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D 01601
01602
(1992)

(Continued)

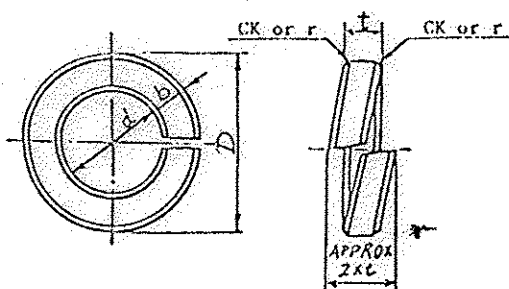
Unit mm

Nominal size	Variety code	Dimension code	d		S	Sectional dimension (min.)		D (max.)	L (approx.)	Mass ($\times 10^{-3}$ kg)	Nominal size of KES adaptable bolts		
			Basic size	Deviation		b	l				Metric thread	Unified thread	
12	01602	1236	12.2	$+0.6$ 0	0.1 to 1.0	4.4	3.6	21.9	0.9	6	12	—	
13		1338	13			4.5	3.8	22.9	1.0	8	—	$U \frac{1}{2}$	
14		1442	14.2		0.1 to 1.5	4.8	4.2	24.7	1.1	10	14	—	
16		1648	16.2			5.3	4.8	28.2	1.2	14	16	$U \frac{5}{8}$	
18		1854	18.2	$+0.8$ 0	0.15 to 2.0	5.9	5.4	31.4	1.4	20	18	—	
19		1957	19.5			6.2	5.7	33.3		22	—	$U \frac{3}{4}$	
20		2060	20.2		6.4	6.0	34.4	1.5	26	20	—		
22		2268	22.5		$+1.0$ 0	0.2 to 2.2	7.1	6.8	38.3	1.7	36	22	$U \frac{7}{8}$
24		2472	24.5	7.6			7.2	41.3	1.8	44	24	—	
25		2578	26	0.3 to 2.5	8.1	7.8	44.0	2.0	53	—	$U 1$		
27		2783	27.5		8.6	8.3	46.7	2.1	64	27	—		
28	01601	2871	29.3	$+1.2$ 0	0.3 to 3.0	8.3	7.1	47.9	1.8	70	—	$U 1 \frac{1}{8}$	
30		3075	30.5			8.7	7.5	49.9	1.9	88	30	—	
31		3179	32.5			9.1	7.9	52.7	2.0	93	—	$U 1 \frac{1}{4}$	
33		3382	33.5	$+1.4$ 0		9.5	8.2	54.7		108	33	—	
34		3487	35.8			9.9	8.7	57.8		2.2	111	—	$U 1 \frac{3}{8}$
36		3690	36.5			10.2	9.0	59.1		2.3	121	36	—
39		3995	39.5			10.7	9.5	63.1	2.4	156	39	$U 1 \frac{1}{2}$	

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These parts are mainly used for industrial machines.



Division code	0
Material	JIS SUP-6
Rust prevention treatment	Coating KP-9
Heat treatment	Quenching and tempering
Hardness	HRC 39 to 46

These washers need a special tool for clamping, because tightening torque force may be increase. It is preferred to use other methods such as shrinkage fit.

Unit mm

Nominal size	Variety code	Dimension code	d		b		L		D (approx.)	K or r (approx.)	Mass (kg)
			Basic size	Deviation	Basic size	Deviation	Basic size	Deviation			
42	01602	4200	43	+1.5 0	11.5	±0.2	10	±0.2	66	—	0.155
45		4505	46		12.5		10.5		71		0.181
48		4810	49.5		13.5		11		76.5		0.231
52		5220	53.5	+2.2 0	14.5		12		82.5		0.291
56		5630	58		15.5		13		89		0.365
60		6040	62		17		14		96		0.463
64		6450	66	+2.5 0	18		15		102		0.558
68		6860	70		19		16		108		0.667
72		7270	74		20		17		114		0.788
76		7680	78		21		18		120		0.923
80		8090	82		22		19		126		1.070

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2. Hydrogen fragility removal treatment of approximately 200°C × approximately 6 hours shall be made on the parts of division code 2 or (3), after metal plating.

