

USED ON

ZONE

ITEM
NO

DRAWING NUMBER

D S CAT NUMBER

DESCRIPTION

QTY

REMARKS

172.45.060cbCb
188.45.001cb-3CbCOMMON TO T-72.
I/L CREATED BASED ON RUSSIAN ORIGINAL ISSUE - NIL

ZONE	ITEM NO	DRAWING NUMBER	D S CAT NUMBER	DESCRIPTION	QTY	REMARKS
		172.47.015cbCb		HYDRAULIC		
				COUPLING WITH		
				SHAFT ASSY.		
	1	172.47.001cbCb		FLEXIBLE COUPLING		
				WITH PUMPWHEEL ASSY	1	
	2	172.47.042cbCb		RUNNER ASSY	2	
	3	172.47.016		BUSHING	1	
	4	172.47.066		LOCK WASHER	1	
	5	172.47.067		HEAD	1	
	7	172.47.071		ADJUSTING RING	1	SELECTION
	8	172.47.071-01		ADJUSTING RING	1	SELECTION
	9	172.47.071-02		ADJUSTING RING	1	SELECTION
	16	172.47.071-03		ADJUSTING RING	1	SELECTION

356

SUPPLY CODE
U-01-1-2

D90060

F-81

06

ISSUE	DATE	NATURE OF AMENDMENTS	ISSUE	DATE	NATURE OF AMENDMENTS
DRN			CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI.		
CHD			TITLE: HYDRAULIC COUPLING WITH SHAFT ASSY.		
APPD					
DATE	22-6-04	SHT. NO. 1 OF 3	D S CAT NUMBER	ITEM LIST FOR 172.47.015cbCb	

Gp Husparaj

Gp Husparaj

Chanchal

USED ON

ZONE

ITEM NO

DRAWING NUMBER

D S CAT NUMBER

DESCRIPTION

QTY

REMARKS

17

172.47.071-04

ADJUSTING RING

1

6

172.47.103

DRIVEN SHAFT

1

12

172.47.237

WASHER

1

13

172.47.238

PUMP WHEEL

1

14

172.47.240

PIN

24

10

175.47.011

BUSHING

1

11

175.47.028

RING

1

15

ETY-500

BEARING 205

1

Alternate for item 18 or 19

I/L CREATED BASED ON RUSSIAN ORIGINAL ISSUE - NIL

356

SUPPLY CODE
U-01-1-2

D90060

F-81

06

ISSUE

DATE

NATURE OF AMENDMENTS

ISSUE

DATE

NATURE OF AMENDMENTS

DRN

Chanchal

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI.

CHD

Chanchal

TITLE:

HYDRAULIC COUPLING WITH SHAFT ASSY.

APPD

Chanchal

DATE

22-6-04

SHT. NO. 2 OF 3

D S CAT NUMBER

ITEM LIST FOR

172.47.015cbCb

USED ON

ZONE

ITEM NO

DRAWING NUMBER

D S CAT NUMBER

DESCRIPTION

QTY

REMARKS

18

ETY-500

BEARING 205K

1

Alternate for item 15 or 19

19

ETY-500

BEARING 205AK

1

Alternate for item 15 or 18

I/L CREATED BASED ON RUSSIAN ORIGINAL ISSUE - NIL

356

SUPPLY CODE
U-01-1-2

D90060

F-81
06

ISSUE

DATE

NATURE OF AMENDMENTS

ISSUE

DATE

NATURE OF AMENDMENTS

DRN

GP JusLparaj

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI.

CHD

GP JusLparaj

TITLE: **HYDRAULIC COUPLING WITH SHAFT ASSY.**

APPD

Chanchal

DATE

22-6-04

SHT. NO. 3 OF 3

D S CAT NUMBER

ITEM LIST FOR

172.47.015cbCb

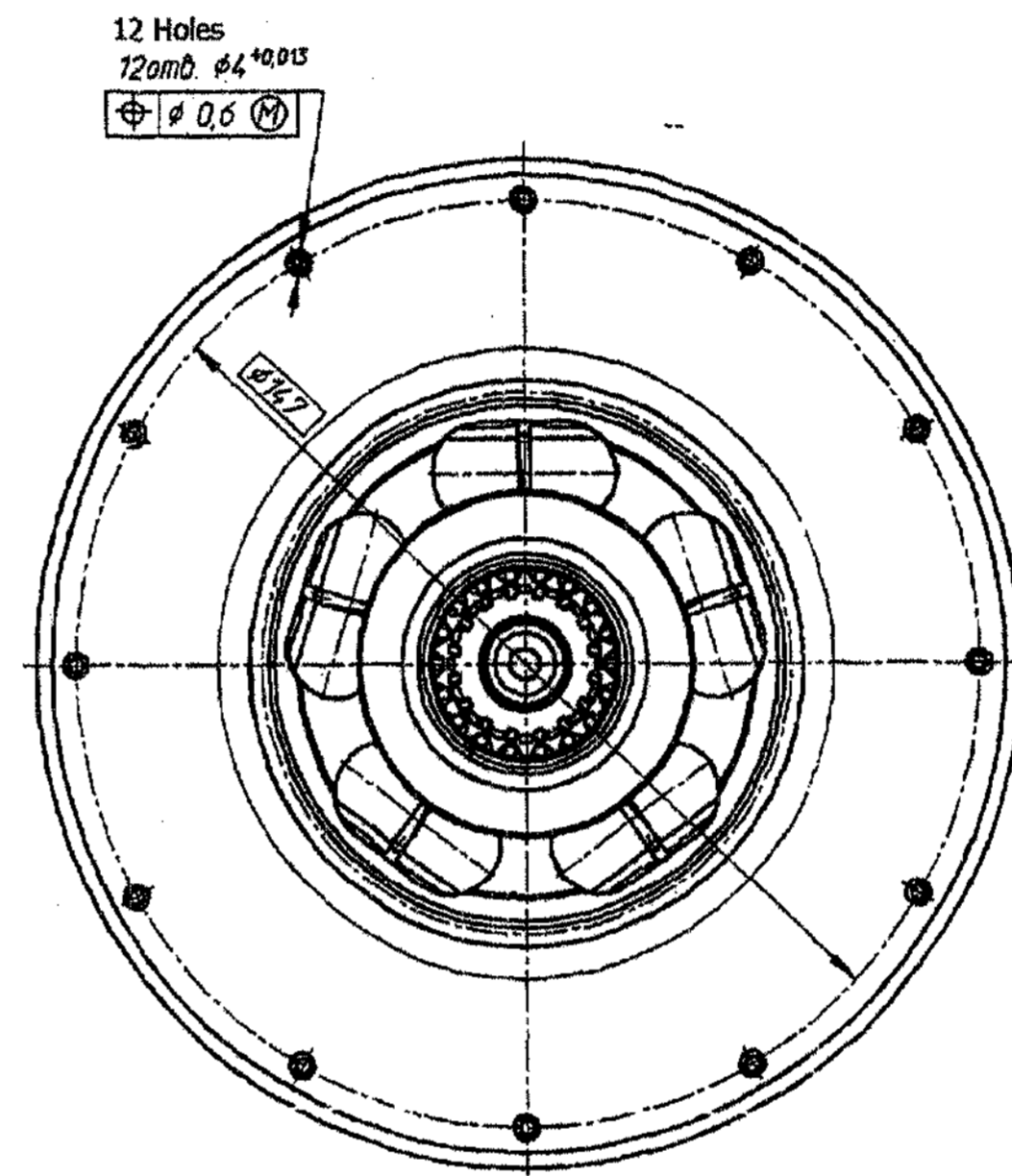
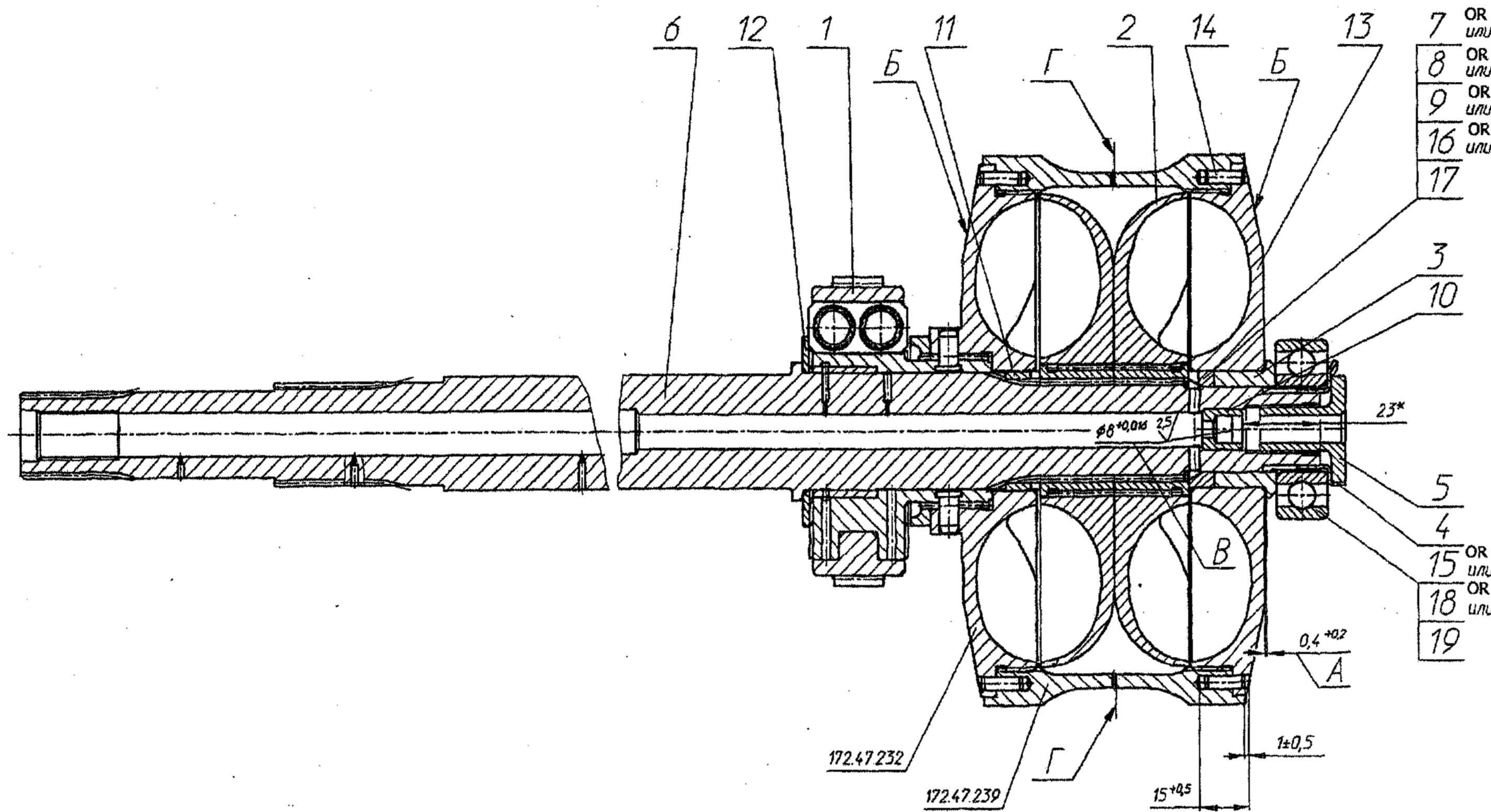
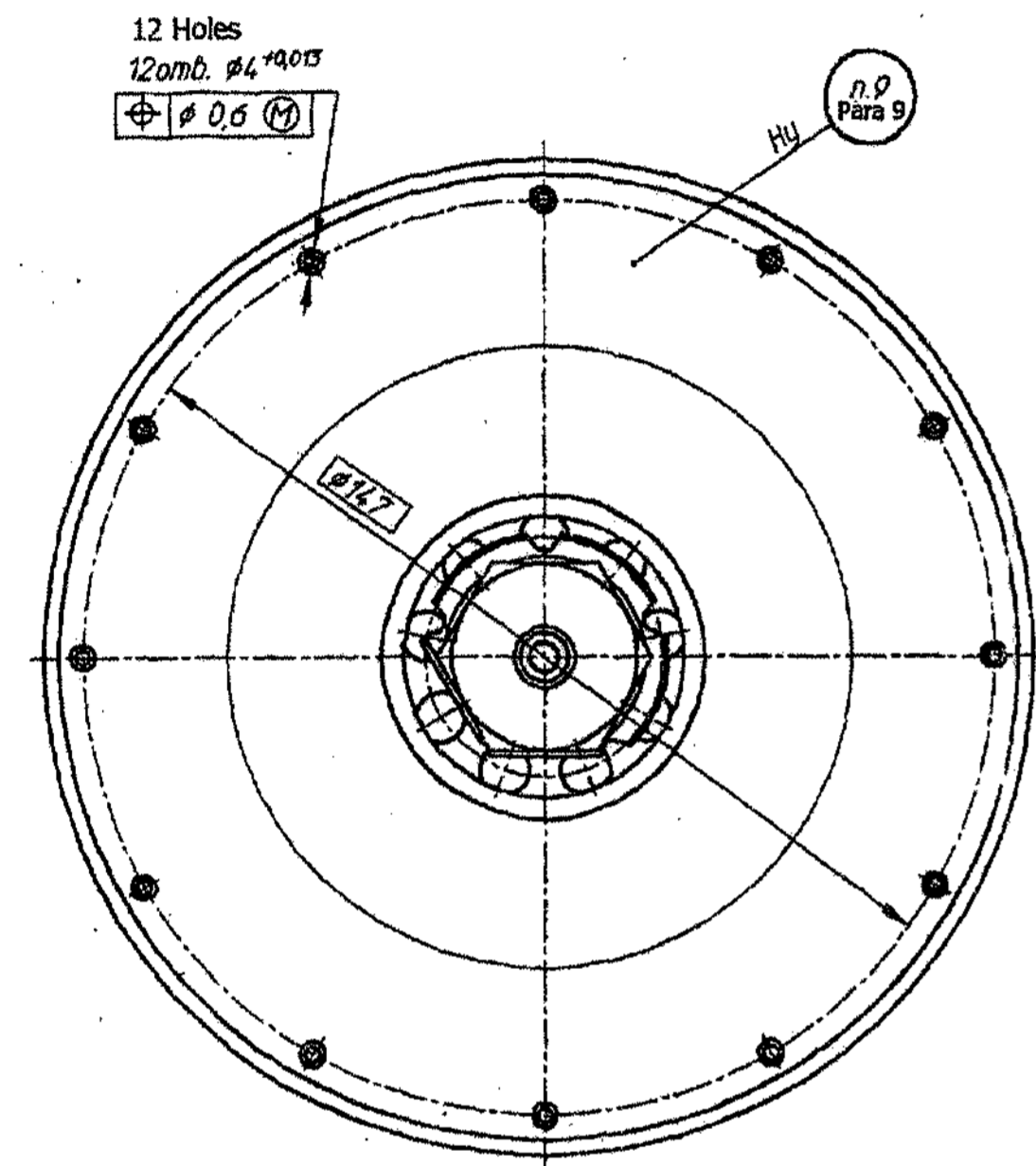
DRAWING NUMBER
172.47.015cbCb

SHEET No. 1 OF 1

DRG. INDANISED BASED ON RUSSIAN ORIGINAL ISSUE - 28
COMMON TO T-72.

SUPPLY CODE
U-01-1-2
DS0060
356

F-81
05
SIZE A3 x 4



- 1.* Размер для справок
2. Допускается сборочные единицы поз. 2 перед установкой на вал поз. 6 нагревать до 100 °С.
3. Затяжку резьбы деталей 172.47.232 и поз.13 с деталью 172.47.239 производить моментом 400 Н·м по рискам старения сборочной единицы 172.47.040сб на поверхностях Б. Неодовод рисок не допускается.
4. После установки штифтов поз. 14 отверстия завальцевать.
5. Размер В контролировать после запрессовки детали поз.10. При уменьшении размера В отверстия развернуть на длину 8±0,5 мм.
6. Перед затяжкой детали поз. 5 торцы, прилегающий к детали поз. 4, смазать маслом, применяемым в трансмиссии.
7. Не допускается проворот детали поз. 3 относительно детали поз. 6. В случае проворота деталь поз. 3 заменить.
8. Гидромуфта испытать на герметичность в течение 3 мин. маслом ТСЗп-8 ТУ 38.1011280-89 давлением 0,9 МПа (9 кгс/см²) при температуре масла 90 ± 10 °С, при этом:
 - масло должно выходить струей из отверстий Г;
 - допускается течь масла по стыкам деталей 172.47.232, 172.47.239, поз.13 0,05 л/мин;
 - допускаются утечки масла по зазорам в сопряжении сборочной единицы поз. 1 с деталью поз. 3, количество масла не контролировать
9. Маркировать шрифтом П-3 ГОСТ 2930-62. Масса налетка 100 ± 5 г.
9. Остальные требования по 520.ТУ1.

1. *Dimensions for reference.
2. The assembly units item 2 can be heated upto 100 °C before fixing to the shaft item 6.
3. Tighten the threads of parts 172.47.232 and item 13 with part 172.47.239 with a torque of 400 Nm along palmness marking of assembly unit 172.47.040cb on surface B. Incomplete marking is not allowed.
4. After fixing pins, item 14 flare the holes.
5. Check dimension B after pressing the part, item 10. While reducing dimension B open-up the hole to a length of 8±0.5 mm.
6. Before tightening the part, item 5 lubricate the buttend adjacent to part, item 4 with oil used in transmission. Turning of part item 3 with respect to part item 6 is not allowed. In case of turn, replace the part item 3.
7. Check the hydraulic coupling for air tightness for 3 minutes with oil ТСЗп-8 ТУ 38.1011280-89 with pressure 0.9 MPa (9 kgf/cm²) at oil temperature 90 ± 10 °C. In this case:
 - the oil should come out as jet from holes Г.
 - leakage of oil through joints of parts 172.47.232, 172.47.239, item 13 0.05 l/min is allowed.
 - leakage of oil through gaps at joints of assembly unit item 1 and part item 3, quantity of oil need not be checked.
8. Mark with type П-3 GOST 2930-62. Weight of hammer - 100 g.
9. Other requirements are 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)

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

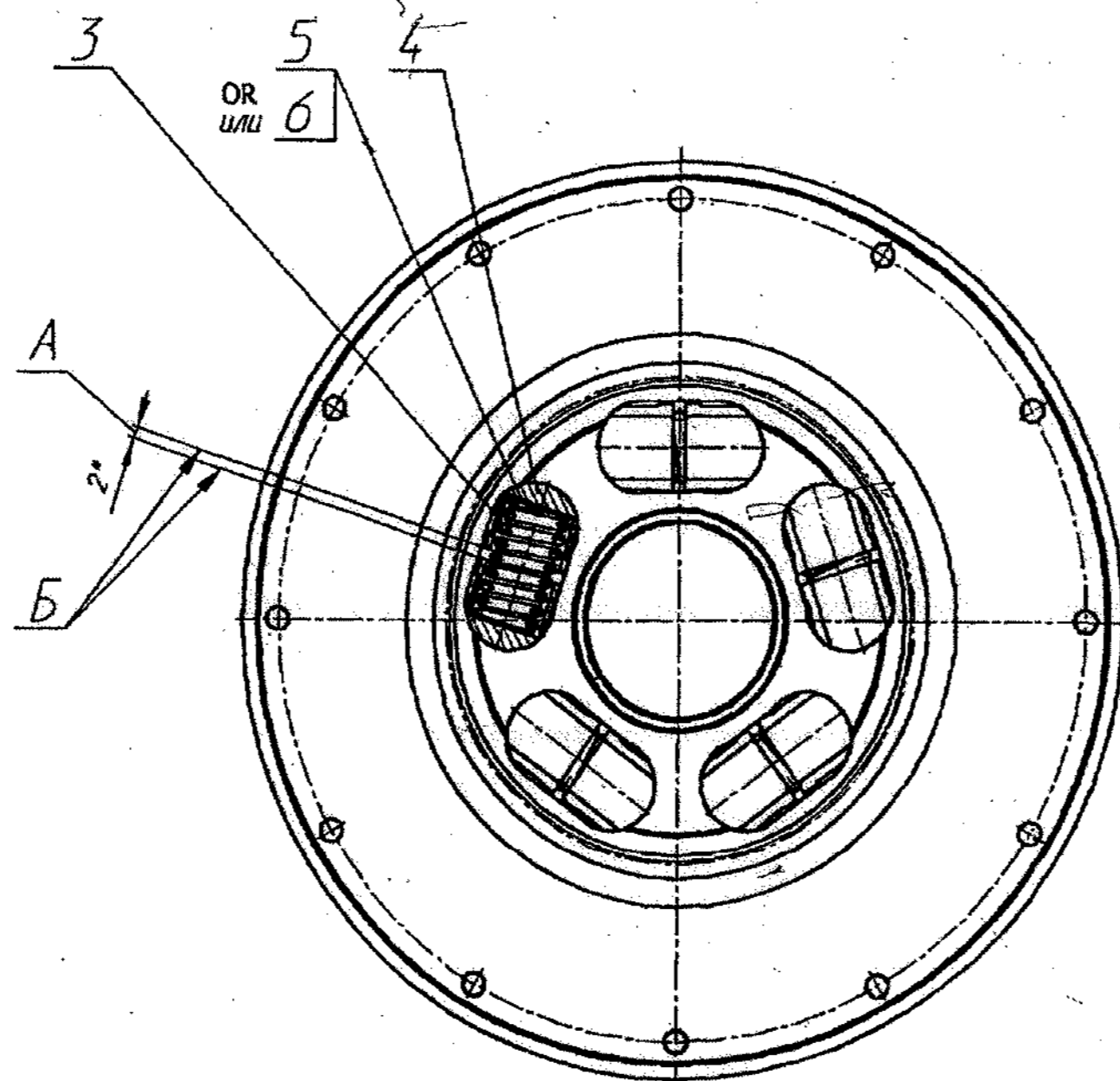
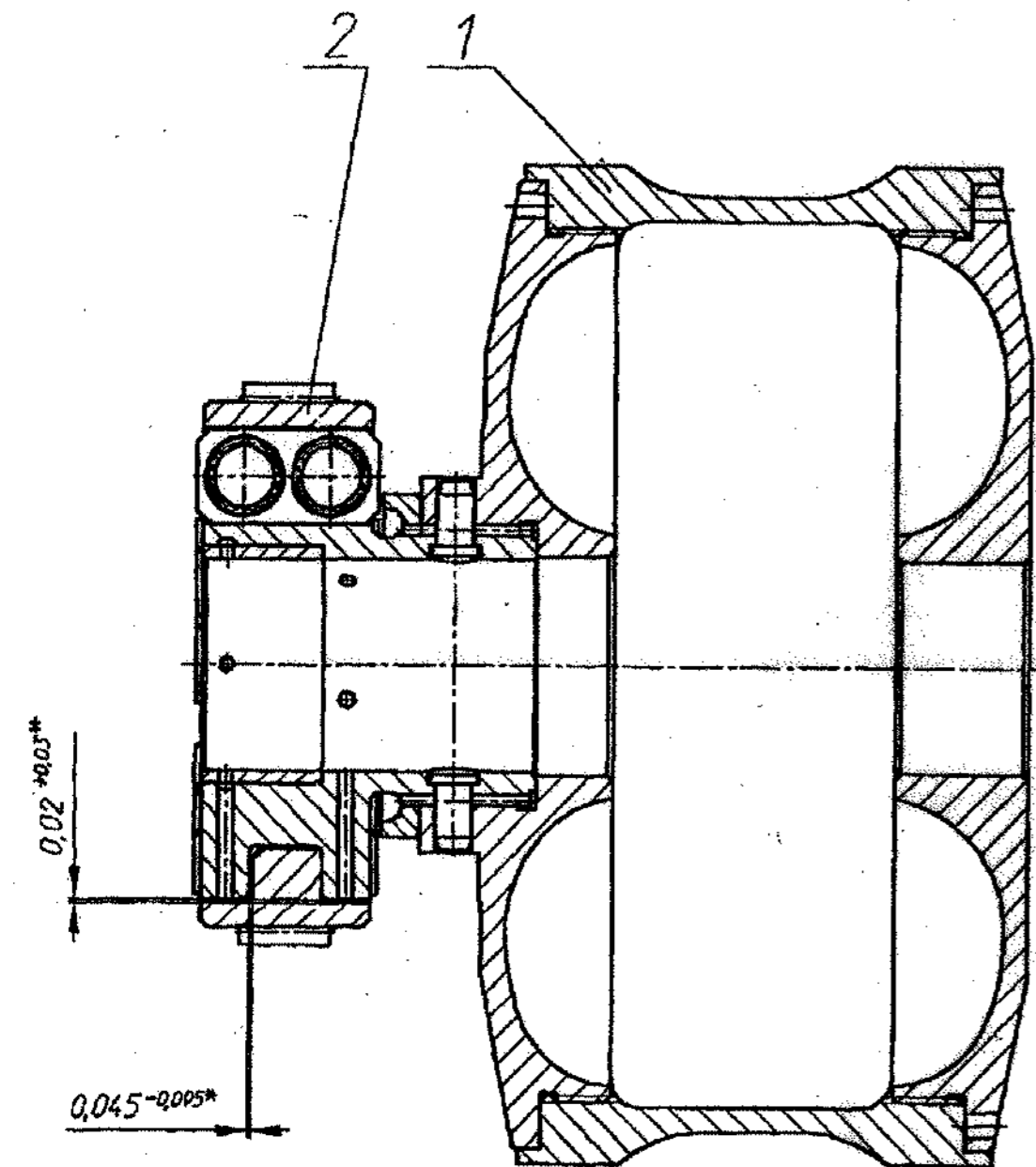
DRN	APPROVED	MATERIAL	USED ON: 172.45.060cbCb, 188.45.001cb-3Cb
CHD	APPROVED		
APPD	APPROVED		
DATE	11-06-04	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)	AVADI
SCALE	1:1		
DIMENSIONS IN mm		TITLE: HYDRAULIC COUPLING WITH SHAFT ASSY.	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS: 203-69		D S CAT NUMBER	DRAWING NUMBER
ALL THREADS TO CONFORM TO			172.47.015cbCb
ISSUE	DATE	NATURE OF AMENDMENTS	

USED ON		ZONE	ITEM NO	DRAWING NUMBER	D S CAT NUMBER	DESCRIPTION	QTY	REMARKS	
172.47.015cbCb				172.47.001cbCb		FLEXIBLE COUPLING WITH PUMP WHEEL ASSY.			
		✓	1	172.47.040cbCb ✗		PUMP WHEEL ASSY	1		
		✓	2	172.47.007		GEAR WHEEL	1		
		✓	3	172.47.073		SPRING	10		
		✓	4	172.47.227		SLEEVE	10		
		✓	5	172.47.243 ✗		SHIM	10	SELECTION	
		✓	6	172.47.243-01 ✗		SHIM	10	SELECTION	
356									
SUPPLY CODE U-01-1-2									
D90060		ISSUE	DATE	NATURE OF AMENDMENTS		ISSUE	DATE	NATURE OF AMENDMENTS	
F-81		DRN	<i>G. Juslparaj</i>	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI.		TITLE : FLEXIBLE COUPLING WITH PUMP WHEEL ASSY.			
02		CHD	<i>G. Juslparaj</i>						
		APPD	<i>Chanchal</i>						
		DATE	<i>22-6-04</i>	SHT. NO. 1 OF 1	D S CAT NUMBER	ITEM LIST FOR 172.47.001cbCb			

COMMON TO T-72.
I/L CREATED BASED ON RUSSIAN ORIGINAL ISSUE - NIL

DRAWING NUMBER
172.47.001cbCb

SHEET No 1 OF 1



1. Обработанные в сборе детали поз. 2 и 172.47.233 по чертежу 172.47.004-сб применять совместно, раскомплектовывать не допускается.
2. Разность размеров А для всех пар стаканов поз. 4, вычисленных для каждой пары как среднее арифметическое измерений в крайних точках, $0^{+0.05}$ мм, обеспечить подбором стаканов и шлифовкой их по торцам Б на $0^{+0.1}$ мм.
3. Обеспечить предварительную деформацию пружин поз. 3 $1.8^{+0.2}$ мм подбором регулировочных шайб поз. 5 и 6.
4. Момент при начале деформации пружин поз. 3 - $32^{+1.8}$ Н·м ($3.2^{+1.8}$ кгс·м), при соприкосновении стаканов поз. 4 - $70^{+3.0}$ Н·м (7^{+3} кгс·м).
- 5.* Размеры для справок.
6. Остальные требования по 520.TY1.

1. Parts, item 2 and 172.47.233 machined as assembly unit as per drawing 172.47.004cb, should be used together and not separately.
2. Ensure difference of dimensions A $0^{+0.05}$ mm for all pairs of sleeves, item 4. Calculated for each pair as arithmetic mean of measurement at extreme points by selection of sleeves and grinding them along end face B.
3. Ensure preliminary deformation of spring, item 3 of $1.8^{+0.2}$ mm by selection of adjusting washers, item 5 and 6.
4. Torque at beginning of deformation of spring, item 3 is $32^{+1.8}$ Nm ($3.2^{+1.8}$ Kgf/M) and at contact of sleeves, item 4 is $70^{+3.0}$ Nm (7^{+3} Kgf/M).
- 5.* Dimensions for reference.
6. Other requirements are as per 520.TY1.

DRG. INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE -10
COMMON TO T-72.

SUPPLY CODE
U-01-1-2
D90060
356
F-81
01
SIZE A4 x 4

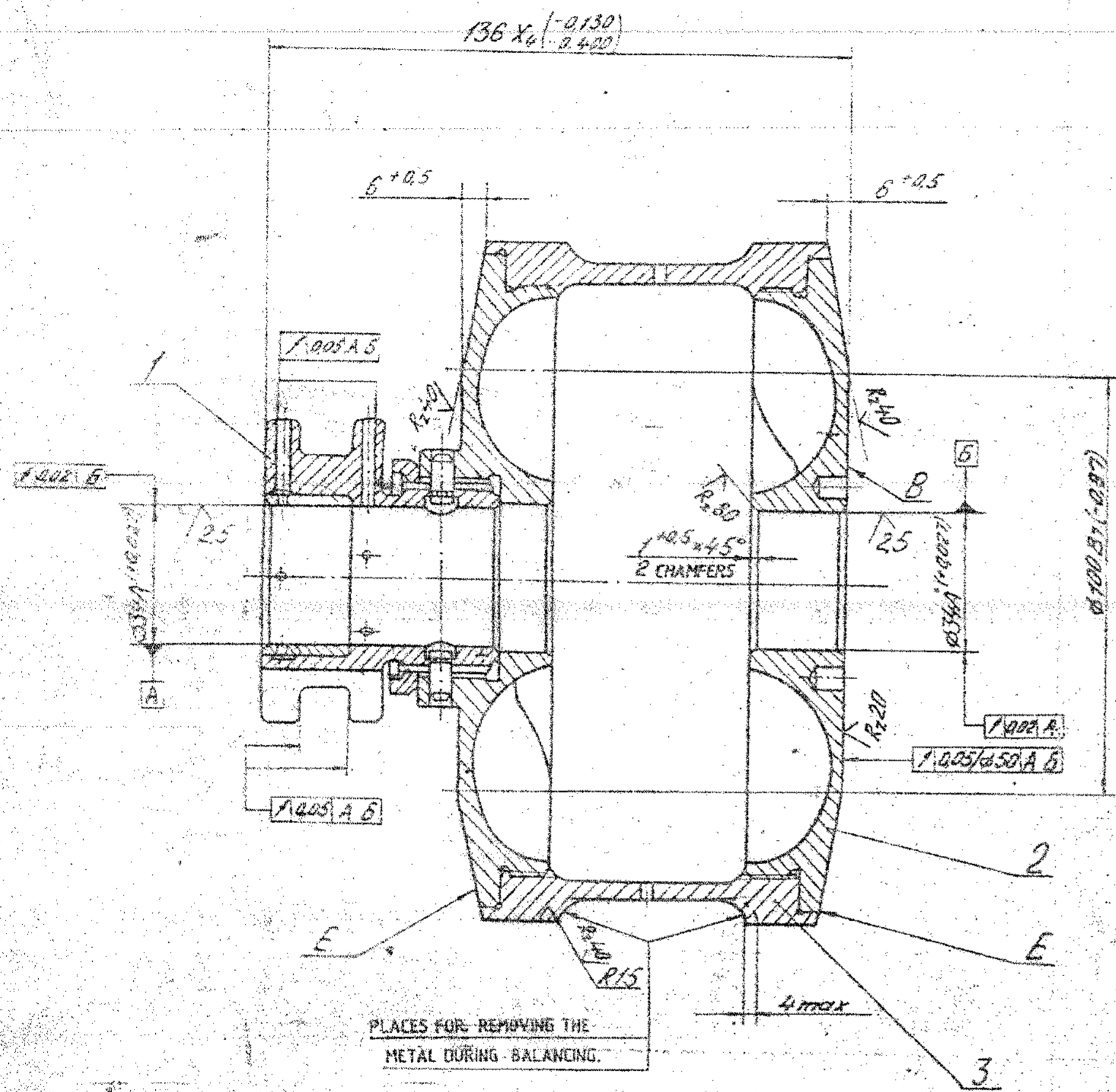
PILOT SAMPLE SHOULD BE APPROVED BY A H S P
BEFORE BULK PRODUCTION.

