

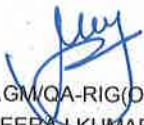
VENDOR QUALIFICATION CRITERIA

Sl. No.	Nomenclature & drawing No.	Manufacturing Technology & Testing / Inspection facilities required to produce the item	Essential (To be possessed by the vendor in his premises) (P & M list and Testing / Inspection Equipment list to be submitted)	Desirable (May be possessed by the vendor in his premises or out sourced) (Self declaration to be submitted)	Firm Compliance (Y/N)	
	7056594115 BEARING 941/15 GOST: 4060 (941/15) (Needle)	TECHNOLOGY-1	Forging Process		Suitable Cold/ heading heading machines	
		TECHNOLOGY-2	Flash removal		Suitable Deflashing machine	
		TECHNOLOGY-3	Heat treatment		Heat treatment plant.	
		TECHNOLOGY-4	Needle roller grinding		Suitable Double Disc needle roller grinding machine Accuracy 0.005mm	
		TECHNOLOGY-5	Needle roller edge preparation		Suitable edge preparation grinding machine.	
		TECHNOLOGY-6	Needle roller lapping		Suitable Double Disc needle roller lapping machine	
		TECHNOLOGY-7	Demagnetisation		Demagnetising Machine	
		INSPECTION-1	Test-1	1.Roundness Tester 2.Crack Detection Machine	1.Hardness Tester.	
		INSPECTION-2	Testing		NABL 1.Spectroscopy 2. Hardness Test 3. Macro & micro structure analysis.	
		INSPECTION-3	Surface finish		1. Surface Finish Tester	
2	Race	TECHNOLOGY-1	Raw material Preparation		Tube Stock Machining	
		TECHNOLOGY-2	Machining	CNC Turning or other suitable process for 20mm with 0.010mm accuracy		
		TECHNOLOGY-3	Hardening		Heat Treatment Plant	
		TECHNOLOGY-4	Face Grinding	Rotary table surface grinder or Double Disc surface grinder for Job thickness 12mm		
		TECHNOLOGY-5	O.D. Grinding	External or Centerless Grinding suitable for Dia.20mm with 0.005mm accuracy		
		TECHNOLOGY-6	Race Grinding	Internal grinding machine Suitable for needle roller race grinding with 0.005mm accuracy		
		TECHNOLOGY-7	Race Honing	Super Finish Honing Machine Suitable for needle roller track honing		
		TECHNOLOGY-8	Demagnetisation	Demagnetising Machine		
		INSPECTION-1	Measuring instrument	1. Vernier caliper 2. OD Micrometer. 3. Bore Dial.		
		INSPECTION-2	Metallurgical		NABL 1.Spectroscopy 2. Hardness Test 3. Macro & micro structure analysis.	

		INSPECTION-3	Testing-1	1.Axial, Radial and Side Runout Gauge/ Machine 2.Roundness Tester for Inner Race and Outer Race 3.Squareness Test		
		INSPECTION-4	Testing-2	1.Crack Detection machine 2.Profile Testing Machine		
		INSPECTION-5	Surface finish	Surface Finish Tester		
3	Assembly	TECHNOLOGY-1	Edge preparation	Suitable pressing machine.		
		INSPECTION-1	Noise and Vibration testing	1.Decibel meter 2.Vibration Testing equipment.		
		INSPECTION-2	Axial and Radial Clearance testing	Axial and Radial Clearance testing equipment.		
		INSPECTION-3	Bearing life		Static and Dynamic Load Test Rig	



JWM/ TRG-II
M.SENTHIL KUMAR



JT.GM/QA-RIG(OE)
NEERAJ KUMAR



JWM/ QA (RIG/GA AND OH)
M. JANARTH KUMAR

**NEEDLE ROLLER BEARINGS WITH OUTER STAMPED
RACE**

Technical specifications

**GOST 4060-78
EXTRACT**

**NEEDLE ROLLER BEARINGS WITH OUTER
STAMPED RACE**

Technical specifications

**GOST 4060-78
EXTRACT**

**NEEDLE ROLLER BEARING
WITH OUTER STAMPED RACE
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GOST 4060-78

EXTRACT

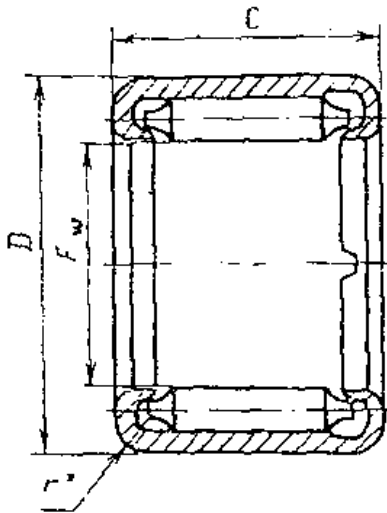
Present standard deals with needle roller bearings with outer stamped race of normal and high accuracy.

1. TERMS AND BASIC DIMENSIONS

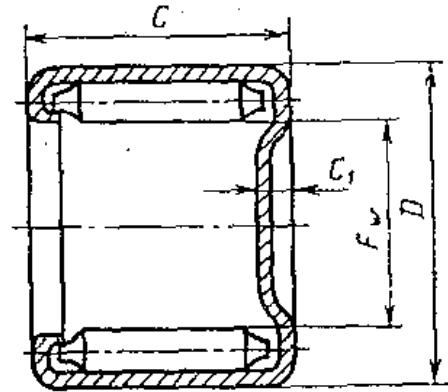
1.1a. Standard establishes the following designs of bearing:

- HK...; 94./... - with outer race with through holes with out separator (drawing 1);
- НД... - with outer race with profile bottom without separator (drawing 2);
- СК... - with outer race with through holes with separator (drawing 3);
- БК... - with outer race with flat bottom with separator (drawing 4).

1.1. Basic dimensions and designation of bearings should correspond to drawing 1-4 and table 1, 1б, 1в.

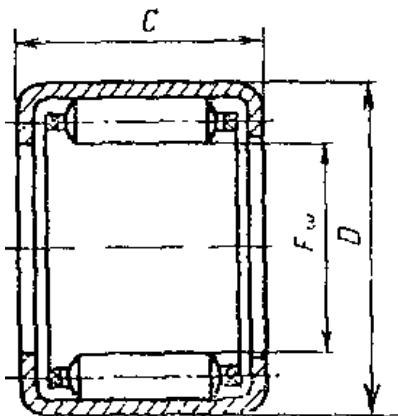


Drawing 1

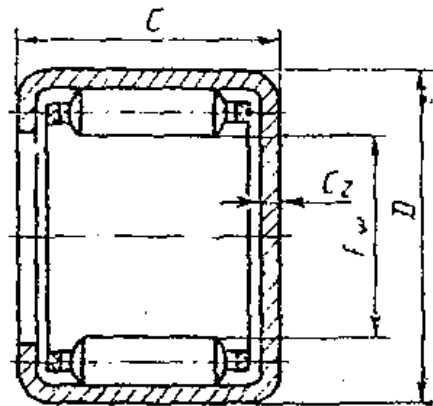


Drawing 2

* Dimensions is for reference.



Drawing 3



Drawing 4

Note:

1. Drawing does not determine the internal design of bearing.

2. Designations, specified in drawing 1-4:

F_w – nominal circumference diameter, specified in the set of needle rollers;

D – nominal diameter of outer cylindrical surface of outer race;

C – nominal width of outer race;

C_1 – nominal height of profiled bottom of outer race;

C_2 – nominal thickness of flat bottom of outer race.

