IFI
512-C
1982

METRIC SPRING PINS

SPRING PINS

IFI Note:

As yet there are no ISO standards for metric spring pins. However, such standards are under development by a Working Group of ISO/TC2 and IFI-512C is one of the documents being considered.

Notes.

1. All dimensions are in millimeters unless noted.

2. **Diameter.** Pin diameter shall be inspected using GO and NO GO ring gages. The length of the hole in the GO ring gage shall not be greater than 3.0 mm. The full length of the pin shall pass through the GO ring gage. Neither end of the pin shall enter the NO GO ring gage beyond a length equal to the length of the chamfer, C, or 10 percent of the length of the pin, whichever is greater.

3. **Hole Size.** Hole tolerances up to and including 1.2 mm diameters are in accordance with ISO 286 H10 and hole tolerances for holes larger than 1.2 mm diameter are H12, see page J—29.

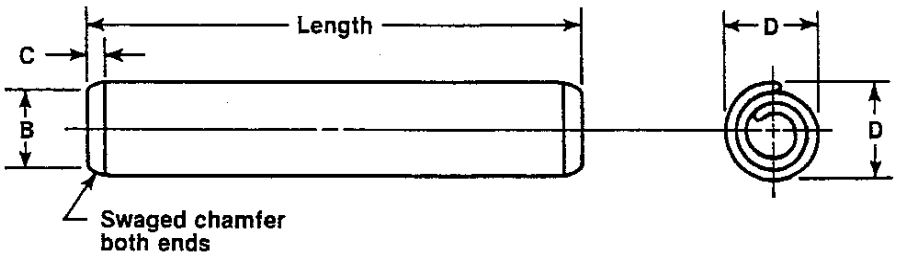

Table 1 Coiled Spring Pin Dimensions

Nom Pin Size	D						B	C	Recommended Hole Size		Pin Stock Thickness		
	Dia						Chamfer						
	Standard Duty		Heavy Duty		Light Duty		Dia	Length			Std. Duty	Heavy Duty	Light Duty
	Max	Min	Max	Min	Max	Min	Max	Ref	Max	Min			
0.8	0.91	0.85	—	—	—	—	0.75	0.3	0.84	0.80	0.07	—	—
1	1.15	1.05	—	—	—	—	0.95	0.3	1.04	1.00	0.08	—	—
1.2	1.35	1.25	—	—	—	—	1.15	0.4	1.24	1.20	0.10	—	—
1.5	1.73	1.62	1.71	1.61	1.75	1.62	1.4	0.5	1.60	1.50	0.13	0.17	0.08
2	2.25	2.13	2.21	2.11	2.28	2.13	1.9	0.7	2.10	2.00	0.17	0.22	0.11
2.5	2.78	2.65	2.73	2.62	2.82	2.65	2.4	0.7	2.60	2.50	0.21	0.28	0.14
3	3.30	3.15	3.25	3.12	3.35	3.15	2.9	0.9	3.10	3.00	0.25	0.33	0.17
3.5	3.84	3.67	3.79	3.64	3.87	3.67	3.4	1.0	3.62	3.50	0.29	0.39	0.19
4	4.40	4.20	4.30	4.15	4.45	4.20	3.9	1.1	4.12	4.00	0.33	0.45	0.22
5	5.50	5.20	5.35	5.15	5.50	5.20	4.85	1.3	5.12	5.00	0.42	0.56	0.28
6	6.50	6.25	6.40	6.18	6.55	6.25	5.85	1.5	6.12	6.00	0.50	0.67	0.33
8	8.63	8.30	8.55	8.25	8.65	8.30	7.8	2.0	8.15	8.00	0.67	0.90	0.45
10	10.80	10.35	10.65	10.30	—	—	9.75	2.5	10.15	10.00	0.84	1.10	—
12	12.85	12.40	12.75	12.35	—	—	11.7	3.0	12.18	12.00	1.00	1.30	—
14	14.95	14.45	14.85	14.40	—	—	13.6	3.5	14.18	14.00	1.20	1.60	—
16	17.00	16.45	16.90	16.40	—	—	15.6	4.0	16.18	16.00	1.30	1.80	—
20	21.10	20.45	21.00	20.40	—	—	19.6	4.5	20.21	20.00	1.70	2.20	—

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Table 2 Recommended Coiled Spring Pin Lengths

