RESTRICTED
(DRAFT/PROVISIONAL)
QUALITY ASSURANCE PLAN

FOR

(BLANK SIZE FOR RING RACE LOWER)

DRG.NO.434.12.007/F

(LF NO: 3906111026)

No: HVF/T-72/QAP/12/BLANK SIZE FOR RING RACE LOWER/244060- 00

ISSUE No: 00 **DATE: JULY–2022**

QUALITY ASSURANCE (RIG–(OE))

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

BLANK SIZE FOR RING RACE LOWER

DRG. NO.434.12.007/F

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AVADI CHENNAI – 600 054

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 will only prevail.

2.INTRODUCTION

1. This quality plan lays down the inspection and testing procedure to be carried out on the component **BLANK SIZE FOR RING RACE LOWER TO DRG.NO 434.12.007/F** being procured indigenously. This is prepared, based on the acceptance standards and inspection parameters laid down in collaborators documents and on the inspection test standards followed in respect of similar indigenous items.

2. This QAP is the property of Government of India and is liable for amendments as and when required. The Chief General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054, is the inspecting Authority for this assembly. Any query / clarification on the content of this QAP shall be referred to this Factory. Any departure from these instructions is allowed only after written approval from the above authority. Notwithstanding the tests indicated in this QAP, the inspecting Officer has the right to carry out any test to check conformance to the paper particulars quoted in the Supply Order, which he may consider necessary to satisfy himself about the stores which he has to accept.

3.AIM

The QAP is aimed at standardizing the Inspection procedure and acceptance norm for **BLANK SIZE FOR RING RACE LOWER TO DRG.NO 434.12.007/F.**

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 **BLANK SIZE FOR RING RACE LOWER TO DRG.NO 434.12.007/F** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

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

Note:

i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.
ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.
iii. In case of S.O, it is the 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 the components like GOST/Drawing/Specification, Technical data book, process sheet etc, and technical instructions on the subject item is to be obtained by the contractor from AHSP through DDO/HVF.
b) Any clarification required on these documents to be obtained from the Inspecting Authority i.e. The Chief General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. Equivalents to the collaborators specifications and standards will be decided only by the Inspecting Authority and should not be unilaterally decided. For any change in the specifications, standards or written approval, any alterations in specification can be affected and not otherwise.
c) The process instruction sheets supplied by the collaborators are available with the Authority Holding Sealed Particulars, i.e. The Controllerate of Quality

Assurance (Heavy Vehicles), Avadi, Chennai for the reference. The relevant process sheets may be studied at the premises of the AHSP after obtaining necessary permission.

d) The supplier after scrutiny of the concerned process sheets and connected paper particulars should establish the necessary production and inspection facilities. Particularly the inspection test rigs, stands, fixtures, template, gauges etc should be provided as recommended in these process sheets. If process sheet / Process Book is not available the details particulars/parameters available in the drawings to be strictly adhered.

6.ITEM USED ON:

1) 432.12.007 – LOWER RACE RING

7.LIST OF DRAWINGS:

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	434.12.007/F	BLANK SIZE FOR RING RACE LOWER	-

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

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	434.12.007/F	BLANK SIZE FOR RING RACE LOWER	45 XHM TY 14-1-2982-80	1

Note: Vendor/Contractor may use approved alternate material if any specified in drawing/specification. And 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 / Conformance of certificate(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, Physical properties)	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/ Equipments 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 process book, TD book and related specification for acceptance test of the component)

During acceptance of castings, the following are to be checked as per Specification:

1. Chemical composition of steel;
2. Mechanical properties of steel;
3. External view (absence of defects) and quality defects;
4. Dimensions;
5. Hardness;
6. Absence of internal defects;
7. 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/Dents/Scratches.
- Fitment of all components
- Presence of foreign particles
- Moisture and dust
- Corrosion of metal parts
- Mechanical imperfections & distortion
- Any form of deterioration of material and finishing.

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

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

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

12.1 BLANK SIZE FOR RING RACE LOWER TO DRG.NO 434.12.007/F.

1. All dimensions should be confirmed as per drawing.
2. Surface finish/Roughness should be confirmed as per drawing and specification.
3. Refer drawing / specification for admissible alternate manufacture in dimensions/material if any specified for the component.