Table 1

Series of diameters ID
Dimensions, mm

Conventional designation of bearing of various designs HK, CK, BK, HД	E _w	D	C	C _{1 max}	C _{2 max}	Weight, g ≈				Dimensions series
						Various designs				
						HK	HД	CK	BK	
040807	4	8	7	1.9	1.0	-	-	-	-	21D
040808*	4	8	8	1.9	1.0	-	-	1.4	1.45	31D
040809	4	8	9	1.9	1.0	-	-	-	-	41D
050907	5	9	7	1.9	1.0	-	-	-	-	21D
050908	5	9	8	1.9	1.0	-	-	-	-	31D
050909*	5	9	9	1.9	1.0	-	-	2.0	2.1	41D
061007	6	10	7	1.9	1.0	-	-	-	-	21D
061008	6	10	8	1.9	1.0	-	-	2.0	2.1	31D
061009*	6	10	9	1.9	1.0	-	-	2.3	2.4	41D
061010	6	10	10	1.9	1.0	-	-	-	-	51D
071107	7	11	7	1.9	1.0	-	-	-	-	21D
071108	7	11	8	1.9	1.0	-	-	-	-	31D
071109*	7	11	9	1.9	1.0	-	-	2.7	2.9	41D
071110	7	11	10	1.9	1.0	-	-	-	-	51D
071112	7	11	12	1.9	1.0	-	-	-	-	61D
081207	8	12	7	1.9	1.0	-	-	-	-	21D
081208	8	12	8	1.9	1.0	-	-	2.6	2.8	31D
081209	8	12	9	1.9	1.0	-	-	-	-	41D
081210*	8	12	10	1.9	1.0	-	-	3.2	3.4	51D
081212	8	12	12	1.9	1.0	-	-	-	-	61D
091307	9	13	7	1.9	1.0	-	-	-	-	21D
091308	9	13	8	1.9	1.0	-	-	3.0	-	31D
091309	9	13	9	1.9	1.0	-	-	-	-	41D
091310*	9	13	10	1.9	1.0	-	-	3.5	3.8	51D
091312	9	13	12	1.9	1.0	-	-	4.6	4.9	61D
091314	9	13	14	1.9	1.0	-	-	-	-	71D
101407	10	14	7	1.9	1.0	-	-	-	-	21D
101408	10	14	8	1.9	1.0	-	-	-	-	31D
101409	10	14	9	1.9	1.0	-	-	-	-	41D
101410*	10	14	10	1.9	1.0	-	-	3.9	4.2	51D
101412	10	14	12	1.9	1.0	-	-	4.7	5.0	61D
121607	12	16	7	1.9	1.0	-	-	-	-	21D
121608	12	16	8	1.9	1.0	-	-	-	-	31D
121609	12	16	9	1.9	1.0	-	-	-	-	41D
121610*	12	16	10	1.9	1.0	-	-	4.5	5.0	51D
121612	12	16	12	1.9	1.0	-	-	-	-	61D
121614	12	16	14	1.9	1.0	-	-	-	-	71D
142010	14	20	10	2.8	1.3	-	-	-	-	21D
142012*	14	20	12	2.8	1.3	10.5	11.6	9.8	10.7	31D
142014	14	20	14	2.8	1.3	-	-	-	-	41D
142016*	14	20	16	2.8	1.3	-	-	13.0	13.9	51D

Continuation of table 1

Dimensions, mm

Conventional designation of bearing of various designs HK, CK, BK, HД	E _w	D	C	C _{1 max}	C _{2 max}	Weight, g ≈				Dimensions series
						Various designs				
						HK	HД	CK	BK	
142018	14	20	18	2.8	1.3	-	-	-	-	61D
142020	14	20	20	2.8	1.3	-	-	-	-	71D
152110	15	21	10	2.8	1.3	-	-	-	-	21D
152112	15	21	12	2.8	1.3	11.0	12.2	10.5	11.5	31D
152114	15	21	14	2.8	1.3	-	-	-	-	41D
152116	15	21	16	2.8	1.3	-	-	15.0	16.5	51D
152118	15	21	18	2.8	1.3	-	-	-	-	61D
152120	15	21	20	2.8	1.3	-	-	-	-	71D
162210	16	22	10	2.8	1.3	-	-	-	-	21D
162212*	16	22	12	2.8	1.3	12.0	13.4	11.0	12.3	31D
162214	16	22	14	2.8	1.3	-	-	-	-	41D
162216*	16	22	16	2.8	1.3	-	-	14.7	16.0	51D
162218	16	22	18	2.8	1.3	-	-	-	-	61D
162220	16	22	20	2.8	1.3	-	-	-	-	71D
172310	17	23	10	2.8	1.3	-	-	-	-	21D
172312	17	23	12	2.8	1.3	13.0	14.4	11.6	13.0	31D
172314	17	23	14	2.8	1.3	-	-	-	-	41D
172316	17	23	16	2.8	1.3	-	-	-	-	51D
172318	17	23	18	2.8	1.3	-	-	-	-	61D
172320	17	23	20	2.8	1.3	-	-	-	-	71D
182410	18	24	10	2.8	1.3	-	-	-	-	21D
182412*	18	24	12	2.8	1.3	14.0	16.0	12.7	14.3	31D
182414	18	24	14	2.8	1.3	-	-	-	-	41D
182416*	18	24	16	2.8	1.3	19.0	21.0	17.0	18.6	51D
182418	18	24	18	2.8	1.3	-	-	-	-	61D
182420	18	24	20	2.8	1.3	-	-	-	-	71D
202610	20	26	10	2.8	1.3	15.0	17.0	11.5	13.5	21D
202612*	20	26	12	2.8	1.3	-	-	13.8	15.8	31D
202614	20	26	14	2.8	1.3	-	-	-	-	41D
202616*	20	26	16	2.8	1.3	20.0	22.0	19.3	20.1	51D
202618	20	26	18	2.8	1.3	-	-	-	-	61D
202620	20	26	20	2.8	1.3	-	-	23.0	25.0	71D
222810	22	28	10	2.8	1.3	-	-	12.3	-	21D
222812*	22	28	12	2.8	1.3	-	-	15.0	18.0	31D
222814	22	28	14	2.8	1.3	-	-	-	-	41D
222816*	22	28	16	2.8	1.3	22.0	25.0	20.0	23.0	51D
222818	22	28	18	2.8	1.3	-	-	-	-	61D
222820	22	28	20	2.8	1.3	-	-	26.2	29.9	71D
253212	25	32	12	2.8	1.3	-	-	20.0	23.0	21D
253214	25	32	14	2.8	1.3	-	-	-	-	31D
253216*	25	32	16	2.8	1.3	-	-	26.0	29.0	41D
253218	25	32	18	2.8	1.3	-	-	-	-	51D
253220*	25	32	20	2.8	1.3	-	-	32.0	35.0	61D
253224	25	32	24	2.8	1.3	-	-	-	-	71D
253228	25	32	28	2.8	1.3	-	-	-	-	81D
253232	25	32	32	2.8	1.3	-	-	-	-	91D

Continuation of table 1

Dimensions, mm

Conventional designation of bearing of various designs HK, CK, BK, HД	E _w	D	C	C _{1 max}	C _{2 max}	Weight, g ≈				Dimensions series
						Various designs				
						HK	HД	CK	BK	
283512	28	35	12	2.8	1.3	-	-	-	-	21D
283514	28	35	14	2.8	1.3	-	-	-	-	31D
283516*	28	35	16	2.8	1.3	-	-	28.0	32.0	41D
283518	28	35	18	2.8	1.3	-	-	-	-	51D
283520*	28	35	20	2.8	1.3	-	-	35.0	39.0	61D
283524	28	35	24	2.8	1.3	-	-	-	-	71D
283528	28	35	28	2.8	1.3	-	-	-	-	81D
283532	28	35	32	2.8	1.3	-	-	-	-	91D
303712	30	37	12	2.8	1.3	-	-	23.0	27.0	21D
303714	30	37	14	2.8	1.3	-	-	-	-	31D
303716*	30	37	16	2.8	1.3	-	-	30.0	34.0	41D
303718	30	37	18	2.8	1.3	-	-	-	-	51D
303720*	30	37	20	2.8	1.3	-	-	38.0	42.0	61D
303724	30	37	24	2.8	1.3	-	-	-	-	71D
303728	30	37	28	2.8	1.3	-	-	-	-	81D
303732	30	37	32	2.8	1.3	-	-	-	-	91D
323912	32	39	12	2.8	1.3	-	-	-	-	21D
323914	32	39	14	2.8	1.3	-	-	-	-	31D
323916*	32	39	16	2.8	1.3	-	-	-	-	41D
323918	32	39	18	2.8	1.3	-	-	-	-	51D
323920*	32	39	20	2.8	1.3	-	-	-	-	61D
323924	32	39	24	2.8	1.3	-	-	50.7	-	71D
323928	32	39	28	2.8	1.3	-	-	-	-	81D
323932	32	39	32	2.8	1.3	-	-	-	-	91D
354212	35	42	12	2.8	1.3	-	-	27.7	32.9	21D
354214	35	42	14	2.8	1.3	40.0	40.0	-	-	31D
354216*	35	42	16	2.8	1.3	-	-	35.0	41.0	41D
364218	35	42	18	2.8	1.3	-	-	-	-	51D
354220*	35	42	20	2.8	1.3	-	-	43.0	49.0	61D
354224	35	42	24	2.8	1.3	-	-	-	-	71D
354228	35	42	28	2.8	1.3	-	-	-	-	81D
354232	35	42	32	2.8	1.3	-	-	-	-	91D
384512	38	45	12	2.8	1.3	-	-	-	-	21D
384514	38	45	14	2.8	1.3	-	-	-	-	31D
384516	38	45	16	2.8	1.3	-	-	-	-	41D
384518	38	45	18	2.8	1.3	-	-	-	-	51D
384520	38	45	20	2.8	1.3	-	-	-	-	61D
384524	38	45	24	2.8	1.3	-	-	-	-	71D
384528	38	45	28	2.8	1.3	-	-	-	-	81D
384532	38	45	32	2.8	1.3	-	-	-	-	91D
404712	40	47	12	2.8	1.3	-	-	30.0	37.0	21D
404714	40	47	14	2.8	1.3	-	-	-	-	31D
404716*	40	47	16	2.8	1.3	-	-	39.0	46.0	41D
404718	40	47	18	2.8	1.3	-	-	-	-	51D
404720*	40	47	20	2.8	1.3	-	-	49.0	56.0	61D
404724	40	47	24	2.8	1.3	-	-	-	-	71D