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

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

DRN	APPROVED	MATERIAL:-	USED ON :- 172.47.015cbCb
CHD	APPROVED	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
APPD	CHANCEL		
DATE	11-06-04	TITLE:- FLEXIBLE COUPLING WITH PUMP WHEEL ASSY.	
SCALE:-	1 : 1	D S CAT NUMBER	DRAWING NUMBER 172.47.001cbCb
DIMENSIONS IN mm			
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102-69			
ALL THREADS TO CONFORM TO			
ISSUE	DATE	NATURE OF AMENDMENTS	

DRAWING NUMBER
172 47 040 (CBC)



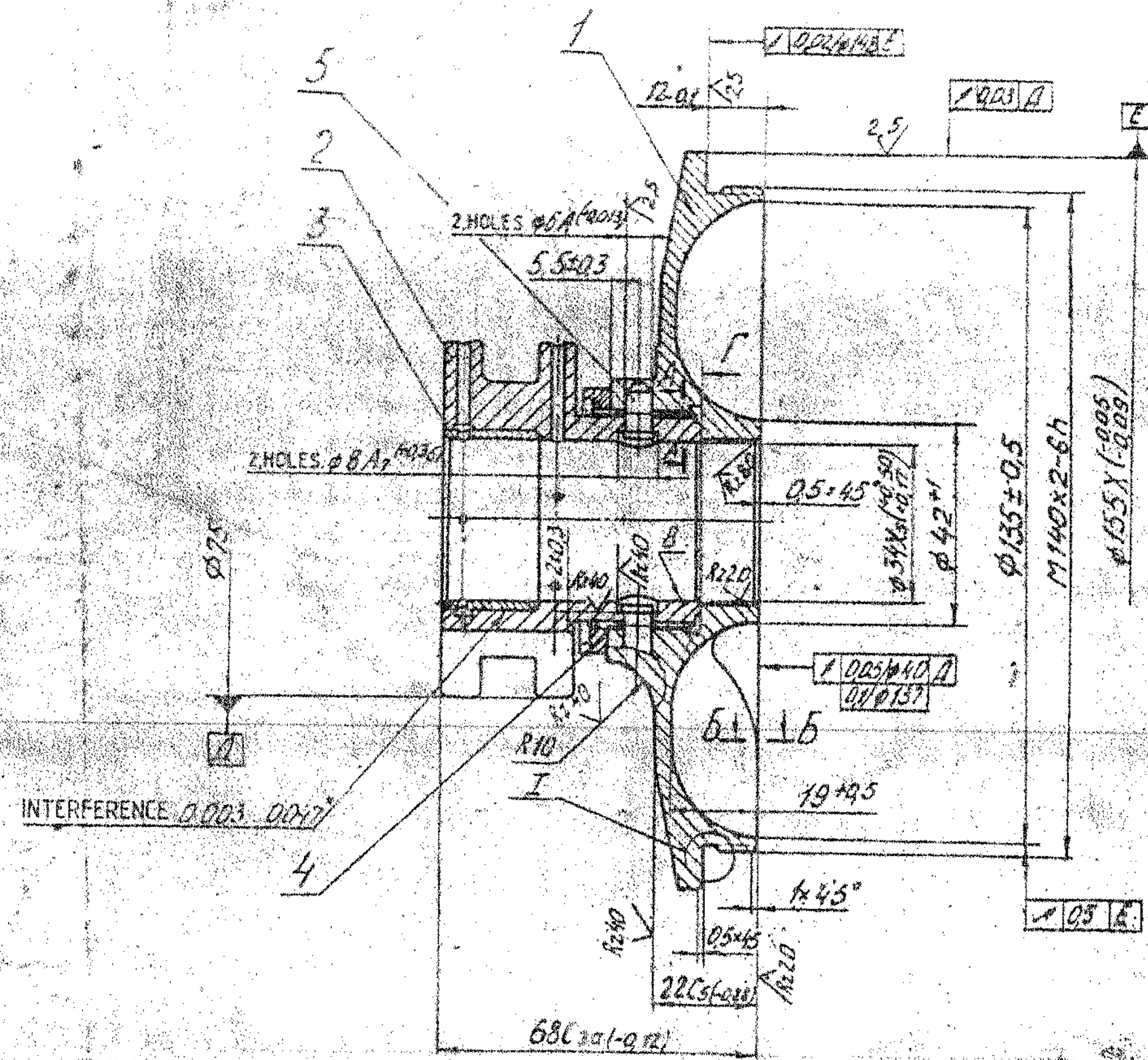
1. THREAD OF BOTH IMPELLERS IS TO BE TORQUED TO 40 KgM MINIMUM
① 400 ± 100 Nm. (40 ± 10 Kgfm) MINIMUM.
2. AFTER BORING UNIT IS TO BE CLEANED FROM CHIPS AND BLOWN THROUGH WITH COMPRESSED AIR.
3. PAIRING MARK IS TO BE APPLIED ON SURFACES 'E' AFTER MACHINING.
4. THE UNIT IS TO BE SUBJECTED TO DYNAMIC BALANCING, WITH
① ACCURACY TO NOT MORE THAN 0.001 Nm (110 gfcm) 10 gm. STATIC BALANCING IS ALLOWED INSTEAD OF DYNAMIC BALANCING. IN THIS CASE UNBALANCED COUNTERWEIGHT SHOULD NOT BE MORE THAN 15 g AT A RADIUS OF 75 mm.
5. STAMP OF PAIRING WITH COMPONENT 172 47 233 IS TO BE APPLIED ON SURFACE 'E' OF COMPONENT 2.
6. ROUGHNESS R_{z20} OF SURFACE "B" IS TO BE MAINTAINED AT A LENGTH OF $\phi 50$ MIN. ON THE REST OF THE SURFACES ROUGHNESS MAY BE R_{z40} .

MASTER COPY

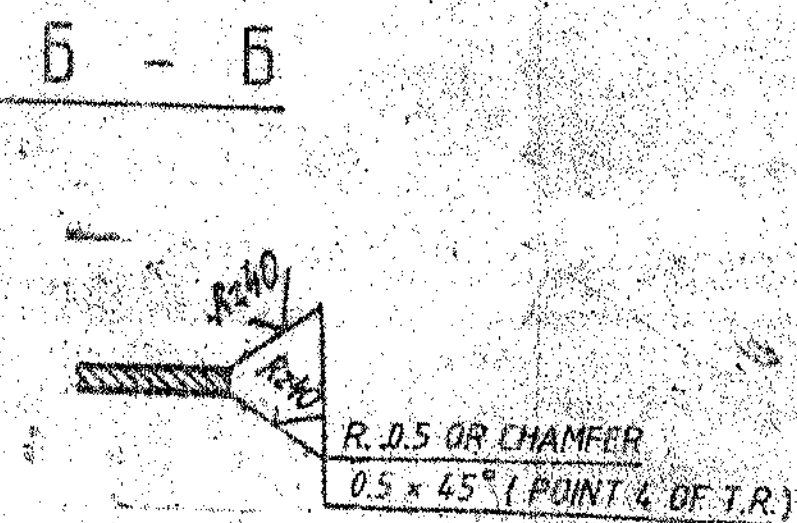
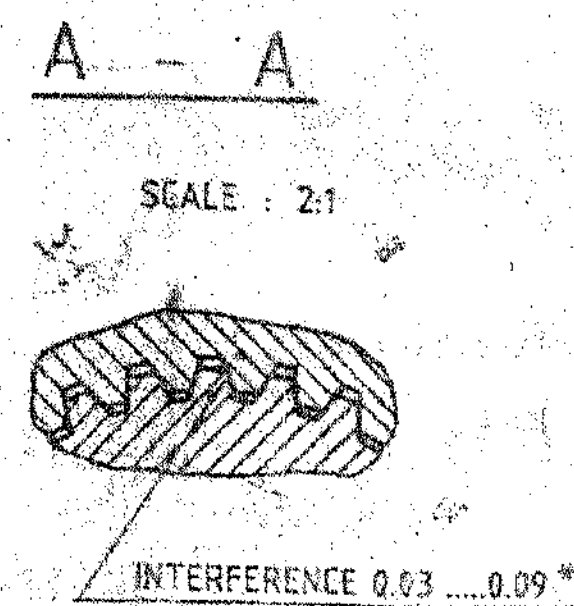
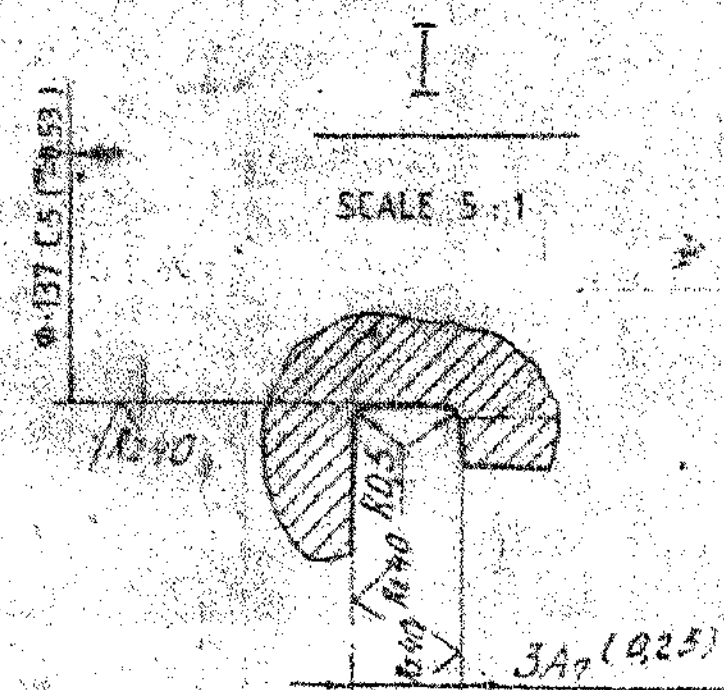
PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION

EST. WT. 1.666 TO BE STAMPED OR MARKED WHERE INDICATED THUS # LETTERS
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUTSIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

DRN	5	MATERIAL		USED ON	172 47 001 CB
ENG					
TCD					
APPD	V. ROOSES	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)			
DATE	12-02-94	A V A D I			
SCALE	1:1				
DIMENSIONS IN mm					
TOLERANCE ON DIMS UNLESS OTHERWISE STATED IS 2102-69					
1	17-12-89	AMD T LIST N.2, PART II BOOK-8		TITLE	IMPELLER ASSY
ISSUE	DATE	NATURE OF AMENDMENTS		D S CAT NUMBER	
				DRAWING NUMBER	172 47 040 (CBC)



1. INTERNAL HOLDER 2 IS TO BE PRESS FITTED UP TO THE STOP AGAINST END FACE 'C' OF IMPELLER 1 CLEARANCE GAUGE 0.03 mm SHOULD NOT ENTER
2. BEFORE PRESS-FITTING IN IMPELLER, INTERNAL HOLDER 2 IS TO BE COOLED IN LIQUID NITROGEN
3. PROJECTION OF STOPPERS 5 BEYOND SURFACE 'B' IS NOT ALLOWED
4. R. 0.5 OR CHAMFER 0.5 x 45° SHOULD BE MADE ON ALL BLADES
5. THE REST OF THE REQUIREMENTS ACCORDING TO SPECIFICATIONS 520 TY 1
6. * DIMENSIONS FOR REFERENCE
7. RUN OUT OF THREAD PITCH DIAMETER RELATIVE TO SURFACE 'E' SHOULD NOT EXCEED 0.05 mm.



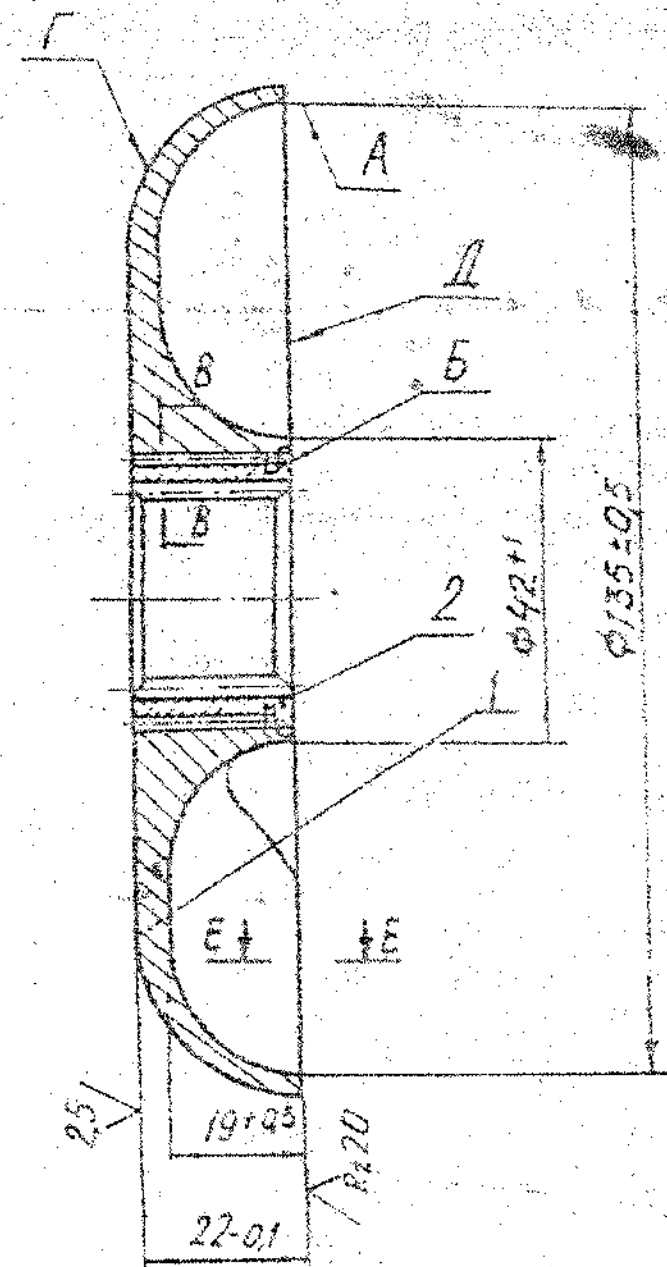
MAILED COPY

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

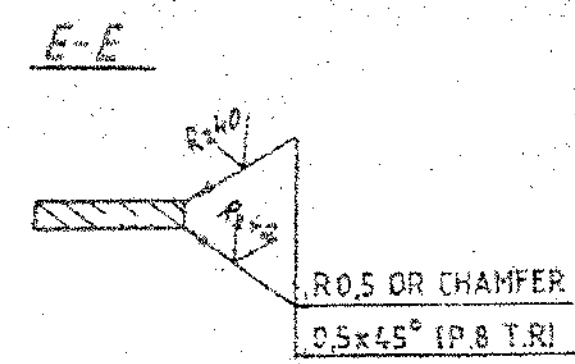
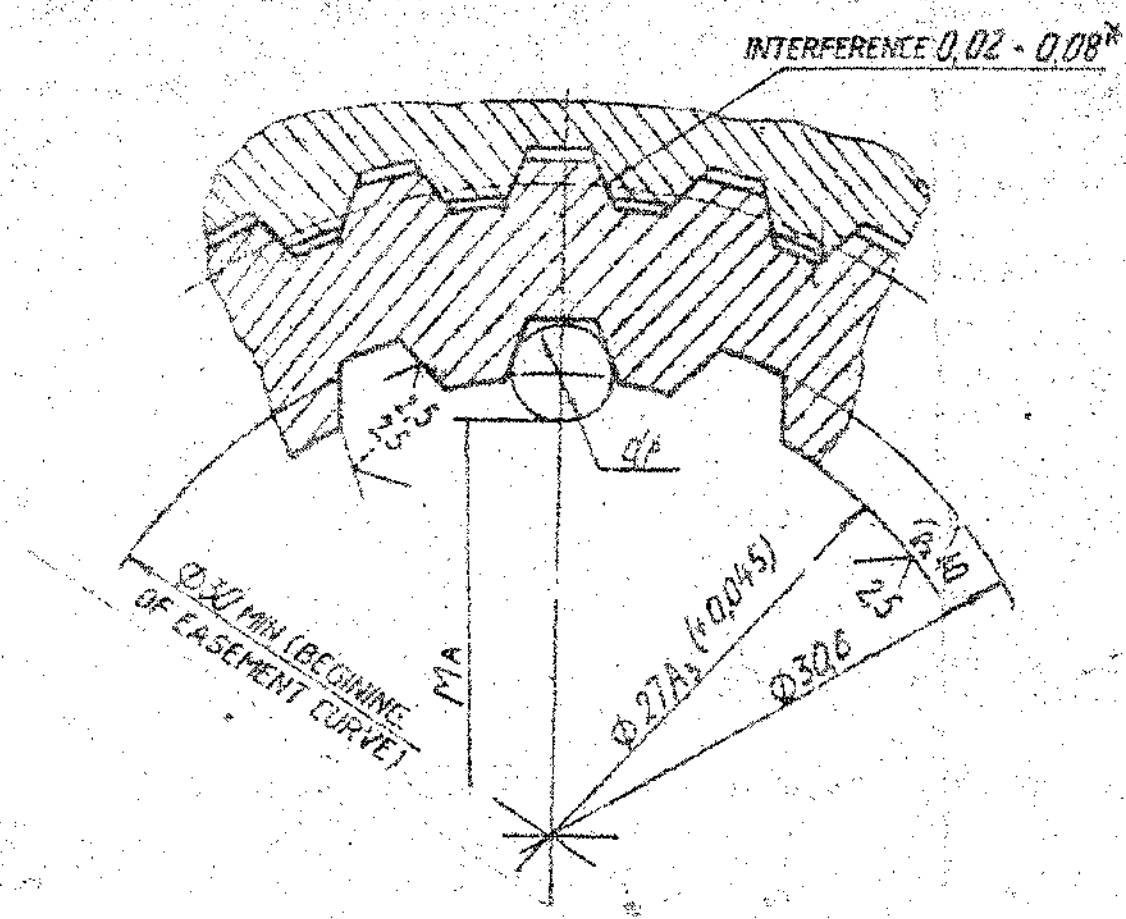
EST MASS TO BE STAMPED OR MARKED WHERE INDICATED THUS II (LETTERS)
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED. MACHINED CORNERS TO HAVE R. OUT-SIDE R. INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

DRN	CHD	TEC	APPD	DATE	SCALE	DIMENSIONS IN mm	TOLERANCE ON DIMS UNLESS OTHERWISE STATED IS 2002-69	ALL THREADS TO CONFORM TO
				22-02-94	2:1			
MATERIAL						USED ON		
						172 47 040 C6		
CONTROLLER OF QUALITY ASSURANCE						HEAVY V. HICLES		
A V A D								
TITLE						IMPELLER ASSEMBLY		
U'S CAT NUMBER						172 47 041 C6 CE		
ISSUE	DATE	NATURE OF AMENDMENTS						

DRAWING NUMBER
172 47 042 CbCb



B-B
SCALE 5 : 1



DESIGNATION OF HOLE ACCORDING TO GOST 6033-51:	38. 30 x 1,5 x 18, S3a	
MODULE	m	1,5
NUMBER OF TEETH	Z	18
PRESSURE ANGLE	α_a	30°
DIAMETER OF PIN	dp	2,886 ± 0,001
DISTANCE OVER PINS	Ma	23,92 ^{+0,12} / _{+0,05}
ADDENDUM MODIFICATION SHIFT	X	0,75
TOOTH-SPACE WIDTH ALONG REFERENCE CIRCLE ARC	Sa	3,222 ^{+0,07} / _{+0,03}
REFERENCE DIAMETER	da	27

- SPLINED BUSHING 2 IS TO BE PRESS-FITTED UP TO THE STOP AGAINST END FACE OF RUNNER 1.
- PRIOR TO PRESS-FITTING IN THE RUNNER, BUSHING 2 IS TO BE COOLED IN LIQUID NITROGEN.
- UNIT IS TO BE DYNAMICALLY BALANCED WITH ACCURACY OF NOT MORE THAN ^① 0,003 Nm. ^② 13 gcm² METAL IS TO BE REMOVED ON SURFACE 'A' TO WALL THICKNESS NOT LESS THAN 2 mm. WITH SMOOTH DRESSING. STATIC BALANCING IS ALLOWED INSTEAD OF DYNAMIC BALANCING. IN THIS CASE UN-BALANCED COUNTERWEIGHT SHOULD NOT BE MORE THAN 2g AT A RADIUS OF 60mm.
- TEETH (SLOTS) SHOULD BE CHECKED WITH COMPLEX GAUGE WITH TOLERANCES ACCORDING TO GOST 6528-53.
- RUN-OUT RELATIVE TO SLOTS MAY BE :-
a) OF SURFACE 'A' NOT MORE THAN 0,5 mm.
b) OF SURFACE 'A' NOT MORE THAN 0,05 mm ON $\phi 136$.
- THE REST OF THE REQUIREMENTS ACCORDING TO SPECIFICATION 520 TY 1.
- * DIMENSIONS FOR REFERENCE.
- R0,5 OR CHAMFER 0,5x45° IS TO BE MADE ON ALL BLADES ALONG THE WHOLE CONTOUR.

DRAWING REDRAWN BASED ON ISSUE III

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

EST. WT. 0,416	TO BE STAMPED OR MARKED WHERE INDICATED THUS # LETTERS:
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT-SIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.	

DRG	2	MATERIAL	USED ON
END			172 47 015 Cb
TCD			
APPD			
DATE	11-02-94	CONTROLLER OF QUALITY ASSURANCE (HEAVY VEHICLES) A V A D I	
SCALE	1:1		
DIMENSIONS IN mm.			
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69		TITLE IMPELLER ASSY (MECHANICAL UNIT) TO BE SUPPLIED AS A SET	
2A	27.3.99	D S CAT NUMBER	DRAWING NUMBER
?	29.12.88		172 47 042 CbCb
1	17.12.88		
ISSUE	DATE	NATURE OF AMENDMENTS	

40001 KD
11-83
SIZE A

ITEMS

ITEM	DRAWING NUMBER	D'S CAT NUMBER	DESCRIPTION	NO OF PPS	REMARKS
	172 47 042 C5 CB		IMPELLER ASSY. (MECHANICAL UNIT)		
	6 ITEM LIST		TO BE SUPPLIED AS A SET (3)		
1	172 47 261		TURBINE WHEEL	1	
2	172 47 262		SPRING BUSH	1	

MASTER COPY

ISSUE	DATE	NATURE OF AMENDMENTS	ISSUE	DATE	NATURE OF AMENDMENTS
A	27.3.94	D. O. CORRECTION			

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI

TITLE: IMPELLER ASSY (MECHANICAL UNIT)
 TO BE SUPPLIED AS A SET

DRAWN: *W. E.*

CHEKED: *E. S. S.*

TCD: *J. S.*

APPROVED: *V. R.*

DATE: 11 - 02 - 96

SHT. No. 1 OF 1

D'S CAT NUMBER: 172 47 042 C5 CB

ITEM LIST FOR: 172 47 042 C5 CB

ITEM LIST REDRAWN BASED ON IS 16-96-NIL

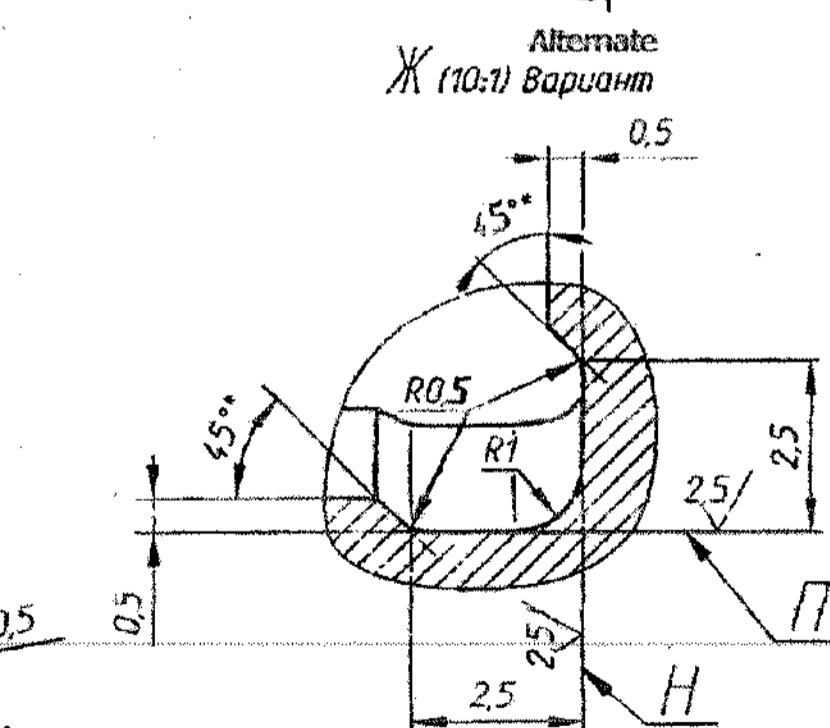
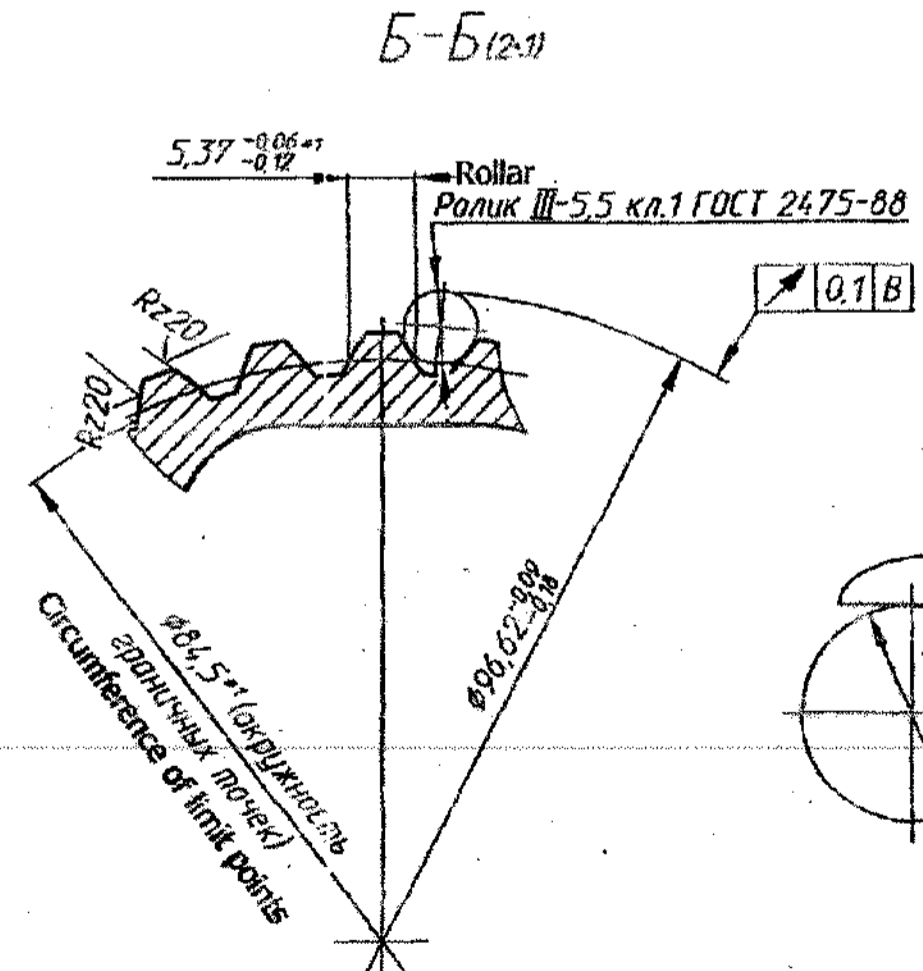
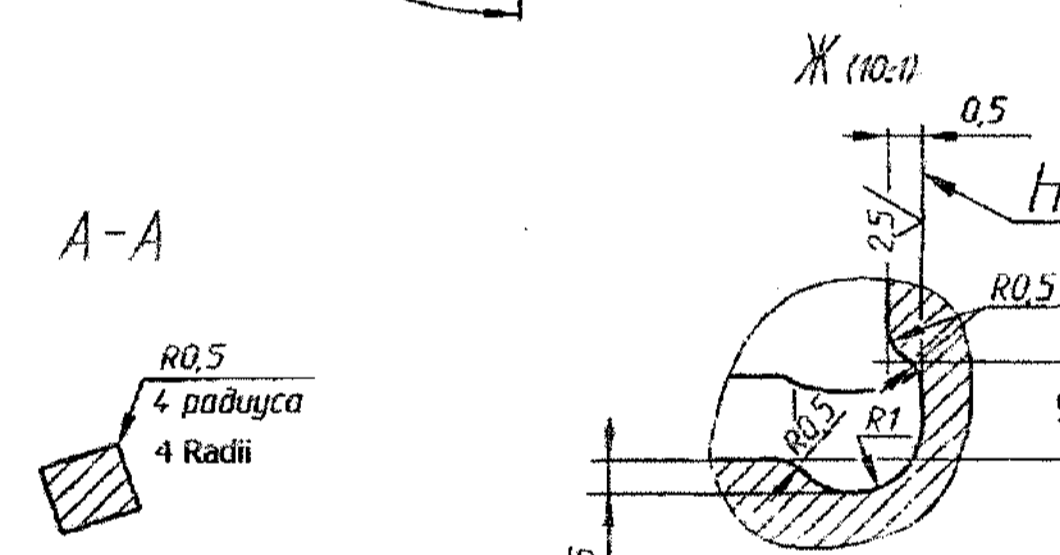
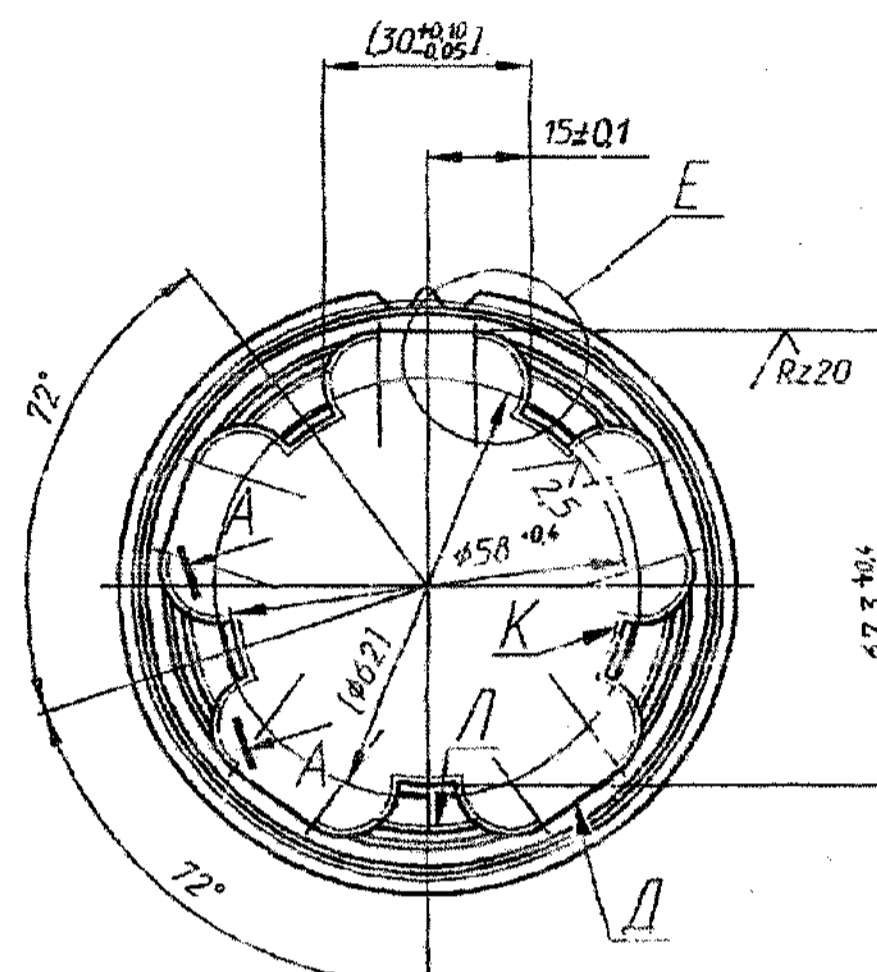
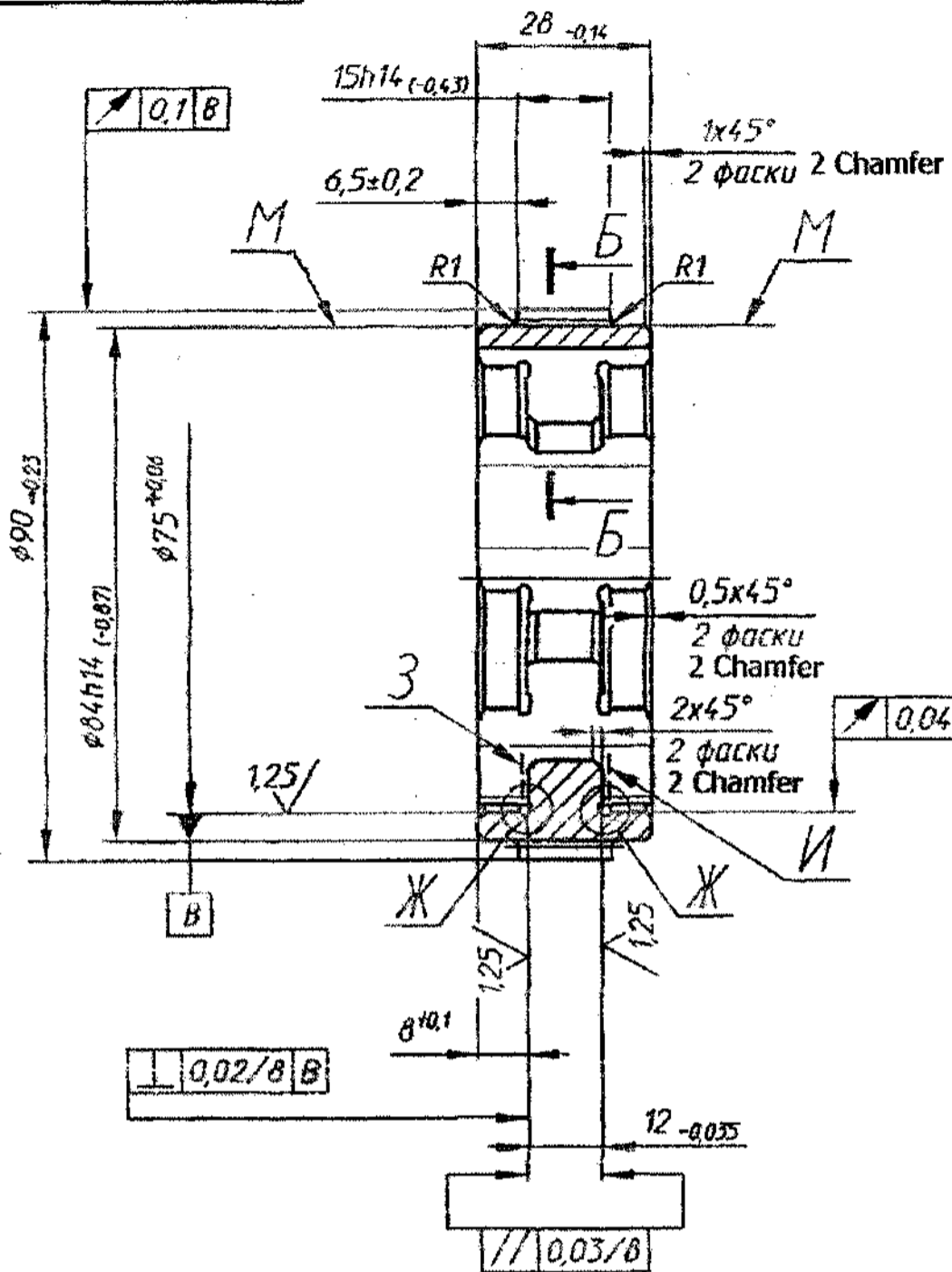
FL 58
14

DRAWING NUMBER
172.47.007

SHEET No. 1 OF 1

Rz40/ ✓ (✓)

Module	m	2,5
No. of teeth	Z	34
Profile angle	α	30°
Shift of basic contour	Xm	1,25
Reference diameter	d	85



1. Поверхности 3, И, К, Л цементировать h 0.5...1.1 мм >56 HRC. Твердость ядра 35...49 HRC. Твердость ядра допускается не контролировать.
 2. Материал-заменитель сталь 18X2H4MA, 18X2H4BA-Ш, 18X2H4MA-Ш ГОСТ 4543-71.
 3. *Размеры обеспечить инструментом.
 4. **Размеры для справок.
 5. Обработку по размерам в скобках производить совместно с дет. 172.47.233.
 6. Детали применять совместно.
 7. На цементированных участках, не подвергающихся механической обработке, допускается h 0.8...1.3 мм. Глубину цементации проверять на образце-свидетеле.
 8. Допускается цементация поверхностей Д.
 9. На поверхности М допускаются следы от выхода фрезы.
 10. После термообработки допускается шероховатость Rz=20 мкм поверхностей Н и П.
 11. В окончательно готовой детали поверхности 3, И, К, Л проверять магнитным дефектоскопом на отсутствие трещин, расслоений, волосодина и неметаллических включений.
 12. Деталь должна быть немагнитной.
 13. Остальные требования по 520.TY1.
1. Carburize the surfaces 3, И, К, Л with h0.5 to 1.1 mm >56 HRC. Core hardness 35 to 49 HRC. Core hardness need not be checked.
 2. Alternate material is steel 18X2H4MA, 18X2H4BA-Ш, 18X2H4MA-Ш GOST 4543-71.
 3. *Ensure dimensions with tool.
 4. **Dimensions for reference.
 5. Carryout machining along dimensions given in brackets along with part 172.47.233.
 6. Use the parts together.
 7. On carburizing sections not subjected to machining, height can be 0.8 to 1.3 mm check the depth of carburizing on test piece.
 8. Carburize (case harden) the surfaces Д.
 9. On surface М traces of milling cutter are allowed.
 10. After heat treatment surface finish of surfaces Н and П can be Rz=20microns
 11. In the finally prepared part check the surfaces 3, И, К, Л for absence of cracks, peeling off, hair cracks and non-metallic impurities.
 12. The part should be non-magnetic.
 13. Other requirements are as per 520.TY1.