3. HARDNESS TEST:

Torsion of a washer shall be adjusted, and the washer shall be finished to have 0 to 2° parallelism and 3.2S to 12.5S surface roughness, by cutting it approximately 0.2 to 0.3 mm.

Measurement of hardness shall be made at clamping plane of a bolt.

Measurement shall be made at three positions for each sample, and the measured mean value shall be rounded off at the first place of integral.

4. QUALITY: As follows.

4.1 Spring Action

Free height shall be minimum of 1-2/3 times as high as thickness, after a washer has been compressed three times with heavy load listed in Table 1.

Table 1

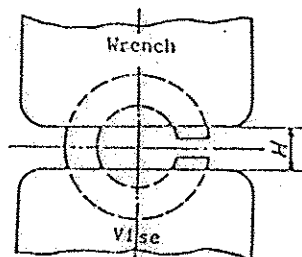
Unit mm

Nominal size	02	03	04	05	06	07	08	09	10
Load	2	4	6	17	45	45	65	78	90
Nominal size		11	12	13	14	16	18	19	20
Load		110	125	150	165	200	275	295	315
Nominal size		22	24	25	27	28	30	31	33
Load		415	445	500	600	310	350	375	415
Nominal size		34	36	39					
Load		445	510	535					

4.2 Toughness

A washer shall be put between mouths of a vice and wrench as shown in the following figure. When the washer is twisted in the direction which increases its height, it shall not be broken before twisting angle becomes 90°.

In this case, the edges of the vice and wrench used for this test shall not be too round. In addition, distance H between the vice and wrench shall be in accordance with Table 2.



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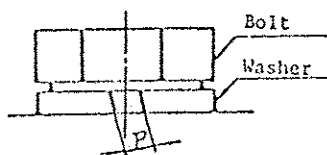
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Table 2

Unit mm								
Nominal size	02·03	04	05	06·07	08	09·10	11 to 13	14
//	1.5	2	2.5	3.5	4	5	6	7
Nominal size	16	18·19	20	22	24	25	27·28	30
//	8	9	10	11	12	13	14	15
Nominal size	31	33·34	36	39				
//	16	17	18	19				

- 4.3 When the washer is clamped in accordance with KES 04.123.1 [TIGHTENING TORQUE OF BOLTS (METRIC THREAD)] or KES 04.123.2 [TIGHTENING TORQUE OF BOLTS (UNIFIED THREAD)], maximum quantity of opening (P) shall be in accordance with the following.



		Unit mm																											
Nominal size		02	03	04	05	06	07	08	09	10	11	12	13	14	16	18	19	20	22	24	25	27	28	30	31	33	34	36	39
Quantity of opening	P	0.6	0.7	1.0	1.3		1.7	2.0		2.4		2.5	2.8	3.2	3.6	3.8	4.0	4.5	4.8	5.2	5.5	4.7	5.0	5.2	5.4	5.8	6.0	6.3	
	*1	P=t				P=3/4 x t																							

*1: Relation between plate thickness t and P .

REFERENCE STANDARD:

This standard is extracted from JIS B 1251-1966 (SPRING LOCK WASHER) except of nominal size 42 to 80. However, section angle and opening quantity of section are not specified in JIS standards. Moreover, nominal size 42 to 80 shall conform to the specified dimension of Tokushu Hatsujo Kogyo K. K.

REFERENCE:

1. Nominal size 06 to 27 of variety code 01601 that were applicable until August 27, 1968 when revision was made, shall not be used for new designs.
2. In the revision of August 27, 1968, washers of division code 1 have been so decided as not to be used for the new design. Therefore, this washer shall not be applicable in future; however, division code 0 can be applicable for replacement parts as substitute for it.

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