

JIS

JAPANESE INDUSTRIAL STANDARD

**Coiled Helical Springs for
Stamping Dies**

JIS B 5012—1986

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the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD
Coiled Helical Springs for Stamping Dies

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B 5012-1986

1. Scope

This Japanese Industrial Standard specifies round wire coiled helical springs and flat wire coiled helical springs, hereinafter referred to as the "springs", used for stamping dies.

Remark: The units and numerical values given in { } in this standard are based on the traditional units and are appended for reference.

2. Classification

The springs shall be classified as given in Table.

Table

Gross classification	Type	Symbol	Discrimination colour
Round wire coiled helical spring	Light load	LR	—
	Middle load	MR	—
Flat wire coiled helical spring	Feather load	F	Yellow
	Light load	L	Blue
	Middle load	M	Red
	Heavy load	H	Green
	Extremely heavy load	B	Brown

Applicable Standards and Reference Standards: See page 4.

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3. Shape and Dimensions

The shape and dimensions of springs shall be as given in Attached Tables 1 to 7.

4. Materials

The materials of springs shall comply with piano wires specified in JIS G 3522, SUP 10 and SUP 12 specified in JIS G 4801 or materials having performance equal or superior thereto.

5. Quality

5.1 Appearance The appearance of springs shall be smooth on the surface and free from defects such as flaws harmful to use and others.

5.2 Hardness The hardness of springs shall comply with HRC 42 or more.

5.3 Inequality of Pitch When the spring is compressed by 80 % the maximum deflection, the close adhesion of the coil other than both ends shall not be generated.

5.4 Characteristics of Spring The characteristics of spring shall comply with the requirements specified in each item of Attached Table 8 as the load at a specified deflection.

5.5 Permanent Set in Fatigue The permanent set in fatigue shall be $\pm 1\%$ the free height ⁽¹⁾ given in Attached Tables 1 to 7.

Note ⁽¹⁾ The free height herein means the height of spring in a state of no-load.

5.6 Squareness The squareness of spring shall be within 2.9 degrees.

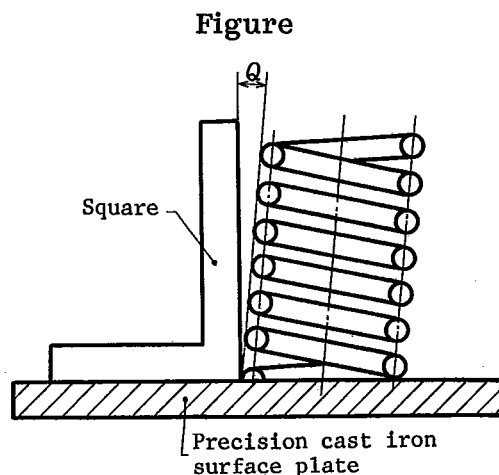
6. Test Methods

6.1 Hardness The hardness of spring shall be measured by using the testing machine specified in JIS B 7726 in accordance with JIS Z 2245 or methods corresponding thereto.

6.2 Characteristics of Spring As to the characteristics of spring, when a load is vertically applied to a specified deflection of Attached Table 8, the load at that time shall be measured.

6.3 Permanent Set in Fatigue The permanent set in fatigue when the load given in Attached Table 8 is successively 10 times applied, shall be measured.

6.4 Squareness The squareness of spring shall be measured by the inclination (Q) of coil outside plane to the axis respectively normal to each end plane under a state of no-load as given in Figure.



Squares specified in JIS B 7526 and Grade 2
precision surface plate specified in JIS B 7513

7. Inspection

The spring shall be inspected as to shape, dimensions, appearance, hardness, inequality of pitch, characteristics of spring, permanent set in fatigue and squareness, and the results shall respectively comply with the requirements specified in 3. and 5.

8. Designation

The spring shall be designated by standard number or standard name, symbol of type, and nominal size.

Example: JIS B 5012 H 10 × 30
Coiled helical spring for stamping dies H 10 × 30

9. Marking

9.1 Discrimination Colour The discrimination colour specified in Table shall be applied to the flat wire coiled helical spring.

