

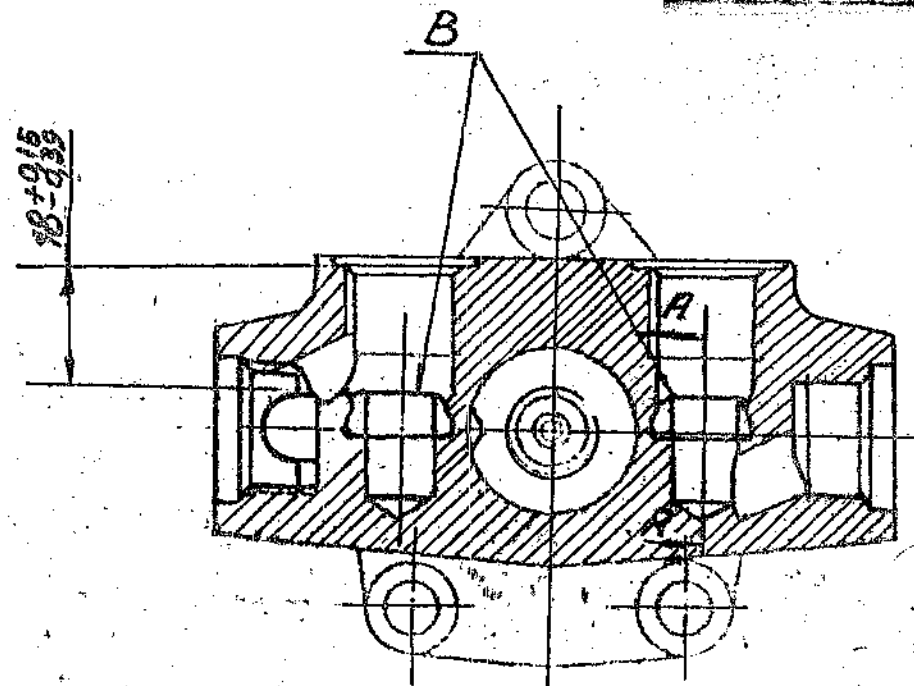
- 1) Clearance between rod Ref. No. 2 and bushing Ref. No. 1 should not exceed 0,005 mm.
- 2) Busing rod should be thoroughly rinsed in pure diesel fuel. Check for its smooth movement. Bushing in vertical position should move along the rod without jamming by gravity. To be checked at three turning angles of bushing along the rod.
- 3) Local resistance, frictional action, and jamming at any position is not allowed when the bushing slides over the entire length of rod.
- 4) Joint lapping of parts Ref. No. 1, and 2 is allowed. After lapping no part may be changed without subsequent lapping.

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

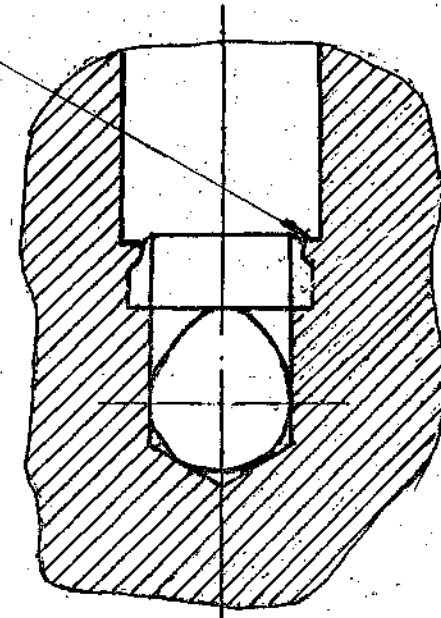
		EST. MASS	TO BE STAMPED OR MARKED WHERE INDICATED THIS #	
		0.032 Kg	1 LETTERS	
		ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUTSIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE		
ISSUE DATE	NATURE OF AMENDMENTS	MATERIAL	USED ON	
ORN	SCALE - 2:1		150-37-008-1CB	
CHD	DIMENSIONS IN mm.	CONTROLLER OF INSPECTION (HEAVY VEHICLES) AVADI		
TCD	TOLERANCE ON DIMS UNLESS OTHERWISE STATED		TITLE	
APD	ALL THREADS CONFORM TO	D S CAT NUMBER		ROD WITH BUSHING ASSY
DATE	17-2-87	DRAWING NUMBER		150-37-003-1CB

Flare-out all over

$\frac{1}{2}$   
2:1

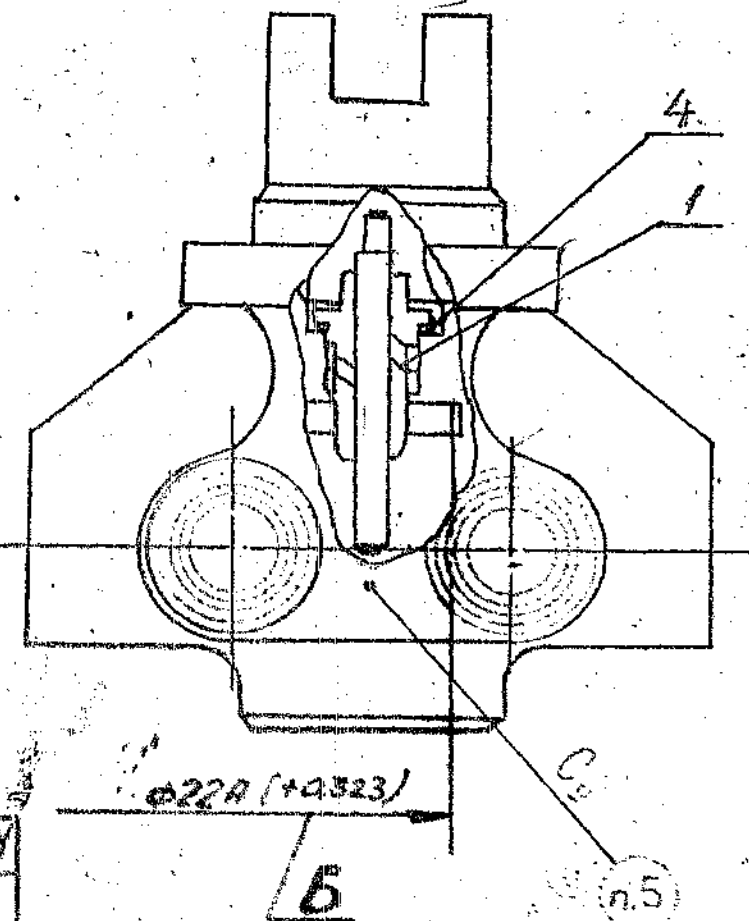


2



3

6) Check for smooth movement of rod in the bushing, after turning in bushing Ref. No. 1 rod initially rinsed in diesel oil together with body should be moved down along the entire length by hand; at any turning angle of rod in vertical position; if local resistance or jamming occurs additional finishing of rod and bushing with body is allowed.



- 1) After mounting of parts Ref. No. 3, check surface B by blueing, bearing pattern should be atleast 70% in the form of a continuous band, carry-out checking as per TИ 25203-90001.
- 2) The valve seats should be firmly fitted into their sockets after expanding.
- 3) The bodies are divided into three groups according to hole B, which are assembled with the corresponding pistons as shown in the table (carry-out the division into groups in compliance with maximum diameter).
- 4) Mount bushing Ref. No. 1, on sealing compound as per instructions, "a" TИ -19-046-77.
- 5) Mark the group of hole B with type No. 5 as per GOST 2930-62.

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

Group No	Hole dimension
1	22 ± 0.023
2	22 ± 0.023
3	22 ± 0.023

		EST. MASS 0,348 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	
ISSUE	DATE	NATURE OF AMENDMENTS	
DRN		SCALE 1:1	MATERIAL - USED ON - 20-150-37-000-1 C6
CHD		DIMENSIONS IN mm	CONTROLLER OF INSPECTION (HEAVY VEHICLES) AVADI
TCD		TOLERANCE ON DIMS UNLESS OTHERWISE STATED	TITLE - FUEL FEED PUMP BODY
APPD		ALL THREADS CONFORM TO	D'S CAT NUMBER
DATE	17-2-87		DRAWING NUMBER 150-37-008-1 C6

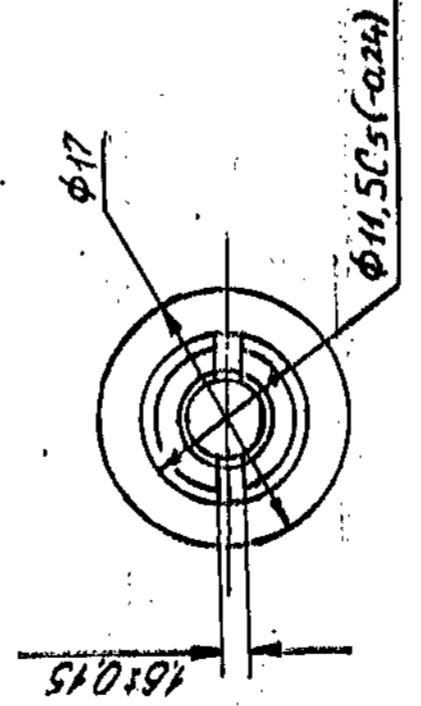
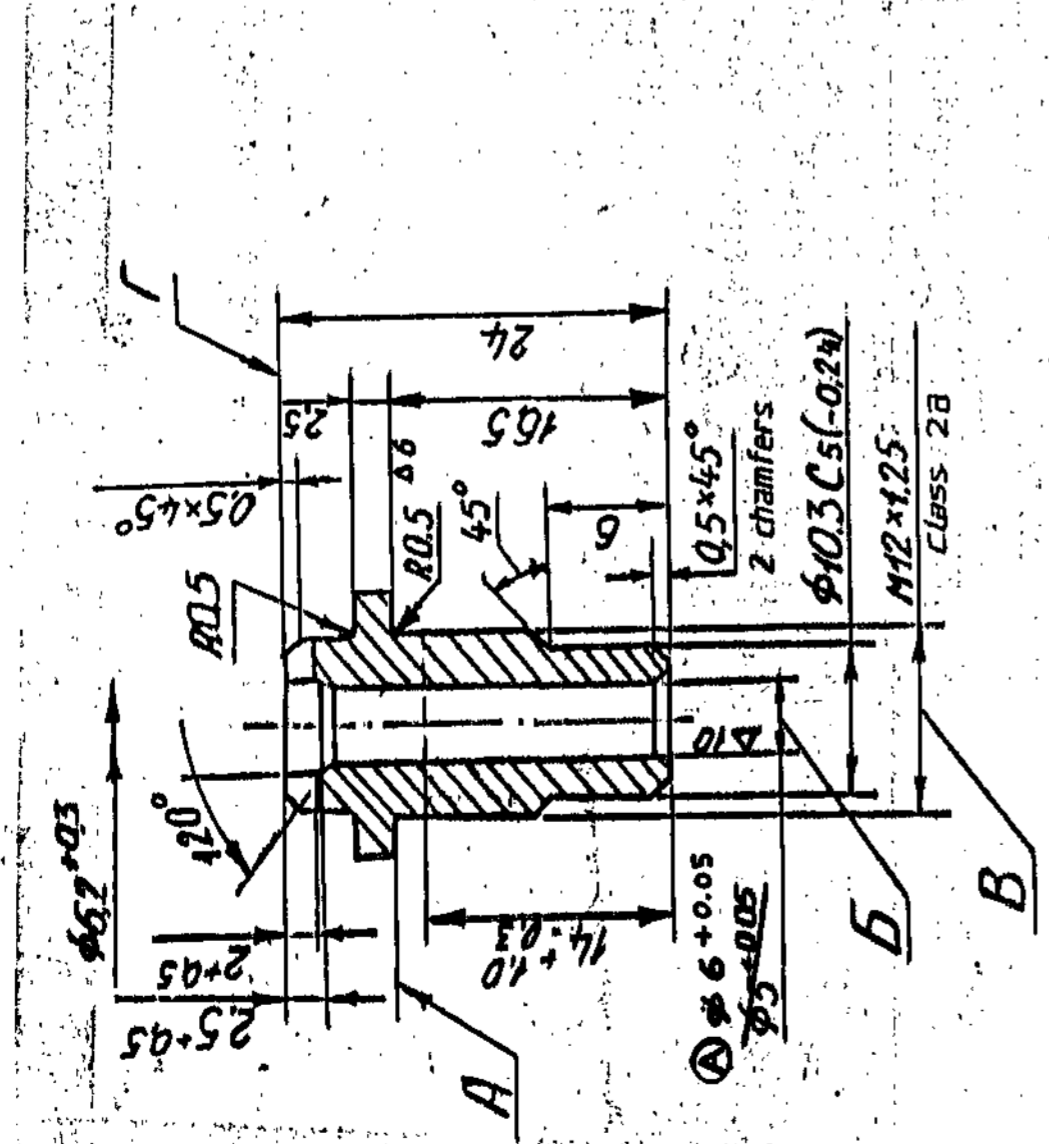






