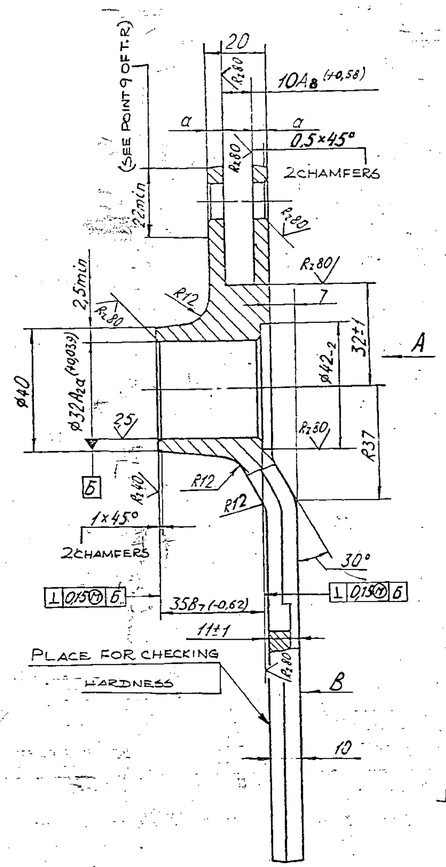
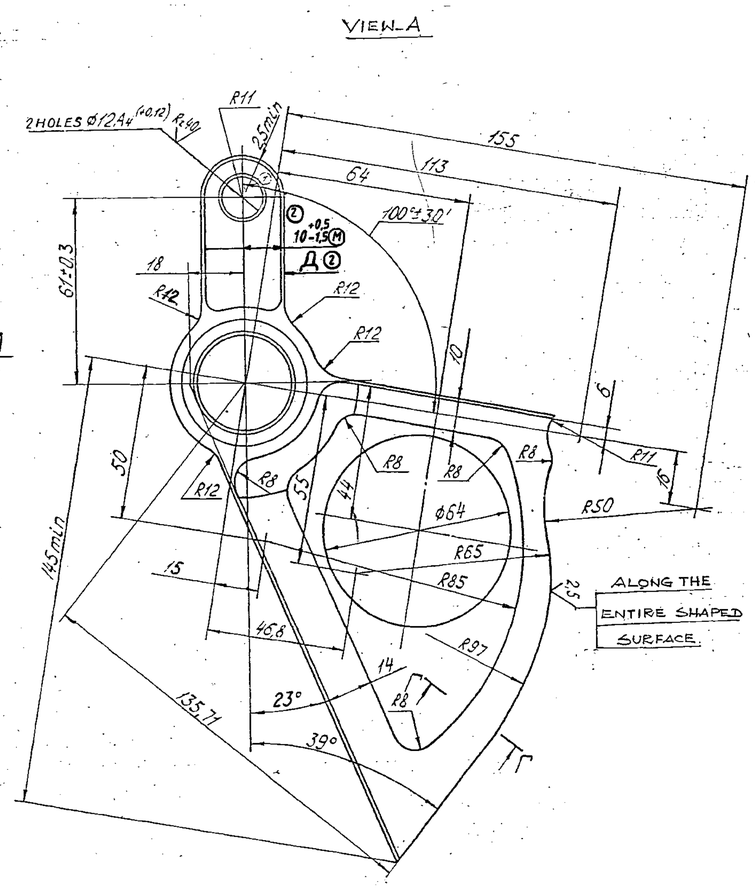
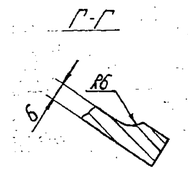
DRAWING NUMBER
172 63 054-1

9(V)







1. BHN 341-285 (IND.DIA 3.3 TO 3.6) TO BE CHECKED ON BLANK.
2. IN HOLE Ø64 THE PRESENCE OF STAMPED FIN AND SHRINKAGE OF EDGES ARE ALLOWED Ø64 IS NOT TO BE CHECKED.
3. DEVIATION OF CAM PROFILE FROM THE PROFILE OF TEMPLET MANUFACTURED TO SUIT THE NOMINAL DIMENSIONS IS NOT TO EXCEED 0.3mm
4. NON PARALLELISM OF GENERATRICES OF SHAPED SURFACE RELATIVE TO THE AXIS OF SURFACE Ø32A2a IS NOT TO EXCEED 0.1mm OVER THE LENGTH OF GENERATRICES OF SHAPED SURFACE.
5. NON SQUARENESS OF AXIS OF SURFACE Ø32A2a RELATIVE TO PLANE "B" IS NOT TO EXCEED 0.5mm IT IS TO BE CHECKED IN WAY OF CAM PROFILE AT ALENGTH OF 10mm min FROM THE PROFILE. MACHINING OF SURFACE "B" IS ALLOWED UP TO THICKNESS OF 8.5mm MINIMUM SHOULDER IS ALLOWED
6. NON SQUARENESS OF AXIS OF HOLE Ø12A4 RELATIVE TO THE SURFACE OF SLOT AT DIMENSION 10A8 IS TO BE CHECKED BY FREE ROTATION OF RING ON SHAFT Ø12Ж THE RING HAS A HEIGHT OF 9.8mm AND AN EXTERNAL DIAMETER OF 35mm min
7. DIFFERENCE IN MEASUREMENTS OF DIMENSIONS "a" IS NOT TO EXCEED 0.8mm
8. IN HOLE Ø32A2a TOOL MARKS AND REDUCTION OF Ø32A2a BY 0.008mm ARE ALLOWED
9. THE HEIGHT OF FORK 20B7 (-0.52) IS TO BE CHECKED BY TOOL AT A LENGTH OF 22min SHOULDER IS ALLOWED.
10. REMAINING REQUIREMENTS AS PER 520 TY 1.
11. ~~FOR ENSURING DIMENSION 10 +0,5 -1,5 MACHINING OF SURFACE A IS ALLOWED SHOULDER IS ALLOWED~~ ③
12. ~~PAINT AND VARNISH COATING IS ACCORDING TO THE PRESENT SPECIFICATION~~ ④③

12. COATING OF UNMACHINED SURFACES.
PRIMER ФЛ-03К.
④ DARK-GREY ENAMEL ПФ-223 OR DARK-GREY ENAMEL ПФ-115, 894
REQUIREMENTS AS PER 520 Ty 5.

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

EST. MASS 0.56 Kg	TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)				DRN		MATERIAL :- STEEL 38XC GOST 4543-71
					CHD		USED ON :- 175 63 042 C6-5C5
					TCD		
					APPD		CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI
					DATE	3.1.89	
					SCALE - 1:1		
					DIMENSIONS IN mm.		TITLE
					TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69		CAM R.H.
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUTSIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.		4	3.1.91	172M 777"A"-88 (AL.11/3).	ALL THREADS TO CONFORM TO		D S CAT NUMBER
		3	10.1.89.	AMDT LIST NO6,PART-II,BOOK-9			DRAWING NUMBER 172 63 054-1
		2					
		ISSUE	DATE	NATURE OF AMENDMENTS			

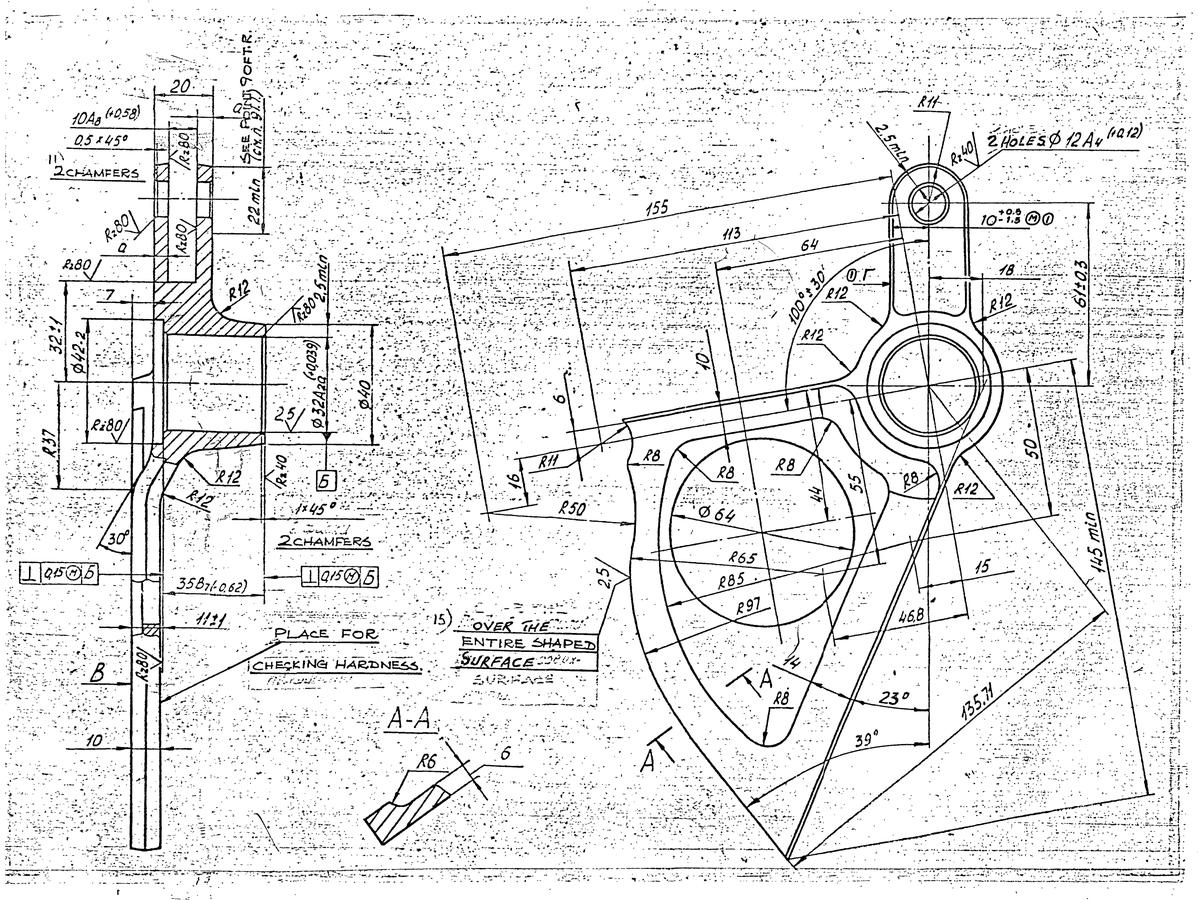
COMMON TO BLT

DRAWING INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE-1

F-1023 11

SIZE A1

DRAWING NUMBER
172 63 053-1



1. BHN 341-285 (IND.DIA. 3.3 TO 3.6) MAY BE CHECKED ON BLANK.
2. IN HOLE Ø 64, PRESENCE OF PRESSED IN FIN AND SHRINKAGE OF EDGES ARE ALLOWED Ø 64 NEED NOT BE CHECKED.
3. DEVIATION OF THE CAM PROFILE FROM THE PROFILE OF TEMPLET MADE TO NOMINAL DIMENSIONS SHOULD NOT EXCEED 0.3mm
4. NON PARALLELISM OF GENERATRICES OF SHAPED SURFACE RELATIVE TO AXIS OF SURFACE Ø 32 A2a SHOULD NOT EXCEED 0.1mm OVER THE ENTIRE LENGTH OF SHAPED SURFACE GENERATRICES.
5. NON SQUARENESS OF AXIS OF SURFACE Ø 32 A2a RELATIVE TO SURFACE "B" SHOULD NOT EXCEED 0.5mm. IT IS TO BE CHECKED ALONG THE CAM PROFILE AT A LENGTH OF 10mm min FROM THE PROFILE IT IS ALLOWED TO MACHINE SURFACE "B" TO A THICKNESS OF 8.5mm min SHOULDER IS ALLOWED.
6. NON SQUARENESS OF THE AXIS OF HOLE Ø 12A4 RELATIVE TO THE SURFACE OF SLOT AT DIMENSION 10A8, IS TO BE CHECKED BY FREE ROTATION OF RING ON SHAFT Ø 12X. THE RING HAS A HEIGHT OF 9.8mm, EXTERNAL DIAMETER OF 35mm min.
7. VARIATION IN MEASUREMENTS OF DIMENSIONS "a" SHOULD NOT EXCEED 0.8mm
8. IN HOLE Ø 32 A2a TOOL MARKS AND REDUCTION OF Ø 32 A2a BY 0,008mm ARE ALLOWED.
9. THE HEIGHT OF FORK 20B7 (-0.52) IS TO BE CHECKED BY TOOL AT A LENGTH OF 22min SHOULDER IS ALLOWED.
10. REMAINING REQUIREMENTS AS PER 520 TY 1.
11. (1) FOR ENSURING DIMENSION 10 +0.5 -1.5 MACHINING OF SURFACE T IS ALLOWED. SHOULDER IS ALLOWED (2)
12. (3)(2) ~~PAINT AND VARNISH COATING IS ACCORDING TO THE PRESENT SPECIFICATION.~~

12. COATING OF UNMACHINED SURFACES.
(3) PRIMER 4M-03K.
DARK-GREY ENAMEL ПФ-223 OR DARK-GREY ENAMEL ПФ-115, 894.
REQUIREMENTS AS PER 520 Ty 5.