Note: FORGING WEIGHT- 511 Kgs. (Approx)

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 BLANK SIZE FOR RING RACE LOWER TO DRG.NO 434.12.007/F

a) The component should be manufactured from 45 XHM TY 14-1-2982-80

b) Chemical properties: As per 45 XHM TY 14-1-2982-80

Grade	CONTENT OF ELEMENTS%							
	C	Si	Mn	Ni	Cr	Mo	S	P
							MAX	
45XHM	0.42 to 0.50	0.17 to 0.37	0.50 to 0.80	1.00 to 1.40	0.45 to 0.75	0.15 to 0.25	0.035	0.035

Note: For mass fraction of other elements refer TY 14-1-2982-80.

c) Mechanical properties: As per 45 XHM TY 14-1-2982-80

Grade	Yield point, (kgf/mm²)	Ultimate strength, (Kgf/mm²)	Elongation %	Relative reduction of area %	Impact strength KCV (Kgf.m/cm²)	Hardness all over the section Diameter (mm)
	Not less than					
45XHM	60	80	12	45	7	3.4 to 3.8

Note: For other properties refer TY 14-1-2982-80.

14) PERFORMANCES/ACCEPTANCE TEST: BLANK SIZE FOR RING RACE LOWER TO DRG.NO.434.12.007/F

FORGINGS ARE TO BE SUPPLIED IN ROUGH MACHINED CONDITION.
ALL TECHNICAL REQUIREMENTS SHOULD CONFIRM TO TY-14-1-2982-80.
MACHINING DIMNS ARE SHOWN IN BRACKETS.
ALL DIMNS ARE SHOWN IN MM.

Note:

(For clarification if any on dimensions on the subject item, the same is to be obtained by the contractor from AHSP through DDO/HVF)

Rings to be accepted are presented in batches. The batch includes rings of the same melt of steel in one or several standard sizes.

Measurement of Brinell Hardness is carried out in compliance with GOST 9012-59.(For other details refer Specification TY 14-1-2982-80).

For acceptance of component all the test parameters are to be confirmed as specified in TY14-102-182-98 and related amendments in specification

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 of the component, (i.e. heat treatment process, heat treatment cycles, 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.

Note:

The Forging Manufacturers are required to follow the instructions strictly so far as supply of forgings.

a) All billets/blooms should be used for manufacturing forgings melt wise. The forgings made from particular mould should be clearly marked to avoid mix up with those melts from other melts.
b) While dispatching forgings clear indication of melt should be given in I / Note and preferably forgings of each melt should be separately dispatched.
c) Copies of all test certificates of chemistry, grain size, inclusion, microstructure and physical properties etc. as obtained from steel suppliers should be along with the test certificates of forgings as carried out at the premises of forging suppliers.

d) The forging supplied should satisfy the required chemical and physical properties, microstructure, grain size, inclusions rating, hardenability, etc.

e) After normalizing or hardening & tempering, as the case may be, the firms are advised in their own interest to check the microstructure and satisfy themselves for its correctness before dispatch of forgings.

f) In case of normalized forgings, it has been observed that sometimes microstructure is having banded structure and difficulties are experienced in broaching the components, hence banded structure will not be accepted and firms are advised to ensure proper microstructure free from banding before dispatch of the forgings.

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 shall posses 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 should be in line with the parameters as specified in the GOST/drawing and Specification.
d. The component should be clean, free from distortion, cracks and other harmful defects.
e. The component shall be well dressed and fettled and shall be readily machinable.
f. Preservation coating is to be done after heat treatment as called for in the specification.
g. Components will cleared for bulk supplies only after acceptance of the components in machining trials at HVF.

16) INTERCHANGEABILITY:

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17) CALIBRATION CHECKS (TEST STANDS/JIGS/FIXTUERS/GAUGES/INSTRUMENTS):

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

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

18) MARKING/IDENTIFICATION.

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

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

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

19) PRESERVATION CHECK

a) Preservative coatings are to be strictly adhered to as called for in the drawing. However, equivalent BIS Standards can also be followed, subject to the thickness of the coating/preservative is maintained as per the drawing/specification.

b) Other preservations as necessary to prevent damages due to moisture and dust during process, storage and transit are to be carried out. Conventional Methods can also be resorted to.