Continuation of table 1

Dimensions, mm

Conventional designation of bearing of various designs HK, CK, BK, HД	E _w	D	C	C _{1 max}	C _{2 max}	Weight, g ≈				Dimensions series
						Various designs				
						HK	HД	CK	BK	
404728	40	47	28	2.8	1.3	-	-	-	-	81D
404732	40	47	32	2.8	1.3	-	-	-	-	91D
424912	42	49	12	2.8	1.3	-	-	-	-	21D
424914	42	49	14	2.8	1.3	-	-	-	-	31D
424916	42	49	16	2.8	1.3	-	-	-	-	41D
424918	42	49	18	2.8	1.3	-	-	-	-	51D
424920	42	49	20	2.8	1.3	-	-	-	-	61D
424924	42	49	24	2.8	1.3	-	-	-	-	71D
424928	42	49	28	2.8	1.3	-	-	-	-	81D
424932	42	49	32	2.8	1.3	-	-	-	-	91D
455212	45	52	12	2.8	1.3	-	-	34.8	-	21D
455214	45	52	14	2.8	1.3	-	-	-	-	31D
455216*	45	52	16	2.8	1.3	48.0	58.0	43.0	53.0	41D
455218	45	52	18	2.8	1.3	-	-	-	-	51D
455220*	45	52	20	2.8	1.3	-	-	54.0	64.0	61D
455224	45	52	24	2.8	1.3	-	-	-	-	71D
455228	45	52	28	2.8	1.3	-	-	-	-	81D
455232	45	52	32	2.8	1.3	-	-	-	-	91D
505814	50	58	14	2.8	1.6	-	-	-	-	21D
505816	50	58	16	2.8	1.6	-	-	-	-	31D
505818	50	58	18	2.8	1.6	71.0	85.0	-	-	41D
505820*	50	58	20	2.8	1.6	71.0	91.0	70.0	83.0	51D
505824*	50	58	24	2.8	1.6	-	-	84.0	97.0	61D
505828	50	58	28	2.8	1.6	-	-	-	-	71D
505832	50	58	32	2.8	1.6	-	-	-	-	81D
505836	50	58	36	2.8	1.6	-	-	-	-	91D
556314	55	63	14	2.8	1.6	-	-	-	-	21D
556316	55	63	16	2.8	1.6	-	-	-	-	31D
556318	55	63	18	2.8	1.6	-	-	-	-	41D
556320*	55	63	20	2.8	1.6	86.0	192.0	76.0	82.0	51D
556324*	55	63	24	2.8	1.6	-	-	91.0	107.0	61D
556328	55	63	28	2.8	1.6	-	-	111.0	132.0	71D
556332	55	63	32	2.8	1.6	-	-	-	-	81D
556336	55	63	36	2.8	1.6	-	-	-	-	91D
606814	60	68	14	2.8	1.6	-	-	-	-	21D
606816	60	68	16	2.8	1.6	-	-	-	-	31D
606818	60	68	18	2.8	1.6	-	-	-	-	41D
606820	60	68	20	2.8	1.6	-	-	86.0	105.0	51D
606824	60	68	24	2.8	1.6	-	-	-	-	61D
606828	60	68	28	2.8	1.6	-	-	-	-	71D
606832	60	68	32	2.8	1.6	-	-	136.0	164.0	81D
606836	60	68	36	2.8	1.6	-	-	-	-	91D
657314	65	73	14	2.8	1.6	-	-	-	-	21D
657316	65	73	16	2.8	1.6	-	-	-	-	31D
657318	65	73	18	2.8	1.6	-	-	-	-	41D
657320	65	73	20	2.8	1.6	-	-	-	-	51D

Continuation of table 1

Conventional designation of bearing of various designs HK, CK, BK, HД	Dimension, mm					Weight, g ≈				Dimensions services
	E _w	D	C	C _{1 max}	C _{2 max}	Various designs				
						HK	HД	CK	BK	
657324	65	73	24	2.8	1.6	-	-	-	-	61D
657328	65	73	28	2.8	1.6	-	-	-	-	71D
657332	65	73	32	2.8	1.6	-	-	-	-	81D
657336	65	73	36	2.8	1.6	-	-	-	-	91D
707814	70	78	14	2.8	1.6	-	-	-	-	21D
707816	70	78	16	2.8	1.6	-	-	-	-	31D
707818	70	78	18	2.8	1.6	-	-	-	-	41D
707820	70	78	20	2.8	1.6	-	-	-	-	51D
707824	70	78	24	2.8	1.6	-	-	-	-	61D
707828	70	78	28	2.8	1.6	-	-	-	-	71D
707832	70	78	32	2.8	1.6	-	-	-	-	81D
707836	70	78	36	2.8	1.6	-	-	-	-	91D

* Bearings preferred for usage.

Table 16*

Series of diameters 2D
Dimensions, mm

Conventional designation of bearing of various designs HK, CK, BK, HД	Dimensions, mm					Weight, g ≈				Dimensions series
	E _w	D	C	C _{1 max}	C _{2 max}	Various designs				
						HK	HД	CK	BK	
081410	8	14	10	2.8	1.3	5.3	5.6	-	-	22D
081412	8	14	12	2.8	1.3	-	-	-	-	32D
081414	8	14	14	2.8	1.3	-	-	-	-	42D
091510	9	15	10	2.8	1.3	-	-	-	-	22D
091512	9	15	12	2.8	1.3	-	-	-	-	32D
091514	9	15	14	2.8	1.3	-	-	-	-	42D
091516	9	15	16	2.8	1.3	-	-	-	-	52D
101610	10	16	10	2.8	1.3	-	-	-	-	22D
101612	10	16	12	2.8	1.3	8.0	8.5	7.5	8.2	32D
101614	10	16	11	2.8	1.3	-	-	-	-	42D
101616	10	16	16	2.8	1.3	-	-	-	-	52D
121810	12	18	10	2.8	1.3	7.6	8.4	7.0	7.8	22D
121812	12	18	12	2.8	1.3	9.4	10.2	8.7	9.5	32D
121814	12	18	14	2.8	1.3	-	-	-	-	42D

* Table 1a is excluded.