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

EST. MASS	TO BE STAMPED OR MARKED WHERE INDICATED THUS #
0,56Kg	LETTERS)

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

ISSUE	DATE	NATURE OF AMENDMENTS
3	2.1.91	172M 777"A"-88 (AL.11/3).
2	10.1.88.	AMDT LIST NO6.PART-1.BOOK-9
1		

DRN	
CHD	
TCD	
APPD	
DATE	8.1.88
SCALE - 1:1	
DIMENSIONS IN mm.	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69	
ALL THREADS TO CONFORM TO	
D S CAT NUMBER	

MATERIAL :-
STEEL 38XC,GOST 4543-71

USED ON :-
175 63 041C6-B66

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)
A V A D I

TITLE
CAM L.H

DRAWING NUMBER
172 63 053-1

COMMON TO BLT

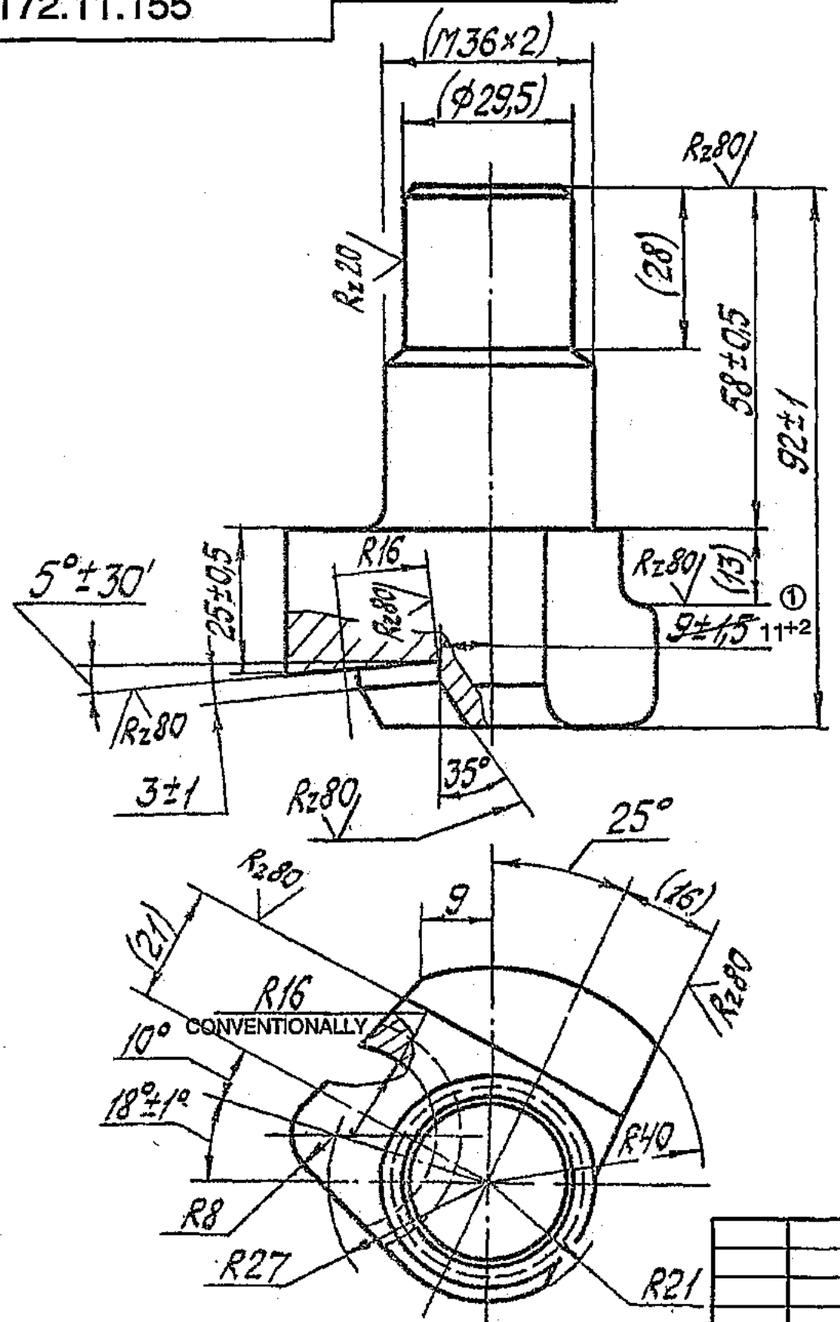
DRAWING INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE- NIL

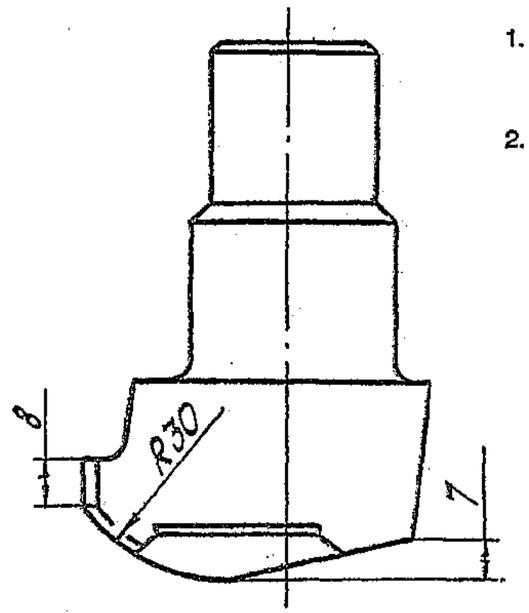
F-103
10

SIZE A1.

DRAWING NUMBER
172.11.155

SHEET No. 1 OF 1





1. DIMENSIONS WITHIN BRACKETS ARE AFTER ASSEMBLY AS PER DRG. 172.11.034cbCb.
2. OTHER REQUIREMENTS FOR COMPONENT AS PER 520 TY 1.

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

EST. WT. (Kg)	TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)
0.58	

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT-SIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

ISSUE	DATE	NATURE OF AMENDMENTS
1	12.6.89	172 M 304 "A" -87 AMDT. 9/3.

DRN	Sd/=
CHD	Sd/=
APPD	Sd/=
DATE	14.10.88
SCALE:-	1 : 1
DIMENSIONS IN mm	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102 - 69	
ALL THREADS TO CONFORM TO	

MATERIAL :- STEEL 38 X C GOST 4543-71

USED ON :- 172.11.034cbCb

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI

TITLE :- LOCK

D S CAT NUMBER

DRAWING NUMBER 172.11.155

"COMMON TO T-90"
DRAWING RE-INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - NIL

(R.RAMANI, JTO 20 Jun 06)

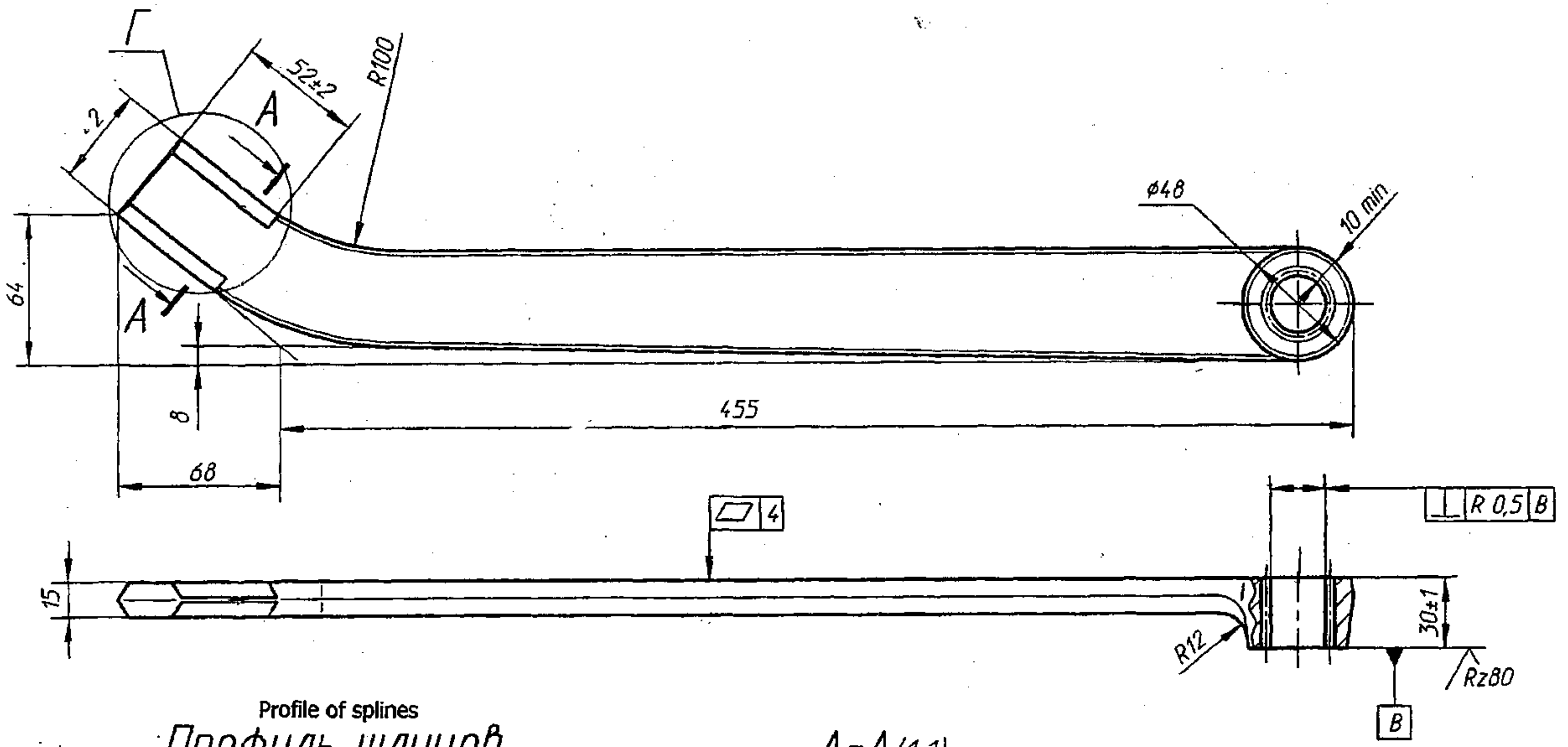
F-32
60

SIZE A3

DRG. INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 10

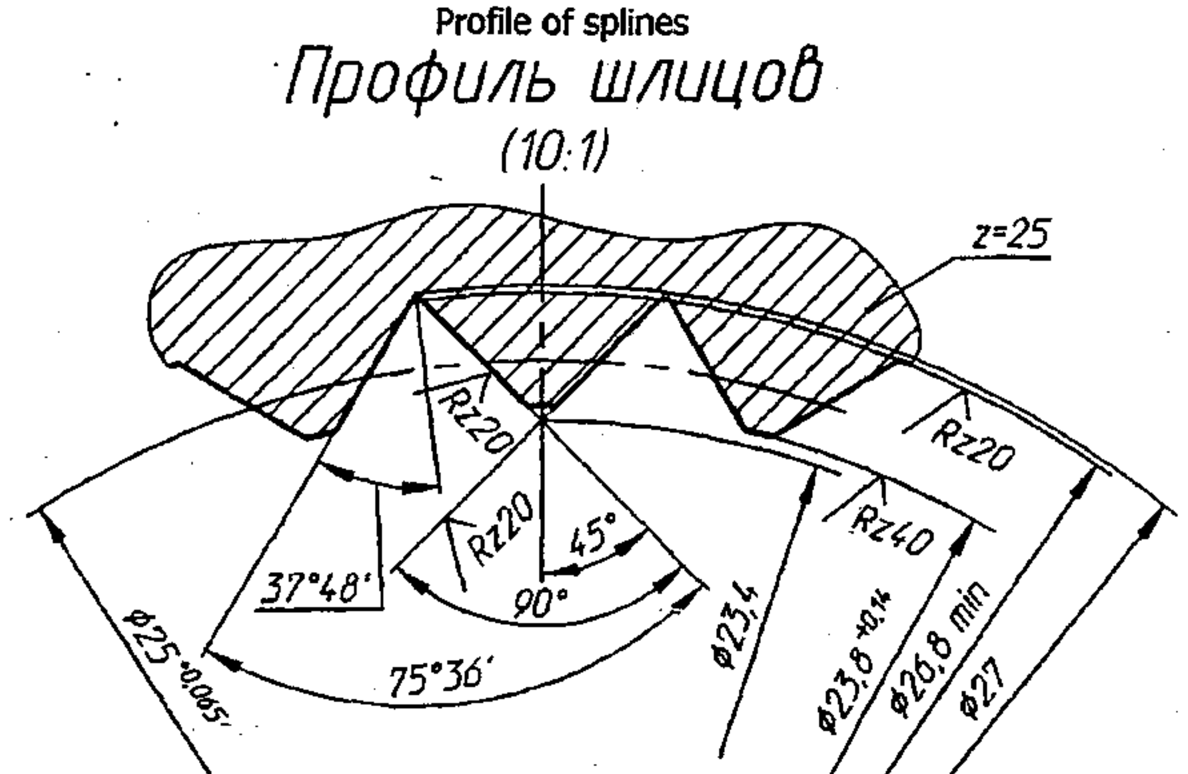
COMMON TO T-72

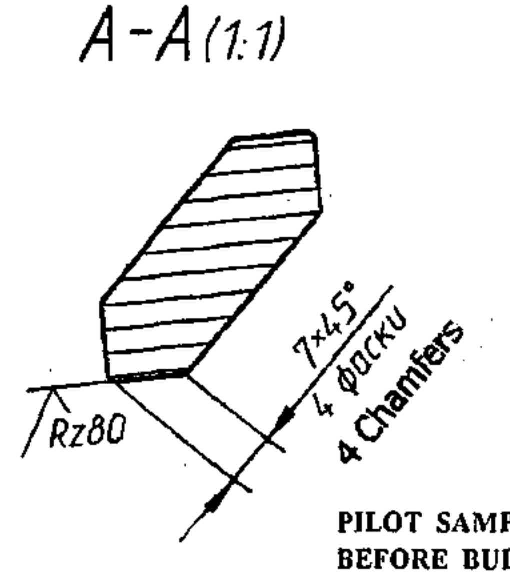
DRAWING NUMBER	SHEET No. 1 OF 1
175.02.261-1	

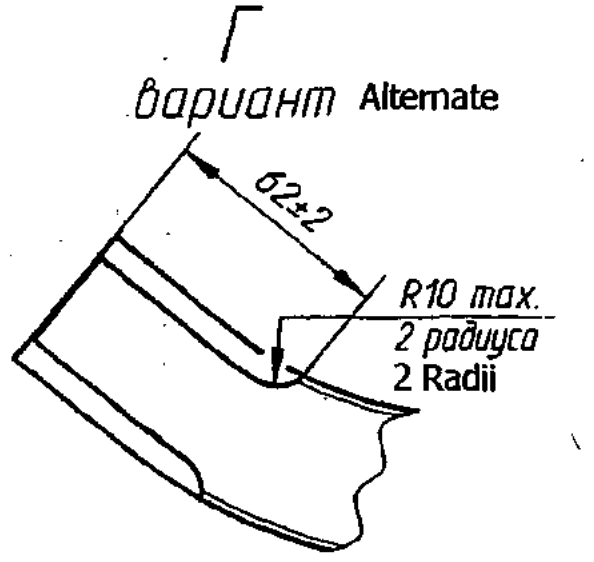


1. 255...302 HB. Проверять в заготовке.
2. Штамповочные уклоны в тело.
3. Перекос (сдвиг) осей штампов 0^{+2} мм.
4. Следы заусенцев по линии разъема штампов 0^{+2} мм.
5. Шлицы проверять комплексным калибром с номинальным размером среднего диаметра резьбы 25 мм.
6. Остальные требования по 520.ТУ1.

1. BHN 255 to 302. To be checked in blank.
2. Draft - Internal.
3. Skewness (shift) of stamping axis 0^{+2} mm
4. Traces of burrs along parting line of die - 0^{+2} mm
5. Splines are to be checked with combination gauge with nominal dimension of pitch diameter of thread 25 mm.
6. Other requirement as per 520.TY1.







