
AASHTO-AGC-ARTBA Joint Committee

Subcommittee on New Highway Materials

Task Force 13 Report

A Guide to Small Sign Support Hardware

June 1998



**AASHTO-AGC-ARTBA
Joint Committee**

Task Force No. 13

A Guide to Small Sign Support Hardware

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Preface

This document is disseminated upon the sponsorship of the Joint Committee of the American Association of State Highway and Transportation Officials, the Associated General Contractors of America and the American Road and Transportation Builders Association (the Joint AASHTO-AGC-ARTBA Committee) in the interest of information exchange, based on the combined technical expertise of the authors. As such, the opinions and conclusions implied or expressed herein do not necessarily reflect the official views or policies of the Joint Committee or its member organizations.

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These materials were developed by Dr. Malcolm H. Ray of Momentum Engineering as a part of National Cooperative Highway Research Program (NCHRP) Project 22-10. The NCHRP project panel provided considerable guidance, review, and direction during the project. The panel members included:

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Table of Contents

Introduction	1
Background	1
Submitting New Small Sign Hardware Drawings	2
Safety Performance	3
Organization	3
Units	4
Abbreviations	5
Component Nomenclature	5
System Nomenclature	7
Federal Highway Administration Approval Letters	7
Index to Names	17
 Fastener Components	19
 Post Components	59
 Sign Support Systems	119
 References	227

Introduction

Background

Most small highway signs are supported by rolled steel shapes, extruded aluminum shapes, woodposts, steel flange-channel shapes, round tubes, pipes, square steel tubes or fiber reinforced plastic shapes. These may be used in a variety of ways to meet the dual requirements of (1) providing support for signs under a broad range of environmental conditions and (2) releasing when struck by a vehicle to minimize the chance of injury to vehicle occupants.

This guide is a compilation of proprietary and non-proprietary small sign support hardware. Details have been provided and reviewed by members of the American Association of State Highway and Transportation Officials (AASHTO), the Associated General Contractors of America (AGC), and American Road and Transportation Builders' Association (ARTBA), Joint Cooperative Committee Task Force 13. Proprietary sign support hardware materials were provided by the manufacturers and non-proprietary sign support materials were developed by Momentum Engineering, Inc. as a part of National Cooperative Highway Research Program Project 22-10.

The Task Force believes that it would provide a valuable service to the highway community by publishing a comprehensive document containing the information detailed herein for widely used small sign support systems. This document presents a "state of the art" perspective that should be of benefit to engineers, designers, maintenance personnel, contractors, and administrators. This document only addresses the crashworthiness features of sign supports. Issues like typical design wind loadings, the sign to post attachment details and the maximum size sign permitted for each type of support, though important, are not discussed in this document.

To be acceptable for use on Federal Aid roadways all sign supports must be tested and evaluated as described in AASHTO's 1994 *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*. (1) The results of this testing must be submitted to the Federal Highway Administration (FHWA) whereupon FHWA will issue a letter indicating the acceptable uses of the sign support system.

While every effort has been made to make this document as complete as possible, some designs may have been omitted inadvertently. New systems and improvements to existing systems will also continue to be developed in the coming years. The information in this document, therefore, must be continually updated to remain of value to practicing engineers. This guide has been organized with special consideration to facilitating more frequent revisions. Task Force 13 will periodically update this document so that it will become an effective and timely means of transmitting sign support hardware information throughout the roadside safety community and hardware manufacturing industry. Information on any new small sign support designs should be forwarded to the AASHTO-AGC-ARTBA Joint Committee's Task Force 13, through AASHTO, AGC, or ARTBA, for evaluation and possible inclusion in future versions of this publication.

Many of the tested sign support systems in this document are representative of the largest crashworthy design. For example, a single 4.5 kg/m u-channel post driven directly into a strong soil is acceptable. By extension, single posts of lesser masses (kg/m) are also acceptable. Slip

bases and breakaway couplings theoretically will work over a wide range of post sizes. The upper limit is dependent upon the mass of the post that the impacting vehicle must accelerate (maximum 270 kg) and the lower limit is dependent upon the rigidity of the post to ensure that it does not bend.

Submitting New Small Sign Hardware Drawings

Anyone interested in having new systems or components included in future revisions of *A Guide to Small Sign Support Hardware* should send the following materials to the secretary of AASHTO-ARTBA-AGC Task Force 13:

1. An FHWA letter of approval that indicates the submitted small sign system has been successfully crash-tested according to the latest AASHTO Specifications.
2. A drawing (on a reproducible 216 x 280 mm sheet) along with design and material specifications conforming exactly to the standards and style used on the drawings currently in the guide.

The above materials should be forwarded to:

Secretary, AASHTO-ARTBA-AGC Task Force 13
Federal Highway Administration/HNG-14
400 Seventh Street, S.W.
Washington, D.C. 20590

Submissions that do not meet the above criteria will not be considered for inclusion in any revisions to this guide.