DRAWING NUMBER  
150-37-151

▽ 4 (▽)



**EXPLANATORY NOTE**

MATERIAL QUOTED: STEEL УХ 15 GOST 801-78  
BALL BEARING STEEL WITH CHROMIUM (X) CONTENT 1.5 %  
BY WEIGHT.

**CHEMICAL COMPOSITION %**

CARBON	0.95 - 1.05
SILICON	0.17 - 0.37
MANGANESE	0.20 - 0.40
CHROMIUM	1.30 - 1.65
SULPHUR	0.02 (max)
PHOSPHOROUS	0.027 (max)
NICKEL	0.30 (max)
COPPER	0.25 (max)
NICKEL & COPPER	0.50 (max)

- 1) Hardness HRC 52 to 56
- 2) Non-squareness of surface A, with respect to axis of thread B should not exceed 0.05 mm over  $\phi 15.5$  mm.
- 3) Non-parallelity of axis of surface B with respect to axis of thread B should not exceed 0.1 mm, over length 25.0 mm.
- 4) Out of roundness and non-straightness of surface B should not exceed 0.001 mm. Taper should not exceed 0.002 mm. Vertex of cone should be directed towards butt-end F.
- 5) Carry-out of ageing of part as per TI - 491-74.
- 6) Inspection group III as per TY 35.002-76.

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

EST. WT. 0.023 Kg  
TO BE STAMPED OR MARKED WHERE INDICATED THUS # (LETTERS)

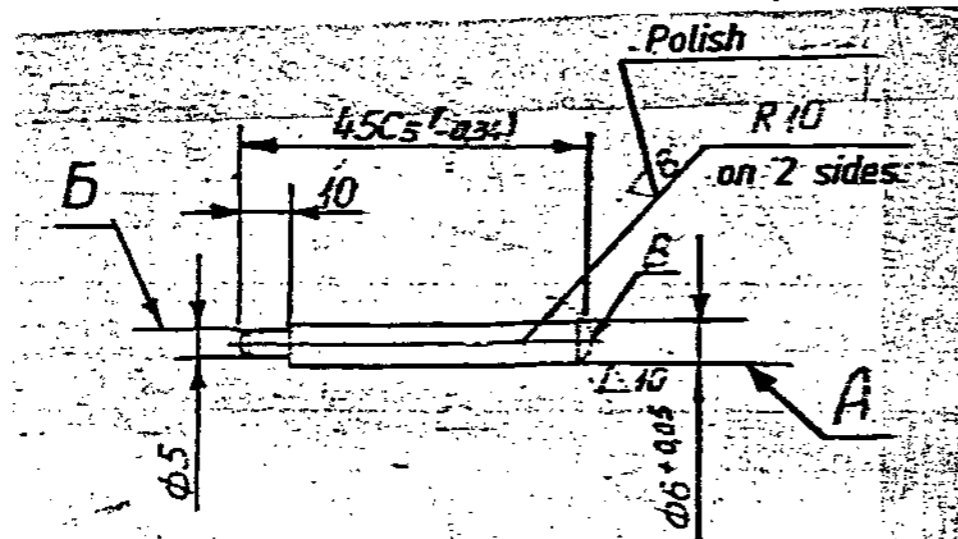
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT-SIZE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

DRN	DRN	MATERIAL :-	USED CN :-
CHD	CHD	STEEL УХ 15	150-37-003-1 Cb
TCO	TCO	GOST 801-78	
APPO	APPO	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)	
DATE	DATE	A V A D I	
SCALE	SCALE	1:1	
DIMENSIONS IN mm.		TITLE	
TOLERANCE ON DIMNS		TAPPET ROD BUSHING	
UNLESS OTHERWISE STATED IS 2102-69		D S CAT NUMBER	
ALL THREADS TO CONFORM TO		DRAWING NUMBER	
A 15.1.02 AUTHRY LT. No. J10026 (IND-III/509) (3.1.02)		150-37-151	
ISSUE	DATE	NATURE OF AMENDMENTS	

DRAWING NUMBER

150-37-152

▽ 5 (▽)



- 1) Hardness HRC 58 to 63.
- 2) Out of roundness and non-straightness of surface A, should not exceed 0,001 mm, taper should not exceed 0,002 mm. Vertex of cone should be directed towards but-end B.
- 3) Carry-out the ageing of part as per T4-491-74.
- 4) Inspection group IV as per Technical specifications TY 35.002-76.

**EXPLANATORY NOTE:**

MATERIAL QUOTED: STEEL UXX 15 GOST 801-78

BALL BEARING STEEL WITH CHROMIUM (X) CONTENT 1.5 % BY WEIGHT.

**CHEMICAL COMPOSITION %**

CARBON	0.95 - 1.05
SILICON	0.17 - 0.37
MANGANESE	0.20 - 0.40
CHROMIUM	1.30 - 1.65
SULPHUR	0.02 (max)
PHOSPHOROUS	0.027 (max)
NICKEL	0.30 (max)
COPPER	0.25 (max)
NICKEL & COPPER	0.50 (max)

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

EST WT 0.009 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

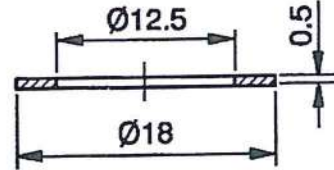
DRN	Polisado	MATERIAL :-	USED ON :-
CHO	10x 18mm	STEEL UXX15	150-37-003-1 CB
TCD	G. n. n. n.	GOST 801-78	
APPD		CONTROLLERATE OF INSPECTION (HEAVY VEHICLES) AVADI	
DATE	17-2-87		
SCALE	-1 : 1		
DIMENSIONS IN MM		TITLE	TAPPET BUSHING ROD
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS: 2102-69			
ALL THREADS TO CONFORM TO		D S CAT NUMBER	DRAWING NUMBER
			150-37-152

ISSUE | DATE | NATURE OF AMENDMENTS

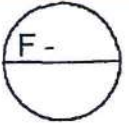
V. Ramesh  
(V. RAMESH)  
18/11/2015  
JTD(0)

DRG. RE - INDIANISED BASED ON RUSSIAN ORIGINAL ISSUE - -

DRAWING NUMBER  
**150.37.153**



1. TEARS AND SCALING OF EDGES IS NOT ALLOWED.
2. SEPERATION OF GASKET IS NOT ALLOWED TO OBTAIN THE REQUIRED THICKNESS IN MANUFACTURING.



PILOT SAMPLE SHOULD BE APPROVED BEFORE BULK PRODUCTION.

		EST. WT. (Kg) 0.0001	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.		
		MATERIAL :- TEXTOLITE MA TY - 6 - 05 - 1548-77	USED ON :- 150.37.008-1Cb	
ISSUE	DATE	NATURE OF AMENDMENTS		
DRN	Sd/=	SCALE :- 2 : 1	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) AVADI	
CHD	Sd/=	DIMENSIONS IN mm	TITLE :- <b>GASKET</b>	
APPD	Sd/=	TOLERANCE ON DIMENSIONS UNLESS OTHERWISE STATED IS : 2102 - 69	D S CAT NUMBER	
DATE	17.2.87	ALL THREADS TO CONFORM TO IS:4218.PART- 4	DRAWING NUMBER <b>150.37.153</b>	

DRAWING NUMBER  
160-37-110

**EXPLANATORY NOTE :**

Rz80 ✓ (✓)

6. MATERIAL QUOTED : STEEL 45 GOST 1050-74.

ALTERNATE MATERIAL QUOTED : STEEL 40, 50 GOST 1050-74; cm 6 GOST 380-71.

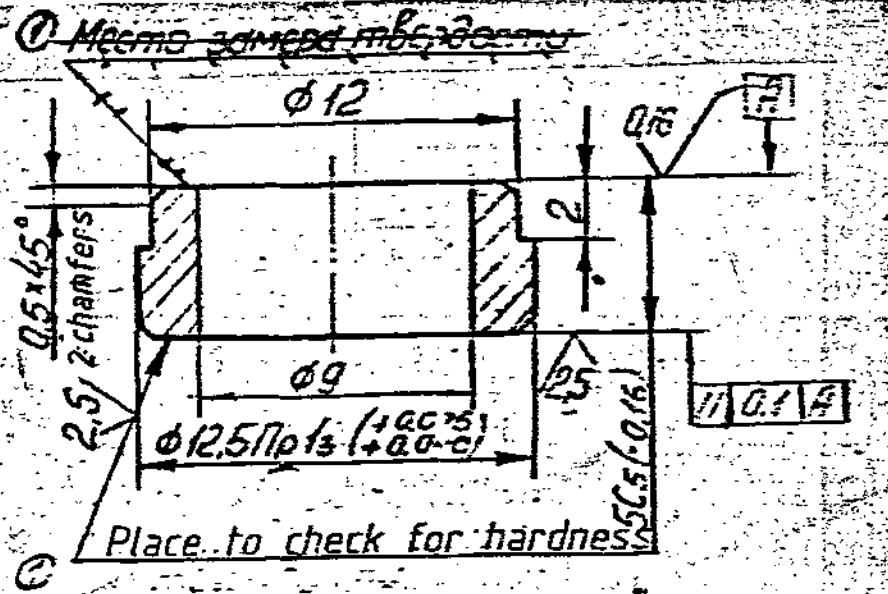
CONVENTIONAL DESIGNATION OF SIZED STEEL GRADE 45.

a) CHEMICAL COMPOSITION

ELEMENTS	Gde 40	Gde 45	Gde 50
CARBON	0.37 - 0.45	0.42 - 0.50	0.47 - 0.55
SILICON	0.17 - 0.37	0.17 - 0.37	0.17 - 0.37
MANGANESE	0.50 - 0.80	0.50 - 0.80	0.50 - 0.80
CHROMIUM	0.25 (max)	0.25 (max)	0.25 (max)
SULPHUR	0.04 (max)	0.04 (max)	0.04 (max)
PHOSPHOROUS	0.035 (max)	0.035 (max)	0.035 (max)

b) MECHANICAL PROPERTIES

STEEL GRADES →	40	45	50	GOST 380-71
YIELD POINT Kgf/mm <sup>2</sup>	34	36	38	32
ULTIMATE TENSILE STRENGTH Kgf/mm <sup>2</sup> min	58	61	61	46 - 60
% ELONGATION (min)	19	16	14	15
% REDUCTION OF AREA	45	40	40	-
IMPACT STRENGTH Kgf/cm <sup>2</sup>	6	5	4	-



1) Hardness HRC 40 to 50.