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

EST. WT. (kg)	TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)
2.57	

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT-SIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

ISSUE	DATE	NATURE OF AMENDMENTS

DRN	
CHD	
APPD	
DATE	15-10-04
SCALE:-	1 : 2
DIMENSIONS IN mm	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102 - 69	
ALL THREADS TO CONFORM TO	

MATERIAL :- Steel 38XC GOST 4543-71

USED ON :- 175.02.007cb-1Cb

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI

TITLE :- LEVER

D S CAT NUMBER

DRAWING NUMBER 175.02.261-1

356

SUPPLY CODE U-01-1-2

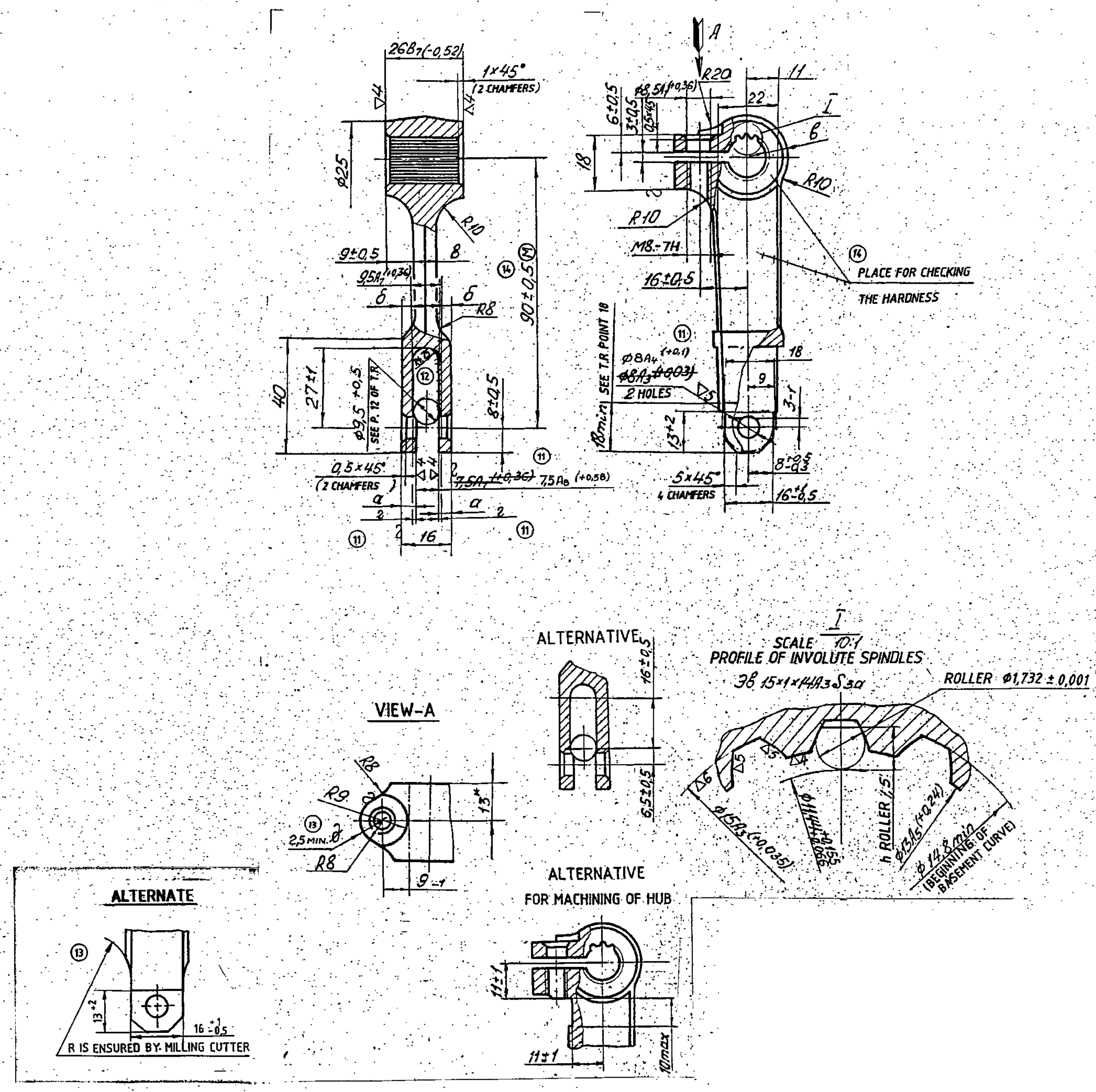
D90040

F - 61 / 15

SIZE A4x3

DRAWING NUMBER
172 63 079

UNLESS OTHERWISE SPECIFIED. ∇3 (∇)



BASIC DATA					
MODULE	m	1	FOR CHECKING	NOMINAL THICKNESS OF TEETH (ALONG THE ARC OF REFERENCE CIRCLE) OF COMPLEX GAUGE 1,571
NUMBER OF TEETH	Z	14		
PROFILE ANGLE OF BASIC RACK	α_{∂}	30°		
DIAMETER OF REFERENCE CIRCLE	Д	14	REFERENCE DATA	DIMENSION ϕ14,8 MIN. IS CHECKED WITH COMPLEX GAUGE.
ADDENDUM MODIFICATION CO-EFFICIENT	ξ	0		
WIDTH OF TOOTH SPACES ALONG THE ARC OF REFERENCE CIRCLE.	δ	$1{,}571^{+0{,}07}_{+0{,}03}$		

1. TO BE HEAT TREATED TO BHN 302 – 255 (IND.DIA.3,5 TO 3,8) TO BE CHECKED ON BLANK.
2. EXTERNAL DRAFTS UPTO 7°.
3. PERMISSIBLE DEVIATIONS ON ROUGH DIMENSIONS AS PER ACCURACY GROUP 2 OF GOST 7505-55.
4. UNSPECIFIED RADII TO R5.
5. TECHNICAL REQUIREMENTS FOR SURFACES NOT TO BE MACHINED AS PER GOST 8479-57.

(11) ~~6. BODY THICKNESS AT DIMENSION "a" IS 0,5mm MIN. AT DIMENSION "b" IS 4mm MIN. AT DIMENSION "δ" IS 2,5mm MINIMUM.~~

(11) 6. THICKNESS OF BODY AS PER THE MEASUREMENT "a" IS MINIMUM 3,5mm. AS PER THE MEASUREMENT "b" IS MINIMUM 4mm. AS PER THE MEASUREMENT "δ" IS MINIMUM 2,5mm, AS PER THE MEASUREMENT "2" IS MINIMUM 0,2mm.

7. (14) NON PARALLELISM OF AXES OF SPLINE HOLE AND HOLE ϕ8A3/4 SHOULD NOT EXCEED 0,4mm OVER A LENGTH OF 50mm. PERMISSIBLE TOLERANCE. (11)

8. NON SQUARENESS OF AXIS OF SPLINE HOLE RELATIVE TO END FACE AT DIMENSION 26B7 SHOULD NOT EXCEED 0,5mm OVER A LENGTH OF 50mm. PERMISSIBLE TOLERANCE. (11)

(11) 9. NON SQUARENESS OF AXIS OF HOLE ϕ8A3/4 RELATIVE TO THE SLOT SURFACE IS TO BE CHECKED BY FREE ROTATION OF RING ON SHAFT ϕ8X. THE RING HAS A HEIGHT OF 7,3 mm AND A DIAMETER OF 18mm.

10. BEFORE MILLING SLOT 3 ± 0,05 THE SPLINES ARE TO BE CHECKED BY SPLINE PLUG GAUGE MADE TO MAXIMUM DIMENSION OF MATING COMPONENT.

11. BUCKLING SHOULD NOT EXCEED 1,5mm.

(11) ~~12. DIMENSION 9,5A7 MAY BE INCREASED TO ϕ9,5 +0,5 ON THE SECTION INDICATED IN THE MAIN VIEW ON THE REMAINING LENGTH SLOT MAY BE HAVE A WIDTH OF $9{,}5^{+0{,}36}_{-0{,}2}$ THICKNESS "δ" AT ϕ9,5 +0,5 SHOULD BE 2,5mm MIN.~~

(11) 12 REDUCTION OF DIMENSION 9,5 A_7 UPTO $\phi 9{,}5^{+0{,}5}$ IN SECTION, INDICATED ON FRONT VIEW AND MAKING WIDTH OF SLOT AS PER THE DIMENSION $9{,}5^{+0{,}36}_{-0{,}20}$ ON REST OF THE LENGTH ARE ALLOWED. TO BE CHECKED PRIOR TO THE SECTIONING OF COMPONENT AS PER DIMENSION 7,5 A_8.

13. POSITION OF SPLINES SHOULD BE SUCH THAT THE SYMMETRY PLANE OF TOOTH SPACES COINCIDES WITH THE PLANE PASSING THROUGH THE COMMON AXIS OF HOLES ϕ8A3/4 AND ϕ13A5. PERMISSIBLE DEVIATION SHOULD BE ±1°.

(15) ~~14. PAINT COATING IN COMPLIANCE WITH 175 TY 2-2.~~

(15) 14. COATING OF UNMACHINED SURFACES.
PRIMER ФЛ-03К.
DARK-GREY ENAMEL ПФ – 223 OR DARK-GREY ENAMEL ПФ-115, 894
REQUIREMENTS AS PER 520 TY 5.

15. MACHING ALONG DOTTED LINE IS ALLOWED.
16. MISMATCH OF DIES UPTO 1mm.
17. UNDERTRIMMED FIN ALONG THE PARTING LINE UPTO 1mm IS ALLOWED.
18. HEIGHT OF LEVER 16±0,5 IS TO BE CHECKED BY TOOL AT A LENGTH OF NOT LESS THAN 18mm.
19. * DIMENSION FOR REFERENCE.

EXPLANATORY NOTE :-

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

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

CONTENT OF ELEMENTS %					
C	Si	Mn	Cr	S (MAX)	P (MAX)
0.34-0.42	1.0-1.4	0.30-0.60	1.30-1.60	0.035	0.035

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

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

TENSILE STRENGTH Kgf/mm²	YIELD POINT Kgf/mm²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgf/cm²
MINIMUM				
95	75	12	50	7

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

EST. MASS	TO BE STAMPED OR MARKED WHERE INDICATED THUS II (— LETTERS)
0,2	

ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT-SIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

ISSUE	DATE	NATURE OF AMENDMENTS
15	03-1-91	172M 777 "A" - 88 (AL. 11/3).
14		
13	14-1-89	AMDT LIST No. 6 PART-II BOOK-9.
12		
11		

DRN	[signature]
CHD	[signature]
TCD	[signature]
APPD	[signature]
DATE	16-12-93
SCALE	1 : 1

DIMENSIONS IN mm.
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69.
ALL THREADS TO CONFORM TO

MATERIAL:- STEEL 38XC GOST 4543-71

USED ON:- 175 63 030 CБ, 175 63 031 CБ

CONTROLLERATE OF QUALITY ASSURANCE(HEAVY VEHICLES)
A V A D I

TITLE: LEVER.

D S CAT NUMBER

DRAWING NUMBER
172 63 079

COMMON TO BLT

DRG. REDRAWN BASED ON ISSUE - 15 AND EXPLANATORY NOTE ADDED.

F-103 / 19

SIZE A1

COMPLETING ARTICLES SHOP (69)
Vendor Qualification Criteria (VQC)

NOMENCLATURE & DRAWING No.: **CAM R.H.to Drg. No. 172.63.054-1, LF No. 6206419078**

1	2	3	4	5	6
MANUFACTURING TECHNOLOGY & TESTING / INSPECTION FACILITIES REQUIRED TO PRODUCE THE ITEM		MUST BE POSSESSED BY THE VENDOR IN HIS OWN PREMISES - (P&M LIST & TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (3) THAT ARE AVAILABLE IN-HOUSE (SELF-DECLARED P&M LIST (Nomenclature of machine, Make/Model, Capacity/Size & accuracy, Date of Installation, Vintage of machine/Year of Manufacturing of machine) AND TESTING/INSPECTION EQUIPMENT LIST (Nomenclature of the Testing/Inspection Equipment, Make/Model, Size & Range, Date of calibration) ALSO TO BE SUBMITTED)	MAY BE POSSESSED BY THE VENDOR IN HIS OWN PREMISES OR OUT SOURCED - (MOU/TIE-UP WITH THE OUTSOURCING VENDOR/SUB-VENDOR AND THEIR P&M LIST & TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (5) THAT ARE AVAILABLE IN-HOUSE OR OUT-SOURCED FIRMS (NAME AND ADDRESS OF THE OUTSOURCING VENDOR TO BE DECLARED BY THE FIRM IN FIRM'S LETTERHEAD, SELF-DECLARED P&M LIST (Nomenclature of machine, Make/Model, Capacity/Size & accuracy, Date of Installation, Vintage of machine/Year of Manufacturing of machine) AND TESTING/ INSPECTION EQUIPMENT LIST (Nomenclature of the Testing/Inspection Equipment, Make/Model, Size & Range, Date of calibration) AND MOU/TIE-UP ALSO TO BE SUBMITTED)
Technology 1	STEEL FORGING			Forging: 172.63.054-1, Est.: 1.34kg.	
Technology 2	HEAT TREATMENT			Normalizing & Hardening 341-285 BHN	
Technology 3	SURFACE CLEANING			Shot Blasting	
Technology 4	*MACHINING	Conventional/ CNC VMC /HMC Bed Cap. 430x325mm Min.		Broaching Dia. 32 mm	
Technology 5	SURFACE COATING			Primer, Drak Gray Enamel as per 520 TY 5	
Test/ Inspection 1	TESTING MACHINE			Brinell Hardness Tester	
Test/ Inspection 2	MEASURING INSTRUMENTS /GAUGES	Required Measuring Instruments/Suitable Standard Gauges.			

Test/ Inspection 3	MEASURING GEOMETRICAL ACCURACY			3D/CMM Table working area 500 x 500 mm min.	
Test/ Inspection 4	TESTING MACHINE			Ultrasonic/Radiographic testing, Spectroscope/NABL Certified lab report for Chemical composition, Mechanical properties specified as per material Specification to be produced.	

Note: (1) Facilities must be available with vendors own premises - including facilities available with **Sister / Parent Concerns / Strategic Partners** shall be Considered for Capacity Verification subjected to documentary evidence to prove the relationship / ownership.

(2) *The firm may indicate the alternate machines/process by which the component can be manufactured as per technical specification/drawing.
** Firm should give undertaking that they will develop the all the testing facility if they get order.

(3) Firm should be capable to arrange the raw material like forging material as per drawing & specification.

(4) Firm should be capable to arrange Suitable Furnace for carrying out Hardening and Tempering.