Nom Length	Length Tol Plus	Nom Pin Size 0.8	1	1.2	1.5	2	2.5	3	3.5	4	5	6	8	10	12	14	16	20
4	0.5	X	X	X	X	X												
5	for all	X	X	X	X	X	X											
6	lengths	X	X	X	X	X	X	X	X									
8	thru	X	X	X	X	X	X	X	X	X								
10	10mm	X	X	X	X	X	X	X	X	X	X							
12		X	X	X	X	X	X	X	X	X	X	X						
14		X	X	X	X	X	X	X	X	X	X	X						
16		X	X	X	X	X	X	X	X	X	X	X	X					
18					X	X	X	X	X	X	X	X	X					
20					X	X	X	X	X	X	X	X	X	X				
22	1.0				X	X	X	X	X	X	X	X	X	X				
25	for all				X	X	X	X	X	X	X	X	X	X	X			
28	lengths					X	X	X	X	X	X	X	X	X	X	X		
30	over					X	X	X	X	X	X	X	X	X	X	X		
32	10mm					X	X	X	X	X	X	X	X	X	X	X	X	
35	thru					X	X	X	X	X	X	X	X	X	X	X	X	
40	50mm					X	X	X	X	X	X	X	X	X	X	X	X	
45							X	X	X	X	X	X	X	X	X	X	X	
50							X	X	X	X	X	X	X	X	X	X	X	X
55										X	X	X	X	X	X	X	X	X
60										X	X	X	X	X	X	X	X	X
65												X	X	X	X	X	X	X
70												X	X	X	X	X	X	X
75												X	X	X	X	X	X	X
80	1.5												X	X	X	X	X	X
85	for all												X	X	X	X	X	X
90	lengths												X	X	X	X	X	X
95	over												X	X	X	X	X	X
100	50mm												X	X	X	X	X	X
110													X	X	X	X	X	X
120													X	X	X	X	X	X
140															X	X	X	X
160															X	X	X	X
180															X	X	X	X

NOTE: Pins of lengths shorter, longer, or intermediate to those listed are available by special agreement.

4. Straightness. Straightness of pins shall be within the limits necessary to permit pins to fall through a ring gage by their own weight. Ring gage dimensions shall be as specified in Table 3.

Table 3 Straightness Limits

Pin Length mm	Gage Length mm		Gage Hole Dia, mm	
	Max	Min	Min	Max
			Specified Pin Dia, Max plus	Specified Pin Dia, Max plus
to and incl 25	25.15	24.85	0.18	0.20
over 25 to 50	50.15	49.85	0.30	0.34
over 50	75.15	74.85	0.42	0.48

5. Lengths. Length of pins is the distance measured parallel to the axis of the pin between the extreme ends. Length tolerances are given in Table 2.

6. Material.

6.1 Carbon steel pins shall be made of steel meeting the following analyses:

	All Pin Diameters	Alternate For Pin Diameters Larger Than 12 mm
C	0.64 / 0.99	0.48 / 0.53
Mn	0.60 / 0.90	0.70 / 0.90
P	0.04 max	0.035 max

S	0.05 max	0.04 max
Si	0.15 / 0.35	0.20 / 0.35
Cr	0.50 min (Opt.)	0.80 / 1.10
V	—	0.15 min

6.2 Stainless steel pins shall be made of steel meeting either one of the following analyses as specified by the customer:

	Chrome Martensitic	Chrome-Nickel Austenitic
C	Over 0.15	0.15 max
Mn	1.00 max	2.00 max
P	0.04 max	0.045 max
Cr	12.00 / 14.00	16.00 / 19.00
Ni	0.50 max	6.00 / 10.00
Si	1.00 max	1.50 max
Mo	—	0.80 max

6.3 Pins shall be heat treated as necessary to meet the mechanical and performance requirements.

6.4 Pins of other materials shall be as agreed upon by purchaser and manufacturer.

7. Hardness. Carbon steel pins shall have a hardness of Rockwell C 43-52. Chrome martensitic stainless steel pins shall have a hardness of Rockwell C 46-55. Chrome-nickel austenitic stainless steel is a work hardening material and hardness limits are not specified. Hardness may be determined using any acceptable method with Tukon or Rockwell testing equipment, provided deflection of the pin under load is prevented. Longitudinal or axial cutting and testing individual coils, or testing the end of a mounted pin is recommended to eliminate the effects of flexibility. The proper Rockwell Scale should be selected when testing pins of different wall thickness. Equivalencies to the Rockwell C Scale shall be in accordance with SAE J417.

8. Finish. Pins shall be furnished in natural finish treated with a rust preventive lubricant, unless otherwise specified. Phosphate coated, zinc or cadmium plated finishes are available in accordance with specifications by the purchaser. When pins are electroplated or phosphate coated, appropriate plating or coating processes should be employed to avoid hydrogen embrittlement. If necessary, pins shall be suitably treated as soon as practicable after plating or coating to remove detrimental hydrogen embrittlement.

