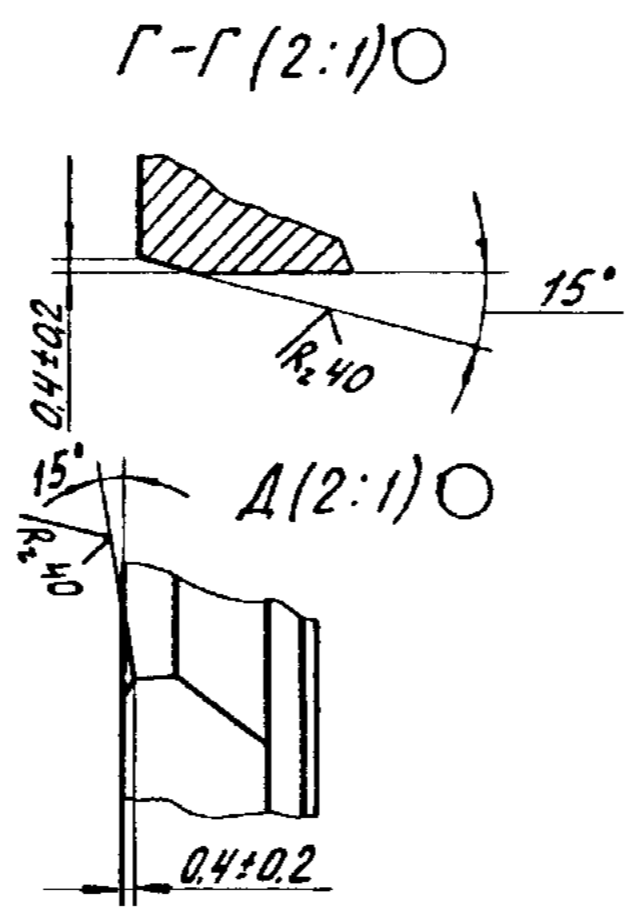
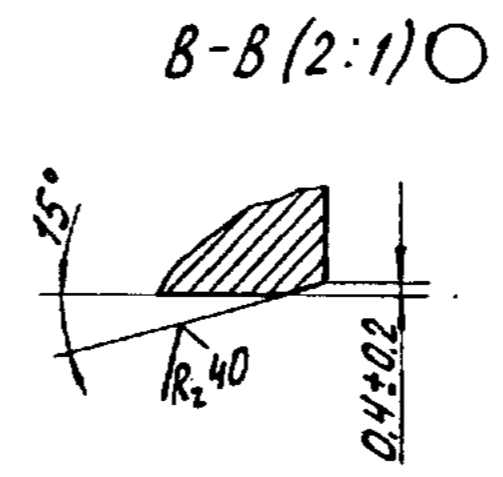
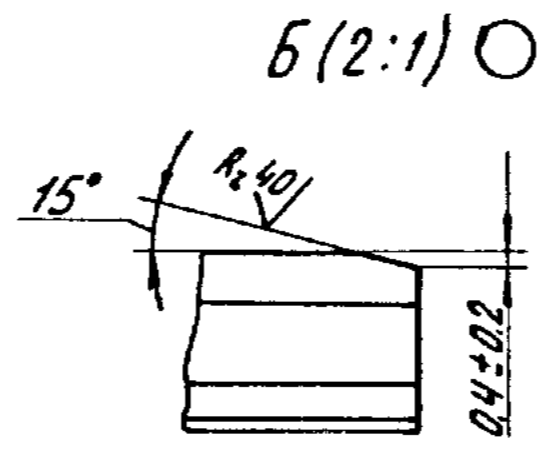
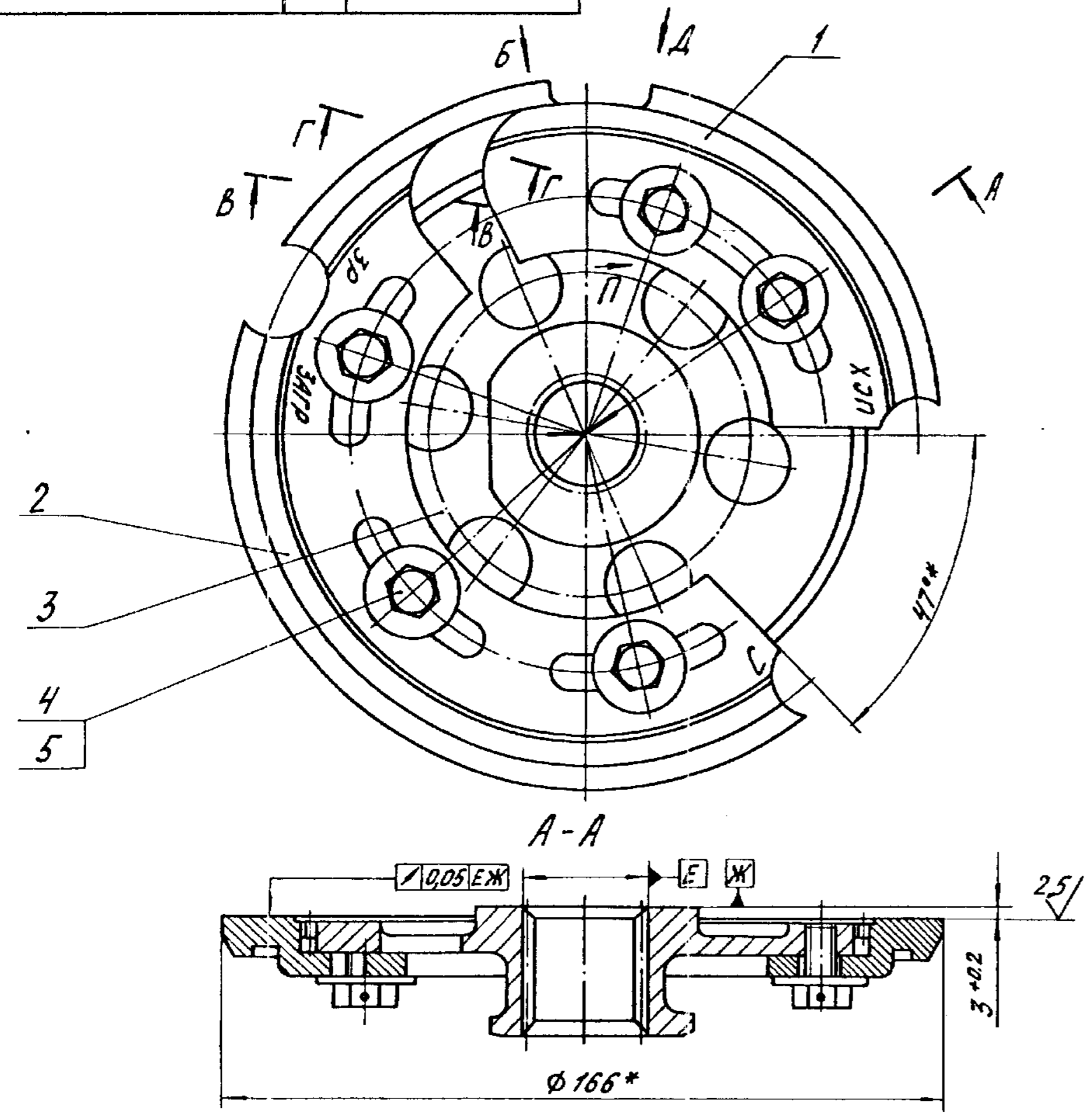


188.28.004sbSB

Перо примен.  
Спроб. №  
Подп. и дата  
Взам инв. № Инв. № дудл.  
Подп. и дата  
Инв. № подл.



1. Сектора стопорные поз. 1 и 2 подавать комплектно.
2. Покрытие : Хим. Фос. окс. или Хим. Фос. окс. прм.
3. Надписи : УСХ, С, ЗР, ЗАГР залить, а стрелку и букву П нанести эмалью ПФ-115 белой или ПФ-223 белой 02 шрифтом П0-5 ГОСТ 2930-62.
- Требования по 520.ТЧ5.
- 4.\*Размеры для справок.
5. Остальные требования по 520.ТЧ1.

1. Locking Sector item 1 and 2 to be supplied as complete set.
2. Coating : Chemical Phosphated - Oxidised or Chemical . Phosphated, Oxidised oiled.
3. Inscriptions : USX , C , ЗР , ЗАГР to be filled, pointer and letter П should be applied with white enamel ПФ- 115 or white ПФ- 223 02 with type П0.5 as per GOST 2930-62. Requirements as per 520.TY5.
4. \* Dimensions for reference
5. Other requirements as per 520.TY1.

			188.28.004sbSB			Sup. Code	Fold. No.	Sl.no.
			LOCKING DISK			U-01-1-4	97	7
			ASSEMBLY DRAWING			Weight (kgs)	Scale	
						1.33	1:1	
						Page	Page total	
							1	
ISSUE SHEET	REFERENCE		HEAVY VEHICLES FACTORY AVADI					
APPROVED								
CHECKED								
DRAWN								

Копировал

Формат А4 х 3

Size	Area	Item No.	Part no.	Nomenclature	QTY	Remarks
				<u>DOCUMENTATION</u>		
			188.28.004sbSB	ASSEMBLY DRAWING		
				<u>PARTS</u>		
		1	175.28.001-2	SECTOR, RETAINING	1	
		2	175.28.002-1	SECTOR, RETAINING	1	
		3	175.28.003-2	DISC, RETAINING	1	
				<u>STANDARD ITEMS</u>		
		5		WASHER C.8.01.016		
				GOST 11371-78	5	
		4		BOLT		
				3M8X1-6gx14.88.38xc-		
				016 GOST 7808-70	5	

188.28.004sb

ISSUE	SHEET	REFERENCE
APPROVED		
CHECKED		
DRAWN		

DISC, RETAINING

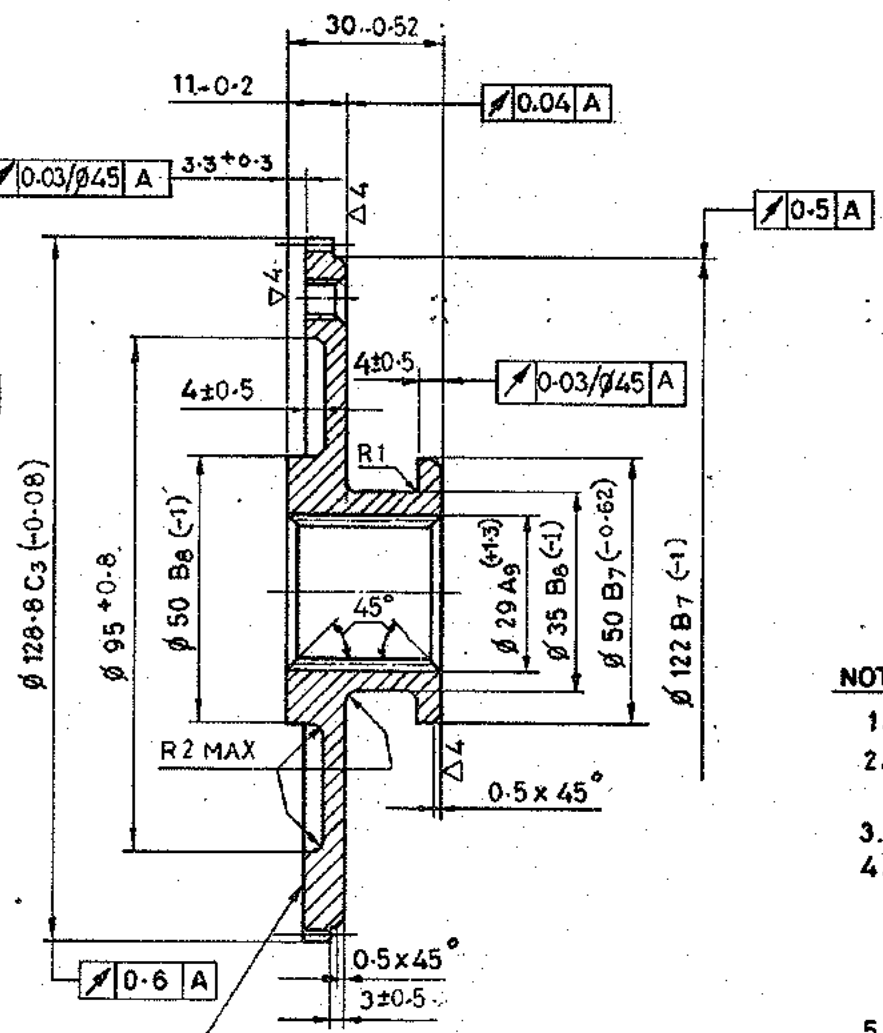
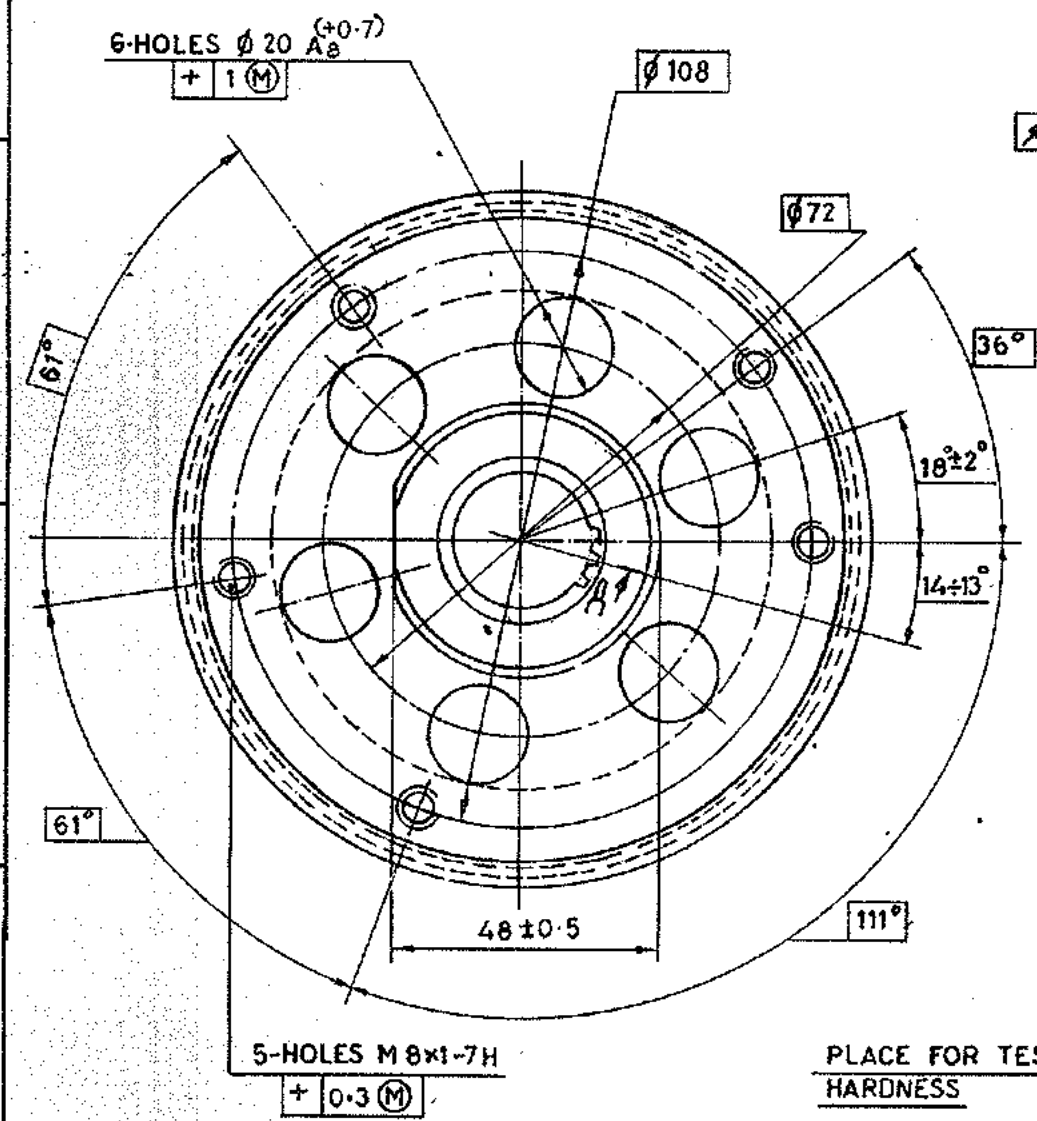
PAGE	PAGE TOTAL
1	2
F/SI No 97/08	

### SHEET FOR RECORDING AMENDMENT

Issue NO	No of sheets/pages				Total No. of sheets/pages in the document	Document No	Entry No. of accompanying Doc. & Date	Signature	Date
	Amended	Replaced	Newly introduced	Deleted					
					<b>188.28.004sb</b>			PAGE	
ISSUE	SHEET	REFERENCE						2	

D S CAT No.  
1015-002979

▽3 (▽)

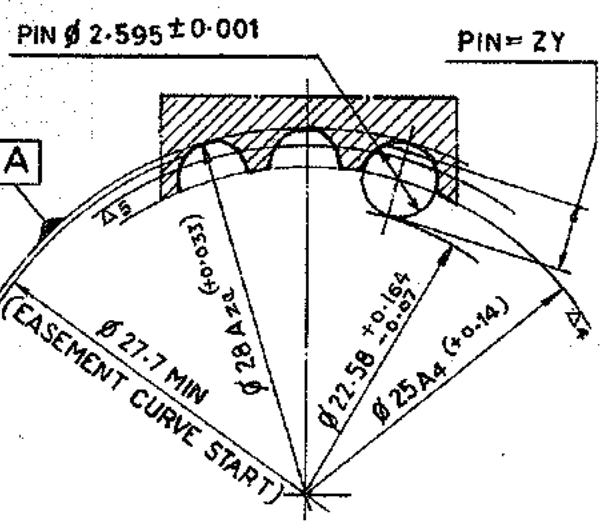


		9628×1.5×18A3450		MODULE		m	0.7
MODULE		m	1.5	NUMBER OF TEETH		Z	182
INITIAL PARAMETERS	NUMBER OF TEETH	Z	18	BASIC RACK	ANGLE OF PROFILE	α	20°
	PROFILE ANGLE	α	30		COEFFICIENT OF ADDENDUM	f'	1
	ADDENDUM MODIFICATION SHIFT	ε	-0.25		COEFFICIENT OF DEDUNDUM	f''	1.25
	TOOTH SPACE WIDTH ALONG THE ARC OF REFERENCE CIRCLE		-0.07 2.067 -0.03		FILLET RADIUS	r <sub>L</sub>	0.3
	ADDENDUM MODIFICATION COEFFICIENT	ε	0		BASE TANGENT LENGTH	L	-0.084 44.15 -0.135
TOLERANCE OF BASE TANGENT LENGTH		6σ <sub>L</sub>	0.045	REFERENCE DIAMETER		A	127.4
DRAWING NUMBER OF MATING COMPONENT				DRAWING NUMBER OF MATING COMPONENT		175.28.001-2 175.28.001-1	

NOTES :-

- BHN 302-255 (INDENTATION DIA 3.5-3.8)
- THREADED HOLES ARE TO BE COUNTER SUNK AT AN ANGLE OF 120° UP TO THREAD MAJOR DIAMETER.
- POSITION OF FLAT IN RELATION TO THE HOLES IS ARBITRARY.
- NOTCH 'A' -0.5 +0.25 mm WIDE 0.5 +0.25 mm DEEP OF AN ARBITRARY PROFILE, IS TO BE MADE AGAINST THE SPLINE, WHICH IS LOCATED 14 IN RELATION TO THE THREADED HOLE. BULGING OF METAL NEAR THE NOTCH IS NOT ALLOWED.
- COATING :- CHEMICAL OXIDISING, OIL FINISHING, OR CHEMICAL OXIDISING/ PHOSPHATING, OIL FINISHING.
- SPLINES ARE TO BE CHECKED FOR INTERCHANGEABILITY WITH COMPLEX GAUGE.
- TEETH ARE TO BE CHECKED WITH COMPLEX GAUGE OR WITH MATING COMPONENT.