2) The part is made from steel of grade 40, 50, GOST 1050-74 and steel cm 6 GOST 380-71.

3) Check surface A by blueing. Surface A should have a bearing pattern in the form of a continuous band.

4) Technical requirements for manufacturing are as per TT 35.002-77.

5) Inspection group IV is as per Technical requirements TY 35.002-76.

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

EST. WT. 0.0017 Kg TO BE STAMPED OR MARKED WHERE INDICATED THUS ( LETTERS)

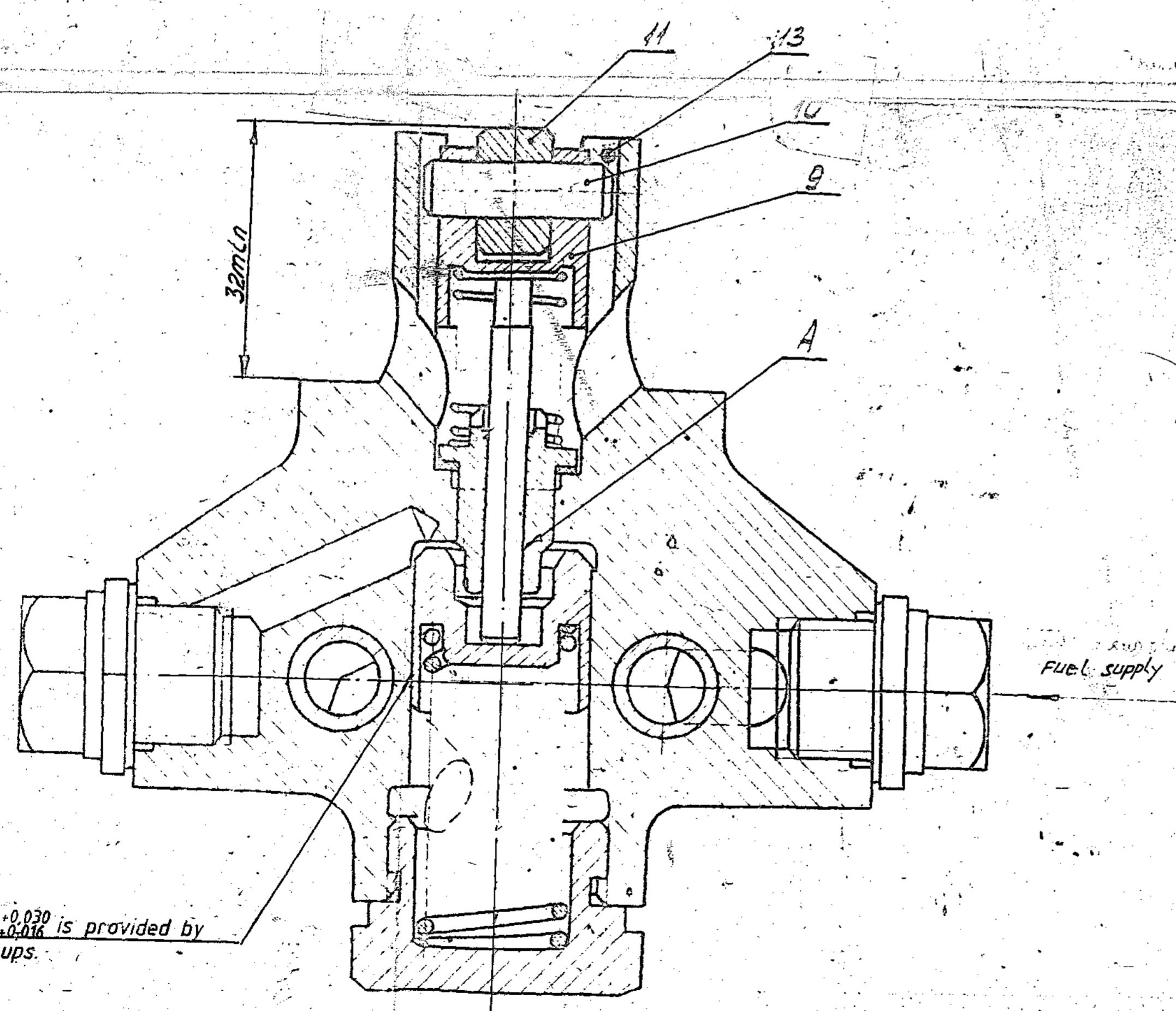
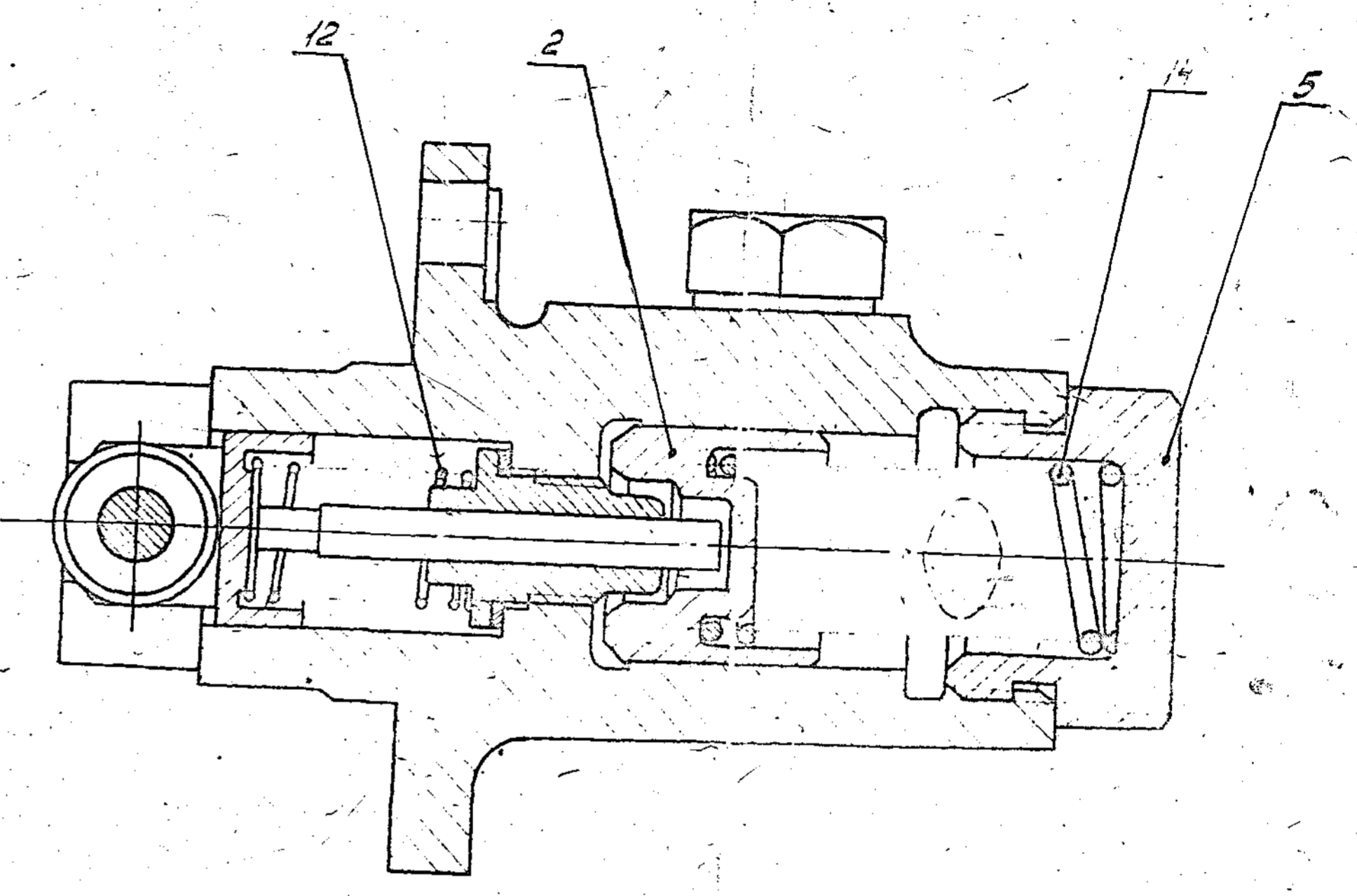
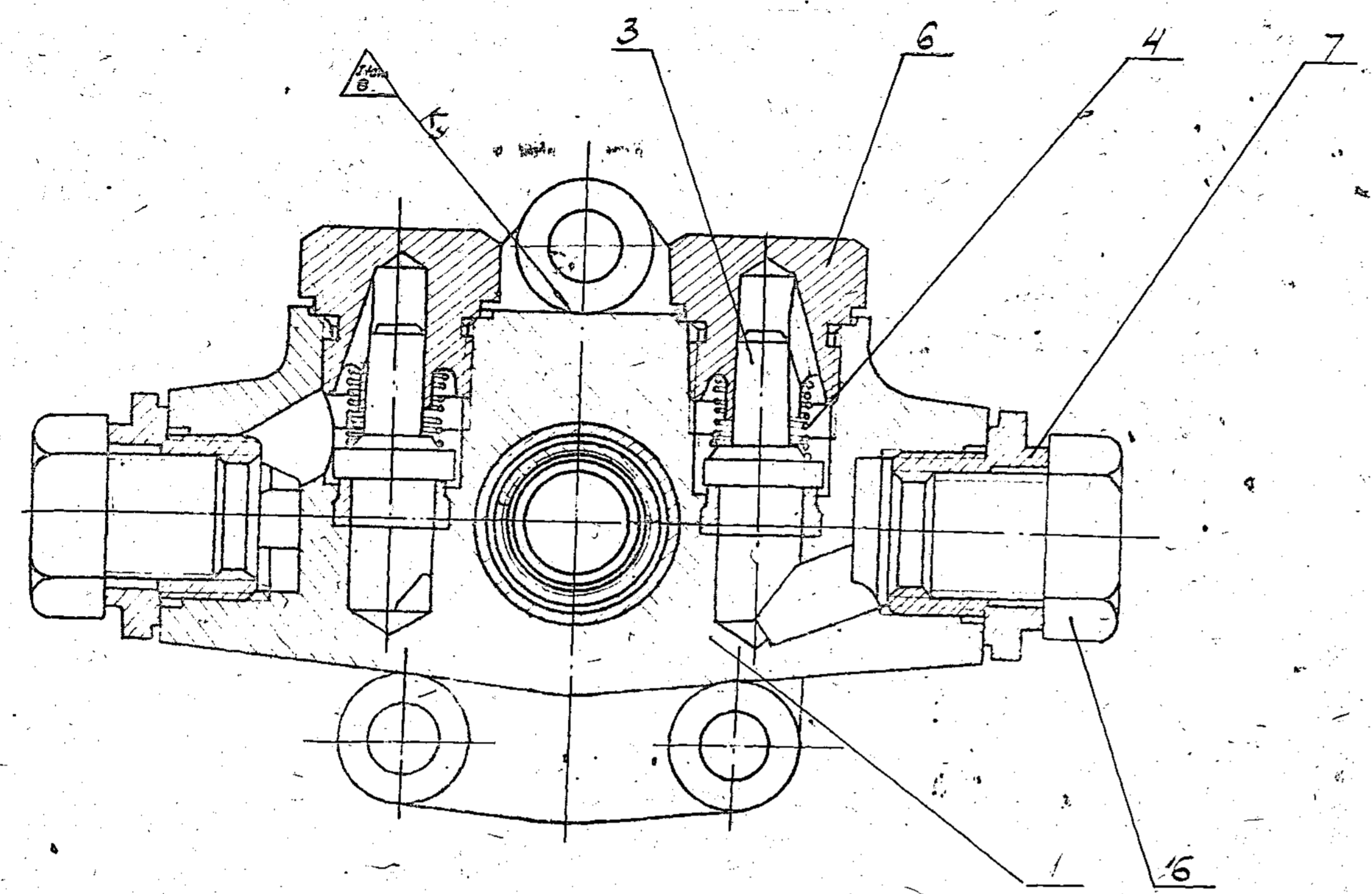
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT SIDE INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE

DRN	APPD	MATERIAL:-	USED ON
CHD	DATE	STEEL 45 GOST 1050-74	CB 150-37-008-1
TCD	SCALE:-	CONTROLLERATE OF QUALITY ASSURANCE(HEAVY VEHICLES)	
APPD	4 : 1	AVADI	
DATE	DIMENSIONS IN mm	TITLE	DRAWING NUMBER
17-02-87	TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS:2102-69		
SCALE:-	ALL THREADS TO CONFORM TO	D S CAT NUMBER	
ISSUE DATE	NATURE OF AMENDMENTS		









Assembly clearance  $\pm 0.030$  /  $\pm 0.016$  is provided by selection as per groups.

- 1) All parts of the pump, before assembly, should be thoroughly washed, blown with compressed air and treated with aviation oil as per GOST 21743-76.
- 2) Check that the Ref. No. 3, move freely, within their guides before mounting parts Ref. No. 6.
- 3) Stop punch the stud Ref. No. 13 on two sides to protect it from falling out. Inspect the pump for cracks, after press fitting the stud.
- 4) After completion of pump assembly check manually for free rotation of tappet roller, part Ref. No. 11, movement of follower, Part Ref. No. 9, and piston, part Ref. No. 2, in the body of pump in both directions.
- 6) Carry-out preservation and de-preservation of pumps as per UWW/20-1251.
- 7) Finally assembled pump is exposed to pressure test with diesel fuel as per GOST 305-73 or GOST 4749-73, through the fuel supply union at a pressure of 3 kgf/cm<sup>2</sup>, for 180 seconds or with air for 20 seconds: at an air pressure of at least 0,392 MPa ( 4 kgf/cm<sup>2</sup> ).  
Time of pressure test is 10 seconds. Leakage of air in form of single bubbles between the bushing and is allowed. Leakage from joints, when the part is immersed in liquid is not allowed.  
Run the pump at 1300 strokes per minute while the back pressure at the out let is 0,15 MN/M<sup>2</sup> ( 1,5 kgf/cm<sup>2</sup> ) for 10 min.  
Check leakage of diesel fuel during the pump running through joint A, which should not exceed 2 cm<sup>3</sup> for 10 min, leakage through other joints is not allowed during the pump running.

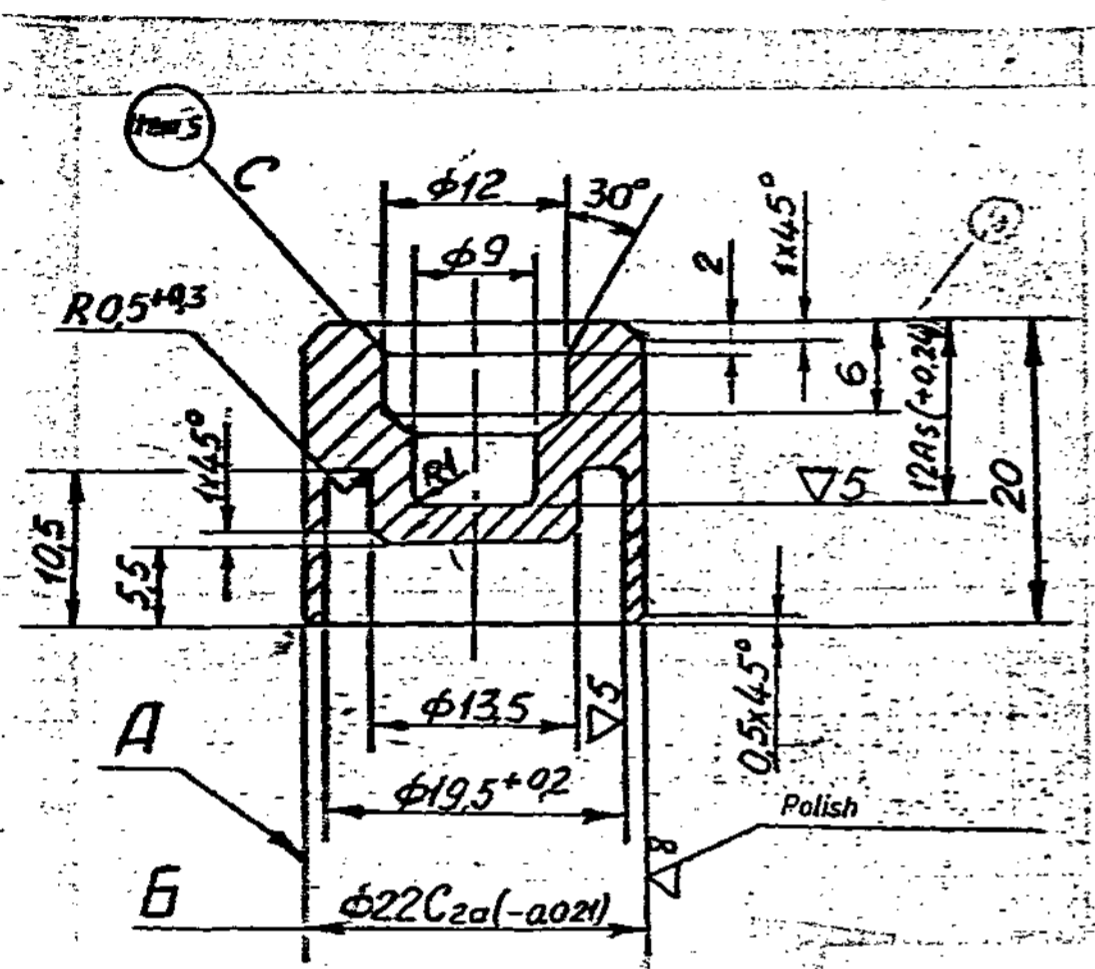
- 8) Stamp, the acceptance stamp of technical inspection bureau, stamp the year ( last 2 figures ), month of manufacturing, and serial number of pump with type no-3, as per GOST 2930-62.
- 9) Apply sealant 33w as per instructions U 240 280/75 on butt-end Ref. No. 7, in contact with pump body and 2 to 4 threads turn adjacent to them.
- 10) Volumetric feed of the pump while working on fuel, as per GOST 305-73, GOST 4749-73, rarefaction on suction is at least 0,012 MPa ( 0,12 kgf/cm<sup>2</sup> ) and back pressure of at least 0,08 MPa ( 0,8 kgf/cm<sup>2</sup> ), should be in compliance with 1,8 1/min. at the frequency of working cycles of piston 12,45 HZ ( 750 cycles/min. ).
- 11) Maximum fuel pressure set up by the pump should be 0,17 MPa ( 1,7 kgf / cm<sup>2</sup> ).
- 12) Acceptance rules and of test methods for the pumps are in compliance with GOST 15829-77.

PILOT SAMPLE SHOULD BE APPROVED BY A H S P BEFORE BULK PRODUCTION			
ISSUE DATE	NATURE OF AMENDMENTS	EST. MASS	TO BE STAMPED OR MARKED WHERE INDICATED THIS LETTERS
DRN	SCALE 2 : 1	MATERIAL	USED ON C6 20-32-00-4
CHD	DIMENSIONS IN mm	CONTROLLER OF INSPECTION ( HEAVY VEHICLES ) AVADI	
TCD	TOLERANCE ON DIMS UNLESS OTHERWISE STATED	TITLE FUEL FEED PUMP ASSY	
APPD	D S CAT NUMBER	DRAWING NUMBER	
DATE 17.02.87	ALL THREADS CONFORM TO	20-150-37-000-1CB	



DRAWING NUMBER  
150-37-108-1

▽ 4 (▽)



- 1) The part is made from steel of grade 10, 20 and 15 as per GOST 1050-74.
- 2) Cyanide finished articles all over, to a depth of 0,1 to 0,3 mm ( before polishing surface A ).
- 3) Hardness of working surface HR 15 H88 to 91. Measuring of hardness by vickers hardness test is allowed.
- 4) In surfaces not to be machined after heat treatment, cyanide layer may have a depth of upto 0,4 mm.
- 5) Mark group number with electrograph. Pistons are split into 3 groups as to diameter  $\phi$ . They are assembled with corresponding holes in the body, as shown in the table ( split the part into groups ) according to maximum diameter.
- 6) Ovality and taper of piston should not exceed 0,007 mm ( with in the limits for group tolerance ).
- 7) Oxidize. Removal of oxidation from surface A is allowed.
- 8) Inspection group III in compliance with technical specifications TY 35.002-76.
- 9) Technical requirements for manufacturing are as per TY 35.002-76.

**EXPLANATORY NOTE**

MATERIAL QUOTED: (AS PER NOTE 1) : STEEL 10, 20 AND 15  
GOST 1050-74

**CHEMICAL COMPOSITION**

GRADE OF STEEL	CONTENTS OF ELEMENTS %							
	C	Si	Mn	Cr	P	S	Cu	Ni
10	0.07 - 0.14	0.17 - 0.37	0.35 - 0.65	0.15	0.035	0.040	0.25	0.25
	MAXIMUM							
20	0.17 - 0.24	0.17 - 0.37	0.35 - 0.65	0.25	0.035	0.040	0.25	0.25
15	0.12 - 0.19	0.17 - 0.37	0.35 - 0.65	0.15	0.035	0.040	0.25	0.25

**MECHANICAL PROPERTIES**

GRADE OF STEEL	TENSILE STRENGTH Kgf/mm <sup>2</sup> (min)	YIELD POINT Kgf/mm <sup>2</sup> (min)	ELONGATION % (min)	REDUCTION IN AREA % (min)
10	34	21	31	55
20	42	25	25	55
15	38	23	27	55

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

EST. WT. 0.020 Kg  
TO BE STAMPED OR MARKED WHERE INDICATED THUS  $\equiv$  ( 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	CHD	TCD	APPD	DATE	SCALE	DIMENSIONS IN mm.	TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69	MATERIAL :- STEEL 10, 20, & 15 GOST 1050-74	USED ON :- 20-150-37-000-1 C5
				17-02-87				CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)	AVAB
								TITLE PUMP PISTON	
								D S CAT NUMBER	DRAWING NUMBER 150-37-108-1
ISSUE	DATE	NATURE OF AMENDMENTS							



