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IEEE Standard for Zinc-Coated Ferrous Lag Screws for Overhead Line Construction

IEEE Power Engineering Society

Sponsored by the
Transmission and Distribution Committee



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IEEE Standard for Zinc-Coated Ferrous Lag Screws for Overhead Line Construction

Sponsor

Transmission and Distribution Committee
of the
IEEE Power Engineering Society

Approved 14 June 2001

IEEE-SA Standards Board

Abstract: Zinc-coated steel lag screws of the fetter drive, gimlet point, and twist drive types commonly used in overhead line construction are covered in this standard.
Keywords: Cold bend test, fetter drive, gimlet point, lag screws, twist drive, zinc-coated.

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Introduction

(This introduction is not part of IEEE Std C135.3-2001, IEEE Standard for Zinc-Coated Ferrous Lag Screws for Overhead Line Construction.)

This standard covers requirements for various types of zinc-coated steel lag screws for overhead line construction.

Participants

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IEEE Standard for Zinc-Coated Ferrous Lag Screws for Overhead Line Construction

1. Overview

1.1 Scope

This standard covers zinc-coated steel lag screws of the fetter drive, gimlet point, and twist drive types commonly used in overhead line construction.

1.2 Application

The lag screws conforming to this standard shall, in all respects, meet the basic dimensional and performance requirements hereinafter stated. The text, specifications or standards references, and associated Figure 1 through Figure 5 supplement each other and shall be considered as parts of this standard.

Metric lag screws are not covered by this standard.

2. References

The following standards shall be used in conjunction with this standard. When the following standards are superceded by an approved revision, the revision shall apply.

ANSI B18.2.1-1996, American National Standard for Square and Hex Bolts and Screws[1]

ASTM A153/A153M-98, Standard Specification for Zinc-Coating on Iron and Steel Hardware[2]

[1]ANSI publications are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA (http://www.ansi.org/).

[2]ASTM publications are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA (http://www.astm.org/).

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3. Material

3.1 Bolts

All lag screws shall be made from one of the following materials:

a) Hot-headed lag screws shall be made from hot-rolled steel which has been produced by the open hearth, basic-oxygen, or electric-furnace process and which is of a grade and quality suitable to meet the requirements of this standard.

b) Cold-headed lag screws shall be made from steel cold-heading wire which has been produced by the open hearth, basic-oxygen, or electric-furnace process and which is of a grade and quality suitable to meet the requirements of this standard, and shall be reheated (stress relieved) if necessary to meet the requirements of this standard.

4. Dimensions

All dimensions are in inches prior to zinc coating.[3]

All lag screws shall be square or hex and in accordance with ANSI B18.2.1-1996[4], as specified in Figure 3 and Figure 4.

Lag screw threads shall be machine-rolled or cut as specified in the data sheets.

5. Strength

Lag-screw heads shall be of sufficient strength to develop the body tensile strength of the screws. Failure shall occur in the shank or threaded section and not at the junction of the head and shank. In no case shall the strength be less than the following:

Normal diameter of screw (inches)	Minimum strength	
	Newtons	Pounds-force
1/4	6 670	1 500
5/16	10 200	2 300
3/8	15 600	3 500
1/2	28 900	6 500

5.1 Cold bend test

After removal of the threads to the root diameter, the unthreaded portion of bolts shall be capable of being bent while at room temperature (10 ˚C to 32 ˚C) at any point through an angle of 180˚, about a diameter equal to the diameter of the bolt without cracking the steel on the outside of the bent portion.

[3] 1 inch = 2.54 cm.

[4] Information on references can be found in Clause 2.

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6. Corrosion protection

Lag screws shall be zinc-coated. The coating shall be applied by:

a) The hot-dip process in accordance with ASTM A153/A153M-98, or
b) Another method producing a zinc coating that meets the requirements of ASTM A153/A153M-98 for adhesion, purity, and thickness applicable to the class of material being coated.

7. Sizes and types

The sizes and types shall be as specified on the data sheets.