9.2 Package The packages shall be marked with the following information:

- (1) Name
- (2) Type
- (3) Nominal size
- (4) Quantity
- (5) Manufacturer's name or its abbreviation

Applicable Standards:

JIS B 7513-Precision Surface Plates

JIS B 7526-Squares

JIS B 7726-Rockwell and Rockwell Superficial Hardness Testing Machines

JIS G 3522-Piano Wire

JIS G 4801-Spring Steels

JIS Z 2245-Method of Rockwell and Rockwell Superficial Hardness Test

Reference Standards:

JIS B 0103-Glossary of Terms Used in Springs

JIS B 2702-Hot Coiled Helical Springs

JIS B 2707-Cold Coiled Helical Compression Springs

JIS Z 8203-SI Units and the Use of their Multiples and of Certain other
Units

Attached Table 1. For Light Load (Round Wire Coiled Helical Springs)

Nominal size	Outside diameter D_o (mm)		Inside diameter D_i (mm)		Free height H_f (mm)		Assignment		Informative reference						
	Basic size	Tolerance	Basic size	Tolerance	Basic size	Tolerance	Deflection (mm) δ_{24}	Load N {kgf} P_{24}	Max. deflection (mm) δ_{16}	Deflection (mm)		Load N {kgf}		Spring constant	
										δ_{16}	δ_{32}	P_{16}	P_{32}	N {kgf}/mm	
3×10	3		2.0		10		2.4	6.62 { 0.68 }	5.0	1.6	3.2	4.4 { 0.45 }	8.8 { 0.9 }	2.94	0.3
3×15					15		3.6		7.8	2.4	4.8			1.96	0.2
3×20					20		4.8		10.7	3.2	6.4			0.98	0.1
3×25					25		6.0		13.6	4.0	8.0			0.98	0.1
4×10	4	0 -0.4	2.6	+0.4 +0.1	10		2.4	11.8 { 1.2 }	4.8	1.6	3.2	7.8 { 0.8 }	15.7 { 1.6 }	4.90	0.5
4×15					15		3.6		7.8	2.4	4.8			2.94	0.3
4×20					20		4.8		10.8	3.2	6.4			2.94	0.3
4×25					25		6.0		14.0	4.0	8.0			1.96	0.2
4×30					30		7.2		17.0	4.8	9.6			1.96	0.2
6×15	6		4.0		15	±1 %	3.6	26.5 { 2.7 }	7.0	2.4	4.8	17.7 { 1.8 }	35.3 { 3.6 }	7.85	0.8
6×20					20		4.8		10.3	3.2	6.4			5.88	0.6
6×25					25		6.0		13.3	4.0	8.0			4.90	0.5
6×30					30		7.2		16.3	4.8	9.6			3.92	0.4
6×35					35		8.4		19.3	5.6	11.2			2.94	0.3
8×15	8		5.4		15	±0.5 at least	3.6	47.1 { 4.8 }	7.0	2.4	4.8	31.4 { 3.2 }	62.8 { 6.4 }	12.75	1.3
8×20					20		4.8		9.3	3.2	6.4			9.81	1.0
8×25					25		6.0		12.3	4.0	8.0			7.85	0.8
8×30					30		7.2		15.1	4.8	9.6			6.86	0.7
8×35					35		8.4		18.2	5.6	11.2			5.88	0.6
8×40					40		9.6		21.0	6.4	12.8			4.90	0.5
10×25	10	0 -0.5	6.5	+0.5 +0.1	25		6.0	73.6 { 7.5 }	11.5	4.0	8.0	49.0 { 5.0 }	98.0 { 10.0 }	12.75	1.3
10×30					30		7.2		14.4	4.8	9.6			9.81	1.0
10×35					35		8.4		17.0	5.6	11.2			8.83	0.9
10×40					40		9.6		19.0	6.4	12.8			7.85	0.8
10×45					45		10.8		22.8	7.2	14.4			6.86	0.7
10×50					50		12.0		25.7	8.0	16.0			5.88	0.6

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Attached Table 1. (Cont'd)

