

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

**FOR**

**(COLLAR)**

**DRG.NO. 432.40.036-2**

**(LF NO: 6206401172)**

**No.HVF/T-72/QAP/40/COLLAR/240682-00**

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

**HEAVY VEHICLES FACTORY**

**AVADI CHENNAI – 600 054**

**QUALITY ASSURANCE PLAN (QAP)**

**FOR**

**COLLAR**

**DRG. NO. 432.40.036-2**


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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”.

## **2.INTRODUCTION**

1. This quality plan lays down the inspection and testing procedure to be carried out on the component **COLLAR - 432.40.036-2** 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 **COLLAR - to Drg no. 432.40.036-2**.

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 **COLLAR to Drg no. - 432.40.036-2** 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:**

1. 172.40.052CbCb – RIGHT HAND REAR FLANGE ASSY
2. 172.40.053CbCb – LEFT HAND REAR FLANGE ASSY
3. 172.40.054CbCb -
4. 172.40.018Cb -
5. 172.40.019Cb -
6. 172.40.020 Cb.

**7. LIST OF DRAWINGS:**

Single (individual) item

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	432.40.036-2	COLLAR	-

**8. BILL OF MATERIALS:**

Single (individual) item, details as below,

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	432.40.036-2	COLLAR	Rubber ИПП 1316 To Specification Ty 005 216 - 75	1

**Note:** Vendor/Contractor may use approved alternate material as per drawing. Refer Para 13.

**9. CONDITIONS OF USE/STORAGE INSTRUCTIONS**

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

- (a) The threaded parts if any should be covered with suitable plastic caps to prevent damages.
- (b) If the item consists of assemblies, each assembly should be packed separately.
- (c) The stores are to be suitably covered for preventing ingress of dust and Dirt/entry of sunlight / moisture.

(d) The packaging slip shall contains

- (i) Certificate of testing (NABL)
- (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 II, single sampling, Normal Inspection, AQL 1.5 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	----	-----
(v)	Pressure testing	2 nos.	-----
(vi)	Machining/Fitment/ Performance trial on higher assembly / Tank	2 nos.	2 nos. per batch (of batch less than 50 nos.) and 2 nos. thereon for every 50 nos. of batch)
(vii)	Interchangeability Test	02 Nos.	02 Nos. per batch on randomly basis, except selective assembly.
(viii)	Test stand/Jigs/ Fixtures/Gauges/Man drels/etc.	100%	100%
(ix)	Marking/Identification	100%	100%
(x)	Packing/ Preservation	100%	100%

#### Note:-

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

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

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

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

- Defects in construction
- Cracks/Dents/Scratches
- Fitment of all components
- Presence of foreign particles
- Moisture and dust
- Corrosion of metal parts
- Mechanical imperfections & distortion
- Any form of deterioration of material and finishing.

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

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

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

### **12.1 COLLAR (432.40.036-2)**

All dimensions shall be confirmed as per drawing/Specification.

<b>Sl. No.</b>	<b>Drawing Dimensions</b>
(i)	9 ± 0.4 mm
(ii)	2.5 ± 0.3*1 mm
(iii)	Ø 206 ± 1.2*1 mm
(iv)	12° ± 30°*1
(v)	0.75 ± 0.1*1
(vi)	R 0.8 max *2
(vii)	Ø 191.3 (+0.2 / - 1.8) mm
(viii)	Ø 197*1
(ix)	Surface Finish/ roughness should be confirmed as per the drawing / specification.