INSPECTION NOTE :- FOR LIST OF GAUGES AND FIXTURE REFER GAUGE SHEET No. 9S(W)-10135, SHT 1 & SHT 2.



CONTOUR OF SPLINES

जांची गई सही प्रति  
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SEALED DRAWING AS ON

23/12

इसे नियंत्रक, गुणवत्ता  
FOR CONTROLLER OF QUALITY  
आश्वासन (क वा आ) आवदि बन्ने 54  
ASSURANCE (AVA) AVADI, CHENNAI. 54

22/10/03	18814-W	HINDI NOMEN ADDED	
7/5/03	18759-W	INSPECTION NOTE ADDED.	
23/9/02		RETRACED WITHOUT CHANGE	
DATE		AUTHORITY	ZONE
DRG SEALED :- 16476-W		22-10-86	
AMENDMENTS		D O CQA(W)	

DRN :-	CHD :-	ASSY DRG :-
TCD :- RD Baroj	CHD :-	DATE :- 4-1-86
G.P. Shinde	AHSP	SCALE :- 1:1
CHIEF D'MAN	D O FOR CQA W	ESTD MASS :- 0-65
MATERIAL :- STEEL 38×C, GOST 4543-71		DESIGN No.
PROTECTIVE FINISH :-		PART No.

GROUP No. F-128  
40001 KA 3

CQA(AVA) AVADI

DATE :- 4-1-86

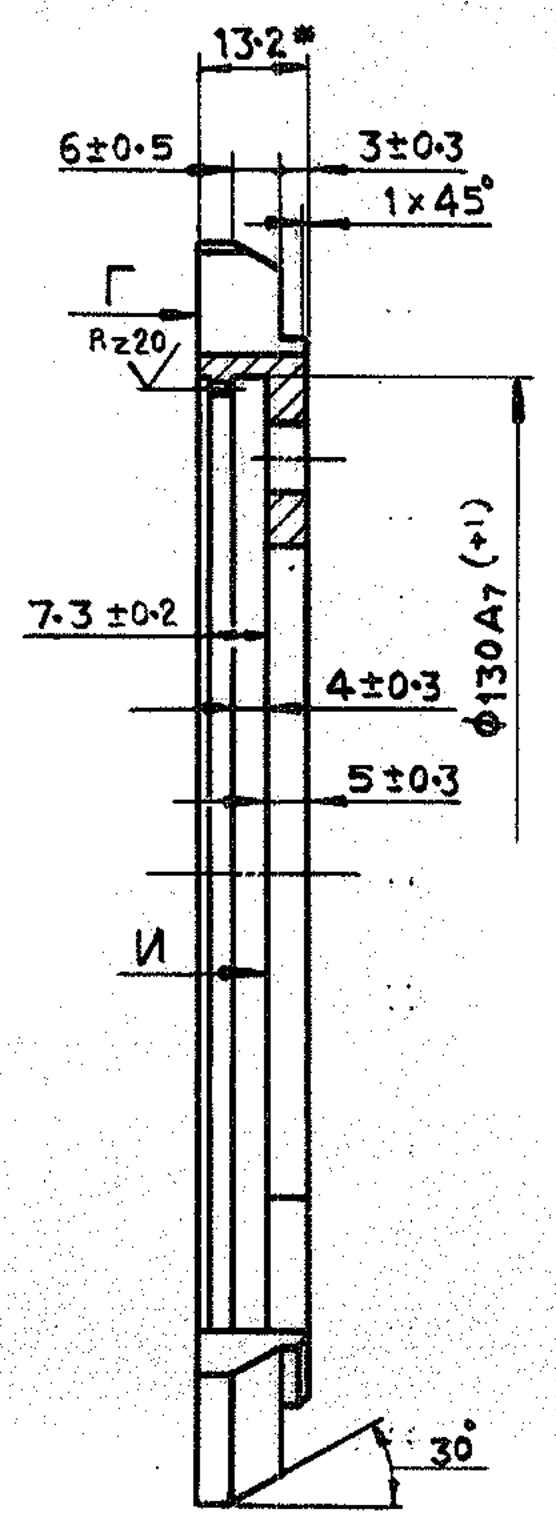
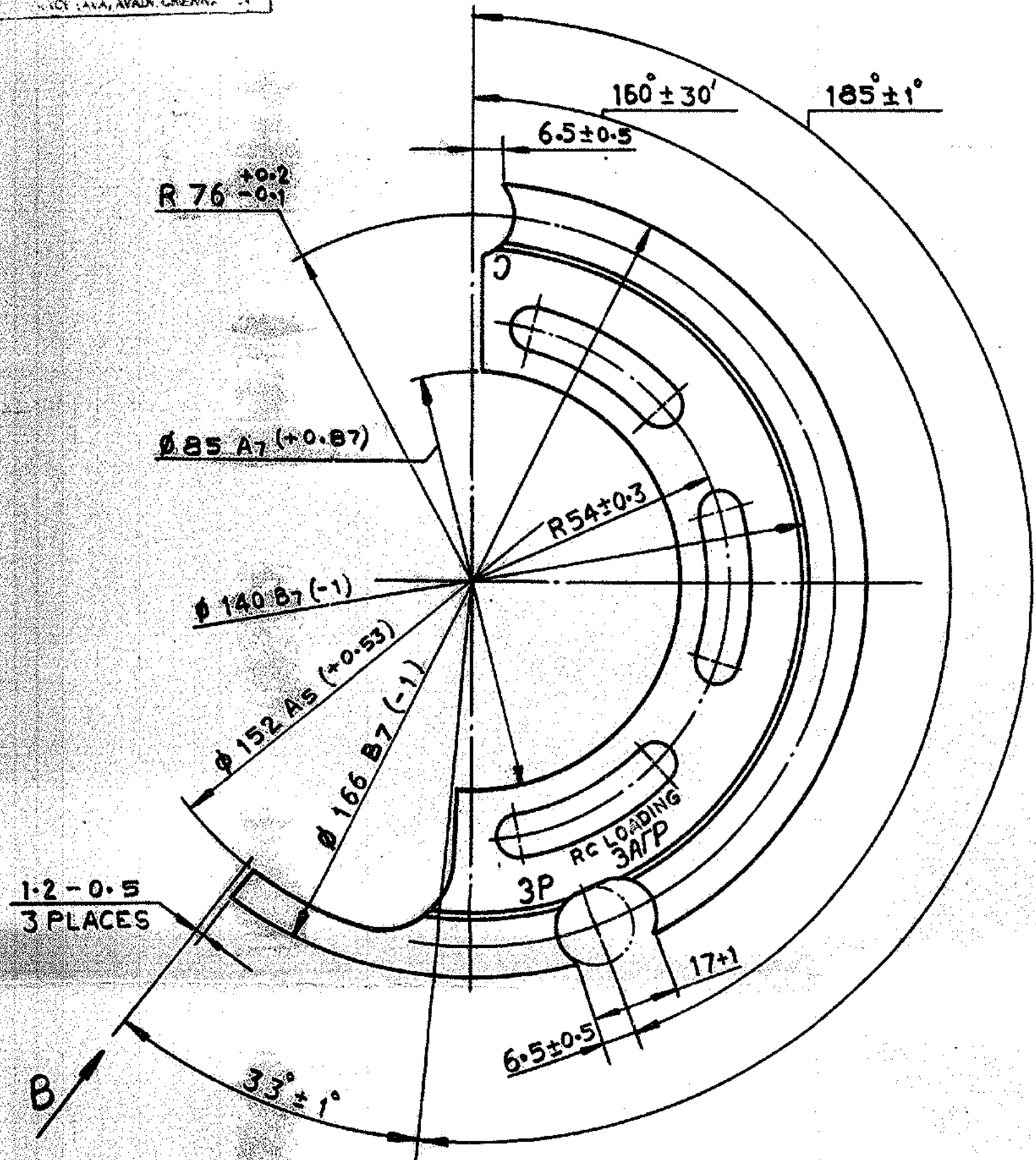
SCALE :- 1:1

ESTD MASS :- 0-65

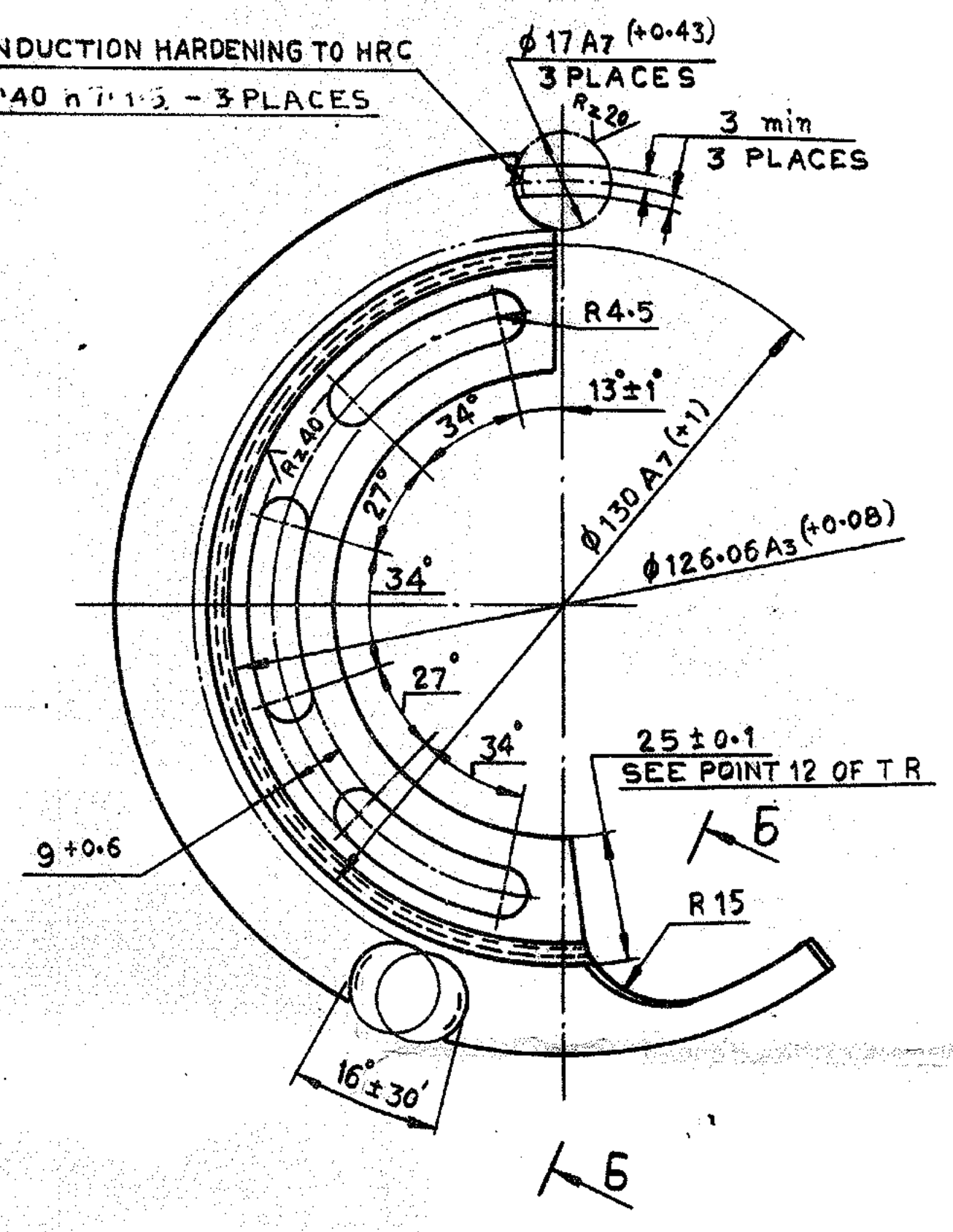
LOCKING DISC लॉकिंग डिस्क

PART No.  
175.28.003-2  
D S CAT No.  
1015-002979

सर्वोत्तम गुणवत्ता  
CERTIFIED CORRESPONDENCE OF  
सर्वोत्तम गुणवत्ता  
QUALITY  
सर्वोत्तम गुणवत्ता  
QUALITY  
सर्वोत्तम गुणवत्ता  
QUALITY



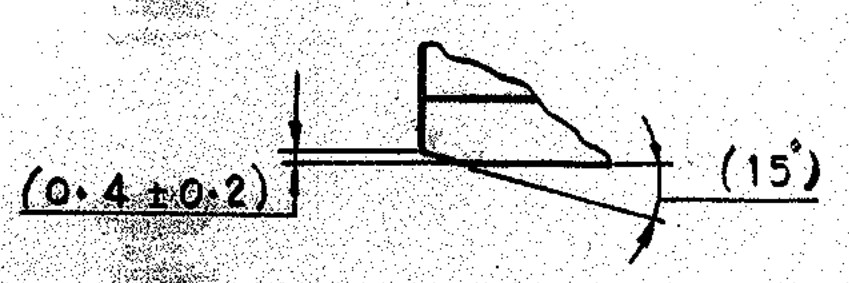
INDUCTION HARDENING TO HRC  
 7.40 n 7.1.5 - 3 PLACES



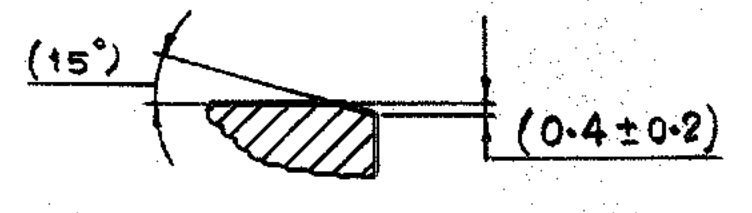
MODULE	m	0.7	
NUMBER OF TEETH	Z	182	
BASIC RACK	PROFILE ANGLE	$\alpha$	$20^\circ$
	COEFFICIENT OF ADDENDUM OF DEDENDUM	$f'$	1
$f''$		1.25	
FILLET RADIUS	(r)	0.3	
ADDENDUM MODIFICATION COEFFICIENT	$\epsilon$	0	
BASE TANGENT LENGTH	$\delta$	$44.15^{+0.135}_{-0.084}$	
TOLERANCES ON BASE TANGENT LENGTH	$\delta_0$	0.045	
REFERENCE DIAMETER	A	127.4	
DRAWING NUMBER OF MATING COMPONENT		175.28.003-2	

- NOTES:-
- BHN 415-311 (INDENTATION DIA 3.0-3.45)
  - ISOTHERMAL HARDENING TO BHN 478-388 (INDENTATION DIA 2.8-3.1) IS ALLOWED INSTEAD OF INDUCTION HARDENING.
  - AFTER MACHINING OF SLOT 9 mm, RECESSES UP TO 0.5 mm ARE ALLOWED AT R 4.5.
  - INSCRIPTIONS SHELL; PROPELLANT; RELOADING TO BE MADE WITH TYPE 710-5, GOST 2930-62.
  - THE PRESENT COMPONENT AND COMPONENT 175.28.001-2 ARE TO BE MADE FROM ONE AND THE SAME BLANK. AFTER CUTTING THEY ARE TO BE DELIVERED FOR ASSEMBLY AS A SET.
  - ON SURFACE "C" MACHINING ALLOWANCE IS TO BE PROVIDED.
  - ALONG LINES OF CUTTING, TEETH OF INCOMPLETE PROFILE ARE TO BE REMOVED.
  - TEETH ARE TO BE CHECKED WITH COMPLEX GAUGE.
  - DIMENSIONS IN BRACKETS SHOULD BE INSURED DURING MACHINING AS PER DRAWING 175.28.007 C6-2.
  - ON SURFACE 'W' BEYOND  $\phi 124 \text{ mm}$ , ALLOWED IS A SHOULDER, PROVIDED DIMENSIONS  $7.3 \pm 0.2$ ,  $5 \pm 0.3$  AND  $4 \pm 0.3$  ARE MAINTAINED.
  - RUNOUT OF  $\phi 126.06 A3$  IN RELATION TO SURFACE  $\phi 85$  SHOULD NOT EXCEED 0.06 mm, WHICH IS TO BE CHECKED BEFORE CUTTING AND HEAT-TREATMENT.
  - WHEN MACHINING TO  $\phi 85 A3 (+0.07)$ ,  $\phi 17 A4 (+0.12)$  INSTEAD OF  $\phi 85 A7$ ,  $17 A7$ , IT IS ALLOWED TO CHECK WALL THICKNESS OF  $25 \pm 0.1$  INSTEAD OF  $R 76^{+0.2}_{-0.1}$ .
  - \* DIMENSION FOR REFERENCE.
  - THE REMAINING REQUIREMENTS ARE AS PER B20 TY 1.

ALT MATL :-  
 STEEL, GRADE 317 M-40, B5-970 Pt 1: 1983



VIEW B TURNED  
 SCALE: 2:1



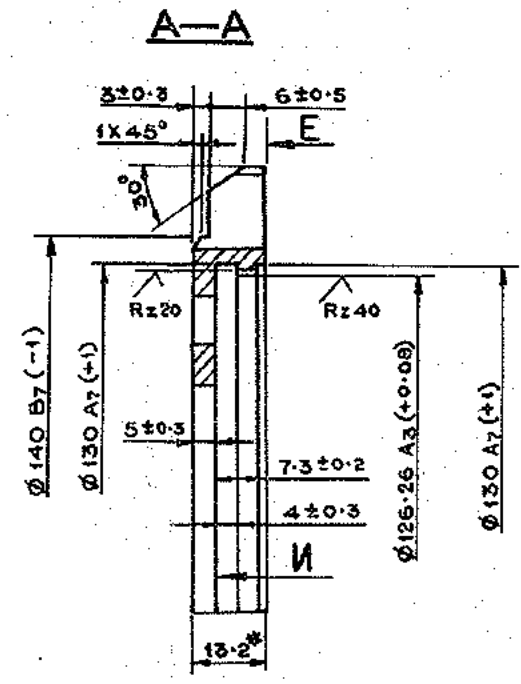
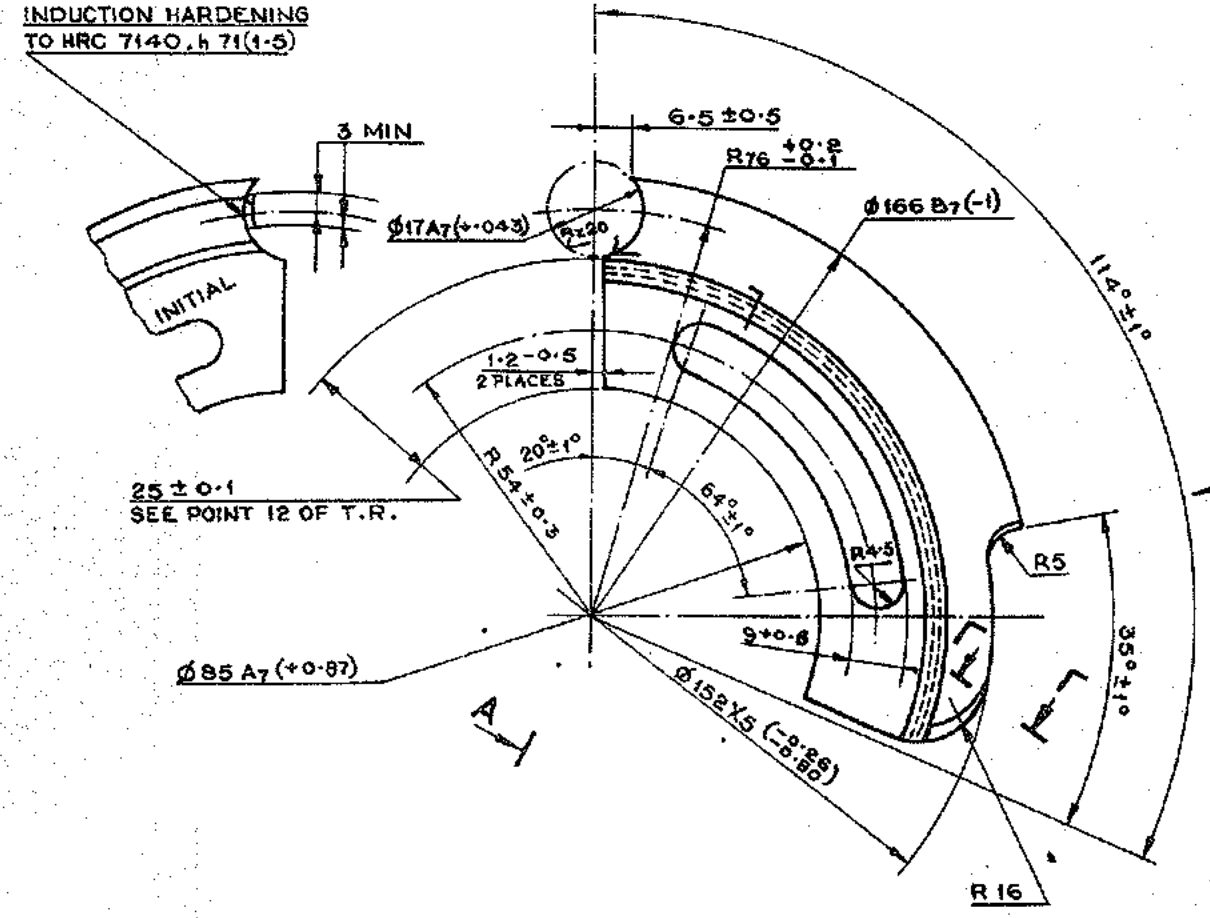
B-B TURNED  
 SCALE 2:1

