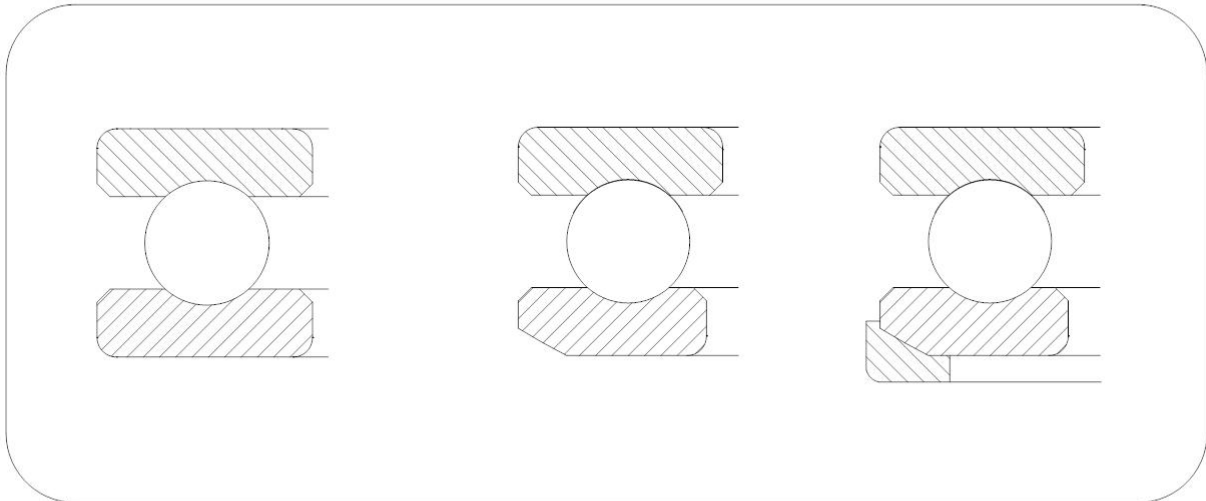


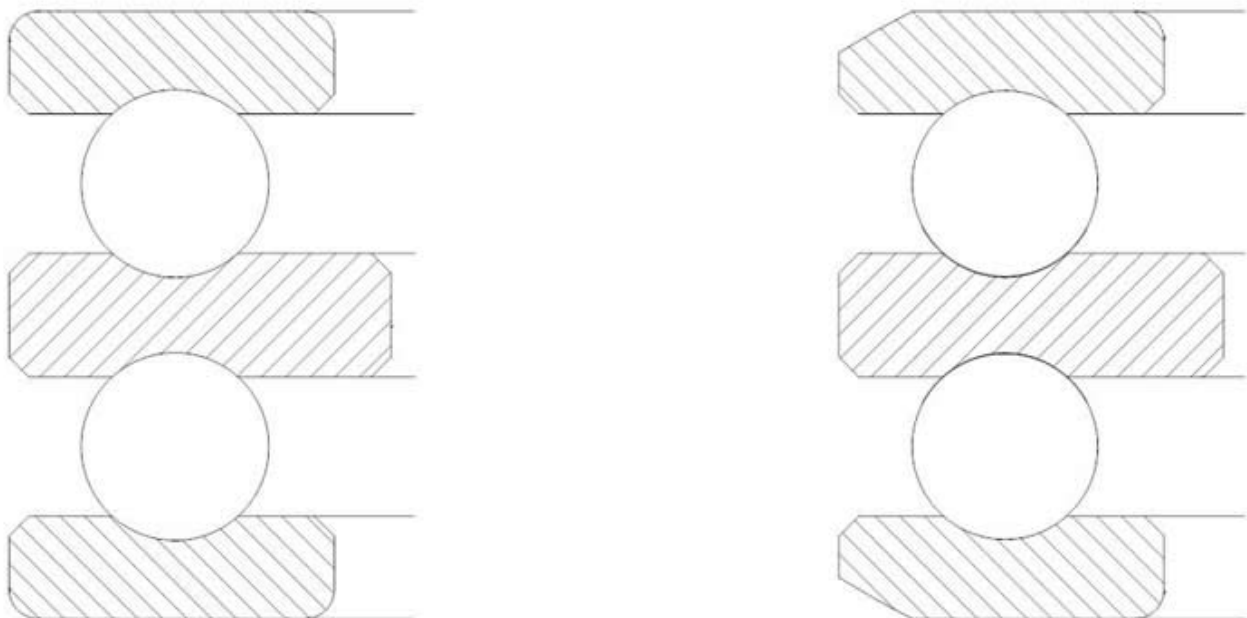
Thrust ball bearings

Thrust ball bearings are manufactured in two versions: single and double direction. These bearings can carry single or double direction heavy axial loads.