For admissible alternate manufacture if any in dimensions/material, 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/equivalent 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 COLLAR to Drg. No. 432.40.036-2**

a) The component should be manufactured from RUBBER ИПП 1316 TY 005 216- 75

b) **Mechanical properties:** As per Rubber GRADE ИПП 1316 TY 005 216 - 75 , the physical - mechanical properties of this grade as follows

Sl. No	Physical - Mechanical properties				
1	Rubber grade	Rubber ИПП 1316 (TY 005 216 – 75)			
2	Type of Raw Rubber	VITON F = 26% (CKΦ-26)			
3	Relative tensile strength, MPa (Kgf/cm <sup>2</sup> ), Not less than	15.7 (160)			
4	Relative Elongation at Rupture % Not less than	65			
5	Relative residual deformation after breaking % Not more than	5			
6	Hardness unit in Shore A, within the limits	76-88			
7	Density Kg/M <sup>3</sup> . 10 <sup>3</sup> (Limit deviation. ±0.05)	1.95			
8	Co efficient of cold resistance as per elastic restoration after pressing, Min	---			
9	Temperature range of brittleness in °C, not more than	---			
10	Change in elongation after aging in air	Temp eratur e, °C	Time (Hr)	Norm at the ranges	
		200	72	From -55 to plus 25	
11	Relative residual deformation in atmosphere when pressing and after rupture	Temp eratur e, °C	Tim e (Hr)	Pres sure in %	Value of deform ation
		200	24	20	45
12	Change in weight during the effect of standard liquid CKP-	---			

	2 for 72 Hrs at a temperature 100°C, % at the ranges.	
13	Working medium	oil
14	Binding strength of rubber with metal when separating (Steel 20) Mpa (Kgf/cm <sup>2</sup> ), Min	----
15	Storage life of rubber stock, months	3
16	Pressure during use of the component Kgf/cm <sup>2</sup> (min)	50

Note: For other properties/ parameters of the rubber refer Specification TY005 216-99.

For checking methods of rubber, refer Specification TY005 216-75.

c) Alternate material : Rubber Grade FKM to Specification CQA(HV)/FKM

<b>Physical - Mechanical properties of Fluorocarbon Vulcanisates</b>			
Sl. No	Properties	FKM	Test Method
1	Hardness, Shore A	75-85	Relevant BS/ASTM methods shall be followed.
2	Density, g/cc	Agreed value ± 0.05	
3	Tensile strength, Mpa (Min)	15	
4	Elongation at break, % (min)	200	
5	Residual elongation after break, % (max)	10	
6	Compression set, at 200°C for 24 hrs, in Hyd oil (OM 15) % Max	25	
7	Volume change at 150°C for 24 hrs, in Hyd Oil (OM 15)%max.	0-10	
8	Resistance to low temperature °C	-20	
9	Heat ageing in air, at 200°C for 72 hrs, change in EB%	-50 to + 25	
10	Ash Content	10	

Composition : The compound shall be based on Fluorocarbon rubber (67-68.5% fluorine) reinforced with carbon black, vulcanized with suitable curatives minimum base polymer content shall not be less than 50%

For other properties/ parameters refer Specification No: CQA(HV)/FKM.

#### 14) PERFORMANCES/ACCEPTANCE TEST: COLLAR 432.40.036-2.

The following technical requirements shall be confirmed for acceptance of the component.

1. Dimensions marked with \*1 are to be ensured by tool.
2. Dimensions marked with \*2 are given for reference.
3. "Б" is working surface.
4. Working edges A and Б may have marks caused by grinding off the flash up to 0.2 mm in depth and 0.2 mm in height and local inconsiderable blunts of R 0.1 mm.
5. Non working Surfaces may have Projections, depression up to 0.5mm (Those on surface "Г" up to 0.2mm), besides, they may have inclusions and hollows left by fallen-out inclusions up to 0.3 mm high and deep ( not more than three such defects on 100 mm arc are permissible), imprints from moulds of not more than 0.5 mm. all these defects should be ground.
6. Permissible are the following defects.
  - a. On component surface – more pattern, dull spots, minor burnings, embedment of foreign matter, marks without exfoliation caused by separation of blank from mould.
  - b. On non working surfaces- 0.3 mm max, from mould flash, along its split surfaces and traces left by machining of flash of not more than 0.3 mm.
  - c. Spontaneous distortion of component form.
7. On surface "Б" the component number should be marked by imprinting the engraving of mould. For the purpose, use ПО – 2 GOST 2930-62.
8. Seals should be transported on cardboard or press board mandrel. At this it is impermissible that on the components be damaged by containers.
9. Diametrical dimensions are to be checked in compliance with instructions No. ИС – 51-10-35-81
10. Other requirements for articles, code 253122, as per Ty 005 216 – 75.