22.10.03	18814-W	HINDI NOMEN ADDED							GROUP No. F128
5.3.94	17913-W	ALT MATL ADDED.							40001 K A
4.7.91	17088-W	D S CAT No. ADDED							2
21.8.85		RETRACED WITHOUT CHANGE							CQA(AVA) AVADI
DATE	AUTHORITY	ZONE	NATURE	BIG	BIG	DO	DO	DO	SCALE: 1:1
AMENDMENTS			MATERIAL: STEEL 38 XC GOST 4543-71			PROTECTIVE FINISH			ESTD MASS: 0.4
DRG SEALED: D C (I) No. 16476 -W			DATE 22-10-86			DO CQA(W)			DESIGN No.
LOCKING QUADRANT लॉकिंग क्वाड्रेंट									PART No.
									175.28.002-1
									D S CAT No.
									1015-002978

जांची गई सही प्रति  
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 SEALER DRAWING AS ON  
 21/3/12  
 कृते नियंत्रक युग्मता  
 FOR CONTROLLER OF QUALITY  
 आश्रम (फ वा आ) आवडि चेन्नै - 54  
 ASSURANCE (AVA) AVADI CHENNAI 54

MODULE		m	0.7	
NUMBER OF TEETH		Z	182	
BASIC RACK	ANGLE OF PROFILE	$\alpha$	20°	
	COEFFICIENT OF	ADDENDUM	$f'$	1
		DEDENDUM	$f''$	1.25
FILLET RADII		$r_f$	0.3	
ADDENDUM MODIFICATION COEFFICIENT		$\phi$	0	
BASE TANGENT LENGTH		$L$	44.15 <sup>+0.135</sup> -0.084	
TOLERANCE ON BASE TANGENT LENGTH		$\delta L$	0.045	
REFERENCE DIAMETER		$\Phi$	127.4	
DRAWING NUMBER OF THE MATING COMPONENT			175.28.003-2	

**VIEW B**  
 INDUCTION HARDENING  
 TO HRC 7140, h 71(1.5)

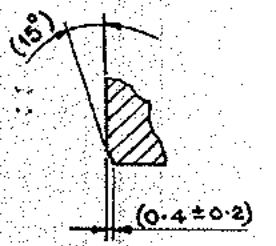


**NOTES:**

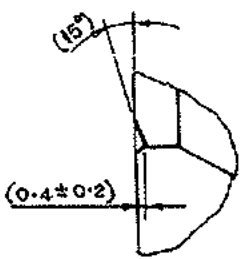
- BHN 415-311 (INDENTATION DIA 3.0-3.45).
- ISOTHERMAL HARDENING TO BHN 475-368 (INDENTATION DIA 2.8 TO 3.1) IS ALLOWED INSTEAD OF INDUCTION HARDENING.
- AFTER MACHINING OF SLOT OF 3mm, RECESSES UP TO 0.5mm ARE ALLOWED AT R 4.5.
- INSCRIPTION "INITIAL" IS TO BE MADE WITH TYPE JI 0.5, GOST 2930-62
- THE PRESENT COMPONENT AND COMPONENT 175.28.002-1 ARE TO BE MADE FROM THE SAME BLANK. AFTER CUTTING THEY ARE TO BE DELIVERED FOR ASSEMBLY AS A SET.
- ON SURFACE 'E', MACHINING ALLOWANCE IS TO BE PROVIDED.
- ALONG CUT LINES, TEETH OF INCOMPLETE PROFILE ARE TO BE REMOVED.
- THE TEETH ARE TO BE CHECKED WITH COMPLEX GAUGE.
- DIMENSIONS IN BRACKETS ARE TO BE ENSURED DURING MACHINING AS PER DRAWING 175.28.007. C6-2.
- ON SURFACE J1 BEYOND Ø 124 mm, SHOULDER IS ALLOWED, PROVIDED DIMENSIONS 7.3±0.2, 5±0.3, 4±0.3 ARE MAINTAINED.
- RUNOUT OF Ø 126.06 A3 IN RELATION TO Ø 85 SHOULD NOT EXCEED 0.06 mm WHICH IS TO BE CHECKED BEFORE CUTTING AND HEAT TREATMENT.
- WHEN MACHINING TO Ø 85 A3(+0.07), Ø 17 A4(+0.12) INSTEAD OF Ø 85 A7, Ø 17 A7, IT IS ALLOWED TO CHECK WALL THICKNESS OF 25±0.1 INSTEAD OF R7±0.1.
- \* DIMENSION FOR REFERENCE.
- THE REMAINING REQUIREMENTS ARE AS PER 520 TY 1.

ALT. MATL:  
 STEEL, GRADE 817 M-40, BS; 970 Pt 1-1983.

**F-F**  
 TURNED  
 SCALE 2:1



**VIEW K**  
 TURNED  
 SCALE 2:1



22-10-83	18814-W	HINDI NOMEN ADDED	
21-9-82		RETRACED WITHOUT CHANGE	
		PREV DC Nos. 16476-W, 17088-W & 17913-W, Dt: 5-3-94	
DATE	AUTHORITY	ZONE	NATURE
AMENDMENTS			
DRG SEALED:		DC No. 16476-W	Dt: 22-10-86
		DO CQA(W)	

DRAWN:	CHD:	ASSY DRG:
TRACED: G.S.N.	CHD: [Signature]	DATE:
G.P. Shetty	AHSP	SCALE: 1:1
C/D' MAN	DO FOR CQA (W)	ESTD man: 0.10
MATERIAL: STEEL 38 X C, GOST 4543-71		
PROTECTIVE FINISH:		

GROUP No.	F128
40001 KA	1
CQA(AVA) AVADI	
DESIGN No.	
PART No.	
175.28.001-2	
DS CAT No.	
1015-002977	

लॉकिंग क्वाड्रेंट LOCKING QUADRANT

191  
GOST

191

MASTER COPY

STATE STANDARD OF THE USSR

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WASHERS

TECHNICAL CONDITIONS

GOST 11371-78

OFFICIAL EDITION

USSR STATE COMMITTEE ON STANDARDS

MOSCOW

*Note: - Do not scribble in the specifications.*

17

## USSR STATE STANDARD

WASHERS

TECHNICAL CONDITIONS

GOST

11371-78

This supercedes

GOST 11371-68

BY ORDER NO. 1674 DATED 26th JUNE 1978 OF THE USSR STATE  
COMMITTEE ON STANDARDS THIS STANDARD IS VALID FROM 01.01.1979  
TO 01.01.1984

~~NONOBSERVANCE OF THIS STANDARD IS PUNISHABLE BY LAW~~

The present standard is applicable to normal washers for fasteners with thread diameter from 1 to 48 mm.

The standard is conformity with the COMECON standards ST SEV 290-76 and ST SEV 281-76 for diameters from 1 to 48 mm and with ST SEV 219-75 in respect of maximum permissible deviations in inside and outside diameters and in respect of noncoaxiality of washers of thickness upto 4 mm and tolerance classes A and C.

## 1. DIMENSIONS

Washer dimensions must conform to the values given in the drawing and Table.

OFFICIAL EDITION

REPRINTING FORBIDDEN

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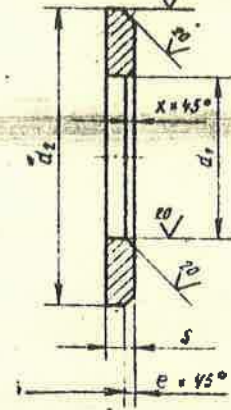
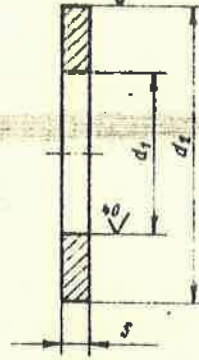
Исполнение 1

Исполнение 2

∇ (∇)

Variant 1

Variant 2



conventional

Example of notational designation of washers for a fastener of variant 1, diameter 12 mm and standard thickness made of material of group 01 with plating type 01 of thickness 9 microns; <sup>ings</sup> <sup>culr</sup>

Washer 12.01.019 GOST 11371-78

Ditto of variant 2

Washer 2.12.01.019 GOST 11371-78

1.2. The following are permitted by mutual agreement between manufacturer and user:

Making washers of other thicknesses;

Using washers with internal diameters 12.5, 14.5 and 16.5 mm

## 2. TECHNICAL REQUIREMENTS

2.1. Washers must be manufactured in conformity with the requirements of the present standard and GOST 18123-72.

2.2. Maximum <sup>L (m) or</sup> permissible deviations in washer dimensions as per ST SEV 144-75 and ST SEV 145-75;

in hole diameter  $d_1$  - follow H14 for variant 1 and H13 for variant 2;

in outside diameter  $d_2$  - follow h14; in <sup>misalignment</sup> noncoaxiality of hole diameter  $d_1$  with respect to outside diameter  $d_2$

$$\text{for } d_2 \leq 50 - \frac{IT15}{2}$$

$$\text{for } d_2 > 50 - \frac{IT16}{2}$$

2.3. The reference annexure lists theoretical weights of washers.

## 3. ACCEPTANCE PROCEDURE

3.1. Acceptance procedure for rough class of accuracy washers follows GOST 17769-72.

## 4. INSPECTION PROCEDURE

4.1. Inspection procedure for washers follows GOST 18123-72.

## 5. PACKING AND MARKING

5.1. Packing of washers and <sup>Package</sup> case markings follow GOST 18160-72.

mm

Thread diameter of fastener <sup>ings</sup>	d <sub>1</sub>	d <sub>2</sub>	s	e		x, not less than
				not <sup>more</sup> greater than	not less than	
1.0	1.1	3.5				
1.2	1.3					
1.4	1.5	4.0	0.3	0.08	0.15	0.15
1.6	1.7					
2.0	2.2	5.0				
2.5	2.7	6.5	0.5	0.13	0.25	0.25
3.0	3.2	7.0				
4.0	4.3	9.0	0.8	0.20	0.40	0.40
5.0	5.3	10.0	1.0	0.25	0.50	0.50
6.0	6.4	12.5	1.6	0.40	0.80	0.80
8.0	8.4	17.0				
10.0	10.5	21.0	2.0	0.50	1.00	1.00
12.0	13.0	24.0				
14.0	15.0	28.0	2.5	0.60	1.25	1.25
16.0	17.0	30.0				
18.0	19.0	34.0				
20.0	21.0	37.0	3.0	0.75	1.50	
22.0	23.0	39.0				1.50
24.0	25.0	44.0				
27.0	28.0	50.0	4.0	1.00	2.00	
30.0	31.0	56.0				
36.0	37.0	66.0	5.0	1.25	2.50	
42.0	43.0	78.0	7.0	1.75	3.50	2.10
48.0	50.0	92.0	8.0	2.00	4.00	2.40

## Notes:

Washers of variant 2 may be manufactured without chamfer but with the edges rounded off to radius e.

Washers of variant 2 may be manufactured without internal chamfer.

Annexure

Reference

## WEIGHTS OF STEEL WASHERS

Thread diameter of fastener mm	Theoretical weight of 1000 nos. in variant <i>in kg</i>		Thread diameter of fastener mm	Theoretical weight of 1000 nos. in variant <i>in kg</i>	
	1	2		1	2
1.0	0.021	0.020	12.0	6.270	5.558
1.2	0.026	0.025	14.0	8.620	7.795
1.4	0.025	0.023	16.0	11.300	10.000
1.6	0.024	0.022	18.0	14.700	13.230
2.0	0.037	0.035	20.0	17.160	15.560
2.5	0.109	0.102	22.0	18.350	16.530
3.0	0.119	0.110	24.0	32.330	29.530
4.0	0.308	0.282	27.0	42.310	39.120
5.0	0.450	0.415	30.0	53.640	50.080
6.0	1.139	0.990	36.0	92.080	86.120
8.0	2.150	1.949	42.0	182.770	169.070
10.0	4.080	3.699	48.0	294.170	273.090

Notes: The weights given in the Table are to be multiplied by the factors given below for determining the weight of washers made out of other materials:

- 0.35 - for aluminium alloy;
- 0.97 - for bronze;
- 1.08 - for brass;
- 1.13 - for copper.

BASE UNITS SI

127

Quantity	Units		
	Name	Abbreviations	
		Russian	International
LENGTH	metre	M	m
MASS	kilogram	k	kg
TIME	second	C	s
ELECTRIC CURRENT	ampere	A	A
Thermodynamic temperature	kelvin	K	K
Amount of substance	mole	Моля	mol
Luminous Intensity	candela	кд	cd

SUPPLEMENTARY UNITS

Plane angle	radian	рад	rad
Solid angle	steradian	ср	sr

DERIVED UNITS SI HAVING PROPRIETARY NAMES

Quantity	Unit	Expressed in derived units			
		Name	Abbreviation	in terms of other units SI	in terms of base units SI
Frequency	hertz	Гц	Hz	-	$s^{-1}$
Force	newton	Н	N	-	$m, kg, s^{-2}$
Pressure	pascal	Па	Pa	N/m <sup>2</sup>	$m^{-2}, kg, s^{-2}$
Energy, work, heat	joule	Дж	J	N.m	$m^2, kg, s^{-2}$
Power, Rate of flow of energy	watt	Вт	W	J/s	$m^2, kg, s^{-3}$
Quantity of electricity, electrical charge	coulomb	Кл	C	A.s	s.A
Electrical voltage, potential difference	volt	В	V	W/A	$m^2, kg, s^{-3}, A^{-1}$
Capacitance	farad	Ф	F	C/V	$m^{-2}, kg^{-1}, s^4, A^2$
Resistance	ohm	Ом	Ω	V/A	$m^2, kg, s^{-3}, A^{-2}$
Conductance	siemens	См	S	A/V	$m^{-2}, kg^{-1}, s^3, A^2$
Magnetic flux	weber	Вб	Wb	V.s	$m^2, kg, s^{-1}, A$
Magnetic flux density	tesla	Тл	T	Wb/m <sup>2</sup>	$kg, s^{-2}, A^{-1}$
Inductance	henry	Гн	H	Wb/A	$m^2, kg, s^{-2}, A^{-2}$
Luminous flux	lumen	лм	lm	-	cd.sr
Brightness	lux	лк	lx	-	$m^{-2}, cd, sr^{-1}$
Nucleid activity	becquerel	Бк	Bq	-	$s^{-1}$
Radiation dose	grey	Гр	Gy	-	$m^2, s^{-2}$

\* The supplementary unit steradian figures in these two expressions along with base units.

GOST: 7808 - 70

HEXAGON BOLT WITH REDUCED HEAD  
(IMPROVED ACCURACY)

CONSTRUCTION & DIMENSIONS.

NOTE:- DO NOT SCRIBBLE IN THE SPECIFICATION.

## USSR STATE STANDARD

Hexagon bolts with reduced head  
(Improved accuracy)  
Construction and Dimensions

GOST  
7808-70  
This supersedes  
GOST 7808-62

Valid from 01-01-1972

1. The present standard relates to hexagon bolts of improved accuracy with reduced head.

The requirements of the C3B recommendations PC 170-70, PC 186-64, PC 309-65, PC 376-65 PC 584-66 and PC 792-67 on standardisation have been taken into account in this standard.

2. Construction and dimensions of bolts must conform to those shown in the drawing and in Tables 1 and 2.

3. Threading is as per CT C 3 B 180-75 and CT C 3 B 182-75 and tolerance zone 8g or 6g as per GOST 16093-81.

4. Bolts with tolerance zone 4 h, 6 e, and 6 d, bolts with head height  $H_1$  in arrangements 1 and 2 and bolts with nominal thread diameter 36 to 48 mm with 2 mm thread pitch may be manufactured by mutual consent between manufacturer and customer.

Clause 2 to 4 (Revised edition, Rev. No.2).

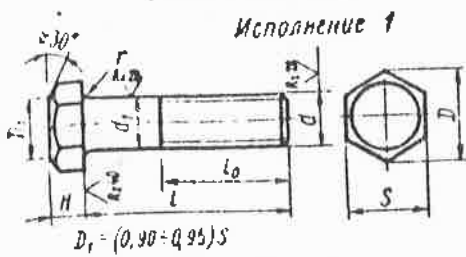
5. The manufacturer decides about the head arrangement.

6. Technical requirements are as per GOST 1759-70.

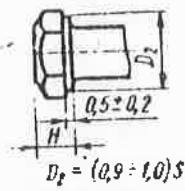
7. (Deleted. Rev.No.2).

8. Weight of bolts is indicated in annexure 1.

**Arrangement 1**

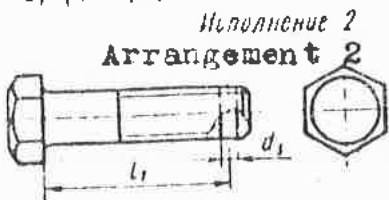


Вариант исполнения головки

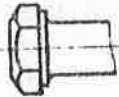


Variant in head arrangement

**Arrangement 2**

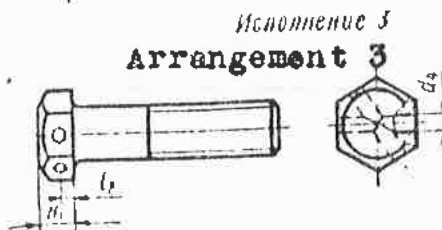


Вариант исполнения головки

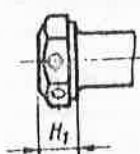


Variant in head arrangement

**Arrangement 3**

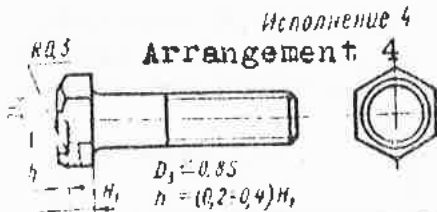


Вариант исполнения головки

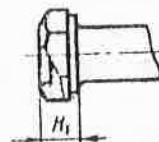


Variant in head arrangement

**Arrangement 4**

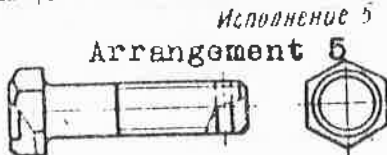


Вариант исполнения головки

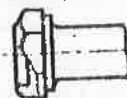


Variant in head arrangement

**Arrangement 5**



Вариант исполнения головки



Variant in head arrangement



Nominal thread diameter d		8	10	12	(14)
Thread pitch	Coarse	1.25	1.5	1.75	2
	Fine	1	1.25	1.25	1.5
Body diameter d <sub>1</sub>	Nominal	8	10	12	14
	Tolerance	-0.20		-0.24	
Width across flats S	Nominal	12	14	17	19
	Tolerance	-0.24			-0.28
Head height H	Nominal	5	6	7	8
	Tolerance	±0.15		±0.18	
Head height H <sub>1</sub>	Nominal	5.5	7.0	8.0	9.0
	Tolerance	±0.15		±0.18	
Width across corners D, not less than		13.2	15.5	18.9	21.1
Radius under the head r	Not less than	0.4		0.6	
	Not more than	0.6		1.1	
Diameter of hole in body d <sub>3</sub>	Nominal	2	2.5	3.2	
	Tolerance	+0.25		+0.30	
Maximum displacement of centre line of hole in body with respect to centre line of thread.		0.20		0.25	
Diameter of hole in head d <sub>4</sub>	Nominal	2.5		3.2	
	Tolerance	+0.40		+0.48	
Distance from bearing surface to centre line of hole in head	Nominal	2.8	3.5	4.0	4.5
	Tolerance	±0.20		±0.25	
Maximum displacement of centre line of head with respect to body.		0.30			0.35

Bolt dimensions given in brackets are not recommended to be used.