8. Finish

All lag screws shall be free from badly formed or otherwise defective heads and bodies.

9. Marking

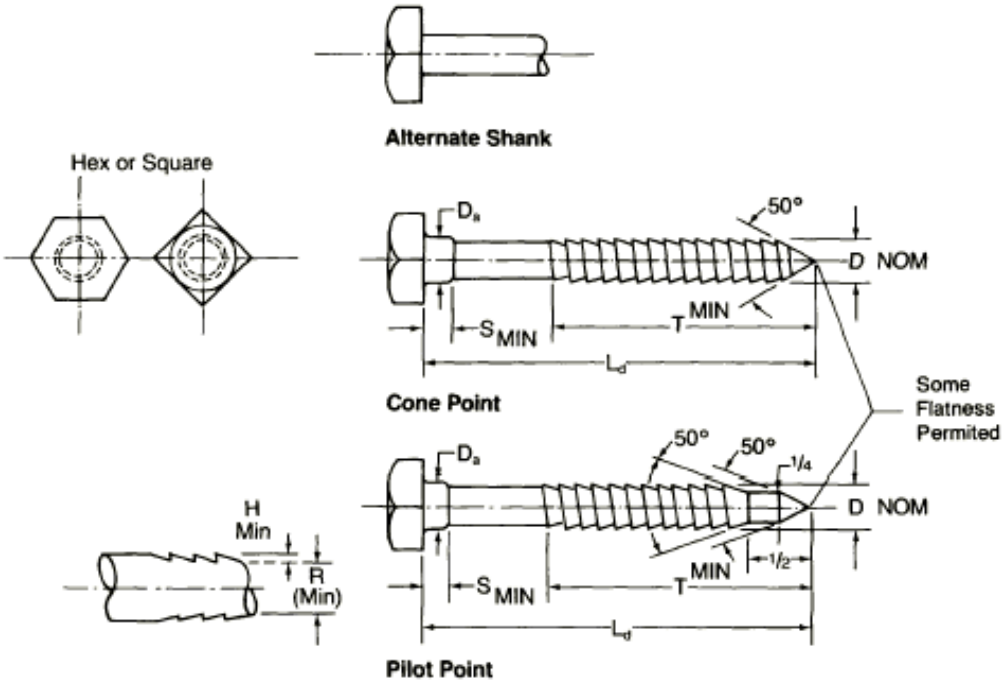
Lag screws shall bear the manufacturer's symbol or identification mark.

10. Marking of shipping packages

Each package shall be marked with the vendor's name and catalog number.

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BODY DIMENSIONS				THREADS PER INCH		
D	L	T	S		R_a	H_b
DIA. OF SCREW	LENGTH	MIN. THREAD	SHOULDER		ROOT DIA.	DEPTH OF THREAD
¼	2½	1¾	.094	10	.18	.01
3/8	2½	1¾	.125	8 or 9	.30	.02
	3	2				
½	4	2½	.156	6 or 7	.41	.02
	4½	2¾				