ALT. MATL. 835 M15 (EN-39B) BS: 970-83
AUTHY. CQR(CHV) letter no. 05V/1FD/IND-V/MPF/OE dated 29.09.04

DRG. INDIAISED BASED ON RUSSIAN ORIGINAL ISSUE - 20
COMMON TO T-72.

356
SUPPLY CODE
U-01-1-2
D90060
F-81
09
SIZE A2

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

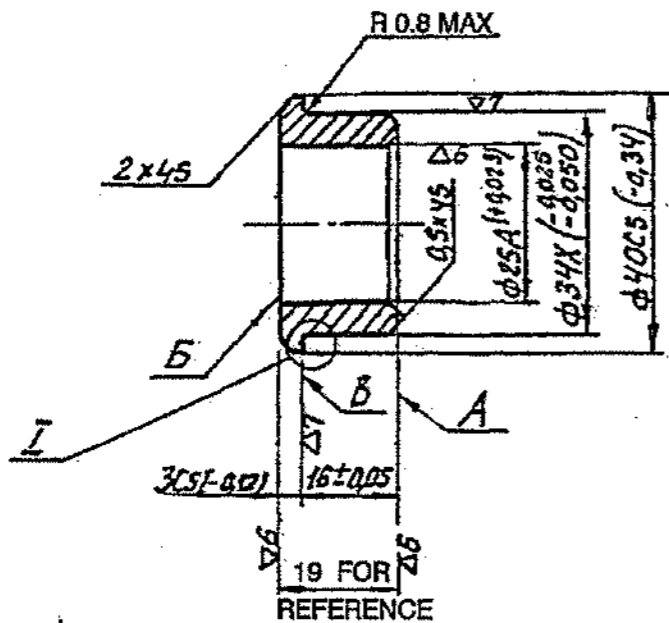
EST. WT. (Kg) 0.375	TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)
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ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUTSIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

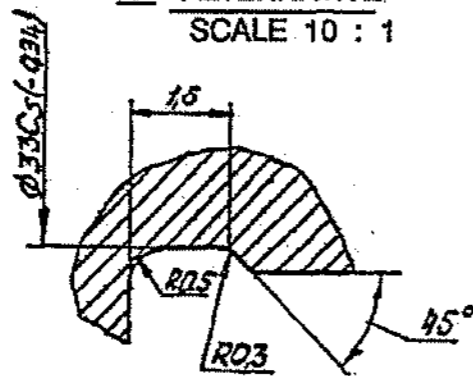
DRN	CHD	APPD	DATE	SCALE: 1:1	DIMENSIONS IN mm	TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS: 2102-69	ALL THREADS TO CONFORM TO
MATERIAL:- Steel 18X2H4BA GOST 4543-71				USED ON:- 172.47.004Cb 172.47.001CbCb			
CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI				TITLE:- GEAR WHEEL			
D S CAT NUMBER				DRAWING NUMBER 172.47.007			
ISSUE	DATE	NATURE OF AMENDMENTS					

DRAWING NUMBER
172.47.016

SHEET No. 1 OF 1



ALTERNATIVE
SCALE 10 : 1



1. RELATIVE TO CYLINDRICAL SURFACE $\phi 25A$ AND FACE B MACHINED AT ONE SETTING THE FOLLOWING IS ALLOWED.
 - a) END PLAY OF FACES "A" AND "B" NOT EXCEEDING 0.02 mm.
 - b) RUN-OUT OF CYLINDRICAL SURFACE $\phi 34X$ NOT EXCEEDING 0.02 mm.
2. SHARP EDGES SHOULD BE BLUNTED.
3. TO BE HEATED IN BLANK. HARDNESS BHN 302 - 255 (DIA. OF INDENTATION 3.5 ... 3.8).

$\nabla 3, (\nabla)$

EXPLANATORY NOTE :-

4. REFERENCE MATERIAL QUOTED : STEEL 38XC GOST 4543-71.
STRUCTURAL CHROMIUM SILICON ALLOY QUALITY STEEL GRADE 38XC GOST 4543-71.
- a) CHEMICAL COMPOSITION : AS PER STEEL GRADE 38XC GOST 4543-71.

CONTENT OF ELEMENTS %					
C	Si	Mn	Cr	S	P
				MAX	
0.34 - 0.42	1.00 - 1.40	0.30 - 0.60	1.30 - 1.60	0.035	0.035

RESIDUAL CONTENT OF COPPER AND NICKEL SHOULD NOT EXCEED 0.30% EACH

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

TENSILE STRENGTH Kgf/mm ²	YIELD POINT Kgf/mm ²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgm/cm ²
MINIMUM				
95	75	12	50	7

(7A) ALT. MATL :- STEEL 817M40 (En 24) TO BS : 970 Part 1 : 1983

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

EST. WT. (Kg) 0.07 TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)

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

DRN	Sd/=	MATERIAL :- STEEL 38XC GOST 4543-71	USED ON :- 172.47.015Cb
CHD	Sd/=		
APPD	Sd/=		
DATE	12.02.94	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
SCALE:- 1 : 1		TITLE :- BUSHING	
DIMENSIONS IN mm			
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102 - 69			
ALL THREADS TO CONFORM TO IS : 4218, PART-4.		D S CAT NUMBER	DRAWING NUMBER 172.47.016
7A	07.07.06	AUTHY. Lt. No. 80001/CQA(HV)/GEN. Dt. 15.10.05.	
ISSUE	DATE	NATURE OF AMENDMENTS	

DRG. REINDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 7
COMMON TO T-80
B. JAYAVELU, JTO(D)
27-07-06

DRG. REINDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 7
COMMON TO T-80

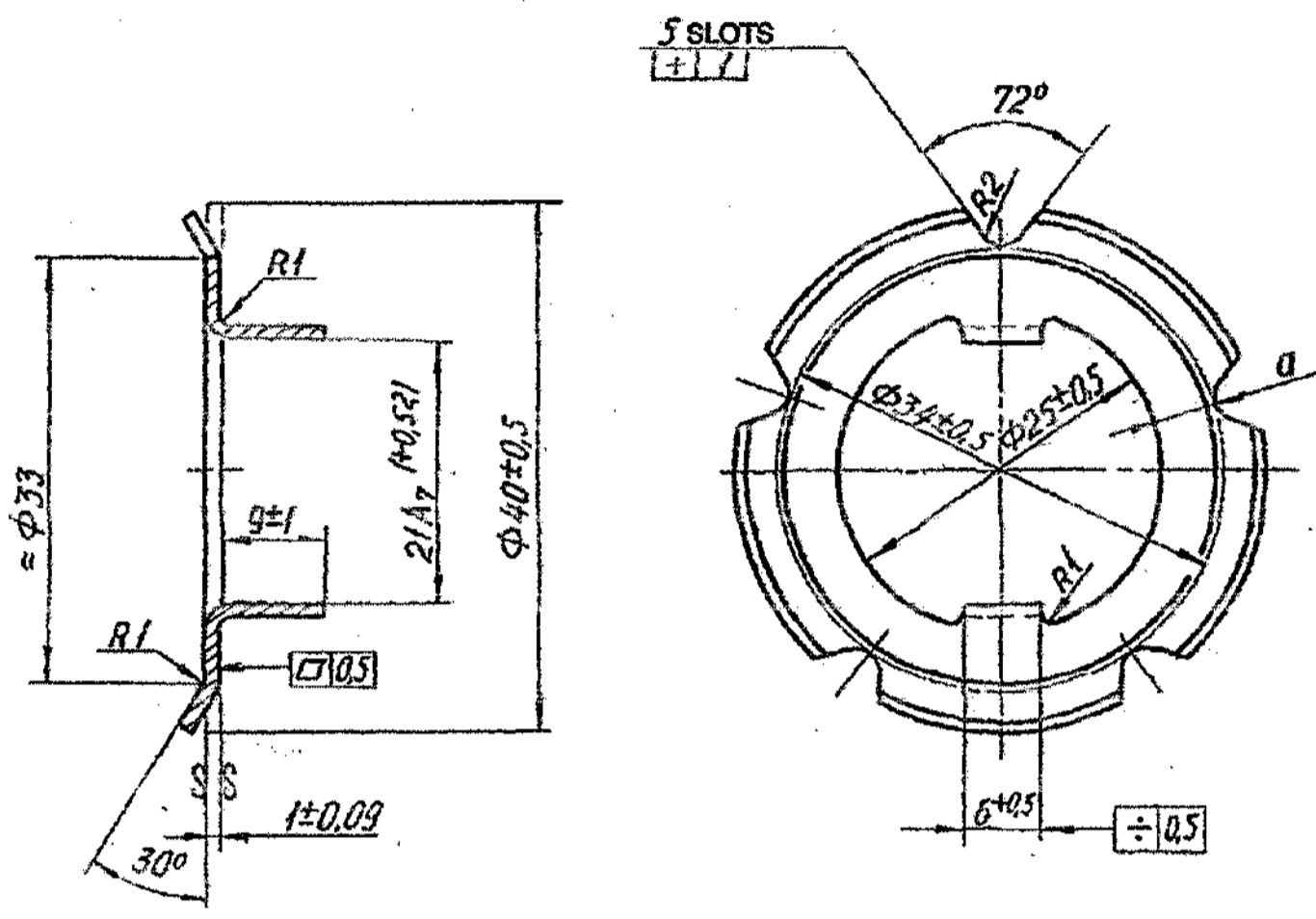
F-88
35

SIZE A3

DRAWING NUMBER
172.47.066

SHEET No. 1 OF 1

▽2 (▽)



EXPLANATORY NOTE :-

4. a) REFERENCE MATERIAL QUOTED OPEN HEARTH STEEL 10K1-5-II Г GOST 16523-70.
COLD ROLLED STEEL SHEET WITH NORMAL ROLLING ACCURACY OF STEEL GRADE 10 K1 CATAGORY 5 GROUP II HIGH FINISH DEEP DRAWN (Г) ON SURFACE QUALITY GOST 16523-70 AND MANUFACTURED IN ACCORDANCE WITH GOST 1050-74.
- b) REFERENCE NOTE 1 ON ALTERNATIVE MATERIAL: STEEL 15 K1-5-II-Г GOST 16523-70
COLD ROLLED STEEL SHEET WITH NORMAL ROLLING ACCURACY OF STEEL GRADE 15 K1 CATAGORY 5 GROUP II HIGH FINISH DEEP DRAWN (Г) ON SURFACE QUALITY GOST 16523-70 AND MANUFACTURED IN ACCORDANCE WITH GOST 1050-74.
- 5 a) CHEMICAL COMPOSITION AS PER STEEL GRADES 10 K1 AND 15 K1 TO GOST 1050-74.

GRADE OF STEEL	CONTENT OF ELEMENTS %					
	Cr	Si	Mn	Cr	S	P
10 K1	0.07 - 0.14	0.07 (MAX)	0.25 - 0.50	0.15	0.040	0.035
15 K1	0.12 - 0.19	0.07 (MAX)	0.25 - 0.50	0.25	0.040	0.035

b) MECHANICAL PROPERTIES AS PER STEEL GRADES 10 K1 AND 15 K1 TO GOST 16523-70

GRADE OF STEEL	ULTIMATE TENSILE STRENGTH Kgf / mm ²	RELATIVE ELONGATION %	CUPPING TEST DEPTH SPHERICAL HOLE	BEND TEST 180° IN COLD STAGE
10 K1	28 - 40	25	10.1	CLOSE
15 K1	32 - 45	24	9.2	CLOSE

1. MAY BE MANUFACTURED FROM STEEL 15 K1-5-II Г GOST 16523-70 OPEN HEARTH.
2. DIFFERENCE IN MEASUREMENT OF DIMENSION "a" SHOULD NOT 1 MM.
3. COATING: Zn 9, CHROMATIZING.

(2A) ALT. MATL. :- GRADE 'D' TO IS: 513-94

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

EST. WT. (G) 0.006 TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)

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

DRN	Sd / =	MATERIAL :- OPEN HEARTH	USED ON :-
CBD	Sd / =	STEEL 10 K1-5 II Г	172.47.015cbCb
AFTD	Sd / =	GOST 16523-70	
DATE	19-02-94	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
SCALE:-	2:1		
DIMENSIONS IN mm			
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS: 2H02-69		TITLE :- LOCK WASHER	
ISSUE	DATE	NATURE OF AMENDMENTS	D S CAT NUMBER
2A	07.07.08	AUTHY LL No. 80001/COA(HV)/GEN/DI.15.10.05	DRAWING NUMBER
			172.47.066

DRG. FILE INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 2
(E. JAYAVELU, JTD) 03-08-06

" COMMON TO T-90 "

F-88
41

SIZE A2

DRAWING NUMBER
172.47.067

SHEET No. 1 OF 1

▽3(▽)

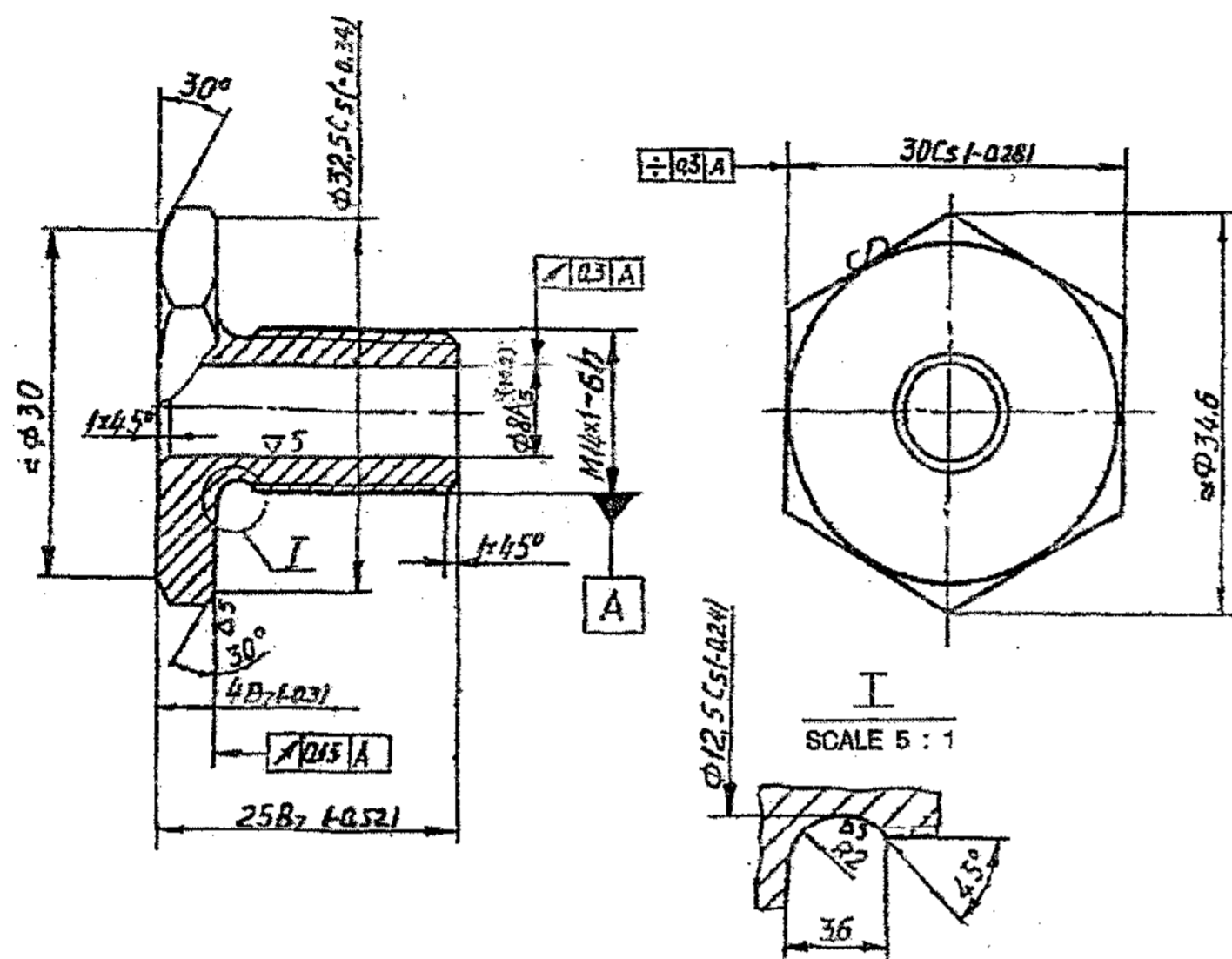
EXPLANATORY NOTE :-

4. REFERENCE MATERIAL QUOTED :- STEEL 20X2H4A GOST 4543-71.
 STRUCTURAL ALLOY STEEL HIGH QUALITY OF GRADE 20X2H4A (CHROMIUM -NICKEL AND CHROMIUM -NICKEL STEEL WITH BORON) AND MANUFACTURED IN ACCORDANCE WITH GOST 4543-71.
 a) CHEMICAL COMPOSITION :

GRADE OF STEEL	CONTENT OF ELEMENTS %							
	C	Si	Mn	Cr	Ni	S	P	Cu
20X2H4A	0.16 - 0.22	0.17 - 0.37	0.30 - 0.80	1.25 - 1.65	3.25 - 3.65	0.035	0.035	0.30

b) MECHANICAL PROPERTIES :

TENSILE STRENGTH Kg/mm ²	YIELD POINT Kg/mm ²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgm/cm ²
MINIMUM				
130	110	9	45	8



- BHN 321 - 269 (DIA. OF INDENTATION 3.4 - 3.7 mm) TO BE CHECKED IN BLANK.
- COATING : CHEMICAL PHOSPHATING , OIL FINISHING OR CHEMICAL OXIDIZING , PHOSPHATING , OIL FINISHING .
- MAY BE MANUFACTURED FROM SHAPE STEEL No. 1855 TY 14 - 1 - 1271 - 75.

5A ALT. MATL. :- STEEL 835 M15 (En 39B) TO BS : 970 Part 1 : 1983

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

EST. WT. (Kg) 0.047	TO BE STAMPED OR MARKED WHERE INDICATED THIS # (LETTERS)
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ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R. OUTSIDE R. INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

DRN	Sd/=	MATERIAL :- STEEL 20X2H4A - GOST 4543-71	USED ON :- 172.47.015Cb eb
CHD	Sd/=	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
APPD	Sd/=		
DATE	16.02.94	TITLE :- MUSHROOM SHAPED THRUST NUT	
SCALE	2 : 1		
DIMENSIONS IN mm		D S CAT NUMBER	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102 - 63			
ALL THREADS TO CONFORM TO IS : 4218, PART-4.		DRAWING NUMBER 172.47.067	
ISSUE	DATE	NATURE OF AMENDMENTS	

DRG. REINDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 5
COMMON TO T-90
(B. KAYAVELU), JTOID
03-08-06

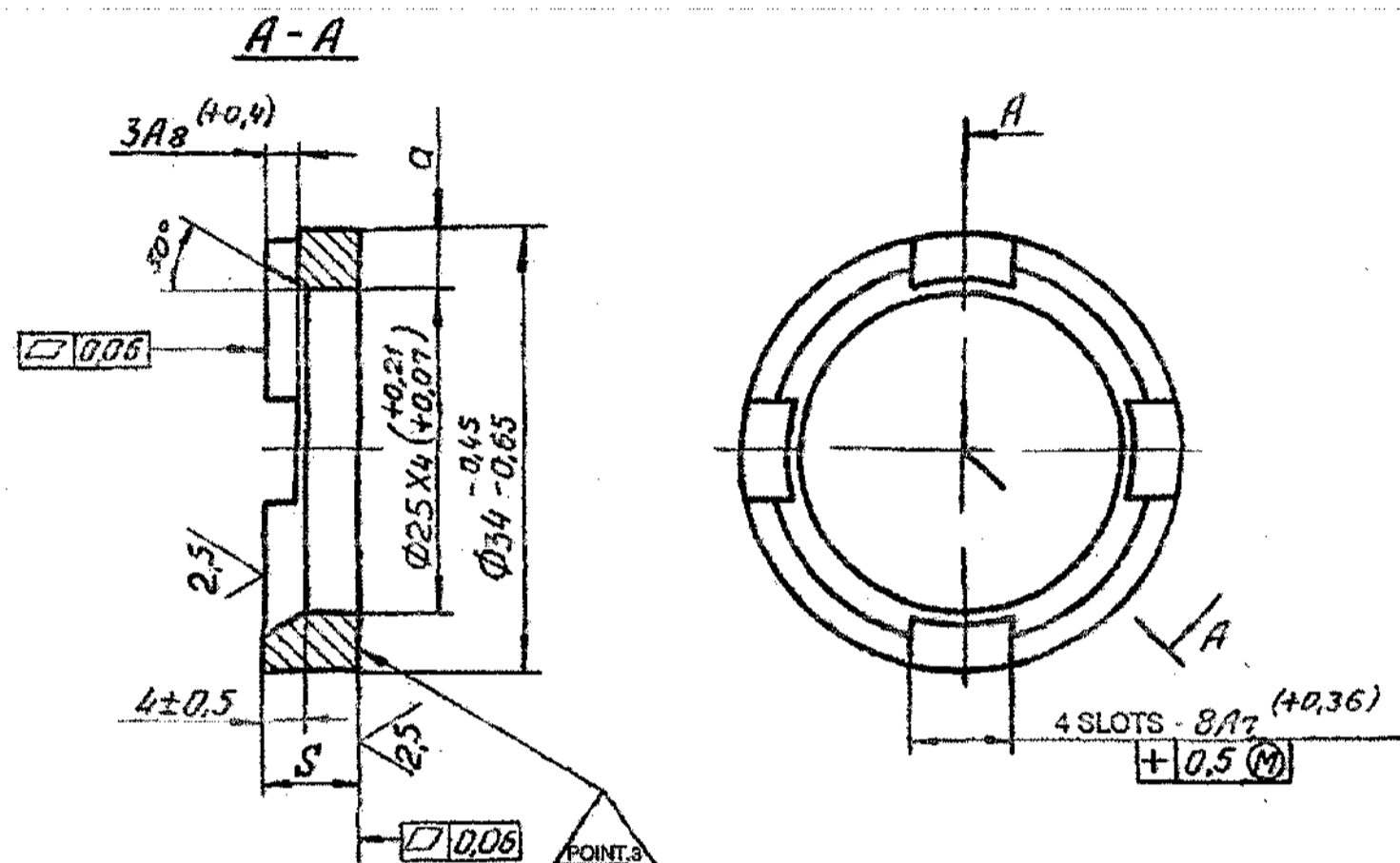
DRG. REINDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 5
COMMON TO T-90

F-88
42
SIZE A2

DRAWING NUMBER
172.47.071

SHEET No. 1 OF 1

Rz 40 (✓)



PART No.	S	MAXIMUM TOLERANCE	MASS
172.47.071	7.4	C ₃ (-0.03)	0.018
-01	7.2		0.0176
-02	7		0.0172
-03	6.8		0.0168
-04	6.6		0.0164

1. BHN 302 - 255 (DIA. OF INDENTATION 3.5 . . . 3.8) TO BE CHECKED IN BLANK.
2. DIFFERENCE IN MEASUREMENTS OF DIMENSION "a" SHOULD NOT EXCEED 0.2 MM.
3. TO BE MARKED OTHERWISE THAN BY PUNCHING.
4. ALTERNATE MATERIAL : STEEL 30XTCA GOST 4543 - 71.

EXPLANATORY NOTE :-

1. a) REFERENCE MATERIAL QUOTED :- STEEL 38XC GOST 4543 - 74.
STRUCTURAL CHROMIUM SILICON ALLOY QUALITY STEEL
GRADE 38XC GOST 4543 - 74.
- b) REFERENCE NOTE 4 ON ALTERNATIVE MATERIAL :- STEEL 30XTCA GOST 4543 - 74
STRUCTURAL ALLOY STEEL HIGH QUALITY GRADE 30XTCA (CHROMIUM SILICON MANGANESE STEEL & CHROMIUM SILICON MANGANESE NICKEL STEEL AND MANUFACTURED IN ACCORDANCE WITH GOST 4543 - 71.
2. a) CHEMICAL COMPOSITION AS PER STEEL GRADES 38XC & 30XTCA GOST 4543 - 74.

GRADE OF STEEL	CONTENT OF ELEMENTS %				RESIDUAL CONTENTS %				
	C	Si	Mn	Cr	S	P	Cu	Ni	Cr
38XC	0.34 - 0.42	1.0 - 1.4	0.30 - 0.60	1.30 - 1.60	0.035	0.035	0.30	0.30	0.30
30XTCA	0.28 - 0.34	0.90 - 1.2	0.60 - 1.10	0.80 - 1.10	0.025	0.025			

- b) MECHANICAL PROPERTIES AS PER STEEL GRADES 38XC & 30XTCA GOST 4543 - 74.

GRADE OF STEEL	TENSILE STRENGTH Kgf / mm ²	YIELD POINT Kgf / mm ²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgm/cm ²
38XC	95	75	12	50	7
30XTCA	110	85	10	45	5

2A) ALT. MATL :- STEEL 817M40 (En 24) TO BS : 970 Part 1 : 1983

DRN	Sd / =	MATERIAL :-	USED ON :-
CHD	Sd / =	STEEL 38XC	172.47.015cbCb
APPD	Sd / =	GOST 4543 - 71	
DATE	12 - 02 - 94	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)	
SCALE	2 : 1	AVADI	
DIMENSIONS IN mm		TITLE :-	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102 - 69		RING ADJUSTING	
ALL THREADS TO CONFORM TO IS : 4218 Pt IV		D S CAT NUMBER	DRAWING NUMBER
2A 07.07.06	AUTHY.LLNo.80001/CQA(H)/GEN/DL15.10.05		172.47.071
ISSUE	DATE	NATURE OF AMENDMENTS	

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)

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

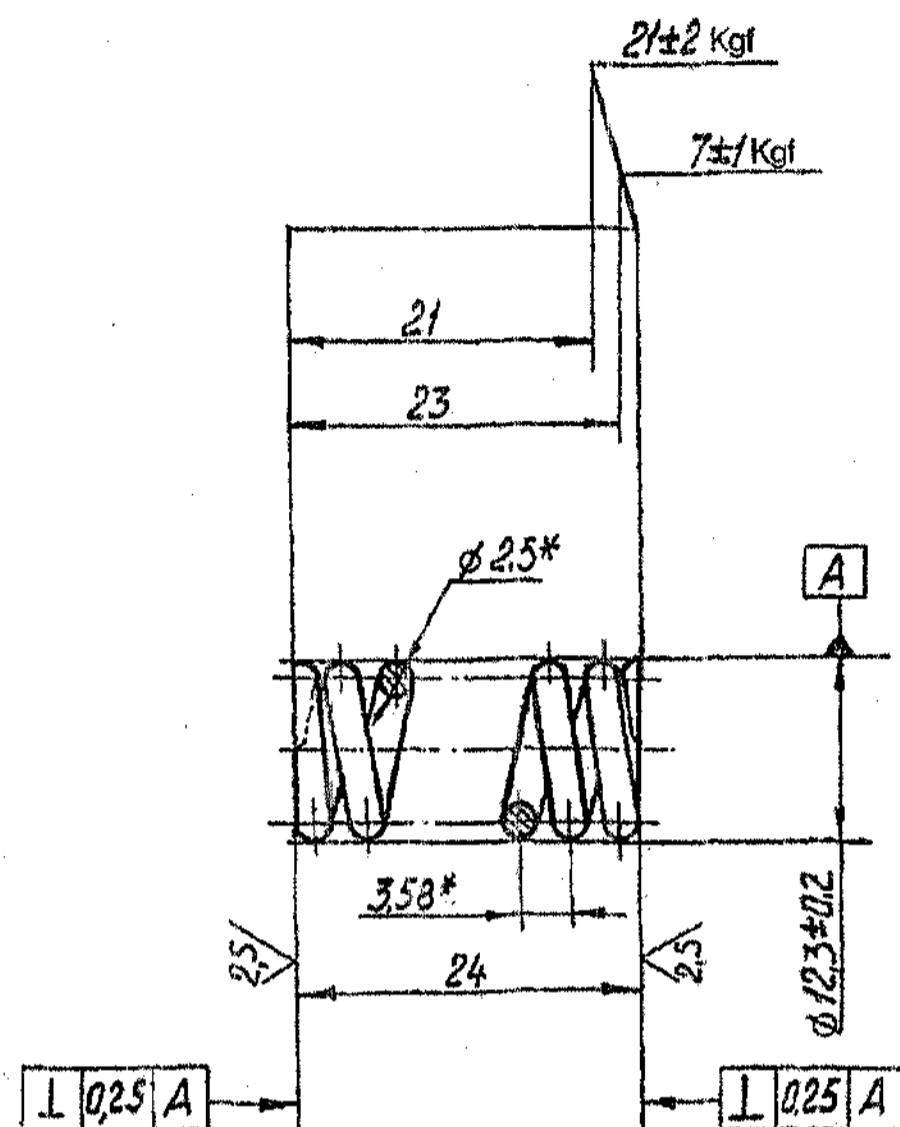
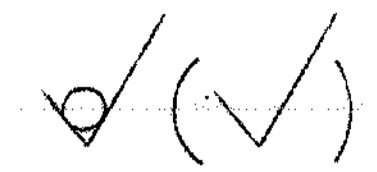
" COMMON TO T - 90 " DRG. RE INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 2

F-88
46
SIZE A2

03-08-06

DRAWING NUMBER
172.47.073

SHEET No. 1 OF 1



1. DIRECTION OF WINDING RH.
2. NUMBER OF TURNS - 6.
3. NUMBER OF FULL TURNS - 6 ± 0.25
4. END TURNS SHOULD BE COMPRESSED AND GROUND TO 3/4 OF THE CIRCUMFERENCE.
5. CLEARANCE BETWEEN OPERATING AND END TURNS SHOULD NOT EXCEED 0.1mm.
6. THICKNESS OF END TURN SHOULD NOT BE LESS THAN 0.4mm.
7. CHECKING THE CHARACTERISTIC IS NECESSARY FOR EACH SPRING.
8. WHEN COMPRESSING WITHIN THE LIMITS OF SPRING LOAD DIAGRAM THERE SHOULD BE NO RESIDUAL DEFORMATION.