Table 1

Таблица 1

16	(18)	20	(22)	24	(27)	30	36	42	48
2	2.5	2.5	2.5	3	3	3.5	4	4.5	5
1.5	1.5	1.5	1.5	2	2	2	3	3	3
16	18	20	22	24	27	30	36	42	48
-0.24		-0.28				-0.34			
22	24	27	30	32	36	41	50	60	70
-0.28				-0.34			-0.40		
9	10	11	12	13	15	17	20	23	26
±0.18		±0.21				±0.26			
10.0	12.0	13.0	14.0	15.0	17.0	19.0	23.0	26.0	30.0
±0.18	±0.21				±0.26				
24.5	26.8	30.2	33.6	35.8	40.3	45.9	56.1	67.4	78.6
0.6		0.8			1.0		1.2	1.6	
1.1		1.2			1.7		1.8	2.3	
4.0			5.0			6.3	8		
+0.30					+0.36				
0.30			0.45				0.50		
4.0						5.0			
+0.48									
5.0	6.0	6.5	7.0	7.5	8.5	9.5	11.5	13.0	15.0
±0.25		±0.30				±0.35			
0.25				0.40			0.50		

рекомендуется:

Dimensions in mm

Размеры

1. Bolt length  $l$

3. Nominal  
4. Tolerance

1. Длина болта $l$		5 Пред. откл. $l_1$	2. Длина резьбы $l_0$ и расстояние от опорной поверхности номинального диаметра резьбы $d$ (значком X)											
3. Номинал	4. Пред. откл.		8		10		12		(14)		16		(18)	
			$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$
8	$\pm 0,30$		—	X	—	—	—	—	—	—	—	—	—	—
10			—	X	—	X	—	—	—	—	—	—	—	—
12			—	X	—	X	—	—	—	—	—	—	—	—
14	$\pm 0,35$		—	X	—	X	—	X	—	—	—	—	—	—
16			12	X	—	X	—	X	—	X	—	—	—	—
(18)		$\pm 0,2$	14	X	14	X	—	X	—	X	—	X	—	—
20			16	X	16	X	15	X	—	X	—	X	—	X
(22)			18	X	18	X	17	X	17	X	—	X	—	X
25	$\pm 0,40$		21	X	21	X	20	X	20	X	19	X	—	X
(23)			21	22	21	X	23	X	23	X	22	X	22	X
30			26	22	26	X	25	X	25	X	24	X	24	X
(32)			28	22	28	26	27	X	27	X	26	X	26	X
35		$\pm 0,3$	31	22	31	26	30	30	30	X	29	X	29	X
(38)			34	22	34	26	33	30	33	X	32	X	32	X
40	$\pm 0,50$		36	22	36	26	35	30	35	31	34	X	34	X
45			41	22	41	26	40	30	40	34	39	38	39	X
50			46	22	46	26	45	30	45	34	44	38	44	42
55			51	22	51	26	50	30	50	34	49	38	49	42
60			56	22	56	26	55	30	55	34	54	38	54	42
65	$\pm 0,60$		61	22	61	26	60	30	60	34	59	38	59	42
70		$\pm 0,4$	66	22	66	26	65	30	65	34	64	38	64	42
75			71	22	71	26	70	30	70	34	69	38	69	42
80			76	22	76	26	75	30	75	34	74	38	74	42
(85)	$\pm 0,70$		81	22	81	26	80	30	80	34	79	38	79	42
90			86	22	86	26	85	30	85	34	84	38	84	42

50

2. Threaded length  $l_0$  and distance from bearing surface of head to centre line of hole in body  $l_1$  for various nominal thread diameters  $d$  (The sign X indicates full threading).
5. Tolerance in  $l_1$

In mm

Таблица 2  
Table 2

2. Диаметры головок до оси отверстия и стержня  $l_0$  при отрезке болты с резьбой на всей длине стержня

	20	(22)	24	(27)	30	36	42	48							
	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-
24	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-
26	X	28	X	-	X	-	-	-	-	-	-	-	-	-	-
29	X	28	X	28	X	-	X	-	-	-	-	-	-	-	-
32	X	31	X	31	X	-	X	-	-	-	-	-	-	-	-
34	X	33	X	33	X	32	X	-	X	-	-	-	-	-	-
39	X	35	X	38	X	37	X	36	X	-	-	-	-	-	-
44	X	43	X	43	X	42	X	41	X	40	X	-	-	-	-
49	46	48	X	48	X	47	X	46	X	45	X	-	X	-	-
54	46	53	50	53	X	52	X	51	X	50	-	48	X	-	-
59	46	58	50	56	54	57	X	56	X	55	X	53	X	-	X
61	46	63	50	63	54	62	60	61	X	60	X	58	X	58	X
69	46	68	50	68	54	67	60	66	60	65	X	63	X	63	X
74	46	73	50	73	54	72	60	71	66	70	X	68	X	68	X
79	46	78	50	78	54	77	60	76	66	75	X	73	X	73	X
84	46	83	50	83	54	82	60	81	66	80	79	79	X	78	X

2. Threaded length  $l_0$  and distance from bearing surface of head to centre line of the hole in body  $l_1$  for various nominal thread diameters  $d$  (The sign X indicates full threading).

2. Threaded length  $l_1$  and distance from bearing surface of head to centre<sup>o</sup> line of hole in body  $l_2$  for various nominal thread diameters  $d$  (The sign X indicates full threading).

4. Tolerance 5. Tolerance in  $L_1$  6. Tolerance in  $L_0$   
 7. Coarse pitch thread  
 8. Line pitch thread

Page 7 GOST 7808-70

Стр. 7 ГОСТ 7808-70

Dimensions in mm

Размеры

Bolt length	1	Длина болта 1		5 Предел откл. $\mu$	2 Длина резьбы $l_1$ и расстояние от опорной поверхности до центра линии отверстия $l_2$ (знаком X)											
		Номинал	Предел откл. $\mu$		8		10		12		(14)		16		(18)	
					$l_1$	$l_2$	$l_1$	$l_2$	$l_1$	$l_2$	$l_1$	$l_2$	$l_1$	$l_2$	$l_1$	$l_2$
				$\pm 0,4$	91	22	91	26	90	30	90	34	89	38	89	42
					96	22	96	26	95	30	95	34	94	38	94	42
					X	X	101	26	100	30	100	34	99	38	99	42
					X	X	106	26	105	30	105	34	104	38	104	42
					X	X	111	26	110	30	110	34	109	38	109	42
					X	X	116	26	115	30	115	34	114	38	114	42
					X	X	121	26	120	30	120	34	119	38	119	42
					X	X	126	26	125	30	125	34	124	38	124	42
					X	X	136	26	135	30	135	34	134	38	134	42
					X	X	146	26	145	30	145	34	144	38	144	42
				$\pm 0,5$	X	X	156	32	155	36	155	40	154	44	154	48
					X	X	166	32	165	36	165	40	164	44	164	48
					X	X	176	32	175	36	175	40	174	44	174	48
					X	X	186	32	185	36	185	40	184	44	184	48
					X	X	196	32	195	36	195	40	194	44	194	48
					X	X	X	X	215	36	215	40	214	44	214	48
					X	X	X	X	235	36	235	40	234	44	234	48
					X	X	X	X	255	36	255	40	254	44	254	48
					X	X	X	X	X	X	275	40	274	44	274	48
					X	X	X	X	X	X	295	40	294	44	294	48
				$\pm 0,6$	X	X	X	X	X	X	X	X	X	X	X	X
					X	X	X	X	X	X	X	X	X	X	X	X
				$\pm 0,7$	X	X	X	X	X	X	X	X	X	X	X	X
					X	X	X	X	X	X	X	X	X	X	X	X
				7			+2,5	+3,0	+3,5			+4,0		+5,0		
					8			+2,0	+2,5			+3,0				

Note: Bolts with lengths given in brackets are not recommended to be used.

Example of conventional designation.

Bolt of arrangement 1, with thread diameter  $d = 12$  mm, length  $l = 60$  mm, coarse pitch thread with tolerance zone 8g, strength class 5.8, without plating.

Bolt M12 X 60.58 GOST 7808-70.

-Do- arrangement 2 with fine pitch thread tolerance zone 6g, strength class 10.9 made of steel grade 40 X with O1 plating to 6 microns thickness:

Bolt M12 X 1.25-6g X 60.109.40 X.016 GOST 7808-70.

In mm

Продолжение табл. 2  
Contd. Table 2

2. Диаметры в головке до оси отверстия в стержне  $l_0$  при  
отдельных болты с резьбой по всей длине стержня

20		(22)		24		(27)		30		36		42		48	
$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$
59	46	88	50	88	54	87	60	86	66	85	78	83	X	83	X
94	46	93	50	93	54	92	60	91	66	90	78	88	X	88	X
99	46	98	50	98	54	97	60	96	66	95	78	93	90	93	X
104	46	103	50	103	54	102	60	101	66	100	78	96	90	98	X
109	46	108	50	108	54	107	60	106	66	105	78	103	90	103	102
114	46	113	50	113	54	112	60	111	66	110	78	108	90	108	102
119	46	118	50	118	54	117	60	116	66	115	78	113	90	113	102
124	46	123	50	123	54	122	60	121	66	120	78	118	90	118	102
134	46	133	50	133	54	132	60	131	66	130	78	128	90	128	102
144	46	143	50	143	54	142	60	141	66	140	78	138	90	138	102
154	52	153	56	153	60	152	66	151	72	150	84	148	96	148	108
164	52	163	56	163	60	162	66	161	72	160	84	158	96	158	108
174	52	173	56	173	60	172	66	171	72	170	84	168	96	168	108
184	52	183	56	183	60	182	66	181	72	180	84	178	96	178	108
194	52	193	56	193	60	192	66	191	72	190	84	188	96	188	108
214	52	213	56	213	60	212	66	211	72	210	84	208	96	208	108
234	52	233	56	233	60	232	66	231	72	230	84	228	96	228	108
254	52	253	56	253	60	252	66	251	72	250	84	248	96	248	108
274	52	273	56	273	60	272	66	271	72	270	84	268	96	268	108
294	52	293	56	293	60	292	66	291	72	290	84	288	96	288	108
+5,0		+6,0				+7,0		+8,0		+9,0		+10,0			
+3,0		+4,0								+6,0					

2. Threaded length  $l_0$  and distance from bearing surface of head to centra line of hole in body  $l_1$  for various nominal thread diameters  $d$  (The sign X indicates full threading).

1. Weight of steel bolts (arrangement 1) with coarse Pitch thread

3. Теоретическая масса 100 шт. болтов, кг., при номинальном диаметре резьбы d, мм

Bolt length l, mm	Theoretical weight of 100 bolts, kg., at nominal thread diameter d, mm															
	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	48
8	7,732															
10	8,458	13,57														
12	9,184	14,71														
14	9,910	15,85	25,09													
16	10,640	16,99	26,73	35,04												
18	11,360	18,12	28,37	37,28	55,80											
20	12,090	19,26	30,01	39,52	58,75	75,63										
22	12,810	20,40	31,65	41,76	61,70	79,39										
25	13,900	22,11	34,11	45,11	66,12	81,95	111,5									
28	15,150	23,81	36,57	48,47	70,54	90,51	118,4									
30	15,940	24,95	38,21	50,71	73,49	94,21	123,0	156,5								
32	16,720	26,32	39,85	52,95	76,44	97,92	127,6	162,1	195,6							
35	17,910	28,17	42,59	56,30	80,86	103,50	134,6	170,5	205,6	279,0						
38	19,090	30,02	45,26	59,66	85,28	109,00	141,5	178,9	215,6	291,7						
40	19,880	31,25	47,03	64,56	88,23	112,70	146,1	184,5	222,2	300,2	420,7					
45	21,860	34,34	51,48	70,60	96,26	122,00	157,7	198,5	238,8	321,3	426,8					
50	23,830	37,42	55,92	75,65	104,20	132,20	169,2	212,6	255,4	342,5	452,8	712,6				
55	25,810	40,51	60,36	82,70	112,10	142,20	181,9	226,6	272,0	363,7	478,9	760,3	1124			
60	27,780	43,59	64,80	88,74	120,00	152,20	194,3	242,6	288,6	384,9	504,9	787,9	1175			
65	29,760	46,68	69,25	94,79	127,80	162,20	206,6	257,5	307,4	406,0	531,0	825,5	1258	1729		
70	31,730	49,76	73,69	100,80	135,80	172,20	218,9	272,4	325,2	429,5	557,0	663,2	1278	1796		
75	33,710	52,85	78,13	106,90	143,70	182,20	231,3	287,4	342,9	452,0	585,6	900,8	1329	1863		

3. Theoretical weight of 1000 nos bolts, kg approx, for various nominal diameters d, mm.

3. Theoretical weight of 1000 nos bolts, kg approx, for various nominal diameters d, mm.

1. Weight of steel bolts (arrangement 1) with coarse pitch thread

Table Contd.  
Продолжение

Диаметр болта D, мм	Теоретическая масса 1000 шт. болтов, кг ±, при условном значении расхода d, мм															
	8	10	12	14	16	18	20	22	24	27	30	36	42	48		
80	35,680	55,93	82,57	112,90	151,60	192,20	243,6	302,3	350,7	474,4	613,4	938,4	1350	1930		
85	37,650	56,92	87,02	119,00	159,40	202,20	256,0	317,2	373,5	496,0	641,1	976,0	1432	1998		
90	39,630	62,10	91,46	123,00	167,40	212,20	268,3	332,2	396,2	519,4	668,9	1018,0	1483	2055		
95	41,600	66,15	95,90	131,10	175,20	222,20	280,6	347,1	414,0	541,0	695,7	1049,0	1534	2132		
100	43,580	69,27	100,30	137,10	183,10	232,27	293,0	362,0	431,8	564,4	721,4	1098,0	1585	2199		
105	—	71,36	104,80	143,20	191,00	242,10	305,3	377,0	449,6	586,9	752,2	1138,0	1635	2265		
110	—	74,44	109,20	149,20	199,90	252,10	317,7	391,9	467,3	600,4	780,0	1178,0	1685	2332		
115	—	77,52	113,70	155,30	208,60	262,10	330,0	405,8	481,1	631,9	807,7	1218,0	1733	2400		
120	—	80,60	118,10	161,30	217,70	272,10	342,3	421,8	502,0	651,4	830,5	1258,0	1780	2480		
125	—	83,70	122,60	167,40	222,60	282,10	354,7	436,7	520,6	676,8	863,3	1298,0	1843	2530		
130	—	86,78	127,00	173,60	229,50	292,10	367,0	451,6	538,4	699,3	891,0	1338,0	1917	2623		
140	—	92,94	135,90	185,50	246,30	312,10	391,7	481,5	574,0	741,3	946,0	1418,0	2023	2765		
150	—	99,11	144,50	197,00	263,10	322,10	416,1	511,3	606,5	789,3	1022,0	1498,0	2131	2907		
160	—	105,30	153,00	207,70	277,90	332,10	441,1	541,2	643,0	831,3	1058,0	1578,0	2244	3049		
170	—	111,40	162,50	221,50	293,70	342,10	465,7	571,0	680,6	879,3	1113,0	1658,0	2353	3191		
180	—	117,64	171,40	228,90	309,50	352,10	490,4	601,0	710,1	924,3	1168,0	1738,0	2461	3333		
190	—	123,88	180,30	246,00	325,30	362,10	515,1	630,5	751,0	989,2	1223,0	1818,0	2570	3475		
200	—	130,06	189,20	253,00	341,10	372,10	539,8	659,7	787,2	1044,0	1280,0	1898,0	2675	3618		
220	—	—	207,00	—	372,00	472,00	589,1	729,4	858,2	1101,0	1391,0	2058,0	2897	3902		
240	—	—	221,00	306,40	404,30	512,00	638,5	789,1	929,4	1191,0	1502,0	2218,0	3115	4165		
260	—	—	245,50	330,80	435,90	552,00	687,6	839,9	1091,0	1284,0	1613,0	2378,0	3332	4471		
280	—	—	—	351,80	467,50	592,00	737,2	899,5	1072,0	1374,0	1724,0	2538,0	3559	4755		
300	—	—	—	378,00	499,00	632,00	786,6	956,3	1143,0	1461,0	1835,0	2698,0	3785	5039		

8. Для определения массы болтов из других материалов в величиих назов. указание в таблице, следует умножить на коэффициенты 0,356 — для алюминия, 0,280 — для латуни.

Weights indicated in the Table are to be multiplied by 0.356 for aluminium alloys and by 1.080 for brass.



Hexagon bolts with reduced head

(Improved accuracy)

Constructions and Dimensions

By resolution of USSR State Committee on Standards No. 1619 of 270301981 this revision comes into force

from 01.07.1981

Clause 2. Drawing. Arrangement 1.

Amend designations and dimension as follows:

$R_{z 80}$  to  $12.5$ ;  $R_{z 40}$  to  $6.3$ ;  $R_{z 20}$  to  $3.2$ ;  
 $\approx 30^\circ$  to  $15^\circ$   $30^\circ$ ;

Parameter	Amend the words:	To read
"Head height H"	Tolerance -	Tolerance js14
"Diameter of hole in body $d_3$ ".	Tolerance -	Tolerance H 14
"Diameter of hole in head $d_4$ ".	Tolerance -	Tolerance H 15
"Distance of bearing surface from centre line of hole in head $d_2$ ".	Tolerance - and its value $\pm 0.25$ $\pm 0.30$	Tolerance js15  $\pm 0.24$ $\pm 0.29$
"Diameter of body $d_1$ ".	Tolerance - and its value -0.20 -0.24 -0.28 -0.34	Tolerance h13  -0.22 -0.27 -0.33 -0.39
"Dimension width across flats S"	Tolerance - and its value -0.24 -0.28 -0.34 -0.40	Tolerance h13  -0.27 -0.33 -0.39 -0.46

Parameter	Amendment						
Maximum displacement of centre line of hole in body with respect to centre line of thread	Insert new version						
Maximum displacement of centre line of head with respect of body	Insert new version						
Nominal thread diameter d	8	10	12	(14)	16	(18)	20
Tolerance in symmetry of hole in body with respect to thread centre line in the diametral expression 21T13	0.44		0.54			0.6	
Tolerance in symmetry of head with respect to centre line of body in the diametral expression 21T13	0.54			0.66			
Nominal thread diameter d	(22)	24	(27)	30	36	42	48
Tolerance in symmetry of hole in body with respect to thread centre line in the diametral expression 21T13	0.66			0.78			
Tolerance in symmetry of head with respect to centre line of body in the diametral expression 21T13	0.66	0.78			0.92		

Clause 2. Table 2. Heading "Bolt length l"  
 Amend the word Tolerance<sup>1c</sup> read Tolerance j 15  
 Amend the value  $\pm 30$  to read  $\pm 0.29$   
 Amend the value  $\pm 1.00$  to read  $\pm 0.92$

Table 2. Delete column heading "Tolerance l"<sub>1</sub>  
 In the heading of the Table after the words  
 "to the centre line of the hole in body l<sub>1</sub>" add the words "Tolerance  
 + 1T14".

Example of conventional designation.  
 Amend designation 1.256g to read 1.25-6g.

