТ 8820-83.
14. На поверхности С, допускается выступ не более 0,5 мм.
15. Поверхность механически необработанных поверхностей: Грунтостой 14-170. Шлиф Т10-115. Блеска от П-223 белого цвета. Требования по 520 ТУ.
16. Остальные требования по 520 ТУ.

1. Hardness and mechanical property as per mode T5 GOST 1583-83.
2. Requirements of casting as per 172 TUs.
3. Deviations not more than 120 towards increase above the tolerance for dimensions is permitted.
4. Unspecified limit deviation for rough dimensions and thickness of wall ± 2 mm.
5. Unspecified casting radius 20-15 mm.
6. Mark the material as per GOST 2171-90 on any non working surface by punch marking or by casting with letter type not less than 10-5 GOST 2930-82. Filling in of letters and digits should not be more than 1 mm, projection not more than 2 mm.
7. Sharp edges of slot Ш in place of coming out of hole 3 should be rounded off with radius not more than 2 mm.
8. Dimensions to be ensured by tool.
9. On surfaces А, Б, В, Г, Д, Е, Ж, З, И, К, Л, М, Н, О, П, Р, С, Т, У, Ф, Ц, Ч, Ш, Щ, Э, Ю, Я, individual tool marks having depth not more than 0,1 mm is allowed.
10. Unspecified rough after machining should not be more than 1 mm.
11. Fitting depth of threaded holes should not be more than 16 mm. Threaded gauge must be used on depth not more than 3 mm.
12. Size of wells in line up to holes should be not less than 3 mm.
13. On surfaces Б and А groove for exit of grinding wheel as per GOST 8820-83 may be made.
14. On surface С step not exceeding 0,5 mm is allowed.
15. Casting of external unmachined surface: Primer AK-070. White enamel ПФ-115 по ПФ-223 белого цвета. Requirements as per 520 TUs.
16. Other requirements as per 520 TUs.

IND. EQUIV. MATL. - 18: 617-94- DESIGNATION 4423, CHILL CAST, CONDITION 'M'

22-140119-AVA	IND. EQUIV. MATL. ADDED	DATE: 22.02.2008	SCALE: 1:1	QCA(AVA) AVADI
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<p>IND. EQUIV. MATL. - 18: 617-94- DESIGNATION 4423, CHILL CAST, CONDITION 'M'</p> <p>HOUSING</p>				<p>172 28.002-5</p> <p>1015-012738</p>

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

FOR

(UPPER HOUSING)

DRG.NO. 188.25.002

(LF NO: 6201025005)

No.HVF/T-90/QAP/25/UPPER HOUSING/240602-00

ISSUE No: 00

DATE: FEB -2022

QUALITY ASSURANCE (RIG-SUB ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR


UPPER HOUSING

188.25.002


PREPARED BY


(C.NANDAKUMAR)
JWM/QA (RIG-SA)

REVIEWED BY


(V. RAJA)
JWM/QA (RIG-SA/ST&CT)

APPROVED BY


(SUBHAM BIJLWAN)
AWM/QA-RIG-(SA)

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 **UPPER HOUSING TO DRG NO. 188.25.002** 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 **UPPER HOUSING TO DRG NO. 188.25.002**.

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 **UPPER HOUSING TO DRG NO. 188.25.002** 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. 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:

Single (individual) item

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	188.25.002	UPPER HOUSING	-

8. BILL OF MATERIALS:

Single (individual) items, details as below,

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	188.25.002	UPPER HOUSING	Aluminium Alloy AK7u GOST 1583-93	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)
 - (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	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.

During acceptance of castings, the following are to be checked as per Specification: (For details refer Specification 172 TY 6 & GOST 1583-93).

1. Chemical composition of steel;
2. Mechanical properties of steel;
3. External view (absence of defects) and quality welding of casting defects;
4. Dimensions;
5. Hardness;
6. Absence of internal defects;
7. Microstructure/Macrostructure.

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/Flaws/blowholes/shrinkage/porosities
- 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 UPPER HOUSING TO DRG.NO: 188.25.002

1. All dimensions shall be confirmed as per drawing/specification
2. Surface finish/Roughness should be confirmed as per drawing and specification.
3. For admissible alternate method for manufacture in dimensions/material if any, refer drawing/specification.

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. 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.

For each heat code/batch the test bars/test samples as specified in GOST/specification is to be submitted for testing chemical, mechanical, physical properties and other parameters of the casting and also the test certificates for the same tested by the supplier is to be submitted.

13.1 UPPER HOUSING TO 188.25.002.

- a) The component should be manufactured from ALUMINIUM ALLOY AK7;
GOST 1583-93

b) Chemical properties: As per ALUMINIUM ALLOY AK7₄ GOST 1583-93.

CONTENT OF ELEMENTS %									
BASIC ELEMENTS									
Al	Mg	Si	Mn	Cu	Ni	Ti	Be	Zr	OTHER ELEMENTS
BASE	0.2-0.4	6.0-8.0	-	-	-	-	-	-	-

Content of Elements %					
Amixtures not more than					
Mn	Cu	Zn	Sn	Pb	Ni
0.50	0.20	0.30	0.01	0.05	0.15 (Titanium + Zirconium)

Note: For mass fraction of other elements refer GOST 1583-93

c) Mechanical properties: ALUMINIUM ALLOY AK7₄ GOST 1583-93.

The castings should be subjected to heat treatment. The mode of heat treatment for obtaining the given mechanical properties or the removal of internal stresses should be set by the manufacturing plant.

After final heat treatment, the mechanical properties of steel should comply with standards specified in table below

GRADE OF ALLOY	CASTING PROCESS	TYPE OF HEAT TREATMENT	ULTIMATE TENSIL STRENGTH, MPa (kgf/mm ²)	RELATIVE ELONGATION IN %	HARDNESS IN BRINELL HB
AK7 ₄	Refer GOST 1583-93	T5	Refer GOST 1583-93	2.0	60.0

Note: For details of other parameter refer Specification GOST 1583-93.

14) PERFORMANCES/ACCEPTANCE TEST: UPPER HOUSING to Drg. No. 188.25.002.

The technical requirements shall be confirmed for acceptance of the component as specified in Specification and Drawing.

1. Requirements for casting as per 172.TY6.
2. Draft angle not more than 1:20 in sides of increasing dimensions. Unspecified fillet radius 0^{+6} mm.
3. Hardness and mechanical properties as per mode T5 GOST 1583-93.
4. Un-specified limit deviation of dimensions ± 2 mm.
5. Mark the material on any non-machined surface by stamping or by ways of casting as per type П05...П08 GOST 2930-62.
6. Unspecified radius from tool 0^{+2} mm.
7. During the machining of hole M, cutting of cone of drilling tool in wall of slot H is permitted for the depth of 0^{+2} mm.
8. Shift of axis of surface П, P, C relative to surface Y should be not more than 0.1 mm.
9. As per dimensions K and Л with cutting tool at depth 8^{+2} mm from surface E.
10. After machining the surface, it is allowed to dress the minor defects with epoxy based resin compound ЭД – 20 GOST 10587-84.
11. *Dimensions for reference.
12. *Dimensions and surface finish to be ensured by tool.
13. Coating of external surfaces
Primer AK-070
Enamel ПФ-223 dark-grey or ПФ-115 dark-grey 894.
Requirements are as per 520.TY5.
14. Other requirements are as per specification 520.TY1

Note:

The Casting Manufacturers are required to follow the instructions strictly so far as supply of castings (Refer Specification 172 TY 6 & GOST 1583-93)

Explanatory Note

1. Stage wise inspection and process of the component as specified in TD Book / Process Book / illustration book is to be confirmed by the supplier during manufacturing the components.
2. Firm shall submit the inspection process details/reports 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.