9. COATING - CHEMICAL OXIDIZING, OIL FINISHING.
10. NUMBER OF THE SPRING IS TO BE MARKED ON A TAG.
11. DIMENSIONS FOR REFERENCE.
- ② 12. INSTEAD OF CHECKING THE SQUARENESS OF FACE TO THE BEING FORMED "A" SQUARENESS OF THE BEING FORMED "A" TO BOTH FACES OF SPRING MAY BE CHECKED. DEVIATION FROM THE SQUARENESS OF BEING FORMED "A" TO BOTH FACES OF SPRING SHOULD NOT EXCEED 0.5 MM.

EXPLANATORY NOTE :-

REFERENCE MATERIAL QUOTED :- WIRE II A - Π - 2.5 GOST 9389 - 75
 CARBON STEEL COLD DRAWN WIRE OF CATAGORY II A WITH HIGH ACCURACY (Π) ON DIAMETER 2.5 ± 0.02 AND MANUFACTURED FROM CARBON STEEL WIRE TO GOST 1050 - 74, GOST 1436 - 74 AND ALSO FROM STEEL GRADE KT - 2 AND 3K - 7 AS PER GOST 9389 - 75
 CHEMICAL COMPOSITION AS PER GOST 9389 - 75.

GRADE OF STEEL	C	Si	Mn	S	P	Cr	Ni	Cu
KT - 2	0.86 - 0.91	0.2 - 0.4	0.17 - 0.37	0.020	0.020	0.06	0.05	0.10
3K - 7	0.68 - 0.78	0.5 - 0.8	0.17 - 0.37	0.030	0.020	0.05	0.05	0.40

MECHANICAL PROPERTIES AS PER GOST 9389 - 75

WIRE DIA	TENSILE STRENGTH Kg/mm ²	NUMBER OF BENDS (MINIMUM)	NUMBER OF TWISTS (MINIMUM)
2.5	165 - 195	7	21

(B. JAYAVELU, JTDI)
 03-08-06

" COMMON TO T - 90 "
 DRG. RE INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 2

Ⓜ ALT. MATL: GRADE DM TO IS: 4454 (Part-1)-2001

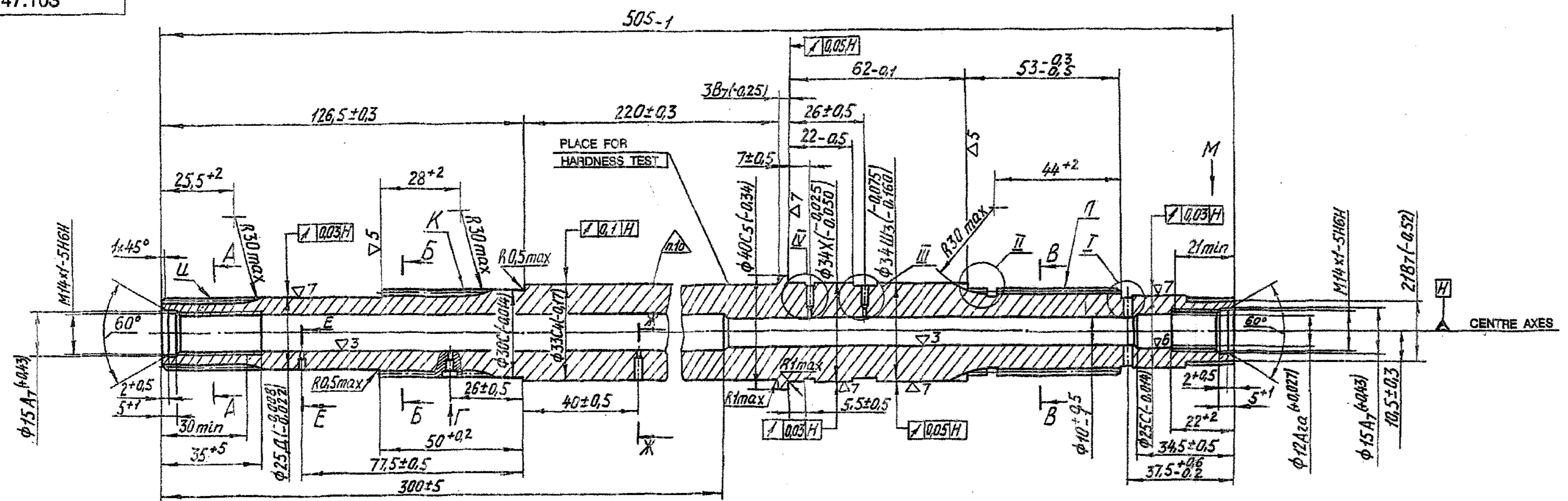
PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION.

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

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

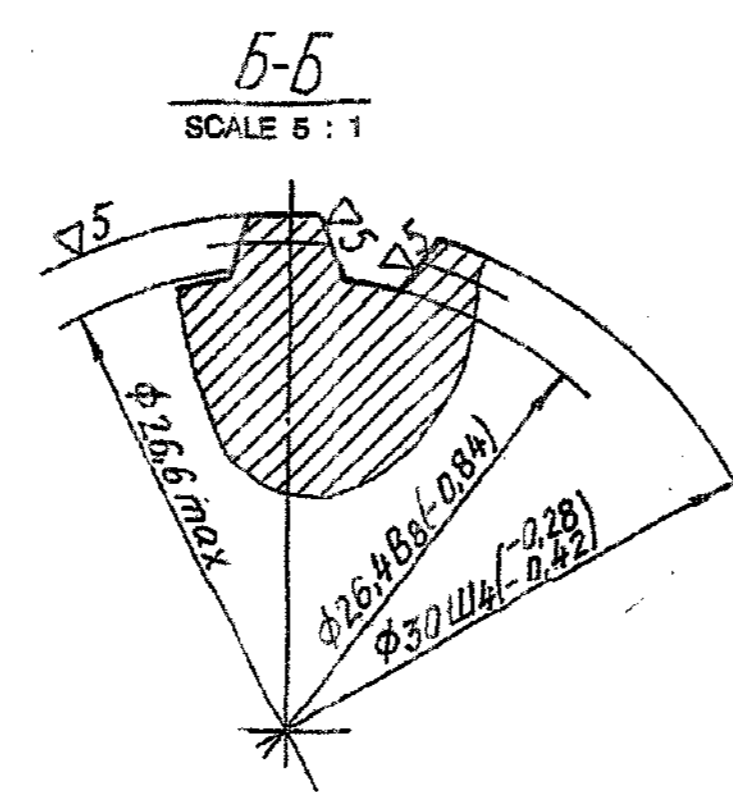
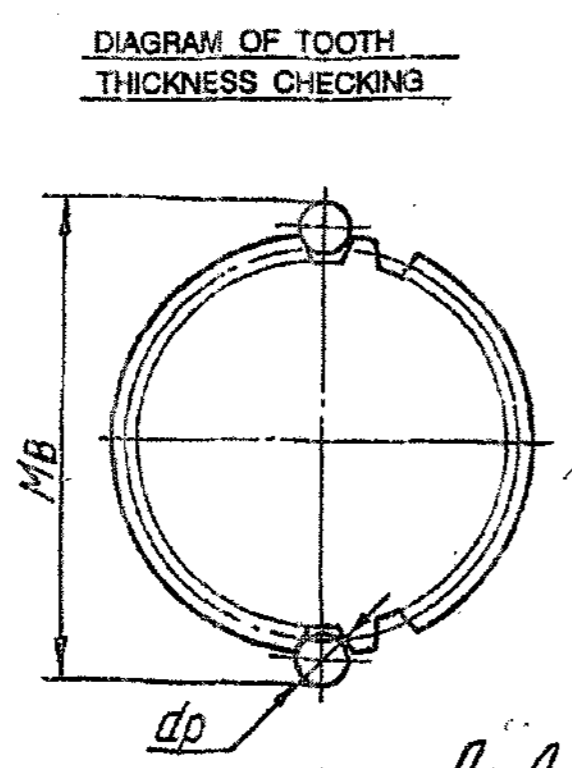
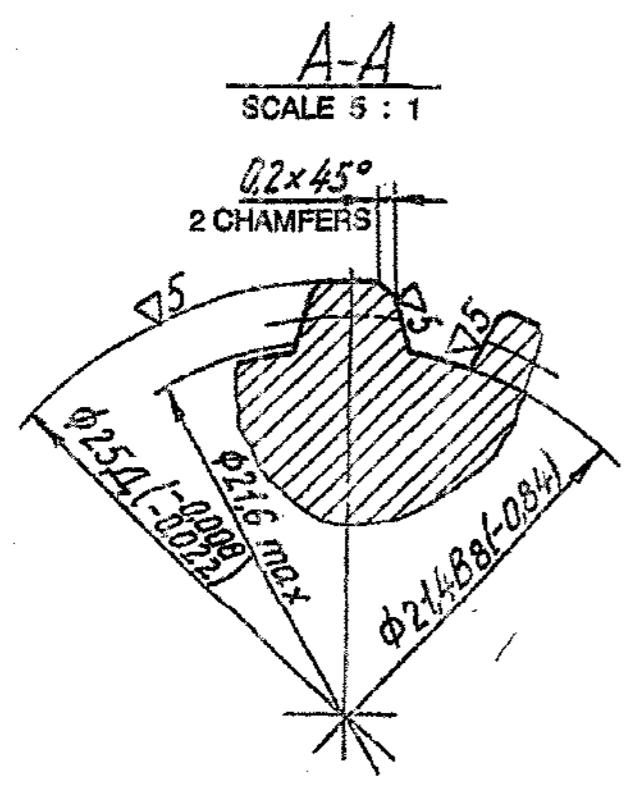
DRN	Sd / =	MATERIAL :-	USED ON :-
CHD	Sd / =	WIRE II A - Π - 2.5	172.47.001cbCb
APPD	Sd / =	GOST 9389 - 75	
DATE	17 - 02 - 94	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
SCALE:-	2:1	TITLE:-	
DIMENSIONS IN mm		SPRING	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS: 2102 - 69		D S CAT NUMBER	DRAWING NUMBER
2A	22.8.05		172.47.073
2	29.12.88		
ISSUE	DATE	NATURE OF AMENDMENTS	

F-88
47
SIZE A2



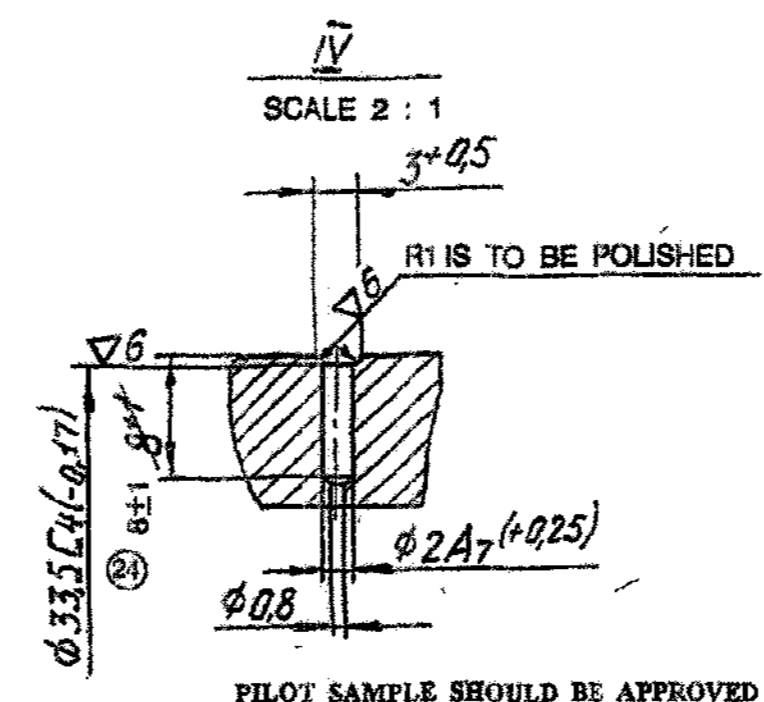
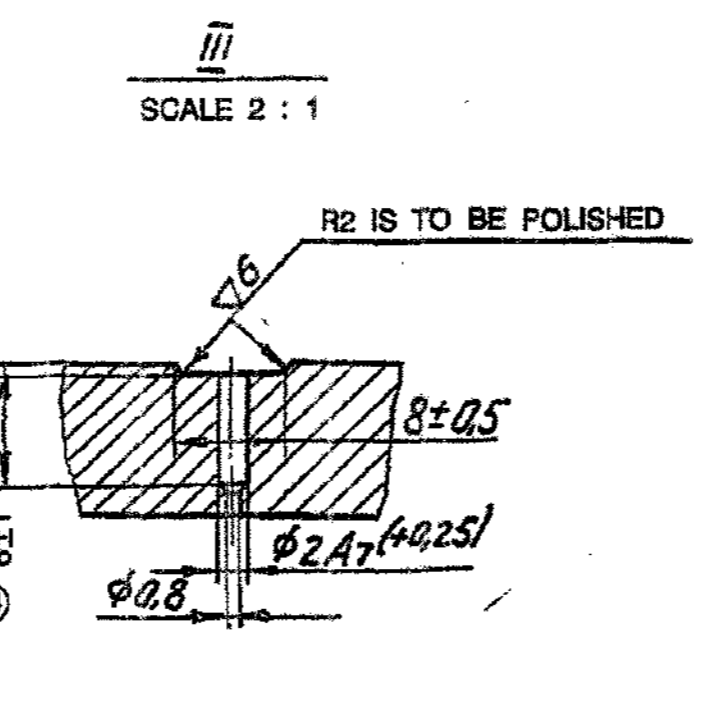
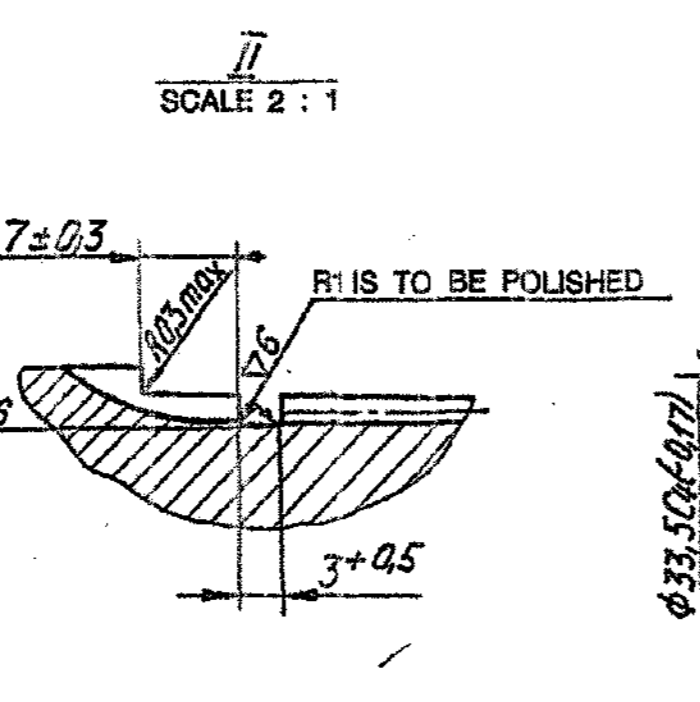
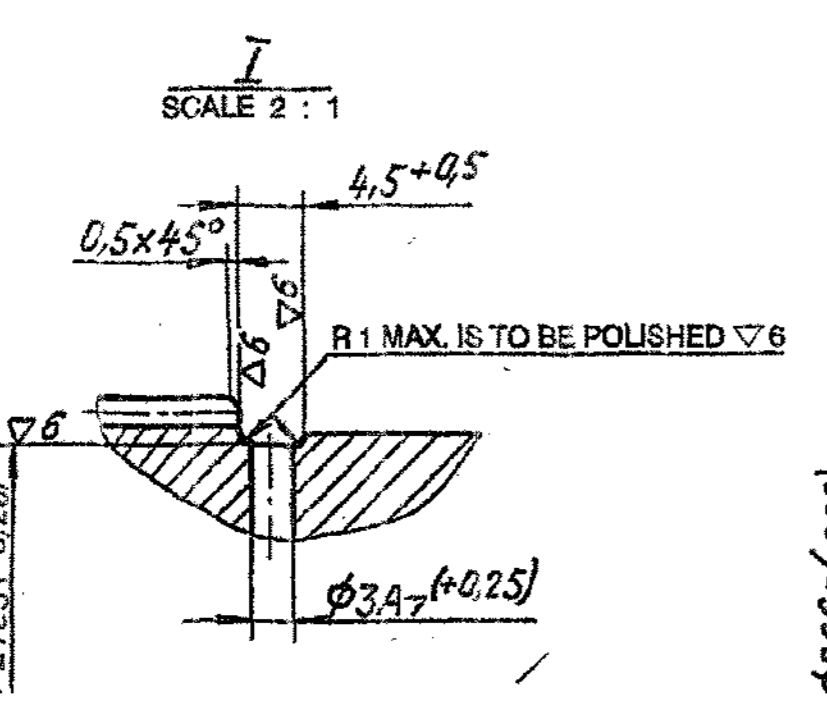
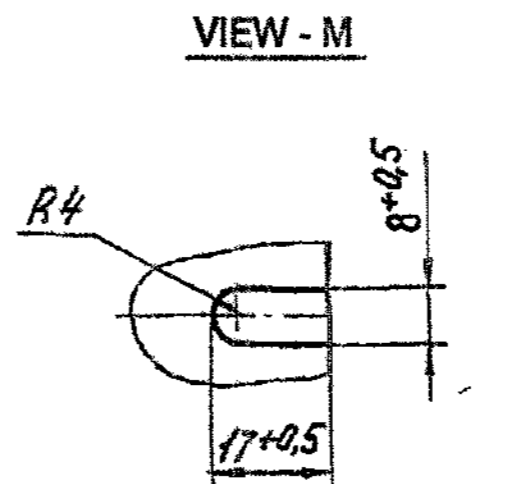
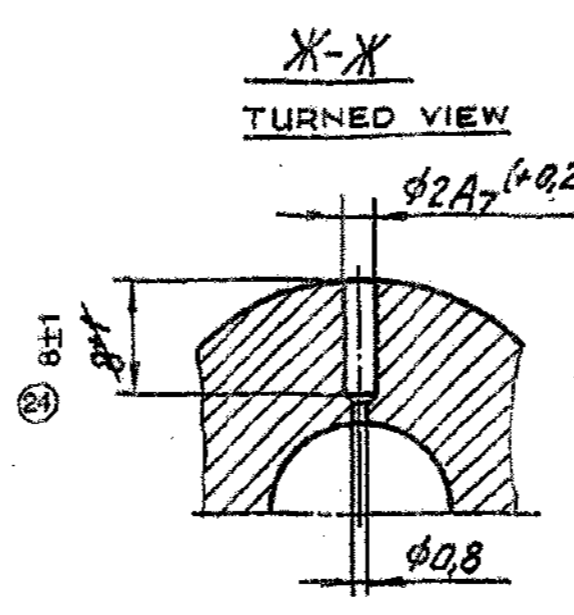
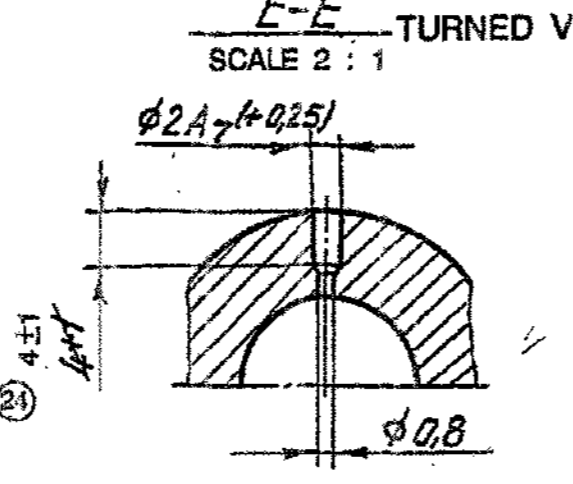
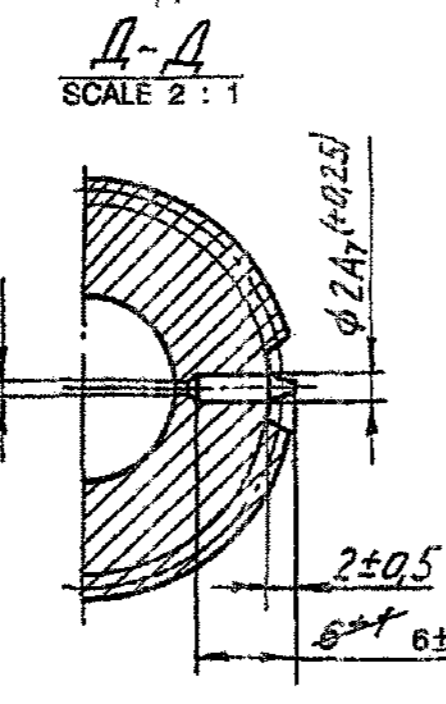
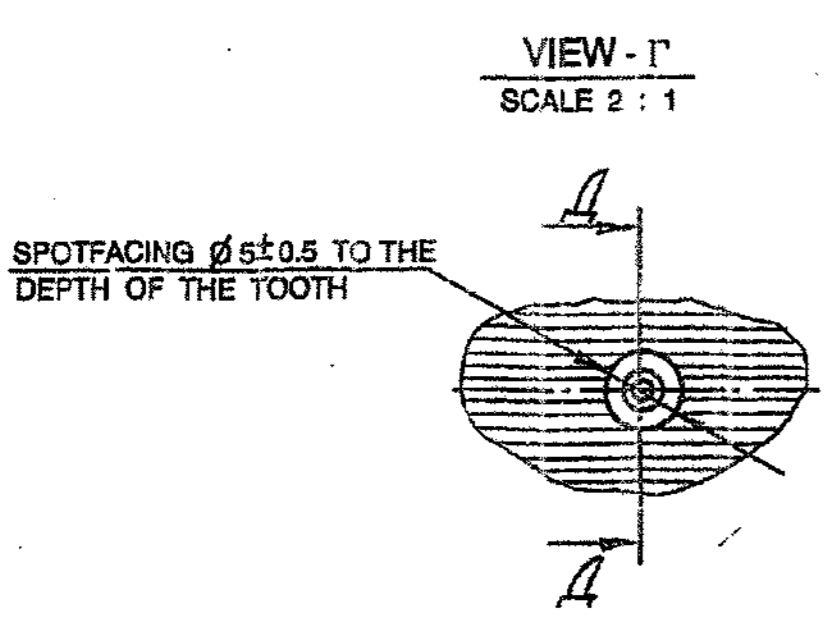
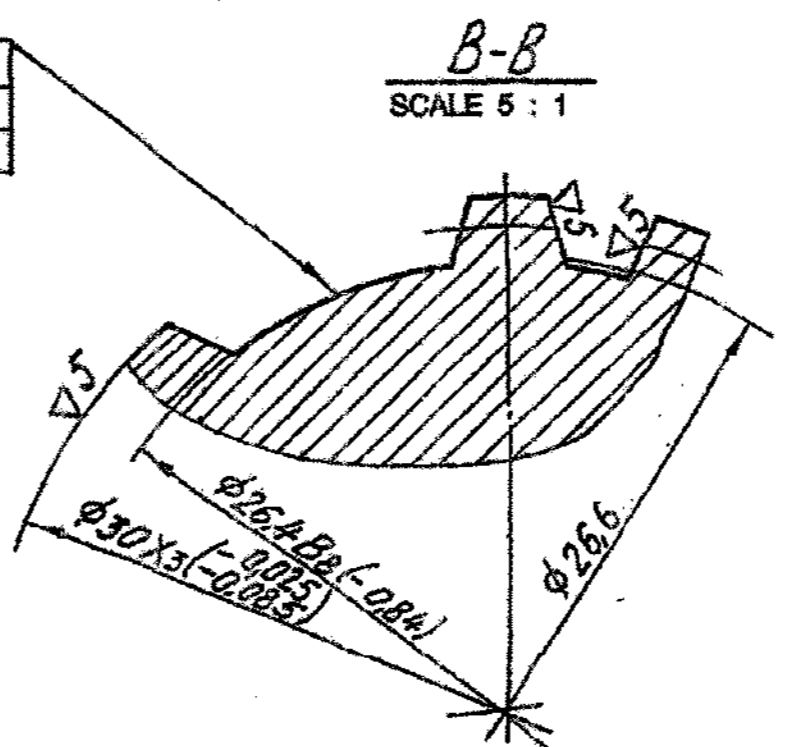
	U	K	Л
DESIGNATION OF SHAFT AS PER GOST 6038-81	SPLINES $\phi 25 \times 15 \times 16$	SPLINES $\phi 30 \times 15 \times 18$	SPLINES $\phi 30 \times 15 \times 18$
MODULE	m	1.5	1.5
NUMBER OF TEETH	Z	16	18
PIN DIAMETER	d_p	3.287 ± 0.001	3.666 ± 0.001
DISTANCE OVER PINS	M B	$29.1 - 0.05$	$34.71 - 0.05$
TOOTH THICKNESS ALONG THE ARC OF THE REFERENCE CIRCLE	S B	$2.067 - 0.07$	$3.22 - 0.02$
REFERENCE DIAMETER	d_d	24	27

- IT IS ALLOWED TO MANUFACTURE COMPONENT FROM STEEL 18X2H4MA, GOST 4543-71.
- HRO-95-44 HB 388 ... 341 (DIA. OF INDENTATION 3.1 ... 3.3).
- AFTER HEAT TREATMENT, THREAD M14x1 MAY BE AS PER 3 CLASS 7H.
- THE FOLLOWING IS ALLOWED RELATIVE TO CENTRES:
 - RUN-OUT OF SPLINE SURFACES K, ± 0.5 mm, MAX.
 - MISALIGNMENT OF THE SPLINE SURFACES \perp , \perp OF 0.05 mm, MAX. ON THE LENGTH OF THE SPLINES.
- RELATIVE POSITIONS OF THE SPLINES AND HOLES ARE ARBITRARY.
- THREAD SHOULD BE COUNTERSHUNK AT AN ANGLE OF 90° TO 120° UP TO THE MAJOR DIAMETER OF THE THREAD.
- HOLE FOR THREAD M14x1 MAY BE PROCESSED WITHIN THE LIMITS OF $\phi 12 \pm 1$ mm EXCEPT THE PORTION OF THREAD.
- DECREASE OF DIMENSIONS BY 0.2 mm, MAX. ON A LENGTH OF NOT EXCEEDING 3 mm AT THE PLACES OF TRANSITION TO THE FOLLET ON SURFACES DIA. 25A DIA 30C, DIA 30XC, DIA 33C4 AND DIA 34X IS ALLOWED.
- SEPERATE TOOL MARKS ARE ALLOWED IN HOLE DIA 12A 2a.
- TO BE MARKED BY OTHER METHOD THAN PUNCHING.
- CHAMFER $0.5 \times 45^\circ$ ON THE FACE OF THE SHAFT ON THE SIDE OF $\phi 25C$ IS ALLOWED.
- CHAMFER $0.2 \times 45^\circ$ AT ALL THE TOOTH TIPS OF SPLINES $\phi 30 \times 15 \times 18$ 3C IS ALLOWED.



2 DIAMETRICALLY OPPOSITE SPLINES SHOULD BE SHEARED ON A LENGTH OF 44 mm. IT IS ALLOWED TO CUT INTO DIMENSION 28.4 ± 0.5

TO BE ENSURED ON A LENGTH OF 28 ± 2 DIA 30C (-0.014) SHOULD BE ENSURED ON THE REMAINING LENGTH



EXPLANATORY NOTE:-

REFERENCE MATERIAL QUOTED: STEEL 18X2H4BA GOST 4543-71 AND ALTERNATIVELY STEEL 18X2H4MA GOST 4543-71.

CHROMIUM NICKEL MOLYBDENUM STEEL WITH HIGH QUALITY TO GRADE 18X2H4BA AND ALTERNATIVELY TO GRADE 18X2H4MA TO GOST 4543-71 FOR GOLD MACHINING (B) ALTERNATIVELY WITH CONTROL OF MECHANICAL PROPERTIES (M) AND MANUFACTURED IN ACCORDANCE WITH GOST 4543-71.

a) CHEMICAL COMPOSITION: AS PER GOST 4543-71

GRADE OF STEEL	CONTENT OF ELEMENTS %					RESIDUAL CONTENTS %				
	C	Si	Mn	Cr	Ni	P	S	Cu	Ni	Cr
	MAXIMUM									
18X2H4BA	0.14 -	0.17 -	0.25 -	1.35 -	4.00 -	0.025	0.025	0.30	0.30	0.30
18X2H4MA	0.20	0.37	0.55	1.65	4.40					

b) MECHANICAL PROPERTIES: AS PER GOST 4543-71

GRADE OF STEEL	TENSILE STRENGTH	YIELD POINT	ELONGATION	REDUCTION IN AREA	IMPACT STRENGTH
	Kgf/mm ²	Kgf/mm ²	%	%	Kgm/cm ²
	MINIMUM				
18X2H4BA	115	85	12	50	10
18X2H4MA	105	80	12	50	12

(24A) ALT. MATL. :- STEEL 835 M15 (En 988) TO BS: 970 Part 1: 1988

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

EST. WT. (Kg) 2.92 TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)

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

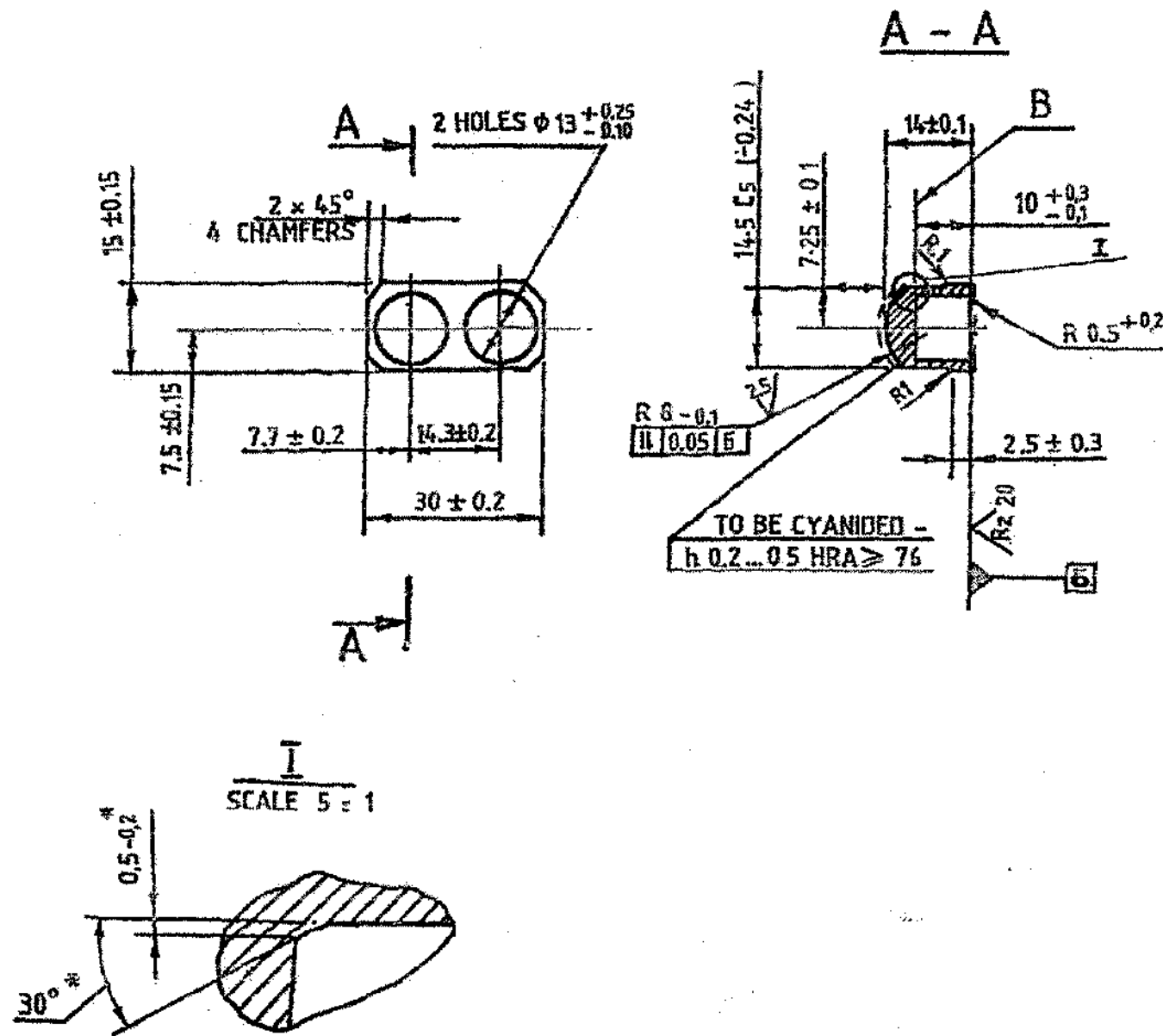
DRN	Sd/=	MATERIAL	USED ON
CHD	Sd/=	STEEL 18X2H4BA GOST 4543-71	172.47.015Cb
APPD	Sd/=	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
DATE	16.09.84	TITLE:- DRIVEN SHAFT	
SCALE	1:1	D S CAT NUMBER	
DIMENSIONS IN mm	DRAWING NUMBER		
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS: 2/0.2 - 0	172.47.103		
ALL THREADS TO CONFORM TO	NATURE OF AMENDMENTS		

DRG. REINDIANISED BASED ON RUSSIAN ORIGINAL ISSUE-22 COMMON TO T-80

DRAWING NUMBER
172.47.227

SHEET No. 1 OF 1

Rz 40 (✓)



EXPLANATORY NOTE :-

9. REFERENCE MATERIAL QUOTED : STEEL 12XH3A GOST 4543-71
STRUCTURAL ALLOY STEEL HIGH QUALITY OF GRADE 20XH3A AND ALTERNATIVELY 20X2H4A (CHROMIUM-NICKEL AND CHROMIUM NICKEL STEEL WITH BORON) AND MANUFACTURED IN ACCORDANCE WITH GOST 4543-71.

a) CHEMICAL COMPOSITION AS PER GOST 4543-71

GRADE OF STEEL	CONTENT OF ELEMENTS %					RESIDUAL CONTENT % (MAX)				
	C	Si	Mn	Cr	Ni	S	Cu	Ni	P	Cr
12XH3A	0.09 - 0.16	0.17-0.37	0.3 - 0.6	0.60 - 0.90	2.75 - 3.75	0.025	0.30	0.30	0.025	0.30
20X2H4A	0.16 - 0.22	0.17-0.37	0.3 - 0.6	1.25 - 1.65	3.25 - 3.65	0.025	0.30	0.30	0.025	0.30

b) MECHANICAL PROPERTIES AS PER GOST 4543-71.