M. GNANASEKARAN
DGM/CA

ANTARYAMI PRADHAN
JWM/QA(OE)(CA)

LAKSHMINARAYANAN. C
JWM/CA

COMPLETING ARTICLES SHOP (69)
Vendor Qualification Criteria (VQC)

NOMENCLATURE & DRAWING No.: **CAM L.H.to Drg. No. 172.63.053-1, LF No. 6206419077**

1	2	3	4	5	6
MANUFACTURING TECHNOLOGY & TESTING / INSPECTION FACILITIES REQUIRED TO PRODUCE THE ITEM		MUST BE POSSESSED BY THE VENDOR IN HIS OWN PREMISES - (P&M LIST & TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (3) THAT ARE AVAILABLE IN-HOUSE (SELF-DECLARED P&M LIST (Nomenclature of machine, Make/Model, Capacity/Size & accuracy, Date of Installation, Vintage of machine/Year of Manufacturing of machine) AND TESTING/INSPECTION EQUIPMENT LIST (Nomenclature of the Testing/Inspection Equipment, Make/Model, Size & Range, Date of calibration) ALSO TO BE SUBMITTED)	MAY BE POSSESSED BY THE VENDOR IN HIS OWN PREMISES OR OUT SOURCED - (MOU/TIE-UP WITH THE OUTSOURCING VENDOR/SUB-VENDOR AND THEIR P&M LIST & TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (5) THAT ARE AVAILABLE IN-HOUSE OR OUT-SOURCED FIRMS (NAME AND ADDRESS OF THE OUTSOURCING VENDOR TO BE DECLARED BY THE FIRM IN FIRM'S LETTERHEAD, SELF-DECLARED P&M LIST (Nomenclature of machine, Make/Model, Capacity/Size & accuracy, Date of Installation, Vintage of machine/Year of Manufacturing of machine) AND TESTING/ INSPECTION EQUIPMENT LIST (Nomenclature of the Testing/Inspection Equipment, Make/Model, Size & Range, Date of calibration) AND MOU/TIE-UP ALSO TO BE SUBMITTED)
Technology 1	STEEL FORGING			Forging: 172.63.053-1, Est.: 1.34kg.	
Technology 2	HEAT TREATMENT			Normalizing & Hardening 341-285 BHN	
Technology 3	SURFACE CLEANING			Shot Blasting	
Technology 4	*MACHINING	Conventional/ CNC VMC /HMC Bed Cap. 430x325mm Min.		Broaching Dia. 32 mm	
Technology 5	SURFACE COATING			Primer, Drak Gray Enamel as per 520 TY 5	
Test/ Inspection 1	TESTING MACHINE			Brinell Hardness Tester	
Test/ Inspection 2	MEASURING INSTRUMENTS /GAUGES	Required Measuring Instruments/Suitable Standard Gauges.			

Test/ Inspection 3	MEASURING GEOMETRICAL ACCURACY			3D/CMM Table working area 500 x 500 mm min.	
Test/ Inspection 4	TESTING MACHINE			Ultrasonic/Radiographic testing, Spectroscope/NABL Certified lab report for Chemical composition, Mechanical properties specified as per material Specification to be produced.	

Note: (1) Facilities must be available with vendors own premises - including facilities available with **Sister / Parent Concerns / Strategic Partners** shall be Considered for Capacity Verification subjected to documentary evidence to prove the relationship / ownership.

(2) *The firm may indicate the alternate machines/process by which the component can be manufactured as per technical specification/drawing.
** Firm should give undertaking that they will develop the all the testing facility if they get order.

(3) Firm should be capable to arrange the raw material like forging material as per drawing & specification.

(4) Firm should be capable to arrange Suitable Furnace for carrying out Hardening and Tempering.

M. GNANASEKARAN
DGM/CA

ANTARYAMI PRADHAN
JWM/QA(OE)(CA)

LAKSHMINARAYANAN. C
JWM/CA

COMPLETING ARTICLES SHOP (69)
Vendor Qualification Criteria (VQC)

NOMENCLATURE & DRAWING No.: **LOCK to Drg. No. 172.11.155, LF No. 6206110014**

1	2	3	4	5	6
MANUFACTURING TECHNOLOGY & TESTING / INSPECTION FACILITIES REQUIRED TO PRODUCE THE ITEM		MUST BE POSSESSED BY THE VENDOR IN HIS OWN PREMISES - (P&M LIST & TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (3) THAT ARE AVAILABLE IN-HOUSE (SELF-DECLARED P&M LIST (Nomenclature of machine, Make/Model, Capacity/Size & accuracy, Date of Installation, Vintage of machine/Year of Manufacturing of machine) AND TESTING/INSPECTION EQUIPMENT LIST (Nomenclature of the Testing/Inspection Equipment, Make/Model, Size & Range, Date of calibration) ALSO TO BE SUBMITTED)	MAY BE POSSESSED BY THE VENDOR IN HIS OWN PREMISES OR OUT SOURCED - (MOU/TIE-UP WITH THE OUTSOURCING VENDOR/SUB-VENDOR AND THEIR P&M LIST & TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (5) THAT ARE AVAILABLE IN-HOUSE OR OUT-SOURCED FIRMS (NAME AND ADDRESS OF THE OUTSOURCING VENDOR TO BE DECLARED BY THE FIRM IN FIRM'S LETTERHEAD, SELF-DECLARED P&M LIST (Nomenclature of machine, Make/Model, Capacity/Size & accuracy, Date of Installation, Vintage of machine/Year of Manufacturing of machine) AND TESTING/ INSPECTION EQUIPMENT LIST (Nomenclature of the Testing/Inspection Equipment, Make/Model, Size & Range, Date of calibration) AND MOU/TIE-UP ALSO TO BE SUBMITTED)
Technology 1	STEEL FORGING			Forging 172.11.155 as per drawing	
Technology 2	HEAT TREATMENT			Hardness as per drawing	
Technology 3	*MACHINING	Suitable Conventional / CNC Turning machine & CNC VMC/HMC required as per drawing.			
Test/ Inspection 1	TESTING MACHINE			Brinell Hardness Tester	
Test/ Inspection 2	MEASURING INSTRUMENTS/ GAUGES	Required Measuring Instruments/Suitable Standard Gauges.			
Test/ Inspection 3	METAL TESTING			The firm should submit Material test report from NABL accredited lab as per drawing.	

Note: (1) Facilities must be available with vendors own premises - including facilities available with **Sister / Parent Concerns / Strategic Partners** shall be Considered for Capacity Verification subjected to documentary evidence to prove the relationship / ownership.

(2) *The firm may indicate the alternate machines/process by which the component can be manufactured as per technical specification/drawing.

(3) Firm should give undertaking that they will develop all the fixture facility if they get order.

(4) Dimensions with in brackets are to be machined after assembly. Refer technological process book for machining.

M. GNANASEKARAN
DGM/CA&SMS

ANTARYAMI PRADHAN
JWM/QA(OE)(CA)

LAKSHMINARAYANAN. C
JWM/CA

COMPLETING ARTICLES SHOP (69)
Vendor Qualification Criteria (VQC)

NOMENCLATURE & DRAWING No.: **LEVER to Drg. No. 175.02.261-1, LF No. 6206102348**

1	2	3	4	5	6
MANUFACTURING TECHNOLOGY & TESTING / INSPECTION FACILITIES REQUIRED TO PRODUCE THE ITEM		MUST BE POSSESSED BY THE VENDOR IN HIS OWN PREMISES - (P&M LIST & TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (3) THAT ARE AVAILABLE IN-HOUSE (SELF-DECLARED P&M LIST (Nomenclature of machine, Make/Model, Capacity/Size & accuracy, Date of Installation, Vintage of machine/Year of Manufacturing of machine) AND TESTING/INSPECTION EQUIPMENT LIST (Nomenclature of the Testing/Inspection Equipment, Make/Model, Size & Range, Date of calibration) ALSO TO BE SUBMITTED)	MAY BE POSSESSED BY THE VENDOR IN HIS OWN PREMISES OR OUT SOURCED - (MOU/TIE-UP WITH THE OUTSOURCING VENDOR/SUB-VENDOR AND THEIR P&M LIST & TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (5) THAT ARE AVAILABLE IN-HOUSE OR OUT-SOURCED FIRMS (NAME AND ADDRESS OF THE OUTSOURCING VENDOR TO BE DECLARED BY THE FIRM IN FIRM'S LETTERHEAD, SELF-DECLARED P&M LIST (Nomenclature of machine, Make/Model, Capacity/Size & accuracy, Date of Installation, Vintage of machine/Year of Manufacturing of machine) AND TESTING/ INSPECTION EQUIPMENT LIST (Nomenclature of the Testing/Inspection Equipment, Make/Model, Size & Range, Date of calibration) AND MOU/TIE-UP ALSO TO BE SUBMITTED)
Technology 1	STEEL FORGING			175.02.261-1 as per drawing	
Technology 2	HEAT TREATMENT			Hardness as per drawing	
Technology 3	*MACHINING	Suitable Conventional Milling & Radial drilling machine /CNC VMC/HMC required as per drawing.			
Technology 4	BROACHING			Spline Broaching required as per drawing.	
Test/ Inspection 1	TESTING MACHINE			Brinell Hardness Tester	
Test/ Inspection 2	MEASURING INSTRUMENTS/ GAUGES	Required Measuring Instruments/Suitable Standard Gauges.			
Test/ Inspection 3	METAL TESTING			The firm should submit Material test report from NABL accredited lab as per drawing.	

Note: (1) Facilities must be available with vendors own premises - including facilities available with **Sister / Parent Concerns / Strategic Partners** shall be Considered for Capacity Verification subjected to documentary evidence to prove the relationship / ownership.

(2) *The firm may indicate the alternate machines/process by which the component can be manufactured as per technical specification/drawing.

(3) Firm should give undertaking that they will develop the all the fixture facility if they get order.

(4) Requirements of Forging as per drawing.

M. GNANASEKARAN
DGM/CA&SMS

ANTARYAMI PRADHAN
JWM/QA(OE)(CA)

LAKSHMINARAYANAN. C
JWM/CA

COMPLETING ARTICLES SHOP (69)
Vendor Qualification Criteria (VQC)

NOMENCLATURE & DRAWING No.: LEVER toDrg. No. 172.63.079, LF No. 6206419081

1	2	3	4	5	6
MANUFACTURING TECHNOLOGY & TESTING / INSPECTION FACILITIES REQUIRED TO PRODUCE THE ITEM		MUST BE POSSESSED BY THE VENDOR IN HIS OWN PREMISES - (P&M LIST & TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (3) THAT ARE AVAILABLE IN-HOUSE (SELF-DECLARED P&M LIST (Nomenclature of machine, Make/Model, Capacity/Size & accuracy, Date of Installation, Vintage of machine/Year of Manufacturing of machine) AND TESTING/INSPECTION EQUIPMENT LIST (Nomenclature of the Testing/Inspection Equipment, Make/Model, Size & Range, Date of calibration) ALSO TO BE SUBMITTED)	MAY BE POSSESSED BY THE VENDOR IN HIS OWN PREMISES OR OUT SOURCED - (MOU/TIE-UP WITH THE OUTSOURCING VENDOR/SUB-VENDOR AND THEIR P&M LIST & TESTING/INSPECTION EQUIPMENT LIST TO BE SUBMITTED)	PROVIDE DETAILS OF THE FACILITIES ASKED IN COLUMN (5) THAT ARE AVAILABLE IN-HOUSE OR OUT-SOURCED FIRMS (NAME AND ADDRESS OF THE OUTSOURCING VENDOR TO BE DECLARED BY THE FIRM IN FIRM'S LETTERHEAD, SELF-DECLARED P&M LIST (Nomenclature of machine, Make/Model, Capacity/Size & accuracy, Date of Installation, Vintage of machine/Year of Manufacturing of machine) AND TESTING/ INSPECTION EQUIPMENT LIST (Nomenclature of the Testing/Inspection Equipment, Make/Model, Size & Range, Date of calibration) AND MOU/TIE-UP ALSO TO BE SUBMITTED)
Technology 1	STEEL FORGING			172.63.079 as per drawing	
Technology 2	HEAT TREATMENT			Hardness as per drawing	
Technology 3	*MACHINING	Suitable CNC VMC/HMC required as per drawing.			
Technology 4	BROACHING			Spline Broaching required as per drawing.	
Technology 5	SURFACE COATING	Primer, Enamel Dark grey as per drawing			
Test/ Inspection 1	TESTING MACHINE			Brinell Hardness Tester	
Test/ Inspection 2	MEASURING INSTRUMENTS/ GAUGES	Required Measuring Instruments/Suitable Standard Gauges.			
Test/ Inspection 3	METAL TESTING			The firm should submit Material test report from NABL accredited lab as per drawing.	

Note: (1) Facilities must be available with vendors own premises - including facilities available with **Sister / Parent Concerns / Strategic Partners** shall be Considered for Capacity Verification subjected to documentary evidence to prove the relationship / ownership.

(2) *The firm may indicate the alternate machines/process by which the component can be manufactured as per technical specification/drawing.

(3) Firm should give undertaking that they will develop the all the fixture facility if they get order.

(4) Requirements of Forging as per drawing.

M. GNANASEKARAN
DGM/CA&SMS

ANTARYAMI PRADHAN
JWM/QA(OE)(CA)

LAKSHMINARAYANAN. C
JWM/CA

RESTRICTED

(DRAFT/PROVISIONAL) QUALITY ASSURANCE PLAN

FOR

(CAM R.H)

DRG.NO. 172.63.054-1

(LF NO: 6206419078)

No HVF/T-72C/QAP/63/CAM R.H/241171 - 00

ISSUE No: 00 DATE: JAN– 2022

QUALITY ASSURANCE (RIG–SUB ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

CAM R.H

DRG. NO. 172.63.054-1

PREPARED BY

(C.NANDA KUMAR)
JWM/QA (RIG-SA)

REVIEWED BY

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

APPROVED BY

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

ISSUED BY

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

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 **CAM R.H TO DRG.NO 172.63.054-1** 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 **CAM R.H TO DRG.NO:172.63.054-1.**

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 **CAM R.H TO DRG. NO. 172.63.054-1** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

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

NOTE-I:

i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.

ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.

iii. In case of S.O, it is the responsible of the vendor to obtained copy of QAP and give the statement of compliance that the vendor will follow QAP. However, GM/HVF reserves the right to revise/update the QAP from time to time.

5. DOCUMENTS:

a) On placement of firm supply order, One set of relevant specification and technical instructions on the subject item can be obtained by the contractor from AHSP through DDO/HVF

b) Any clarification required on these documents should be obtained from the Inspecting Authority i.e. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. 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. 175.63.042CB-BCB -

7. LIST OF DRAWINGS:

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	172.63.054-1	CAM R.H	-

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

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	172.63.054-1	CAM R.H	STEEL 38XC GOST 4543-71	1

Note: Vendor / Contractor may use approved alternate material if any specified in drawing/ specification.* Also refer Para no.13.

9. CONDITIONS OF USE/STORAGE INSTRUCTIONS

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

(a) The threaded parts if any should be covered with suitable plastic caps to prevent damages.

(b) If the item consists of assemblies, each assembly should be packed separately.

(c) The stores are to be suitably covered for preventing ingress of dust and Dirt/entry of sunlight / moisture.

(d) The packaging slip shall contains

(i) Certificate of testing- NABL Certificate.

(ii) Guarantee/ Warranty Certificate

(iii) Service and maintenance instructions

(iv) Delivery Slip with Inspector's Acceptance Mark

(v) Undertaking letter / certificate of conformance (As applicable).