15) FITMENT / MACHINING 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 item should possess appropriate material for machining as indicated in the drawing and should be supplied in such a way that the components to suit in machine/fixtures/Jigs etc to carry out machining.
- c. The component should be free from any defects after machining in trial and the casting should be in line with the parameters as specified in the GOST and Specification.
- d. The casting shall be clean, free from porosity blowholes, hard spots, Cold shut, distortion, cracks and other harmful defects as per the specification.
- e. The casting shall be well dressed and fettled and shall be readily machinable.
- f. Casting shall be cleaned / shot blasted and preservation coating is to be done after heat treatment as called for in the specification.
- g. No weld/repair should be carried out without prior permission from HVF.
- h. Testing methods for acceptance of the casting refer Specification 172 TY 6 & GOST 1583-93.

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/FIXTURES/GAUGES/INSTRUMENTS):

The supplier / Contractor should have suitable Instruments, Test Stand, jigs, fixture, mandrels, templates 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/certificates 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 QAP Para No: 14(5)).

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, 2.Mechanical properties, 3. Pre-forming process, 4. Coating certification (wherever applicable), 5. Calibration reports of instruments and 6. 100% Dimensional inspection reports, 7. Pressure test (leakage test) if applicable, 8. Hardness checks, 9. Certificates for Macro/micro structure (wherever applicable), 10. Fracture test (if applicable) and other relevant test reports for acceptance of the Casting, etc.

22) REFERENCE:

- a) Drawing No: 188.25.002.
- b) Material specification as per drawing:
ALUMINIUM ALLOY AK7, GOST 1583-93.
- c) GOST 1583-93.
- d) GOST 10587-84 & GOST 2930-62
- e) Specification: 172 TY 6, 520 TY1 & 520 TY 5.
- f) Alternate Material:
1. IS: 617 -94, Designation 4423, Chill Cast, Condition 'M'.

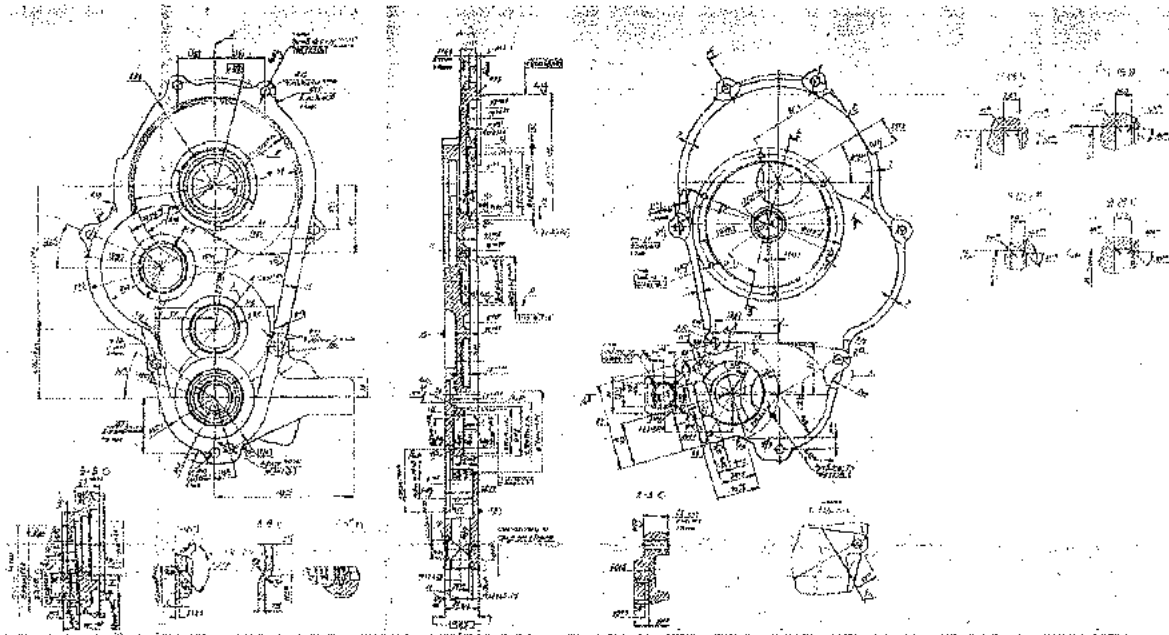
ANNEXURE-A

SL. NO.	CATEGORY	ASSEMBLY/ SUB ASSEMBLY	TESTS/ INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	UPPER HOUSING TO DRG. NO 188.25.002	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 1583-93 & 172 TY 6	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		Machining Trial	Suitability of component for machining	Refer QAP Para no: 10 (vi) & Para 15	Confirm to QAP Para no: 10 (vi) & Para 15	-	P	R	SP followed by HVF
6		Hardness Checks	Hardness	As per Para 13.1 (c) & 14(3)	All the values to confirm with QAP	P	W/V	R	SP followed by HVF.
7		Coating Check	Coating	Refer QAP Para no: 14(13)	Confirm to QAP Para no:14(13)	P	V	R	SP followed by HVF.
8		Marking / traceability	Marking / traceability	Refer QAP Para no: 18 & 14(5)	Confirm to QAP Para no: 18 & 14(5)	P	V	R	100% by firm/ vendor. SP followed by HVF.
9		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).
 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 or not to use 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 (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: UPPER HOUSING TO DRG. NO 188.25.002
(For reference only)**

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

FOR

(LOWER HOUSING)

DRG.NO. 188.25.001

(LF NO: 6201025004)

No.HVF/T-90/QAP/25/LOWER HOUSING/240577-00

ISSUE No: 00

DATE: FEB -2022

QUALITY ASSURANCE (RIG-SUB ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

LOWER HOUSING

188.25.001

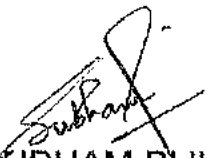
PREPARED BY


(C.NANDAKUMAR)
JWM/QA (RIG-SA)

REVIEWED BY


(V. RAJA)
JWM/QA (RIG-SA/ST&CT)

APPROVED BY


(SUBHAM BIJLWAN)
AWM/QA-RIG-(SA)

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.

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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.

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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.

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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”.

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2. INTRODUCTION

1. This quality plan lays down the inspection and testing procedure to be carried out on the component **LOWER HOUSING TO DRG NO. 188.25.001** 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 **LOWER HOUSING TO DRG NO. 188.25.001**.

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 **LOWER HOUSING TO DRG NO. 188.25.001** 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.
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- 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
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- 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:

Single (individual) item

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	188.25.001	LOWER HOUSING	-

8. BILL OF MATERIALS:

Single (individual) items, details as below,

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	188.25.001	LOWER HOUSING	Aluminium Alloy AK7u GOST 1583-93	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)
 - (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	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.

During acceptance of castings, the following are to be checked as per Specification: (For details refer Specification 172 TY 6 & GOST 1583-93).

1. Chemical composition of steel;
2. Mechanical properties of steel;
3. External view (absence of defects) and quality welding of casting defects;
4. Dimensions;
5. Hardness;
6. Absence of internal defects;
7. Microstructure/Macrostructure.

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/Flaws/blowholes/shrinkage/porosities
- 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 LOWER HOUSING TO DRG.NO: 188.25.001

1. All dimensions shall be confirmed as per drawing/specification
2. Surface finish/Roughness should be confirmed as per drawing and specification.
3. For admissible alternate method for manufacture in dimensions/material if any, refer drawing/specification.

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. 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.

For each heat code/batch the test bars/test samples as specified in GOST/specification is to be submitted for testing chemical, mechanical, physical properties and other parameters of the casting and also the test certificates for the same tested by the supplier is to be submitted.

