APPLICATION		REVISION HISTORY			
NEXT ASSY	USED ON	REV	DESCRIPTION	DATE	APPR
N/A	N/A	A	Procedure Validation	20250922	AD
N/A	N/A	NC	Procedure Validation	20230913	HY
N/A	N/A	NC	NEW RELEASE	20180524	MCC

CUST: N/A
PRODUCT: N/A
DESC: N/A

DIMENSIONS ARE IN INCHES
TOLERANCES ARE:

ANGLES ±0.5° DECIMALS .XX ± .03 .XXX ± .010

DO NOT SCALE DRAWING
PARTS SHALL BE FREE OF BURRS
BROKEN EDGES .005-.030
FILLETS R .005-.020
SURFACE ROUGHNESS 125

INTERPRET DRAWING IN ACCORDANCE WITH ASME Y14.100-2004 AND ASME Y14.5M-1994

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DRAWING TITLE

STANDARD INSPECTION GUIDE FOR HELICAL COMPRESSION SPRINGS

SIZE	ID NO		REV
A	SP-12-04		A
SCALE	WEIGHT (lb)	CAGE CODE	SHEET
N/A	N/A	32067	1 of 9

Purpose

This inspection guide is used to provide guidelines on inspecting compression springs, The information herein is derived from ASME Y14.13 Mechanical Spring Representation. Many older drawings overspecify spring features. This guide will provide knowledge about what specifications are mandatory and which are to be treated as reference.

1.0 Parameters for specifying helical compression springs

1.1 Parameters common to all springs

Not all parameters available are necessarily specified on a spring drawing. Depending on parameters are specified, others become reference and may not be called out on the spring drawing.

1.2 Material specification

Typical spring materials are carbon steel wire (music, hard drawn, oil tempered, valve spring), alloy steel, stainless steel, copper base alloys, nickel base alloys. These materials are usually specified via an ASTM or AMS specification but not always.

1.3 Wire size

Wire diameter or width and thickness will be specified on the drawing. Dimensions apply before plating and finishes. Tolerances on wire size are covered in the appropriate material specification.

1.4 Helix, direction of

When a spring is viewed from one end, the direction of helix is right hand if the coil recedes in a clockwise direction and left hand when it recedes in a counterclockwise direction. The direction of the helix may not be specified on the drawing. In that case it is considered to be optional and may be wound in either direction.

1.5 Types of ends

Types of ends available are: open not ground; closed not ground; closed end ground; open end ground. See Figure 2 for depiction.

1.6 Outside diameter (OD)

OD is typically specified and inside diameter is not, particularly if the spring must operate within a cylinder.

1.7 Inside dimeter (ID)

ID is not typically specified unless the spring must operate over a rod.

1.8 Free length

1.9 Total coils

The sum of the active and inactive coils.

1.10 Active coils

The number of coils used in computing the total deflection of the spring.

1.11 Inactive coils

The number of coils used in forming the ends. Typically only total coils and active coils are specified.

1.12 Heat treatment

Some springs will call out heat treatment to a specific condition.

1.13 Stress relief

Some springs will call out a stress relief procedure to remove bending stresses in wires caused during forming. In other springs this stress relief is omitted from the drawing and assumed as standard practice in forming springs.

1.14 Finish process

Some springs will call out a finish process. Examples of finishes include passivate, plating, dry film lube, magnetic particle inspection, etc.

1.15 Solid length

Solid length is usually only called out on drawing to designate no permanent set is allowed at solid length. Otherwise it is typically a reference dimension determined by number of coils and wire diameter.

1.16 Pitch

Typically this a reference dimension as it is driven by number of coils, wire diameter and free length.

1.17 Spring rate

The force required to deflect the spring one unit of length. It should be specified over a deflection range as the spring rate is not linear. Many drawing do not call out the deflection range so engineering judgement should be applied as to what range it is to be measured.