Nominal size	Outside diameter D_o (mm)		Inside diameter D_i (mm)		Free height H_f (mm)		Assignment		Informative reference						
	Basic size	Tolerance	Basic size	Tolerance	Basic size	Tolerance	Deflection (mm) δ_{24}	Load N {kgf} P_{24}	Max. deflection (mm)	Deflection (mm)		Load N {kgf}		Spring constant N {kgf}/mm	
										δ_{16}	δ_{32}	R_{16}	P_{32}		
12×25	12	0 -0.5	8.0	+0.5 +0.1	25		6.0	105.9 { 10.8 }	11.0	4.0	8.0	70.6 { 7.2 }	141.2 { 14.4 }	17.65	1.8
12×30					30		7.2		13.8	4.8	9.6			14.71	1.5
12×35					35		8.4		16.6	5.6	11.2			12.75	1.3
12×40					40		9.6		19.3	6.4	12.8			10.79	1.1
12×45					45		10.8		22.5	7.2	14.4			9.81	1.0
12×50					50		12.0		25.3	8.0	16.0			8.83	0.9
12×55					55		13.2		28.1	8.8	17.6			7.85	0.8
12×60					60		14.4		31.2	9.6	19.2			7.85	0.8
14×25	14	0 -0.6	9.3	+0.6 +0.1	25	±1 % ±0.5 at least	6.0	144.2 { 14.7 }	10.7	4.0	8.0	96.1 { 9.8 }	192.2 { 19.6 }	24.52	2.5
14×30					30		7.2		13.6	4.8	9.6			19.61	2.0
14×35					35		8.4		16.5	5.6	11.2			17.65	1.8
14×40					40		9.6		19.6	6.4	12.8			14.71	1.5
14×45					45		10.8		22.5	7.2	14.4			13.73	1.4
14×50					50		12.0		25.4	8.0	16.0			11.77	1.2
14×55					55		13.2		28.3	8.8	17.6			10.79	1.1
14×60					60		14.4		31.4	9.6	19.2			9.81	1.0
14×65					65		15.6		34.3	10.4	20.8			8.83	0.9
14×70					70		16.8		37.5	11.2	22.4			8.83	0.9
16×25	16		10.7		25		6.0	188.3 { 19.2 }	9.9	4.0	8.0	125.5 { 12.8 }	251.1 { 25.6 }	31.38	3.2
16×30					30		7.2		12.7	4.8	9.6			26.48	2.7
16×35					35		8.4		15.8	5.6	11.2			22.56	2.3
16×40					40		9.6		18.4	6.4	12.8			19.61	2.0
16×45					45		10.8		21.5	7.2	14.4			17.65	1.8
16×50					50		12.0		24.5	8.0	16.0			15.69	1.6
16×55					55		13.2		27.4	8.8	17.6			14.71	1.5
16×60					60		14.4		30.0	9.6	19.2			12.75	1.3

Attached Table 1. (Cont'd)

Nominal size	Outside diameter D_o (mm)		Inside diameter D_i (mm)		Free height H_f (mm)		Assignment		Informative reference							
	Basic size	Tolerance	Basic size	Tolerance	Basic size	Tolerance	Deflection (mm) δ_{24}	Load N {kgf} P_{24}	Max. deflection (mm)	Deflection (mm)		Load N {kgf}		Spring constant N {kgf}/mm		
										δ_{16}	δ_{32}	P_{16}	P_{32}			
16×65	16		10.7		65		15.6	188.3 { 19.2 }		33.3	10.4	20.8	125.5 { 12.8 }	251.1 { 25.6 }	11.77	1.2
16×70					70		16.8			36.4	11.2	22.4			10.79	1.1
16×75					75		18.0			39.0	12.0	24.0			10.79	1.1
16×80					80		19.2			41.5	12.8	25.6			9.81	1.0
18×25	18	0 −0.6		+0.6 +0.1	25	±1 % ±0.5 at least	6.0	238.3 { 24.3 }		8.2	4.0	8.0	158.9 { 16.2 }	317.7 { 32.4 }	40.21	4.1
18×30					30		7.2			10.7	4.8	9.6			33.34	3.4
18×35					35		8.4			13.2	5.6	11.2			28.44	2.9
18×40					40		9.6			14.2	6.4	12.8			24.52	2.5
18×45					45		10.8			17.0	7.2	14.4			22.56	2.3
18×50					50		12.0			19.2	8.0	16.0			19.61	2.0
18×55					55		13.2			21.4	8.8	17.6			17.65	1.8
18×60					60		14.4			24.1	9.6	19.2			16.67	1.7
18×65					65		15.6			26.6	10.4	20.8			15.69	1.6
18×70					70		16.8			29.1	11.2	22.4			14.71	1.5
18×75					75		18.0			31.6	12.0	24.0			13.73	1.4
18×80					80		19.2			34.0	12.8	25.6			12.75	1.3
18×90					90		21.6			39.0	14.4	28.8			10.79	1.1
20×25	20	0 −0.7	13.5	+0.7 +0.1	25		6.0	294.2 { 30.0 }		8.8	4.0	8.0	196.1 { 20.0 }	392.3 { 40.0 }	49.03	5.0
20×30					30		7.2			12.0	4.8	9.6			41.19	4.2
20×35					35		8.4			14.7	5.6	11.2			35.30	3.6
20×40					40		9.6			17.5	6.4	12.8			30.40	3.1
20×45					45		10.8			20.4	7.2	14.4			27.46	2.8
20×50					50		12.0			23.6	8.0	16.0			24.52	2.5
20×55					55		13.2			26.5	8.8	17.6			22.56	2.3
20×60					60		14.4			29.4	9.6	19.2			20.59	2.1
20×65					65		15.6			32.6	10.4	20.8			18.63	1.9