Table 4 Double Shear Strength of Coiled Spring Pins

Nom Pin Size	Double Shear Strength — kN Min					
	Carbon Steel and Chrome Martensitic Steel Pins			Chrome-Nickel Austenitic Steel Pins		
	Std. Duty	Heavy Duty	Light Duty	Std. Duty	Heavy Duty	Light Duty
0.8	0.4	—	—	0.3	—	—
1	0.6	—	—	0.45	—	—
1.2	0.9	—	—	0.65	—	—
1.5	1.45	1.9	—	1.05	1.45	0.65
2	2.5	3.5	—	1.9	2.5	1.1
2.5	3.9	5.5	2.3	2.9	3.8	1.8
3	5.5	7.6	3.3	4.2	5.7	2.5
3.5	7.5	10.0	4.5	5.7	7.6	3.4
4	9.6	13.5	5.7	7.6	10.0	4.4
5	15	20	9	11.5	15.5	7.0
6	22	30	13	16.8	23	10.0
8	39	53	23	30	41	18
10	62	84	—	48	64	—
12	89	120	—	67	91	—
14	120	165	—	—	—	—
16	155	210	—	—	—	—
20	250	340	—	—	—	—

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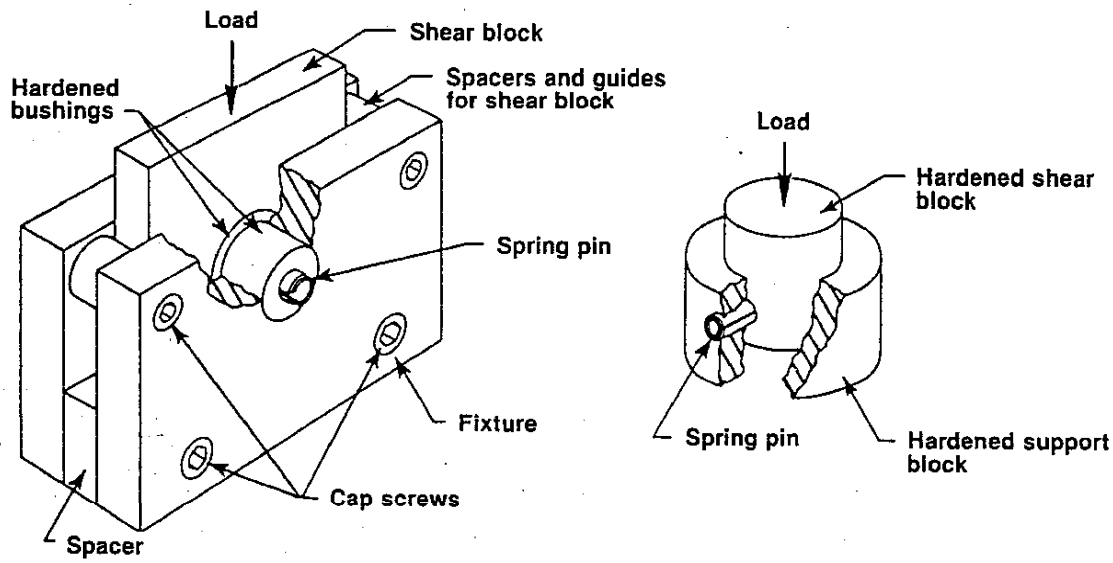

FIG. 1 TYPICAL SPRING PIN SHEAR TEST FIXTURES

9. Performance. Pins shall be capable of withstanding the double shear loads specified in Table 4.

The shear test shall be performed in a fixture (a typical fixture is shown in Fig. 1) in which the pin support members and the member for applying the load shall have holes with diameters conforming to the nominal pin size as specified in Table 1 and shall have a hardness of Rockwell 60 minimum. The clearance between the supporting members and the loading member shall not exceed 0.15 mm, and the shear plane shall be at least one pin diameter away from each end, and at least two diameters apart. Pins too short to be tested in double shear shall be tested by shearing two pins simultaneously in single shear. Speed of testing shall not exceed 13 mm per minute.

Pins shall be tested to failure. The maximum load applied to the pin coincident with or prior to pin failure shall be recorded as the double shear strength of the pin. Pins, tested for shear strength, shall show a ductile shear without longitudinal cracks.

Coiled type pins are designed to withstand shock and rapidly changing oscillating or intermittent dynamic loads. Due to the many factors which are involved in dynamic loading, theoretical data cannot readily be related to actual application performance. Tests which simulate the conditions of the actual application are recommended to determine dynamic loading performance.

10. Workmanship. Pins shall be free from burrs, loose scale, seams, notches, sharp edges and corners and any other defects affecting their serviceability.