Tolerances Zones for hexagon bolts in the  
OCT and ЕСДП СЭВ Systems

Tolerance Zones	
In OCT System	In ЕСДП СЭВ System
B <sub>5</sub>	h13
CM <sub>7</sub>	js14
A <sub>7</sub>	H14
A <sub>8</sub>	H15
CM <sub>8</sub>	js15

Bolts may, with customer's concurrence, be made to tolerances given in the reference annexure No.2, if it becomes necessary to provide interchangeability for use in articles designed before 01.01.1980.

### MACHINED COMPONENTS (GROUP -II)

Sl no.	Nomenclature & drawing No.	Manufacturing technology & Testing / Inspection Facilities required to produce the item	Must be possessed by the vendor in his premises (P&M list and testing / inspection equipment list to be submitted)	May be possessed by the vendor in his premises or out sourced (Self declaration to be submitted)	FIRM Compliance (Y/N)	Remarks
1	Components as per enclosed list of Machined Components (Group II) <i>Total items = 48 Nos</i>	TECHNOLOGY-1	Turning	CNC Turning machine suitable to accommodate component upto 150 mm diameter with 0.010mm accuracy		
		Milling & Drilling	HMC/VMC machine as per component requirement with 0.010mm accuracy			
		Grinding	Internal/ External /Surface grinding machine as per component requirement with 0.010mm accuracy			
		Gear machining		Gears machining by Hobbing / Gear Shaping/ Broaching method as per component requirement with class 7 accuracy		
		Heat Treatment		Carburising, Hardening, Induction Hardening & Tempering furnace with Oil quenching facility suitable to the components		
		Protection coating		Oxidising , Phosphating, Zinc chromatising, Hard Chromium Plant suitable to the components		
		Raw material		Firm should be capable to arrange the raw material like forging, casting, bar material etc as per drawing specification and standard.		
		TECHNOLOGY-2				
		TECHNOLOGY-3				


*(Signature)*  
**(D.SATHISH KUMAR)**  
 WM/QA(NF& QMSC)



*(Signature)*  
**(LUXMIAN SINGH)**  
 WM/TRG-II,HT & EP

*(Signature)*  
**(K-DURAIRAJ)**  
 JWM/Trans -II

S. No.	Nomenclature & drawing No.	Manufacturing technology & Testing / Inspection Facilities required to produce the item	Must be possessed by the vendor in his premises (P&M list and testing / inspection equipment list to be submitted)	May be possessed by the vendor in his premises or out sourced (Self declaration to be submitted)	FIRM Compliance (Y/N)	Remarks
1	Components as per enclosed list of Machined Components (Group II)	TEST / INSPECTION-1 3D CMM Surface Roughness Tester Gauges Measuring Instruments Hardness measurement TEST / INSPECTION-2	3D CMM 300 x 300mm Standard Gauges for checking <del>radius and chamfers</del> suitable to the requirement of the components. Firm should submit the undertaking in this regard that they will create the facilities within 6 months from the date of receipt of order. Vernier Caliper, Groove Vernier, Gear tooth Micrometer, Radius gauge, Feeler Gauge etc. suitable to the requirement of the components	Surface Roughness Tester for Ra & Rz values Profile projector for checking profiles / splines of 10X magnification Brinell / Rockwell Hardness Tester		

Note : Justification for alternate facilities may be shared to prove that alternate facilities can be utilised to manufacture the item wherever the facilities are mentioned above are not available, but vendor has alternate facilities.

  
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 WM/QA(NF& QMSC)

  
 (LUXMAN SINGH)  
 WM/TRG-II, HT & EP  
  
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 AH-10 (NEERAJ KUMAR)  
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 DGM/CA, TRG & RG

  
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 GM-OPERATIONS I

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

**FOR**

**(DISC RETAINER/LOCKING DISC/DISC RETAINING)**

**DRG.NO. 188.28.004SB**

**(LF NO: 6201028026)**

**No HVF/T-90/QAP/28/DISC RETAINER/LOCKING  
DISC/DISC RETAINING/242858- 00**

**ISSUE No:00**

**DATE: FEB-2022**

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

**HEAVY VEHICLES FACTORY**


**AVADI CHENNAI – 600 054**

**QUALITY ASSURANCE PLAN (QAP)**  
**FOR**  
**DISC RETAINER/LOCKING DISC/DISC RETAINING**  
**DRG. NO. 188.28.004SB**

PREPARED BY

  
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HEAVY VEHICLES FACTORY  
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## **1.IMPORTANT NOTE**

### **Note-1**

This is only a provisional and will be amended from time to time according to the requirement. No addition, deletion and reproduction will be done without permission of The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 54.

### **Note –2**

Any instruction contained in this does not prejudice the terms and conditions of the contract what so ever. In case of any contradiction between the contents of this QAP and the clause in the contract, the latter will prevail.

### **Note-3**

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

### **Note-4**

Any amendment issued by the Inspection Authority shall be incorporated in the QAP and the records for the amendments carried out should be maintained as per the Performa at Appendix-“A”.

### **Note-5**

In case of any contradiction between the contents of this QAP and drawings issued along with the contract, the latter will prevail.

## **2.INTRODUCTION**

1. This quality plan lays down the inspection and testing procedure to be carried out on the component **DISC RETAINER/LOCKING DISC/DISC RETAINING TO DRG.NO 188.28.004SB** 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 indigenously items.
2. This QAP is the property of Government of India and is liable for amendments as and when required. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054, is the inspecting Authority for this assembly. Any query / clarification on the content of this QAP shall be referred to this Factory. Any departure from these instructions is allowed only after written approval from the above authority. Notwithstanding the tests indicated in this QAP, the inspecting Officer has the right to carry out any test to check conformance to the paper particulars quoted in the Supply Order, which he may consider necessary to satisfy himself about the stores which he has to accept.

## **3.AIM**

The QAP is aimed at standardizing the Inspection procedure and acceptance norm for **DISC RETAINER/LOCKING DISC/DISC RETAINING TO DRG.NO:188.28.004SB**.

It also aims at giving adequate information to the manufacturer on the quality requirements so that the required quality control methods are established. This is also meant to guide authorized Inspection Officer in his routine inspection and to set out main points to which his attention must be drawn to ensure that the accepted stores meet the stipulated standards.

#### **4. SCOPE:**

This QAP outlines in general terms, the checks and methods to be used during inspection of **DISC RETAINER/LOCKING DISC/DISC RETAINING TO DRG. NO. 188.28.004SB** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

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

#### **NOTE-I:**

- i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.
- ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.
- iii. In case of S.O, it is the responsible of the vendor to obtained copy of QAP and give the statement of compliance that the vendor will follow QAP. However, GM/HVF reserves the right to revise/update the QAP from time to time.

#### **5. DOCUMENTS:**

- a) On placement of firm supply order, One set of relevant specification and technical instructions on the subject item can be obtained by the contractor from AHSP through DDO/HVF
- b) Any clarification required on these documents should be obtained from the Inspecting Authority i.e. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. Equivalentents to the collaborators specifications and standards will be decided only by the Inspecting Authority and should not be unilaterally decided. For any change in the specifications, standards or written approval, any alterations in specification can be affected and not otherwise.
- c) The process instruction sheets supplied by the collaborators are available with the Authority Holding Sealed Particulars, i.e. The Controllerate of Quality Assurance (Heavy Vehicles), Avadi, Chennai for the reference. The relevant process sheets may be studied at the premises of the AHSP after obtaining necessary permission.

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

**6. ITEM USED ON:**

**7. LIST OF DRAWINGS:**

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
	188.28.004SB	DISC RETAINER/LOCKING DISC/DISC RETAINING	-
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	-
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	-
3.	175.28.003-2	LOCKING DISC/ DISC RETAINING	-
<b>STANDARD ITEMS</b>			
4.	GOST 7808- 70	BOLT 3M8X1- 6gx14.88.38XC	-
5.	GOST 11371- 78	WASHER C.8.01.016	-

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

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
	188.28.004SB	DISC RETAINER/LOCKING DISC/DISC RETAINING	-----	1
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL 38XC GOST 4543-71	1
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL 38XC GOST 4543-71	1
3.	175.28.003-2	LOCKING DISC/ DISC RETAINING	STEEL 38XC GOST 4543-71	1
<b>STANDARD ITEMS</b>				
4.	GOST 7808- 70	BOLT 3M8X1- 6gx14.88.38XC	Refer GOST 7808- 70	5

5.	GOST 11371-78	WASHER C.8.01.016	Refer GOST 11371-78	5
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**Note:** Vendor/Contractor may use approved alternate material if any specified in drawing/ specification.\* Also refer Para no.13.

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

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

- (a) The threaded parts if any should be covered with suitable plastic caps to prevent damages.
- (b) If the item consists of assemblies, each assembly should be packed separately.
- (c) The stores are to be suitably covered for preventing ingress of dust and Dirt/entry of sunlight / moisture.
- (d) The packaging slip shall contains
  - (i) Certificate of testing- NABL Certificate.
  - (ii) Guarantee/ Warranty Certificate
  - (iii) Service and maintenance instructions
  - (iv) Delivery Slip with Inspector's Acceptance Mark
  - (v) Undertaking letter / certificate of conformance (As applicable).
- (e) The stores are not permitted to be stored together with oils. Petrol, acids, alkaline and other substances to avoid damage to the metal / rubber components.

#### **10.SAMPLING PLAN:**

Sl. No.	Sampling Plan	Pilot	Bulk
(i)	Visual Inspection	100%	100%
(ii)	Dimensional Inspection	100%	General Inspection level III, single sampling, Normal Inspection, AQL 2.5 of IS 2500 (Part-I)-2000
(iii)	Material Inspection	1 No	1 No. for each batch of raw material or heat treatment lot as required by specifications.
(iv)	Acceptance test	100 %	100 %
(v)	Pressure testing	-----	-----
(vi)	Machining/Fitment/ Performance trial on	01 No.	01 No. per batch/As required.

	higher assembly / Tank		
vii)	Interchangeability Test	02 Nos.	02 Nos.Per batch on randomly basis, except selective assembly.
viii)	Test stand/Jigs/ Fixtures/Gauges/Man drels/etc.	100 %	100 %
ix)	Marking/Identification	100%	100%
x)	Packing/ Preservation	100%	100%

**Note:-**

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

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

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

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

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

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

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

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

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
	188.28.004SB	DISC RETAINER/LOCKING DISC/DISC RETAINING	All dimensions should be confirmed against each item as per relevant drawing/specification.
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	
3.	175.28.003-2	LOCKING DISC/ DISC RETAINING	
<b>STANDARD ITEMS</b>			
4.	GOST 7808- 70	BOLT 3M8X1- 6gx14.88.38XC	All dimensions should be confirmed against each item as per relevant drawing/specification.
5.	GOST 11371- 78	WASHER C.8.01.016	

**Note:**

1. Surface finish/Roughness of items should be ensured as per drawing and specification.
2. Refer drawing/specification for admissible alternate manufacture in dimensions/material if any specified for the component.
3. Place for testing hardness refer drawing.
4. Spline/Gear details dimensions including profile is to be confirmed as per drawing.

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

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

**13.1 LOCKING QUADRANT/ SECTOR, RETAINING TO DRG.NO: 175.28.001-2, LOCKING QUADRANT/ SECTOR, RETAINING TO DRG.NO: 175.28.002-1 & LOCKING DISC/ DISC RETAINING TO DRG.NO: 175.28.003- 2.**

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

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

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

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

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

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

Note: For other properties refer GOST 4543-71

**13.2 BOLT 3M8X1-6gx14.88.38XC TO SPECIFITION GOST 7808-70 & WASHER C.8.01.016 TO SPECIFITION GOST 11371-78.**

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1.	GOST 7808-70	BOLT 3M8X1-6gx14.88.38XC	The material parameters (Chemical and Mechanical) should be conformed against each item as per relevant drawing/specification.
2.	GOST 11371-78	WASHER C.8.01.016	

**14) PERFORMANCES/ACCEPTANCE TEST:**

**14.1 DISC RETAINER/LOCKING DISC/DISC RETAINING TO DRG.NO: 188.28.004SB**

1. Non standard welds - gas shielded arc welding.
2. Manual arc welding is allowed.
3. Coating for internal surfaces primer  $\phi/1-0.5K$  requirements as per 520.TY5.
4. \*Dimensions for reference.
5. Other requirements as per 520.TY1.

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	All technical requirements (T.R) points to be conformed against each item as per relevant drawing/specification.
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	
3.	175.28.003-2	LOCKING DISC/ DISC RETAINING	
<b>STANDARD ITEMS</b>			

4.	GOST 7808-70	BOLT 3M8X1-6gx14.88.38XC	All technical requirements (T.R) points to be conformed against each item as per relevant drawing/specification.
5.	GOST 11371-78	WASHER C.8.01.016	

**LOCKING QUADRANT/SECTOR, RETAINING TO DRG.NO: 175.28.001-2 TEETH / GEAR DETAILS:**

MODULE		m	0.7
NUMBER OF TEETH		Z	182
BASIC RACK	ANGLE OF PROFILE		$\alpha$ 20°
	COEFFICIENT OF	ADDENDUM	f' 1
		DEDENDUM	f'' 1.25
	FILLET RADII		ρρ 0.3
ADDENDUM MODIFICATION COEFFICIENT		ε	0
BASE TANGENT LENGTH		ℓ	44.15 <sup>+0.135</sup> <sub>-0.084</sub>
TOLERANCE ON BASE TANGENT LENGTH		δℓ	0.045
REFERENCE DIAMETER		A	127.4
DRAWING NUMBER OF THE MATING COMPONENT		175.28.003 -2	

**LOCKING QUADRANT/SECTOR, RETAINING TO DRG.NO: 175.28.002-1 GEAR DETAILS:**

MODULE		m	0.7
NUMBER OF TEETH		Z	182
BASIC RACK	PROFILE ANGLE		$\alpha$ 20°
	COEFFICIENT OF	ADDENDUM	f' 1
		DEDENDUM	f'' 1.25
	FILLET RADIUS		ρρ
ADDENDUM MODIFICATION COEFFICIENT		ε	0
BASE TANGENT LENGTH		ℓ	44.15 <sup>+0.135</sup> <sub>+0.084</sub>
TOLERANCES ON BASE TANGENT LENGTH		δo ℓ	0.045
REFERENCE DIAMETER		A	127.4
DRAWING NUMBER OF MATING COMPONENT		175.28.003 -2	



**LOCKING DISC / DISC RETAINING TO DRG.NO: 175.28.003-2 SPLINE / GEAR  
DETAILS:**

		9628*1-5*18A3450		MODULE		$m$	0.7	
MODULE		$m$	1.5	NUMBER OF TEETH		$Z$	182	
INITIAL PARAMETERS	NUMBER OF TEETH	$Z$	18	BASIC RACK	ANGLE OF PROFILE	$\alpha$	20°	
	PROFILE ANGLE	$\alpha$	30		COEFFICIENT OF	ADDENDUM	$f'$	1
	ADDENDUM MODIFICATION SHIFT	$\xi$	-0.25			DEDUNDUM	$f''$	1.25
	TOOTH SPACE WIDTH ALONG THE ARC OF REFERENCE CIRCLE		-0.07 2.067 -0.03		FILLET RADIUS	$\gamma_c$	0.3	
					ADDENDUM MODIFICATION COEFFICIENT	$\xi$	0	
					BASE TANGENT LENGTH	$L$	$44.15$ $-0.155$	
					TOLERANCE OF BASE TANGENT LENGTH	$6\sigma L$	0.045	
			REFERENCE DIAMETER	$A$	127.4			
			DRAWING NUMBER OF MATING COMPONENT		175.28.001-2 175.28.001-1			

**15) FITMENT AND PERFORMANCE TEST:**

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

**EXPLANATORY NOTE:**

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

**16) INTERCHANGEABILITY:**

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

**17) CALIBRATION CHECKS**

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

The supplier / Contractor should have suitable Instruments, Test Stand, jigs, fixture, mandrels and gauges to carry out quality checks, to ensure

conformance of components/assembly as per drawing and Specification /T.R points.

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

#### **18) MARKING/IDENTIFICATION**

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

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

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

#### **19) PRESERVATION CHECK**

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

#### **20) PACKING CHECK**

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

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

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

#### **21) DOCUMENTATION**

- i. Firm has to maintain all the documents as per QAP with respect to the Sl.No.to have traceability.
- ii. Vendor has to submit Bill of materials, Material test reports, Class 'C' /Endurance test reports (wherever specified in drawing/TY specification/QAP) and Complete PIR (pre-inspection report)at the time of offering the item for inspection. HVF will commence inspection only after scrutiny of these documents.

- iii. The testing/inspection responsibility to test all the parameters as per QAP and drawing specifications as mentioned in Annexure -A (enclosed).
- iv. Pre inspection reports (PIR) of firm like, 1. Chemical analysis (NABL Certificate), 2.Mechanical properties(NABL Certificate), 3. Pre-forming process, 4. Coating certification. 5. Calibration reports of instruments and 6. 100 % Dimensional inspection reports including reports of Spline/Gear profiles.

**22) REFERENCE:**

- 1. Drawing No:188.28.004SB,175.28.003-2, 175.28.001-2, 175.28.002-1,175.28.007CB-2 & 175.28.001-1
- 2. Material specification as per drawing:

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS
	188.28.004SB	DISC RETAINER/LOCKING DISC/DISC RETAINING	-----
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL 38XC GOST 4543-71
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL 38XC GOST 4543-71
3.	175.28.003-2	LOCKING DISC/ DISC RETAINING	STEEL 38XC GOST 4543-71
4.	GOST 7808-70	BOLT 3M8X1-6gx14.88.38XC	Refer GOST 7808-70
5.	GOST 11371-78	WASHER C.8.01.016	Refer GOST 11371-78

- 3. GOST 4543-71, GOST 11731-78 & GOST 7808-70, GOST 2930-62.
- 4. Specification: 520 TY 1 & 520 TY5.
- 5. Alternate material:

SI. NO	DRG. NO	NOMENCLATURE	ALTERNATE MATERIAL SPECIFICATIONS
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL GRADE 817M40, BS:970 PT-1-1983
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL GRADE 817M40, BS:970 PT-1-1983

- 6. **INSPECTION NOTE: FOR LIST OF GAUGES AND FIXTURE REFER GAUGE SHEET NO: GS(W)-10135, SHT1 & SHT2.**

SL. NO.	CATEGORY	ASSEMBLY/SU B ASSEMBLY	TESTS/INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	DISC RETAINER/ LOCKING DISC/DISC RETAINING TO DRG. NO 188.28.004SB	Pre inspection reports (PIR) of firm	Firm has to produced all the document as per Para 21 (iv)	As per the relevant drawing and QAP.	Confirm to drawing and QAP as per bill of material	P	V	R	100% by firm/ vendor.
2		Bill of material (BOM)	Firm has to prepare the BOM as per QAP	Refer QAP Para no: 8 or item list.	Confirm to QAP.	P	V	R	100% by firm/ vendor.
3		Material tests	Chemical composition & Mechanical / Physical Properties	As per-GOST 4543-71, GOST 7808-70 & GOST 11371-78	All the values to confirm with QAP(Para no:13.1 (a), (b) & (c) & 13.2	P	WV	R	SP followed by HVF.
4		Hardness checks	Hardness	Refer QAP Para no: 14	Confirm to QAP Para no: 14	P	V	R	SP followed by HVF.
5		Coating	Coating	Refer QAP Para no: 14.1	Confirm to QAP Para no: 14.1	P	V	R	SP followed by HVF.
6		Dimensional checks	Dimensions as per the drawing	Refer drawing /QAP Para no: 12	Confirm to drawing and QAP	P	W/P	R	100% by firm/ vendor SP followed by HVF.
7		Marking / traceability	Firm has to make marking / traceability records.	Refer QAP Para no: 18	Confirm to QAP Para no: 18	P	V	R	100% by firm/ vendor.
8		Preservation & packing	Firm has to make Preservation & packing records	Refer QAP Para no: 19 & 20	Confirm to QAP Para no: 19 & 20	P	V	R	100% by firm/ vendor.