Explanatory Note:

Sl.no	Description	Physical and mechanical Parameters
1	Type of raw rubber	(СКФ-26)
2	Working medium	oil

3	Working temperature	-20°C to + 200°C
4	Rupture strength	160 Kgf/cm <sup>2</sup> (min)
5	Elongation of rupture	65% (min)
6	Residual elongation after rupture	5 % max
7	Hardness (TNP) device	76-88
8	Density	1.95 g/cm <sup>3</sup> ± 0.05

#### **15) FITMENT AND PERFORMANCE TEST:**

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

#### **16) INTERCHANGEABILITY:**

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

#### **17) CALIBRATION CHECKS**

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

- i. 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.
- ii. The supplier/contractor should submit calibration reports/certificates for instruments/fixtures/gauges/mandrels etc., which are used during process of inspection activities.
- iii. The component collar should withstand a minimum pressure of 50 Kgf/cm<sup>2</sup> in working temperature of -20°C to 200°C. Being key parameter, firm shall establish a setup for checking leakage of component at oil temperature 200°C and minimum pressure of 50Kg/cm<sup>2</sup>.

#### **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 Para 14(7)).

#### **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.
- c) Finished rubber items, prior to being put into use, should also be stored in accordance with recommendations given in BS 35741, ISO 2230 1, BS 3F-69 If items stored in accordance with above standards the shelf life of the items should be ensured by testing as per list schedule given in BS 3F-68.

#### **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) reports, etc.,

**22) REFERENCE:**

- a) Drawing No: 432.40.036-2
- b) Material specification (Rubber ИРП 1316 to Ty 005 216 - 75)
- c) Specification TY 005 216 75 Code 253122
- d) GOST 2930-62
- e) Specification ИС-51-10-35- 81
- f) Alternate material : Rubber Grade FKM to Specification CQA(HV)/FKM

SL. NO.	CATEGORY	ASSEMBLY/SUB ASSEMBLY	TESTS/INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1		Pre inspection reports (PIR) of firm	Firm has to produced all the document as per Para 21 (iv)	As per the relevant drawing and QAP.	Confirm to drawing and QAP as per bill of material	P	V	R	100% by firm/vendor.
2		Bill of material (BOM)	Firm has to prepare the BOM as per QAP	Refer QAP Para no: 8 or item list.	Confirm to QAP.	P	V	R	100% by firm/vendor.
3		Dimensional checks	Dimensions as per the specification	Refer Specifications & QAP Para no: 12.1	Conform to Specifications and QAP	P	W/P	R	100% by firm/vendor SP followed by HVF.
4		Material tests	Chemical composition & Mechanical / Physical Properties	Refer Specifications TY 005 216 99	All the values to confirm with QAP ( Para no:13.1 (a), (b), &(c))	P	W/V	R	SP followed by HVF.
5		Pressure test	50 Kg/cm2	As per Para 13.1 (6) & Para 17 (3)	All the values to confirm with QAP ( Para no:13.1(b)(16)& Para 17 (3))	P	W/V	R	100% by firm/vendor SP followed by HVF.
6		Hardness checks	Shore A – 76-88	As per Para 13.1 (6)	All the values to confirm with QAP Para 13.1 (6)	P	W/V	R	SP followed by HVF.
7		Marking / traceability	Firm has to make marking / traceability records.	Refer QAP Para no: 18 and 14(7)	Conform to QAP Para no:18 and 14(7)	P	V	R	100% by firm/vendor.
8		Preservation & packing	Firm has to make Preservation & packing records	Refer QAP Para no: 19 & 20	Conform to QAP Para no: 19 & 20	P	V	R	100% by firm/vendor.