DRAWING NUMBER

150-37-111

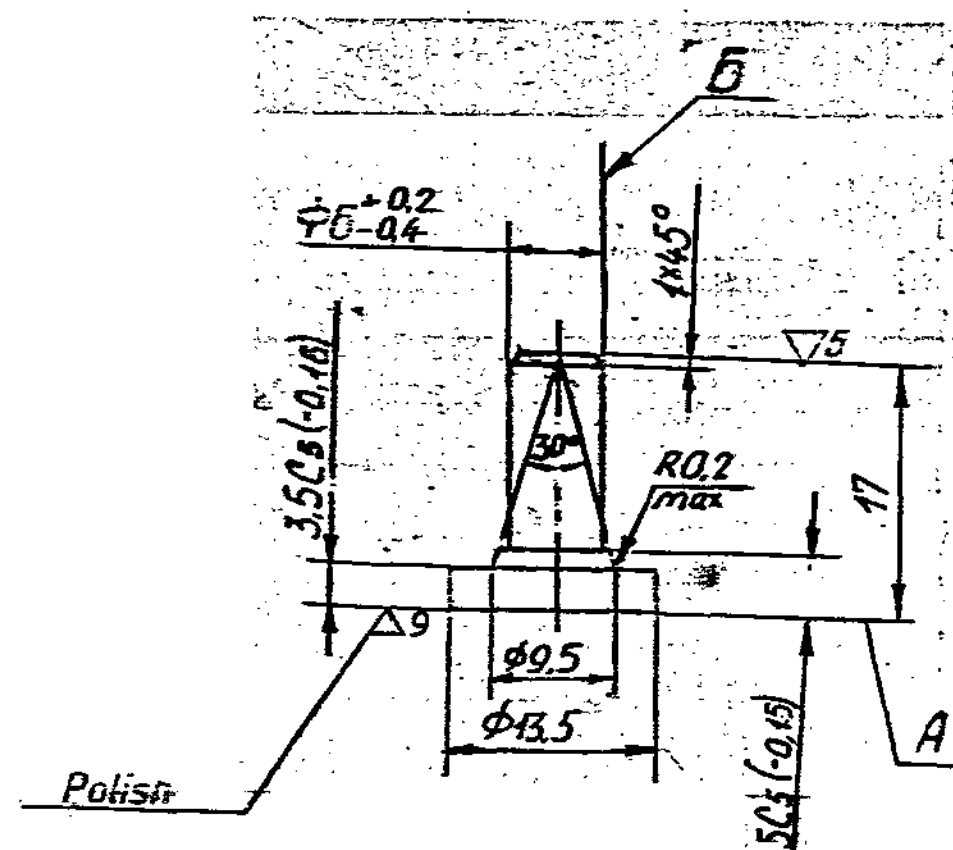
▽<sup>6</sup> (▽)

EXPLANATORY NOTE:-

MATERIAL QUOTED:- TEXTOLITE ПTK GOST 5-78.

PARAMETERS:-

1. TENSILE ELASTICITY MODULUS  $\text{kgf/cm}^2 = 3.9-6.4.$
2. RELATIVE ELONGATION AT RUPTURE = 1.
3. COEFFICIENT OF FRICTION
  - (a) WITHOUT LUBRICATION = 0.32.
  - (b) WITH (OIL) LUBRICATION = 0.02.
4. SHEAR STRESS AT RUPTURE FOR SHEETS OF THICKNESS FROM 2 TO 9mm ( $\text{kgf/cm}^2$ ) = 1400.
5. IMPACT STRENGTH  $\text{kgf.cm/cm}^2 = 25$  FOR SHEET THICKNESS FROM 8 TO 9mm
6. OIL STABILITY AT 20°C FOR SOAKING TIME OF 24 HOURS = 0.06-0.08%
7. STABILITY IN PETROL AT 20°C FOR SOAKING TIME OF 24 HOURS = 0.02%
8. OPERATING TEMPERATURE = FROM -40°C TO +105°C.



- 1) Run out of surface A, with respect to surface B should not exceed 0.1 over  $\phi 12.0$  mm.
- 2) Bearing pattern should be in the form of continuous band on surface A, over  $\phi$  of more than 8.
- 3) Technical requirements for manufacturing are as per TT 35.002-77.

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

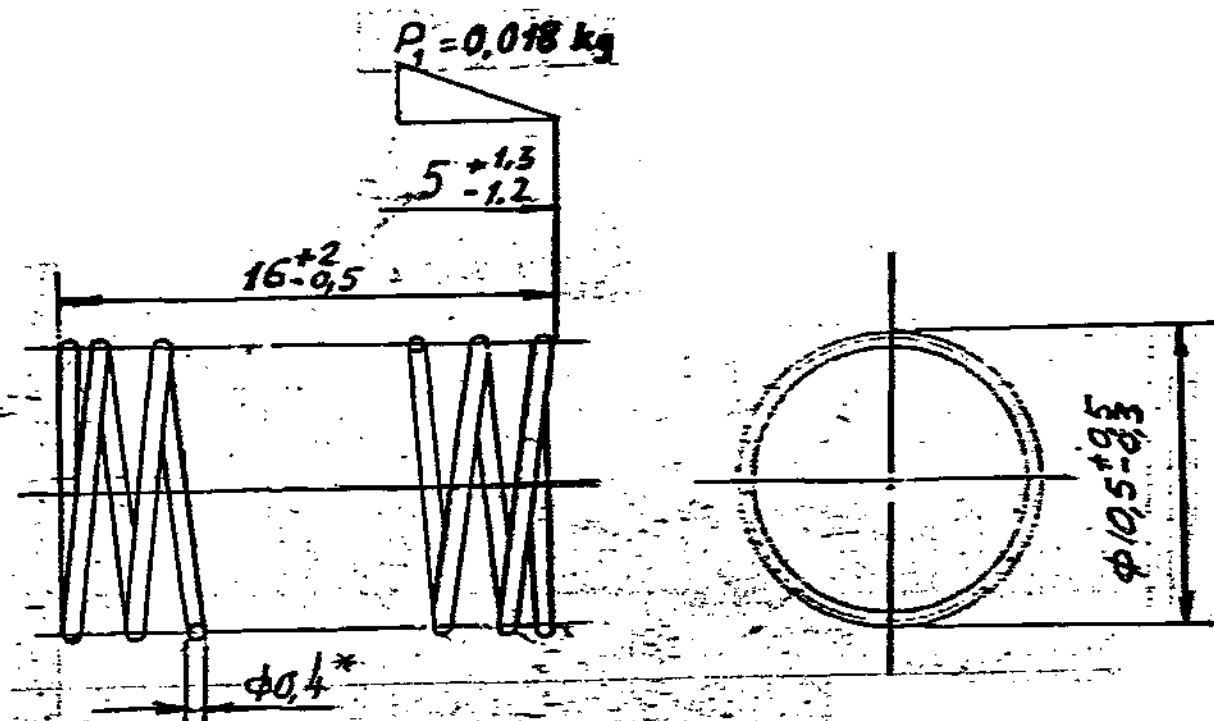
EST. WT. 0.0012 Kg TO BE STAMPED OR MARKED WHERE INDICATED THUS # LETTERS)

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

DRN	CHD	TCD	APPD	DATE	SCALE	DIMENSIONS IN mm.	TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2:02-69	ALL THREADS TO CONFORM TO	ISSUE	DATE	NATURE OF AMENDMENTS
				17-02-87	2:1						
MATERIAL :- TEXTOLITE ПTK GOST 5-78.							USED CN :- 20-150-37-000-1 C6				
CONTROLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES) A V A D I							TITLE VALVE				
							D S CAT NUMBER		DRAWING NUMBER 150-37-111		



DRAWING NUMBER  
150-37-112



- 1) Number of working turns  $n_1 = 7$ .
- 2) Number of complete turns  $n_2 = 9.5^{+0.2}_{-0.3}$ .
- 3) Coiling direction is left hand.
- 4) Total length of spring  $L^* = 290$  mm.
- 5) Non-squareness of end surfaces with respect to axis of spring should not exceed 0.3 mm, over the length of spring.
- 6) Irregularity of pitch in free state is  $\pm 0.4$  mm.
- 7) Clearance between compressed turns should not exceed 0.2 mm over length of at least 0.25 of the turn circumference.
- 8) Carry-out technological compressing upto length H press fit = 4.5 mm.
- 9) Coating-zinc-plated, 9 to 12 microns thick. Perform zinc-plating as per T.45.0-37-77. Remove hydrogen embrittlement by heating in oil at  $t = 90$  to  $120^\circ\text{C}$  for 3 hours.
- 10) Technical specifications rules of acceptance, testing marking preservation, storage and packing of spring are as per OST 5.95.39-72.
- 11) As to its working conditions the spring is referred to group I, the spring is manufactured as per accuracy class 2.
- 12) \*Dimensions are given for reference.

EXPLANATORY NOTE:-

MATERIAL QUOTED:- WIRE I-0.4 GOST 9389-75. CARBON STEEL COLD DRAWN WIRE, CATEGORY-I NORMAL ACCURACY  $\phi$  OF WIRE  $0.4 \pm 0.02$  mm. MANUFACTURED FROM EITHER GRADES KT-2 OR SK-7 AS PER GOST 9389-75.

GRADE OF STEEL	CONTENT OF ELEMENTS %							
	C	Si	Mn	S	P	Cr	Ni	Cu
KT-2	0.86-0.91	0.17-0.37	0.20-0.40	0.020	0.020	0.05	0.05	0.10
SK-7	0.68-0.76	0.17-0.37	0.50-0.80	0.030	0.020	0.05	0.05	0.040