- single direction



- double direction



Suffixes

F	-machined steel cage
J	-pressed sheet cage
M	- machined brass cage
P6	-tolerance class with smaller values than normal
P5	- tolerance class with smaller values than P6
TN	-polyamide cage
U	-sphered housing washer
Z	-shielded bearing
V	-bearing without cage

Thrust ball bearings, single direction

Thrust ball bearings, single direction, are used to take single direction axial loads. They cannot take radial loads.

Such a bearing consists of a shaft washer, a housing washer with flat support surface and a ball cage.

These bearings are dismountable.

Thrust ball bearings, double direction

Thrust ball bearings, double direction, can take axial loads in both directions. They cannot take radial loads.

Such a bearing consists of a shaft washer, two housing washers with flat support surfaces and two ball cages.

These bearings are dismountable and their housing washers and cages are interchangeable with those of the corresponding single direction thrust ball bearings.

Dimensions

The overall dimensions of thrust ball bearings, single and double direction, are in accordance with ISO 104, national standard STAS 3921 and national standard STAS 3922 respectively.

Misalignment

Thrust ball bearings with flat washers do not allow any errors of angle between the position of shaft washer axis and position of the housing washer axis. Thrust ball bearings are provided either with sphered housing washer or with sphered housing washer and lock washer to enable them to compensate for these errors of alignment.

Tolerances

Thrust ball bearings are generally manufactured to the normal tolerance class.

Bearings series 511 can be manufactured at request to tolerance classes P6 and P5.


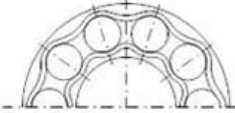


The tolerances of thrust ball bearings are in accordance with ISO 199, and national standard STAS 4207, respectively and are given on *BEARINGS TOLERANCES*.

Cages

Thrust ball bearings are generally fitted with pressed sheet cages. At special request and for large sized bearings, they can be fitted with machined brass or steel cages.

Cage designs and some technical data are given in table 1.

TABELUL 1

Denumire	Reprezentare Rulment	Colivie	Domeniu de aplicare	Valoare max.	
				D_{m^n} ulei	unsoare
Colivie ambutisata din tabla			- Utilizare generala	140×10^3	100×10^3
Colivie masiva din alama M			- Rulmenti mari - Rulmenti cu destinatie speciala	140×10^3	100×10^3

Minimum axial load

In order to guarantee a proper arrangement of balls on the raceways, these bearings should be subjected to a minimum axial load. This is also true in case of thrust ball bearings if they operate at high speeds where the centrifugal forces and gyroscopic moments have detrimental influence on balls, i.e. sliding movements between the raceways and balls.

Maximum axial load can be calculated using the equation:

$$F_{a \min} = M(n/1000)^2, \text{ kN}$$

where:

$F_{a \min}$ – minimum axial load, kN,

M – minimum load factor, see bearing tables,

n – speed, rot/min.

The weight of the components supported by the bearing, together with the external forces, often exceeds the requisite minimum load. If this is not the case, the bearings should be preloaded (e.g. by springs).

Equivalent dynamic load

For single and double row thrust ball bearings, equivalent dynamic load is:

$$P_a = F_a, \text{ kN}$$

Equivalent static load

For single and double row thrust ball bearings, equivalent static load is:

$$P_{0a} = F_a, \text{ kN}$$

Abutment dimensions

For a proper location of the washers on the shaft and housing shoulder respectively, shaft (housing) maximum connection radius $r_{u \max}$ should be less than bearing minimum mounting chamfer $r_{s \min}$.

Shoulder height should also be properly sized in case of bearing maximum mounting chamfer.

The values of the connection radius (r_u) and mounting dimensions are given in table 2, depending on the bearing series.