All Dimensions In Inches

FETTER DRIVE LAG SCREW
ROLLED THREAD

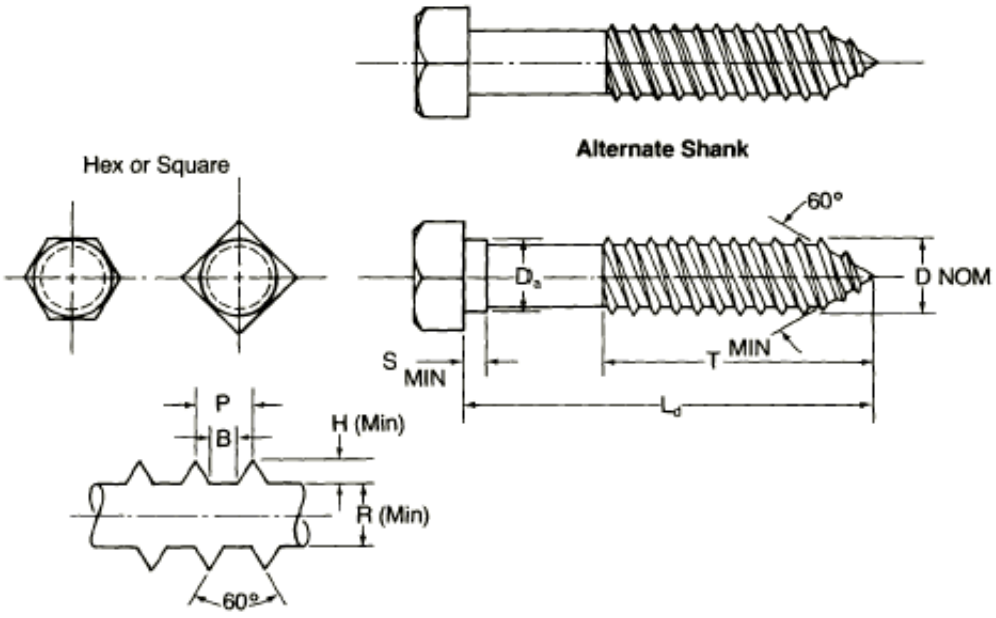
a: 1/64 d: 1/8 g: 3/8 k: 1
b: 1/32 e: 3/16 h: 1/2 x: 0
c: 1/16 f: 1/4 j: 3/4

ALLOWABLE VARIATIONS
SINGLE LETTER INDICATES, SAME + or −, a: ± 1/64
TWO LETTERS INDICATE, FIRST + SECOND −, ax: + 1/64 − 0

Figure 1—Dimensions for fetter drive lag screws

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D	L	T	P	B	H	R	S	
DIA. OF SCREW	LENGTH	MIN. THREAD LENGTH	THREADS DIMENSIONS					THREADS PER INCH
			PITCH	FLAT AT ROOT	DEPTH OF THREAD	ROOT DIA.	SHOULDER	
¼	2	1½	.100	.043	.02	.16	.094	10
	2½	1¾						
	3	2						
5/16	2½	1¾	.111	.048	.02	.21	.125	9
	3	2						

All Dimensions in Inches

GIMLET POINT LAG SCREW
ROLLED OR CUT THREAD

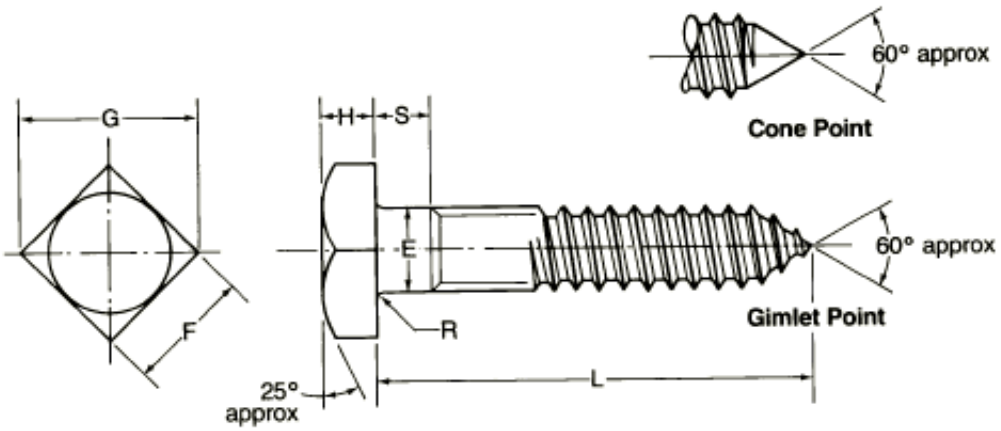
a: 1/64	d: 1/8	g: 3/8	k: 1
b: 1/32	e: 3/16	h: 1/2	x: 0
c: 1/16	f: 1/4	j: 3/4	