13.1 LOWER HOUSING TO 188.25.001.

- a) The component should be manufactured from ALUMINIUM ALLOY AK7_u
GOST 1583-93

b) **Chemical properties:** As per ALUMINIUM ALLOY AK7₄ GOST 1583-93.

CONTENT OF ELEMENTS %									
BASIC ELEMENTS									
Al	Mg	Si	Mn	Cu	Ni	Ti	Be	Zr	OTHER ELEMENTS
BASE	0.2-0.4	6.0-8.0	-	-	-	-	-	-	-

Content of Elements %					
Amixtures not more than					
Mn	Cu	Zn	Sn	Pb	Ni
0.50	0.20	0.30	0.01	0.05	0.15 (Titanium + Zirconium)

Note: For mass fraction of other elements refer GOST 1583-93

c) **Mechanical properties:** ALUMINIUM ALLOY AK7₄ GOST 1583-93.

The castings should be subjected to heat treatment. The mode of heat treatment for obtaining the given mechanical properties or the removal of internal stresses should be set by the manufacturing plant.

After final heat treatment, the mechanical properties of steel should comply with standards specified in table below

GRADE OF ALLOY	CASTING PROCESS	TYPE OF HEAT TREATMENT	ULTIMATE TENSILE STRENGTH, MPa (kgf/mm ²)	RELATIVE ELONGATION IN %	HARDNESS IN BRINELL HB
AK7 ₄	Refer GOST 1583-93	T5	Refer GOST 1583-93	2.0	60.0

Note: For details of other parameter refer Specification GOST 1583-93.

14) **PERFORMANCES/ACCEPTANCE TEST: LOWER HOUSING to Drg. No. 188.25.001.**

The technical requirements shall be confirmed for acceptance of the component as specified in Specification and Drawing.

1. Hardness and mechanical properties as per mode T5 according to GOST 1583-93.
2. Accuracy of casting Φ 0-0-9 GOST 26645-85.
3. Requirements for casting as per 172.TY6.
4. Draft angle not more than 1:20 in sides of increasing dimensions. Unspecified fillet radius 0^{+5} mm.
5. Un-specified limit deviation of dimensions ± 2 mm. Unspecified radius from tool 0^{+2} mm.
6. Symmetry tolerance of hole axis P relative to the common symmetry plane of holes K and M should not exceed 0.1mm.
7. On surface K, П grooves are allowed as per GOST 8820-69.
8. As per dimensions H, П, P test with cutting tool at depth 22.5^{+1} mm from surface E.
9. After machining the surface, it is allowed to dress the minor defects with epoxy based resin compound ЭД - 20 GOST 10587-84.
10. *Dimensions for reference.
11. Coating of external surfaces
Primer АК-070 or КФ-030.
Enamel ПФ-223 dark-grey or ПФ-115 dark-grey 894.
Requirements are as per 520.TY5.
12. Mark the material on any non-machined surface by punch marking or by casting as per type П05... П08 GOST 2930-62.
13. Other requirements are as per specification 520.TY1.

Note:

The Casting Manufacturers are required to follow the instructions strictly so far as supply of castings (Refer Specification 172 TY 6 & GOST 1583-93)

Explanatory Note

1. Stage wise inspection and process of the component as specified in TD Book / Process Book / illustration book is to be confirmed by the supplier during manufacturing the components.
2. Firm shall submit the inspection process details/reports 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

15) FITMENT / MACHINING 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 item should possess appropriate material for machining as indicated in the drawing and should be supplied in such a way that the components to suit in machine/fixtures/Jigs etc to carry out machining.
- c. The component should be free from any defects after machining in trial and the casting should be in line with the parameters as specified in the GOST and Specification.
- d. The casting shall be clean, free from porosity blowholes, hard spots, Cold shut, distortion, cracks and other harmful defects as per the specification.
- e. The casting shall be well dressed and fettled and shall be readily machinable.
- f. Casting shall be cleaned / shot blasted and preservation coating is to be done after heat treatment as called for in the specification.
- g. No weld/repair should be carried out without prior permission from HVF.
- h. Testing methods for acceptance of the casting refer Specification 172 TY 6 & GOST 1583-93.

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/FIXTURES/GAUGES/INSTRUMENTS):

The supplier / Contractor should have suitable Instruments, Test Stand, jigs, fixture, mandrels, templates 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/certificates 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 QAP Para No:14(12)).

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, 2.Mechanical properties, 3. Pre-forming process, 4. Coating certification (wherever applicable), 5. Calibration reports of instruments and 6. 100% Dimensional inspection reports. 7. Pressure test (leakage test) if applicable, 8. Hardness checks, 9. Certificates for Macro/micro structure (wherever applicable), 10. Fracture test (if applicable) and other relevant test reports for acceptance of the Casting, etc.

22) REFERENCE:

- a) Drawing No: 188.25.001
- b) Material specification as per drawing:
ALUMINIUM ALLOY AK7, GOST 1583-93.
- c) GOST 1583-93.
- d) GOST 26645-85, GOST 8820-69, GOST 10587-84 & GOST 2930-62
- e) Specification: 172 TY 6, 520 TY1 & 520 TY 5.
- f) Alternate Material:
1. IS:617 -94, Designation 4423, Chill Cast, Condition 'M'.

ANNEXURE-A

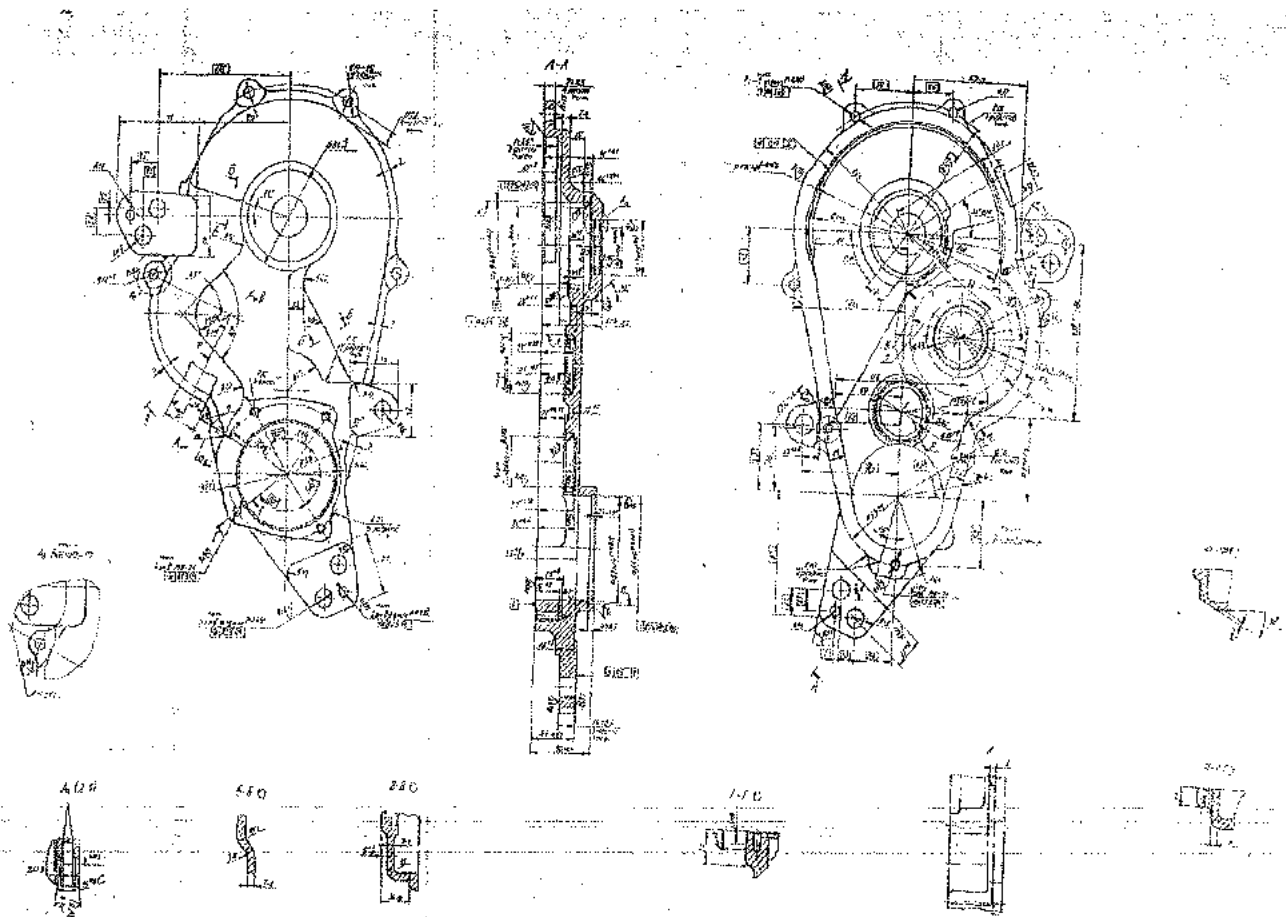
SL. NO.	CATEGORY	ASSEMBLY/ SUB ASSEMBLY	TESTS/ INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGOA	
1	LOWER HOUSING TO DRG. NO 188.25.001	Pre inspection reports (PIR) of firm	Firm has to produce all the document as per QAP	As per 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 1583-93 & 172 TY 6	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		Machining Trial	Suitability of component for machining	Refer QAP Para no.10 (vi) & Para 15	Confirm to QAP Para no.10 (vi) & Para 15	-	P	R	SP followed by HVF
6		Hardness Checks	Hardness	As per Para 13.1 (c) & 14(1)	All the values to confirm with QAP	P	W/V	R	SP followed by HVF.
7		Coating Check	Coating	Refer QAP Para no: 14(11)	Confirm to QAP Para no: 14(11)	P	V	R	SP followed by HVF.
8		Marking / traceability	Marking / traceability	Refer QAP Para no:18 & 14(12)	Confirm to QAP Para no: 14(12)	P	V	R	100% by firm/ vendor. SP followed by HVF.
9		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).