Attached Table 1. (Cont'd)

Nominal size	Outside diameter D_o (mm)		Inside diameter D_i (mm)		Free height H_f (mm)		Assignment		Informative reference						
	Basic size	Tolerance	Basic size	Tolerance	Basic size	Tolerance	Deflection (mm) δ_{24}	Load N {kgf} P_{24}	Max. deflection (mm)	Deflection (mm)		Load N {kgf}		Spring constant N {kgf}/mm	
										δ_{16}	δ_{32}	R_{16}	P_{32}		
20 × 70	20		13.5		70		16.8	294.2 { 30.0}	35.5	11.2	22.4	196.1 { 20.0}	392.3 { 40.0}	17.65	1.8
20 × 75					75		18.0			12.0	24.0			16.67	1.7
20 × 80					80		19.2			12.8	25.6			15.69	1.6
20 × 90					90		21.6			14.4	28.8			13.73	1.4
20 × 100					100		24.0			16.0	32.0			12.75	1.3
22 × 25	22	0 -0.7	14.7	+0.7 +0.1	25	±1 % ±0.5 at least	6.0	356.0 { 36.3}	9.7	4.0	8.0	237.3 { 24.2}	474.6 { 48.4}	59.82	6.1
22 × 30					30		7.2			4.8	9.6			49.03	5.0
22 × 35					35		8.4			5.6	11.2			42.17	4.3
22 × 40					40		9.6			6.4	12.8			37.27	3.8
22 × 45					45		10.8			7.2	14.4			33.34	3.4
22 × 50					50		12.0			8.0	16.0			29.42	3.0
22 × 55					55		13.2			8.8	17.6			27.46	2.8
22 × 60					60		14.4			9.6	19.2			24.52	2.5
22 × 65					65		15.6			10.4	20.8			22.56	2.3
22 × 70					70		16.8			11.2	22.4			21.57	2.2
22 × 75					75		18.0			12.0	24.0			19.61	2.0
22 × 80					80		19.2			12.8	25.6			18.63	1.9
22 × 90					90		21.6			14.4	28.8			16.67	1.7
22 × 100					100		24.0			16.0	32.0			14.71	1.5
25 × 25	25		17.0		25		6.0	459.9 { 47.0}	8.3	4.0	8.0	307.0 { 31.3}	613.9 { 62.6}	76.49	7.8
25 × 30					30		7.2			4.8	9.6			63.74	6.5
25 × 35					35		8.4			5.6	11.2			54.92	5.6
25 × 40					40		9.6			6.4	12.8			48.05	4.9
25 × 45					45		10.8			7.2	14.4			42.17	4.3
25 × 50					50		12.0			8.0	16.0			38.25	3.9
25 × 55					55		13.2			8.8	17.6			35.30	3.6

Attached Table 1. (Cont'd)

Nominal size	Outside diameter D_o (mm)		Inside diameter D_i (mm)		Free height H_f (mm)		Assignment		Informative reference						
	Basic size	Tolerance	Basic size	Tolerance	Basic size	Tolerance	Deflection (mm) δ_{24}	Load N {kgf} P_{24}	Max. deflection (mm)	Deflection (mm)		Load N {kgf}		Spring constant N {kgf}/mm	
										δ_{16}	δ_{32}	P_{16}	P_{32}		
25×60	25	0 -0.7	17.0	+0.7 +0.1	60	$\pm 1\%$ ± 0.5 at least	14.4	459.9 { 47.0}	25.8	9.6	19.2	307.0 { 31.3}	613.9 { 62.6}	32.36	3.3
25×65					65		15.6		28.9	10.4	20.8			29.42	3.0
25×70					70		16.8		32.0	11.2	22.4			27.46	2.8
25×75					75		18.0		34.7	12.0	24.0			25.50	2.6
25×80					80		19.2		37.0	12.8	25.6			23.54	2.4
25×90					90		21.6		42.0	14.4	28.8			21.57	2.2
25×100					100		24.0		47.6	16.0	32.0			19.61	2.0

Remark: The deflections of 16 %, 24 % and 32 % relating to the free height (H_f) are expressed by δ_{16} , δ_{24} and δ_{32} . Further, the loads at that time are expressed by P_{16} , P_{24} and P_{32} .