GRADE OF STEEL	YIELD POINT Kgf / mm ²	ULTIMATE STRENGTH Kgf / mm ²	RELATIVE ELONGATION %	REDUCTION IN AREA	IMPACT STRENGTH
12XH3A	70	95	11	55	9
20X2H4A	110	130	9	45	8

- IT IS ALLOWED TO MANUFACTURE FROM SHAPED ROLLED STOCK No.2613 AS PER TY 14-1-1271-75.
- CYANIDING ALL OVER IS ALLOWED.
- MARK LEFT BY DRILL WITH DIAMETER NOT MORE THAN 5mm TO THE DEPTH NOT MORE THAN 1mm IS ALLOWED ON SURFACE "B".
- LOCAL TOOL MARKS IN HOLE DIA 13 ARE ALLOWED.
- ALTERNATE MATERIAL - STEEL 20X2H4A, GOST 4543-71.
- * DIMENSIONS TO BE ENSURED BY TOOL.
- ⑦ TRACE OF CHECKING THE HARDNESS ON SPHERE R 8 WITH DEPTH NOT EXCEEDING 0.06mm IS PERMITTED
- ⑦ 8. REMAINING REQUIREMENTS ARE AS PER 520 TY 1.

⑦A ALT. MATL :- STEEL 655 M13 (En 36A) TO BS : 970 Part 1 : 1983

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

EST. WT. (Kg) 0.019 TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)

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

DRN	Sd / =	MATERIAL:-	USED ON:-
CRD	Sd / =	STEEL 12XH3A -	172.47.001cbCd
APPD	Sd / =	GOST 4543-71.	
DATE	18-09-94	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)	
SCALE:-	1:1	AVADI	
DIMENSIONS IN mm		TITLE:-	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS: 2102-69		SLEEVE	
7A 07.07.06	AUTH/ILLNo.80601/COA(HV)/GENDL15.10.05	D S CAT NUMBER	DRAWING NUMBER
7 3.8.89	172M.510.A.87 A.L.No.9/5-		172.47.227
ISSUE	DATE	NATURE OF AMENDMENTS	
		IS : 4218 Pt.IV	

" COMMON TO T - 90 "

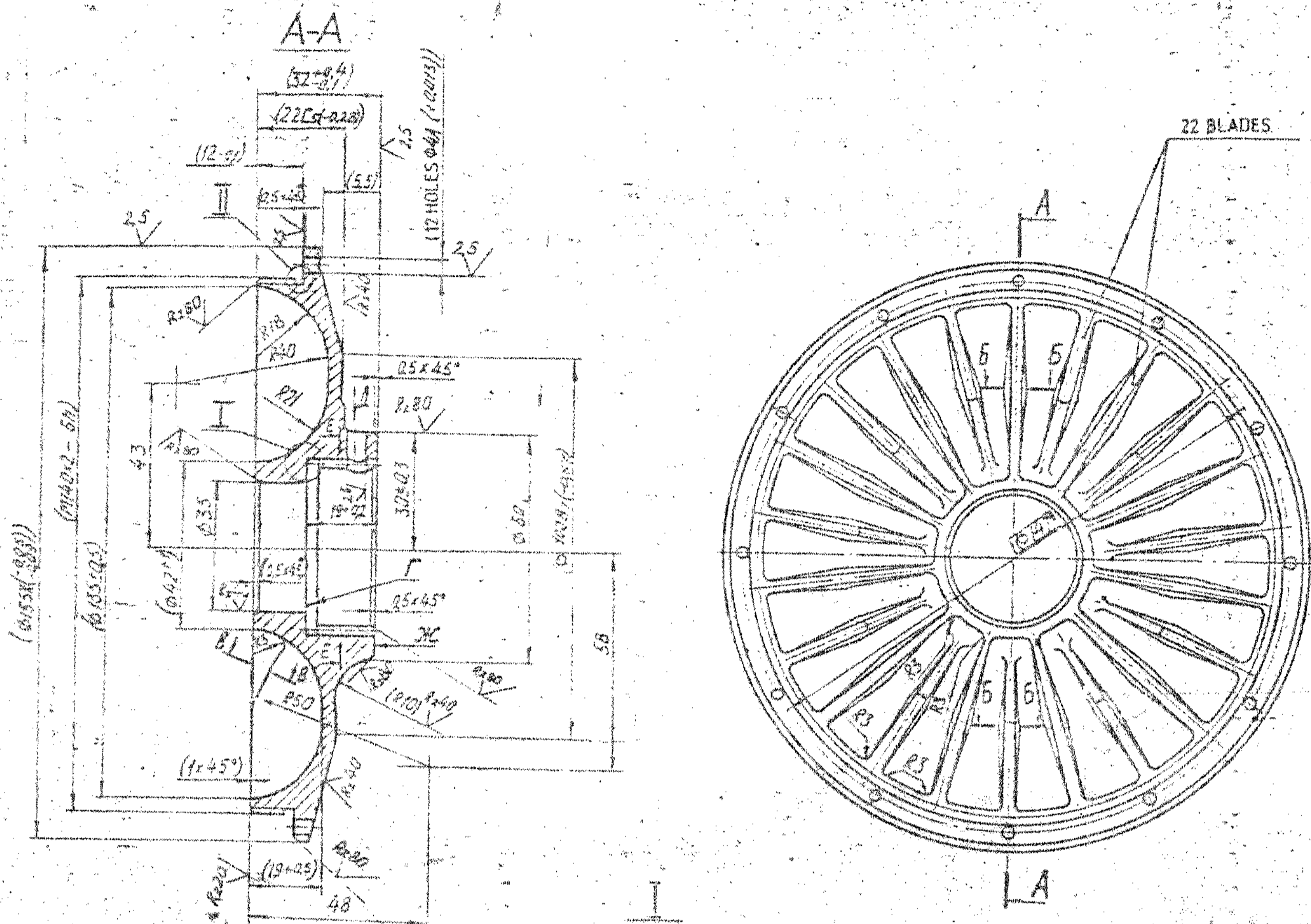
DRG. RE INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 8

IB SATAVELU, JTO(D)
03-08-06

F-89
34

SIZE A2

1. BHN $\geq 90^\circ$ DIA OF INDENTATION $1000 \leq 3.7$
2. UNSPECIFIED LIMIT DEVIATIONS ARE TO BE AS PER ACCURACY CLASS 7.
3. DIMENSIONS IN BRACKETS ARE TO ENSURED AFTER THE ASSEMBLY.
4. TEETH (SPLINES) SHOULD BE CHECKED BY A COMPLEX GAUGE WITH TOLERANCES AS PER GOST 6528-53.
5. R. 0.5 OR CHAMFER $0.5 \times 45^\circ$ IS TO BE MADE ON THE ENTIRE CONTOUR.
6. RUN-OUT OF SURFACES RELATIVE TO SPLINES MAY BE :
 - a) SURFACE γ_C - 0.05 mm. MAX. ON DIAMETER 65 mm.
 - b) SURFACE γ - 0.05 mm. MAX. ON DIAMETER 40 mm.
7. OTHER REQUIREMENTS ARE AS PER 520 TY 1.



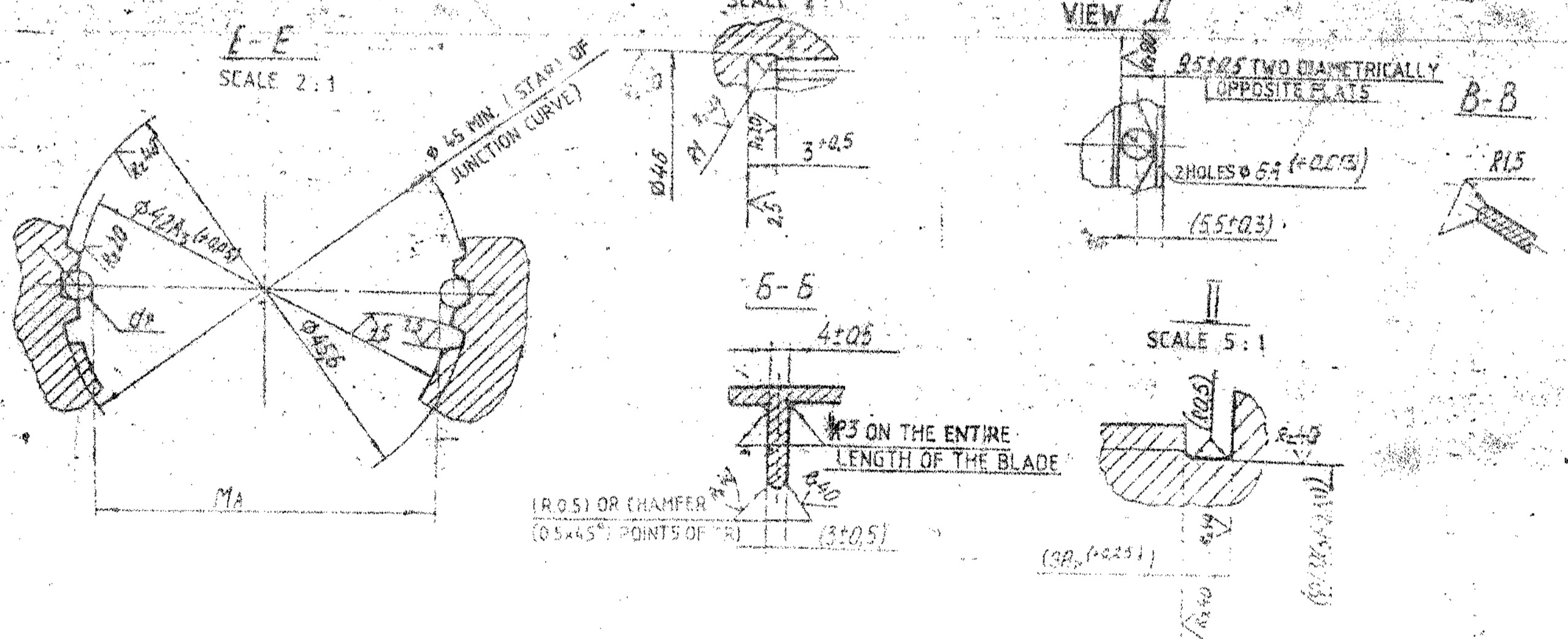
DESIGNATION OF HOLE AS PER GOST 6033-76	3645 x 1.5 x 28	
MODULE	m	1.5
NUMBER OF TEETH	Z	28
ANGLE OF PROFILE	α_0	30
PIN DIAMETER	d _p	2.886 ± 0.001
DISTANCE OVER PINS	M _A	38.9 +0.16 +0.09
TOOTH SPACE WIDTH ALONG THE ARC OF THE REFERENCE CIRCLE.		3.222 +0.07 +0.04
REFERENCE DIAMETER	d _a	42

EXPLANATORY NOTE :-
 8. REFERENCE MATERIAL QUOTED :- ALUMINIUM ALLOY BARS AS PER GOST 21488-76 MADE FROM ALUMINIUM ALLOY BARS WITH OUT HEAT TREATMENT (HOT EXTRUDED) TO GRADE AK4 GOST 21488-76 WITH NORMAL ACCURACY AND MANUFACTURED IN ACCORDANCE WITH GOST 1784-71
 9. CHEMICAL COMPOSITION AS PER GOST 4784-74

GRADE OF ALLOY	ALLOYING CONSTITUENTS						IMPURITIES (MAX)					TOTAL
	Al	Cu	Mg	Ni	Fe	Si	Mn	Zn	Ti	OTHER IMPURITIES (BY CALCULATION)		
AK4	BASE	1.90	1.40	0.80	0.80	0.50	0.20	0.30	0.10	0.50	0.10	
		2.50	1.80		1.30	1.20						

b) MECHANICAL PROPERTIES AS PER GOST 21488-76

GRADE OF ALLOY	TENSILE STRENGTH	ELONGATION
	Kgf/mm ²	%
AK4	360	8.0



MASTER COPY

ALTERNATE MATERIAL:
 ALUMINIUM ALLOY GRADE 22588 TO IS:734-75
 AUTHORITY: CQA (CANADA) LeHex No: 091/IFD/INDV/MTPI/OE dt:24-03-05

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

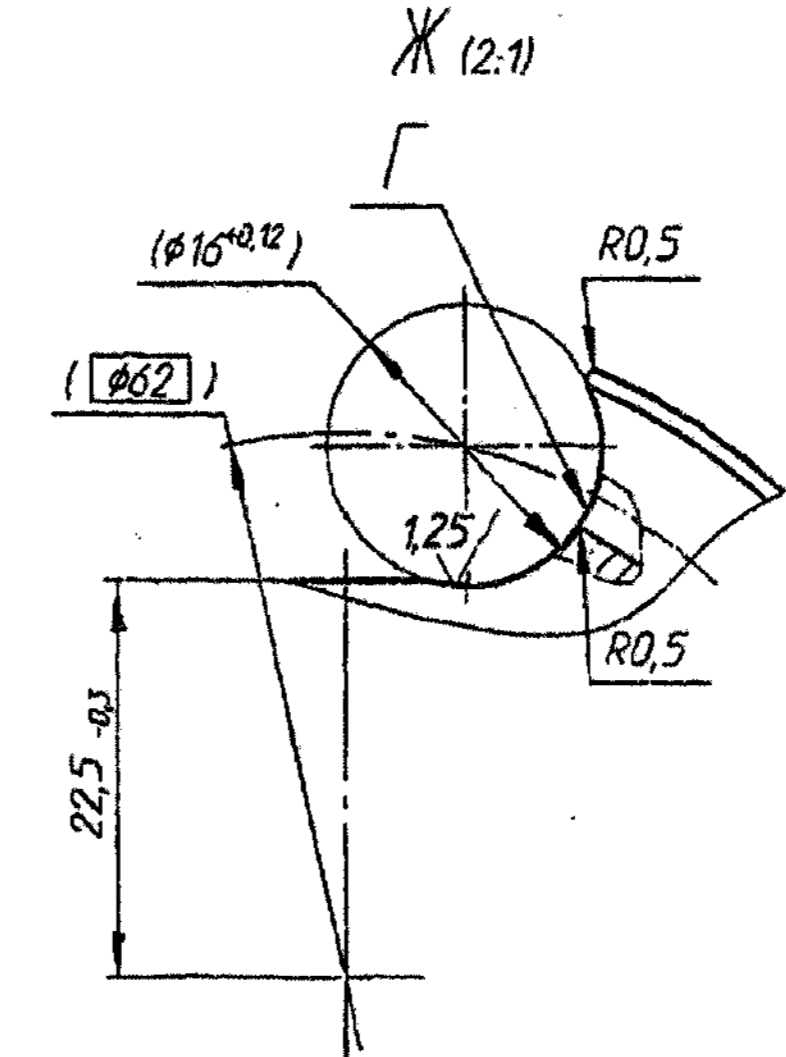
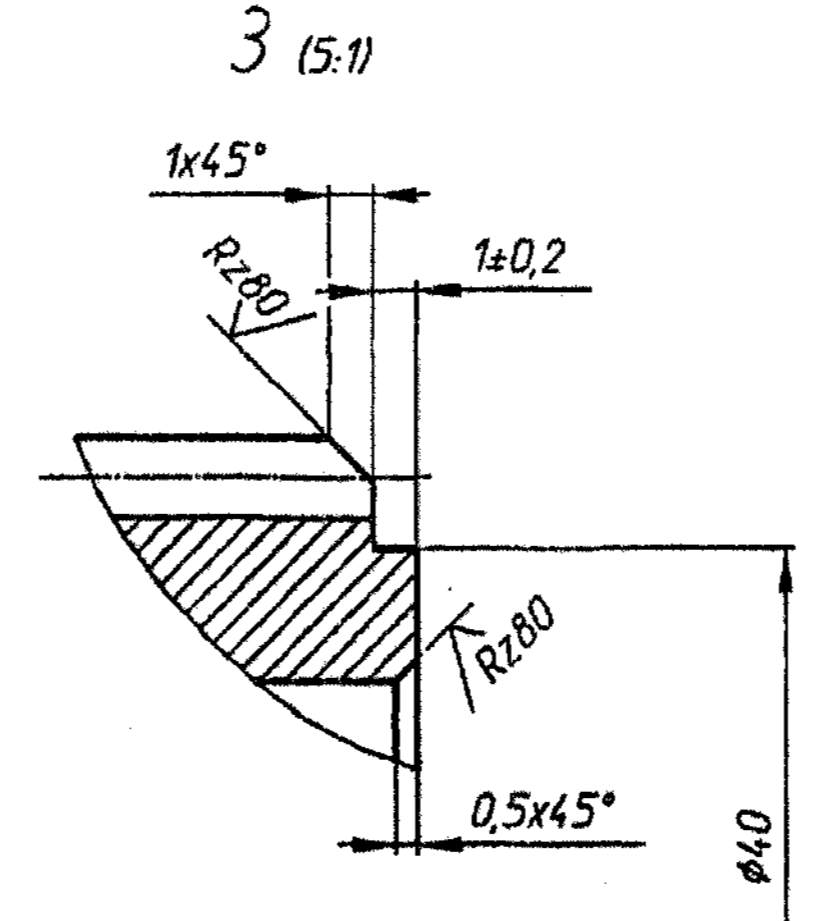
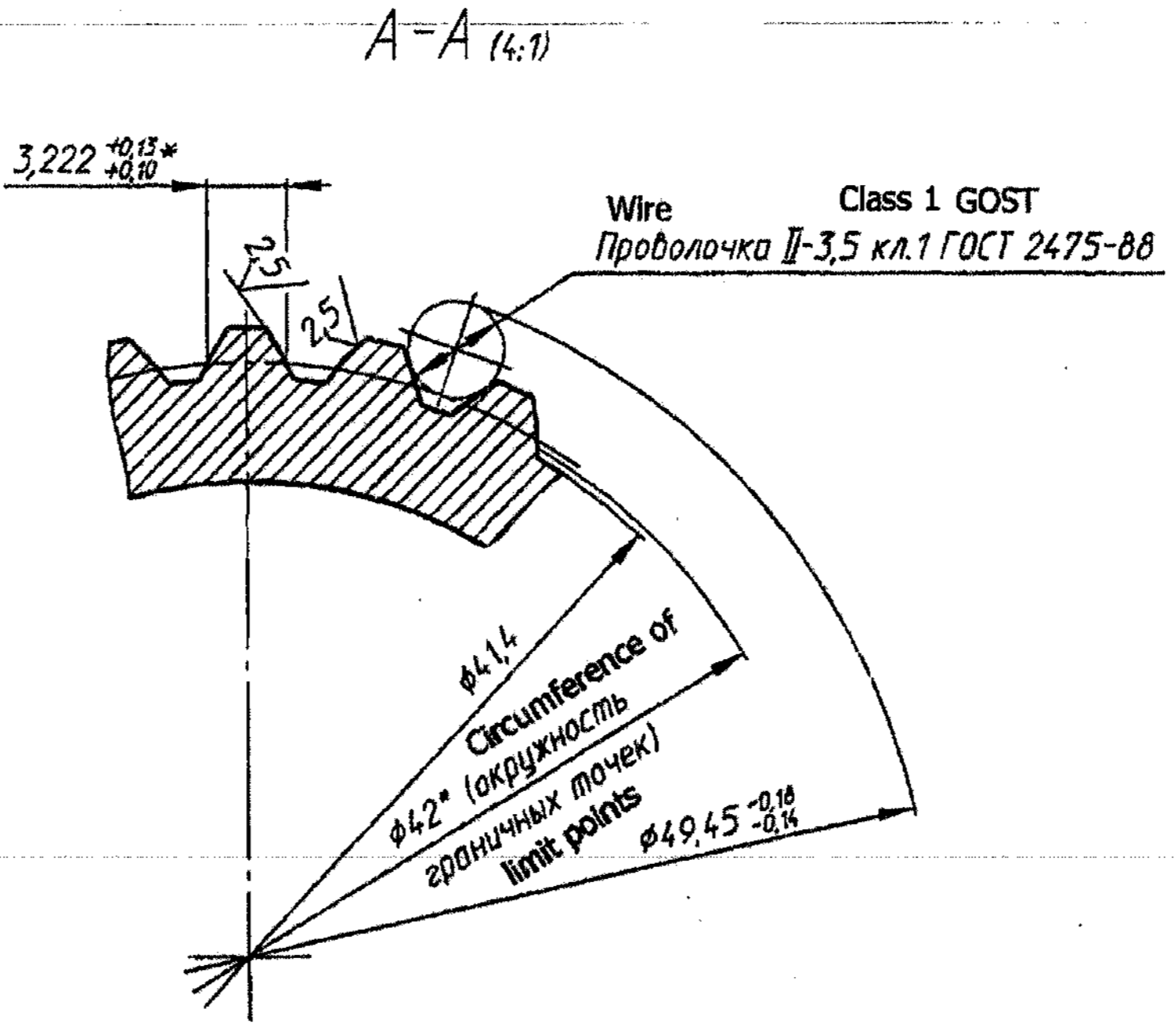
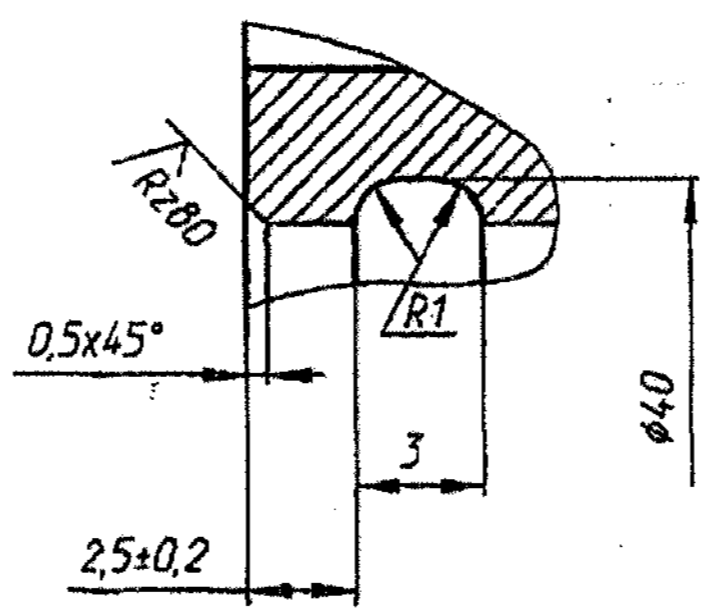
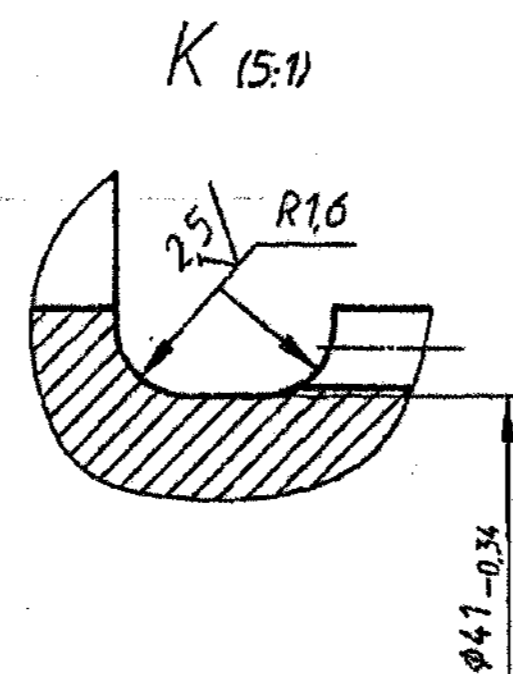
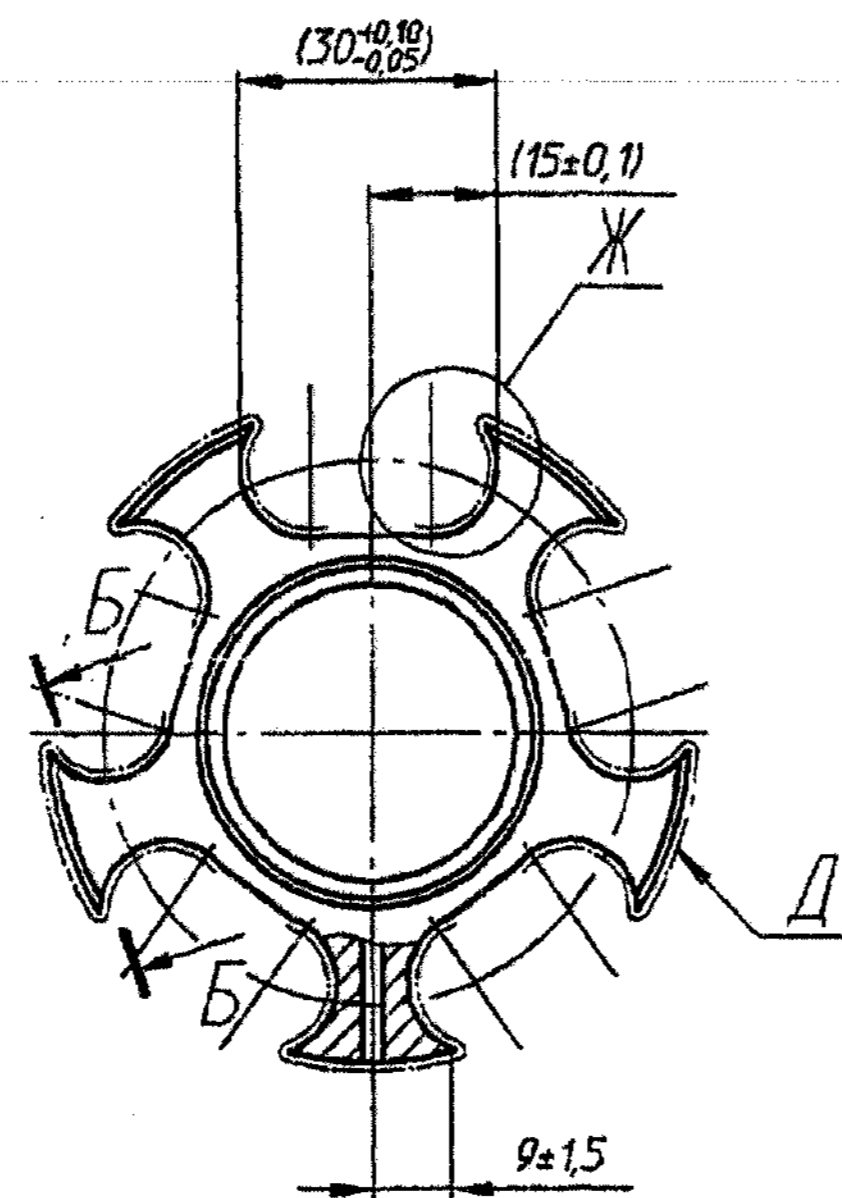
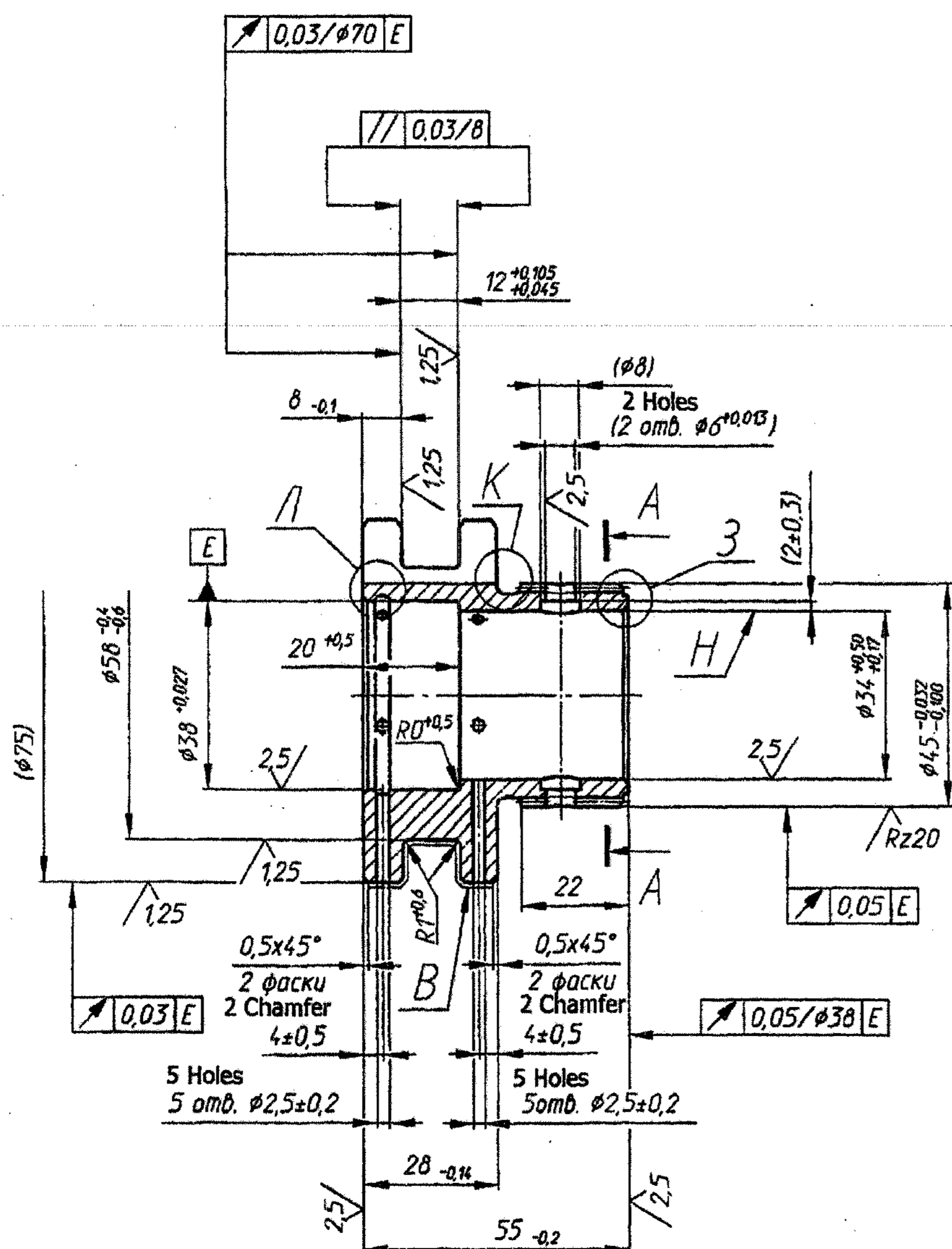
EST. MASS TO BE STAMPED ON MARKED WHERE INDICATED THIS R (LETTERS)
 ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUTSIDE R / INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

DRN	LHD	TCD	APPD	DATE	SCALE	MATERIAL	USED ON
				12-08-94	1:1	ALUMINIUM ALLOY AK4 GOST 21488-76	172 47 041 CS CS
						CONTROLLER/ATE OF QUALITY ASSURANCE/HEAVY VEHICLES	A V A D I
						TITLE	IMPELLER
						DIMENSIONS IN mm	
						TOLERANCE ON DIMS UNLESS OTHERWISE STATED IS 2102-69	
						ALL THREADS TO CONFORM TO	
						D S CAV. NUMBER	DRAWING NUMBER
							172 47 232

DRAWING REDRAWN BASED ON INDIANISED DRG. ISSUE - 3.

DRAWING NUMBER
172.47.233

SHEET No. 1 OF 1



Rz40/√(√)

Module	m	1,5
No. of teeth	z	28
Profile angle	α	30°
Shift of base rack	xm	0,75
Reference diameter	d	42

1. Поверхности В, Д цементировать h 0,5..1,1 мм; ≥ 56 HRC. Допускается цементация кругом, кроме шлицев и поверхности Н.
 2. Материал-заменитель сталь 18Х2Н4ВА, 18Х2Н4МА-Ш ГОСТ 4543-71
 3. *Размеры для справок.
 4. Размеры в скобках - после сборки.
 5. На цементруемых участках, кроме поверхности Г, допускается h 0,8..1,3 мм.
 6. Шлицы контролировать комплексным калибром.
 7. Контролировать методом магнитно-порошковой дефектоскопии. Дефекты не допускаются.
 8. Деталь должна быть немагнитной.
 9. Остальные требования по 520 ТУ1
1. Case harden the surface В, Д with h 0.5 to 1.1 mm; \geq HRC 56 case hardening can be done all around, except splines and surface H.
 2. Alternate material is steel 18X2H4BA, 18X2H4MA-Ш GOST 4543-71.
 3. *Dimensions for reference.
 4. Dimension given in brackets are after assembly.
 5. On case hardening sections, except surface Г, h 0.8 to 1.3 mm is allowed.
 6. Check the spline with complete gauge.
 7. Carry out checking by magnetic particle test. Defects are not allowed.
 8. The part should be non-magnetic.
 9. Other requirements are as per 520.TY1.