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 or not to use 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 (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: LOWER HOUSING TO DRG. NO 188.25.001
(For reference only)**

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

**FOR
(FLANGE)**

DRG.NO. 172.25.106

(LF NO: 6201025013)

No.HVF/T-90/QAP/25/FLANGE/240575-00

ISSUE No: 00

DATE: FEB – 2022

QUALITY ASSURANCE (RIG-SUB ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

FLANGE

172.25.106

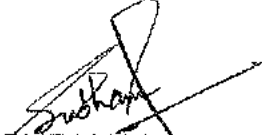
PREPARED BY


(C.NANDAKUMAR)
JWM/QA (RIG-SA)

REVIEWED BY


(V. RAJA)
JWM/QA (RIG-SA/ST&CT)

APPROVED BY


(SUBHAM BIJLWAN)
AWM/QA-RIG-(SA)

ISSUED BY

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

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3. AIM

The QAP is aimed at standardizing the Inspection procedure and acceptance norm for **FLANGE TO DRG NO. 172.25.106**.

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 **FLANGE TO DRG NO. 172.25.106** 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.

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6. ITEM USED ON:

7. LIST OF DRAWINGS:

Single (individual) item

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	172.25.106	FLANGE	-

8. BILL OF MATERIALS:

Single (individual) items, details as below,

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
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Note: Vendor/Contractor may use approved alternate material, if any specified in drawing/specification. * Also refer Para no: 13.

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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:

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(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/Ma ndrels/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.

During acceptance of castings, the following are to be checked as per Specification: (For details refer Specification 172 TY 6 & GOST 1583-93).

1. Chemical composition of steel;
2. Mechanical properties of steel;
3. External view (absence of defects) and quality welding of casting defects;
4. Dimensions;
5. Hardness;
6. Absence of internal defects;
7. Microstructure/Macrostructure.

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/Flaws/blowholes/shrinkage/porosities
- 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 FLANGE TO DRG.NO: 172.25.106

1. All dimensions shall be confirmed as per drawing/specification
2. Surface finish/Roughness should be confirmed as per drawing and specification.
3. For admissible alternate method for manufacture in dimensions/material if any, refer drawing/specification.

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. 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.

For each heat code/batch the test bars/test samples as specified in GOST/specification is to be submitted for testing chemical, mechanical, physical properties and other parameters of the casting and also the test certificates for the same tested by the supplier is to be submitted.

13.1 FLANGE TO 172.25.106.

- a) The component should be manufactured from ALUMINIUM ALLOY AK7_r GOST 1583-93.

b) Chemical properties: As per ALUMINIUM ALLOY AK7₄ GOST 1583-93.

CONTENT OF ELEMENTS %									
BASIC ELEMENTS									
Al	Mg	Si	Mn	Cu	Ni	Ti	Be	Zr	OTHER ELEMENTS
BASE	0.2-0.4	6.0-8.0	-	-	-	-	-	-	-

Content of Elements %					
Amixtures not more than					
Mn	Cu	Zn	Sn	Pb	Ni
0.50	0.20	0.30	0.01	0.05	0.15 (Titanium + Zirconium)

Note: For mass fraction of other elements refer GOST 1583-93

c) Mechanical properties: ALUMINIUM ALLOY AK7₄ GOST 1583-93.

The castings should be subjected to heat treatment. The mode of heat treatment for obtaining the given mechanical properties or the removal of internal stresses should be set by the manufacturing plant.

After final heat treatment, the mechanical properties of steel should comply with standards specified in table below

GRADE OF ALLOY	CASTING PROCESS	TYPE OF HEAT TREATMENT	ULTIMATE TENSILE STRENGTH, MPa (kgf/mm ²)	RELATIVE ELONGATION IN %	HARDNESS IN BRINELL HB
AK7 ₄	Refer GOST 1583-93	T5	Refer GOST 1583-93	2.0	60.0

Note: For details of other parameter refer Specification GOST 1583-93.

14) PERFORMANCES/ACCEPTANCE TEST: FLANGE to Dwg. No. 172.25.106.

The technical requirements shall be confirmed for acceptance of the component as specified in Specification and Drawing.

1. Requirements for casting as per 172.TY6.
2. Heat treatment to be ensured as per mode T5 GOST 1583-93.
3. Draft angle not more than 1:20 in sides of increasing dimensions.
4. After machining, dressing of porous area not more than 3 mm² and minor defects with depth 0.2 mm is allowed using epoxy based resin compound ЭД 20 GOST 10587-84.
5. Dimension and surface finish to be ensured by tool.
6. Other requirements are as per specification 520.TY1.

Note:

The Casting Manufacturers are required to follow the instructions strictly so far as supply of castings (Refer Specification 172 TY 6 & GOST 1583-93)

Explanatory Note

1. Stage wise inspection and process of the component as specified in TD Book / Process Book / illustration book is to be confirmed by the supplier during manufacturing the components.
2. Firm shall submit the inspection process details/reports 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.

15) FITMENT / MACHINING 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 item should possess appropriate material for machining as indicated in the drawing and should be supplied in such a way that the components to suit in machine/fixtures/Jigs etc to carry out machining.
- c. The component should be free from any defects after machining in trial and the casting should be in line with the parameters as specified in the GOST and Specification.
- d. The casting shall be clean, free from porosity blowholes, hard spots, Cold shut, distortion, cracks and other harmful defects as per the specification.
- e. The casting shall be well dressed and fettled and shall be readily machinable.
- f. Casting shall be cleaned / shot blasted and preservation coating is to be done after heat treatment as called for in the specification.
- g. No weld/repair should be carried out without prior permission from HVF.