(e) The stores are not permitted to be stored together with oils. Petrol, acids, alkaline and other substances to avoid damage to the metal / rubber components.

10. SAMPLING PLAN:

Sl. No.	Sampling Plan	Pilot	Bulk
(i)	Visual Inspection	100%	100%
(ii)	Dimensional Inspection	100%	General Inspection level III, single sampling, Normal Inspection, AQL 2.5 of IS 2500 (Part-I)-2000
(iii)	Material Inspection	1 No	1 No. for each batch of raw material or heat treatment lot as required by specifications.
(iv)	Acceptance test	100 %	100 %
(v)	Pressure testing	------	------
(vi)	Machining/Fitment/ Performance trial on higher assembly / Tank	01 No.	01 No. per batch/As required.
vii)	Interchangeability Test	02 Nos.	02 Nos. per batch on randomly basis, except selective assembly.
viii)	Test stand/Jigs/ Fixtures/Gauges/Mandrels/etc.	100 %	100 %
ix)	Marking/Identification	100%	100%
x)	Packing/ Preservation	100%	100%

Note:-

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

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

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

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

- Defects in construction
- Cracks/Dents/Scratches
- Fitment of all components
- Presence of foreign particles
- Moisture and dust
- Corrosion of metal parts

- Mechanical imperfections & distortion
- Any form of deterioration of material and finishing.

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

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

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

12.1 CAM R.H TO DRG.NO 172.63.054-1

1. All dimensions should be confirmed as per drawing.
2. Place for checking hardness refer drawing.
3. Surface finish / Roughness of items should be ensured as per drawing and specification.
4. Refer drawing/specification for admissible alternate manufacture in dimensions/material if any specified for the component.

13) MATERIAL CHECKS [SAMPLING PLAN AS PARA – 10 (iii)]

Material specimen /test bars of the components shall be in conformity as per the material mentioned in the relevant documents/drawing. NABL test reports for all the parameters as per relevant specifications to be submitted. Test samples to be submitted by the vendor to HVF, if required. The material check will be carried out as per sampling plan.* However, if the manufacturer proposes any alternative material at the stage of tender enquiry, the same has to be approved and a written concurrence should be obtained from AHSP through DDO/HVF, before usage of such materials.

13.1 CAM R.H TO DRG.NO.172.63.054-1

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

b) Chemical properties: As per STEEL 38XC GOST 4543-71.

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

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

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

Grade	Yield point, (kgf/mm²)	Ultimate strength, (Kgf/mm²)	Elongation %	Relative reduction of area %	Impact strength (Kgm/cm²)
	Not less than				
38XC	75	95	12	50	7

Note: For other properties refer GOST 4543-71

14) PERFORMANCES / ACCEPTANCE TEST: CAM R.H TO DRG.NO:172.63.054-1

1. BHN 341-285 (IND.DIA 3.3 TO 3.6) TO BE CHECKED ON BLANK.
2. IN HOLE ø64 THE PRESENCE OF STAMPED FIN AND SHRINKAGE OF EDGES ARE ALLOWED ø64 IS NOT TO BE CHECKED.
3. DEVIATION OF CAM PROFILE FROM THE PROFILE OF TEMPLET MANUFACTURED TO SUIT THE NOMINAL DIMENSIONS IS NOT TC EXCEED 0.3mm
4. NON PARALLELISM OF GENERATRICES OF SHAPED SURFACE RELATIVE TO THE AXIS OF SURFACE ø32A2a IS NOT TO EXCEED 0.1mm OVER THE LENGTH OF GENERATRICES OF SHAPED SURFACE.
5. NON SQUARENESS OF AXIS OF SURFACE ø32A2a RELATIVE TO PLANE "B" IS NOT TO EXCEED 0.5mm IT IS TO BE CHECKED IN WAY OF CAM PROFILE AT ALENGIH OF 10mm min FROM THE PROFILE. MACHINING OF SURFACE "B" IS ALLOWED UP TO THICKNESS OF 8.5mm MINIMUM SHOULDER IS ALLOWED
6. NON SQUARENESS OF AXIS OF HOLE ø12A4 RELATIVE TO THE SURFACE OF SLOT AT DIMENSION 10A8 IS TO BE CHECKED BY FREE ROTATION OF RING ON SHAFT ø12X THE RING HAS A HEIGHT OF 9.8mm AND AN EXTERNAL DIAMETER OF 35mm min
7. DIFFERENCE IN MEASUREMENTS OF DIMENSIONS "a" IS NOT TO EXCEED 0.8mm
8. IN HOLE ø32A2a TOOL MARKS AND REDUCTION OF ø32A2a BY 0.008mm ARE ALLOWED
9. THE HEIGHT OF FORK 20B7 (-0.52) IS TO BE CHECKED BY TOOL AT A LENGTH OF 22min SHOULDER IS ALLOWED.
10. REMAINING REQUIREMENTS AS PER 520 TY 1.
11. FOR ENSURING DIMENSION $10^{+0.5}_{-1.5}$ MACHINING OF SURFACE A IS ALLOWED SHOULDER IS ALLOWED (3)
12. COATING OF UNMACHINED SURFACES.
    PRIMER ФЛ-03К.
    DARK-GREY ENAMEL ПФ-223 OR DARK-GREY ENAMEL ПФ-115, 894
    REQUIREMENTS AS PER 520 Ty 5.

15) FITMENT AND PERFORMANCE TEST:

a. Pilot samples should be checked for fitment and Performance test to ascertain the efficacy of the system under different operating conditions by

fitting in higher assembly and repeating it for functional checks, wherever required.

b. Items of Bulk supplies may be subjected to performance trial in tank in case of repeated failure/defects during exploitation.

EXPLANATORY NOTE:

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

16) INTERCHANGEABILITY:

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

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

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

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

18) MARKING/IDENTIFICATION

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

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

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

19) PRESERVATION CHECK

a) Preservative coatings are to be strictly adhered to as called for in the drawing. However, equivalent BIS Standards can also be followed, subject

to the thickness of the coating/preservative is maintained as per the drawing/specification.

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

20) PACKING CHECK

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

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

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

21) DOCUMENTATION

i. Firm has to maintain all the documents as per QAP with respect to the 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 (NABL Certificate), 2.Mechanical properties (NABL Certificate), 3. Pre-forming process, 4. Coating certification. 5. Calibration reports of instruments and 6. 100 % Dimensional inspection reports.

22) REFERENCE:

1. Drawing No: 172.63.054-1
2. Material specification as per drawing:
   STEEL 38XC GOST 4543-71.
3. GOST 4543-71.
4. Specification 520 TY1 & 520 TY5.

ANNEXURE-A

SL. NO.	CATEGORY	ASSEMBLY/SUB ASSEMBLY	TESTS/INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	CAM R.H TO DRG. NO 172.63.054-1	**Pre inspection reports (PIR) of firm**	Firm has to produced all the document as per Para 21 (iv)	As per the relevant drawing and QAP.	Confirm to drawing and QAP as per bill of material	P	V	R	100% by firm/ vendor.
2		**Bill of material (BOM)**	Firm has to prepare the BOM as per QAP	Refer QAP Para no: 8 or item list.	Confirm to QAP.	P	V	R	100% by firm/ vendor.
3		**Material tests**	Chemical composition & Mechanical / Physical Properties	As per– GOST 4543-71.	All the values to confirm with QAP (Para no:13.1 (a), (b) & (c))	P	W/V	R	SP followed by HVF.
4		**Hardness checks**	Hardness BHN 341-285 (Dia of ind. 3.3-3.6)	Refer QAP Para no: 14(1)	Confirm to QAP Para no: 14(1)	P	V	R	SP followed by HVF.
5		**Coating checks**	Coating.	Refer QAP Para no: 14(12)	Confirm to QAP Para no: 14(12)	P	V	R	SP followed by HVF.
6		**Dimensional checks**	Dimensions as per the drawing	Refer drawing /QAP Para no: 12.1	Confirm to drawing and QAP	P	W/P	R	100% by firm/ vendor SP followed by HVF.
7		**Marking / traceability**	Firm has to make marking / traceability records.	Refer QAP Para no: 18	Confirm to QAP Para no: 18	P	V	R	100% by firm/ vendor.
8		**Preservation & packing**	Firm has to make Preservation & packing records	Refer QAP Para no: 19 & 20	Confirm to QAP Para no: 19 & 20	P	V	R	100% by firm/ vendor.

Note:

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

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 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**

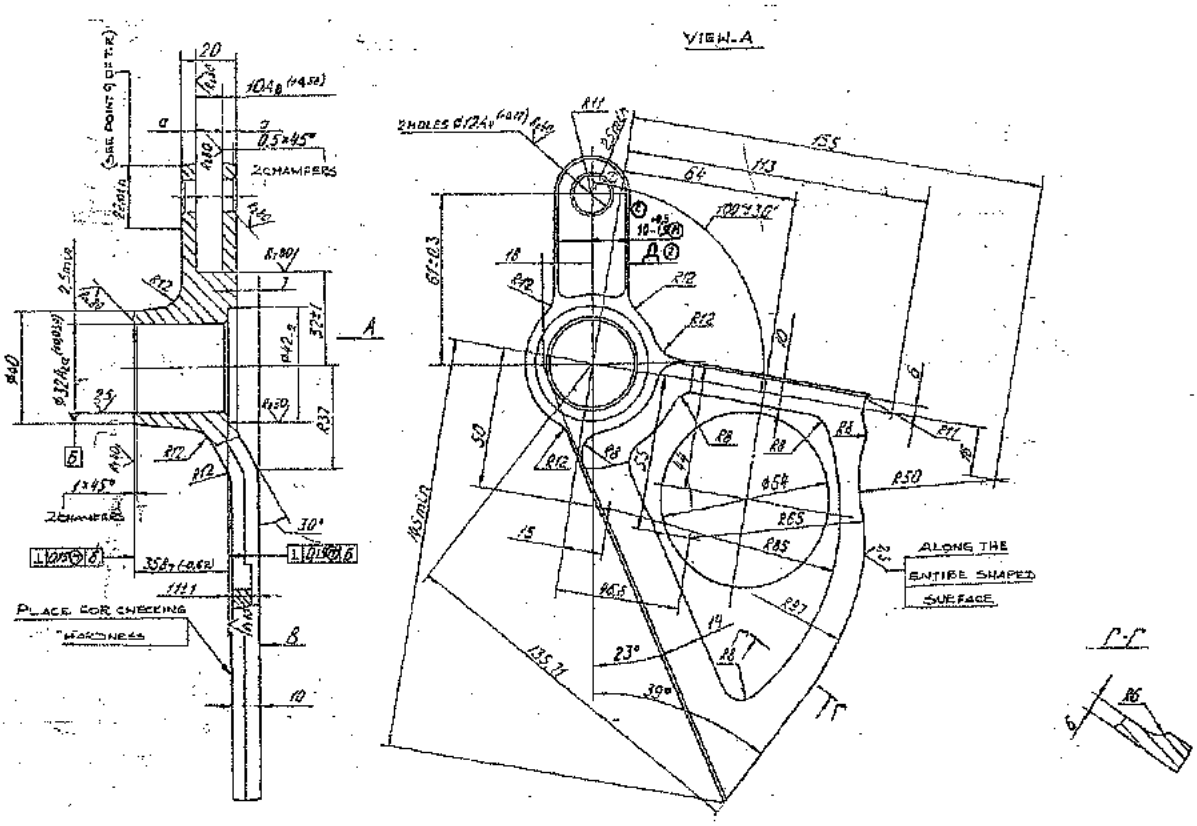


FIG: CAM R.H TO DRG. NO 172.63.054-1

APPENDIX ' A'

RECORD OF AMENDMENTS

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

RESTRICTED
(DRAFT/PROVISIONAL)
QUALITY ASSURANCE PLAN

FOR

(CAM L.H)

DRG.NO.172.63.053-1

(LF NO: 6206419077)

No: HVF/T-72C/QAP/63/CAM L.H/242593- 00

ISSUE No: 00 **DATE: OCT–2021**

QUALITY ASSURANCE (RIG–SUB ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

CAM L.H

DRG. NO. 172.63.053-1

PREPARED BY

(C.NANDA KUMAR)
JWM/QA (RIG-SA)

REVIEWED BY

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

APPROVED BY

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

ISSUED BY

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

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 **CAM L.H TO DRG.NO 172.63.053-1** 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 **CAM L.H TO DRG.NO:172.63.053-1**

sheet / Process Book is not available the details particulars/parameters available in the drawings to be strictly adhered.

6. ITEM USED ON:

1. 175.63.041CB-BCB - MOUNTING OF CAM ASSY L.H.

7. LIST OF DRAWINGS:

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	172.63.053-1	CAM L.H	-

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

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	172.63.053-1	CAM L.H	STEEL 38XC GOST 4543-71.	1

Note: Vendor/Contractor may use approved alternate material if any specified in drawing/ specification. *Also 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 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.

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 **CAM L.H TO DRG. NO.172.63.053-1** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

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

NOTE-I:

i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.

ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.

iii. In case of S.O, it is the responsible of the vendor to obtained copy of QAP and give the statement of compliance that the vendor will follow QAP. However, GM/HVF reserves the right to revise/update the QAP from time to time.

5. **DOCUMENTS:**

a) On placement of firm supply order, One set of relevant specification and technical instructions on the subject item can be obtained by the contractor from AHSP through DDO/HVF

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

10. SAMPLING PLAN:

Sl. No.	Sampling Plan	Pilot	Bulk
(i)	Visual Inspection	100%	100%
(ii)	Dimensional Inspection	100%	General Inspection level III, single sampling, Normal Inspection, AQL 2.5 of IS 2500 (Part-I)-2000
(iii)	Material Inspection	1 No	1 No. for each batch of raw material or heat treatment lot as required by specifications.
(iv)	Acceptance test	100%	100%
(v)	Pressure testing	------	------
(vi)	Machining / Fitment/ Performance trial on higher assembly / Tank	01 No.	01 No. per batch / As required.
vii)	Interchangeability Test	02 Nos.	02 Nos. per batch on randomly basis, except selective assembly.
viii)	Test stand/Jigs/ Fixtures/Gauges/Mandrels/etc.	100 %	100 %
ix)	Marking/Identification	100%	100%
x)	Packing/ Preservation	100%	100%

Note:-

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

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

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

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

- Defects in construction
- Cracks/Dents/Scratches.
- Fitment of all components
- Presence of foreign particles
- Moisture and dust
- Corrosion of metal parts

- Mechanical imperfections & distortion
- Any form of deterioration of material and finishing.

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

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

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

12.1 CAM L.H TO DRG. 172.63.053-1

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.
4. Place for checking hardness refer drawing.