MECHANICAL PROPERTIES:-

TENSILE STRENGTH  $(\text{kgf/mm}^2) = 265-300$   
NUMBER OF TWISTS (MIN) = 16

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

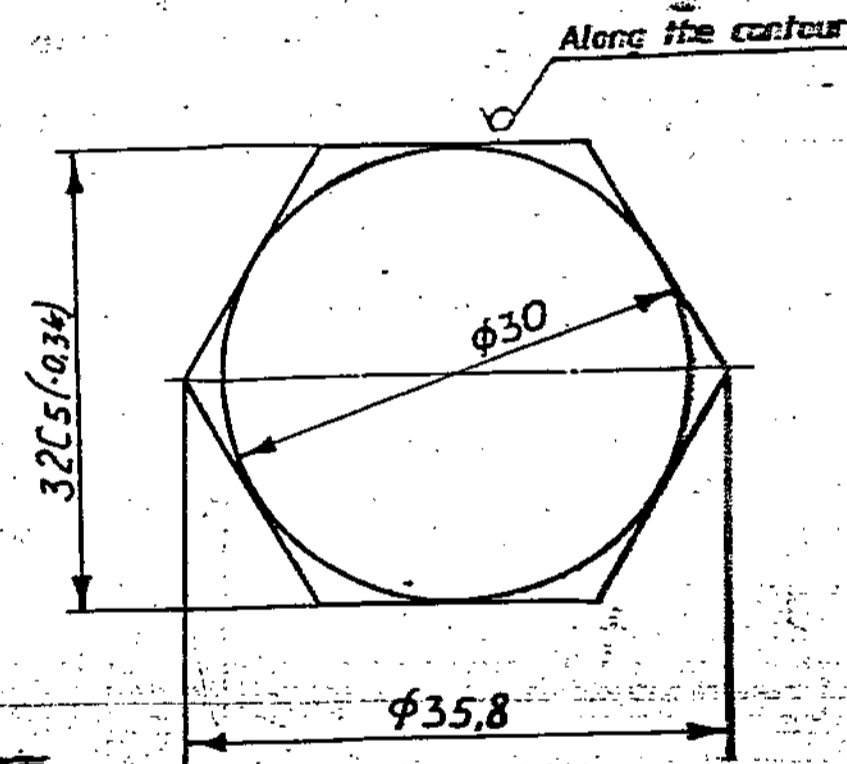
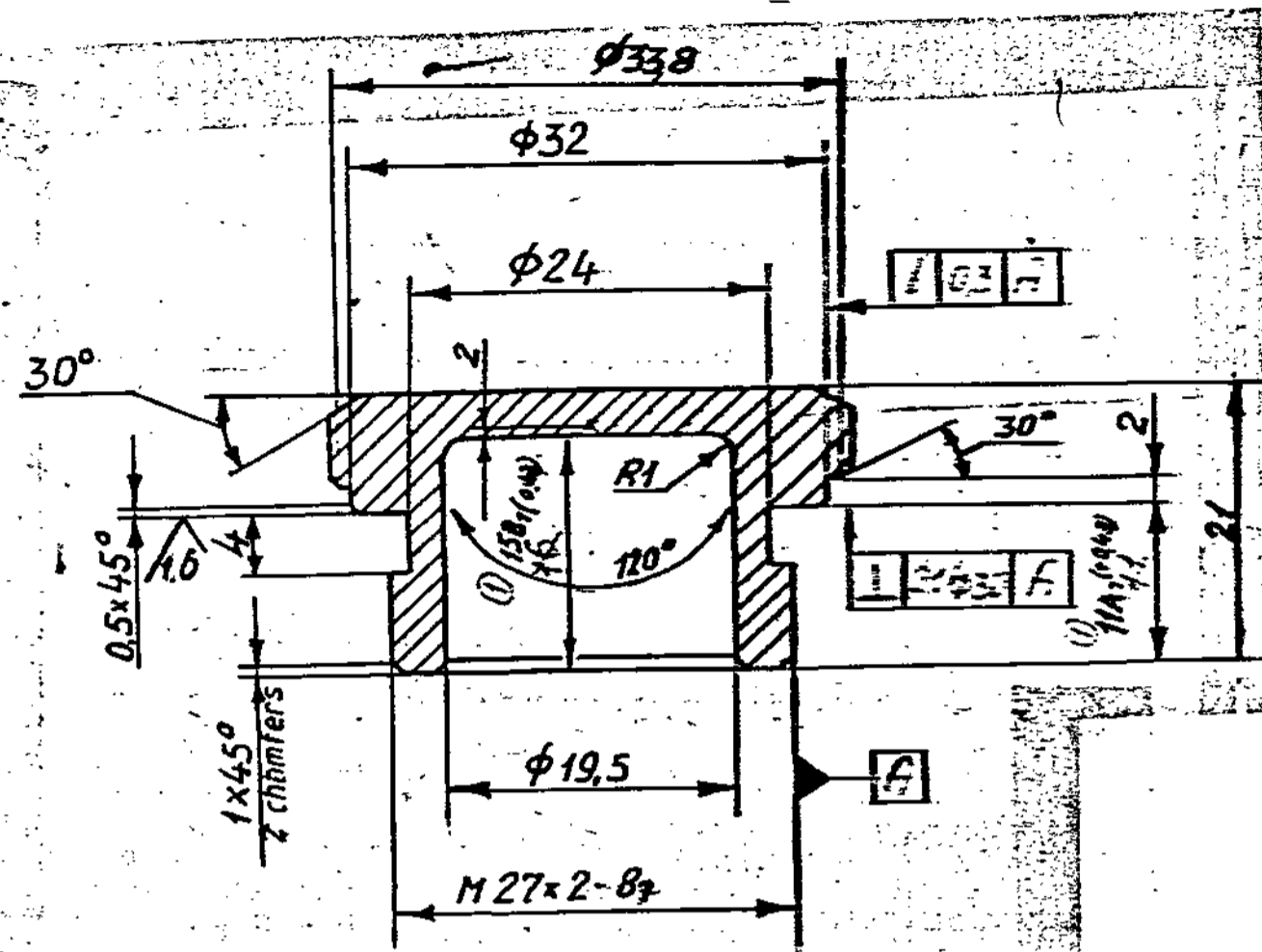
EST. WT. TO BE STAMPED OR MARKED WHERE INDICATED THIS = LETTERS)  
0.0006 kg.  
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUTSIDE R INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

DRN	CHD	TCD	IAPPD	DATE	SCALE	DIMENSIONS IN mm	TOLERANCE ON DIMS UNLESS OTHERWISE STATED IS 2102-69	ALL THREADS TO CONFORM TO
DRN	CHD	TCD	IAPPD	DATE	SCALE	DIMENSIONS IN mm	TOLERANCE ON DIMS UNLESS OTHERWISE STATED IS 2102-69	ALL THREADS TO CONFORM TO
MATERIAL - WIRE I-0.4				GOST 9389-75		USED ON :- 20-150-37-000-1.06		
CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)						A V A D I		
TITLE							VALVE SPRING	
D S CAT NUMBER						DRAWING NUMBER		
150-37-112						150-37-112		
ISSUE	DATE	NATURE OF AMENDMENTS						



DRAWING NUMBER  
150-37-120-12

Rz 50/(✓)



- 1) The part may be made from steel of grade 30, 35, 40 GOST 1051-73.
- 2) Coating : Cadmium plated, 9 microns thick, chromated. Carry out cadmium plating as per TN 5.038-77.
- 3) Technical requirements for manufacturing are as per TT 35.002-77.

EXPLANATORY NOTE:

HEXAGONAL BAR: 32-5 GOST 8560-78  
45 GOST 1051-73  
ALTERNATE MATERIAL QUOTED: 30, 35, 40, GOST 1051-73  
BRIGHT STEEL HEXAGONAL BAR 32 mm ACROSS FLATS,  
CLASS OF ACCURACY-5, TO GOST 8560-78, GRADE 45, GOST 1051-73

CHEMICAL COMPOSITION:

GRADE OF STEEL	CONTENTS OF ELEMENTS %							
	C	Si	Mn	Cr	P	S	Cu	Ni
	M A X I M U M							
30	0.27 - 0.35	0.17 - 0.37	0.50 - 0.80	0.25	0.035	0.040	0.25	0.25
35	0.32 - 0.40	0.17 - 0.37	0.50 - 0.80	0.25	0.035	0.040	0.25	0.25
40	0.37 - 0.45	0.17 - 0.37	0.50 - 0.80	0.25	0.035	0.040	0.25	0.25
45	0.42 - 0.50	0.17 - 0.37	0.50 - 0.80	0.25	0.04	0.035	0.25	0.25

MECHANICAL PROPERTIES

GRADE OF STEEL	TENSILE STRENGTH Kgf/mm <sup>2</sup> (min)	YIELD POINT Kgf/mm <sup>2</sup> (min)	ELONGATION % (min)	REDUCTION IN AREA % (min)	IMPACT STRENGTH Kgf/cm <sup>2</sup> (min)
30	50	30	21	50	8
35	54	32	20	45	7
40	58	34	19	45	6
45	61	36	16	40	5

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

EST. WT. 0.065 Kg  
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 OUTSIDE R INSIDE EQUIVALENT CHAMFERS, ARE PERMISSIBLE.

DRN	CHD	TCD	APPD	DATE	SCALE	DIMENSIONS	TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2:12-69	ISSUE	DATE	NATURE OF AMENDMENTS	
MATERIAL :- 32-5GOST 8560-78 HEXAGONAL BAR 45 GOST 1051-73		USED ON :- 20-150-37-000-1 CB		CONTROL RATE OF QUALITY ASSURANCE (HEAVY VEHICLES) A V A D I				TITLE PLUG FOR PISTON HOLE			
D S CAT NUMBER		DRAWING NUMBER 150-37-120-12									



DRAWING NUMBER

150-37-128

▽3 (▽)

**EXPLANATORY NOTE:-**

**MATERIAL QUOTED:- STEEL 45 GOST 1051-73.**

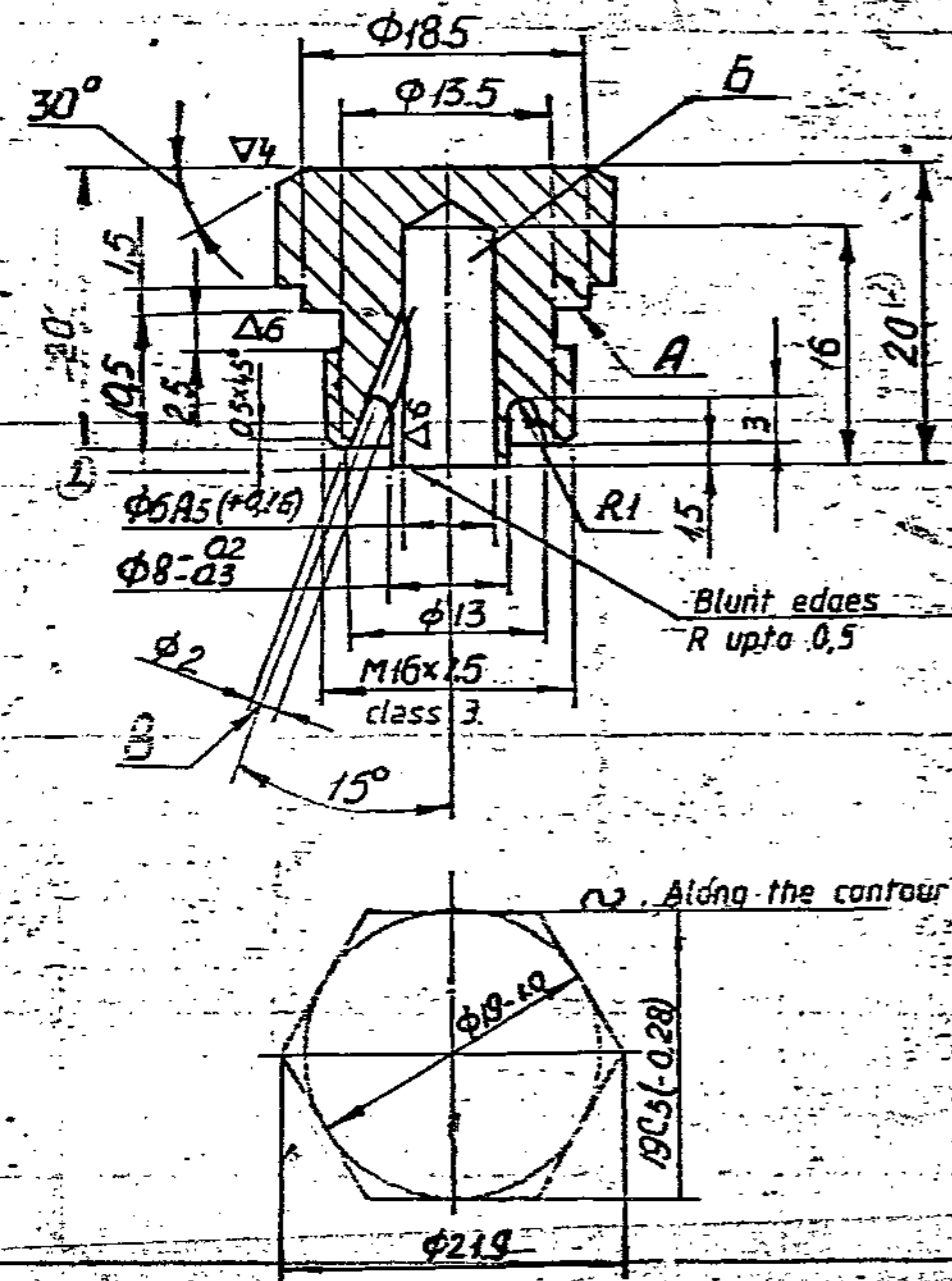
**ALTERNATE MATERIAL QUOTED:- STEEL 30, 40, 50, 20Г, 40Г AS PER GOST 1051-73.**