- h. Testing methods for acceptance of the casting refer Specification 172 TY 6 & GOST 1583-93.

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, templates 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/certificates 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, 2. Mechanical properties, 3. Pre-forming process, 4. Coating certification (wherever applicable), 5. Calibration reports of instruments and 6. 100% Dimensional inspection reports. 7. Pressure test (leakage test) if applicable, 8. Hardness checks, 9. Certificates for Macro/micro structure (wherever applicable), 10. Fracture test (if applicable) and other relevant test reports for acceptance of the Casting, etc.

22) REFERENCE:

- a) Drawing No: 172.25.106
- b) Material specification as per drawing:
ALUMINIUM ALLOY AK7, GOST 1583-93.
- c) GOST 1583-93.
- d) GOST 10587-84.
- e) Specification: 172 TY 6 & 520 TY1.
- f) Alternate Material:
 - 1. IS:617 -94, Designation 4423, Chill Cast, Condition 'M'.

ANNEXURE-A

SL. NO.	CATEGORY	ASSEMBLY/ SUB ASSEMBLY	TESTS/ INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	FLANGE TO DRG. NO 172.25.106	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 1583-93 & 172 TY 6	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		Machining Trial	Suitability of component for machining	Refer QAP Para no.10 (v) & Para 15	Confirm to QAP Para no.10 (v) & Para 15	-	P	R	SP followed by HVF
6		Hardness Checks	Hardness	As per Para 13.1 (c)	All the values to confirm with QAP	P	W/V	R	SP followed by HVF.
7		Marking / traceability	Marking / traceability	Refer QAP Para no:18	Confirm to QAP Para no:18	P	V	R	100% by firm/ vendor. SP followed by HVF.
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.

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 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 (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

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

FOR

(HOUSING, LOWER)

DRG.NO. 172.25.001-1

(LF NO: 6206208022)

No.HVF/T-72/QAP/25/HOUSING, LOWER/240572-00

ISSUE No: 00

DATE: FEB -2022

QUALITY ASSURANCE (RIG-SUB ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR


HOUSING, LOWER

172.25.001-1

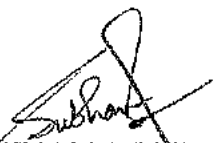
PREPARED BY

REVIEWED BY


(C.NANDAKUMAR)
JWM/QA (RIG-SA)


(V. RAJA)
JWM/QA (RIG-SA/ST&CT)

APPROVED BY


(SUBHAM BIJILWAN)
AWM/QA-RIG-(SA)

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 **HOUSING, LOWER TO DRG NO. 172.25.001-1** 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 **HOUSING, LOWER TO DRG NO. 172.25.001-1**.

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 **HOUSING, LOWER TO DRG NO. 172.25.001-1** 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. 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:

Single (individual) item

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	172.25.001-1	HOUSING, LOWER	-

8. BILL OF MATERIALS:

Single (individual) items, details as below,

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	172.25.001-1	HOUSING, LOWER	ALUMINIUM ALLOY АЛ-9 GOST 2685-63	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)
 - (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	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.

During acceptance of castings, the following are to be checked as per Specification: (For details refer Specification 172 TY 6 & GOST 2685-63).

1. Chemical composition of steel;
2. Mechanical properties of steel;
3. External view (absence of defects) and quality welding of casting defects;
4. Dimensions;
5. Hardness;
6. Absence of internal defects;
7. Macrostructure/Microstructure.

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/Flaws/blowholes/shrinkage/porosities
- 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 HOUSING, LOWER TO DRG.NO: 172.25.001-1

1. All dimensions shall be confirmed as per drawing/specification.
2. Surface finish/Roughness should be confirmed as per drawing and specification.
3. For admissible alternate method for manufacture in dimensions/material if any, refer drawing/specification.

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. 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.

For each heat code/batch the test bars/test samples as specified in GOST/specification is to be submitted for testing chemical, mechanical, physical properties and other parameters of the casting and also the test certificates for the same tested by the supplier is to be submitted.

13.1 HOUSING, LOWER TO 172.25.001-1.

- a) The component should be manufactured from ALUMINIUM ALLOY AJI-9 GOST 2685-63.

b) Chemical properties: As per ALUMINIUM ALLOY АЛ-9 GOST 2685-63.

CONTENT OF ELEMENTS %									
BASIC ELEMENTS									
Al	Mg	Si	Mn	Cu	Ni	Ti	Be	Zr	OTHER ELEMENTS
BASE	0.2-0.4	6.0-8.0	-	-	-	-	-	-	-

Content of Elements %						
Amixtures not more than						
Mn	Cu	Zn	Sn	Pb	Be	Zr
0.50	0.20	0.30	0.01	0.05	0.01	0.15

Note: For mass fraction of other elements refer GOST 2685-75.

c) Mechanical properties: ALUMINIUM ALLOY АЛ9 GOST 2685-75.
For details refer
ALUMINIUM ALLOY АЛ9 GOST 2685-75.

14) PERFORMANCES/ACCEPTANCE TEST: HOUSING, LOWER to Drg. No. 172.25.001-1.

1. EXTERNAL DRAFTS SHOULD NOT EXCEED 1:20 UNSPECIFIED ROUNDING-OFF RADII SHOULD NOT EXCEED 5mm.
2. COMPONENT SHOULD COMPLY WITH THE REQUIREMENTS OF GENERAL SECTION OF IS2, TY. 6
3. HARDNESS AND MECHANICAL PROPERTIES OF ALLOY ACCORDING TO T5 GOST 2685.75.
4. UNSPECIFIED CASTING DIMENSIONS IS TO BE OBTAINED WITH ACCURACY OF ± 2mm.
5. MATERIAL IS TO BE MARKED ON ANY UNMACHINED SURFACE BY FINCHING OR CASTING, TYPE -70-5 70-8 GOST. 2930-62.
6. MUTUAL SHIFT OF AXES OF HOLES $\phi 85$, $\phi 47$ AND $\phi 68$ RELATIVE TO THEIR COMMON AXIS H IS NOT TO EXCEED 0.1mm.
7. THREADED HOLES ARE TO BE COUNTER-SUNK AT AN ANGLE OF 120° UP TO THE MAJOR DIAMETER OF THREAD.
8. UNSPECIFIED RADII FROM TOOL ARE NOT TO EXCEED R 2mm.
9. ON SURFACES $\phi 68$ A20, $\phi 47$ A22 GROOVES ARE ALLOWED ACCORDING TO GOST 8820-69.
10. MAY BE MANUFACTURED AS SHOWN WITH DOTTED LINE.
11. DIFFERENCE IN MEASUREMENTS OF DIMENSION "4" IS NOT TO EXCEED 0.5mm.
12. COATING OF EXTERNAL UNMACHINED SURFACES. PRIMER AKOTO OR K6-030 DARK-GREY ENAMEL П 6-223 OR DARK-6REY ENAMEL П 6 115894. REQUIREMENTS AS PER 520 15.

Note:

The Casting Manufacturers are required to follow the instructions strictly so far as supply of castings (Refer Specification 172 TY 6 & GOST 2685-63)

Explanatory Note

1. Stage wise inspection and process of the component as specified in TD Book / Process Book / illustration book is to be confirmed by the supplier during manufacturing the components.
2. Firm shall submit the inspection process details/reports 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.