ALTERNATE MATERIAL: STEEL 835 M15 (EN-33B) TO BS: 370-83
AUTHORITY: CGA(HV) Lett No.: 091/EPD-V/MTFF/0E dt. 29-09-2004

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

EST. WT (kg)	TO BE STAMPED OR MARKED WHERE INDICATED THIS # (LETTERS)
0.38	

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

DRN	APPROVED	MATERIAL:-	USED ON:-
CHD	Checked	Steel 18X2H4MA GOST 4543-71	172.47.014Cb 172.47.041cbCb
APPD	Checked	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
DATE	11-06-04		
SCALE:-	1:1	TITLE:- INNER CARRIER	
DIMENSIONS IN mm			
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS: 2102-69		D S CAT NUMBER DRAWING NUMBER 172.47.233	
ALL THREADS TO CONFORM TO			
ISSUE	DATE	NATURE OF AMENDMENTS	

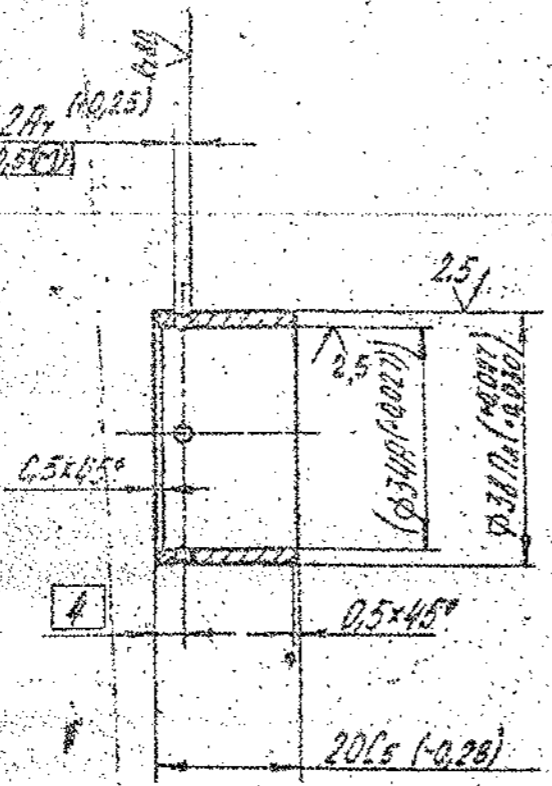
DRG. INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 5 COMMON TO I-72..

SUPPLY CODE
U-01-1-2
D90060
356
F-81
14
SIZE A3x3

DRAWING NUMBER
172 47 734

RZLD ✓

4 HOLES Ø 2.8 (H0.25)
+12.5(0.2)



1. DIMENSION IN BRACKETS IS TO BE ENSURED AFTER ASSEMBLY.
2. OTHER REQUIREMENTS ARE AS PER IS 20 TY 1.
3. ISOLATED PIN-HOLE CASTING DEFECTS, NOT MORE THAN TWO ON EACH MACHINED SURFACE, ARE ALLOWED.

EXPLANATORY NOTE

4. REFERENCE MATERIAL: TIN FOUNDRY BRONZE GP 05 US CS TO GOST 613-79
GP - BRONZE, O-TIN, U-ZINC, C-LEAD.

a) CHEMICAL COMPOSITION:

GRADE OF BRONZE	CONTENT OF ELEMENTS IN %									
	Sn	Zn	Pb	Cu	Al	Fe	Si	P	Sb	TOTAL
GP05USCS	4.0-6.0	4.0-6.0	4.0-6.0	REST	0.05	0.4	0.05	0.1	0.5	1.3
	MAXIMUM									

b) MECHANICAL PROPERTIES:-

GRADE OF BRONZE	ULTIMATE TENSILE STRENGTH Kgf/cm ²	ELONGATION %	HARDNESS BHN Kgf/mm ²
GP05USCS	15	6	588
	MINIMUM		

ALTERNATE MATERIAL:-

BS: 1400-73 LG2 (used latest std. BS:1400-85)

AUTHORITY:- CQA(HV), Letter NO:

98704/04/ID.CO ORD/ALT.COM, dt: 03-05-2005

MASTER COPY

DRG. REDRAWN BASED ON INDIAISED DRG. ISSUE-NIL AND EXPLANATORY NOTE ADDED

PLOT SAMPLE SHOULD BE APPROVED BY A N S P BEFORE BULK PRODUCTION

EST. WT. 0.032 TO BE STAMPED OR MARKED WHERE INDICATED THIS # 1 LETTERS!

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

DRN	DRN	MATERIAL:-	USED ON
CHK	CHK	BRONZE DUE S-5-5	172 47 041 CB CB
TCO	TCO	GOST 613-85	
APPD	APPD	CONTROLLERATE OF QUALITY ASSURANCE(HEAVY VEHICLE) AVADI	
DATE	DATE		
SCALE:- 1:1	SCALE:- 1:1		
DIMENSIONS IN mm	DIMENSIONS IN mm		
TOLERANCE ON DIMS	TOLERANCE ON DIMS		
UNLESS OTHERWISE STATED IS: 2102-69	UNLESS OTHERWISE STATED IS: 2102-69		
ALL THREADS TO CONFORM TO	ALL THREADS TO CONFORM TO		
ISSUE DATE	NATURE OF AMENDMENTS	D S CAT NUMBER	DRAWING NUMBER
			172 47 234

F-89

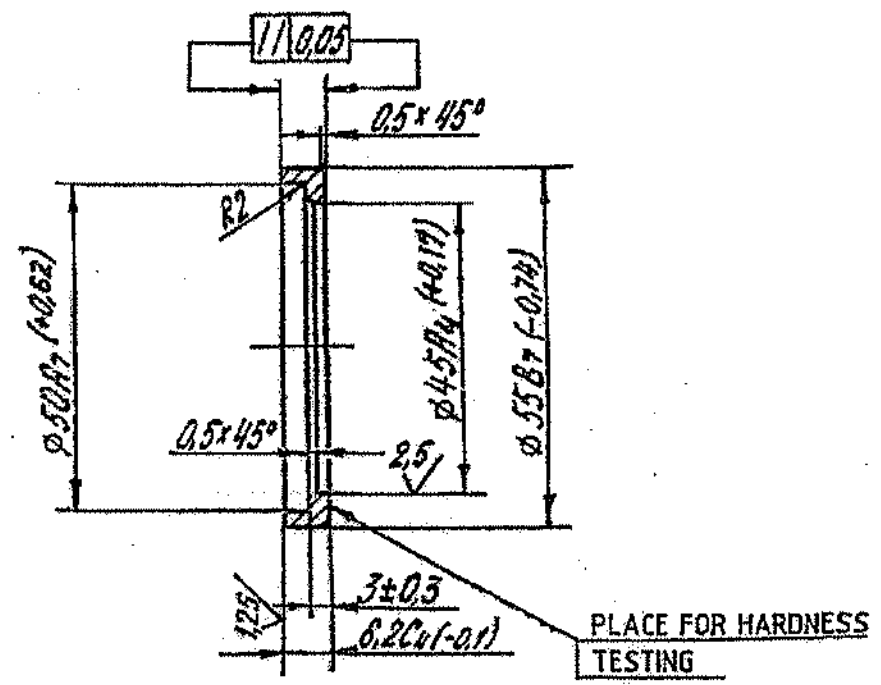
SIZE A3

COMMON TO T-90
DRAWING RE - INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - NIL
19.07.94
21-07-06

DRAWING NUMBER
172.47.235

SHEET No. 1 OF 1

Rz 4.0 ✓ (✓)



EXPLANATORY NOTE :-

4. REFERENCE MATERIAL QUOTED : STEEL 12 X H3A GOST 4543-71.
STRUCTURAL CHROMIUM - NICKEL AND CHROMIUM NICKEL STEEL WITH BORON, HIGH
QUALITY GRADE OF STEEL 12XH3A, ALTERNATIVELY STEEL GRADE 20X 2H4A AND
MANUFACTURED IN ACCORDANCE WITH GOST 4543-71.

a. CHEMICAL COMPOSITION AS PER GOST 4543-71

GRADE OF STEEL	CONTENT OF ELEMENTS %					IMPURITIES %(MAXIMUM)				
	C	Si	Mn	Cr	Ni	P	S	Cu	Ni	Cr
12XH3A	0.09 0.16	0.17 0.37	0.30 0.60	0.60 0.90	2.75 3.15	0.025	0.025	0.30	0.30	0.30
20X2H4A	0.16 0.22	0.17 0.37	0.30 0.60	1.25 1.65	3.25 3.65	0.025	0.025	0.30	0.30	0.30

b. MECHANICAL PROPERTIES AS PER GOST 4543-71.

GRADE OF STEEL	TENSILE STRENGTH Kgf / mm ²	YIELD POINT Kgf / mm ²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgf / cm ²
12XH3A	95 MIN	70 MIN	11 MIN	55 MIN	9 MIN
20X2H4A	130 MIN	110 MIN	9 MIN	45 MIN	8 MIN

1. TO BE CYANIDED ALL OVER h 0.2 TO 0.6 mm.
HRA ≥ 76.
2. OTHER REQUIREMENTS ARE AS PER 520 TY1.
3. ALTERNATIVE MATERIAL : STEEL 20 X 2H4A GOST 4543-71.

(A) ALT. MATL: STEEL 655M13 (En36A) TO BS 970 Part-1: 1983

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

EST. WT. (Kg) 0.030 TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)

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

DRN	Sd/=	MATERIAL:- STEEL 12XH3A GOST 4543-71	USED ON:- 172.47.041CbCb
CHD	Sd/=	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
APPD	Sd/=		
DATE	29-07-94	TITLE:- RING	
SCALE:- 1 : 1			
DIMENSIONS IN mm		D S CAT NUMBER	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102 - 69			
ALL THREADS TO CONFORM TO		DRAWING NUMBER 172.47.235	
A	07-07-06	AUTHY Lt.No. 80001/CAI(HV)/GEN DI. 15.10.05	
ISSUE	DATE	NATURE OF AMENDMENTS	

F-89
42
SIZE A3

DRAWING NUMBER
172.47.236

SHEET No 1 OF 1

Rz 40 (✓) (✓)

EXPLANATORY NOTE :-

REFERENCE MATERIAL QUOTED :- STEEL 38XC GOST 4543 - 71.

STRUCTURAL CHROMIUM SILICON ALLOY QUALITY STEEL

GRADE 38XC GOST 4543 - 71.

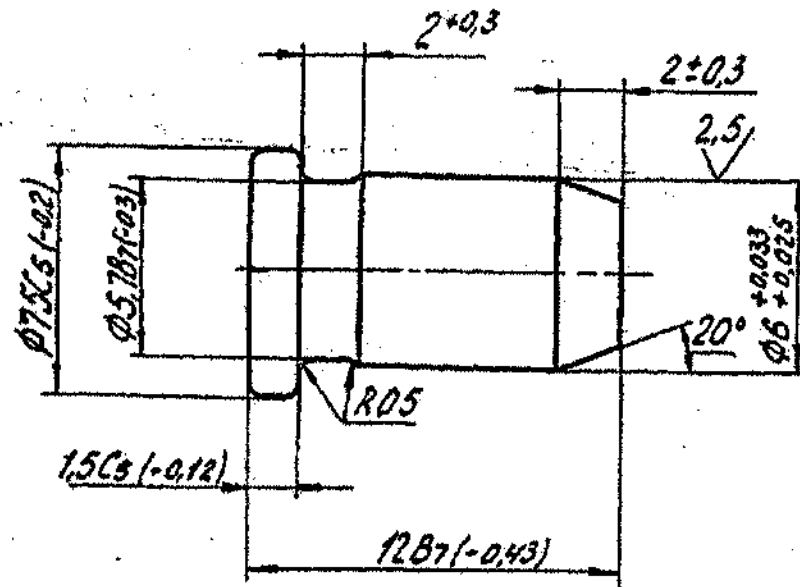
CHEMICAL COMPOSITION : AS PER STEEL GRADE 38XC GOST 4543 - 71.

CONTENT OF ELEMENTS %					
C	Si	Mn	Cr	S	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.

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

TENSILE STRENGTH Kgf/mm ²	YIELD POINT Kgf/mm ²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgf/cm ²
MINIMUM				
95	75	12	50	7



- HRC 26 - 33. IT IS ALLOWED TO CHECK BHN 302 - 255 (DIA OF INDENTATION 3.5 - 3.8)
- OTHER REQUIREMENTS ARE AS PER 520 TY 1.

(A) ALT. MATL :- STEEL 817M40 (En 24) TO BS : 970 Part 1 : 1983

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

EST. WT. (Kg) 0.005 TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)

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

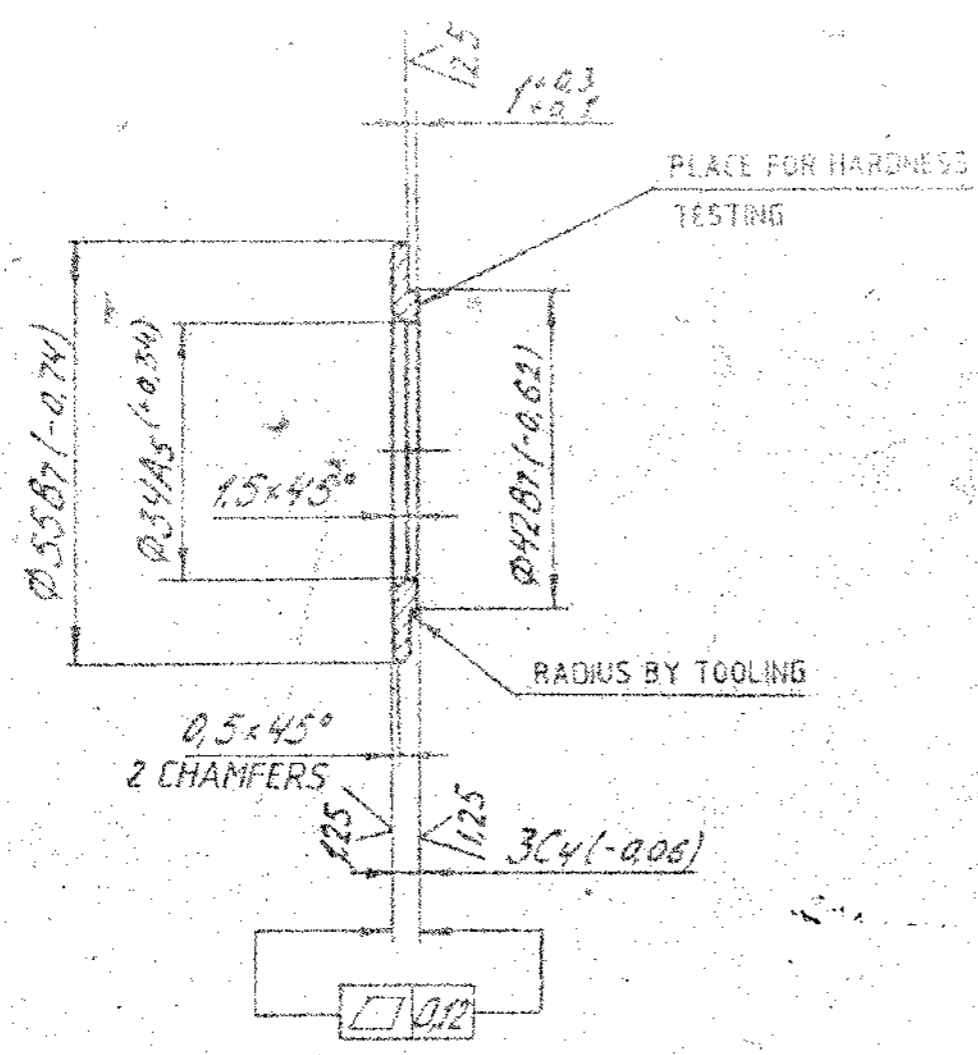
DRN	Sd/=	MATERIAL :- STEEL 38XC GOST 4543 - 71	USED ON :- 172.47.041cbCb
CHD	Sd/=	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
APPD	Sd/=		
DATE	15 - 07 - 94	TITLE :- RETAINER	
SCALE:- 5 : 1			
DIMENSIONS IN mm		D S CAT NUMBER	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102 - 69			
ALL THREADS TO CONFORM TO		DRAWING NUMBER 172.47.236	
ISSUE	DATE	NATURE OF AMENDMENTS	

(B) JAYAVELUJ, JTOID
 27-07-06

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

F-89
43

SIZE A3



EXPLANATORY NOTE -

- REFERENCE MATERIAL QUATED : STEEL 20 X GOST 4543-71 CHROMIUM ALLOY QUALITY STEEL GRADE 20 X GOST 4543-71 AND REFERENCE NOTE 3 ON ALTERNATIVE MATERIAL ROUND BAR B-56 GOST 2590-71 20 X GOST 4543-71 NOT ROLLED STEEL ROUND BAR WITH NORMAL ROLLING ACCURACY (B) ON DIA-METER $56 \pm \frac{0.4}{10}$ AS PER GOST 2590-71.
- CHEMICAL PROPERTIES AS PER GOST 4543-71

GRADE OF STEEL	CONTENT OF ELEMENTS %				RESIDUAL CONTENTS %				
	C	Si	Mn	Cr	Ni	S	P	Cu	Cr
20 X	0.17-0.23	0.17-0.37	0.50-0.80	0.70-1.00	0.30	0.035	0.035	0.30	0.30

- MECHANICAL PROPERTIES AS PER AS PER STEEL GRADE 20 X GOST 4543-71.

YIELD POINT Kgf/mm ²	ULTIMATE STRENGTH Kgf/mm ²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgm/Cm ²	LIMITING RULING SECTION mm
65 MIN	80 MIN	11 MIN	40 MIN	6 MIN	15 MIN

MASTER COPY

ALTERNATE MATERIAL: IS: 1570, 21Cr1Mo28 OR 16MnCr5
 AUTHORITY: - CQA(HV) Letter No: 091/2FD/IND-V/
 MTPF/OE dt. 24-03-2005

- TO BE CYANIDED ALL OVER IN 0.2 - 0.5 mm. H R A ≥ 76
- OTHER REQUIREMENTS ARE AS PER 520 TY.1.
- ALTERNATE MATERIAL ROUND BAR - B-56 GOST 2590-71 20 X GOST 4543-71 IN THIS CASE ON $\phi 56$ MAY NOT BE MACHINED.

PLOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION		DRM	APPROVED	MATERIAL - STEEL 20 X 4543-71	USED ON 172 47 015 C5
EST. WT. TO BE STAMPED OR MARKED WHERE INDICATED THIS # 1 LETTERS)	0.025	DATE	25-07-94	SCALE - 1:1	CONTROLLERATE OF QUALITY ASSURANCE(HEAVY VEHICLES) AVADI
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT SIDE UNLESS EQUIVALENT CHAMFERS ARE PERMISSIBLE		ISSUE DATE	17.12.85	NATURE OF AMENDMENTS	TITLE
SIZE A3		AMOT. LIST No. 4, PART II, BOOK - 6		CONFORM TO	WASHER
				D S CAT NUMBER	DRAWING NUMBER
					172 47 237

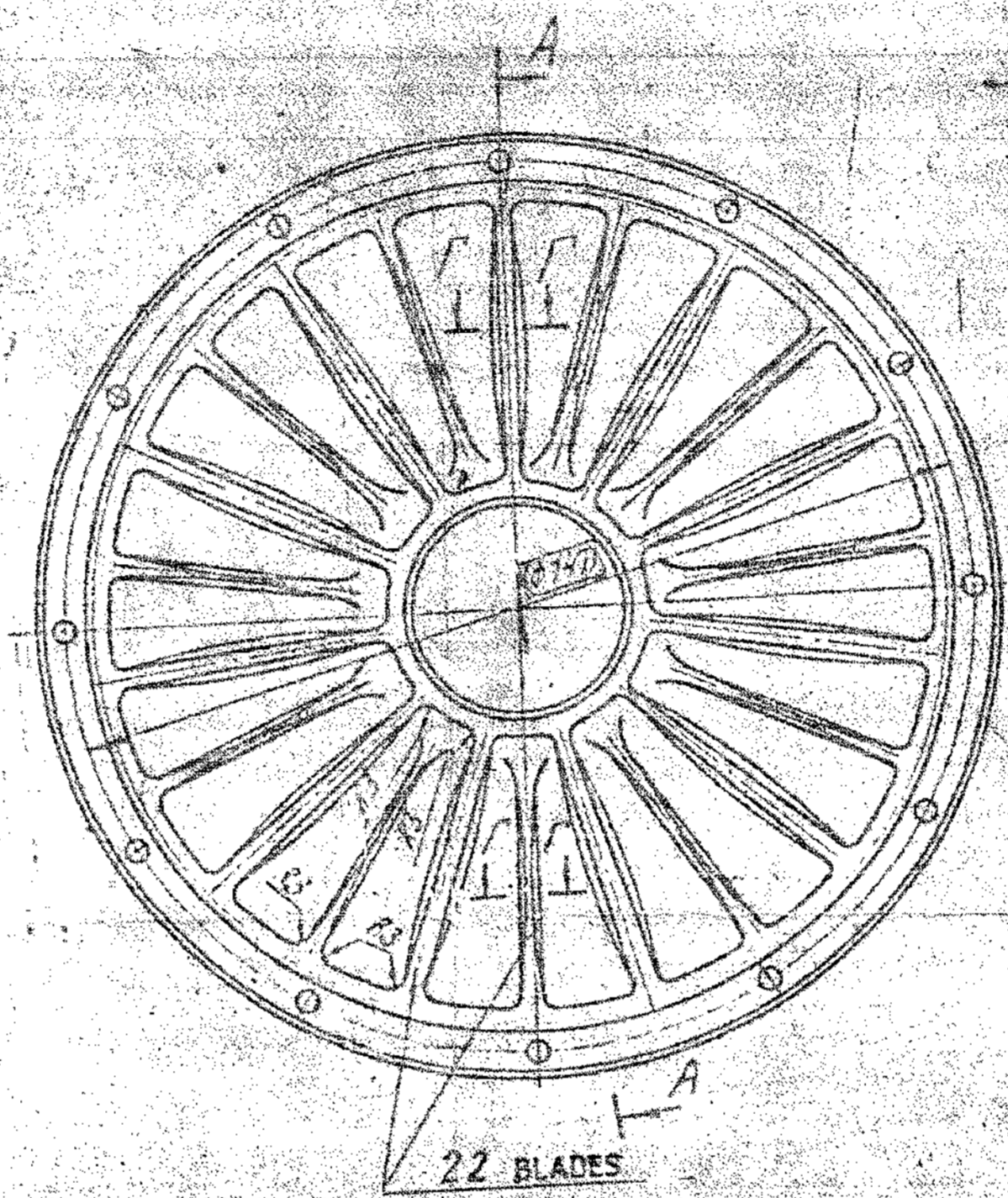
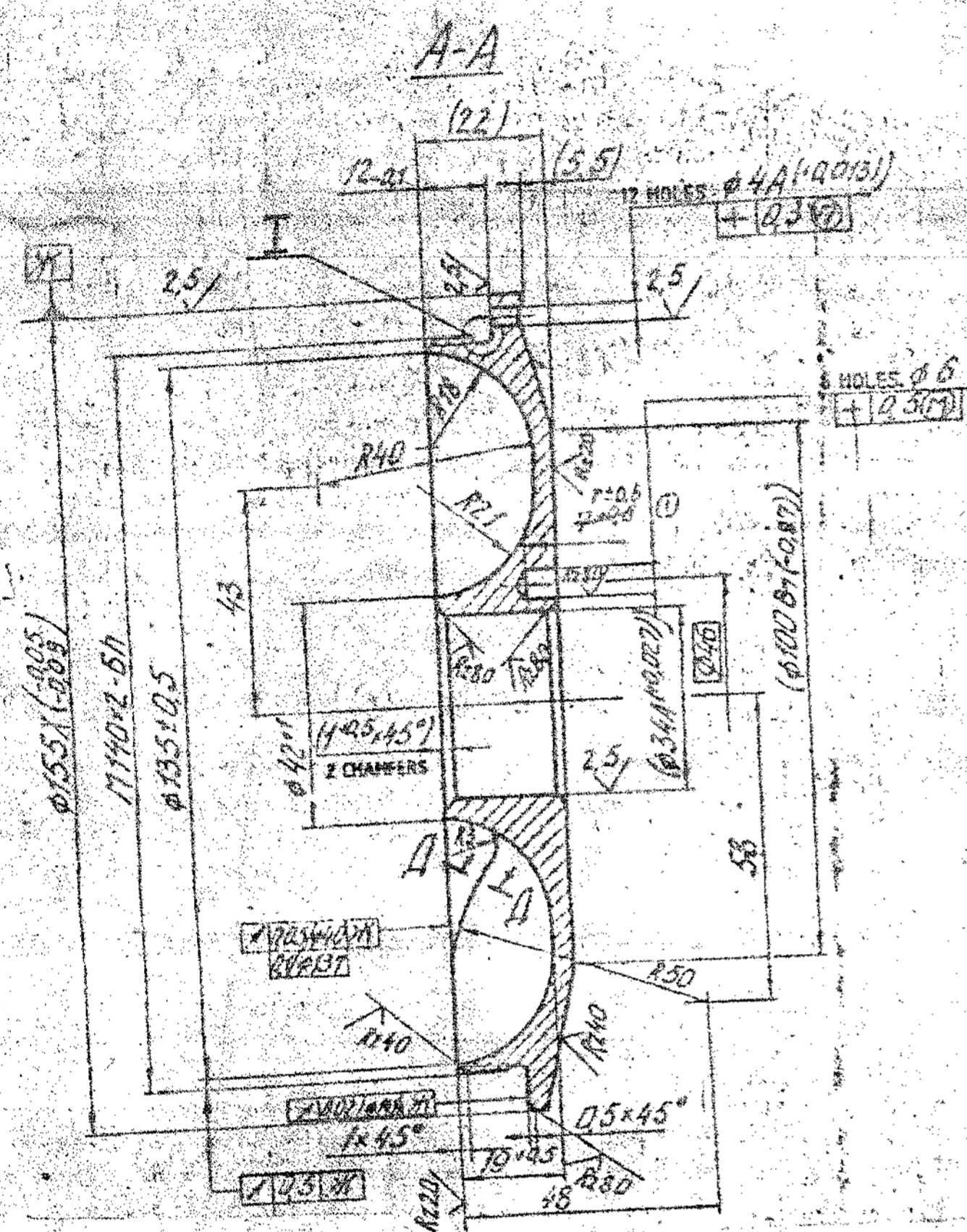
F-89
44
SIZE A3

DRG REDRAWN BASED ON INDIANISED DRG. ISSUE - 1

DRAWING NUMBER
172 47 238

✓(✓)

- 1 BHN ≥ 90 DIA OF INDENTATION 1000 ≤ 3,7
- 2 UNSPECIFIED LIMIT DEVIATIONS SHOULD BE AS PER ACCURACY CLASS 7
- 3 DIMENSIONS GIVEN IN BRACKETS ARE TO BE ENSURED AFTER ASSEMBLY
- 4 RADIUS 0,5 OR CHAMFER 0,5 x 45° IS TO BE MADE ON THE ENTIRE CONTOUR
- 5 OTHER REQUIREMENTS ARE AS PER 520 TY 1
- 6 RUNOUT OF THE PITCH DIAMETER OF THREAD RELATIVE TO SURFACE
"X" MAY BE 0,05 mm MAX.



EXPLANATORY NOTE :-

7 REFERENCE MATERIAL QUOTED :- ALUMINIUM ALLOY BARS AK4 GOST 21488-76. MADE FROM ALUMINIUM ALLOY BARS WITH OUT HEAT-TREATMENT. (NOT EXTENDED) TO GRADE AK4 GOST 21488-76 WITH NORMAL ACCURACY ON DIAMETER AND MANUFACTURED IN ACCORDANCE WITH GOST 4784-74.

a) CHEMICAL COMPOSITION AS PER GOST 4784-74

GRADE OF ALLOY	ALLOYING CONSTITUENTS						IMPURITIES (MAX)			OTHER IMPURITIES EACH INDIVIDUALLY	TOTAL
	Al	Cu	Mg	Ni	Fe	Si	Mn	Zn	Ti		
AK4	BASE	1.90 2.50	1.40 1.80	0.80 1.30	0.80 1.30	0.50 1.20	0.20	0.30	0.10	0.50	0.10

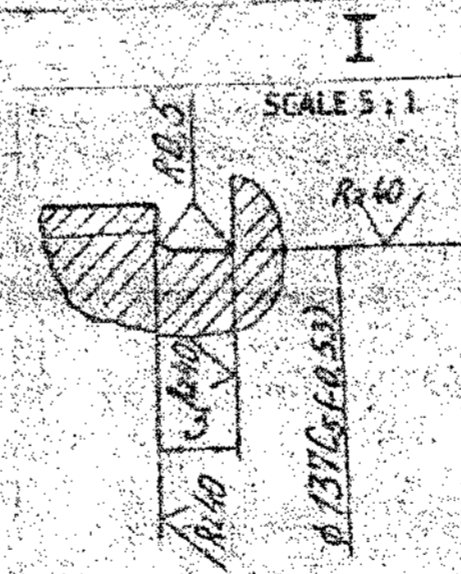
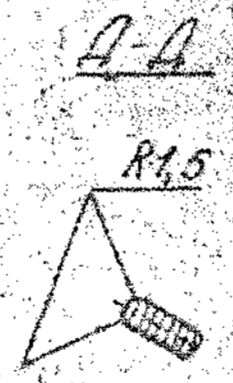
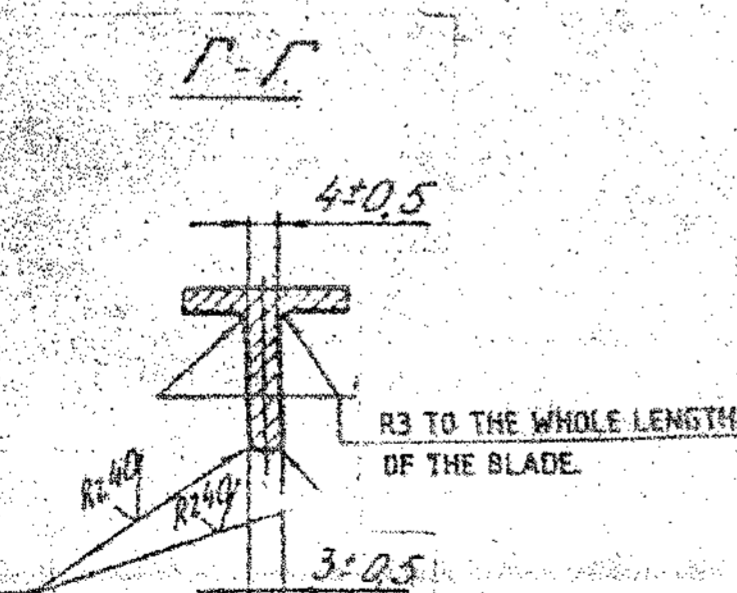
b) MECHANICAL PROPERTIES AS PER GOST 21488-76

GRADE OF ALLOY	TENSILE STRENGTH	ELONGATION
	Kgf/mm ²	%
AK4	36.0	8.0

ALTERNATE MATERIAL :-

ALUMINIUM ALLOY GRADE 22588 TO IS:734-75
AUTHORITY:- COACHV) Letter No:-
091/IFD/IND-V/MTPP/OE dt:24-03-05

MASTER COPY



(RADIUS 0,5 OR CHAMFER (0,5x45°) (POINT 4 OF T R))

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

EST. WT. 0,395	TO BE STAMPED OR MARKED WHERE INDICATED THUS * LETTERS)
ALL SHARP EDGES AND CORNERS TO BE REMOVED, UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUTSIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE	

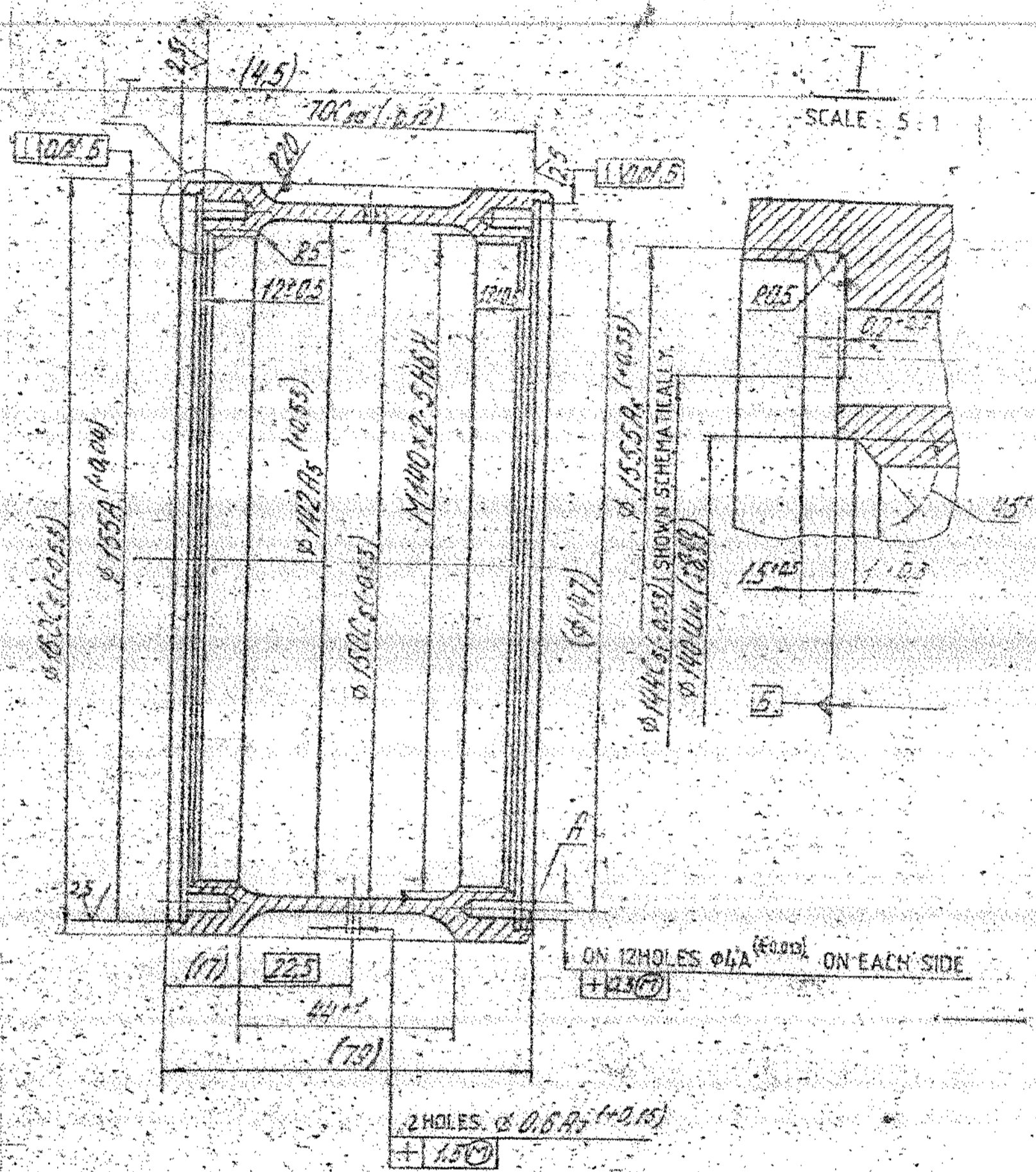
DRN	B. D. D.	MATERIAL :- ALUMINIUM	USED ON
CHD	S. S. S.	ALLOY AK4 GOST 21488-76.	172 47 015 Eb (FOR REF)
TED	A. D. D.		172 47 040 Eb
APPO	V. R. R.	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)	
DATE	01-8-94	A V A D I	
SCALE	1:1	TITLE: IMPELLER	
DIMENSIONS IN mm		D S CAT NUMBER	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69		DRAWING NUMBER	
ALL THREADS TO CONFORM TO		172 47 238	
1A	27.3.99	D.O. CORRECTION	
ISSUE	DATE	NATURE OF AMENDMENTS	

DRG REDRAWN BASED ON INDICISED DRG ISSUE-1

F.69
65

DRAWING NUMBER
172 47 239

Rz 40 ✓
IV ✓



- BHN $\geq 90^\circ$ DIA. OF INDENTATION ≤ 3.7 AT AN EFFORT OF 1000 Kg.
- DIMENSIONS GIVEN IN BRACKETS ARE TO BE PERFORMED AFTER ASSEMBLY.
- WHILE MAKING HOLES $\phi 0.6$, IT IS ALLOWED TO DRILL $\phi 2$ TO A DEPTH NOT EXCEEDING 2mm.
- RUN-OUT OF SURFACE "A" RELATIVE TO THE PITCH DIAMETER OF THREAD SHOULD NOT EXCEED 0.05 mm. ON EACH SIDE OF THE COMPONENT.
- MISALIGNMENT OF PITCH DIAMETERS OF THREADED HOLES SHOULD NOT EXCEED 0.15 mm.
- OTHER REQUIREMENTS ARE AS PER 520 TY1.
- IT IS ALLOWED TO MAKE CHAMFER AT 45° ANGLE ON THE TRANSITION OF SURFACE $\phi 14.4$ TO THE FACE, AND INSTEAD OF RADII R.0.5 MAKE CHAMFER $0.25 \times 45^\circ$ IN THE GROOVE.