Continuation of table 16

Dimensions, mm

Conventional designation of bearing of various designs HK, CK, BK, HД	E _w	D	C	C _{1 max}	C _{2 max}	Weight, g ≈				Dimensions series
						Various designs				
						HK	HД	CK	BK	
121816	12	18	16	2.8	1.3	-	-	-	-	52D
121818	12	18	18	2.8	1.3	-	-	-	-	62D
142212	14	22	12	2.8	1.3	-	-	-	-	22D
142214	14	22	14	2.8	1.3	-	-	-	-	32D
142216	14	22	16	2.8	1.3	-	-	-	-	42D
142218	14	22	18	2.8	1.3	-	-	-	-	52D
142220	14	22	20	2.8	1.3	-	-	-	-	62D
142224	14	22	24	2.8	1.3	-	-	-	-	72D
152312	15	23	12	2.8	1.3	-	-	-	-	22D
152314	15	23	14	2.8	1.3	-	-	-	-	32D
152316	15	23	16	2.8	1.3	-	-	-	-	42D
152318	15	23	18	2.8	1.3	-	-	-	-	52D
152320	15	23	20	2.8	1.3	-	-	-	-	62D
152324	15	23	24	2.8	1.3	-	-	-	-	72D
162412	16	24	12	2.8	1.3	-	-	-	-	22D
162414	16	24	14	2.8	1.3	-	-	-	-	32D
162416	16	24	16	2.8	1.3	-	-	-	-	42D
162418	16	24	18	2.8	1.3	-	-	-	-	52D
162420	16	24	20	2.8	1.3	-	-	-	-	62D
162424	16	24	24	2.8	1.3	-	-	-	-	72D
172512	17	25	12	2.8	1.3	-	-	-	-	22D
172514	17	25	14	2.8	1.3	-	-	-	-	32D
172516	17	25	16	2.8	1.3	-	-	-	-	42D
172518	17	25	18	2.8	1.3	-	-	-	-	52D
172520	17	25	20	2.8	1.3	-	-	-	-	62D
172524	17	25	24	2.8	1.3	-	-	-	-	72D
182612	18	26	12	2.8	1.3	-	-	-	-	22D
182614	18	26	14	2.8	1.3	-	-	-	-	32D
182616	18	26	16	2.8	1.3	-	-	-	-	42D
182618	18	26	18	2.8	1.3	-	-	-	-	52D
182620	18	26	20	2.8	1.3	-	-	-	-	62D
182624	18	26	24	2.8	1.3	-	-	-	-	72D
202812	20	28	12	2.8	1.3	-	-	-	-	22D
202814	20	28	14	2.8	1.3	-	-	-	-	32D
202816	20	28	16	2.8	1.3	-	-	-	-	42D
202818	20	28	18	2.8	1.3	-	-	-	-	52D
202820	20	28	20	2.8	1.3	-	-	-	-	62D
202824	20	28	24	2.8	1.3	-	-	-	-	72D
223012	22	30	12	2.8	1.3	-	-	-	-	22D
223014	22	30	14	2.8	1.3	-	-	-	-	32D
223016	22	30	16	2.8	1.3	-	-	-	-	42D
223018	22	30	18	2.8	1.3	-	-	-	-	52D
223020	22	30	20	2.8	1.3	-	-	-	-	62D
223024	22	30	24	2.8	1.3	-	-	-	-	72D
253514	25	35	14	3.4	1.6	-	-	-	-	22D
253516	25	35	16	3.4	1.6	-	-	-	-	32D

Continuation of table 16

Dimensions, mm

Conventional designation of bearing of various designs HK, CK, BK, HД	E _w	D	C	C _{1 max}	C _{2 max}	Weight, g ≈				Dimensions series
						Normal designs				
						HK	HД	CK	BK	
253518	25	35	18	3.4	1.6	-	-	-	-	42D
253520	25	35	20	3.4	1.6	-	-	-	-	52D
253524	25	35	24	3.4	1.6	-	-	-	-	62D
253528	25	35	28	3.4	1.6	-	-	-	-	72D
253532	25	35	32	3.4	1.6	-	-	-	-	82D
283814	28	38	14	3.4	1.6	-	-	-	-	22D
283816	28	38	16	3.4	1.6	-	-	-	-	32D
283818	28	38	18	3.4	1.6	-	-	-	-	42D
283820	28	38	20	3.4	1.6	-	-	-	-	52D
283824	28	38	24	3.4	1.6	-	-	-	-	62D
283828	28	38	28	3.4	1.6	-	-	-	-	72D
283832	28	38	32	3.4	1.6	-	-	-	-	82D
304014	30	40	14	3.4	1.6	-	-	-	-	22D
304016	30	40	16	3.4	1.6	-	-	-	-	32D
304018	30	40	18	3.4	1.6	-	-	-	-	42D
304020	30	40	20	3.4	1.6	-	-	-	-	52D
304024	30	40	24	3.4	1.6	-	-	-	-	62D
304028	30	40	28	3.4	1.6	-	-	-	-	72D
304032	30	40	32	3.4	1.6	-	-	-	-	82D
324214	32	42	14	3.4	1.6	-	-	-	-	22D
324216	32	42	16	3.4	1.6	-	-	-	-	32D
324218	32	42	18	3.4	1.6	-	-	-	-	42D
324220	32	42	20	3.4	1.6	-	-	-	-	52D
324224	32	42	24	3.4	1.6	-	-	-	-	62D
324228	32	42	28	3.4	1.6	-	-	-	-	72D
324232	32	42	32	3.4	1.6	-	-	-	-	82D
354514	35	45	14	3.4	1.6	-	-	-	-	22D
354516	35	45	16	3.4	1.6	-	-	-	-	32D
354518	35	45	18	3.4	1.6	-	-	-	-	42D
354520	35	45	20	3.4	1.6	-	-	-	-	52D
354524	35	45	24	3.4	1.6	-	-	-	-	62D
354528	35	45	28	3.4	1.6	-	-	-	-	72D
354532	35	45	32	3.4	1.6	-	-	-	-	82D
384814	38	48	14	3.4	1.6	-	-	-	-	22D
384816	38	48	16	3.4	1.6	-	-	-	-	32D
384818	38	48	18	3.4	1.6	-	-	-	-	42D
384820	38	48	20	3.4	1.6	-	-	-	-	52D
384824	38	48	24	3.4	1.6	-	-	-	-	62D
384828	38	48	28	3.4	1.6	-	-	-	-	72D
384832	38	48	32	3.4	1.6	-	-	-	-	82D
405014	40	50	14	3.4	1.6	-	-	-	-	22D
405016	40	50	16	3.4	1.6	-	-	-	-	32D
405018	40	50	18	3.4	1.6	-	-	-	-	42D
405020	40	50	20	3.4	1.6	-	-	-	-	52D
405024	40	50	24	3.4	1.6	-	-	-	-	62D
405028	40	50	28	3.4	1.6	-	-	-	-	72D

Continuation of table 16

Dimensions, mm

Conventional designation of bearing of various designs HK, CK, BK, HД	E _w	D	C	C _{1 max}	C _{2 max}	Weight, g ≈				Dimensions series
						Normal designs				
						HK	HД	CK	BK	
405032	40	50	32	3.4	1.6	-	-	-	-	82D
425214	42	52	14	3.4	1.6	-	-	-	-	22D
425216	42	52	16	3.4	1.6	-	-	-	-	32D
425218	42	52	18	3.4	1.6	-	-	-	-	42D
425220	42	52	20	3.4	1.6	-	-	-	-	52D
425224	42	52	24	3.4	1.6	-	-	-	-	62D
425228	42	52	28	3.4	1.6	-	-	-	-	72D
425232	42	52	32	3.4	1.6	-	-	-	-	82D
455514	45	55	14	3.4	1.6	-	-	-	-	22D
455516	45	55	16	3.4	1.6	-	-	-	-	32D
455518	45	55	18	3.4	1.6	-	-	-	-	42D
455520	45	55	20	3.4	1.6	-	-	-	-	52D
455524	45	55	24	3.4	1.5	-	-	-	-	62D
455528	45	55	28	3.4	1.5	-	-	-	-	72D
455532	45	55	32	3.4	1.6	-	-	-	-	82D

Note for table 1.16:

1. Maximum value of values C₁ and C₂ are specified for ensuring the exclusion of mating of end face shaft with bottom of outer race of bearing.
2. If flat bottom of outer race of bearing have ribs of rigidity. then thickness of bottom with ribs of rigidity should not exceed the values C_{2max}. specified in table 1. 16.
3. Weight of bearings is calculated at density of metal 7.85 g/dm³.
4. Values of weight. not specified in tables. will be introduced depending upon the productinization of bearings.

Table 1B

Designation of bearings			F _w	D	Designation of bearings			r
941/...	942/...	943/...			941/...	942/...	943/...	
C								
941/6			6	10	7			0.8
941/7			7	12	8			1.0
	942/8		8	14		12		1.2
941/10		943/10	10	16	10		17	1.2
941/12			12	17	12			1.2
941/15	942/15		15	20	12	16		1.2
941/17			17	23	14			1.2
941/20	942/20	943/20	20	26	14	20	25	1.2
941/25	942/25	943/25	25	32	16	22	25	1.2
941/30	942/30	943/30	30	38	16	24	32	1.5
	942/32		32	40		24		1.5
	942/35	943/35	35	43		25	32	1.5
	942/40	943/40	40	50		32	38	2.0
		943/45	45	55			38	2.0
		943/50	50	60			38	2.0

Example of conventional designation of needle roller bearings with outer stamped race of accuracy class II. design HK... with F_w = 12 mm. D=16 mm. and C=10 mm:

Bearing HK 121610 GOST 4060-78

Also. with holes for lubricant:

Bearing HK 121610K GOST 4060-78

Also. for bearings of accuracy class 1:

Bearing 1-HK 121610 GOST 4060-78

Also. for bearings of accuracy class 1 with hole for lubricant:

Bearing 1-HK 121610K GOST 4060-78

Also. for bearings of series 941:

Bearing 1-941/12K GOST 4060-78.