Note:

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

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

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

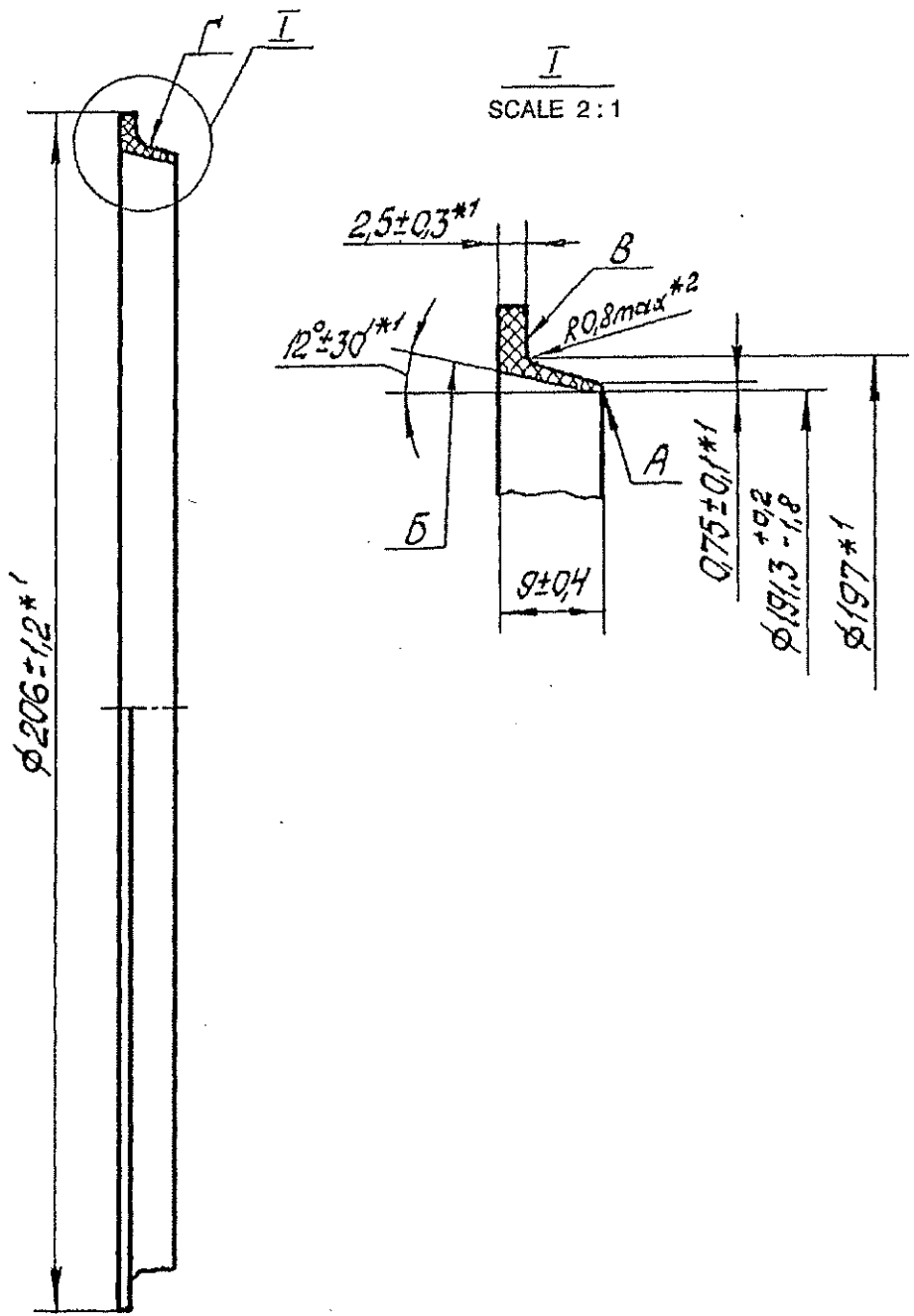


FIG: COLLAR TO DRG. NO 432.40.036-2