ALLOWABLE VARIATIONS
SINGLE LETTER INDICATES, SAME + or −, a: ± 1/64
TWO LETTERS INDICATE, FIRST + SECOND −, ax: + 1/64 − 0

Figure 2—Dimensions for gimlet point lag screws

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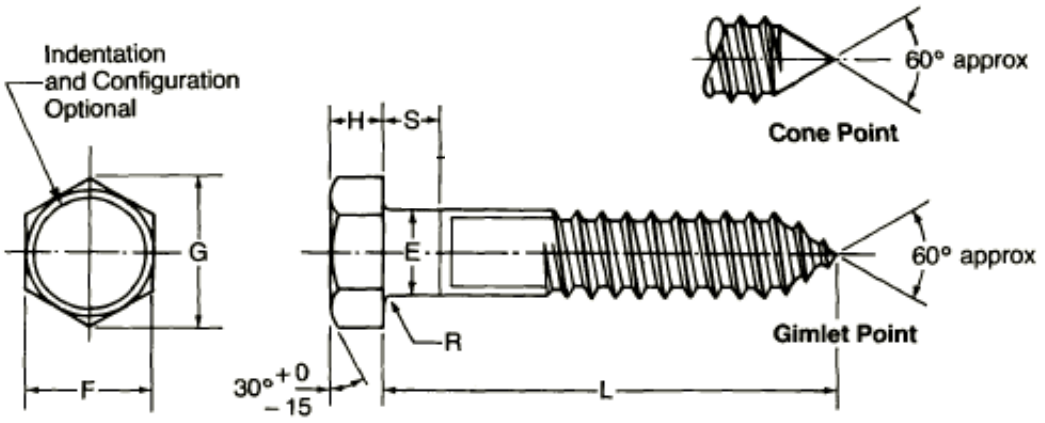
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Nominal Size or Basic Product Dia		E		F			G		H			S	R	
		Body or Shoulder Dia		Width Across Flats			Width Across Corners		Height			Shoulder Length	Radius of Fillet	
		Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min	Min	Max	Min
No. 10	0.1900	0.199	0.178	9/32	0.281	0.271	0.398	0.372	1/8	0.140	0.110	0.094	0.03	0.01
1/4	0.2500	0.260	0.237	3/8	0.375	0.362	0.530	0.498	11/64	0.188	0.156	0.094	0.03	0.01
5/16	0.3125	0.324	0.298	1/2	0.500	0.484	0.707	0.665	13/64	0.220	0.186	0.125	0.03	0.01
3/8	0.3750	0.388	0.360	9/16	0.562	0.544	0.795	0.747	1/4	0.268	0.232	0.125	0.03	0.01
7/16	0.4375	0.452	0.421	5/8	0.625	0.603	0.884	0.828	19/64	0.316	0.278	0.156	0.03	0.01
1/2	0.5000	0.515	0.482	3/4	0.750	0.725	1.061	0.995	21/64	0.348	0.308	0.156	0.03	0.01
5/8	0.6250	0.642	0.605	1-5/16	0.938	0.906	1.326	1.244	27/64	0.444	0.400	0.312	0.06	0.02
3/4	0.7500	0.768	0.729	1-1/8	1.125	1.088	1.591	1.494	1/2	0.524	0.476	0.375	0.06	0.02
7/8	0.8750	0.895	0.852	1-5/16	1.312	1.269	1.856	1.742	19/32	0.620	0.568	0.375	0.06	0.02
1	1.0000	1.022	0.976	1-1/2	1.500	1.450	2.121	1.991	21/32	0.684	0.628	0.625	0.09	0.03
1 1/8	1.1250	1.149	1.098	1-11/16	1.688	1.631	2.386	2.239	3/4	0.780	0.720	0.625	0.09	0.03
1 1/4	1.2500	1.277	1.223	1-7/8	1.875	1.812	2.652	2.489	27/32	0.876	0.812	0.625	0.09	0.03