1.2. As per agreement between user and manufacturer. bearing race may be manufactured with hole for lubricant in the middle of race. Diameter of hole should correspond to table 2.

Table 2

mm	
External diameter of bearing, D	Diameter of hole for lubricant
Upto 10	1.5
Above 10 upto 30	2.0
Above 30 upto 80	3.0

2. TECHNICAL REQUIREMENTS

2.1. Bearings should be manufactured in compliance with requirements of present standard as per working drawings. confirmed in established order.

2.2. Race of bearings should be made of cold rolled low carbon steel taper with strength limit 250-420 Mpa and high quality as per table.

As per order of user race may be manufactured with other materials as per technological documentation for antifriction bearings.

2.3. Race should be subjected to chemical – heat treatment and have hardness of rolling way with in the limits 62...66 HRC₃.

2.4. Surface of race should be smooth and should not have defects. exceeding the permissible. stipulated in GOST 503-81. GOST 9045-80.

2.5. Two accuracy classes of bearing I and II are established. Needle rollers. used in bearings of accuracy class I. should correspond to accuracy level 3 as per GOST 6870-81. and in bearings of accuracy class II – accuracy level 5. Bearings of accuracy class II are not marked.

As per requirements of user, bearings of accuracy class I with rollers of accuracy level 2. and bearings of accuracy class II with rollers of accuracy level 3. may be made as a set.

Needle rollers of one preferable assorted group of deviation of mean diameter of rollers as per GOST 6870-81 should be in one bearing.

2.5a. Additional technical requirements for bearing for special usage are established in technical specifications on these bearings.

2.6. Deviation limit of minimum circumference diameter $\Delta F_{w\min}$, noted in set of needle rollers, and width of bearing ring ΔC_s should correspond to table 3.

Table 3

mm							
F_w	Deviation limit $\Delta F_{w\min}$				D	Deviation limit ΔC_s	
	Accuracy class					Accuracy class	
	I		II			I	II
	Upper	Lower	Upper	Lower			
Above 3 upto 6 incl	+0.028	+0.010	+0.045	+0.012	Upto 30	0.00	±0.15
Above 6 upto 10 incl	+0.031	+0.013					
Above 10 upto 18 incl	+0.034	+0.016					
Above 18 upto 30 incl	+0.041	+0.020					
Above 30 upto 50 incl	+0.050	+0.025			Above 30	-0.25	±0.20
Above 50 upto 70 incl	+0.060	+0.030					

Note. Minimum circumference diameter, noted in set of rollers ($F_{w\min}$), is equal to diameter of mandrels, during usage of which, instead of internal race, zero bottom clearance is obtained at least in one radial direction.

2.7. Hardness of surface of rolling of shaft should be not less than 61 HRC₃.

2.8. Preferable tolerance range of landing place for bearings should correspond to table 4.

2.9. Parameter of surface finish of landing surface for bearing Ra as per GOST 2789-73 should not exceed:

Rolling path of shaft for bearing of accuracy class I – 0.4 micron, accuracy class II – 0.63 micron;

Hole of body made of steel or castiron – 1.25 microns, made of light metal or alloy – 2.5 micron.

Table 4

Mounting place of bearing	Model of work or material of body	Tolerance range as per GOST 25347-82
Shaft	Oscillating motion	k6; js6; k5*
	Rotating motion	h6; h5*
Hole of body	Steel or castiron	N7; J7**; N6*
	Light metal or alloy	R7; K7**; R6*

* Tolerance range is used. if insignificant change of bottom clearance is necessary.

**Tolerance range is used for bearings of accuracy class II.

2.10. Mounting place may be prepared for bearings of accuracy class II with deviation limit. specified in table 5.

Table 5

d _r and D. mm	Deviation limit of mounting place. mkm. not more than							
	Shaft				Body			
	During rational motion		With oscillating motion		Made of steel or castiron		Made of light metal or alloy	
	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
From 3 to 6 incl	0	-8	+9	+1	+9	-4	+4	-9
Above 6 upto 10 incl		-10	+12	+2	+11	-5		-12
Above 10 upto 18 incl		-12	+14		+13	-6	+5	-14
Above 18 upto 30 incl		-14	+17	+16	-7	+6	-17	
Above 30 upto 50 incl		-17	+20	+3	+18	-8	+7	-20
Above 50 upto 80 incl		-20	+23		+20	-10	+8	-23

2.11. Tolerance for circularity and cylindricity of hole of body and oscillating path of shaft should not exceed half of the value of tolerance range for shaft and hole of body.

2.12. Values of dynamic (C) and statistic (C₀) load lifting ability are specified in enclosure 4.

3. MARKING, PACKING, TRANSPORTATION AND STORAGE

3.1. Marking, packing, transportation and storage of bearings – as per GOST 520-71.

3.2. Bearings with external diameters upto 10 mm are not marked. Conventional designation of bearing is specified in companying documentation.

APPENDIX 2
Reference

Examples of determination of nominal diameters of hole of ring gauge and rectification of deviation limit ΔF_{wmin} for bearing with $F_w=14$ mm. $D=20$ mm. $C=16$ mm. accuracy class I

Determination of hole diameter of ring gauge – as per p. 4.3.

Nominal diameter of bearing $D=20$ mm.

Deviation limit of tolerance range N6- $\begin{matrix} -11 \\ -24 \end{matrix}$ microns.

1. Determination of nominal diameter of hole of ring gauge in terms of lower deviation of tolerance range N6 is as per GOST 25347-82.

Nominal diameter of hole of ring gauge is equal to 19.976 mm with deviation limit ± 0.002 mm (GOST 24853-81). i.e. (19.976 ± 0.002) mm.

2. Determination of nominal diameter of hole of ring gauge in terms of upper deviation of tolerance range N6 is as per OST25347-82.

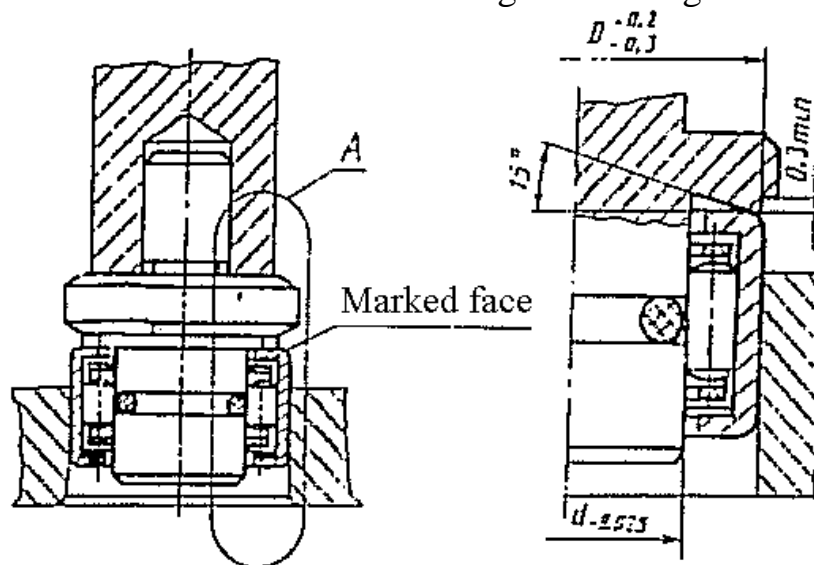
Nominal diameter of hole of ring gauge in equal to 19.989 mm.

In this case ring gauge has increased diameter of hole. deviation limit ΔF_{wmin} equal to $\begin{matrix} +34 \\ +16 \end{matrix}$ micron. for circumference diameter. inscribed in set of rollers $F_w=14$ mm (see table 3). should be increased by 11 mkm. t.e. at value of tolerance IT6 for dimension 14mm as per GOST 25346-82.

Corresponding deviation limit will be equal to $\begin{matrix} +45 \\ +27 \end{matrix}$ microns.

APPENDIX 3
Reference

Mandrel for mounting the bearings in body



Bearing is preliminarily mounted on mandrel. on which it is held with elastic ring and force is applied to marking face of bearing while fitting.

Annexure 2. 3.