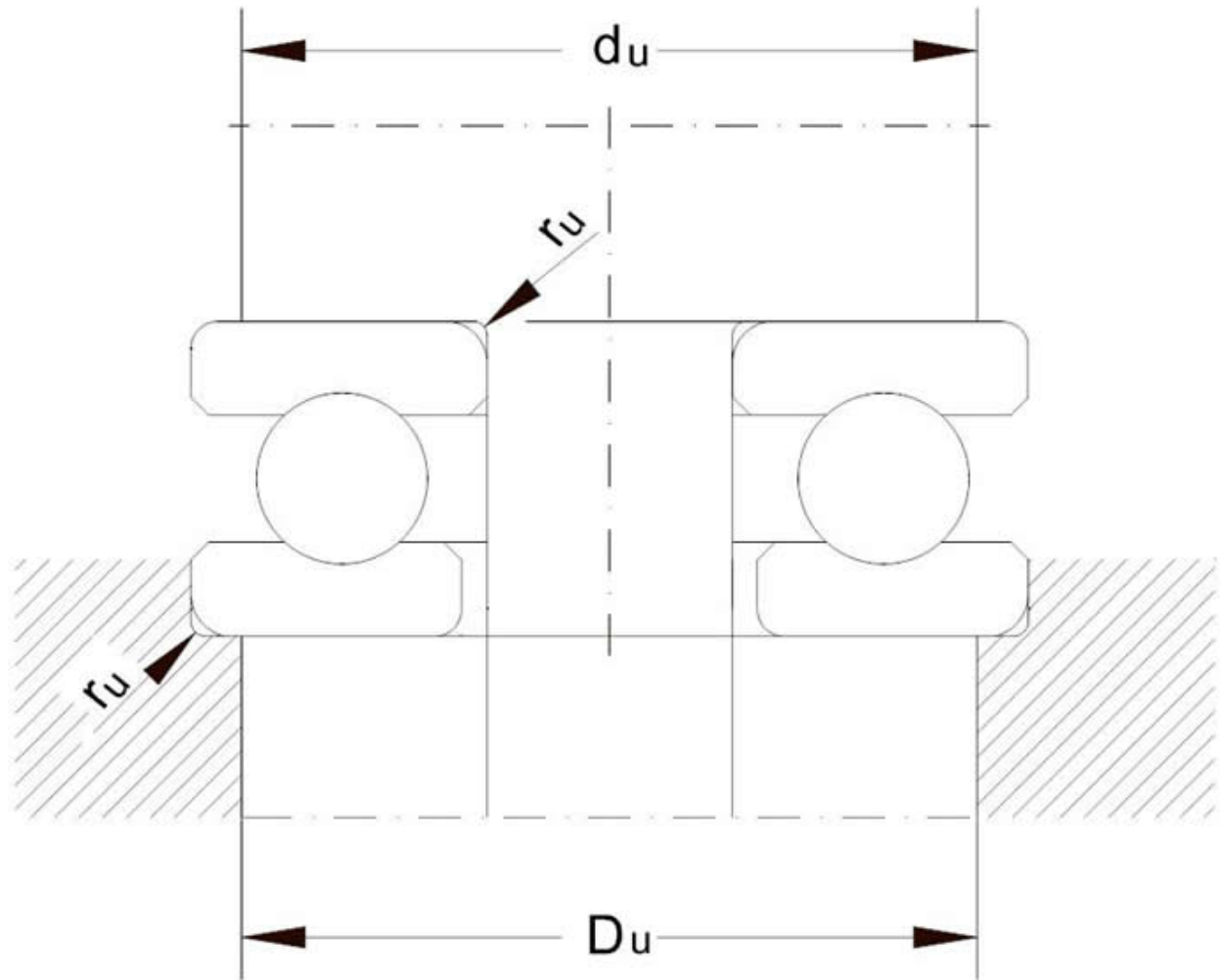


Table 2

Bore symbol	Shaft diameter d	Bearing series											
		511			512			513			514		
		d_u min.	D_u max.	r_u max.	d_u min.	D_u max.	r_u max.	d_u min.	D_u max.	r_u max.	d_u min.	D_u max.	r_u max.
-	mm												
00	10	18	16	0.3	20	16	0.6						
01	12	20	18	0.3	22	18	0.6						
02	15	23	20	0.3	25	22	0.6						
03	17	25	22	0.3	28	24	0.6						
04	20	29	26	0.3	32	28	0.6						
05	25	35	32	0.6	38	34	0.6	41	36	1	46	39	1
06	30	40	37	0.6	43	39	0.6	48	42	1	54	46	1
07	35	45	42	0.6	51	46	1	55	48	1	62	53	1
08	40	52	48	0.6	57	51	1	63	55	1	70	60	1
09	45	57	53	0.6	62	56	1	69	61	1	78	67	1
10	50	62	58	0.6	67	61	1	77	68	1	86	74	1.5
11	55	69	64	0.6	76	69	1	85	75	1	94	81	1.5
12	60	75	70	1	81	74	1	90	80	1	102	88	1.5
13	65	80	75	1	86	79	1	95	85	1	110	95	2
14	70	85	80	1	91	84	1	103	92	1	118	102	2
15	75	90	85	1	96	89	1	111	99	1.5	126	109	2
16	80	95	90	1	101	94	1	116	104	1.5	134	116	2.1
17	85	100	95	1	109	101	1	124	111	1.5	142	123	2.1

18	90	108	102	1	117	108	1	129	116	1.5	150	130	2.1