EXPLANATORY NOTE -

- REFERENCE MATERIAL QUOTED - ALUMINIUM ALLOY BARS AK4 GOST 21488-76 MADE FROM ALUMINIUM ALLOY BARS WITH OUT HEAT TREATMENT (HOT EXTRUDED) TO GRADE AK4 GOST 21488-76 WITH NORMAL ACCURACY AND MANUFACTURED IN ACCORDANCE WITH GOST 4784-76.
- CHEMICAL COMPOSITION AS PER GOST 4784-76.

GRADE OF ALLOY	ALLOYING CONSTITUENTS						IMPURITIES (MAX)				TOTAL
	Al	Cu	Mg	Ni	Fe	Si	Mn	Zn	Ti	OTHER ELEMENTS EACH INDIVIDUALLY	
AK4	BASE	190 2.50	140 1.00	0.80	0.80 1.30	0.50 1.20	0.20	0.30	0.10	0.50	0.10

- MECHANICAL PROPERTIES AS PER GOST 21488-76.

GRADE OF ALLOY	TENSILE STRENGTH	ELONGATION
	Kgf/mm ²	%
AK4	MINIMUM	
	36.0	8.0

ALTERNATE MATERIAL:-

- ALUMINIUM GRADE 22588 TO IS: 734-75
AUTHORITY: CGA(HV) Le Her No. 091/IFD/IND-V/MTPF/OE dt 24-03-2005
- ALUMINIUM GRADE 24345 (HE 15) TO IS: 733-75
AUTHORITY: CGA(HV) Le Her No. 83047/coupling-IND I dt 15-10-2004

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

EST. WT. 0.336	TO BE STAMPED OR MARKED WHERE INDICATED THUS (LETTERS)
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R. OUT - SIDE R. INSIDE. EQUIVALENT CHAMFERS ARE PERMISSIBLE.	

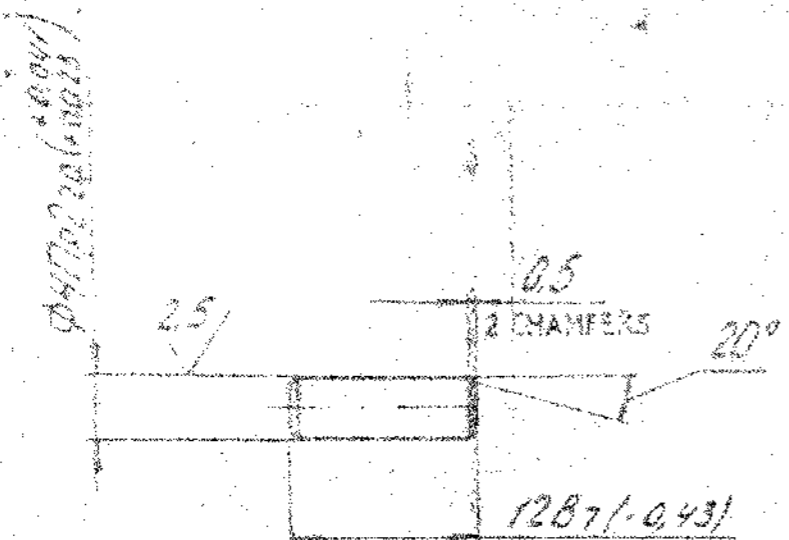
DRN	CHD	TED	APPD	DATE	SCALE	DIMENSIONS IN mm	TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69	ALL THREADS TO CONFORM TO	ISSUE	DATE	NATURE OF AMENDMENTS
				13-08-94	1:1						
MATERIAL - ALUMINIUM ALLOY AK4 GOST 21488-76								USED ON 172 47 040 CB			
CONTROLLER OF QUALITY ASSURANCE (HEAVY VEHICLES)								AVADI			
TITLE - BAND								DRAWING NUMBER 172 47 239			

DRAWING REDRAWN BASED ON INDICATED DRAWING ISSUE - NIL

SIZE A2

DRAWING NUMBER
172 47 240

Rz 80 ✓



EXPLANATORY NOTE

REFERENCE MATERIAL QUOTED, ALUMINIUM ALLOY AK4 GOST 21488-76 AND ALTERNATIVELY, ALUMINIUM BAR A16T OR AK4T1 GOST 21488-76.
ALUMINIUM ALLOY BAR WITHOUT HEAT TREATMENT (HOT EXTRUDED) TO GRADE AK4 AND ALTERNATIVELY ALUMINIUM ALLOY BAR AK4T1 (HARDENED AND NATURALLY AGED) TO GOST 21488-76 AND MANUFACTURED IN ACCORDANCE WITH GOST 4784-74

(a) CHEMICAL COMPOSITION: AS PER GOST 4784-74

GRADE OF ALLOY	ALLOYING CONSTITUENTS %							IMPURITIES %					OTHER IMPURITIES EACH INDIVIDUAL	TOTAL
	Al	Cu	Mg	Ni	Fe	Si	Ti	Mn	Zn	Tl	Si	Cr		
	MAXIMUM													
AK4	BASE	1,90	1,40	0,80	0,80	0,50	—	0,20	0,30	0,10	—	—	0,05	0,1
AK4T1	BASE	1,90	1,2	0,8	0,8	—	0,02	0,20	0,30	—	0,35	0,1	0,05	0,1

(b) MECHANICAL PROPERTIES: AS PER GOST 21488-76

GRADE OF ALLOY	TENSILE STRENGTH	ELONGATION	YIELD POINT
	Kgf/mm ²	%	Kgf/mm ²
MINIMUM			
AK4	36,0	8,0	—
AK4T1	40,0	6,0	32,0

- ALTERNATE MATERIAL: ALUMINIUM BAR A16T OR AK4T1 GOST 21488-76 HARDNESS IS NOT TO BE CHECKED
- BHN ≥ 95 DIA OF INDENTATION ≤ 1,8 WITH 5 mm BALL AND EFFORT OF 250 Kg TO BE CHECKED ON ONE COMPONENT FROM THE BATCH
- OTHER REQUIREMENTS ARE AS PER 520 TY 1

ALTERNATE MATERIAL:

ALUMINIUM ALLOY GRADE 22588 TO IS: 734-75

AUTHORITY: CQA (HV), Letter NO:

091/IFD/IND-V/MTPP/OE dt: 24-03-2005

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

EST. WT. TO BE STAMPED OR MARKED WHERE INDICATED THIS # LETTERS

ALL SHARP CORNERS AND EDGES TO BE REMOVED UNLESS OTHERWISE STATED HATCHED LINKERS TO HAVE R CUT SIZE B NOTE INDICATED DIMENSIONS ARE DIMENSIONS

DRW	A. J. Jones	MATERIAL - ALUMINIUM ALLOY AK4 GOST 21488-76	USED ON 172 47 015 C5
APPD	V. Ramesh	CONTROLLEDATE OF QUALITY ASSURANCE HEAVY VEHICLE	AVAGE
DATE	18-3-91	TITLE	OWEL
SCALE	1:1	S. CAT NUMBER	DRAWING NUMBER

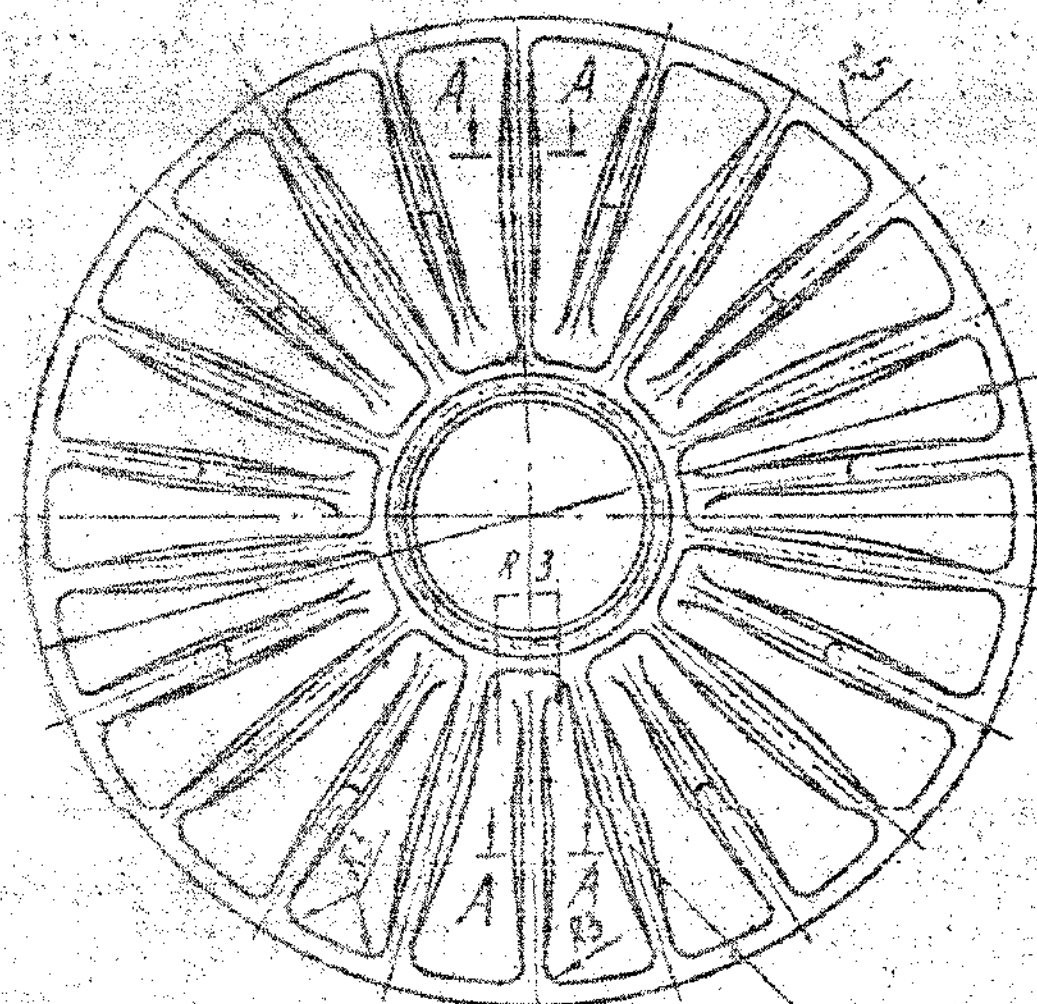
DRG REDRAWN BASED ON INDIAISED DRG ISSUE 4 NIL

SIZE A3

172 47 240

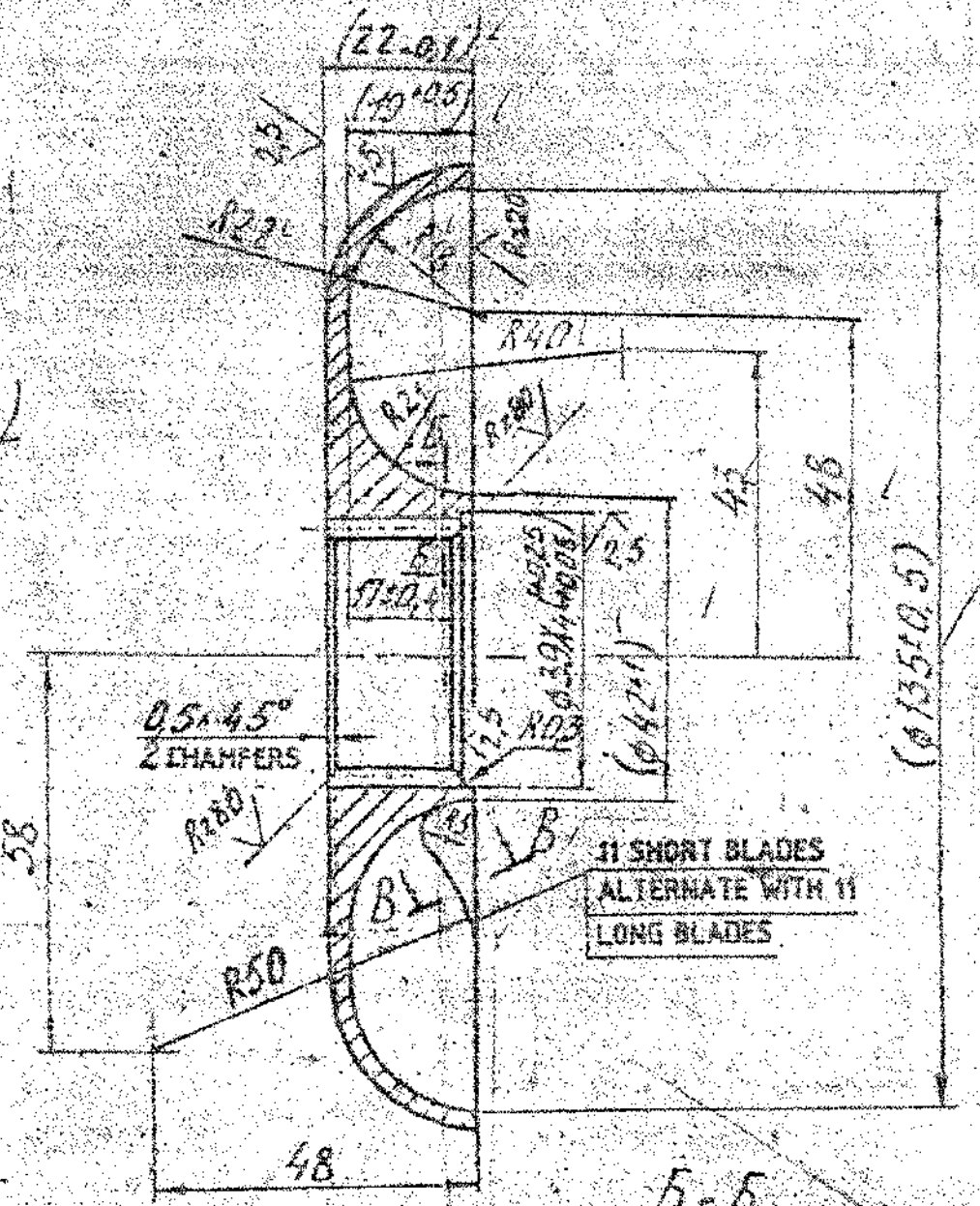
DRAWING NUMBER
172 47 241

✓ (✓)



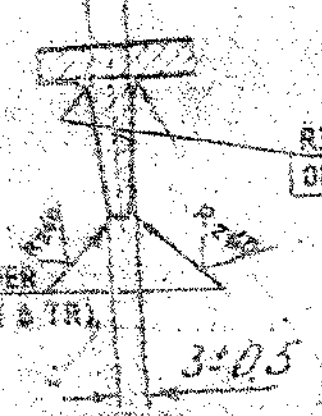
22 BLADES

Ø738/14 (+0.026)
Ø738/14 (+0.53)



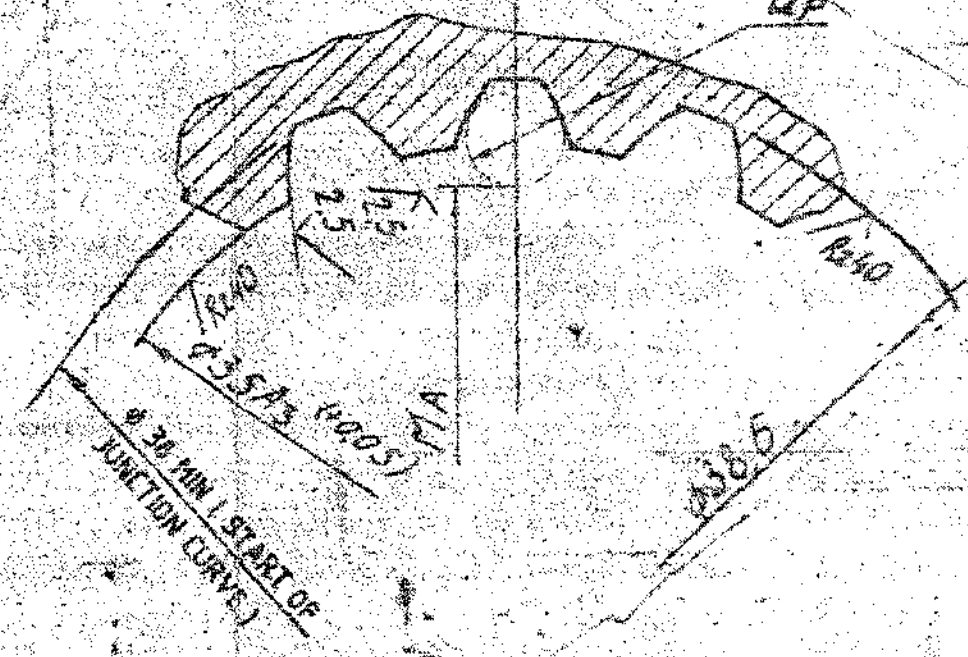
11 SHORT BLADES
ALTERNATE WITH 11
LONG BLADES

A-A
4±0.5



R3 ON THE ENTIRE LENGTH
OF THE BLADE

B-B
R15



ALT. MATL. AL ALLOY GR. 22588 IS: 734-75
AUTHY. CQA (HV) letter no 091/IPD/IND-V (MTPP/OE) 24.03.05
20.04.05
2/90

②

DESIGNATION OF HOLE AS PER GOST 6033-54	3636 x 15 x 24	
MODULE	m	1.5
NUMBER OF TEETH	Z	24
ANGLE OF PROFILE	α₀	30°
PIN DIAMETER	dp	2.886 ± 0.001
DISTANCE OVER PWS.	Mₐ	31.8 ± 0.09 +0.03
TOOTH SPACE WIDTH ALONG THE ARC OF THE REFERENCE CIRCLE	Sₐ	2.645 ± 0.02 -0.01
REFERENCE DIAMETER	da	36

1. BHN ≥ 90° DIA OF INDENTATION ≤ 3.7 AT EFFORT OF 1000 Kg
2. UNSPECIFIED LIMIT DEVIATIONS SHOULD BE AS PER ACCURACY CLASS 7
3. DIMENSIONS GIVEN IN BRACKETS ARE TO BE ENSURED AFTER ASSEMBLY
4. TEETH (SPLINES) SHOULD BE CHECKED BY A COMPLEX GAUGE WITH TOLERANCES AS PER GOST 6528-53
5. RUN-OUT OF SPLINES RELATIVE TO THE AXIS OF DIAMETER 135 ± 0.5 SHOULD NOT EXCEED 0.5 mm.
6. R 0.5 OR CHAMFER 0.5 x 45° IS TO BE MADE ON THE ENTIRE CONTOUR ON ALL BLADES
7. OTHER REQUIREMENTS ARE AS PER 520 TY 1

EXPLANATORY NOTE :-

B. REFERENCE MATERIAL QUOTED :- ALUMINIUM ALLOY BARS AK4 GOST 21488-76 MADE FROM ALUMINIUM ALLOY BARS WITH OUT HEAT TREATMENT (HOT EXTRUDED) TO GRADE AK4 GOST 21488-76 WITH NORMAL ACCURACY ON DIAMETER AND MANUFACTURED IN ACCORDANCE WITH GOST 4784-74

a) CHEMICAL COMPOSITION AS PER GOST 4784-74

GRADE OF ALLOY	ALLOYING CONSTITUENTS						IMPURITIES (MAX)				OTHER IMPURITIES EACH INDIV. QUALITY	TOTAL
	Al	Cu	Mg	Ni	Fe	Si	Hn	Zn	Ti			
AK4	BASE	190	140	0.80	0.80	0.50	0.2	0.30	0.10	0.50	0.10	
		250	180	0.80	1.30	1.20						

b) MECHANICAL PROPERTIES AS PER GOST 21488-76

GRADE OF ALLOY	TENSILE STRENGTH	ELONGATION
	Kgf/mm²	%
AK4	36.0	8.0
MINIMUM		

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

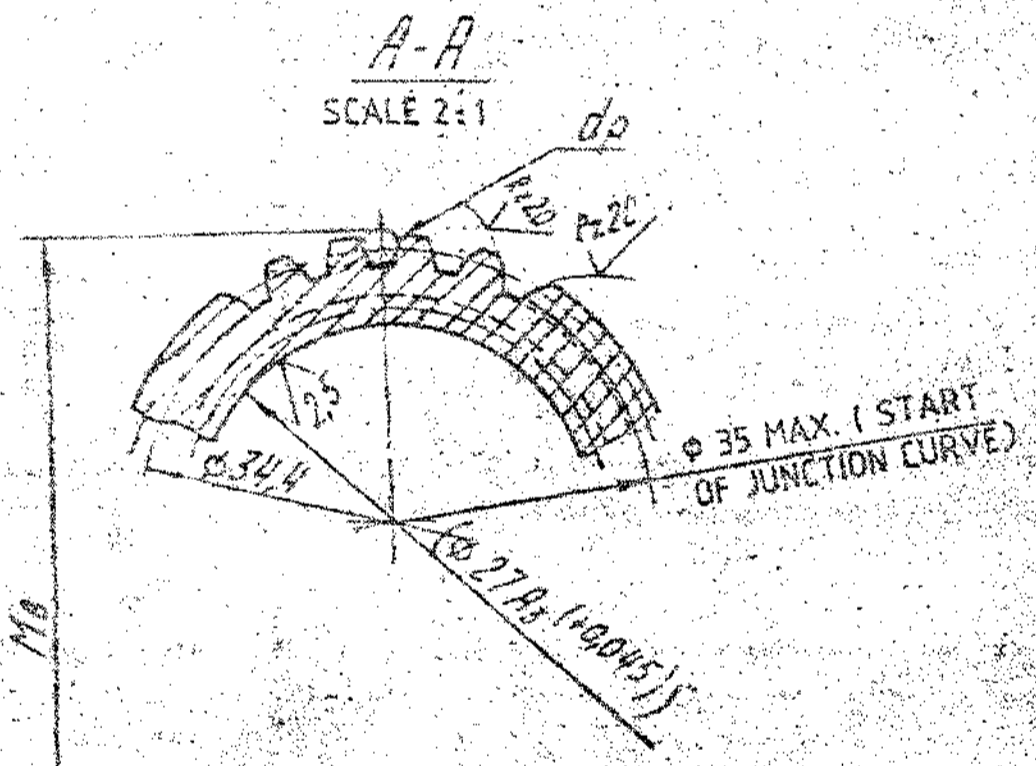
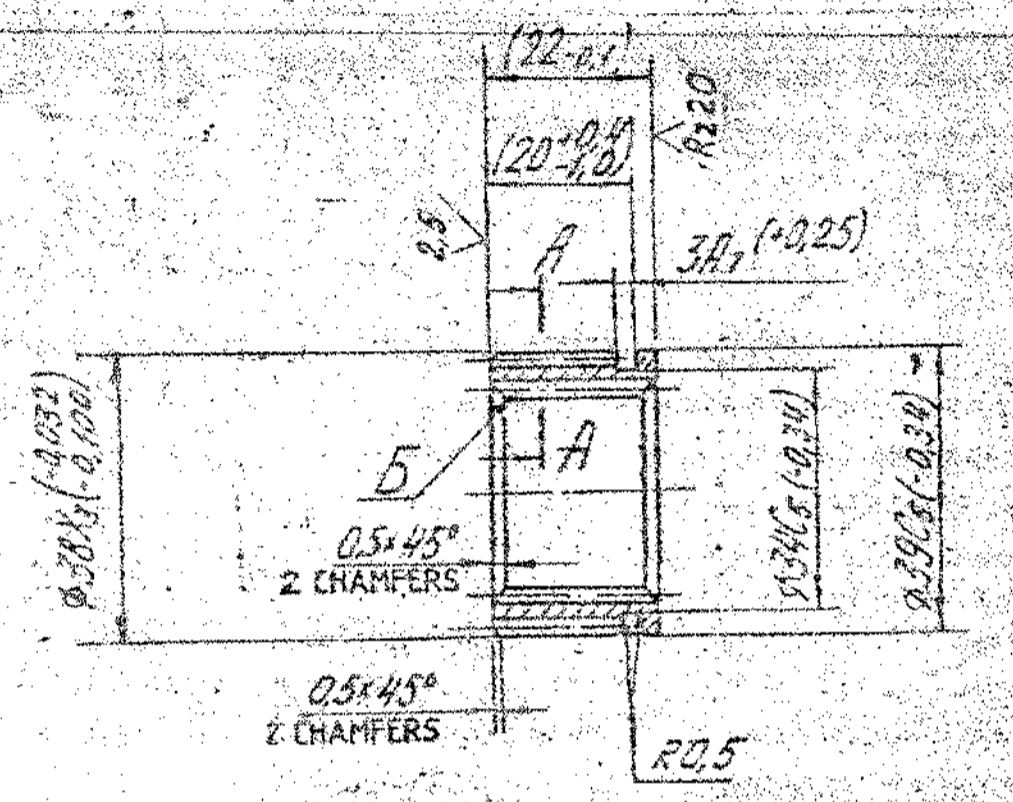
EST. WT. 0.340	TO BE STAMPED OR MARKED WHERE INDICATED THUS (LETTERS)
ALL SHARP EDGES AND CORNERS TO BE ROUNDED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R. OUT SIDE R. INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE	

ORN	B. 70mm	MATERIAL	ALUMINIUM ALLOY AK4
CHD	Salvage		172 47 042 CB CB
ICD	B. 70mm		GOST 21488-76
APPD	V. Ramon	CONTROL RATE OF QUALITY ASSURANCE (HEAVY VEHICLES)	
DATE	26-7-94	A V A D I	
SCALE	1:1	TITLE : TURBINE WHEEL	
DIMENSIONS IN mm		TOLERANCE ON DIMS UNLESS OTHERWISE STATED IS 2102-69	
ISSUE DATE		ALL THREADS TO CONFORM TO	Q S CAT NUMBER
NATURE OF AMENDMENTS			DRAWING NUMBER
2 1312-86 Andr List No. 6 Part B Book B			172 47 241

SIZE A7

DRAWING NUMBER
172 47 242

Rz 10 ✓ M



DESIGNATION OF SHAFT AS PER GOST 6033-51 ①		36 38x15x24 ① 36 38x15x24x3
MODULE	m	1.5
NUMBER OF TEETH	Z	24
ANGLE OF PROFILE	α ₀	30°
PIN DIAMETER	d _p	3.310 ± 0.001
DISTANCE OVER PINS	M _B	42.07 ± 0.10
TOOTH THICKNESS ALONG WITH THE ARC OF THE REFERENCE CIRCLE	S _B	2.645 ± 0.07
REFERENCE DIAMETER	d _a	36

1. BHN 375 - 302 (DIA. OF INDENTATION 3.2 - 3.5)
2. DIMENSIONS GIVEN IN BRACKETS AND SPLINES ' B ' SHOULD BE ENSURED AFTER ASSEMBLY
3. TEETH (SPLINES) SHOULD BE CHECKED BY COMPLEX GAUGE WITH TOLERANCES AS PER GOST 6528-53.
4. OTHER REQUIREMENTS ARE AS PER 520 1Y-1

EXPLANATORY NOTE :-

5. REFERENCE MATERIAL QUOTED :- STEEL 36XC GOST 4543-71
STRUCTURAL CHROMIUM SILICON ALLOY QUALITY STEEL
GRADE 36XC GOST 4543-71
a) CHEMICAL COMPOSITION : AS PER STEEL GRADE 36XC GOST 4543-71

CONTENT OF ELEMENTS %				RESIDUAL CONTENTS %				
C	Si	Mn	Cr	S	P	Cu	Ni	Er
MAXIMUM								
0.34-0.42	10-14	0.30-0.60	1.30-1.60	0.035	0.035	30	30	80

b) MECHANICAL PROPERTIES : AS PER STEEL GRADE 36XC GOST 4543-71

TENSILE STRENGTH Kgf/mm ²	YIELD POINT Kgf/mm ²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgf/cm ²
MINIMUM				
95	75	12	50	7

ALT. MATL. Steel 817M60 (EN-24) BS:970-93
AUTHY. CQA (Ch) letter no: 091/1P/IND-V/MPF/OE dtd: 17.03.05
T. S. J. S. S.