20) PACKING CHECK

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

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

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

21) DOCUMENTATION

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

ii. Vendor has to submit Bill of materials, Material test reports, Class 'C' /Endurance test reports (wherever specified in drawing/TY specification/QAP) and Complete PIR (pre-inspection report) at the time of offering the item for inspection. HVF will commence inspection only after scrutiny of these documents.

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

iv. Pre inspection reports (PIR) of firm like, 1. Chemical analysis, 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 forging, etc is to be submitted.

22) <u>REFERENCE:</u>

a) Drawing No:434.12.007/F.
b) Material specification as per drawing:
45 XHM TY 14-1-2982-80
c) TY 14-1-2982-80.

ANNEXURE-A

SL. NO.	CATEGORY	ASSEMBLY/ SUB ASSEMBLY	TESTS/ INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	BLANK SIZE FOR RING RACE LOWER TO DRG. NO 434.12.007/F.	**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		**Dimensional checks**	Dimensions as per the drawing	Refer drawing / QAP Para no: 12.1	Confirm to drawing and QAP Para no: 12.1	P	P	R	100% by firm/ vendor SP followed by HVF.
4		**Material tests**	Chemical composition & Mechanical / Physical Properties	As per– TY 14-1-2982-80	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		**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.
6		**Marking / traceability**	Marking / traceability	Refer QAP Para no:18	Confirm to QAP Para no: 18	P	V	R	100% by firm/ vendor.
7		**Preservation & packing**	Preservation & packing	Refer QAP Para no 19 & 20	Confirm to QAP Para no 19 & 20	P	V	R	100% by firm/ vendor.
8		**Other testing Parameters for acceptance**	As per drawing/specification/ GOST	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).

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.

3. For approval/acceptance of the forging all tests as per GOST/specification/drawing is to be carried out and confirmed.

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

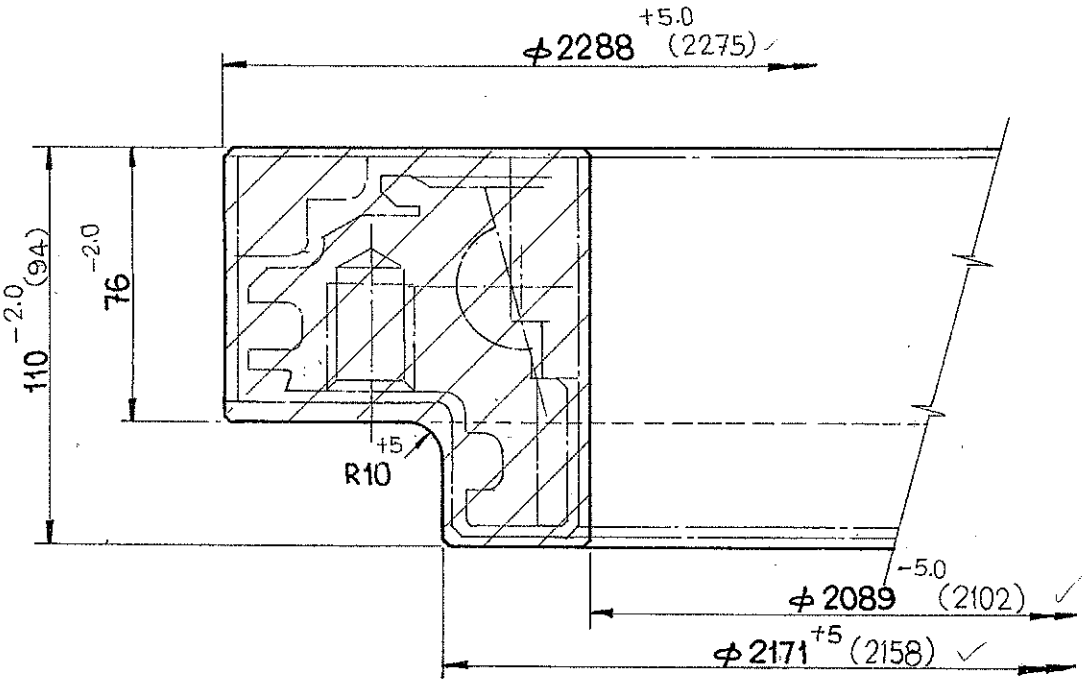

FIG: BLANK SIZE FOR RING RACE LOWER TO DRG. NO 434.12.007/F.

(For reference only)

APPENDIX 'A'

RECORD OF AMENDMENTS

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