Attached Table 2. For Middle Load (Round Wire Coiled Helical Springs)

Nominal size	Outside diameter D_o (mm)		Inside diameter D_i (mm)		Free height H_f (mm)		Assignment		Informative reference						
	Basic size	Tolerance	Basic size	Tolerance	Basic size	Tolerance	Deflection (mm) δ_{20}	Load N {kgf} P_{20}	Max. deflection (mm)	Deflection (mm)		Load N {kgf}		Spring constant N {kgf}/mm	
										δ_{16}	δ_{24}	P_{16}	P_{24}		
6×15	6		3.6		15	$\pm 1\%$	3.0	44.1 { 4.5}	4.2	2.4	3.6	35.3 { 3.6}	53.0 { 5.4}	14.71	1.5
6×20					20		4.0		5.7	3.2	4.8			10.79	1.1
6×25					25		5.0		7.6	4.0	6.0			8.83	0.9
6×30					30		6.0		9.5	4.8	7.2			7.85	0.8
6×35					35		7.0		11.4	5.6	8.4			5.88	0.6
8×15	8	0 -0.5	5.0	+0.5 +0.1	15	± 0.5 at least	3.0	78.5 { 8.0}	4.8	2.4	3.6	62.8 { 6.4}	94.1 { 9.6}	26.48	2.7
8×20					20		4.0		7.4	3.2	4.8			19.61	2.0
8×25					25		5.0		10.0	4.0	6.0			15.69	1.6
8×30					30		6.0		12.5	4.8	7.2			12.75	1.3
8×35					35		7.0		15.0	5.6	8.4			10.79	1.1
8×40					40		8.0		17.6	6.4	9.6			9.81	1.0

Remark: The deflections of 16 %, 20 % and 24 % relating to the free height (H_f) are expressed by δ_{16} , δ_{20} and δ_{24} . Further, the loads at that time are expressed by P_{16} , P_{20} and P_{24} .

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Attached Table 3. For Feather Load (Flat Wire Coiled Helical Springs)

Nominal size	Outside diameter D_o (mm)		Inside diameter D_i (mm)		Free height H_f (mm)		Assignment		Informative reference						
	Basic size	Tolerance	Basic size	Tolerance	Basic size	Tolerance	Deflection (mm) δ_{40}	Load N {kgf} P_{40}	Max. deflection (mm)	Deflection (mm)		Load N {kgf}		Spring constant N {kgf}/mm	
										δ_{30}	δ_{50}	P_{30}	P_{50}		
20 × 25	20	0 -0.7	11.0	+0.7 +0.1	25	±1 % ±0.5 at least	10.0	255.0 { 26.0 }	14.5	7.5	12.5	191.3 { 19.5 }	314.0 { 32.0 }	25.11	2.56
20 × 30					30		12.0		17.4	9.0	15.0			20.89	2.13
20 × 35					35		14.0		20.3	10.5	17.5			17.95	1.83
20 × 40					40		16.0		23.2	12.0	20.0			15.69	1.60
20 × 45					45		18.0		26.1	13.5	22.5			13.93	1.42
20 × 50					50		20.0		29.0	15.0	25.0			12.55	1.28
20 × 55					55		22.0		31.9	16.5	27.5			11.38	1.16
20 × 60					60		24.0		34.8	18.0	30.0			10.49	1.07
20 × 65					65		26.0		37.7	19.5	32.5			9.61	0.98
20 × 70					70		28.0		40.6	21.0	35.0			8.92	0.91
20 × 75					75		30.0		43.5	22.5	37.5			8.34	0.85
20 × 80					80		32.0		46.4	24.0	40.0			7.85	0.80
20 × 90					90		36.0		52.2	27.0	45.0			6.96	0.71
20 × 100					100		40.0		58.0	30.0	50.0			6.28	0.64
20 × 125					125		50.0		73.5	37.5	62.5			5.00	0.51
25 × 25	25	0 -0.7	13.5	+0.7 +0.1	25	±1 % ±0.5 at least	10.0	392.4 { 40.0 }	14.5	7.5	12.5	294.3 { 30.0 }	490.5 { 50.0 }	39.23	4.00
25 × 30					30		12.0		17.4	9.0	15.0			32.66	3.33
25 × 35					35		14.0		20.3	10.5	17.5			27.95	2.85
25 × 40					40		16.0		23.2	12.0	20.0			24.52	2.50
25 × 45					45		18.0		26.1	13.5	22.5			21.77	2.22
25 × 50					50		20.0		29.0	15.0	25.0			19.61	2.00
25 × 55					55		22.0		31.9	16.5	27.5			17.85	1.82
25 × 60					60		24.0		34.8	18.0	30.0			16.38	1.67
25 × 65					65		26.0		37.7	19.5	32.5			15.10	1.54
25 × 70					70		28.0		40.6	21.0	35.0			14.02	1.43
25 × 75					75		30.0		43.5	22.5	37.5			13.04	1.33