15) FITMENT / MACHINING 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 item should possess appropriate material for machining as indicated in the drawing and should be supplied in such a way that the components to suit in machine/fixtures/Jigs etc to carry out machining.
- c. The component should be free from any defects after machining in trial and the casting should be in line with the parameters as specified in the GOST and Specification.
- d. The casting shall be clean, free from porosity blowholes, hard spots, Cold shut, distortion, cracks and other harmful defects as per the specification.
- e. The casting shall be well dressed and fettled and shall be readily machinable.
- f. Casting shall be cleaned / shot blasted and preservation coating is to be done after heat treatment as called for in the specification.
- g. No weld/repair should be carried out without prior permission from HVF.
- h. Testing methods for acceptance of the casting refer Specification 172 TY 6 & GOST 2685-63.

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/FIXTURES/GAUGES/INSTRUMENTS):

The supplier / Contractor should have suitable Instruments, Test Stand, jigs, fixture, mandrels, templates 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/certificates 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 QAP Para No 14 (5)).

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, 2. Mechanical properties, 3. Pre-forming process, 4. Coating certification (wherever applicable), 5. Calibration reports of instruments and 6. 100% Dimensional inspection reports. 7. Pressure test (leakage test) if applicable, 8. Hardness checks, 9. Certificates for Macro/micro structure (wherever applicable), 10. Fracture test (if applicable) and other relevant test reports for acceptance of the Casting, etc.

22) REFERENCE:

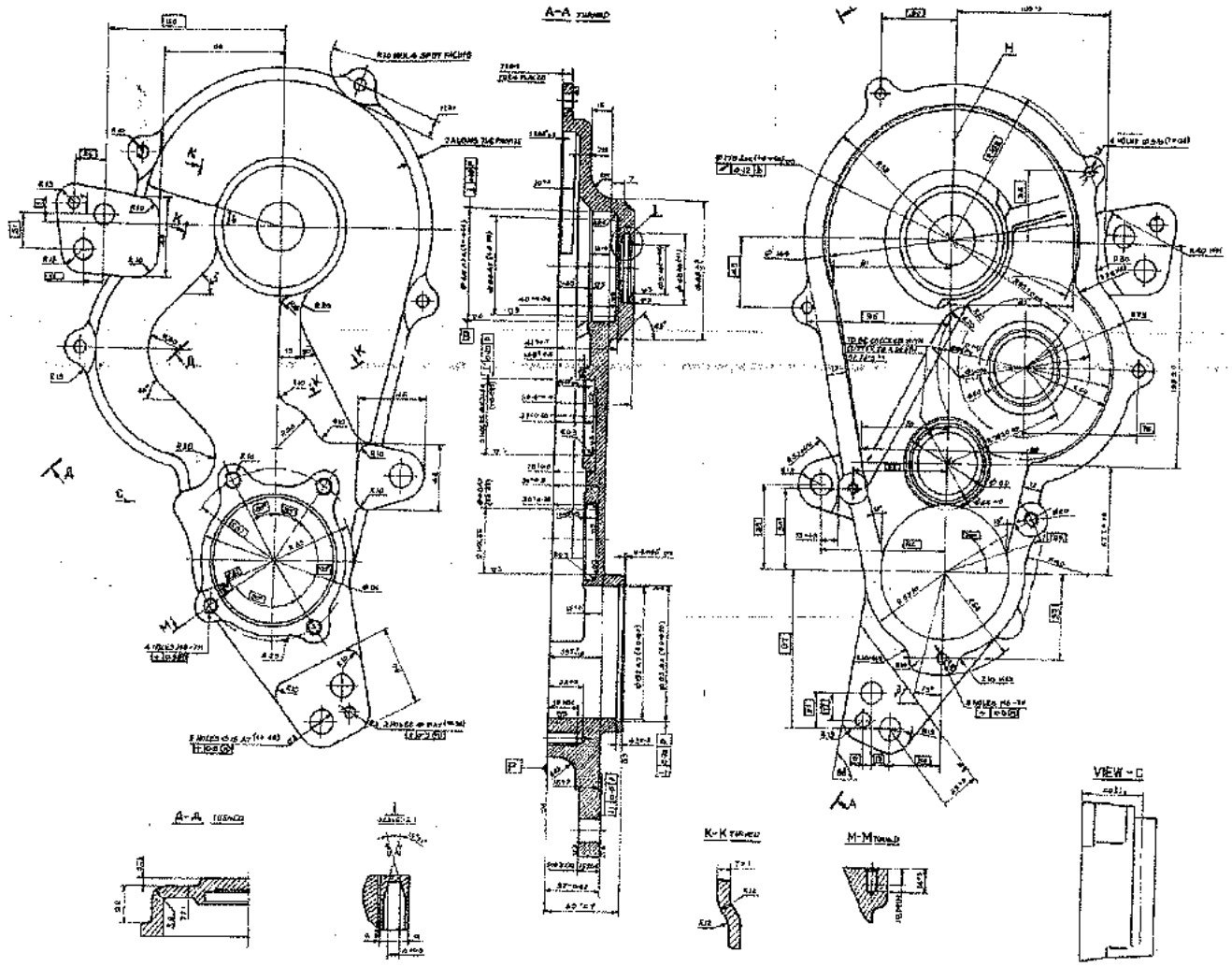
- a) Drawing No: 172.25.001-1
- b) Material specification as per drawing:
ALUMINIUM ALLOY АЛ-9 GOST 2685-63.
- c) GOST 2685-63 & GOST 2685-75 & GOST 8820-69 & GOST 2930-62
- d) Specification 172.TY6 & 520 TY 5.
- e) Alternate Material:
Al CASTING To B5-1490:1970 or LM 25-TB-7

SL. NO.	CATEGORY	ASSEMBLY/ SUB ASSEMBLY	TESTS/ INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	HOUSING, LOWER TO DRG. NO 172.25.001-1	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 2685-63 & GOST 2685-75.	All the values to confirm with QAP (Para no:13.1(a) (b), (c))	P	W/V	R	SP followed by HVF.
4		Hardness check	Hardness	Refer QAP Para no:14(3)	Confirm to QAP Para no:14(3)	P	W/V	R	SP followed by HVF.
5		Coating	Coating	Refer QAP Para no:14(12)	Confirm to QAP Para no:14(12)	P	V	R	SP followed by HVF.
6		Machining Trial	Suitability of component for machining	Refer QAP Para no:10 (v) & Para 15	Confirm to QAP Para no:10 (v) & Para 15	-	P	R	SP followed by HVF.
7		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.
8		Marking / traceability	Marking / traceability	Refer QAP Para no:18 & 14(5)	Confirm to QAP Para no:18 & 14(5)	P	V	R	100% by firm/ vendor. SP followed by HVF.
9		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 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 (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: HOUSING, LOWER TO DRG. NO 172.25.001-1
(For Reference Only)**

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

FOR

(HOUSING)

DRG.NO.172.28.002-5

(LF NO: 6201028038)

No HVF/T-90/QAP/28/HOUSING/244523-00

ISSUE No: 00

DATE: SEP-2022

QUALITY ASSURANCE (RIG-OE)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

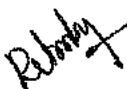
QUALITY ASSURANCE PLAN (QAP)

FOR

HOUSING

DRG. NO. 172.28.002-5

PREPARED BY


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

REVIEWED BY


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

APPROVED BY


(SUBHAM BINLWAN)
AWM/QA-RIG (OE)

ISSUED BY

QUALITY ASSURANCE (RIG- OE)
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 /Specification/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 **HOUSING TO DRG.NO 172.28.002-5** being procured indigenously. This is prepared, covered 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

The QAP is aimed at standardizing the Inspection procedure and acceptance norm for **HOUSING TO DRG.NO:172.28.002-5**.