**Note:**

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

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

P-Perform

W-Witness

V-Verify

R-Review

SP-Sampling Plan

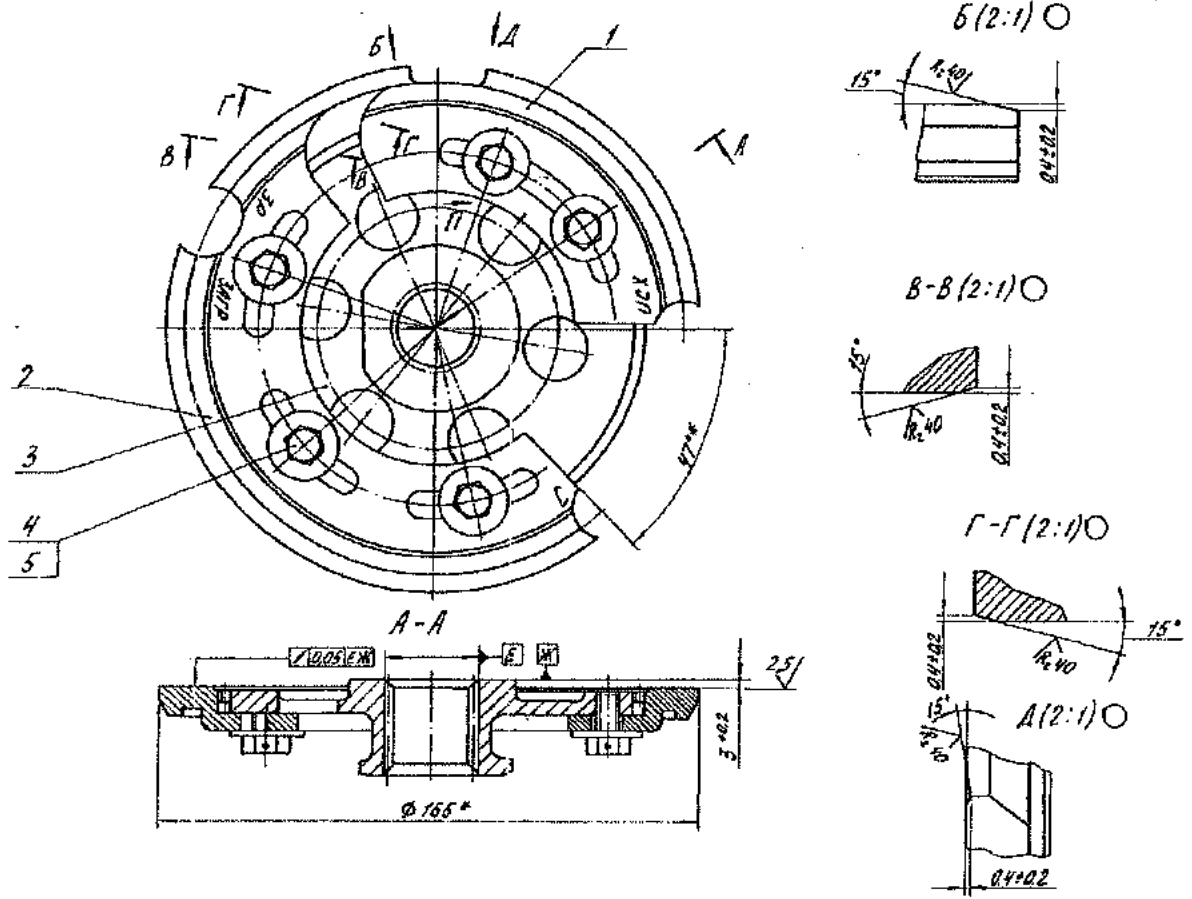


FIG: DISC RETAINER/LOCKING DISC/DISC RETAINING TO DRG. NO  
 188.28.004SB  
 (For reference only)

APPENDIX ' A '

RECORD OF AMENDMENTS

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

GOST: 7808 - 70

HEXAGON BOLT WITH REDUCED HEAD  
(IMPROVED ACCURACY)

CONSTRUCTION & DIMENSIONS.

NOTE:- DO NOT SCRIBBLE IN THE SPECIFICATION.

## USSR STATE STANDARD

Hexagon bolts with reduced head  
(Improved accuracy)  
Construction and Dimensions

GOST  
7808-70  
This supersedes  
GOST 7808-62

Valid from 01-01-1972

1. The present standard relates to hexagon bolts of improved accuracy with reduced head.

The requirements of the C3B recommendations PC 170-70, PC 186-64, PC 309-65, PC 376-65 PC 584-66 and PC 792-67 on standardisation have been taken into account in this standard.

2. Construction and dimensions of bolts must conform to those shown in the drawing and in Tables 1 and 2.

3. Threading is as per CT C 3 B 180-75 and CT C 3 B 182-75 and tolerance zone 8g or 6g as per GOST 16093-81.

4. Bolts with tolerance zone 4 h, 6 e, and 6 d, bolts with head height  $H_1$  in arrangements 1 and 2 and bolts with nominal thread diameter 36 to 48 mm with 2 mm thread pitch may be manufactured by mutual consent between manufacturer and customer.

Clause 2 to 4 (Revised edition, Rev. No.2).

5. The manufacturer decides about the head arrangement.

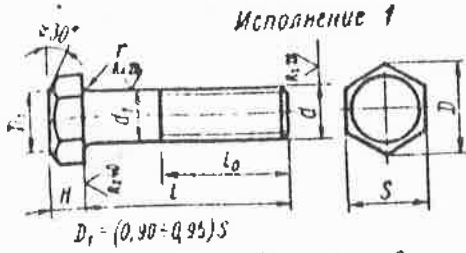
6. Technical requirements are as per GOST 1759-70.

7. (Deleted. Rev.No.2).

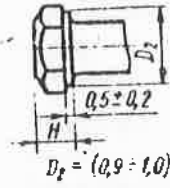
8. Weight of bolts is indicated in annexure 1.



**Arrangement 1**

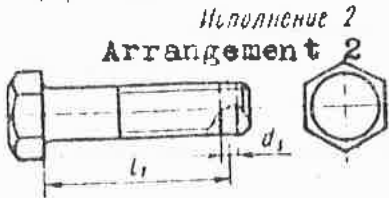


Вариант исполнения головки

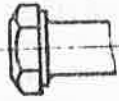


Variant in head arrangement

**Arrangement 2**

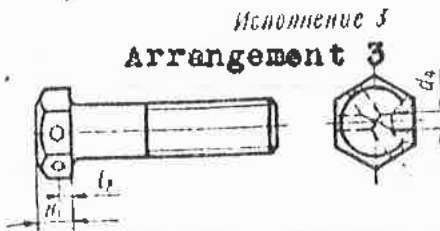


Вариант исполнения головки

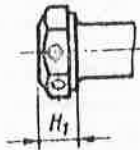


Variant in head arrangement

**Arrangement 3**

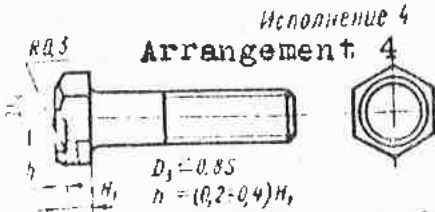


Вариант исполнения головки

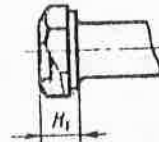


Variant in head arrangement

**Arrangement 4**



Вариант исполнения головки

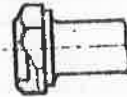


Variant in head arrangement

**Arrangement 5**



Вариант исполнения головки



Variant in head arrangement

Nominal thread diameter d		8	10	12	(14)
Thread pitch	Coarse	1.25	1.5	1.75	2
	Fine	1	1.25	1.25	1.5
Body diameter d <sub>1</sub>	Nominal	8	10	12	14
	Tolerance	-0.20		-0.24	
Width across flats S	Nominal	12	14	17	19
	Tolerance	-0.24			-0.28
Head height H	Nominal	5	6	7	8
	Tolerance	±0.15		±0.18	
Head height H <sub>1</sub>	Nominal	5.5	7.0	8.0	9.0
	Tolerance	±0.15		±0.18	
Width across corners D, not less than		13.2	15.5	18.9	21.1
Radius under the head r	Not less than	0.4		0.6	
	Not more than	0.6		1.1	
Diameter of hole in body d <sub>3</sub>	Nominal	2	2.5	3.2	
	Tolerance	+0.25		+0.30	
Maximum displacement of centre line of hole in body with respect to centre line of thread.		0.20		0.25	
Diameter of hole in head d <sub>4</sub>	Nominal	2.5		3.2	
	Tolerance	+0.40		+0.48	
Distance from bearing surface to centre line of hole in head	Nominal	2.8	3.5	4.0	4.5
	Tolerance	±0.20		±0.25	
Maximum displacement of centre line of head with respect to body.		0.30			0.35

Bolt dimensions given in brackets are not recommended to be used.

Table 1

Таблица 1

16	(18)	20	(22)	24	(27)	30	36	42	48
2	2.5	2.5	2.5	3	3	3.5	4	4.5	5
1.5	1.5	1.5	1.5	2	2	2	3	3	3
16	18	20	22	24	27	30	36	42	48
-0.24		-0.28				-0.34			
22	24	27	30	32	36	41	50	60	70
-0.28				-0.34			-0.40		
9	10	11	12	13	15	17	20	23	26
±0.18		±0.21				±0.26			
10.0	12.0	13.0	14.0	15.0	17.0	19.0	23.0	26.0	30.0
±0.18	±0.21				±0.26				
24.5	26.8	30.2	33.6	35.8	40.3	45.9	56.1	67.4	78.6
0.6		0.8			1.0		1.2	1.6	
1.1		1.2			1.7		1.8	2.3	
4.0			5.0			6.3	8		
+0.30					+0.36				
0.30			0.45				0.50		
4.0						5.0			
+0.48									
5.0	6.0	6.5	7.0	7.5	8.5	9.5	11.5	13.0	15.0
±0.25		±0.30				±0.35			
0.25				0.40			0.50		

раскльенуется:

Dimensions in mm

Размеры

1. Bolt length  $l$

3. Nominal  
4. Tolerance

1. Длина болта $l$		5 Пред. откл. $l_1$	2. Длина резьбы $l_0$ и расстояние от опорной поверхности номинального диаметра резьбы $d$ (значком X)											
3 Номинал	4 Пред. откл.		8		10		12		(14)		16		(18)	
			$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$
8	$\pm 0,30$		—	X	—	—	—	—	—	—	—	—	—	—
10			—	X	—	X	—	—	—	—	—	—	—	—
12			—	X	—	X	—	—	—	—	—	—	—	—
14	$\pm 0,35$		—	X	—	X	—	X	—	—	—	—	—	—
16			12	X	—	X	—	X	—	X	—	—	—	—
(18)		$\pm 0,2$	14	X	14	X	—	X	—	X	—	X	—	—
20			16	X	16	X	15	X	—	X	—	X	—	X
(22)			18	X	18	X	17	X	17	X	—	X	—	X
25	$\pm 0,40$		21	X	21	X	20	X	20	X	19	X	—	X
(23)			21	22	21	X	23	X	23	X	22	X	22	X
30			26	22	26	X	25	X	25	X	24	X	24	X
(32)			28	22	28	26	27	X	27	X	26	X	26	X
35		$\pm 0,3$	31	22	31	26	30	30	30	X	29	X	29	X
(38)			34	22	34	26	33	30	33	X	32	X	32	X
40	$\pm 0,50$		36	22	36	26	35	30	35	31	34	X	34	X
45			41	22	41	26	40	30	40	34	39	38	39	X
50			46	22	46	26	45	30	45	34	44	38	44	42
55			51	22	51	26	50	30	50	34	49	38	49	42
60			56	22	56	26	55	30	55	34	54	38	54	42
65	$\pm 0,60$		61	22	61	26	60	30	60	34	59	38	59	42
70		$\pm 0,4$	66	22	66	26	65	30	65	34	64	38	64	42
75			71	22	71	26	70	30	70	34	69	38	69	42
80			76	22	76	26	75	30	75	34	74	38	74	42
(85)	$\pm 0,70$		81	22	81	26	80	30	80	34	79	38	79	42
90			86	22	86	26	85	30	85	34	84	38	84	42

50

2. Threaded length  $l_0$  and distance from bearing surface of head to centre line of hole in body  $l_1$  for various nominal thread diameters  $d$  (The sign X indicates full threading).
5. Tolerance in  $l_1$

в мм

in mm

Таблица 2  
Table 22. Интервалы головки до оси отверстия и стержня  $l_1$  при отжечных болтах с резьбой на всей длине стержня)

20		(22)		24		(27)		30		36		42		48	
$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
24	X	—	X	—	—	—	—	—	—	—	—	—	—	—	—
26	X	28	X	—	X	—	—	—	—	—	—	—	—	—	—
29	X	28	X	28	X	—	X	—	—	—	—	—	—	—	—
32	X	31	X	31	X	—	X	—	—	—	—	—	—	—	—
34	X	33	X	33	X	32	X	—	X	—	—	—	—	—	—
39	X	35	X	38	X	37	X	36	X	—	—	—	—	—	—
44	X	43	X	43	X	42	X	41	X	40	X	—	—	—	—
49	46	48	X	48	X	47	X	46	X	45	X	—	X	—	—
54	46	53	50	53	X	52	X	51	X	50		48	X	—	—
59	46	58	50	56	54	57	X	56	X	55	X	53	X	—	X
61	46	63	50	63	54	62	60	61	X	60	X	58	X	58	X
69	46	68	50	68	54	67	60	66	60	65	X	63	X	63	X
74	46	73	50	73	54	72	60	71	66	70	X	68	X	68	X
79	46	78	50	78	54	77	60	76	66	75	X	73	X	73	X
84	46	83	50	83	54	82	60	81	66	80	79	79	X	78	X

2. Threaded length  $l_0$  and distance from bearing surface of head to centre line of the hole in body  $l_1$  for various nominal thread diameters  $d$  (The sign X indicates full threading).

2. Threaded length  $l_1$  and distance from bearing surface of head to centre<sup>o</sup> line of hole in body  $l_2$ , for various nominal thread diameters  $d$  (The sign X indicates full threading).

4. Tolerance 5. Tolerance in  $L_1$  6. Tolerance in  $L_0$   
 7. Coarse pitch thread  
 8. Line pitch thread

Page 7 GOST 7808-70

Стр. 7 ГОСТ 7808-70

Dimensions in mm

Размеры

Bolt length	1		5 Предел откл. $l_1$	2											
	Длина болта $l$			Длина резьбы $l_1$ и расстояние от опорной поверхности до центра линии отверстия $l_2$ (знаком X)											
	Номинал	Предел откл.		8		10		12		(14)		16		(18)	
3. Nominal			$l_1$	$l_2$	$l_1$	$l_2$	$l_1$	$l_2$	$l_1$	$l_2$	$l_1$	$l_2$	$l_1$	$l_2$	
(85)			91	22	91	26	90	30	90	34	89	38	89	42	
90			96	22	96	26	95	30	95	34	94	38	94	42	
(100)	±0,70	±0,4	—	—	101	26	100	30	100	34	99	38	99	42	
110			—	—	106	26	105	30	105	34	104	38	104	42	
(115)			—	—	111	26	110	30	110	34	109	38	109	42	
120			—	—	116	26	115	30	115	34	114	38	114	42	
(125)			—	—	121	26	120	30	120	34	119	38	119	42	
130			—	—	126	26	125	30	125	34	124	38	124	42	
140			—	—	136	26	135	30	135	34	134	38	134	42	
150	±0,80	±0,5	—	—	146	26	145	30	145	34	144	38	144	42	
160			—	—	156	32	155	36	155	40	154	44	154	48	
170			—	—	166	32	165	36	165	40	164	44	164	48	
180			—	—	176	32	175	36	175	40	174	44	174	48	
190			—	—	186	32	185	36	185	40	184	44	184	48	
200			—	—	196	32	195	36	195	40	194	44	194	48	
220	±1,00	±0,6	—	—	—	—	215	36	215	40	214	44	214	48	
240			—	—	—	—	235	36	235	40	234	44	234	48	
260			—	—	—	—	255	36	255	40	254	44	254	48	
280	±1,10	±0,7	—	—	—	—	—	—	275	40	274	44	274	48	
300			—	—	—	—	—	—	295	40	294	44	294	48	
6	7		+2,5	+3,0	+3,5		+4,0		+5,0						
	8		+2,0		+2,5		+3,0								

Note: Bolts with lengths given in brackets are not recommended to be used.

Example of conventional designation.

Bolt of arrangement 1, with thread diameter  $d = 12$  mm, length  $l = 60$  mm, coarse pitch thread with tolerance zone 8g, strength class 5.8, without plating.

Bolt M12 X 60.58 GOST 7808-70.

-Do- arrangement 2 with fine pitch thread tolerance zone 6g, strength class 10.9 made of steel grade 40 X with O1 plating to 6 microns thickness:

Bolt M12 X 1.25-6g X 60.109.40 X.016 GOST 7808-70.

In mm

Продолжение табл. 2  
Contd. Table 2

2. Диаметры в головке до оси отверстия в стержне  $l_0$  при  
отдельных болты с резьбой по всей длине стержня

20		(22)		24		(27)		30		36		42		48	
$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$	$l_1$	$l_0$
59	46	88	50	88	54	87	60	86	66	85	78	83	X	83	X
94	46	93	50	93	54	92	60	91	66	90	78	88	X	88	X
99	46	98	50	98	54	97	60	96	66	95	78	93	90	93	X
104	46	103	50	103	54	102	60	101	66	100	78	96	90	98	X
109	46	108	50	108	54	107	60	106	66	105	78	103	90	103	102
114	46	113	50	113	54	112	60	111	66	110	78	108	90	108	102
119	46	118	50	118	54	117	60	116	66	115	78	113	90	113	102
124	46	123	50	123	54	122	60	121	66	120	78	118	90	118	102
134	46	133	50	133	54	132	60	131	66	130	78	128	90	128	102
144	46	143	50	143	54	142	60	141	66	140	78	138	90	138	102
154	52	153	56	153	60	152	66	151	72	150	84	148	96	148	108
164	52	163	56	163	60	162	66	161	72	160	84	158	96	158	108
174	52	173	56	173	60	172	66	171	72	170	84	168	96	168	108
184	52	183	56	183	60	182	66	181	72	180	84	178	96	178	108
194	52	193	56	193	60	192	66	191	72	190	84	188	96	188	108
214	52	213	56	213	60	212	66	211	72	210	84	208	96	208	108
234	52	233	56	233	60	232	66	231	72	230	84	228	96	228	108
254	52	253	56	253	60	252	66	251	72	250	84	248	96	248	108
274	52	273	56	273	60	272	66	271	72	270	84	268	96	268	108
294	52	293	56	293	60	292	66	291	72	290	84	288	96	288	108
+5,0		+6,0				+7,0		+8,0		+9,0		+10,0			
+3,0		+4,0								+6,0					

2. Threaded length  $l_0$  and distance from bearing surface of head to centra line of hole in body  $l_1$  for various nominal thread diameters  $d$  (The sign X indicates full threading).