13) MATERIAL CHECKS [SAMPLING PLAN AS PARA – 10 (iii)]

Material specimen /test bars of the components shall be in conformity as per the material mentioned in the relevant documents/drawing. NABL test reports for all the parameters as per relevant specifications to be submitted. Test samples to be submitted by the vendor to HVF, if required. The material check will be carried out as per sampling plan. * However, if the manufacturer proposes any alternative material at the stage of tender enquiry, the same has to be approved and a written concurrence should be obtained from AHSP through DDO/HVF, before usage of such materials.

13.1 CAM L.H TO DRG.NO 172.63.053-1

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

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

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

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

c) Mechanical properties: As per STEEL 38XC GOST 4543 –71.

Grade	Yield point, (kgf/mm²)	Ultimate strength, (Kgf/mm²)	Elongation %	Relative reduction of area %	Impact strength (Kgm/cm²)
	Not less than				
38XC	75	95	12	50	7

Note: For other properties refer GOST 4543-71.

14) PERFORMANCES/ACCEPTANCE TEST: CAM L.H TO DRG.NO.172.63.053-1

1. BHN 341-285 (IND.DIA. 3.3 TO 3.6) MAY BE CHECKED ON BLANK.
2. IN HOLE ø 64, PRESENCE OF PRESSED IN FIN AND SHRINKAGE OF EDGES ARE ALLOWED ø 64 NEED NOT BE CHECKED.
3. DEVIATION OF THE CAM PROFILE FROM THE PROFILE OF TEMPLET MADE TO NOMINAL DIMENSIONS SHOULD NOT EXCEED 0.3mm
4. NON PARALLELISM OF GENERATRICES OF SHAPED SURFACE RELATIVE TO AXIS OF SURFACE ø 32 A2a SHOULD NOT EXCEED 0.1mm OVER THE ENTIRE LENGTH OF SHAPED SURFACE GENERATRICES.
5. NON SQUARENESS OF AXIS OF SURFACE ø 32 A2a RELATIVE TO SURFACE "B" SHOULD NOT EXCEED 0.5mm. IT IS TO BE CHECKED ALONG THE CAM PROFILE AT A LENGTH OF 10mm min FROM THE PROFILE IT IS ALLOWED TO MACHINE SURFACE "B" TO A THICKNESS OF 8.5mm min SHOULDER IS ALLOWED.
6. NON SQUARENESS OF THE AXIS OF HOLE ø 12A4 RELATIVE TO THE SURFACE OF SLOT AT DIMENSION 10A8, IS TO BE CHECKED BY FREE ROTATION OF RING ON SHAFT ø 12X. THE RING HAS A HEIGHT OF 9.8mm, EXTERNAL DIAMETER OF 35mm min.
7. VARIATION IN MEASUREMENTS OF DIMENSIONS "a" SHOULD NOT EXCEED 0.8mm
8. IN HOLE ø 32 A2a TOOL MARKS AND REDUCTION OF ø 32 A2a BY 0.008mm ARE ALLOWED.
9. THE HEIGHT OF FORK 20B7 (-0.52) IS TO BE CHECKED BY TOOL AT A LENGTH OF 22min SHOULDER IS ALLOWED.
10. REMAINING REQUIREMENTS AS PER 520 TY 1.
11. FOR ENSURING DIMENSION 10 $^{+0.5}_{-1.5}$ MACHINING OF SURFACE T IS ALLOWED.
12. COATING OF UNMACHINED SURFACES.
    PRIMER ФЛ-03K.
    DARK-GREY ENAMEL ПФ-223 OR DARK-GREY ENAMEL ПФ-115, 894.
    REQUIREMENTS AS PER 520 Ty 5.

15) FITMENT AND PERFORMANCE TEST:

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

EXPLANATORY NOTE:

1) Stage wise 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.

16) INTERCHANGEABILITY:

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

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

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

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

18) MARKING/IDENTIFICATION.

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

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

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

19) PRESERVATION CHECK

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

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

20) PACKING CHECK

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

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

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

21) DOCUMENTATION

i. Firm has to maintain all the documents as per QAP with respect to the 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 (NABL Certificate), 2.Mechanical properties (NABL Certificate), 3. Pre-forming process, 4. Coating certification (wherever applicable), 5. Calibration reports of instruments and 6. 100 % Dimensional inspection reports.

22) REFERENCE:

a) Drawing No: 172.63.053-1

b) Material specification as per drawing:
STEEL 38XC GOST 4543-71.

c) GOST 4543-71 .

d) Specification 520 TY1 & 520 TY5.

ANNEXURE-A

SL. NO.	CATEGORY	ASSEMBLY/ SUB ASSEMBLY	TESTS/ INSPECTIONPARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	CAM L.H TO DRG. NO 172.63.053-1	**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 4543-71.	All the values to confirm with QAP Para no: 13.1 (a), (b) & (c).	P	W/V	R	SP followed by HVF.
4		**Hardness check**	Hardness 341- 285 BHN (Dia. Of Ind. 3.3 to 3.6)	Refer QAP Para no: 14(1)	Confirm to QAP Para no: 14(1)	P	W/V	R	SP followed by HVF.
5		**Coating check**	Coating	Refer QAP Para no: 14(12)	Confirm to QAP Para no: 14(12)	P	W/V	R	SP followed by HVF.
6		**Dimensional checks**	Dimensions as per the drawing	Refer drawing / QAP Para no: 12.1	Confirm to drawing and QAP	P	W/P	R	100% by firm/ vendor. SP followed by HVF.
7		**Marking / traceability**	Marking / traceability	Refer QAP Para no: 18	Confirm to QAP Para no: 18	P	V	R	100% by firm/ vendor.
8		**Preservation & packing**	Preservation & packing	Refer QAP Para no 19 & 20	Confirm to QAP Para no 19 & 20	P	V	R	100% by firm/ vendor.

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 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

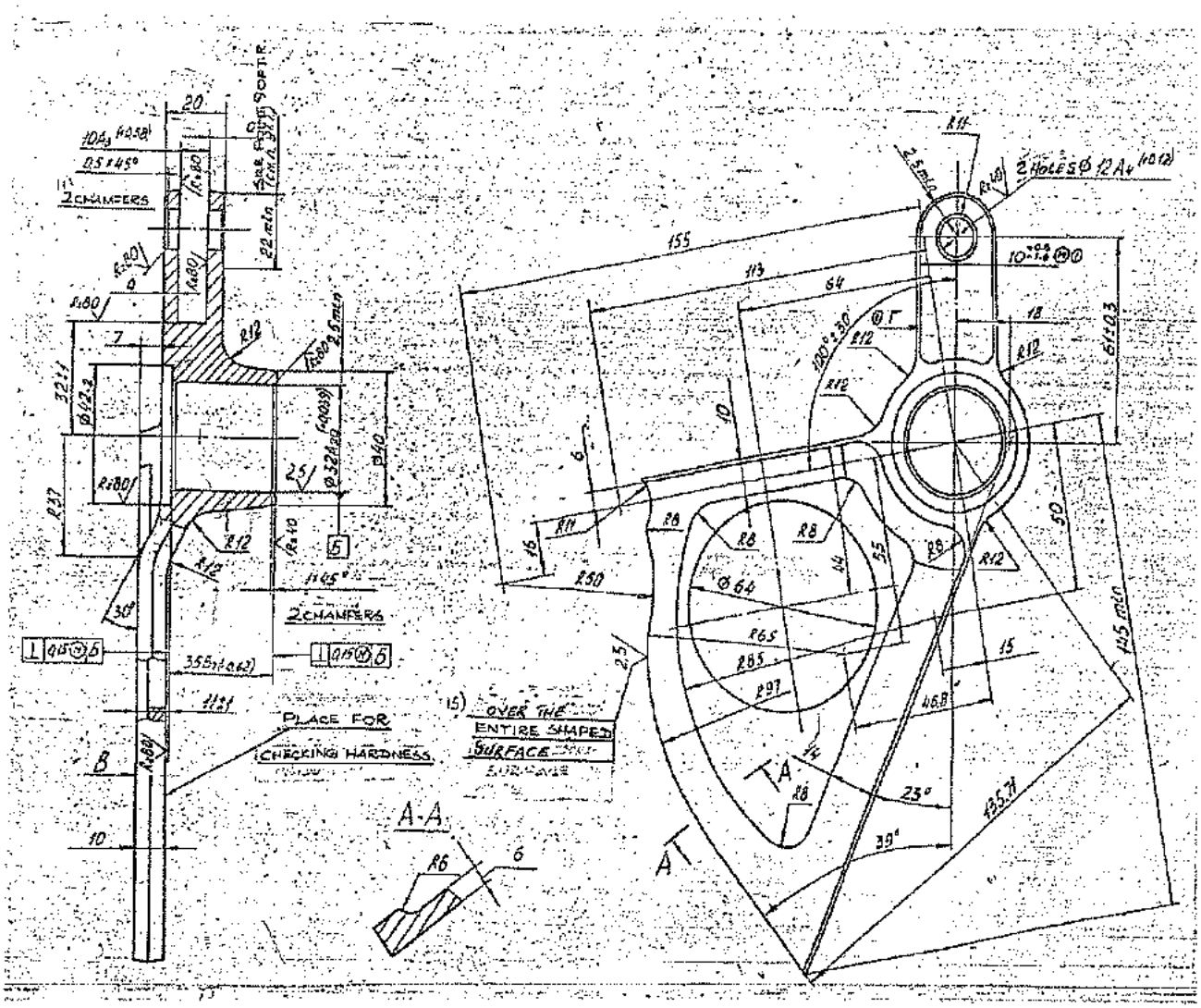


FIG: CAM L.H TO DRG. NO 172.63.053-1
(For reference only)

APPENDIX 'A'

RECORD OF AMENDMENTS

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

RESTRICTED
(DRAFT/PROVISIONAL)
QUALITY ASSURANCE PLAN

FOR

(LOCK)

DRG.NO. 172.11.155

(LF NO: 6206110014)

No HVF/T-72C/QAP/11/LOCK/242661 - 00

ISSUE No: 00 **DATE: OCT– 2021**

QUALITY ASSURANCE (RIG–SUB ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

LOCK

DRG. NO. 172.11.155

PREPARED BY

(C.NANDA KUMAR)
JWM/QA (RIG-SA)

REVIEWED BY

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

APPROVED BY

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

ISSUED BY

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

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 **LOCK TO DRG.NO 172.11.155** 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 **LOCK TO DRG.NO:172.11.155.**

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 **LOCK TO DRG. NO. 172.11.155** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

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

NOTE-I:

i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.

ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.

iii. In case of S.O, it is the responsible of the vendor to obtained copy of QAP and give the statement of compliance that the vendor will follow QAP. However, GM/HVF reserves the right to revise/update the QAP from time to time.

5. DOCUMENTS:

a) On placement of firm supply order, One set of relevant specification and technical instructions on the subject item can be obtained by the contractor from AHSP through DDO/HVF

b) Any clarification required on these documents should be obtained from the Inspecting Authority i.e. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. 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. 172.11.034CBCB -

7. LIST OF DRAWINGS:

Sl. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	172.11.155	LOCK	-

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

Sl. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	172.11.155	LOCK	STEEL 38XC GOST 4543-71	1

Note: Vendor / Contractor may use approved alternate material if any specified in drawing/ specification.* Also refer Para no.13.

9. CONDITIONS OF USE/STORAGE INSTRUCTIONS

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

(a) The threaded parts if any should be covered with suitable plastic caps to prevent damages.

(b) If the item consists of assemblies, each assembly should be packed separately.

(c) The stores are to be suitably covered for preventing ingress of dust and Dirt/entry of sunlight / moisture.

(d) The packaging slip shall contains

(i) Certificate of testing- NABL Certificate.

(ii) Guarantee/ Warranty Certificate

(iii) Service and maintenance instructions

(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 Nos.	01 Nos. per batch/As required.
vii)	Interchangeability Test	02 Nos.	02 Nos. per batch on randomly basis, except selective assembly.
viii)	Test stand/Jigs/ Fixtures/Gauges/Mandrels/etc.	100 %	100 %
ix)	Marking/Identification	100%	100%
x)	Packing/ Preservation	100%	100%

Note:-

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

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

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

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

- Defects in construction
- Cracks/Dents/Scratches
- Fitment of all components
- Presence of foreign particles
- Moisture and dust
- Corrosion of metal parts

- Mechanical imperfections & distortion
- Any form of deterioration of material and finishing.

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

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

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

12.1 LOCK TO DRG.NO 172.11.155

All dimensions should be confirmed as per drawing.

Sl. No.	Drawing Dimensions
1.	R21
2.	R40
3.	[16] mm
4.	25°
5.	9 mm
6.	[21] mm
7.	R16 Conventionally (Refer Drawing).
8.	10°
9.	18°±1°
10.	R8
11.	R27
12.	35°
13.	3±1 mm
14.	5°±30'
15.	25±0.5 mm
16.	R16
17.	11^{+2} mm
18.	[13] mm
19.	92±1 mm
20.	58±0.5 mm

21.	[28] mm
22.	[ϕ29.5] mm
23.	[M36X2]
24.	R30
25.	8 mm
26.	7 mms
27.	Surface finish/Roughness should be confirmed as per drawing and specification.

Refer drawing / specification for admissible alternate manufacture in dimensions/material if any specified for the component.

13) MATERIAL CHECKS [SAMPLING PLAN AS PARA – 10 (iii)]

Material specimen /test bars of the components shall be in conformity as per the material mentioned in the relevant documents/drawing. NABL test reports for all the parameters as per relevant specifications to be submitted. Test samples to be submitted by the vendor to HVF, if required. The material check will be carried out as per sampling plan.* However, if the manufacturer proposes any alternative material at the stage of tender enquiry, the same has to be approved and a written concurrence should be obtained from AHSP through DDO/HVF, before usage of such materials.

13.1 LOCK TO DRG.NO.172.11.155

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

b) **Chemical properties:** As per STEEL 38XC GOST 4543-71.

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

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

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

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

Note: For other properties refer GOST 4543-71

14) PERFORMANCES / ACCEPTANCE TEST: LOCK TO DRG.NO:172.11.155

1. Dimensions within brackets are after assembly as per Drg.172.11.034CBCB.
2. Other requirements for component as per 520.TY1.

15) FITMENT AND PERFORMANCE TEST:

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

EXPLANATORY NOTE:

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

16) INTERCHANGEABILITY:

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

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

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

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

18) MARKING/IDENTIFICATION

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

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

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

19) PRESERVATION CHECK

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

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

20) PACKING CHECK

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

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

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

21) DOCUMENTATION

i. Firm has to maintain all the documents as per QAP with respect to the 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 (NABL Certificate), 2.Mechanical properties (NABL Certificate), 3. Pre-forming process, 4. Coating certification. 5. Calibration reports of instruments and 6. 100 % Dimensional inspection reports.

22) REFERENCE:

a) Drawing No: 172.11.155
b) Material specification as per drawing:
STEEL 38XC GOST 4543-71.
c) GOST 4543-71.
d) Specification: 520.TY1.