APPENDIX 4

Obligatory

DYNAMIC (C) AND STATISTICAL (C₀) LOAD LIFTING ABILITY VALUES

Table 6

Series of diameters ID

Conventional designation of bearings of various designs HK, CK, BK, HД	Load lifting ability, N, not less than			
	C		C ₀	
	Various designs			
	HK, HД	CK, BK	HK, HД	CK, BK
040807	1730	1440	1130	940
040808	2090	1740	1350	1270
040809	2350	1960	1800	1500
050907	2300	1920	1750	1460
050908	2590	2160	2080	1730
050909	2880	2400	2390	1990
061007	2390	1990	2170	1810
061008	2440	2030	2360	1970
061009	3420	2850	3120	2600
061010	3460	2880	3300	2750
071107	3500	2920	2340	2700
071108	3610	3010	3480	2900
071109	3720	3100	3540	2950
071110	3770	3140	3720	3100
071112	4730	3940	5080	4230
081207	2880	2400	2760	2300
081208	3300	2750	3120	2600
081209	3940	3280	3940	3280
081210	4560	3800	4740	3950
081212	4800	4000	5210	4340
091307	3600	3000	3480	2900
091308	4620	3850	4980	4150
091309	4720	3930	5090	4240
091310	5100	4250	5580	4650
091312	6360	5300	7560	6300
091314	7320	6100	8640	7200
101407	3780	3150	3720	3100
101408	4680	3900	5040	4200
101409	4780	3980	5190	4320
101410	5280	4400	6120	5100
101412	6600	5500	8160	6800
101414	7920	6600	10320	8600
121607	4940	4120	6360	5300
121608	5280	4400	6720	5600
121609	5590	4660	7060	5880
121610	5940	4950	7440	6200
121612	6560	5470	7990	6660
121614	7260	6050	8780	7320

Continuation of table 6

Conventional designation of bearings of various designs HK, CK, BK, HD	Load lifting ability, N, not less than			
	C		C ₀	
	Various designs			
	HK, HD	CK, BK	HK, HD	CK, BK
142010	8330	3940	10010	8340
142012	9050	7540	10920	9100
142014	9500	7920	11330	9440
142016	9640	8030	11620	9680
142018	13140	10950	17640	14700
142020	16200	13500	21000	17500
152110	8690	7240	10440	8700
152112	9480	7900	11280	9400
152114	11000	9170	14650	12210
152116	126000	10500	17280	14400
152118	14340	11950	18100	15080
152120	15900	13250	20700	17250
162210	8760	7300	10940	9120
162212	9120	7600	11640	9700
162214	11520	9600	16080	13400
162216	13080	10900	18360	15300
162218	15190	12660	19440	16200
162220	17040	14200	22320	18600
172310	6840	5700	8400	7000
172312	9480	7900	12360	10300
172314	10800	9000	15000	12500
172316	12960	10800	18960	15800
172318	15240	12700	22200	18500
172320	17400	14500	25560	21300
182410	7560	6300	9600	8000
182412	9720	8100	13080	10900
182414	11760	9800	16800	14000
182416	13920	11600	20760	17300
182418	16440	13700	24360	20300
182420	18840	15700	31200	26000
202610	7680	6400	9840	8200
202612	10320	8600	14520	12100
202614	13200	11000	19680	16400
202616	15240	12700	24120	20100
202618	18840	15700	31200	26000
202620	18840	15700	31200	26000
222810	9000	7500	12600	10500
222812	10920	9100	16080	13400
222814	13800	11500	21000	17500
222816	16080	13400	26520	22100
222818	17760	14800	30360	25300
222820	19800	16500	34800	29000
253212	13200	11000	18240	15200
253214	15840	13200	23160	19300
253216	18720	15600	28800	24000
253218	21240	17700	33840	28200
253220	23880	19900	39600	33000

Continuation of table 6

Conventional designation of bearings of various designs HK, CK, BK, HD	Load lifting ability, N, not less than			
	C		C ₀	
	Various designs			
	HK, HD	CK, BK	HK, HD	CK, BK
253224	24360	20300	50400	42000
253228	3440	28700	60000	50000
253232	39600	33000	70800	59000
283512	14040	11700	20640	17200
283514	16800	14000	25860	21550
283516	19680	16400	31800	26500
283518	22320	18600	37560	31300
283520	25080	20900	43200	36000
283524	30420	25350	54240	45200
283528	35760	29800	71280	49500
283532	41160	34300	76560	63800
303712	14520	12100	21840	18200
303714	17400	14500	28200	23500
303716	20640	17200	34800	29000
303718	23520	19600	41400	34500
303720	26400	22000	47400	39500
303724	32400	27000	60024	50020
303728	38640	32200	72840	60700
303732	44760	37300	85680	71400
323912	14640	12200	22320	18600
323914	20760	17300	37680	31400
323916	23040	19200	44040	36700
323918	26880	22400	50160	41800
323920	30840	25700	61080	50900
323924	33000	27500	64800	54000
323928	35880	29900	69720	58100
323932	35760	32300	79440	66200
354212	15720	12100	25560	21300
354214	18960	15800	33360	27800
354216	22440	18700	40200	33500
354218	25320	21100	48000	40000
354220	28560	23800	55200	46000
354554	35160	29300	69720	58100
354228	41160	34300	84000	70000
354232	45840	38200	88500	73750
384512	24240	20200	47580	39400
384514	28560	23800	55200	46000
384516	32640	27200	63120	52600
384518	36720	30600	70980	59150
384520	40800	34000	78840	65700
384524	49080	40900	94680	78900
384528	57120	47600	110400	92000
384532	65340	54450	126000	105000
404712	16800	14000	29160	24300
404714	19580	16320	35280	29400
404716	24000	20000	46200	38500
404718	27000	22500	51900	43250

Continuation of table 6

Conventional designation of bearings of various designs HK, CK, BK, HD	Load lifting ability, N, not less than			
	C		C ₀	
	Various designs			
	HK, HD	CK, BK	HK, HD	CK, BK
404720	30600	25500	62400	52000
404724	36720	30600	75000	62500
404728	42900	35750	87600	73000
404732	49080	40900	120100	83400
424912	19260	16050	39360	32800
424914	22440	18700	45700	38080
424916	25680	21400	52260	43550
424918	28920	24100	58980	49150
424920	31920	26600	65400	54500
424924	38520	32100	78600	65500
424928	45000	37500	91800	76500
424932	51360	42800	104400	87000
455212	17880	14900	33000	27500
455214	20880	17400	38500	32080
455216	25560	21300	51600	43000
455218	28740	23950	57960	48300
455220	32400	27000	70800	59000
455224	38900	32420	85140	70950
455228	45240	37700	99000	82500
455232	52500	43750	114600	95500
505814	28800	24000	52920	44100
505816	33600	28000	60540	50450
505818	36980	30820	67980	56650
505820	37200	31000	75600	63000
505824	44660	37220	90600	75500
505828	52140	43450	105720	88100
505832	59580	49650	135480	112900
505836	67080	55900	152400	127000
556314	26400	22000	56100	46750
556316	30240	25200	64320	53600
556318	33960	28300	72180	60150
556320	37800	31500	80400	67000
556324	45760	38130	96000	80000
556328	52800	44000	123600	103000
556332	60480	50400	141480	117900
556336	64800	54000	151200	126000
606814	26900	22420	63000	52500
606816	3217	26810	72000	60000
606818	36000	30000	81000	67500
606820	40200	33500	90000	75000
606824	48120	40100	108000	90000
606828	56160	46800	125400	104500
606832	64200	53500	143520	119600
606836	70920	59100	156960	130800
657314	30230	25190	68160	56800
657316	34620	28850	77700	64750
657318	39120	32600	87480	72900

Continuation of table 6

Conventional designation of bearings of various designs HK, CK, BK, HD	Load lifting ability, N, not less than			
	C		C ₀	
	Various designs			
	HK, HD	CK, BK	HK, HD	CK, BK
657320	43440	36200	97200	81000
657324	52020	43350	116400	97000
657328	60600	50500	135600	113000
657332	69600	58000	155400	129500
657336	78360	65300	175200	146000
707814	32940	27450	73680	61400
707816	37560	31300	84000	70000
707818	42840	3570	96000	80000
707820	47400	39500	106200	88500
707824	56400	47000	126000	105000
707828	65940	54950	147360	122800
707832	75120	62600	168000	140000
707836	84600	70500	189600	158000