20Г & 40Г ARE CALLED GRADES OF MAGNESIUM STEEL AS PER CHEMICAL COMPOSITION: GOST 4543-71

GRADE OF STEEL	CONTENT OF ELEMENTS %							
	C	Si	Mn	Cr	P	S	Cu	Ni
30	0.27-0.35	0.17-0.37	0.50-0.80	0.25	0.035	0.040	0.25	0.25
40	0.37-0.45	0.17-0.37	0.50-0.80	0.25	0.035	0.040	0.25	0.25
45	0.42-0.50	0.17-0.37	0.50-0.80	0.25	0.040	0.035	0.25	0.25
50	0.47-0.55	0.17-0.37	0.50-0.80	0.25	0.040	0.035	0.25	0.25
20Г	0.17-0.24	0.17-0.37	0.70-1.00	0.30	0.035	0.033	0.30	0.30
40Г	0.37-0.45	0.17-0.37	0.70-1.00	0.30	0.035	0.033	0.30	0.30

**MECHANICAL PROPERTIES:- (AS PER GOST 1050-74 & GOST 4543-71)**

GRADE OF STEEL	TENSILE STRENGTH	YIELD POINT	ELONGATION	REDUCTION	IMPACT
	Kgf/mm <sup>2</sup>	Kgf/mm <sup>2</sup>	%	IN AREA %	STRENGTH Kgf.m/cm <sup>2</sup>
MINIMUM					
30	50	30	21	50	8
40	58	34	19	45	6
45	61	36	16	40	5
50	61	38	14	40	4
20Г	46	28	24	50	-
40Г	60	36	17	45	6



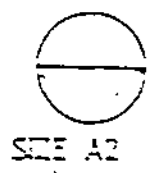
- 1) The part may be made from steel of grades 40, 50, 30Г20, 40Г as per GOST 1051-73.
- 2) Cadmium plating, 9 microns thick, chromated. Carry-out cadmium plating as per TI 5.038-77.
- 3) Displacement of axis of holes B with respect to axis of threads should not exceed 0.2 mm.
- 4) Non-squareness of surface A to the axis of thread should not exceed 0.1 mm over 18.0.
- 5) Burrs are not allowed on edges of hole B.
- 6) Scales and burrs are not allowed on thread.
- 7) Calibrate the thread after cadmium plating.
- 8) Technical requirements for manufacturing the part are as per TT 35.002-77.
- 9) Non-parallelity of axes of holes B with respect to axis of thread should not exceed 0.1 mm over length 30 mm.

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

EST. WT. 0.070 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.

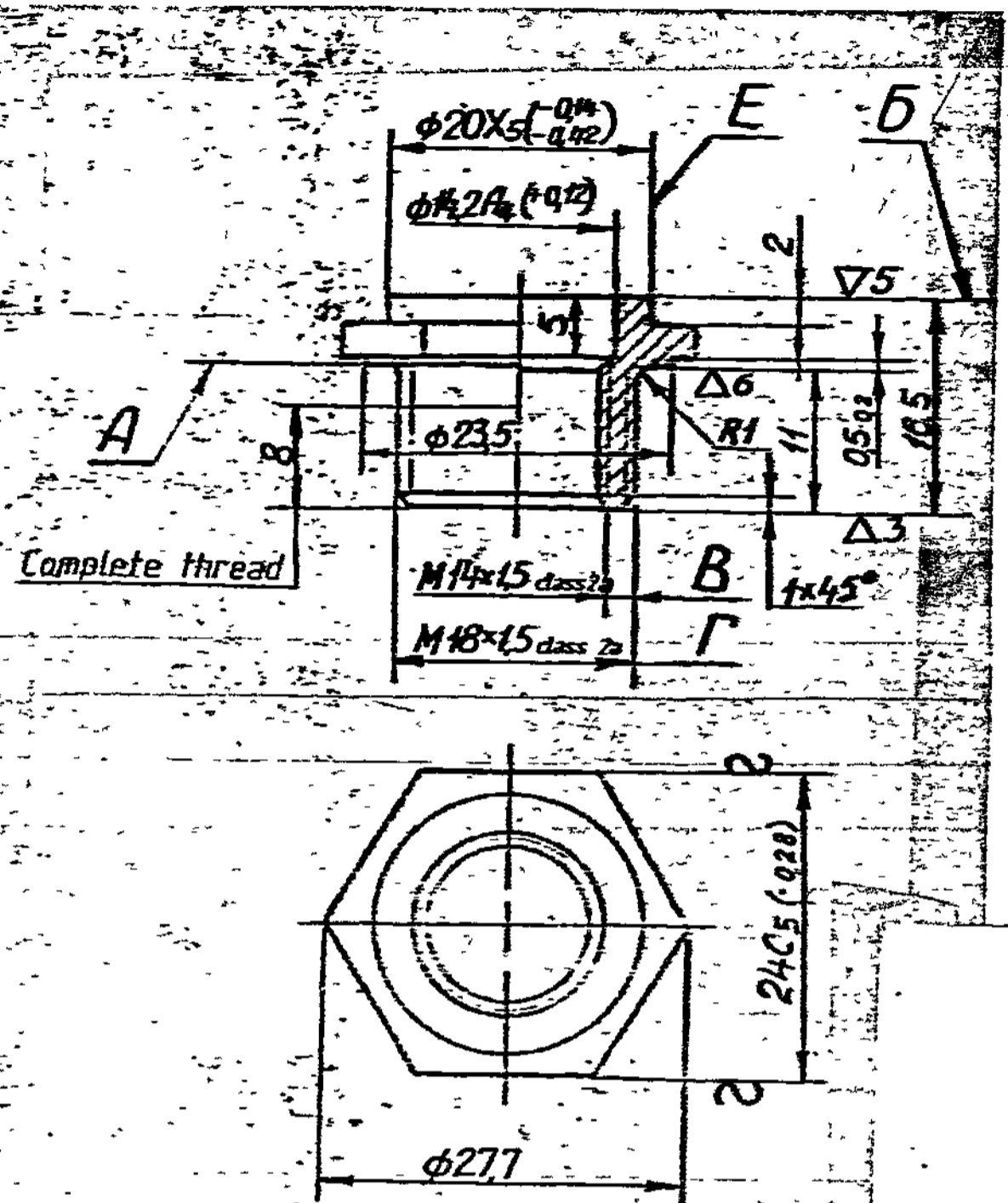
DRN	APPROVED	MATERIAL	STEEL 45	USED ON	20-150-37-000-106
CHKD	CHKD	GOST	1051-73	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)	
TCD	APPD	DATE	17-2-87	A V A D I	
SCALE		DIMENSIONS IN mm			
SCALE		TOLERANCE ON DIMS UNLESS OTHERWISE STATED IS 2102-69			
SCALE		TITLE		PLUG FOR VALVE HOLE	
SCALE		D S CAT NUMBER		DRAWING NUMBER	
SCALE		D S CAT NUMBER		150-37-128	
SCALE		ISSUE   DATE   NATURE OF AMENDMENTS			





DRAWING NUMBER  
150-37-150-1

▽4 (▽)



**EXPLANATORY NOTE :**

8) MATERIAL QUOTED - HEXAGONAL BAR 24-5 GOST 7417-75  
45-5 GOST 1051-73

ALTERNATE MATERIAL QUOTED : STEEL 40, 50 GOST 1050-74.

CONVENTIONAL DESIGNATION OF SIZED STEEL 45

ACROSS FLATS = 24mm - ACCURACY CLASS = 5.

a) CHEMICAL COMPOSITION :

ELEMENTS	Gde 45	Gde 40	Gde 50
CARBON	0.42 - 0.50	0.37 - 0.45	0.47 - 0.55
SILICON	0.17 - 0.37	0.17 - 0.37	0.17 - 0.37
MANGANESE	0.50 - 0.80	0.50 - 0.80	0.50 - 0.80
CHROMIUM	0.25 max	0.25 max	0.25 max
SULPHUR	0.04 max	0.04 max	0.04 max
PHOSPHORUS	0.035 max	0.035 max	0.035 max

b) MECHANICAL PROPERTIES :

	Gde 45	Gde 40	Gde 50
YIELD POINT Kgf/mm <sup>2</sup> min	36	34	38
ULTIMATE TENSILE STRENGTH Kgf/mm <sup>2</sup> min	61	58	61
% ELONGATION min	16	19	14
% REDUCTION OF AREA min	40	45	40
IMPACT STRENGTH Kgf/cm <sup>2</sup>	5	6	4

- 1) Bushing is made from steel of grade 40, 50 GOST 1050-74
- 2) Perform cadmium plating followed by chromization cadmium plated, 9 microns thick, chromized Coating may be absent on internal surfaces, carry-out cadmium plating as per TI 5-038-77. Calibrate the thread after cadmium plating.
- 3) End play of surface A with respect to axis of thread Γ should not exceed 0,08 mm, over 23,0 mm.
- 4) End play of surface B, with respect to axis of thread B, should not exceed 0,1 mm, over 19,0 mm.
- 5) Run-out of surface E, with respect to axis of thread B, should not exceed 0,1 mm.
- 6) Bushing may be made from round bar 27,0 two flats for wrench S = 24 are provided.
- 7) Technical requirements to manufacture part "a" are as per TI 35.002-77.

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

EST. WT. 0,016 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

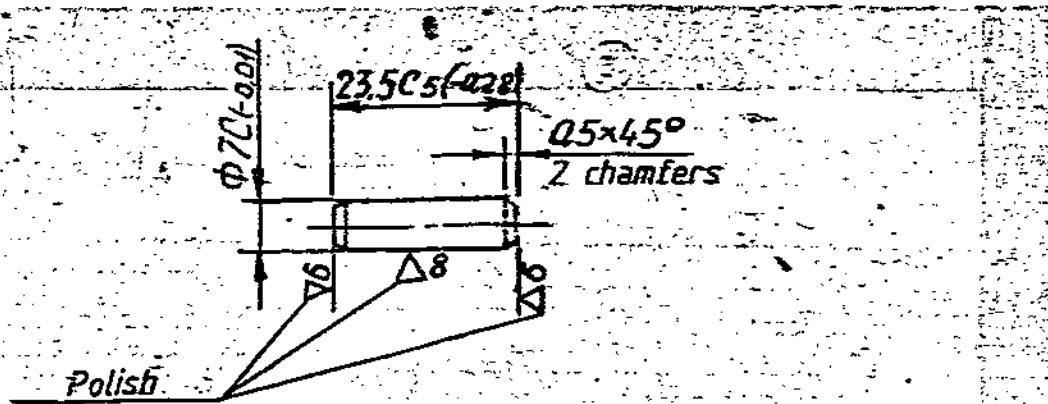
DRN	CHD	TCD	APPO	DATE	SCALE	DIMENSIONS IN mm	TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2102-69	ISSUE	DATE	NATURE OF AMENDMENTS
				17-02-87	- 2 1					
MATERIAL - 24-5 GOST 7417-75 HEXAGONAL BAR 45-5 GOST 1051-73						USED ON - 20-150-37-000 - 106		CONTROLLERATE OF QUALITY ASSURANCE HEAVY VEHICLES) A V A O .		
							TITLE		BUSHING	
							D S CAT NUMBER		DRAWING NUMBER	
									150-37-150-1	







DRAWING NUMBER  
337-37-103-1



- 1) The finished article is carburised all over to depth 0,5 to 0,9 mm.
- 2) Hardness HRC 56 to 62.
- 3) Roller may be made from steel of grade 10 as per GOST 1050-74.
- 4) Technical requirements for manufacturing of part are as per TT 35.002.77.
- 5) Inspection group III is as per technical requirements TY 35.002-76.