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 **HOUSING TO DRG.NO.172.28.002-5** 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:

- 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 technical documents for manufacturing (includes details about material, casting/forging, machining, heat processes, 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. 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 Controller ate 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, cover, 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	172.28.002-5	HOUSING	-

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

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	172.28.002-5	HOUSING	ALUMINIUM ALLOY AK74 GOST 1583-93	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
Acceptance Test (As below)			
(i)	Visual Inspection	100%	100%
(ii)	Dimensional Inspection (Including hardness)	100%	General Inspection level III, single sampling, Normal Inspection, AQL 2.5 of IS 2500 (Part-I)-2000
(iii)	Material Inspection (Including mechanical, chemical, fracture test)	1 No	1 No. for each batch of raw material or heat treatment lot /as required by specifications and as required by HVF for confirmation of material.
(iv)	Pressure testing	----	----
(v)	Machining/Fitment/ Performance trial on higher assembly / Tank	01 Nos.	01 Nos. per batch/As required.
(vi)	Interchangeability Test	---	----
(vii)	Calibration Reports/Certificates of Test stand/Jigs/Equipment/ 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. (Refer Specification 172.TY6 and related specification for acceptance test, periodic test and type test of material)

During acceptance of castings, the following are to be checked as per Specification: (For details refer Specification 172.TY6 & GOST 1583-93).

- chemical composition of steel;
- mechanical properties of steel;
- external view (absence of defects) and quality welding of casting defects;

- dimensions;
- hardness;
- absence of internal defects;

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 HOUSING TO DRG.NO:172.28.002-5

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.
3. For admissible alternate method for manufacture in dimensions/material if any, refer drawing/specification.

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 HOUSING TO DRG.NO.172.28.002-5

a) The component should be manufactured from ALUMINIUM ALLOY AK74 GOST 1583-93.

b) **Chemical properties:** As per ALUMINIUM ALLOY AK74 GOST 1583-93

CONTENT OF ELEMENTS %									
BASIC ELEMENTS									
Al	Mg	Si	Mn	Cu	Ni	Ti	Be	Zr	OTHER ELEMENTS
BASE	0.2-0.4	6.0-8.0	-	-	-	-	-	-	-

Content of Elements %					
A mixtures not more than					
Mn	Cu	Zn	Sn	Pb	Ni
0.50	0.20	0.30	0.01	0.05	0.15 (Titanium + Zirconium)

Note: For mass fraction of other elements refer GOST 1583-93

c) **Mechanical properties:** ALUMINIUM ALLOY AK74 GOST 1583-93.

The castings should be subjected to heat treatment. The mode of heat treatment for obtaining the given mechanical properties or the removal of internal stresses should be set by the manufacturing plant.

After final heat treatment, the mechanical properties of steel should comply with standards specified in table below

GRADE OF ALLOY	CASTING PROCESS	TYPE OF HEAT TREATMENT	ULTIMATE TENSIL STRENGTH, MPa (kgf/mm2)	RELATIVE ELONGATION IN %	HARDNESS IN BRINELL HB
AK74	Refer GOST 1583-93	T5	Refer GOST 1583-93	2.0	60.0

Note: For details of other parameter refer Specification GOST 1583-93.

14) PERFORMANCES/ACCEPTANCE TEST: HOUSING TO DRG.NO:172.28.002-5

- 1.Hardness and mechanical property as per mode T5 GOST 1583-93.
- 2.Requirements of casting as per 172.TY6.
- 3.Drafts not more than 1:20 towards increase above the tolerance for dimensions is permitted.
- 4.Unspecified limit deviation for rough dimensions and thickness of wall ± 2 mm.
- 5.Unspecified casting radius 20^{+10} mm.
- 6.Mark the material as per GOST 2171-90 on any non working surface by punch marking or by casting with letter type not less than $\Pi 0$ -05 GOST 2930-62. Falling in of letters and digits should not be more than 1 mm, projection not more than 2 mm.
- 7.Sharp edges of slot \mathcal{W} in place of coming out of hole \mathcal{J} should be rounded off with radius not more than 2 mm.
- 8.*Dimensions to be ensured by tool.
- 9.On surfaces \mathcal{D} , \mathcal{R} , A_f , B_f , B_f individual tool marks having depth not more than 0.1 mm is allowed.
- 10.Unspecified radii after machining should not be more than 1 mm.
- 11.Drilling depth of threaded holes should not be more than 18 mm. Threaded gauge must be screwed on depth not more than 3 mm.
- 12.Size of webs in fins up to holes should be not less than 3 mm.
- 13.On surfaces B_f and A_f groove for exit of grinding wheel as per GOST 8820-69 may be made.
- 14.On surface C step not exceeding 0.5 mm is allowed.
- 15.Coating of external unmachined surfaces:
Primer AK-070
White enamel $\Pi\Phi$ -115 or $\Pi\Phi$ -223 white 02.
Requirements as per 520.TY5.
- 16.Other requirements as per 520.TY1.

Explanatory Note

1. Stage wise inspection and process of the component as specified in TD Book / Process Book / illustration book is to be confirmed by the supplier during manufacturing the components.
2. Firm shall submit the inspection process details/reports 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.
5. Apart from above, all other relevant test for acceptance,(i.e heat treatment process, heat treatment cycles, Type test, Periodic test & etc.) of the item as specified in GOST / Specification / drawing / TD book shall be carried out by the firm and the report/ certificates shall be submitted to HVF.
6. 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.

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 item should possess appropriate material for machining as indicated in the drawing and should be supplied in such a way that the components to suit in machine/fixtures/Jigs etc to carry out machining.
- c. The component should be free from any defects after machining in trial and the casting should be in line with the parameters as specified in the GOST and Specification.
- d. The casting shall be clean, free from porosity blowholes, hard spots, Cold shut, distortion, cracks and other harmful defects as per the specification.
- e. The casting shall be well dressed and fettled and shall be readily machinable.
- f. Casting shall be cleaned / shot blasted and preservation coating is to be done after heat treatment as called for in the specification.
- g. No weld/repair should be carried out without prior permission from HVF.
- h. Testing methods for acceptance of the casting refer Specification 172 TY6 /GOST 1583-93.
- i. 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.

17) CALIBRATION CHECKS

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

The supplier / Contractor should have suitable equipment, 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 QAP Para no: 14(6))

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, 2.Mechanical properties, 3. Pre-forming process, 4. Coating certification (wherever applicable), 5. Calibration reports of instruments and 6. 100% Dimensional inspection reports7. Pressure test (leakage test) if applicable, 8. Hardness checks, 9. Certificates for Macro/Micro structure (wherever applicable), 10. Fracture test and other relevant test reports for acceptance of the Casting, etc. are to be submitted.

22) REFERENCE:

- a) Drawing No: 172.28.002-5
- b) Material specification as per drawing: ALUMINIUM ALLOY AK74 GOST 1583-93.
- c) GOST 1583-93, GOST 2171-90, GOST 2930-62 & GOST 8820-69.
- d) Specification: 172 TY 6, 520 TY5 & 520 TY 1.

Sl. NO.	CATEGORY	ASSEMBLY/SUB ASSEMBLY	TESTS/INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	HOUSING TO DRG. NO 172.28.002-5	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		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 1583-93.	All the values to confirm with QAP (Para no:13.1 (a), (b), (c))	P	W/V	R	100% by firm/ vendor SP followed by HVF.
5		Hardness checks	Hardness	Refer QAP Para no: 14(1)	Confirm to QAP Para no: 14(1)	P	W/V	R	100% by firm/ vendor SP followed by HVF.
6		Coating checks	coating	Refer QAP Para no: 14 (15)	Confirm to QAP Para no: 14 (15)	P	W/P	R	100% by firm/ vendor SP followed by HVF.
7		Machining Trial	Suitability of component for machining	Refer QAP Para no: 10 (v) & Para 15	Confirm to QAP Para no: 10 (v) & Para 15	-	P	R	100% by firm/ vendor SP followed by HVF.
8		Marking / traceability	Firm has to make marking / traceability records.	Refer QAP Para no: 18 & 14 (6)	Confirm to QAP Para no: 18 & 14(6)	P	V	R	100% by firm/ vendor.
9		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.
10		Other testing Parameters for acceptance	As per specification	Refer drawing/specification /GOST	Confirm to drawing/specification /GOST	P	W/V	R	100% by firm/ vendor. SP followed by HVF

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.
- For approval/acceptance of the casting all tests as per Specification 172 TY10 is to be carried out and confirmed.