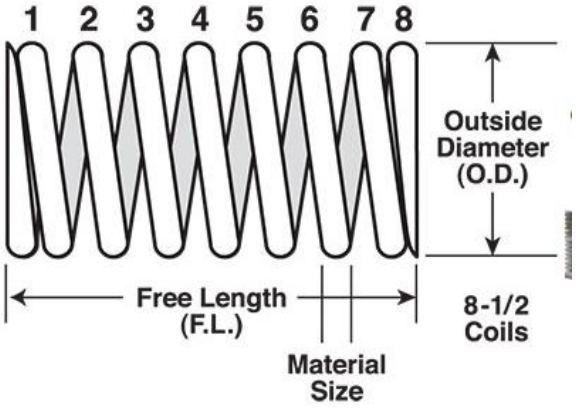

Figure 1: How to count coils in a compression spring

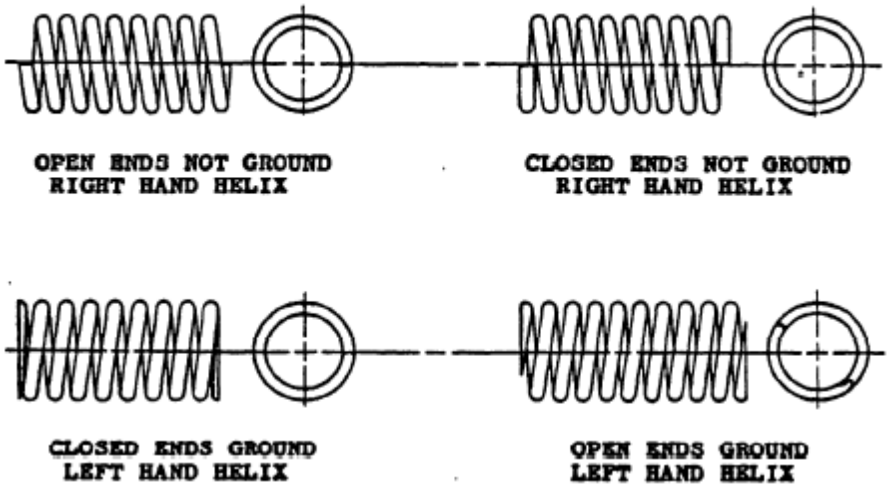

Figure 2: Types of helical compression spring ends

2.0 Types of compression springs

Compression springs come in 4 different types depending on how spring force requirements are specified.

2.1 No force specified

The design activity accepts responsibility for the spring performance. The free length, coil diameter and number of coils are specified, each with a tolerance.

2.2 One force specified

The force at a specified deflection is a requirement, the free length and number of coils are reference dimensions. The force and deflection require tolerances.

2.3 Two forces specified

The forces at 2 deflections are requirements, the free length and number of coils are reference dimensions. The forces and deflections require tolerances.

2.4 Spring rate specified

The spring rate, with tolerance is a requirement, the free length and number of coils are reference dimensions.

3.0 Spring Inspection Checklists

The following tables provide checklists for inspecting helical compression springs by type as defined in section 2. The checklists define which parameters are go/no go parameters and which should be treated as reference.

3.1 No Force Specified Checklist

Hard parameters	**Complies**	**Non-compliant**
Material Specification		
Wire diameter or length and width		
Helix direction		
End configuration		
Outside diameter with tolerance (only if ID is not specified)		
Inside diameter with tolerance (only if OD is not specified)		
Free length with tolerance		
Total number of coils with tolerance		
Active number of coils with tolerance		
Heat treatment or stress relief if specified		
Finish if specified		
No permanent set if compressed to solid (if specified)		
Reference parameters		
Pitch	N/A	N/A
Number of inactive coils	N/A	N/A
Spring rate	N/A	N/A
Force	N/A	N/A

3.2 One Force Specified Checklist

Hard parameters	**Complies**	**Non-compliant**
Material Specification		
Wire diameter or length and width		
Helix direction		
End configuration		
Outside diameter with tolerance (only if ID is not specified)		
Inside diameter with tolerance (only if OD is not specified)		
Force (with tolerance) at Length (with tolerance)		
Heat treatment or stress relief if specified		
Finish if specified		
No permanent set if compressed to solid (if specified)		
Reference parameters		
Free length	N/A	N/A
Pitch	N/A	N/A
Total number of coils with tolerance	N/A	N/A
Active number of coils with tolerance	N/A	N/A
Number of inactive coils	N/A	N/A
Spring rate	N/A	N/A

3.3 Two Forces Specified Checklist

Hard parameters	**Complies**	**Non-compliant**
Material Specification		
Wire diameter or length and width		
Helix direction		
End configuration		
Outside diameter with tolerance (only if ID is not specified)		
Inside diameter with tolerance (only if OD is not specified)		
Force 1 (with tolerance) at Length 1 (with tolerance)		
Force 2 (with tolerance) at Length 2 (with tolerance)		
Heat treatment or stress relief if specified		
Finish if specified		
No permanent set if compressed to solid (if specified)		
Reference parameters		
Free length	N/A	N/A
Pitch	N/A	N/A
Total number of coils with tolerance	N/A	N/A
Active number of coils with tolerance	N/A	N/A
Number of inactive coils	N/A	N/A
Spring rate	N/A	N/A

3.4 Spring Rate Specified

Hard parameters	**Complies**	**Non-compliant**
Material Specification		
Wire diameter or length and width		
Helix direction		
End configuration		
Outside diameter with tolerance (only if ID is not specified)		
Inside diameter with tolerance (only if OD is not specified)		
Spring rate		
Heat treatment or stress relief if specified		
Finish if specified		
No permanent set if compressed to solid (if specified)		
Reference parameters		
Free length	N/A	N/A
Pitch	N/A	N/A
Total number of coils with tolerance	N/A	N/A
Active number of coils with tolerance	N/A	N/A
Number of inactive coils	N/A	N/A