EXPLANATORY NOTE :-

MATERIAL QUOTED:- STEEL 15 GOST 1050-74

CHEMICAL COMPOSITION:

CONTENT OF ELEMENTS %							
C	Si	Mn	Cr	P	S	Cu	Ni
MAXIMUM							
0.12 - 0.19	0.17 - 0.37	0.35 - 0.65	0.15	0.035	0.040	0.25	0.25

MECHANICAL PROPERTIES:-

TENSILE STRENGTH	YIELD POINT	ELONGATION	REDUCTION IN AREA
Kgf/mm <sup>2</sup>	Kgf/mm <sup>2</sup>	%	%
MINIMUM			
38	23	27	55

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.

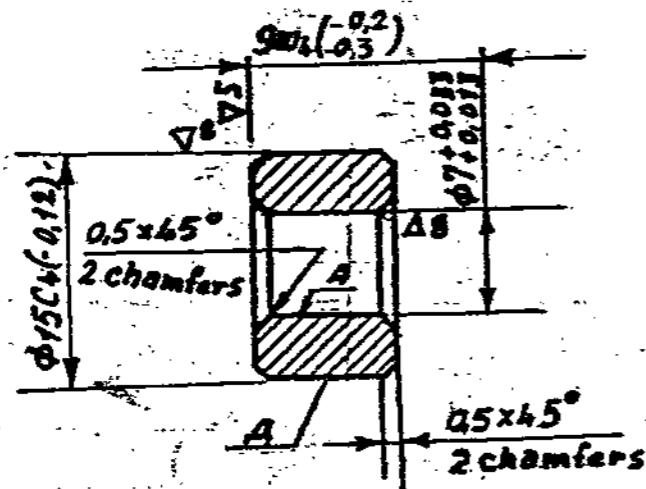
DRN	<i>Shankar</i>	MATERIAL:- STEEL 15	USED ON
CHD	<i>Shankar</i>	GOST. 1050-74	20-151-37-000-105
TCD	<i>Shankar</i>	CONTROLLERATE OF QUALITY ASSURANCE(HEAVY VEHICLES)	
APPD	<i>Shankar</i>	AVADI	
DATE	17-2-87	TITLE	
SCALE:-	1:1	ROLLER AXLE	
DIMENSIONS IN mm		D S CAT NUMBER	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS:2102-69		DRAWING NUMBER	
ALL THREADS TO CONFORM TO		337-37-103-1	
ISSUE DATE	NATURE OF AMENDMENTS		



IZE A3



DRAWING NUMBER  
337-37-104-1



- 1) Harden to obtain hardness HRC 58 to 64.
- 2) Run-out of surface A, with respect to axis of hole A, should not exceed 0,05 mm.
- 3) End-play, with respect to surface A should not exceed 0,15 mm, over  $\phi 14.0$  mm.
- 4) Technical requirements to manufacture part, are as per TT 33.002-77.
- 5) Inspection group III as per Technical specifications TY 35.002-76.

**EXPLANATORY NOTE:**

MATERIAL QUOTED: STEEL  $\psi$ X 15 GOST 801-78

BALL BEARING STEEL WITH CHROMIUM (X) CONTENT 1.5 % BY WEIGHT.

**CHEMICAL COMPOSITION %**

CARBON	0.95	-	1.05
SILICON	0.17	-	0.37
MANGANESE	0.20	-	0.40
CHROMIUM	1.30	-	1.65
SULPHUR	0.02	(max)	
PHOSPHOROUS	0.027	(max)	
NICKEL	0.30	(max)	
COPPER	0.25	(max)	
NICKEL & COPPER	0.50	(max)	

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

EST. WT. 0.0010 Kg TO BE STAMPED OR MARKED WHERE INDICATED THUS  $\#$  ( LETTERS)

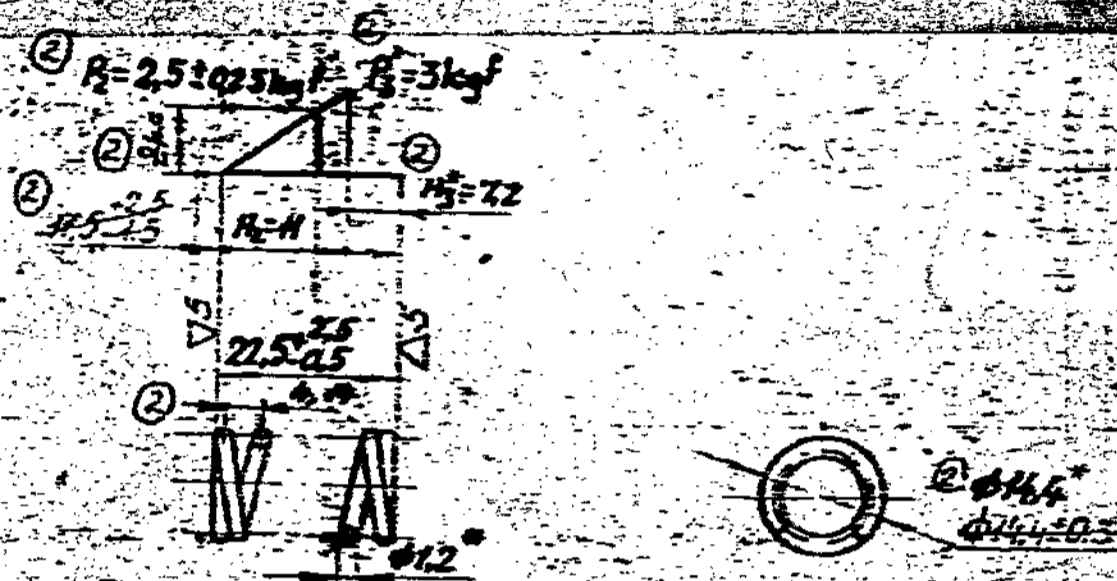
ALL SHARP EDGES AND CORNERS TO BE REMOVED UNLESS OTHERWISE STATED MACHINED CORNERS TO HAVE R OUT SIDE. INSIDE EQUIVALENT CHAMFERS ARE PERMISSIBLE.

DRN	<i>F. Babiker</i>	MATERIAL:-	USED ON
CHK	<i>By R. Babiker</i>	STEEL $\psi$ X15	20-150-37-000-1 Cb
TCO	<i>G. Babiker</i>	GOST 801-78	
APPD	<i>Z. Babiker</i>	CONTROLLERATE OF QUALITY ASSURANCE(HEAVY VEHICLES)	
DATE	17-02-87	AVADI	
SCALE:-	2 : 1		
DIMENSIONS IN mm		TITLE	TAPPET ROLLER
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS:2102-69			
ALL THREADS TO CONFORM TO.		D S CAT NUMBER	DRAWING NUMBER
ISSUE DATE			337-37-104-1
NATURE OF AMENDMENTS			



SIZE A3





Section of developed end of spring

Scale 5:1

- 1) Number of working turns  $n = 5$ .
- 2) Number of complete turns  $n_1 = 7.0^{+0.2}_{-0.5}$ .
- 3) Coiling direction of spring is left hand.
- 4) Total length of spring  $L = 295$  mm.
- 5) Bearing surfaces of extreme turns should be atleast 0.85 of the turn circumference.
- 6) Non-squareness of the ground end surfaces with respect to the axis of spring should not exceed 0.3 over the length of spring.
- 19) Tangential twisting stress (maximum)  
 $T_{3*} = 0.058$  MPa (58 kgf/mm<sup>2</sup>).

- 7) Irregularity of pitch in free state is  $\pm 0.4$  mm.
- 8) Clearance between the compressed turns should not exceed 0.2 mm, over length 34.0 mm,  $\pm 1.0$  circumference of turn.
- 9) Carry-out technological compression upto the length of  $l$  compressed = 9 dynamic compression is allowed instead of static compression, two hundred compression cycles for 4 minutes to obtain length  $l$  compressed.
- 10) Check the part of magnetic flaw detector.
- 11) Galvanize as per instructions TN 5.037-77. Remove hydrogen embrittlement.
- 12) Subject the surface of each spring to surface cold working by shots in compliance with the standard.
- 13) Other technical specifications acceptance rules, Testing marking, preservation, storage and packing of springs are as per OST 5.9539-72.
- 14) The spring is referred to group I as to its operation conditions and class 2 as to its manufacturing accuracy.
- 15) Blunt sharp edges of spring ends.
- 16) \*Dimensions and parameters are given for reference.
- 17) Shear modulus  $G^* = 8$  MPa (8.10<sup>3</sup> kgf/mm<sup>2</sup>).
- 18) Modulus of elasticity  $E^* = 2.1$  MPa (2.1.10<sup>5</sup> kgf/mm<sup>2</sup>).

**EXPLANATORY NOTE:-**

MATERIAL QUOTED:- WIRE II - 1.2 GOST 9389-75.

CARBON STEEL COLD DRAWN WIRE, II - CATEGORY, DIA 1.2 mm WITH NORMAL ACCURACY OF TOLERANCE  $\pm 0.020$  TO EITHER GRADES KT-72 OR SK-7.

(a) CHEMICAL COMPOSITION :

GRADE OF STEEL	CONTENT OF ELEMENTS %						
	C	Mn	P	S	Cr	Ni	Cu
KT-2	0.86-0.91	0.17-0.37	0.020	0.020	0.05	0.05	0.10
SK-7	0.68-0.76	0.17-0.37	0.030	0.030	0.05	0.05	0.04

MECHANICAL PROPERTIES:-

- TENSILE STRENGTH - 180 - 205 Kgf/mm<sup>2</sup>
- No. OF BENDS (min) - 9
- No. OF TWISTS (min) - 16

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

EST. WT. 0.002Kg 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	G. N. S. S.	MATERIAL :- WIRE II 1.2	USED ON :-
CHD	G. N. S. S.	GOST 9389 -75	20-150-37-000-1CB
TCO	G. N. S. S.	CONTROLLERATE OF QUALITY ASSURANCE (HEAVY VEHICLES)	
APPD		A V A D I	
DATE	17-2-87	TITLE	
SCALE	1:1	TAPPET SPRING	
DIMENSIONS IN mm.		D S CAT NUMBER	
TOLERANCE ON DIMNS UNLESS OTHERWISE STATED IS 2:02-59		DRAWING NUMBER	
ALL THREADS TO CONFORM TO		337-37-105-1	
ISSUE	DATE	NATURE OF AMENDMENTS	

1. *Introduction*

2. *Methodology*

3. *Results*

4. *Discussion*

5. *Conclusion*

6. *References*

7. *Appendix*

8. *Tables*

9. *Figures*

10. *Supplementary Materials*

11. *Author Biographies*

12. *Index*

13. *Subject Index*