P. Perform

W. Witness

V. Verify

R. Review

SP-Sampling Plan

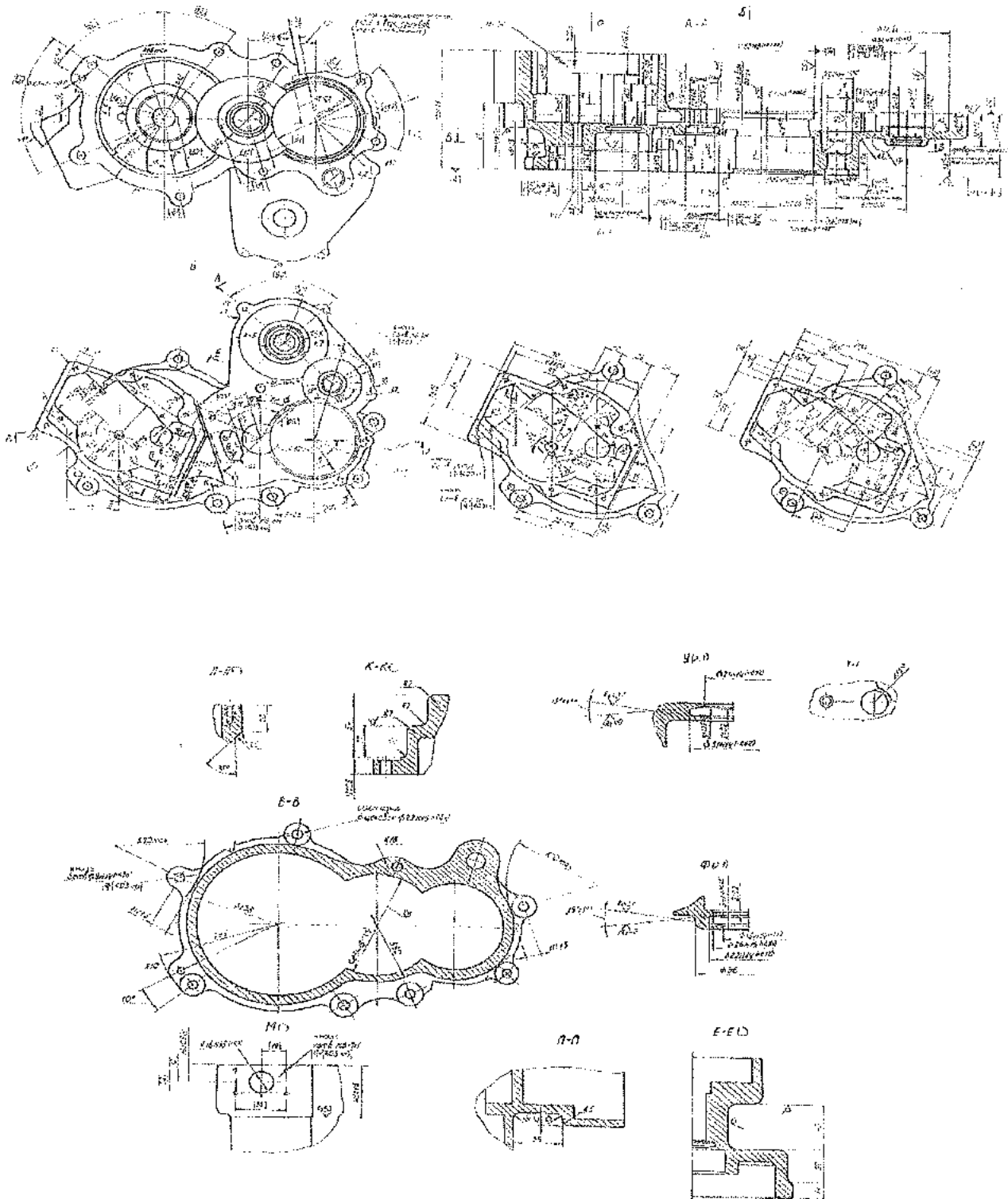


FIG: HOUSING TO DRG. NO.172.28.002-5
 (For reference only)


TR 61 V&C

For item no. 1

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) 1. 10-100 / 100mm dia 114 Nuts	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 components		
			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

SI 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 Comp- lliance (Y/N)	Remarks
1	Components as per enclosed list of Machined Components (Group 1)	TEST / INSPECTION-1	3D CMM Surface Roughness Tester Gauges	3D CMM 300 x 300 mm 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		
		TEST / - INSPECTION-2	Measuring Instruments Hardness measurement	* Vernier Calliper, Groove Vernier, Radius gauge, Feeler Gauge etc. suitable to the requirement of the components	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.

(D.SATHISH KUMAR)
WMM/QA(NFR& QMSC)

(J.P. SINGH)
GIM-OPERATIONS I

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

for (NEERAJ KUMAR)
QA-RIG(OE)

(ANIMESH PAIK)
DGM/CA, TRG & RG

(K.DURAIRAJ)
JMM/Trans -II

For item no. 2, 3, 4, 5, 6 & 7

MACHINED COMPONENTS (GROUP -VI)					FIRM Compliance (Y/N)	Remarks
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)		
1	Components as per enclosed list of Machined Components (Group VI) <i>Tested items = 23 N/A5</i>	TECHNOLOGY-1 Milling & Drilling	HMC and/or VMC suitable to the components upto the size 250mm x 450mm x 250mm height with 0.010 accuracy			
		TECHNOLOGY-2 Raw material		Firm should be capable to arrange the raw material defect free Aluminium Castings/ sheet metal as per drawing specification and standard.		
		TEST / INSPECTION-1 3D CMM	3D CMM 500 x 500mm.			
		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 5 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			

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.

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

(J.P.SINGH)
GM-OPERATIONS I

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

(NEERAJ KUMAR)
QA-RIG(OE)

(K.DURAIRAJ)
JWM/Trans-II

(ANIMESH PAIK)
DGM/CA, TRG & RG

WORM GEAR TO DRG NO 176.23.0225B-1SB & WORM 176.23.051 AND WORM WITH WORM GEAR HVF.23.0625B

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. Comp-lance (Y/N)	Remarks
1	176.23.0225B-1SB Worm Gear	TECHNOLOGY-1 Raw material		Firm should be capable to arrange the raw material like forging, bar material, Brass moulded casting etc as per drawing specification and standard.		
2	176.23.051 Worm	TECHNOLOGY-2 Turning Grinding Gear machining	CNC Turning machine suitable to accommodate component upto 200 mm diameter with 0.050mm accuracy Internal, External & Surface grinding machine as per component Dia 200mm with 0.010mm accuracy	Gear Shaping facility of module 2 or more as per component requirement with DIN class 7 accuracy		
3	HVF.23.0625B Worm with Worm Gear	TECHNOLOGY-3 Worm & Worm Gear Lapping Heat Treatment Protection coating	Firm should have the Lapping facility for both Worm & Worm Gear and should be supplied as a pair (OR) Firm should submit the undertaking in this regard that they will create the facilities within 6 months from the date of receipt of order.	Carburising, Hardening, Induction Hardening & Tempering furnace with Oil quenching facility suitable to the components Oxidising or Oxide Phosphating facility suitable to the component		

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

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

(K.DURAIRAJ)
JWM/Trans -II