1. Weight of steel bolts (arrangement 1) with coarse Pitch thread

3. Теоретическая масса 100 шт болтов, кг., при номинальном диаметре резьбы d, мм

Bolt length l, mm	Theoretical weight of 100 bolts, kg., at nominal thread diameter d, mm															
	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	48
7,732																
8,458	13,57															
9,184	14,71															
9,910	15,85	25,09														
10,640	16,99	26,73	35,04													
11,360	18,12	28,37	37,28	55,80												
12,090	19,26	30,01	39,52	58,75	75,63											
12,810	20,40	31,65	41,76	61,70	79,39											
13,900	22,11	34,11	45,11	66,12	81,95	111,5										
15,150	23,81	36,57	48,47	70,54	90,51	118,4										
15,940	24,95	38,21	50,71	73,49	94,21	123,0	156,5									
16,720	26,32	39,85	52,95	76,44	97,92	127,6	162,1	195,6								
17,910	28,17	42,59	56,30	80,86	103,50	134,6	170,5	205,6	279,0							
19,090	30,02	45,26	59,66	85,28	109,00	141,5	178,9	215,6	291,7							
19,880	31,25	47,03	64,56	88,23	112,70	146,1	184,5	222,2	300,2	420,7						
21,860	34,34	51,48	70,60	96,26	122,00	157,7	198,5	238,8	321,3	426,8						
22,830	37,42	55,92	75,65	104,20	132,20	169,2	212,6	255,4	342,5	452,8	712,6					
25,810	40,51	60,36	82,70	112,10	142,20	181,9	226,6	272,0	363,7	478,9	750,3	1124				
27,780	43,59	64,80	88,74	120,00	152,20	194,3	242,6	288,6	384,9	504,9	787,9	1175				
29,760	46,68	69,25	94,79	127,80	162,20	206,6	257,5	307,4	406,0	531,0	825,5	1228	1729			
31,730	49,76	73,69	100,80	135,80	172,20	218,9	272,4	325,2	429,5	557,0	863,2	1278	1796			
33,710	52,85	78,13	106,90	143,70	182,20	231,3	287,4	342,9	452,0	585,6	900,8	1329	1863			

3. Theoretical weight of 100 nos bolts, kg approx, for various nominal diameters d, mm.



3. Theoretical weight of 1000 nos bolts, kg approx, for various nominal diameters d, mm.

1. Weight of steel bolts (arrangement 1) with coarse pitch thread

Table Contd.  
Продолжение

Диаметр болта D, мм	Теоретическая масса 1000 шт. болтов, кг ±, при условном значении резьбы d, мм															
	8	10	12	14	16	18	20	22	24	27	30	36	42	48		
80	35,680	55,93	82,57	112,90	151,60	192,20	243,6	302,3	350,7	474,4	613,4	938,4	1350	1930		
85	37,650	56,92	87,02	119,00	159,40	202,20	256,0	317,2	373,5	496,0	641,1	976,0	1432	1998		
90	39,630	62,10	91,46	123,00	167,40	212,20	268,3	332,2	396,2	519,4	668,9	1018,0	1483	2055		
95	41,600	65,15	95,90	131,10	175,20	222,20	280,6	347,1	414,0	541,0	695,7	1049,0	1534	2132		
100	43,580	68,27	100,30	137,10	183,10	232,27	293,0	362,0	431,8	564,4	721,4	1098,0	1585	2199		
105	—	71,36	104,80	143,20	191,00	242,10	305,3	377,0	449,6	586,9	752,2	1138,0	1635	2265		
110	—	74,44	109,20	149,20	199,90	252,10	317,7	391,9	467,3	600,4	780,0	1178,0	1686	2332		
115	—	77,52	113,70	155,30	208,60	262,10	330,0	406,8	485,1	631,9	807,7	1218,0	1737	2400		
120	—	80,60	118,10	161,30	217,70	272,10	342,3	421,8	502,0	651,4	830,5	1258,0	1788	2460		
125	—	83,70	122,60	167,40	222,60	282,10	354,7	436,7	520,0	676,8	863,3	1298,0	1840	2530		
130	—	86,78	127,00	173,40	229,50	292,10	367,0	451,6	538,4	699,3	891,0	1338,0	1892	2603		
140	—	92,94	135,90	185,50	246,30	312,10	391,7	481,5	574,0	741,3	946,0	1418,0	2023	2765		
150	—	99,11	144,50	197,60	263,10	322,10	416,1	511,3	606,5	789,3	1022,0	1498,0	2134	2907		
160	—	105,28	153,00	207,70	277,90	332,10	441,1	541,2	643,0	831,3	1058,0	1578,0	2244	3049		
170	—	111,40	162,50	221,80	293,70	342,10	465,7	571,0	680,6	879,3	1113,0	1658,0	2353	3191		
180	—	117,54	171,40	228,90	309,50	352,10	490,4	601,0	710,1	924,3	1168,0	1738,0	2461	3333		
190	—	123,68	180,30	246,00	325,30	362,10	515,1	630,8	751,0	989,2	1223,0	1818,0	2570	3475		
200	—	129,82	189,20	253,00	341,10	372,10	540,0	660,7	787,2	1044,0	1280,0	1898,0	2678	3618		
220	—	—	207,00	—	372,00	472,00	589,1	729,4	858,2	1101,0	1391,0	2058,0	2897	3902		
240	—	—	221,00	305,40	404,30	512,00	638,5	789,1	929,4	1191,0	1502,0	2218,0	3115	4165		
260	—	—	245,50	330,80	435,90	552,00	687,6	838,9	1091,0	1284,0	1613,0	2378,0	3332	4471		
280	—	—	—	351,80	467,50	592,00	737,2	896,5	1072,0	1374,0	1724,0	2538,0	3559	4755		
300	—	—	—	378,00	499,00	632,00	786,6	956,3	1143,0	1461,0	1835,0	2698,0	3786	5039		

8. Для определения массы болтов из других материалов величину массы, указанную в таблице, следует умножить на коэффициент 0,356 — для алюминия, 0,280 — для латуни.

Weights indicated in the Table are to be multiplied by 0.356 for aluminium alloys and by 1.080 for brass.

Hexagon bolts with reduced head

(Improved accuracy)

Constructions and Dimensions

By resolution of USSR State Committee on Standards No. 1619 of 270301981 this revision comes into force

from 01.07.1981

Clause 2. Drawing. Arrangement 1.

Amend designations and dimension as follows:

$R_{z 80}$  to  $12.5$ ;  $R_{z 40}$  to  $6.3$ ;  $R_{z 20}$  to  $3.2$ ;  
 $\approx 30^\circ$  to  $15^\circ$   $30^\circ$ ;

Parameter	Amend the words:	To read
"Head height H"	Tolerance -	Tolerance js14
"Diameter of hole in body $d_3$ ".	Tolerance -	Tolerance H 14
"Diameter of hole in head $d_4$ ".	Tolerance -	Tolerance H 15
"Distance of bearing surface from centre line of hole in head $d_2$ ".	Tolerance - and its value $\pm 0.25$ $\pm 0.30$	Tolerance js15  $\pm 0.24$ $\pm 0.29$
"Diameter of body $d_1$ ".	Tolerance - and its value -0.20 -0.24 -0.28 -0.34	Tolerance h13  -0.22 -0.27 -0.33 -0.39
"Dimension width across flats S"	Tolerance - and its value -0.24 -0.28 -0.34 -0.40	Tolerance h13  -0.27 -0.33 -0.39 -0.46

Parameter	Amendment						
Maximum displacement of centre line of hole in body with respect to centre line of thread	Insert new version						
Maximum displacement of centre line of head with respect of body	Insert new version						
Nominal thread diameter d	8	10	12	(14)	16	(18)	20
Tolerance in symmetry of hole in body with respect to thread centre line in the diametral expression 21T13	0.44		0.54			0.66	
Tolerance in symmetry of head with respect to centre line of body in the diametral expression 21T13	0.54			0.66			
Nominal thread diameter d	(22)	24	(27)	30	36	42	48
Tolerance in symmetry of hole in body with respect to thread centre line in the diametral expression 21T13	0.66			0.78			
Tolerance in symmetry of head with respect to centre line of body in the diametral expression 21T13	0.66	0.78			0.92		

Clause 2. Table 2. Heading "Bolt length l"  
 Amend the word Tolerance<sup>1c</sup> read Tolerance j 15  
 Amend the value  $\pm 30$  to read  $\pm 0.29$   
 Amend the value  $\pm 1.00$  to read  $\pm 0.92$

Table 2. Delete column heading "Tolerance l"<sub>1</sub>  
 In the heading of the Table after the words  
 "to the centre line of the hole in body l<sub>1</sub>" add the words "Tolerance  
 + 1T14".

Example of conventional designation.  
 Amend designation 1.256g to read 1.25-6g.

Tolerances Zones for hexagon bolts in the  
OCT and ЕСДП СЭВ Systems

Tolerance Zones	
In OCT System	In ЕСДП СЭВ System
B <sub>5</sub>	h13
CM <sub>7</sub>	js14
A <sub>7</sub>	H14
A <sub>8</sub>	H15
CM <sub>8</sub>	js15

Bolts may, with customer's concurrence, be made to tolerances given in the reference annexure No.2, if it becomes necessary to provide interchangeability for use in articles designed before 01.01.1980.

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GOST

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MASTER COPY

STATE STANDARD OF THE USSR

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WASHERS

TECHNICAL CONDITIONS

GOST 11371-78

OFFICIAL EDITION

USSR STATE COMMITTEE ON STANDARDS

MOSCOW

*Note: - Do not scribble in the specifications.*

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## USSR STATE STANDARD

WASHERS

TECHNICAL CONDITIONS

GOST

11371-78

This supercedes

GOST 11371-68

BY ORDER NO. 1674 DATED 26th JUNE 1978 OF THE USSR STATE  
COMMITTEE ON STANDARDS THIS STANDARD IS VALID FROM 01.01.1979  
TO 01.01.1984

~~NONOBSERVANCE OF THIS STANDARD IS PUNISHABLE BY LAW~~

The present standard is applicable to normal washers for fasteners with thread diameter from 1 to 48 mm.

The standard is conformity with the COMECON standards ST SEV 290-76 and ST SEV 281-76 for diameters from 1 to 48 mm and with ST SEV 219-75 in respect of maximum permissible deviations in inside and outside diameters and in respect of noncoaxiality of washers of thickness upto 4 mm and tolerance classes A and C.

## 1. DIMENSIONS

Washer dimensions must conform to the values given in the drawing and Table.

OFFICIAL EDITION

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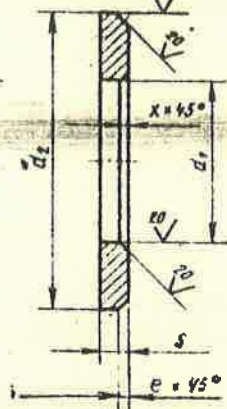
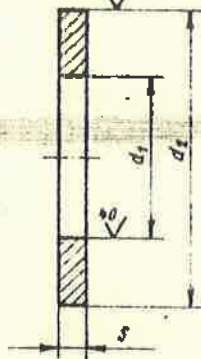
Исполнение 1

Исполнение 2

∇ (∇)

Variant 1

Variant 2



conventional

Example of notational designation of washers for a fastener of variant 1, diameter 12 mm and standard thickness made of material of group 01 with plating type 01 of thickness 9 microns; <sup>ings</sup> <sup>culr</sup>

Washer 12.01.019 GOST 11371-78

Ditto of variant 2

Washer 2.12.01.019 GOST 11371-78

1.2. The following are permitted by mutual agreement between manufacturer and user:

Making washers of other thicknesses;

Using washers with internal diameters 12.5, 14.5 and 16.5 mm

## 2. TECHNICAL REQUIREMENTS

2.1. Washers must be manufactured in conformity with the requirements of the present standard and GOST 18123-72.

2.2. Maximum <sup>L (m) or</sup> permissible deviations in washer dimensions as per ST SEV 144-75 and ST SEV 145-75;

in hole diameter  $d_1$  - follow H14 for variant 1 and H13 for variant 2;

in outside diameter  $d_2$  - follow h14; in <sup>misalignment</sup> noncoaxiality of hole diameter  $d_1$  with respect to outside diameter  $d_2$

$$\text{for } d_2 \leq 50 - \frac{IT15}{2}$$

$$\text{for } d_2 > 50 - \frac{IT16}{2}$$

2.3. The reference annexure lists theoretical weights of washers.

## 3. ACCEPTANCE PROCEDURE

3.1. Acceptance procedure for rough class of accuracy washers follows GOST 17769-72.

## 4. INSPECTION PROCEDURE

4.1. Inspection procedure for washers follows GOST 18123-72.

## 5. PACKING AND MARKING

5.1. Packing of washers and <sup>Package</sup> case markings follow GOST 18160-72.



mm

Thread diameter of fastener <i>ings</i>	$d_1$	$d_2$	$s$	$e$		$x$ , not less than
				not <sup>more</sup> greater than	not less than	
1.0	1.1	3.5				
1.2	1.3					
1.4	1.5	4.0	0.3	0.08	0.15	0.15
1.6	1.7					
2.0	2.2	5.0				
2.5	2.7	6.5	0.5	0.13	0.25	0.25
3.0	3.2	7.0				
4.0	4.3	9.0	0.8	0.20	0.40	0.40
5.0	5.3	10.0	1.0	0.25	0.50	0.50
6.0	6.4	12.5	1.6	0.40	0.80	0.80
8.0	8.4	17.0				
10.0	10.5	21.0	2.0	0.50	1.00	1.00
12.0	13.0	24.0				
14.0	15.0	28.0	2.5	0.60	1.25	1.25
16.0	17.0	30.0				
18.0	19.0	34.0				
20.0	21.0	37.0	3.0	0.75	1.50	
22.0	23.0	39.0				1.50
24.0	25.0	44.0				
27.0	28.0	50.0	4.0	1.00	2.00	
30.0	31.0	56.0				
36.0	37.0	66.0	5.0	1.25	2.50	
42.0	43.0	78.0	7.0	1.75	3.50	2.10
48.0	50.0	92.0	8.0	2.00	4.00	2.40

## Notes:

Washers of variant 2 may be manufactured without chamfer but with the edges rounded off to radius  $e$ .

Washers of variant 2 may be manufactured without internal chamfer.

Annexure

Reference

## WEIGHTS OF STEEL WASHERS

Thread diameter of fastener mm	Theoretical weight of 1000 nos. in variant		Thread diameter of fastener mm	Theoretical weight of 1000 nos. in variant	
	1	2		1	2
1.0	0.021	0.020	12.0	6.270	5.558
1.2	0.026	0.025	14.0	8.620	7.795
1.4	0.025	0.023	16.0	11.300	10.000
1.6	0.024	0.022	18.0	14.700	13.230
2.0	0.037	0.035	20.0	17.160	15.560
2.5	0.109	0.102	22.0	18.350	16.530
3.0	0.119	0.110	24.0	32.330	29.530
4.0	0.308	0.282	27.0	42.310	39.120
5.0	0.450	0.415	30.0	53.640	50.080
6.0	1.139	0.990	36.0	92.080	86.120
8.0	2.150	1.949	42.0	182.770	169.070
10.0	4.080	3.699	48.0	294.170	273.090

Notes: The weights given in the Table are to be multiplied by the factors given below for determining the weight of washers made out of other materials:

- 0.35 - for aluminium alloy;
- 0.97 - for bronze;
- 1.08 - for brass;
- 1.13 - for copper.

BASE UNITS SI

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Quantity	Units		
	Name	Abbreviations	
		Russian	International
LENGTH	metre	M	m
MASS	kilogram	k	kg
TIME	second	C	s
ELECTRIC CURRENT	ampere	A	A
Thermodynamic temperature	kelvin	K	K
Amount of substance	mole	Моля	mol
Luminous Intensity	candela	кд	cd

SUPPLEMENTARY UNITS

Plane angle	radian	рад	rad
Solid angle	steradian	ср	sr


DERIVED UNITS SI HAVING PROPRIETARY NAMES

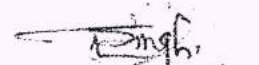
Quantity	Unit	Expressed in derived units			
	Name	Abbreviation	in terms of other units SI	in terms of base units SI	
Frequency	hertz	Гц Hz	-	$s^{-1}$	
Force	newton	Н N	-	$m, kg, s^{-2}$	
Pressure	pascal	Па Pa	N/m	$m^{-1}, kg, s^{-2}$	
Energy, work, heat	joule	Дж J	N.m	$m^2, kg, s^{-2}$	
Power, Rate of flow of energy	watt	Вт W	J/s	$m^2, kg, s^{-3}$	
Quantity of electricity, electrical charge	coulomb	Кл C	A.s	s.A	
Electrical voltage, potential difference	volt	В V	W/A	$m^2, kg, s^{-1}, A^{-1}$	
Capacitance	farad	Ф F	C/V	$m^{-2}, kg^{-1}, s^4, A^2$	
Resistance	ohm	Ом Ω	V/A	$m^2, kg, s^{-3}, A^{-2}$	
Conductance	siemens	См S	A/V	$m^{-2}, kg^{-1}, s^3, A^2$	
Magnetic flux	weber	Вб Wb	W.s	$m^2, kg, s^{-1}, A$	
Magnetic flux density	tesla	Тл T	Wb/m	$kg, s^{-1}, A^{-1}$	
Inductance	henry	Гн H	Wb/A	$m^2, kg, s^{-2}, A^{-2}$	
Luminous flux	lumen	лм lm	-	cd.sr	
Brightness	lux	лк lx	-	$m^{-2}, cd, sr^{-1}$	
Nucleid activity	becquerel	Бк Bq	-	$s^{-1}$	
Radiation dose	grey	Гр Gy	-	$m^2, s^{-2}$	


\* The supplementary unit steradian figures in these two expressions along with base units.

**MACHINED COMPONENTS (GROUP -II)**

Sl no.	Nomenclature & drawing No.	Manufacturing technology & Testing / Inspection Facilities required to produce the item		Must be possessed by the vendor in his premises (P&M list and testing / inspection equipment list to be submitted)	May be possessed by the vendor in his premises or out sourced (Self declaration to be submitted)	FIRM Compliance (Y/N)	Remarks
1	Components as per enclosed list of Machined Components (Group II) <i>Total items = 48 Nos</i>	TECHNOLOGY-1	Turning	CNC Turning machine suitable to accommodate component upto 150 mm diameter with 0.010mm accuracy			
			Milling & Drilling	HMC/VMC machine as per component requirement with 0.010mm accuracy			
			Grinding	Internal/ External /Surface grinding machine as per component requirement with 0.010mm accuracy			
			Gear machining		Gears machining by Hobbing / Gear Shaping/ Broaching method as per component requirement with class 7 accuracy		
		TECHNOLOGY-2	Heat Treatment		Carburising, Hardening, Induction Hardening & Tempering furnace with Oil quenching facility suitable to the components		
			Protection coating		Oxidising , Phosphating, Zinc chromatising, Hard Chromium Plant suitable to the components		
		TECHNOLOGY-3	Raw material		Firm should be capable to arrange the raw material like forging, casting, bar material etc as per drawing specification and standard.		

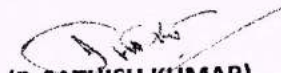
  
**(D.SATHISH KUMAR)**  
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**(LUXMAN SINGH)**  
 WM/TRG-II,HT & EP


  
**(K.DURAIRAJ)**  
 JWM/Trans -II

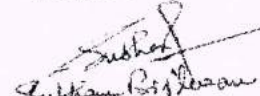
Sl. no.	Nomenclature & drawing No.	Manufacturing technology & Testing / Inspection Facilities required to produce the item	Must be possessed by the vendor in his premises (P&M list and testing / inspection equipment list to be submitted)	May be possessed by the vendor in his premises or out sourced (Self declaration to be submitted)	FIRM Compliance (Y/N)	Remarks
1	Components as per enclosed list of Machined Components (Group II)	TEST / INSPECTION-1	3D CMM	3D CMM 300 x 300mm		
			Surface Roughness Tester		Surface Roughness Tester for Ra & Rz values	
			Gauges	Standard Gauges for checking <del>holes and threads</del> suitable to the requirement of the components. Firm should submit the undertaking in this regard that they will create the facilities within 6 months from the date of receipt of order.		
			Measuring Instruments	Vernier Caliper, Groove Vernier, Gear tooth Micrometer, Radius gauge, Feeler Gauge etc. suitable to the requirement of the components	Profile projector for checking profiles / splines at 10X magnification	
		TEST / INSPECTION-2	Hardness measurement		Brinell / Rockwell Hardness Tester	

Note : Justification for alternate facilities may be shared to prove that alternate facilities can be utilised to manufacture the item wherever the facilities are mentioned above are not available, but vendor has alternate facilities.