MASTER COPY

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

EST. WT. 0.076	TO BE STAMPED OR MARKED WHERE INDICATED THIS * LETTERS)
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT-SIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE	

DRW	DESIGNED BY	MATERIAL	STEEL 36XC	USED ON	172 47 042 EBEB
CHKD	CHECKED BY	GOST	4543-71		
APPD	APPROVED BY	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)			
DATE	06-02-04	A V A 01			
SCALE	1:1	TITLE			
DIMENSIONS IN mm		SPLINED BUSH			
TOLERANCE ON DIMS UNLESS OTHERWISE STATED IS 2102-69		D S CAT NUMBER			
ALL THREADS TO CONFORM TO		DRAWING NUMBER			
ISSUE	DATE	NATURE OF AMENDMENTS		172 47 242	

Dwg redrawn based on INCHES ORG. ISSUE

P. B. S. S.

DRAWING NUMBER
172 47 243

✓(✓)



EXPLANATORY NOTE -

- 1 REFERENCE MATERIAL QUOTED :- STRIP Y-7A-C, 0.3 GOST 2283-69 FOR 172 47 243 AND Y-7A-C, 0.5 FOR 172 47 243-01
- COLD DRAWN TOOL AND SPRING SHEET FROM STEEL TO GRADE Y-7A-C WITH NORMAL ROLLING ACCURACY IN THICKNESS & WIDTH AND WITH RESPECT TO SURFACE LIGHT (C) HAVING THICKNESS 0.3 (FOR 172 47 243) AND 0.5 (FOR 172 47 243-01) TO GOST 2283-69 AND MANUFACTURED IN ACCORDANCE WITH GOST 1435-71

- 1 * DIMENSION FOR REFERENCE
- 2 OTHER REQUIREMENTS ARE AS PER S20 TY 1

a) CHEMICAL COMPOSITION : AS PER GRADE Y-7A TO GOST 1435-71

GRADE OF STEEL	CONTENT OF ELEMENTS IN %							
	C	Mn	Si	S	P	Cr	Ni	Cu
	MAXIMUM							
Y-7A	0.65	0.15	0.15	0.020	0.030	0.12	0.12	0.20
	0.74	0.30	0.35					

b) MECHANICAL PROPERTIES : AS PER GRADE Y-7A TO GOST 2283-69

ULTIMATE TENSILE STRENGTH
Kgf/mm ²
75 - 120

PART No	α	MATERIAL	WEIGHT
172 47 243	0.3	STRIP Y7A-C-0.3 x 60 GOST 2283-69	0.0002
172 47 243 - 01	0.5	STRIP Y7A-C-0.5 x 60 GOST 2283-69	0.0004

ALTERNATE MATERIAL:- *16/12/10*
STEEL GRADE 70C6 TO IS:2507-75

AUTHORITY:- CQA (HV) Letter No:-
091/IFD/IND-V/MTPP/OE dt. 17-03-2005

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

EST. WT. TO BE STAMPED OR MARKED WHERE INDICATED THIS (LETTERS)

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

MASTER COPY

DRN	<i>B. Bhat</i>	MATERIAL:-	USED ON
CHKD	<i>S. Bhat</i>	SEE TABLE	172 47 001 26
TRD	<i>S. Bhat</i>		
APPD	<i>S. Bhat</i>	CONTROLLERATE OF QUALITY ASSURANCE-HEAVY VEHICLE	
DATE	30-7-94		
SCALE	5:1		
DIMENSIONS IN mm		TITLE	SHIM
TOLERANCE ON DIMS UNLESS OTHERWISE STATED IS 2002-69			
ALL THREADS TO CONFORM TO		D S. CAT NUMBER	DRAWING NUMBER
			172 47 243

DRG REDRAWN BASED ON INDIANISED DRG ISSUE- NIL

DRAWING NUMBER
175.47.011

SHEET No 1 OF 1

▽3 (▽)

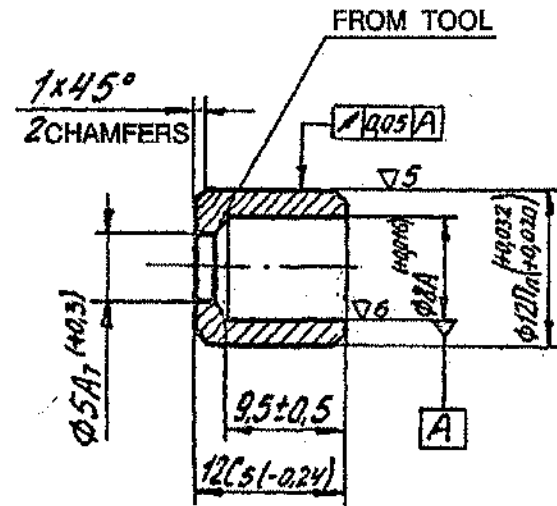
EXPLANATORY NOTE :-

REFERENCE MATERIAL QUOTED :-

TIN - FREE PRESSURE - WORKED BRONZE GRADE Бр АЖМЦ (ALUMINIUM IRON MANGANESE) 10-3-1.5 AND REFERENCE NOTE : 2 ON ALTERNATIVE MATERIAL GRADE Бр АЖ9-4 TO GOST 18175-78.

CHEMICAL COMPOSITION AS PER BRONZE GRADE Бр АЖМЦ 10-3-1.5 AND Бр АЖ9-4 TO GOST 18175-78

GRADE OF BRONZE	BASIC CONTENT OF ELEMENTS %				PARTS OF IMPURITIES BY WEIGHT % (MAX)						
	Al	Fe	Mn	Cu	Sn	Si	Pb	P	Zn	Mn	TOTAL
Бр АЖМЦ 10-3-1.5	9.0-11.0	2.0-4.0	1.0-2.0	REST	0.1	0.1	0.03	0.01	0.5	-	0.7
Бр АЖ9-4	8.0-10.0	2.0-4.0	-		0.1	0.1	0.01	0.01	1.0	0.5	1.7



1. HOLE Ø8A SHOULD BE CHECKED AT A LENGTH OF 6 mm MIN.
2. MAY BE MANUFACTURED FROM Бр АЖ9-4 GOST 18175-78.

Ⓐ ALT. MATL :- 9% Al BRONZE (M) TO IS : 6912-73

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)
0.003

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

DRN	Sd/=	MATERIAL:-	USED ON:-
CHD	Sd/=	Бр АЖМЦ 10-3-1.5	172.47.015cbCb
APPD	Sd/=	GOST 18175-78	
DATE	05-12-95	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)	
SCALE:-	2:1	AVADI	
DIMENSIONS IN mm		TITLE:-	BUSH
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102-69		D S CAT NUMBER	DRAWING NUMBER
ALL THREADS TO CONFORM TO			175.47.011
A	07.07.06	AUTHY.LI.No.80001/CQA(HV)/GEN/Dt.15.10.05	
ISSUE	DATE	NATURE OF AMENDMENTS	

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

F-88
20
SIZE A3

(B. YAYAVELU), JTO(D)
10-08-06

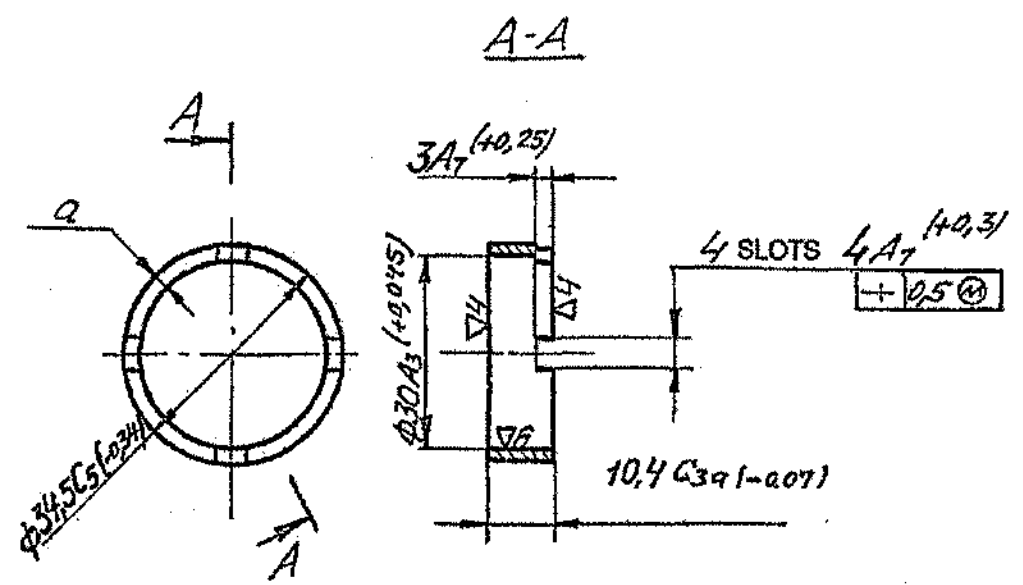
DRAWING NUMBER
175.47.028

SHEET No. 1 OF 1

▽ 3 (▽)

(B. JAYAVELU), JTO (D)
10-08-06

DRG. REINDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - 3
COMMON TO T-90



- 3.5...38
- BHN 302 - 255 (DIA. OF INDENTATION) TO BE CHECKED IN BLANK.
 - DIFFERENCE IN MEASUREMENT OF DIMENSION 'a' SHOULD NOT EXCEED 0.1 mm.

3. EXPLANATORY NOTE :-

- REFERENCE MATERIAL QUOTED : STEEL 38XC GOST 4543-71. STRUCTURAL CHROMIUM SILICON ALLOY QUALITY STEEL GRADE 38XC GOST 4543-71.
- CHEMICAL COMPOSITION : AS PER STEEL GRADE 38XC GOST 4543-71.

CONTENT OF ELEMENTS %					
C	Si	Mn	Cr	S	P
				MAX	
0.34 - 0.42	1.00 - 1.40	0.30 - 0.60	1.30 - 1.60	0.035	0.0356

RESIDUAL CONTENT OF COPPER AND NICKEL SHOULD NOT EXCEED 0.30% EACH

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

TENSILE STRENGTH Kgf/mm ²	YIELD POINT Kgf/mm ²	ELONGATION %	REDUCTION IN AREA %	IMPACT STRENGTH Kgm/cm ²
MINIMUM				
95	75	12	50	7

3A ALT. MATL. :- STEEL 817M40 (En 24) TO BS : 970 Part 1 : 1983

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

EST. WT. (Kg) 0.021 TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)

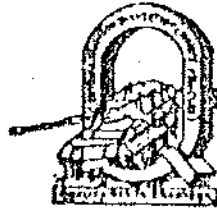
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUTSIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

DRN	Sd/=	MATERIAL :- STEEL 38XC GOST 4543-71	USED ON :- 172.47.015cbCb
CHD	Sd/=	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
APPD	Sd/=		
DATE	03.05.95	TITLE :- RING	
SCALE:- 1 : 1			
DIMENSIONS IN mm		D S CAT NUMBER	DRAWING NUMBER 175.47.028
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS : 2102 - 69			
ALL THREADS TO CONFORM TO IS : 4218, PART-4.			
3A	07.07.06	AUTHY. Lt. No. 80091/CQA(HV)/GEN. Dt. 15.10.05.	
ISSUE	DATE	NATURE OF AMENDMENTS	

F-88
32
SIZE A3

Copy
CART
A note

RESTRICTED



QUALITY ASSURANCE INSTRUCTIONS
FOR
COUPLING WITH HYDRAULIC SHAFT
(172.47-015 CB)
CQA(HV)/QAI/47/HYD. COUPLING

CONTROLLERATE OF QUALITY ASSURANCE
(HEAVY VEHICLES)

AVADI, MADRAS-600054

RESTRICTED

QUALITY ASSURANCE INSTRUCTIONS

FOR

COUPLING HYDRAULIC WITH SHAFT

NO CIHV/2AI/47/HYD.COMP

Prepared by : Shri TR RAMASAMIY, PM *[Signature]*

Checked by : Maj YC MEHRA,
ASST CONTROLLER (QA) *[Signature]*

Approved by : Col. B. Jagannathan,
[Signature]
Joint Controller (IQ)

ISSUE NO 1

DATED Jan 88

CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)

AVADI - MADRAS 600 054

RESTRICTED

IMPORTANT NOTESNOTE : 1

This is only a provisional instruction and will be amended from time to time according to the requirement. No addition, deletion and reproduction will be done without the permission of Controller, CIVV, Avadi : Madras - 600 054.

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 QAI and the clauses in the contract, the latter will prevail.

NOTE : 3

The stores should be manufactured strictly as per the drawings supplied by the Inspection Authority only and not as per the samples, if any received by the manufacturer for guidance purpose.

NOTE : 4

Any amendment issued by the AUSA shall be incorporated in the QAI and the records for the amendments carried out should be maintained as per the proforma at Appendix 'B'.

I N D E X

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3	SCOPE	
4	LAYOUT AND FUNCTION OF THE ASSY	
5	SAMPLING PLAN	
6	VISUAL INSPECTION	
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8	DIMENSION CHECK	
9	INTERCHANGEABILITY	
10	INSPECTION DETAILS	
11	FITMENT AND PERFORMANCE TEST	
12	TEST RIGS	
13	FITMENT AND PERFORMANCE TESTS ON VEHICLE	
14	MARKING	
15	PRESERVATION	
16	PACKING	

-:Ots:-

QUALITY ASSURANCE INSTRUCTION
No. CIHV/PROJ/QAI/172-47-015 CI-VTD G. U.

FOR
COUPLING HYDRAULIC WITH SHART
OF
TANK T-72 1'1

INTRODUCTION

1. This Quality Assurance Instruction lays down the inspection and testing procedure to be carried out on COUPLING HYDRAULIC WITH SHART 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 QAI is the property of Government of India and is liable for amendment as and when required. Controllerate of Inspection (Heavy Vehicles) Avadi, MADRAS-54 is the Authority Holding Sealed Particulars (AHSP) for this assembly. Any query/clarification on the contents of this QAI shall be referred to the AHSP. Any departure from these instructions is allowed only after written approval from above authority. Notwithstanding the tests indicated in this QAI, 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.

AIM

3. This QAI is aimed at standardizing the inspection procedure and acceptance norms for Coupling Hydraulic with shaft. 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 the authorised inspecting 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 standard.

SCOPE

4. This QAI outlines in general terms, the checks and methods to be used during inspection of Coupling Hydraulic with shaft 172-47-015 CE including the technical requirements of the drawings. The recommended Quality Assurance Programme stipulated herein are mandatory and should be strictly adhered to. For inspection purpose only the latest issue of this QAI will be made applicable and required number of copies of this QAI can be obtained from the issuing authority i.e. the Controller, CIHV, Avadi, MADRAS-54.

DOCUMENTS

5. On placement of firm supply order one set of certified drawings will be forwarded to the Contractor and to the respective inspecting officer. One set of relevant specification and technical instructions on the subject item can be obtained from the AFSF.

6. Any clarification required on these documents should be obtained from the AHSP. Equivalence to the collaborators specifications and standards will be decided only by the AHSP and should not be unilaterally decided. For any change in the specifications, standards or written texts, the AHSP should be approached in writing. Only based on the written approval, any alterations in specifications can be affected and not otherwise.

7. The process instruction sheets supplied by the collaborators are available with the AHSP for the reference. The relevant process sheets may be studied at the premises of the AHSP after obtaining necessary permission.

8. 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, templates, gauges etc., should be provided as recommended in these process sheets.

LAYOUT AND FUNCTION OF THE ASSEMBLY

9 As the Starter and Generator are combined in one unit, a Starter Generator Drive System is employed (Ref Sketch 'P'). It is connected ^{to} the transmission Gear Box and meant for transmission of the drive from the starter to the engine when the unit is working as a starter and switch over the drive to work as generator drive after the engine started. The Hydraulic coupling with shaft which is dealt in this QAI is an integral part of the starter generator system (Refer Sketch 'PI'). The main sub assemblies of the Hydraulic coupling with shaft are as follows:-

- (a) A fluid drive assembly consisting of driving and driven shafts coupled with impellers.
- (b) A resilient coupling.

This assembly functions when the starter generator drive system is put in to use to drive the generator assembly by the rotation of impellers with the kinetic energy generated by the circulation of Oil in the impellers.

10

SAMPLING PLAN

	<u>Pilot</u>	<u>Bulk</u>
Visual	100%	100%
Material test	1 set of the test specimen	1 No per lot of 100 Nos or less
Dimensional and Interchangeability	2 sets	2 sets per lot of 100 sets or less
<u>Inspection:</u>		
Assemblies	1 set	1 No
Components	1 set	IL III - AQL 1.5 as per IS-2500 Pt I
Fitment & Performance on test rigs	1 set	1 No per lot of first 100 Nos and 1 No for the subsequent lot of 200 Nos.
On vehicle	1 set	1 No per lot of 250 Nos.
Preservation Packing and marking	100 %	100%

.....b..

Note:- Inspection sample size and acceptable quality level during inspection of the bulk may be changed at the discretion of the Inspector after assessing the consistency of the quality and check points adopted during manufacture.

VISUAL INSPECTION

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

- a) Fitment of all components
- b) Defects in construction
- c) Presence of Foreign bodies
- d) Moisture and dust
- e) Corrosion of metal parts
- f) Any form of deterioration of materials and finishings.
- g) Distortion
- h) Mechanical Imperfection.

MATERIAL CHECK

12 Samples/specimen should be checked as per sampling plan. The material and the properties should conform to the relevant drawings and specifications. Alternate materials suggested by the suppliers will be considered by the ANSP (ie) Controllerate of Quality Assurance (Heavy Vehicles) AVADI. Usage of such alternate material will only be with the written concurrence of the ANSP.

DIMENSIONAL CHECK

13 The dimension of the components and the over all dimension (mounting) of the assembly conform to the respective drawings. This check will be carried out as per sampling plan. Dimensions are to be checked as called for in the drawings after assembling the components to Sub assemblies/Assemblies.

INTERCHANGEABILITY

14 The system should be interchangeable assemblywise and componentwise. However selective assembly checks mentioned on the documents are allowed.

.....S..

15

INSPECTION DETAILS - 172-47-001-06

Pressure Test

- 1 (a) Check for Axial play with impellar and this should be between 0.4 to 0.6 mm (to be achieved by selection of adjusting rings).
- (b) Check lock washer (172-47-066) for proper seating on the groove of the driven shaft. Lock washer should not rotate.
- (c) Bush to Part No 175-45-011 is press fitted. The dimension ϕB is to be checked after the Bush is fitted.

2 172-47-001 06 - Impeller with Coupling Assy

- (a) Dimension between the sleeves to Part No 172-47-227 after assembling should be 2 ± 0.2 (to be achieved by grinding the sleeves to a max of 0.1 mm or by selection of sleeves).
- (b) Preliminary compressor of spring after assembling should be between 1.8 mm to 2 mm (To be achieved by selecting the washers to Part No 172-47-243).

3 172-47-040-06 - Impeller Assembly

- (a) Impellers to be tightened to a torque of 40 Kgm.
- (b) The assembly should be subjected to balancing either static or dynamic. The parameters should be as given in the drawing.
- (c) Being a selective assembly matching marks should be stamped after balancing.
- (d) Surface finishing should be checked as per the drawing.

4 172-47-041 06 06 - Impeller Assembly

- (a) The clearance between the face of Impeller and the internal holder should not exceed 0.03 mm (Refer drawing)
- (b) Perpendicularity and runout should be checked as per drawing.

.....7..

- 5 172-47-232 - Impeller
 - (a) Runout and splines should be checked as per the drawing. Pin dia for checking the splines is $\phi 5.493 \pm 0.001$ (Refer drawing No 172 47 007).
 - (b) Micro and macro structure tests should be carried out on the specimen of forgings at places marked in the attached sketch. P2.
- 6 172-47-073 - Spring
 - (a) Check the load rating of spring as per load diagram given in the drawing.
- 7 172-47-042-C5 C6 - Impeller Assembly
 - (a) Assembly impeller should be subjected to dynamic or static balancing as specified in the drg.
 - (b) Runout and teeth are to be checked as specified.
- 8 172-47-241 - Turbine Wheel
 - (a) Check for the dimensions of splines with pin as indicated in the drawing.
- 9 172-47-016 - Bush
 - (a) End play and runout are to conform as per drg.
- 10 172-47-103 - Driven shaft
 - (a) Splines are to be checked with pins as mentioned in the drawings.
 - (b) The sealing place of lockwasher to Part No 172-47-066 is to be checked as per drawing.
- 11 172-47-067 - Thrust Nut
 - (a) Check for any damage in thread and the component can be tightened freely with the mating component (ie) driven shaft.
- 12 172-47-071 - Adjusting ring
 - (a) Dimension should be checked as per the drg.
 - (b) Part No and thickness of washer to be etched on the component to enable easy selection for achieving the end play required.
- 13 172-47-233 - Impeller
 - (a) The threads should be free from any damage.
 - (b) Counter should be checked with suitable tool.
 - (c) Micro and macro structure tests should be carried out on the specimen of forgings at places marked in the attached sketch. P2

16

PERFORM AND PURPOSES OF TEST ON TEST RIG

- (a) The assembly should be pressure test in a suitable test rig at a pressure of 9 - 10 KG/CM² for a duration of 3 minutes. The temperature oil should be 90° - 100°C. The following parameters are to be checked:
- i) Oil should comeout from releasing nozzle in a jet form.
 - ii) Leakage through rim and impellar joint should not exceed 0.5 L/minute.
 - iii) Leakage can be allowed through coupling Part No 172-47-001 06 and the Bush to Part No 172-47-016.
 - iv) Leakages/seepages are not allowed in places.

17

TEST RIGS

Suitable test rigs, templates, rix and fixtures can be manufactured/fabricated by the supplier subject to the test parameters are met.

18

PERFORM AND PURPOSES OF TEST ON VEHICLE

The complete assembly is to be fitted with proved starter generator drive and to be checked for performance for 500 Kms. The assembly should function satisfactorily.

MARKING

All the components are to be marked with respective part Nos and other markings as called for in the drawing. Suitable method of marking can be adopted. The marking should be legible.

20

PRESERVATION

- (a) The surface treatment (coating) should be as called for in the drawings. Any IS/BS equivalent can be adopted subject to maintenance of the coating thickness as per drawing.

.....9..

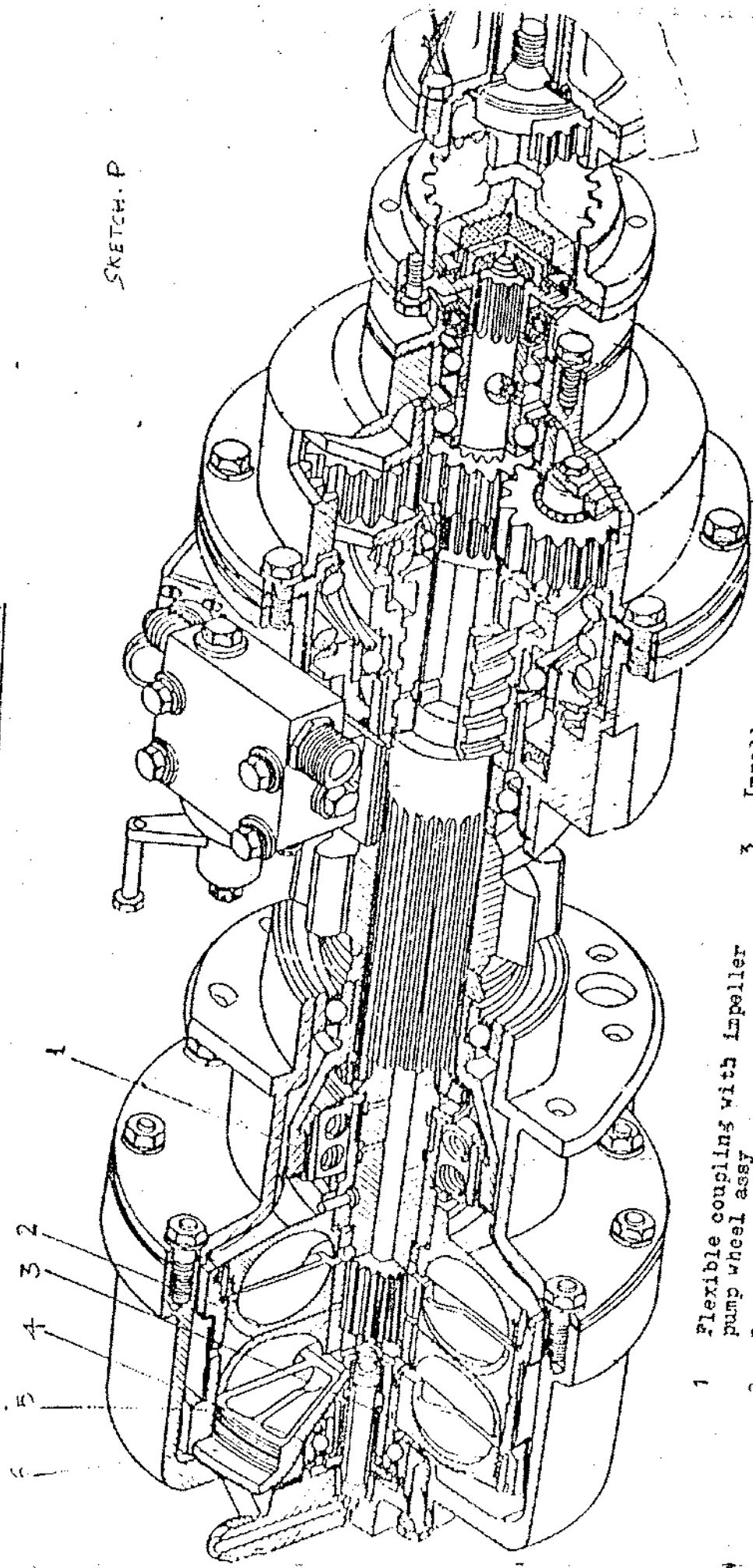
- (b) The machined surfaces should be coated in the grease.
- (c) The holes are to closed suitably to prevent entry of foreign matter.

PACKING

Assemblies/Components of the system should be packed suitably to protect the same from transit and handling damages.

STARTER GENERATOR DRIVE - 175-47 CS-1

SKETCH. P

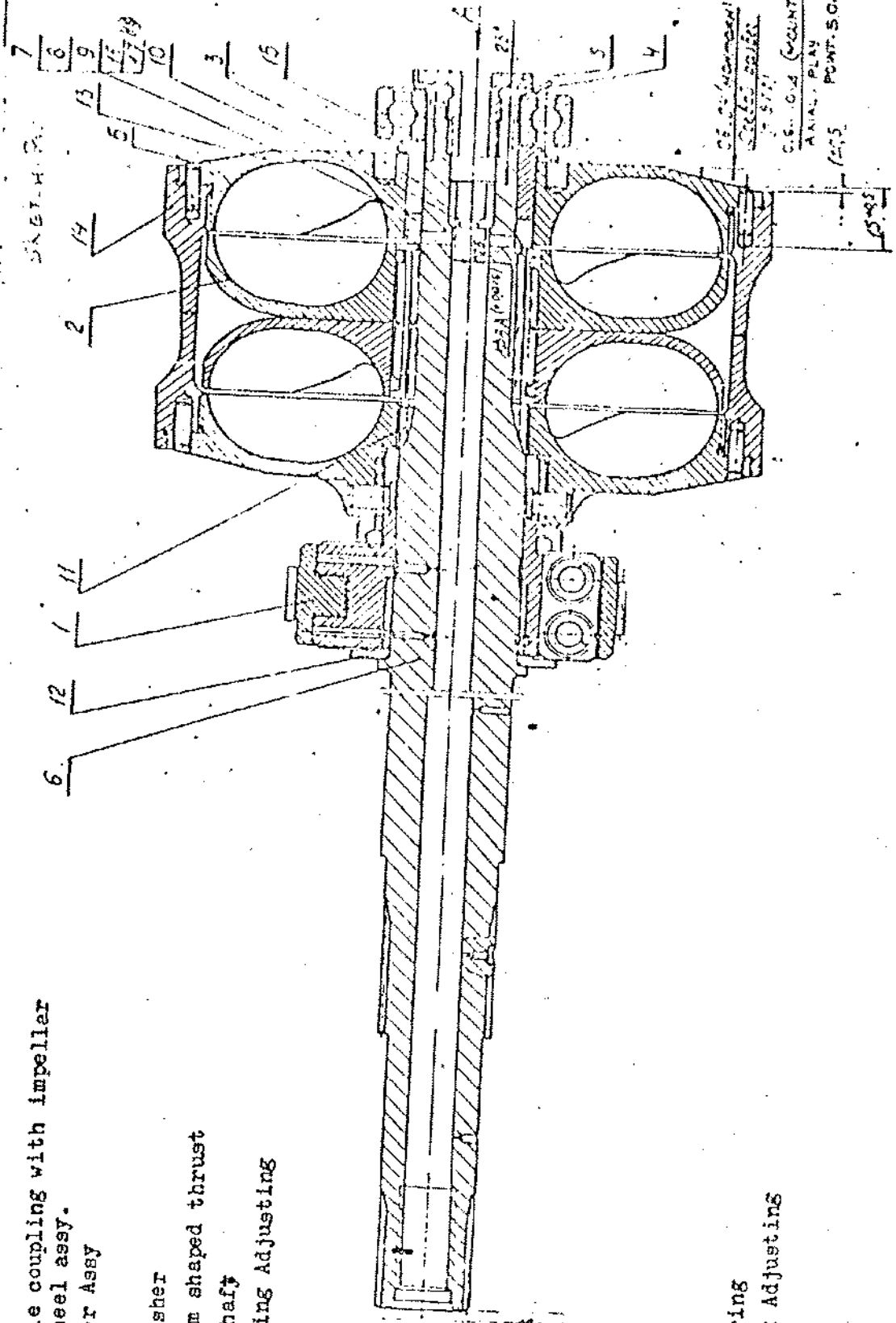


- 1 Flexible couplings with impeller pump wheel assy
- 2 Impeller Assy
- 3 Impeller
- 4 Ball bearings
- 5 Band
- 6 Impeller Driving

HYDRAULIC COUPLING WITH SHAFT ASSY

- 1 Flexible coupling with impeller pump wheel assy.
- 2 Impeller Assy
- 3 Bush
- 4 Lock washer
- 5 Mushroom shaped thrust
- 6 Drive shaft
- 7, 8 & 9 Ring Adjusting
- 10 Bush
- 11 Ring

- 12 Washer
- 13 Impeller
- 14 Dowel
- 15 Ball Bearing
- 16 & 17 Ring Adjusting



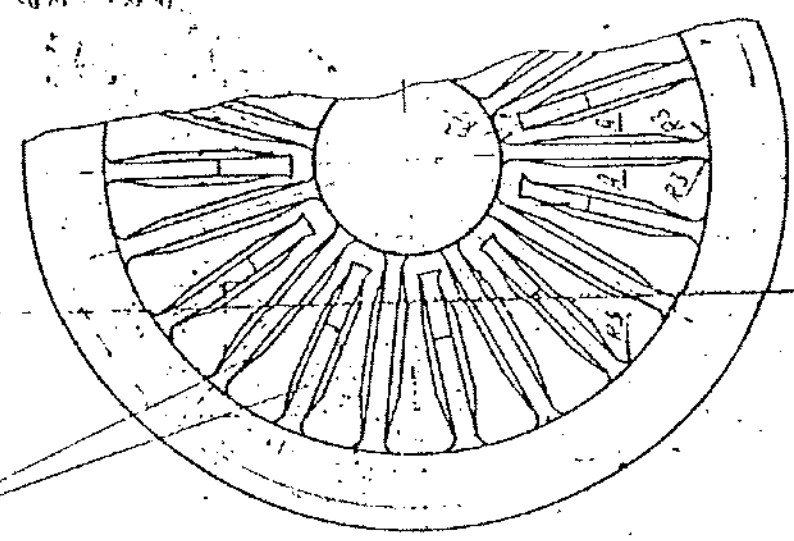
C.E. MCNEIL (MOUNTING),
 AIAA, PLNY
 POINT-SOP, JR.
 1955

1. Вращающаяся часть
 2. Герметик без осевых штифтов
 3. Герметик без осевых штифтов
 4. Герметик без осевых штифтов
 5. Герметик без осевых штифтов
 6. Герметик без осевых штифтов
 7. Герметик без осевых штифтов
 8. Герметик без осевых штифтов
 9. Герметик без осевых штифтов
 10. Герметик без осевых штифтов

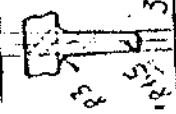
Итого: 10 шт.

- 1. Герметик без осевых штифтов
- 2. Герметик без осевых штифтов
- 3. Герметик без осевых штифтов
- 4. Герметик без осевых штифтов
- 5. Герметик без осевых штифтов
- 6. Герметик без осевых штифтов
- 7. Герметик без осевых штифтов
- 8. Герметик без осевых штифтов
- 9. Герметик без осевых штифтов
- 10. Герметик без осевых штифтов

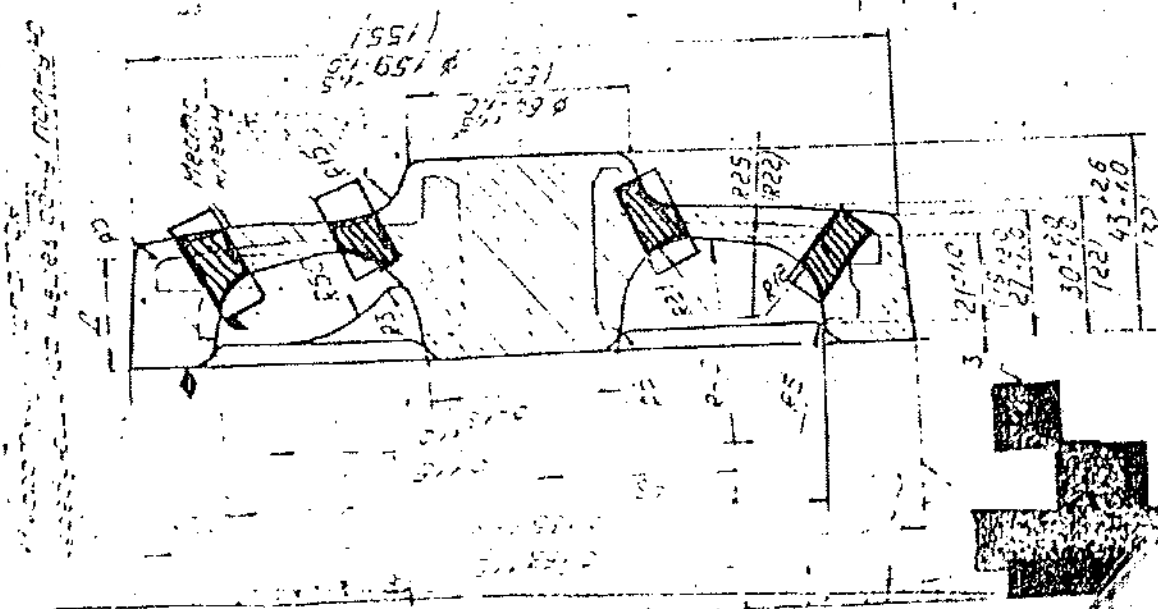
SKETCH - P2.



A-A 4:0.5



3:0.5



A-A 4:0.5

Location of Specimen for Rive and R220 testing

172.47.232/238/241

115

Колесо насосное / турбинное

Итого: 10 шт.