20	100	121	114	1	130	120	1	142	128	1.5	166	144	2.5
22	110	131	124	1	140	130	1	158	142	2	182	158	2.5
24	120	141	134	1	150	140	1	174	156	2.1	198	172	3
26	130	154	146	1	166	154	1.5	187	168	2.1	214	186	3
28	140	164	156	1	176	164	1.5	200	180	2.1	224	196	3
30	150	174	166	1	189	176	1.5	210	190	2.1	240	210	3
32	160	184	176	1	199	186	1.5	226	204	2.5			
34	170	197	188	1	212	198	1.5	236	214	2.5			
36	180	207	198	1	222	208	1.5	252	228	2.5			
38	190	220	210	1	238	222	2	268	242	3			
40	200	230	220	1	248	232	2	284	256	3			
44	220	250	240	1	268	252	2						
48	240	276	264	1.5	300	280	2.1						
52	260	296	284	1.5	320	300	2.1						
56	280	322	308	1.5	340	320	2.1						
60	300	348	332	2	372	348	2.5						
64	320	368	352	2	392	368	2.5						
68	340	388	372	2	412	388	2.5						
72	360	408	392	2	444	416	3						
76	380	428	412	2									
80	400	448	432	2									
84	420	468	452	2									
88	440	500	480	2.1									
92	460	520	500	2.1									
96	480	540	520	2.1									
/500	500	560	540	2.1									
/530	530	596	574	2.5									