ANNEXURE-A

SL. NO.	CATEGORY	ASSEMBLY/SUB ASSEMBLY	TESTS/INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	LOCK TO DRG. NO 172.11.155	**Pre inspection reports (PIR) of firm**	Firm has to produced all the document as per Para 21 (iv)	As per the relevant drawing and QAP.	Confirm to drawing and QAP as per bill of material	P	V	R	100% by firm/ vendor.
2		**Bill of material (BOM)**	Firm has to prepare the BOM as per QAP	Refer QAP Para no: 8 or item list.	Confirm to QAP.	P	V	R	100% by firm/ vendor.
3		**Material tests**	Chemical composition & Mechanical / Physical Properties	As per–GOST 4543-71.	All the values to confirm with QAP (Para no:13.1 (a), (b) & (c))	P	W/V	R	SP followed by HVF.
4		**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		**Marking / traceability**	Firm has to make marking / traceability records.	Refer QAP Para no: 18	Confirm to QAP Para no: 18	P	V	R	100% by firm/ vendor.
6		**Preservation & packing**	Firm has to make Preservation & packing records	Refer QAP Para no: 19 & 20	Confirm to QAP Para no: 19 & 20	P	V	R	100% by firm/ vendor.

Note:

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

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 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**

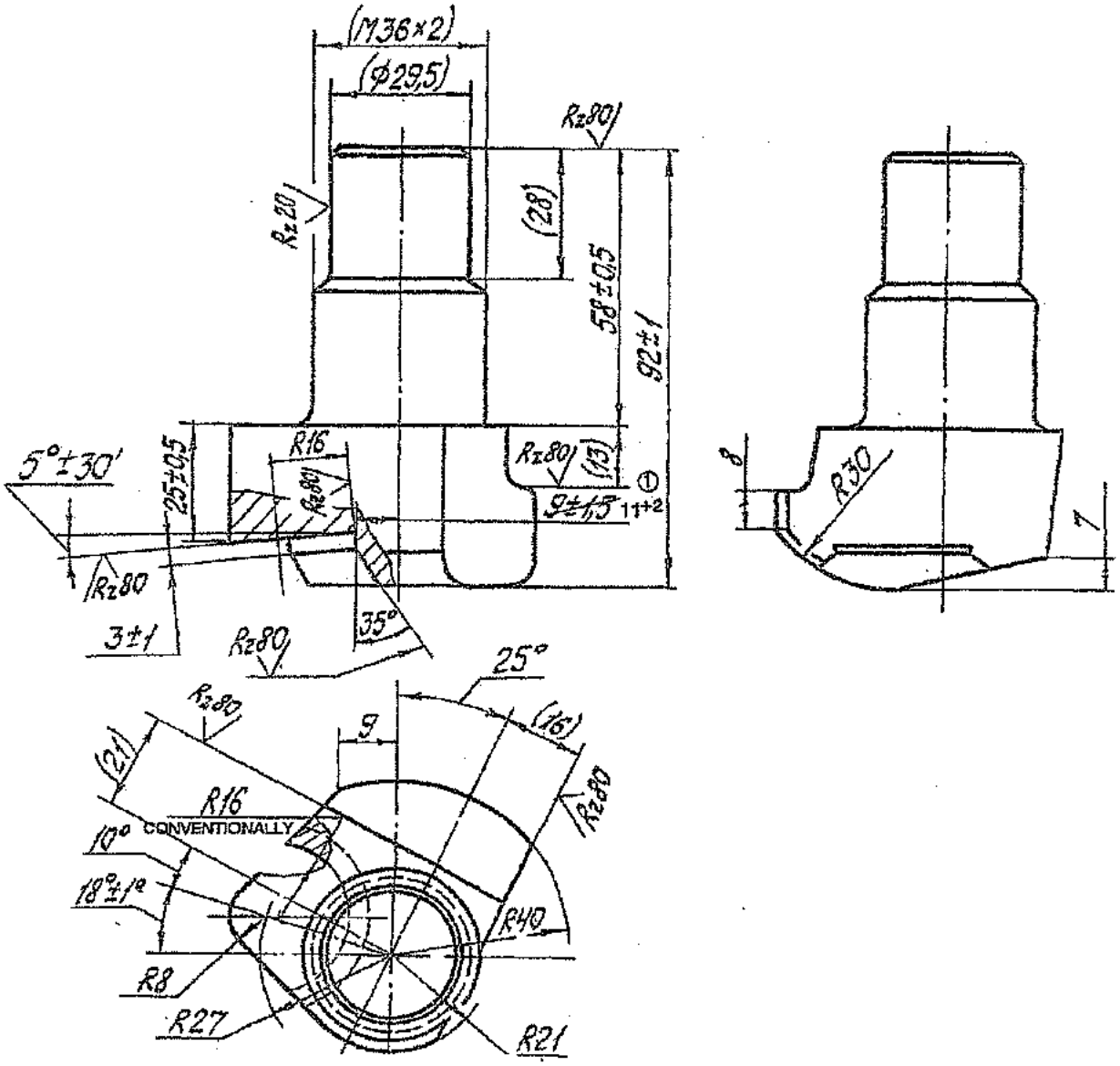


FIG: LOCK TO DRG. NO 172.11.155

APPENDIX ' A'

RECORD OF AMENDMENTS

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

RESTRICTED
(DRAFT/PROVISIONAL)
QUALITY ASSURANCE PLAN

FOR

(LEVER)

DRG.NO.175.02.261-1

(LF NO: 6206102348)

No: HVF/T-72C/QAP/02/LEVER/242595- 00

ISSUE No: 00 **DATE: OCT–2021**

QUALITY ASSURANCE (RIG–SUB ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

LEVER

DRG. NO. 175.02.261-1

PREPARED BY

(C.NANDA KUMAR)
JWM/QA (RIG-SA)

REVIEWED BY

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

APPROVED BY

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

ISSUED BY

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

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 **LEVER TO DRG.NO 175.02.261-1** 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 **LEVER TO DRG.NO:175.02.261-1**

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 **LEVER TO DRG. NO.175.02.261-1** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

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

NOTE-I:

i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.

ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.

iii. In case of S.O, it is the responsible of the vendor to obtained copy of QAP and give the statement of compliance that the vendor will follow QAP. However, GM/HVF reserves the right to revise/update the QAP from time to time.

5. DOCUMENTS:

a) On placement of firm supply order, One set of relevant specification and technical instructions on the subject item can be obtained by the contractor from AHSP through DDO/HVF

b) Any clarification required on these documents should be obtained from the Inspecting Authority i.e. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. 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. 175.02.007CB-1CB - LEVER WITH ROLLER.

7. LIST OF DRAWINGS:

Sl. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	175.02.261-1	LEVER	-

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

Sl. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	175.02.261-1	LEVER	STEEL 38XC GOST 4543-71.	1

Note: Vendor/Contractor may use approved alternate material if any specified in drawing/ specification. *Also 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 Certificate.

(ii) Guarantee/ Warranty Certificate.

(iii) Service and maintenance instructions.

(iv) Delivery Slip with Inspector's Acceptance Mark.

(v) Undertaking letter / certificate of conformance.

(e) The stores are not permitted to be stored together with oils. Petrol, acids, alkaline and other substances to avoid damage to the metal / rubber components.

10. SAMPLING PLAN:

Sl. No.	Sampling Plan	Pilot	Bulk
(i)	Visual Inspection	100%	100%
(ii)	Dimensional Inspection	100%	General Inspection level III, single sampling, Normal Inspection, AQL 2.5 of IS 2500 (Part-I)-2000
(iii)	Material Inspection	1 No	1 No. for each batch of raw material or heat treatment lot as required by specifications.
(iv)	Acceptance test	100%	100%
(v)	Pressure testing	------	-------
(vi)	Machining / Fitment/ Performance trial on higher assembly / Tank	01 No.	01 No. per batch / As required.
vii)	Interchangeability Test	02 Nos.	02 Nos. per batch on randomly basis, except selective assembly.
viii)	Test stand/Jigs/ Fixtures/Gauges/Mandrels/etc.	100 %	100 %
ix)	Marking/Identification	100%	100%
x)	Packing/ Preservation	100%	100%

Note:-

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

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

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

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

- Defects in construction
- Cracks/Dents/Scratches.
- Fitment of all components
- Presence of foreign particles
- Moisture and dust

- Corrosion of metal parts
- Mechanical imperfections & distortion
- Any form of deterioration of material and finishing.

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

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

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

12.1 LEVER TO DRG. 175.02.261-1

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.

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 LEVER TO DRG.NO 175.02.261-1

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

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

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

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

c) Mechanical properties: As per STEEL 38XC GOST 4543 –71.

Grade	Yield point, (kgf/mm²)	Ultimate strength, (Kgf/mm²)	Elongation %	Relative reduction of area %	Impact strength (Kgm/cm²)
	Not less than				
38XC	75	95	12	50	7

Note: For other properties refer GOST 4543-71.

14) PERFORMANCES/ACCEPTANCE TEST: LEVER TO DRG.NO.175.02.261-1

1. BHN 255 to 302. To be checked in blank.
2. Draft - Internal.
3. Skewness (shift) of stamping axis 0^{+2} mm
4. Traces of burrs along parting line of die - 0^{+2} mm
5. Splines are to be checked with combination gauge with nominal dimension of pitch diameter of thread 25 mm.
6. Other requirement as per 520.TY1.

15) FITMENT AND PERFORMANCE TEST:

a. Pilot samples should be checked for fitment and Performance test to ascertain the efficacy of the system under different operating conditions by fitting in higher assembly and repeating it for functional checks, wherever required.

b. Items of Bulk supplies may be subjected to performance trial in tank in case of repeated failure/defects during exploitation.

EXPLANATORY NOTE:

1) Stage wise 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.

16) INTERCHANGEABILITY:

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

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

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

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

18) **MARKING/IDENTIFICATION.**

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

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

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

19) **PRESERVATION CHECK**

a) Preservative coatings are to be strictly adhered to as called for in the drawing. However, equivalent BIS Standards can also be followed, subject to the thickness of the coating/preservative is maintained as per the drawing/specification.
b) Other preservations as necessary to prevent damages due to moisture and dust during process, storage and transit are to be carried out. Conventional Methods can also be resorted to.

20) **PACKING CHECK**

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

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

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

21) **DOCUMENTATION**

i. Firm has to maintain all the documents as per QAP with respect to the 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 (NABL Certificate), 2.Mechanical properties (NABL Certificate), 3. Pre-forming process, 4. Coating certification (wherever applicable), 5. Calibration reports of instruments and 6. 100 % Dimensional inspection reports.

22) <u>REFERENCE:</u>

a) Drawing No: 175.02.261-1

b) Material specification as per drawing:
STEEL 38XC GOST 4543-71.

c) GOST 4543-71.

d) Specification 520 TY1.

SL. NO.	CATEGORY	ASSEMBLY/ SUB ASSEMBLY	TESTS/ INSPECTIONPARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	LEVER TO DRG. NO 175.02.261-1	**Pre inspection reports (PtR) 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 4543-71.	All the values to confirm with QAP Para no: 13.1 (a), (b) & (c).	P	W/V	R	SP followed by HVF.
4		**Hardness check**	Hardness 255 -302 BHN	Refer QAP Para no: 14(1)	Confirm to QAP Para no: 14(1)	P	W/V	R	SP followed by HVF.
5		**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.
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.

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 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

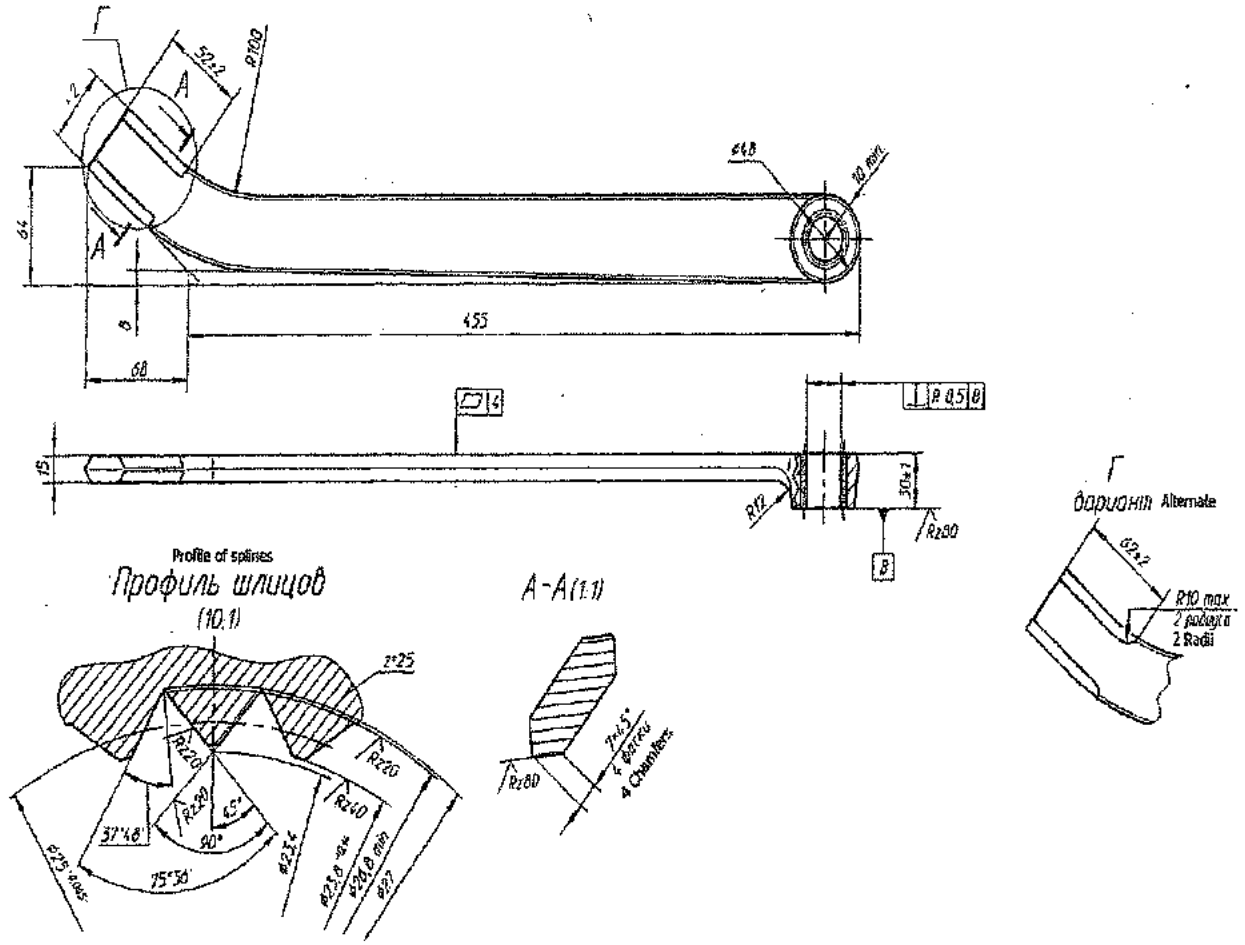


FIG: LEVER TO DRG. NO 175.02.261-1
(For reference only)

APPENDIX ' A'

RECORD OF AMENDMENTS

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

RESTRICTED

(DRAFT/PROVISIONAL) QUALITY ASSURANCE PLAN

FOR

(LEVER)

DRG.NO.172.63.079

(LF NO: 6206419081)

No: HVF/T-72C/QAP/63/LEVER/242594- 00

ISSUE No: 00 DATE: OCT–2021

QUALITY ASSURANCE (RIG–SUB ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI CHENNAI – 600 054

QUALITY ASSURANCE PLAN (QAP)

FOR

LEVER

DRG. NO. 172.63.079

PREPARED BY

(C.NANDA KUMAR)
JWM/QA (RIG-SA)

REVIEWED BY

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

APPROVED BY

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

ISSUED BY

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

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 **LEVER TO DRG.NO 172.63.079** 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 **LEVER TO DRG.NO:172.63.079**

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 **LEVER TO DRG. NO.172.63.079** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

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

NOTE-I:

i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.

ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.

iii. In case of S.O, it is the responsible of the vendor to obtained copy of QAP and give the statement of compliance that the vendor will follow QAP. However, GM/HVF reserves the right to revise/update the QAP from time to time.

5. DOCUMENTS:

a) On placement of firm supply order, One set of relevant specification and technical instructions on the subject item can be obtained by the contractor from AHSP through DDO/HVF

b) Any clarification required on these documents should be obtained from the Inspecting Authority i.e. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. 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. 175.63.030CB -
2. 175.63.031CB -

7. LIST OF DRAWINGS:

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1	172.63.079	LEVER	-

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

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
1	172.63.079	LEVER	STEEL 38XC GOST 4543-71.	1

Note: Vendor/Contractor may use approved alternate material if any specified in drawing/ specification. *Also 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 Certificate.
- (ii) Guarantee/ Warranty Certificate.
- (iii) Service and maintenance instructions.
- (iv) Delivery Slip with Inspector's Acceptance Mark.
- (v) Undertaking letter / certificate of conformance.

(e) The stores are not permitted to be stored together with oils. Petrol, acids, alkaline and other substances to avoid damage to the metal / rubber components.

10. SAMPLING PLAN:

Sl. No.	Sampling Plan	Pilot	Bulk
(i)	Visual Inspection	100%	100%
(ii)	Dimensional Inspection	100%	General Inspection level III, single sampling, Normal Inspection, AQL 2.5 of IS 2500 (Part-I)-2000
(iii)	Material Inspection	1 No	1 No. for each batch of raw material or heat treatment lot as required by specifications.
(iv)	Acceptance test	100%	100%
(v)	Pressure testing	------	-------
(vi)	Machining / Fitment/ Performance trial on higher assembly / Tank	01 No.	01 No. per batch / As required.
vii)	Interchangeability Test	02 Nos.	02 Nos. per batch on randomly basis, except selective assembly.
viii)	Test stand/Jigs/ Fixtures/Gauges/Mandrels/etc.	100 %	100 %
ix)	Marking/Identification	100%	100%
x)	Packing/ Preservation	100%	100%

Note:-

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

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

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

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

- Defects in construction
- Cracks/Dents/Scratches.
- Fitment of all components
- Presence of foreign particles
- Moisture and dust

- Corrosion of metal parts
- Mechanical imperfections & distortion
- Any form of deterioration of material and finishing.

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

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

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

12.1 LEVER TO DRG. 172.63.079

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.
4. Place for checking hardness refer drawing.

13) MATERIAL CHECKS [SAMPLING PLAN AS PARA – 10 (iii)]

Material specimen /test bars of the components shall be in conformity as per the material mentioned in the relevant documents/drawing. NABL test reports for all the parameters as per relevant specifications to be submitted. Test samples to be submitted by the vendor to HVF, if required. The material check will be carried out as per sampling plan. * However, if the manufacturer proposes any alternative material at the stage of tender enquiry, the same has to be approved and a written concurrence should be obtained from AHSP through DDO/HVF, before usage of such materials.

13.1 LEVER TO DRG.NO 172.63.079

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

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

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

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

c) Mechanical properties: As per STEEL 38XC GOST 4543 –71.

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

Note: For other properties refer GOST 4543-71.

14) <u>PERFORMANCES/ACCEPTANCE TEST: LEVER TO DRG.NO.172.63.079</u>

1. TO BE HEAT TREATED TO BHN 302 ~ 255 (IND.DIA.3,5 TO 3,8) TO BE CHECKED ON BLANK.
2. EXTERNAL DRAFTS UPTO 7°.
3. PERMISSIBLE DEVIATIONS ON ROUGH DIMENSIONS AS PER ACCURACY GROUP 2 OF GOST 7505-55.
4. UNSPECIFIED RADII TO R5.
5. TECHNICAL REQUIREMENTS FOR SURFACES NOT TO BE MACHINED AS PER GOST 8479-57.
6. THICKNESS OF BODY AS PER THE MEASUREMENT "a" IS MINIMUM 3,5mm. AS PER THE MEASUREMENT "b" IS MINIMUM 4mm. AS PER THE MEASUREMENT "δ" IS MINIMUM 2,5mm, AS PER THE MEASUREMENT "2" IS MINIMUM 0,2mm.
7. NON PARALLELISM OF AXES OF SPLINE HOLE AND HOLE ϕ 8 A¾ SHOULD NOT EXCEED 0,4mm (15) OVER A LENGTH OF 50mm. PERMISSIBLE TOLERANCE. (11)
8. NON SQUARENESS OF AXIS OF SPLINE HOLE RELATIVE TO END FACE AT DIMENSION 26 B7 SHOULD NOT EXCEED 0,5mm OVER A LENGTH OF 50mm. PERMISSIBLE TOLERANCE. (11)
9. NON SQUARENESS OF AXIS OF HOLE ϕ 8 A¾ RELATIVE TO THE SLOT SURFACE IS TO BE CHECKED BY FREE ROTATION OF RING ON SHAFT ϕ8X. THE RING HAS A HEIGHT OF 7,3 mm AND A DIAMETER OF 18mm.
10. BEFORE MILLING SLOT 3 ± 0,05 THE SPLINES ARE TO BE CHECKED BY SPLINE PLUG GAUGE MADE TO MAXIMUM DIMENSION OF MATING COMPONENT.

11. BUCKLING SHOULD NOT EXCEED 1,5mm.

12 REDUCTION OF DIMENSION 9,5 A_7 UPTO $\phi 9{,}5^{+0,5}$ IN SECTION, INDICATED ON FRONT VIEW AND MAKING WIDTH OF SLOT AS PER THE DIMENSION $9{,}5^{+0,36}_{-0,20}$ ON REST OF THE LENGTH ARE ALLOWED. TO BE CHECKED PRIOR TO THE SECTIONING OF COMPONENT AS PER DIMENSION 7,5 A6.

13. POSITION OF SPLINES SHOULD BE SUCH THAT THE SYMMETRY PLANE OF TOOTH SPACES COINCIDES WITH THE PLANE PASSING THROUGH THE COMMON AXIS OF HOLES ϕ8A3/4 AND ϕ13A5. PERMISSIBLE DEVIATION SHOULD BE $\pm 1^{\circ}$.

14. COATING OF UNMACHINED SURFACES.
PRIMER ФЛ-03К.
DARK-GREY ENAMEL ПФ - 223 OR DARK-GREY ENAMEL ПФ-115, 894
REQUIREMENTS AS PER 520 TY 5.

15. MACHING ALONG DOTTED LINE IS ALLOWED.

16. MISMATCH OF DIES UPTO 1mm.

17. UNDERTRIMMED FIN ALONG THE PARTING LINE UPTO 1mm IS ALLOWED.

18. HEIGHT OF LEVER 16 ± 0,5 IS TO BE CHECKED BY TOOL AT A LENGTH OF NOT LESS THAN 18mm.

Gear Details:

BASIC DATA	MODULE	m	1	FOR CHECKING	NOMINAL THICKNESS OF TEETH (ALONG THE ARC OF REFERENCE CIRCLE) OF COMPLEX GAUGE 1,571
	NUMBER OF TEETH	Z	14		
	PROFILE ANGLE OF BASIC RACK	α_0	30°		
	DIAMETER OF REFERENCE CIRCLE	D_1	14	REFERENCE DATA	DIMENSION ϕ14,8 MIN. IS CHECKED WITH COMPLEX GAUGE.
	ADDENDUM MODIFICATION CO-EFFICIENT	ξ	0		
	WIDTH OF TOOTH SPACES ALONG THE ARC OF REFERENCE CIRCLE.	S	$1{,}571^{+0,07}_{+0,03}$		

15) FITMENT AND PERFORMANCE TEST:

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

EXPLANATORY NOTE:

1) Stage wise 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.

16) INTERCHANGEABILITY:

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

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

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

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

18) MARKING/IDENTIFICATION.

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

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

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

19) PRESERVATION CHECK

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

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

20) PACKING CHECK

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

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

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

21) DOCUMENTATION

i. Firm has to maintain all the documents as per QAP with respect to the 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 (NABL Certificate), 2.Mechanical properties (NABL Certificate), 3. Pre-forming process, 4. Coating certification (wherever applicable), 5. Calibration reports of instruments and 6. 100 % Dimensional inspection reports.

22) REFERENCE:

a) Drawing No: 172.63.079

b) Material specification as per drawing:
STEEL 38XC GOST 4543-71.

c) GOST 4543-71, GOST 7505-55 & GOST 8479-57.

d) Specification 520 TY5.

ANNEXURE-A

SL. NO.	CATEGORY	ASSEMBLY/ SUB ASSEMBLY	TESTS/ INSPECTIONPARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	LEVER TO DRG. NO 172.63.079	**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 4543-71.	All the values to confirm with QAP Para no: 13.1 (a), (b) & (c).	P	W/V	R	SP followed by HVF.
4		**Hardness check**	Hardness 302 – 255 BHN (Dia. Of Ind. 3.5 to 3.8)	Refer QAP Para no: 14(1)	Confirm to QAP Para no: 14(1)	P	W/V	R	SP followed by HVF.
5		**Coating check**	Coating	Refer QAP Para no: 14(14)	Confirm to QAP Para no: 14(14)	P	W/V	R	SP followed by HVF.
6		**Dimensional checks**	Dimensions as per the drawing	Refer drawing / QAP Para no: 12.1	Confirm to drawing and QAP	P	W/P	R	100% by firm/ vendor. SP followed by HVF.
7		**Marking / traceability**	Marking / traceability	Refer QAP Para no: 18	Confirm to QAP Para no: 18	P	V	R	100% by firm/ vendor.
8		**Preservation & packing**	Preservation & packing	Refer QAP Para no 19 & 20	Confirm to QAP Para no 19 & 20	P	V	R	100% by firm/ vendor.

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 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

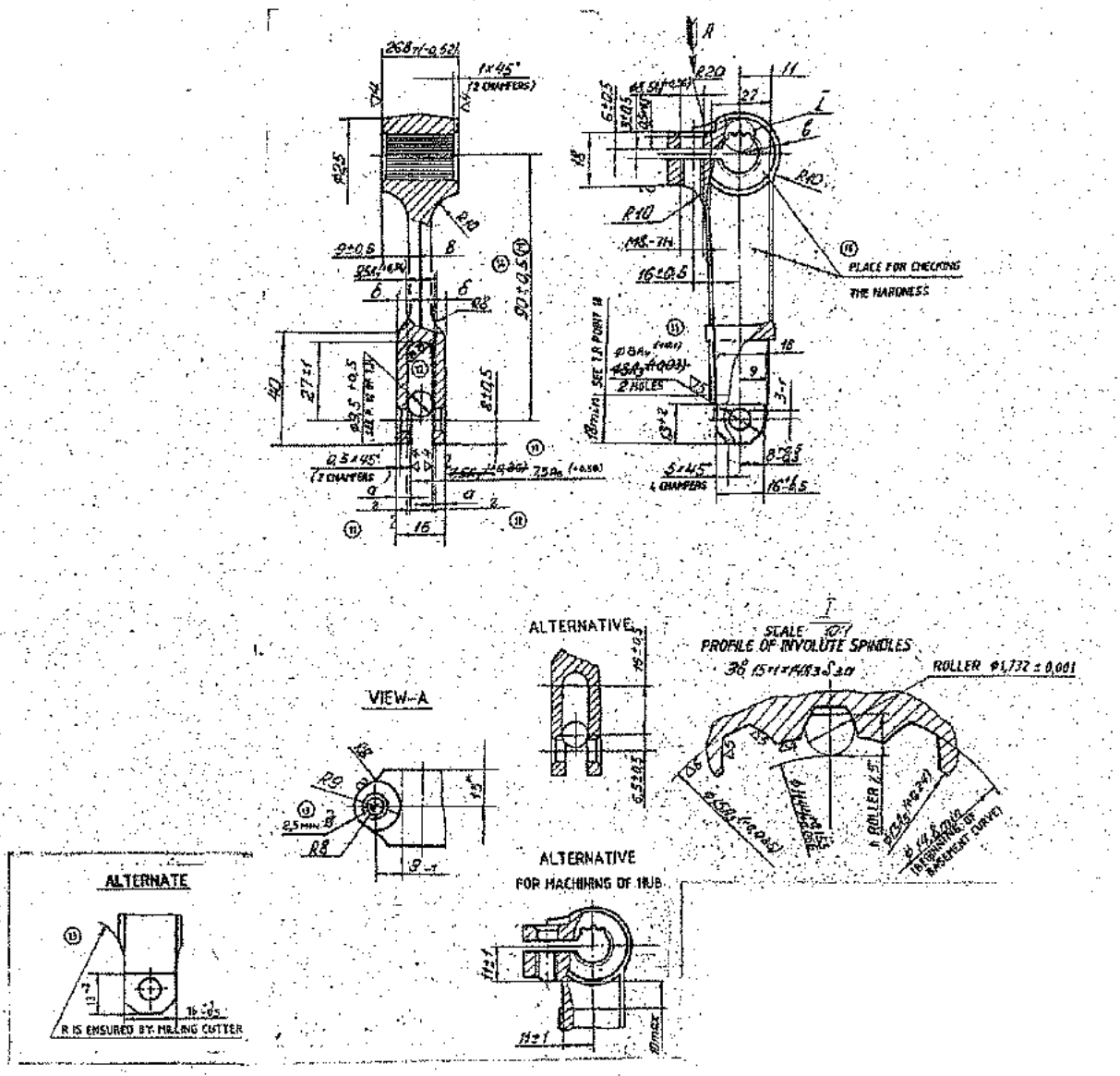


FIG: LEVER TO DRG. NO 172.63.079
(For reference only)

APPENDIX ' A'

RECORD OF AMENDMENTS

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