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

**FOR**

**(DISC RETAINER/LOCKING DISC/DISC RETAINING)**

**DRG.NO. 188.28.004SB**

**(LF NO: 6201028026)**

**No HVF/T-90/QAP/28/DISC RETAINER/LOCKING  
DISC/DISC RETAINING/242858- 00**

**ISSUE No:00**

**DATE: FEB-2022**

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

**HEAVY VEHICLES FACTORY**


**AVADI CHENNAI – 600 054**

**QUALITY ASSURANCE PLAN (QAP)**  
**FOR**  
**DISC RETAINER/LOCKING DISC/DISC RETAINING**  
**DRG. NO. 188.28.004SB**


PREPARED BY

  
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AVADI CHENNAI – 600 054

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## **1.IMPORTANT NOTE**

### **Note-1**

This is only a provisional and will be amended from time to time according to the requirement. No addition, deletion and reproduction will be done without permission of The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 54.

### **Note –2**

Any instruction contained in this does not prejudice the terms and conditions of the contract what so ever. In case of any contradiction between the contents of this QAP and the clause in the contract, the latter will prevail.

### **Note-3**

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

### **Note-4**

Any amendment issued by the Inspection Authority shall be incorporated in the QAP and the records for the amendments carried out should be maintained as per the Performa at Appendix-"A".

### **Note-5**

In case of any contradiction between the contents of this QAP and drawings issued along with the contract, the latter will prevail.

## **2.INTRODUCTION**

1. This quality plan lays down the inspection and testing procedure to be carried out on the component **DISC RETAINER/LOCKING DISC/DISC RETAINING TO DRG.NO 188.28.004SB** being procured indigenously. This is prepared, based on the acceptance standards and inspection parameters laid down in collaborators documents and on the inspection test standards followed in respect of similar indigenous items.
2. This QAP is the property of Government of India and is liable for amendments as and when required. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054, is the inspecting Authority for this assembly. Any query / clarification on the content of this QAP shall be referred to this Factory. Any departure from these instructions is allowed only after written approval from the above authority. Notwithstanding the tests indicated in this QAP, the inspecting Officer has the right to carry out any test to check conformance to the paper particulars quoted in the Supply Order, which he may consider necessary to satisfy himself about the stores which he has to accept.

## **3.AIM**

The QAP is aimed at standardizing the Inspection procedure and acceptance norm for **DISC RETAINER/LOCKING DISC/DISC RETAINING TO DRG.NO:188.28.004SB.**

It also aims at giving adequate information to the manufacturer on the quality requirements so that the required quality control methods are established. This is also meant to guide authorized Inspection Officer in his routine inspection and to set out main points to which his attention must be drawn to ensure that the accepted stores meet the stipulated standards.

#### **4. SCOPE:**

This QAP outlines in general terms, the checks and methods to be used during inspection of **DISC RETAINER/LOCKING DISC/DISC RETAINING TO DRG. NO. 188.28.004SB** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

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

#### **NOTE-I:**

- i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.
- ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.
- iii. In case of S.O, it is the responsible of the vendor to obtained copy of QAP and give the statement of compliance that the vendor will follow QAP. However, GM/HVF reserves the right to revise/update the QAP from time to time.

#### **5. DOCUMENTS:**

- a) On placement of firm supply order, One set of relevant specification and technical instructions on the subject item can be obtained by the contractor from AHSP through DDO/HVF
- b) Any clarification required on these documents should be obtained from the Inspecting Authority i.e. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. Equivalentents to the collaborators specifications and standards will be decided only by the Inspecting Authority and should not be unilaterally decided. For any change in the specifications, standards or written approval, any alterations in specification can be affected and not otherwise.
- c) The process instruction sheets supplied by the collaborators are available with the Authority Holding Sealed Particulars, i.e. The Controllerate of Quality Assurance (Heavy Vehicles), Avadi, Chennai for the reference. The relevant process sheets may be studied at the premises of the AHSP after obtaining necessary permission.

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

**6. ITEM USED ON:**

**7. LIST OF DRAWINGS:**

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
	188.28.004SB	DISC RETAINER/LOCKING DISC/DISC RETAINING	-
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	-
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	-
3.	175.28.003-2	LOCKING DISC/ DISC RETAINING	-
<b>STANDARD ITEMS</b>			
4.	GOST 7808- 70	BOLT 3M8X1- 6gx14.88.38XC	-
5.	GOST 11371- 78	WASHER C.8.01.016	-

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

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	Qty
	188.28.004SB	DISC RETAINER/LOCKING DISC/DISC RETAINING	-----	1
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL 38XC GOST 4543-71	1
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL 38XC GOST 4543-71	1
3.	175.28.003-2	LOCKING DISC/ DISC RETAINING	STEEL 38XC GOST 4543-71	1
<b>STANDARD ITEMS</b>				
4.	GOST 7808- 70	BOLT 3M8X1- 6gx14.88.38XC	Refer GOST 7808- 70	5

5.	GOST 11371-78	WASHER C.8.01.016	Refer GOST 11371-78	5
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**Note:** Vendor/Contractor may use approved alternate material if any specified in drawing/ specification.\* Also refer Para no.13.

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

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

- (a) The threaded parts if any should be covered with suitable plastic caps to prevent damages.
- (b) If the item consists of assemblies, each assembly should be packed separately.
- (c) The stores are to be suitably covered for preventing ingress of dust and Dirt/entry of sunlight / moisture.
- (d) The packaging slip shall contains
  - (i) Certificate of testing- NABL Certificate.
  - (ii) Guarantee/ Warranty Certificate
  - (iii) Service and maintenance instructions
  - (iv) Delivery Slip with Inspector's Acceptance Mark
  - (v) Undertaking letter / certificate of conformance (As applicable).
- (e) The stores are not permitted to be stored together with oils. Petrol, acids, alkaline and other substances to avoid damage to the metal / rubber components.

## **10.SAMPLING PLAN:**

Sl. No.	Sampling Plan	Pilot	Bulk
(i)	Visual Inspection	100%	100%
(ii)	Dimensional Inspection	100%	General Inspection level III, single sampling, Normal Inspection, AQL 2.5 of IS 2500 (Part-I)-2000
(iii)	Material Inspection	1 No	1 No. for each batch of raw material or heat treatment lot as required by specifications.
(iv)	Acceptance test	100 %	100 %
(v)	Pressure testing	-----	-----
(vi)	Machining/Fitment/ Performance trial on	01 No.	01 No. per batch/As required.

	higher assembly / Tank		
vii)	Interchangeability Test	02 Nos.	02 Nos.Per batch on randomly basis, except selective assembly.
viii)	Test stand/Jigs/ Fixtures/Gauges/Man drels/etc.	100 %	100 %
ix)	Marking/Identification	100%	100%
x)	Packing/ Preservation	100%	100%

**Note:-**

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

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

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

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

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

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

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

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

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
	188.28.004SB	DISC RETAINER/LOCKING DISC/DISC RETAINING	All dimensions should be confirmed against each item as per relevant drawing/specification.
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	
3.	175.28.003-2	LOCKING DISC/ DISC RETAINING	
<b>STANDARD ITEMS</b>			
4.	GOST 7808- 70	BOLT 3M8X1- 6gx14.88.38XC	All dimensions should be confirmed against each item as per relevant drawing/specification.
5.	GOST 11371- 78	WASHER C.8.01.016	

**Note:**

1. Surface finish/Roughness of items should be ensured as per drawing and specification.
2. Refer drawing/specification for admissible alternate manufacture in dimensions/material if any specified for the component.
3. Place for testing hardness refer drawing.
4. Spline/Gear details dimensions including profile is to be confirmed as per drawing.

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

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

**13.1 LOCKING QUADRANT/ SECTOR, RETAINING TO DRG.NO: 175.28.001-2, LOCKING QUADRANT/ SECTOR, RETAINING TO DRG.NO: 175.28.002-1 & LOCKING DISC/ DISC RETAINING TO DRG.NO: 175.28.003- 2.**

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

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

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

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

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

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

Note: For other properties refer GOST 4543-71

**13.2 BOLT 3M8X1-6gx14.88.38XC TO SPECIFITION GOST 7808-70 & WASHER C.8.01.016 TO SPECIFITION GOST 11371-78.**

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1.	GOST 7808-70	BOLT 3M8X1-6gx14.88.38XC	The material parameters (Chemical and Mechanical) should be conformed against each item as per relevant drawing/specification.
2.	GOST 11371-78	WASHER C.8.01.016	

**14) PERFORMANCES/ACCEPTANCE TEST:**

**14.1 DISC RETAINER/LOCKING DISC/DISC RETAINING TO DRG.NO: 188.28.004SB**

1. Non standard welds - gas shielded arc welding.
2. Manual arc welding is allowed.
3. Coating for internal surfaces primer  $\phi 11-03K$  requirements as per 520.TY5.
4. \*Dimensions for reference.
5. Other requirements as per 520.TY1.

SI. NO.	DRG. NO	NOMENCLATURE	REMARKS
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	All technical requirements (T.R) points to be conformed against each item as per relevant drawing/specification.
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	
3.	175.28.003-2	LOCKING DISC/ DISC RETAINING	
<b>STANDARD ITEMS</b>			

4.	GOST 7808-70	BOLT 3M8X1-6gx14.88.38XC	All technical requirements (T.R) points to be conformed against each item as per relevant drawing/specification.
5.	GOST 11371-78	WASHER C.8.01.016	

**LOCKING QUADRANT/SECTOR, RETAINING TO DRG.NO: 175.28.001-2 TEETH / GEAR DETAILS:**

MODULE		m	0.7
NUMBER OF TEETH		Z	182
BASIC RACK	ANGLE OF PROFILE		$\alpha$ 20°
	COEFFICIENT OF	ADDENDUM	f' 1
		DEDENDUM	f'' 1.25
	FILLET RADII		ρ 0.3
ADDENDUM MODIFICATION COEFFICIENT		ε	0
BASE TANGENT LENGTH		ℓ	44.15 <sup>+0.135</sup> <sub>-0.084</sub>
TOLERANCE ON BASE TANGENT LENGTH		δℓ	0.045
REFERENCE DIAMETER		A	127.4
DRAWING NUMBER OF THE MATING COMPONENT		175.28.003 -2	

**LOCKING QUADRANT/SECTOR, RETAINING TO DRG.NO: 175.28.002-1 GEAR DETAILS:**

MODULE		m	0.7
NUMBER OF TEETH		Z	182
BASIC RACK	PROFILE ANGLE		α 20°
	COEFFICIENT OF	ADDENDUM	f' 1
		DEDENDUM	f'' 1.25
	FILLET RADIUS		ρ 0.3
ADDENDUM MODIFICATION COEFFICIENT		ε	0
BASE TANGENT LENGTH		ℓ	44.15 <sup>+0.135</sup> <sub>+0.084</sub>
TOLERANCES ON BASE TANGENT LENGTH		δ <sub>0</sub> ℓ	0.045
REFERENCE DIAMETER		A	127.4
DRAWING NUMBER OF MATING COMPONENT		175.28.003 -2	



**LOCKING DISC / DISC RETAINING TO DRG.NO: 175.28.003-2 SPLINE / GEAR  
DETAILS:**

		9628×1.5×18A <sub>34</sub> 50		MODULE		m	0.7		
MODULE		m	1.5	NUMBER OF TEETH		Z	182		
INITIAL PARAMETERS	NUMBER OF TEETH	Z	18	BASIC RACK	ANGLE OF PROFILE		$\alpha$	20°	
	PROFILE ANGLE	$\alpha$	30		COEFFICIENT OF	ADDENDUM	$f'$	1	
	ADDENDUM MODIFICATION SHIFT	$\xi$	-0.25			DEDUNDUM	$f''$	1.25	
	TOOTH SPACE WIDTH ALONG THE ARC OF REFERENCE CIRCLE				-0.07	FILLET RADIUS		$\gamma_L$	0.3
					2.067	ADDENDUM MODIFICATION COEFFICIENT		$\xi$	0
			-0.03	BASE TANGENT LENGTH		$L$	$44.15$ $-0.155$		
				TOLERANCE OF BASE TANGENT LENGTH		$6\sigma L$	0.045		
				REFERENCE DIAMETER		$A$	127.4		
				DRAWING NUMBER OF MATING COMPONENT			175.28.001-2 175.28.001-1		

**15) FITMENT AND PERFORMANCE TEST:**

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

**EXPLANATORY NOTE:**

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

**16) INTERCHANGEABILITY:**

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

**17) CALIBRATION CHECKS**

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

The supplier / Contractor should have suitable Instruments, Test Stand, jigs, fixture, mandrels and gauges to carry out quality checks, to ensure

conformance of components/assembly as per drawing and Specification /T.R points.

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

#### **18) MARKING/IDENTIFICATION**

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

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

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

#### **19) PRESERVATION CHECK**

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

#### **20) PACKING CHECK**

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

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

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

#### **21) DOCUMENTATION**

- i. Firm has to maintain all the documents as per QAP with respect to the Sl.No.to have traceability.
- ii. Vendor has to submit Bill of materials, Material test reports, Class 'C' /Endurance test reports (wherever specified in drawing/TY specification/QAP) and Complete PIR (pre-inspection report)at the time of offering the item for inspection. HVF will commence inspection only after scrutiny of these documents.

- iii. The testing/inspection responsibility to test all the parameters as per QAP and drawing specifications as mentioned in Annexure -A (enclosed).
- iv. Pre inspection reports (PIR) of firm like, 1. Chemical analysis (NABL Certificate), 2.Mechanical properties(NABL Certificate), 3. Pre-forming process, 4. Coating certification. 5. Calibration reports of instruments and 6. 100 % Dimensional inspection reports including reports of Spline/Gear profiles.

**22) REFERENCE:**

- 1. Drawing No:188.28.004SB,175.28.003-2, 175.28.001-2, 175.28.002-1,175.28.007CB-2 & 175.28.001-1
- 2. Material specification as per drawing:

SI. NO	DRG. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS
	188.28.004SB	DISC RETAINER/LOCKING DISC/DISC RETAINING	-----
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL 38XC GOST 4543-71
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL 38XC GOST 4543-71
3.	175.28.003-2	LOCKING DISC/ DISC RETAINING	STEEL 38XC GOST 4543-71
4.	GOST 7808-70	BOLT 3M8X1-6gx14.88.38XC	Refer GOST 7808-70
5.	GOST 11371-78	WASHER C.8.01.016	Refer GOST 11371-78

- 3. GOST 4543-71, GOST 11731-78 & GOST 7808-70, GOST 2930-62.
- 4. Specification: 520 TY 1 & 520 TY5.
- 5. Alternate material:

SI. NO	DRG. NO	NOMENCLATURE	ALTERNATE MATERIAL SPECIFICATIONS
1.	175.28.001-2	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL GRADE 817M40, BS:970 PT-1-1983
2.	175.28.002-1	LOCKING QUADRANT/ SECTOR, RETAINING	STEEL GRADE 817M40, BS:970 PT-1-1983

- 6. **INSPECTION NOTE:** FOR LIST OF GAUGES AND FIXTURE REFER GAUGE SHEET NO: GS(W)-10135, SHT1 & SHT2.

**ANNEXURE-A**

SL. NO.	CATEGORY	ASSEMBLY/SU B ASSEMBLY	TESTS/INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
						Firm	HVF	DGQA	
1	DISC RETAINER/ LOCKING DISC/DISC RETAINING TO DRG. NO 188.28.004SB	Pre inspection reports (PIR) of firm	Firm has to produced all the document as per Para 21 (iv)	As per the relevant drawing and QAP.	Confirm to drawing and QAP as per bill of material	P	V	R	100% by firm/ vendor.
2		Bill of material (BOM)	Firm has to prepare the BOM as per QAP	Refer QAP Para no: 8 or item list.	Confirm to QAP.	P	V	R	100% by firm/ vendor.
3		Material tests	Chemical composition & Mechanical / Physical Properties	As per-GOST 4543-71, GOST 7808-70 & GOST 11371-78	All the values to confirm with QAP(Para no:13.1 (a), (b) & (c) & 13.2	P	W/V	R	SP followed by HVF.
4		Hardness checks	Hardness	Refer QAP Para no: 14	Confirm to QAP Para no: 14	P	V	R	SP followed by HVF.
5		Coating	Coating	Refer QAP Para no: 14.1	Confirm to QAP Para no: 14.1	P	V	R	SP followed by HVF.
6		Dimensional checks	Dimensions as per the drawing	Refer drawing /QAP Para no: 12	Confirm to drawing and QAP	P	W/P	R	100% by firm/ vendor SP followed by HVF.
7		Marking / traceability	Firm has to make marking / traceability records.	Refer QAP Para no: 18	Confirm to QAP Para no: 18	P	V	R	100% by firm/ vendor.
8		Preservation & packing	Firm has to make Preservation & packing records	Refer QAP Para no: 19 & 20	Confirm to QAP Para no: 19 & 20	P	V	R	100% by firm/ vendor.

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

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

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

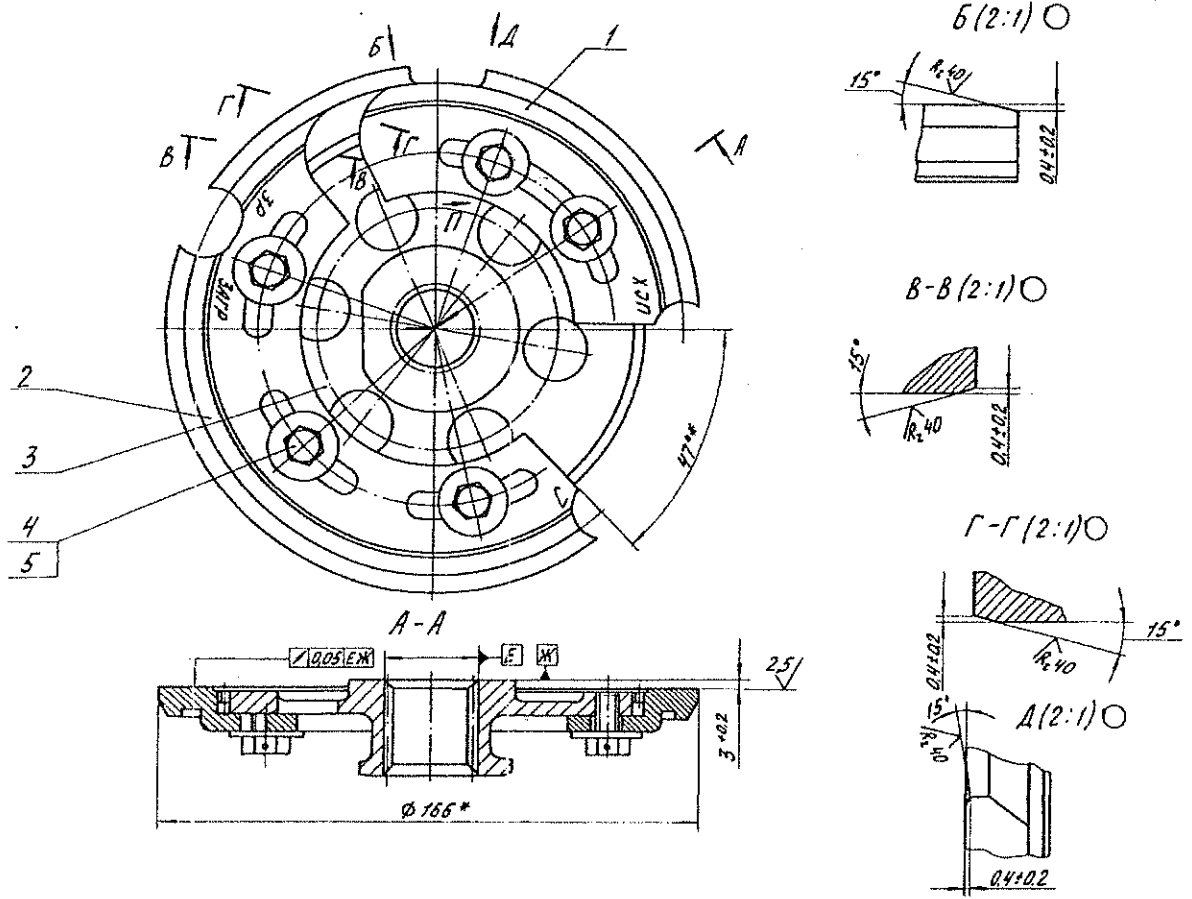


FIG: DISC RETAINER/LOCKING DISC/DISC RETAINING TO DRG. NO  
 188.28.004SB  
 (For reference only)