Table 7

Series of diameters 2D

Conventional designation of bearings of various designs HK, CK, BK, HD	Load lifting ability, N, not less than			
	C		C ₀	
	Various designs			
	HK, HD	CK, BK	HK, HD	CK, BK
081410	4320	3600	4860	4050
081412	5190	4325	5730	4775
081414	6070	5060	6820	5680
091510	4870	4060	5460	4550
091512	5840	4870	6550	5460
091514	6820	5680	7620	6350
091516	7800	6500	8750	7250
101610	5400	4500	6070	5060
101612	6480	5400	7290	6075
101614	7560	6300	8520	7100
101616	8640	7200	9720	8100
121810	6480	5400	7290	6075
121812	7800	6500	8760	7300
121814	9120	7600	10200	8500
121816	10380	8650	11640	9700
121818	11700	9750	13100	10920
142212	9120	7600	10200	8500
142214	10580	8820	11880	9900
142216	12120	10100	13580	11320
142218	13560	11300	15240	12700

Continuation of table 7

Conventional designation of bearings of various designs НК, СК, ВК, НД	Load lifting ability, N, not less than			
	C		C ₀	
	Various designs			
	НК, НД	СК, ВК	НК, НД	СК, ВК
142220	15120	12600	16980	14150
142224	18140	15120	20400	17000
152312	12960	10800	14520	12100
152314	16920	14100	18960	15800
152316	17340	144450	19500	16250
152318	19440	16200	21840	18200
152320	21600	18000	24240	20200
152324	25920	21600	29040	24200
162412	13840	11530	15600	13000
162414	16080	13400	18120	15100
162416	18480	15400	20760	17300
162418	20760	17300	23280	19400
162420	23160	19300	25920	21600
162424	27720	23100	31080	25900
172512	16500	13750	18480	15400
172514	17160	14300	19200	16000
172516	19680	16400	22080	18400
172518	22080	18400	24720	20600
172520	24260	20220	27480	22900
172524	29280	24400	32880	27400
182612	15600	13000	17520	14600
182614	18240	15200	20400	17000
182616	20760	17300	23220	19350
182618	23520	19600	26280	21900
182620	25940	21620	29040	24200
182624	31200	26000	35040	29200
202812	17280	14400	19440	16200
202814	22620	18850	22680	18900
202816	23160	19300	25920	21600
202818	25920	21600	29160	24300
202820	27120	22600	30360	25300
202824	34800	29000	3880	32400
223012	19080	15900	21360	1800
223014	22200	18500	24960	20800
223016	25440	21200	28560	23800
223018	28560	23800	32040	26700
223020	31800	26500	35640	29700
223024	38160	31800	41760	34800
253514	31680	26400	35520	29600
253516	36120	30100	40560	33800
253518	40560	33800	45600	38000
253520	45120	37600	50580	42150
253524	54000	45000	60720	50600
253528	63000	52500	70800	59000
253532	72000	60000	81000	67500
283814	35300	29420	39660	33050
283816	40340	33620	45360	37800

Continuation of table 7

Conventional designation of bearings of various designs НК, СК, ВК, НД	Load lifting ability, N, not less than			
	C		C ₀	
	Various designs			
	НК, НД	СК, ВК	НК, НД	СК, ВК
283818	45600	38000	51120	42600
283820	50400	42000	56640	47200
283824	60600	50500	67920	56600
283828	70800	59000	79440	66200
283832	80700	67250	90600	75500
304014	37860	31550	42480	35400
304016	43240	36030	48600	40500
304018	48600	40500	54600	45500
304020	54000	45000	60600	50500
304024	64920	54100	72900	60750
304028	75840	63200	85200	71000
304032	86400	72000	97200	81000
324214	40320	33600	45240	37700
324216	46080	38400	51600	43000
324218	51840	43200	58200	48500
324220	57600	48000	64800	54000
324224	69180	57650	77520	64600
324228	80700	67250	90600	75500
324232	92400	77000	101160	84300
354514	44160	36800	49560	41300
354516	50580	42150	56640	47200
354518	56880	47400	63720	53100
354520	63120	52600	70800	59000
354524	75780	63120	85200	71000
354528	90000	75000	99120	82600
354532	100800	84000	113400	94500
384814	48000	40000	53940	44950
384816	55020	45850	61800	51500
384818	61800	51500	69300	57750
384820	68520	57100	73800	64000
384824	82200	68500	92400	77000
384828	95400	79500	107340	89450
384832	109440	91200	123000	102500
405014	50400	42000	56700	47250
405016	57600	48000	64800	54000
405018	64800	54000	72900	60750
405020	72000	60000	81000	81000
405024	86400	72000	97200	94500
405028	100800	84000	113400	94500
405032	115200	96000	129600	108000
425214	52800	44000	59400	49500
425216	60540	50450	69000	57500
425218	67800	56500	76440	63700
425220	75600	63000	85080	70900
425224	91800	76500	103200	86000
425228	105600	88000	116280	96900
425232	120960	100800	135600	113000

Continuation of table 7

Conventional designation of bearings of various designs HK, CK, BK, HD	Load lifting ability, N, not less than			
	C		C ₀	
	Various designs			
	HK, HD	CK, BK	HK, HD	CK, BK
455514	56640	47200	63720	53100
455516	64800	54000	72900	60750
455518	72900	60750	82140	68450
455520	81000	67500	91200	76000
455524	97200	81000	109200	91000
455528	113520	94600	127200	106000
455532	129600	108000	147600	123000

RESTRICTED
(DRAFT/PROVISIONAL)
QUALITY ASSURANCE PLAN

FOR
BEARING 941/15
GOST:4060(941/15)
(LF NO: 7056594115)

No. HVF/T-72C/QAP/NC/BEARING 941/15/391248-00

ISSUE No: 00

DATE: SEPT 2021

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

QUALITY ASSURANCE PLAN (QAP)

FOR

BEARING 941/15

GOST: 4060(941/15)

PREPARED BY



(V. BHASKAR)
JWM/QA (RIG-A)

REVIEWED BY



(Anuresh Yadav)
JWM/ QA (RIG-A)

APPROVED BY



(NEERAJ KUMR)
DGM/QA-RIG-(A)

ISSUED BY

QUALITY ASSURANCE (RIG-ASSEMBLY)

HEAVY VEHICLES FACTORY

AVADI, CHENNAI – 600 054

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1. IMPORTANT NOTES:

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 the 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 as per the drawings supplied by the Inspection Authority only and not as per the samples, if any received by the manufacturer for guidance purpose.

Note-4

Any amendment issued by the 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

- a) This quality plan lays down the inspection and testing procedure to be carried out on the **BEARING 941/15 to GOST 4060** 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.
- b) 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 norms for **BEARING 941/15 to GOST 4060** 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 **BEARING 941/15 to GOST 4060** including the technical requirements of the drawings. The recommended Quality Plan stipulated herein is mandatory and should be strictly adhered to.

Note:

- i. Tender enquiry (TE) and supply order (S.O) will be issued with QAP stating that inspection will be done as per QAP.
- ii. In case of TE, It is responsibility of the vendor to obtain the copy of QAP and give the statement of compliance that vendor will abide by the QAP in case supply order is placed.
- iii. In case of S.O, it is the responsibility of the vendor to obtain 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 certified drawings will be forwarded to the Contractor. One set of relevant specification and technical instructions on the subject item can be obtained from AHSP through DDO/HVF.
- b) Any clarification required on these documents should be obtained from the Inspecting Authority i.e. The Sr. General Manager, Heavy Vehicles Factory, Avadi, Chennai – 600 054. Equivalents to the collaborators specifications and standards will be decided only by the Inspecting Authority and should not be unilaterally decided.
- c) The process instruction sheets supplied by the collaborators are available with the DDO/HVF, Avadi, Chennai for reference (i.e. Forging, casting, machining, manufacturing, extrusion, forming, heat treatment and plating process etc..). Where ever applicable.
- 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, templates, gauges etc should be provided as recommended in these process sheets.

6. CONDITIONS OF USE/STORAGE INSTRUCTIONS

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

- (a) Each assy should be packed separately.
- (b) The stores are to be suitably covered for preventing ingress of dust and Dirt/entry of sunlight / moisture.
- (c) The packaging slip shall contains
 - i. Certificate of testing (NABL)
 - ii. Pre-inspection report(PIR)
 - iii. Guarantee/ Warranty Certificate
 - iv. Delivery Slip with Inspector's Acceptance Mark
 - v. Under taking certificate/certificate of conformance.
- (d) 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.