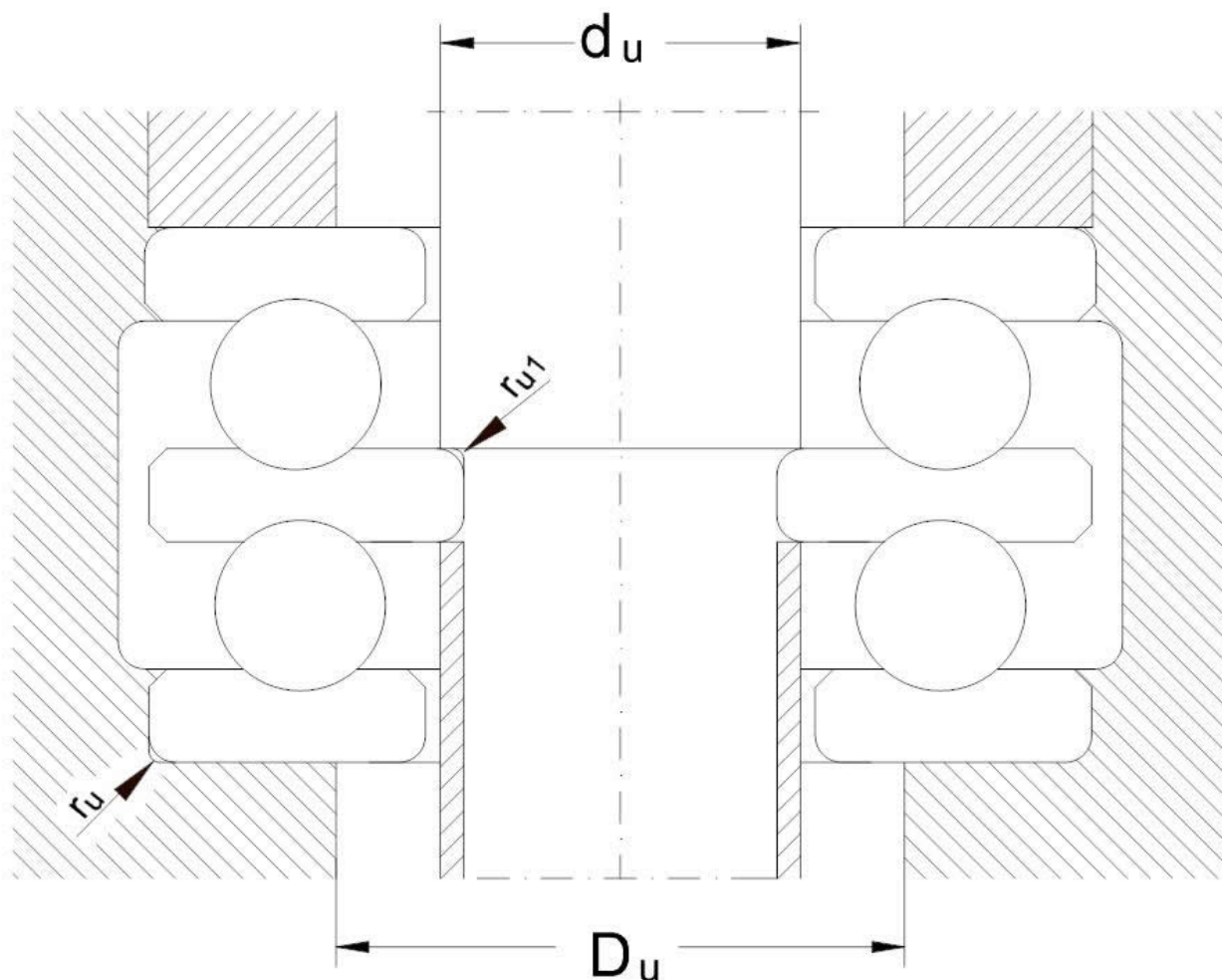


Table 3

Bore symbol	Shaft diam. d	Seria rulmentului								Diam. arbore d	Seria rulmentului			
		522				523					524			
		d_u min.	D_u max.	r_u max.	r_{u1} max.	d_u min.	D_u max.	r_u max.	r_{u1} max.		r_u min.	D_u max.	r_u max.	r_{u1} max.
mm														
02	10	15	22	0.6	0.3									
04	15	20	28	0.6	0.3									
05	20	25	34	0.6	0.3	25	36	1	0.3	15	25	39	1	0.6
06	25	30	39	0.6	0.3	30	42	1	0.3	20	30	46	1	0.6
07	30	35	46	1	0.3	35	48	1	0.3	25	35	53	1	0.6
08	30	40	51	1	0.6	40	55	1	0.6	30	40	60	1	0.6
09	35	45	56	1	0.6	45	61	1	0.6	35	45	67	1	0.6
10	40	50	61	1	0.6	50	68	1	0.6	40	50	74	1	0.6
11	45	55	69	1	0.6	55	75	1	0.6	45	55	81	1.5	0.6
12	50	60	74	1	0.6	60	80	1	0.6	50	60	88	1.5	0.6
13	55	65	79	1	0.6	65	85	1	0.6	50	65	95	2	1
14	55	70	84	1	1	70	92	1	1	55	70	102	2	1
15	60	75	89	1	1	75	99	1.5	1	60	75	109	2	1
16	65	80	94	1	1	80	104	1.5	1	65	80	116	2.1	1
17	70	85	101	1	1	85	111	1.5	1	65	85	123	2.1	1
18	75	90	108	1	1	90	116	1.5	1	70	90	130	2.1	1
20	85	100	120	1	1	100	128	1.5	1	80	100	144	2.5	1
22	95	110	130	1	1	110	142	2	1					
24	100	120	140	1	1	120	156	2.1	1					
26	110	130	154	1.5	1	130	168	2.1	1					

28	120	140	164	1.5	1	140	180	2.1	1					
30	130	150	176	1.5	1									
32	140	160	186	1.5	1									
34	150	170	198	1.5	1									