Figure 3—Dimensions of square lag screws

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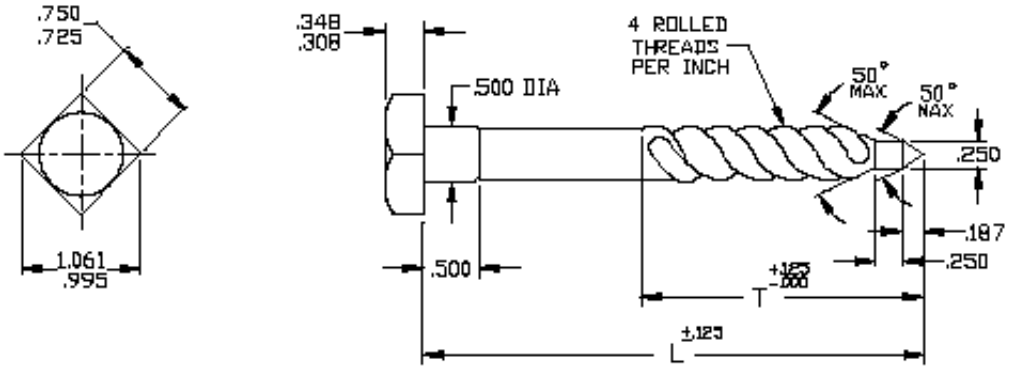


Nominal Size or Basic Product Dia		E		F			G		H			S	R	
		Body or Shoulder Dia		Width Across Flats			Width Across Corners		Height			Shoulder Length	Radius of Fillet	
		Max	Min	Basic	Max	Min	Max	Min	Basic	Max	Min	Min	Max	Min
No. 10	0.1900	0.199	0.178	9/32	0.281	0.271	0.323	0.309	1/8	0.140	0.110	0.094	0.03	0.01
1/4	0.2500	0.260	0.237	7/16	0.438	0.425	0.505	0.484	11/64	0.188	0.150	0.094	0.03	0.01
5/16	0.3125	0.324	0.298	1/2	0.500	0.484	0.577	0.552	7/32	0.235	0.195	0.125	0.03	0.01
3/8	0.3750	0.388	0.360	9/16	0.562	0.544	0.650	0.620	1/4	0.268	0.226	0.125	0.03	0.01
7/16	0.4375	0.452	0.421	5/8	0.625	0.603	0.722	0.687	19/64	0.316	0.272	0.156	0.03	0.01
1/2	0.5000	0.515	0.482	3/4	0.750	0.725	0.866	0.826	11/32	0.364	0.302	0.156	0.03	0.01
5/8	0.6250	0.642	0.605	1-5/16	0.938	0.906	1.083	1.033	27/64	0.444	0.378	0.312	0.06	0.02
3/4	0.7500	0.768	0.729	1-1/8	1.125	1.088	1.299	1.240	1/2	0.524	0.455	0.375	0.06	0.02
7/8	0.8750	0.895	0.852	1-5/16	1.312	1.269	1.516	1.447	37/64	0.604	0.531	0.375	0.06	0.02
1	1.0000	1.022	0.976	1-1/2	1.500	1.450	1.732	1.653	43/64	0.700	0.591	0.625	0.09	0.03
1-1/8	1.1250	1.149	1.098	1-11/16	1.688	1.631	1.949	1.859	3/4	0.780	0.658	0.625	0.09	0.03
1-1/4	1.2500	1.277	1.223	1-7/8	1.875	1.812	2.165	2.066	27/32	0.876	0.749	0.625	0.09	0.03

Figure 4—Dimensions of hex lag screws

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L	T
3.000	2.250
4.000	2.625
4.500	2.625
5.000	3.000

NOTES:
1. UNSPECIFIED DIMENSIONAL TOLERANCES ±.031
2. UNSPECIFIED ANGULAR TOLERANCES ±2°
3. ALL DIMENSIONS ARE IN INCHES EXCEPT AS SPECIFIED

Figure 5—Dimensions for twist drive lag screws

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