7. SAMPLING PLAN

Sl. No	Sampling Plan	Pilot *	Bulk
(i)	Visual Inspection	100%	100%
(ii)	Dimensional Check	100%	General Inspection level II, single sampling, Normal Inspection, AQL 1.5 functional item as per IS 2500 (Part-I)-2000
(iii)	Material Check	100%	1 No for each batch of raw material or heat treatment lot as required by specification..
(iv)	Crack detection	100%	General Inspection level II, single sampling, Normal Inspection, AQL 1.5 functional item as per IS 2500 (Part-I)-2000. Firm has to perform 100% crack detection and submit the report.
(v)	Demagnetization	100%	100%
(vi)	Radial/Axial Clearance	100%	100%
(vii)	Fitment/ Performance test /trial	1 No	--Nil--
(viii)	Test stands/jigs/fixtures/ gauges and calibration checks	100 %	100 %
(ix)	Marking/ Identification	100%	100%
(x)	Packing/ preservation	100%	100%

* This clause is applicable if mentioned in supply order or project sanction order in case of Make-II.

Note: - A New supplier should supply bulk only after pilot sample inspection /evaluation by HVF and obtain bulk production clearance from HVF.

8. BILL OF MATERIAL:

SL. NO	NOMENCLATURE	MATERIAL SPECIFICATIONS	REMARKS
BEARING 941/15 to GOST 4060			
1.	Housing/Outer Race*	Grade 08KП,08ПС, 08 GOST 1050-74	
2.	Roller	WX15 GOST 801-78	

***Note:** Race of bearings should be made of cold rolled low carbon steel taper with strength limit 250-420 Mpa and high quality as per GOST 4060.

9. VISUAL INSPECTION [Sampling plan as per Para- 7 (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/requirements of the assy / components drawing respectively.

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

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

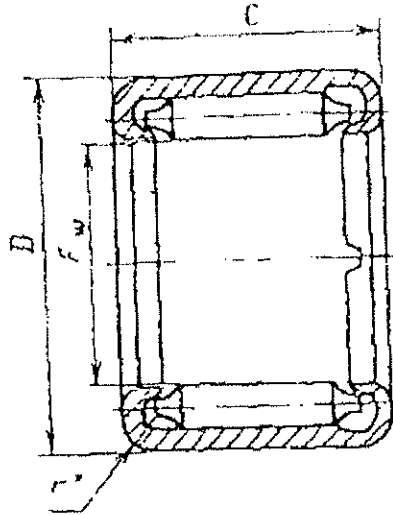
Packing and preservation should be ensured as per drawings/relevant TY specifications (To be ensured on receipt at consignee end).

Checking of nicks, dents and notches are carried out by naked eye with scattered light by comparison with samples.

10. DIMENSIONAL CHECKS [SAMPLING PLAN AS PER PARA- 7(ii)]

The dimensions of individual component, sub assy and major assy shall be checked and ensured as per respective drawings. Dimensional checks 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.

HK...; 94./... - with outer race with through holes without separator (drawing1); as per GOST 4060



Drawing1

10.1 BEARING 941/15 to GOST 4060

The specified

- a) Fw (ID): 15 mm (+0.060,+0.012) as per GPZ catalogue
- b) D (OD) : 20 mm (+0.00,-0.009) as per GPZ catalogue
- c) Width (C) : outer race :25 mm as per GPZ catalogue
- d) Corner Radius (r) : 1.2 mm as per GPZ catalogue
- e) Radial clearance (microns): **when checking bearing by mandrel gauge with dia $15_{-0.004}^{-0.001}$ mm clearance should not exceed 0.12 mm.**
- f) Weight: 0.011 Kgs as per GPZ catalogue.

11. MATERIAL CHECKS [SAMPLING PLAN AS PARA – 7 (iii)]

Material specimen /test bars of the components shall be in conformity as per the material mentioned in the relevant documents/drawings as per the bill of materials (BOM). 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.

11.1 BEARING 941/15 to GOST 4060

Sl.no	Nomenclature	Part no.	specified material	Approved alternate material
1.	Housing/Outer race	ETY: 500	Grade 08KП,08ПC, 08 GOST 1050-74	IS 513 to Gr CR2/CR3
5	Roller	ETY: 500	WX15 GOST 801-78	104Cr6 IS 4398-1994

12. LOAD CAPACITY

- a. Static Load Ratings : **3140N** as per ISO 281 & ISO 76
- b. Dynamic Load Ratings : **4650N** as per ISO 281 & ISO 76

13. ETCH TEST

The test piece should undergo etch test for the specified value and which is free from crack.

14. HEAT TREATMENT

- a. Hardness of Rollers (HRC): **61-65** as per GOST 520

15. CRACK DETECTION

To detect crack in bulk (100%) it should involved in magniflux test (tested as per magna flux standard pieces). Bearing races, roller & balls should be demagnetized 100%. Roller should not cracks, corrosion and similarly burn marks.

16. DEMAGNETIZATION

- a. Bearing races & Rollers should be de-magnetized: Less than 3 gauss as per para-1.12 of GOST: 520-70. In general less than 3 Gauss is acceptable.
- b. Inclusion rating for race & rollers: as per GOST: 801-78 table 4 & 5 and as per alt material IS 4398 table 3.

17. FITMENT / PERFORMANCE TEST/TRAIL;

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

18. TEST STANDS/JIGS/FIXTURES/GAUGES & CALIBRATION CHECKS;

- a) The supplier / Contractor should device a suitable Test Stand, jigs, fixtures & mandrels and gauges to carry out quality checks and to ensure conformance of components/assy as per drg.specification / T.R points.
- b) The supplier/contractor should submit calibration reports for instruments/fixtures/gauges etc., which are used during inspection activities.

19. MARKING/IDENTIFICATION CHECKS:

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 in all components. Suitable method of marking can be adopted, provided the above details are legible. Inscription if any as called for in the relevant drawing is also to be carried out. (Ref GOST 520-71 for Marking/Identification etc).

20. PRESERVATION CHECKS:

- 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 is maintained as per the drawing.
- 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.

21. PACKING CHECKS:

- a) Packing, transportation and storage of bearings – as per GOST 520-71.

22. DOCUMENTATION:

- a) Firm has to maintain all the documents as per QAP with respect to the SI.No.to have traceability.
- b) Vendor has to submit Bill of materials, Material test reports, Class 'C' /Endurance test reports (wherever specified in drg/TY specification/QAP) and Complete PIR (pre-inspection report)at the time of offering the item for inspection. HVF will commence the inspection only after scrutiny of these documents.
- c) Pre inspection reports (PIR) of firm like:
 - 1. Chemical properties obtained from NABL as per bill of material (BOM) with respect to material specifications,
 - 2. Hardness report, inclusion rating, micro structure and macro structure as per races and rollers,
 - 3. NABL Calibration reports of instruments and gauges,
 - 4. 100% Dimensional inspection reports as per bill of material,
 - 5. Static & dynamic load test reports.
 - 6. 100% demagnetization report.
 - 7. Crack detection reports.
 - 8. 100% Radial clearance reports.
 - 9. Radial run out reports are to be submitted.
- d) The testing/inspection responsibility to test all the parameters as per QAP and specifications as mentioned in GOST 4060.

23. REFERENCE:

Refer all material specifications like, GOST, IS & TY refer dimensional and material checks clause in this QAP

SL. NO	CATEGORY	TESTS/INSPECTION PARAMETERS	STANDARDS TO BE REFERRED	ACCEPTANCE CRITERIA	INSPECTION RESPONSIBILITY			REMARKS
					Firm	HVF	DGQA	
1.	Pre inspection reports (PIR) of firm	Firm has to produce all the document as per QAP	As per the relevant drawing and QAP.	Conform to drawing and QAP as per bill of material	P	V	R	100% by firm/ vendor.
2.	Dimensional checks	Dimensions as per the drawing	Refer drawing/QAP para no: 10	Conform to QAP para no 10	P	W/P	R	100% by firm/ vendor, SP followed by HVF.
3.	Hardness checks	Hardness	Refer QAP para no 14	conform to QAP para no 14	P	W/P	R	
4.	Material tests	Chemical composition & Mechanical Properties	As per the relevant drawing and QAP	All the values to conform with QAP and Drawings	P	W/V	R	Refer note.
5.	Marking / Identification checks	Marking / traceability	Refer QAP para no 19	Conform to QAP para no 19	P	V	R	100% by firm/ vendor.
6.	Preservation & packing checks	Preservation & packing	Refer QAP para no 20 & 21	Conform to QAP para 20 & 21	P	V	R	100% by firm/ vendor.

Note:

- 1) One sample per heat/batch shall be tested under NABL Lab/Govt. Approved lab by firm. In case of non-compliance to standards entire lot will be rejected or not to use in production further.
- 2) For cross conformation, manufacturer has to submit test samples / HVF will draw samples from supplied lot on receipt 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

RECORD OF AMENDMENTS

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