The drawings for the non-proprietary drawings in this guide were produced using INTERGRAPH MICROSTATION. The text specifications were produced using WordPerfect 5.1. Both the text and drawing files are available and may be obtained from several sources including:

PCTRANS
Transportation Center
University of Kansas
2011 Learned Hall
Lawrence, Kansas 66045
Phone (913) 864-5655
Fax (800) 245-8760

MACTRANS
University of Florida
Center for Microcomputers in Transportation
512 Weill Hall
P.O. Box 116585
Gainesville, Florida 32611-6585
Phone (800) 226-1013
Fax (904) 392-3224

Suggestions about revising drawings or specifications currently in the Guide should be forwarded to the appropriate manufacturer in the case of proprietary systems or to the Task Force secretary in the case of non-proprietary systems. Proposed revisions will be periodically evaluated by the Task Force.

Safety Performance

The 1994 AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* relate specifically to the safety performance evaluation for small sign support systems.(1) The AASHTO specification requires testing with an 816.5-kg (1800-lb) vehicle at impact velocities of 32 km/h and 97 km/h. To be acceptable the change in velocity while the vehicle is in contact with the sign must be 4.87 m/s (16 ft/sec) or less.

NCHRP Report 350 was published in 1993 and calls for tests with small signs using an 820-kg vehicle striking the device at 35 km/h and 100 km/h for Test Level 3.(2) To be acceptable the change in velocity while the vehicle is in contact with the sign must be 5 m/s or less. Report 350 Test Level 3 conditions are slightly less demanding than the 1985 AASHTO specifications. The low velocity test uses a slightly higher velocity providing a little more energy to make the device activate and the acceptance criteria are slightly higher. The differences arise due to the change from U.S. Customary Units to SI Units in testing so the differences are relatively minor. The FHWA will accept NCHRP Report 350 Test Level 3 results as evidence of the sign support crashworthiness acceptability.

NCHRP Report 230 test and evaluation criteria were closer to the 1985 AASHTO specifications.(3)(1) Anything tested and accepted using Report 230 or the 1985 AASHTO specifications had to pass slightly more demanding tests than those in Report 350.(4) All small sign supports found acceptable using Report 230 and the 1985 AASHTO specifications are therefore still acceptable using Report 350 and the 1994 AASHTO specifications.

All of the sign support systems included in this guide have been crash tested and evaluated in terms of the above specifications. Only those sign support systems judged by the FHWA to have met the safety performance requirements of the specifications are included.

This document only addresses crashworthiness aspects of small sign support designs. Other design considerations affecting the structural adequacy such as abnormal live loads, wind loads, fatigue, and corrosion are also important although they are not addressed in this document.

The user is responsible for verifying the accuracy of any system or component in a specific application.

It is important to note that crash tests are conducted on support systems as opposed to individual components. For this reason, small sign support acceptance letters are generally only referenced on drawings of the whole sign support system. There are a few exceptions to this rule where an acceptance letter was issued regarding specific components such as, for example, the equivalence between some wood species. Seemingly small variations in system details such as embedment method, embedment depth, sign panel size, sign panel mounting height, and mounting hardware may have significant effects on impact behavior.

Organization

This guide is organized into four sections. The first section, including this subsection, contains the introductory materials, table of contents, and general information. The next sections contain drawings and specifications of fastener and post components. The fourth section contains

drawings of small sign support systems. The small sign support system drawings and specifications show how the components shown in the fastener and post sections of the guide can be assembled to produce a variety of small sign support systems.

Fasteners include bolts, nuts, and washers. Post components are those parts that serve to support the sign and also the components of the breakaway, yielding or foundation mechanism. Each component has been assigned a unique designator that identifies the component and also serves as a page number with components being arranged alphabetically by designator. The designator used in this small sign support hardware guide are consistent with those found in *A Guide to Standardized Highway Barrier Hardware*.⁽⁵⁾ Many of the fastener components used in this Guide also appear, with the same designator, in the Hardware Guide.

Units

This guide has been produced completely in the International System (SI) of units. All length dimensions in this guide are in millimeters (mm), the units of stress are Mega-Pascals (MPa), the units of force are kilo-Newtons (kN), the units of torque are Newton-meters (N-m) and the units of mass

are kilograms (kg). Units of length are not shown on the drawings since all dimensions are in millimeters. U.S. customary weights of lbs have been converted to the SI mass unit of kilograms (kg). All the components and systems shown in this guide were originally developed in the foot-pound-second system and have been converted into their present form. Dimensions were converted and rounded as suggested in R 1-91 I (ASTM E 380-89a).

Table 1. Guide Units

Length	millimeters	mm
Mass	kilograms	kg
Force	Newtons	N
Stress	10 ⁶ Pascals (N/m ²)	MPa
Torque	Newton-meters	N-m

Several references were used to guide the metrication process. The National Institute of Building Sciences’ *Metric Guide for Federal Construction* is a good general purpose guide to metrication.⁽⁶⁾ Basic SI definitions and guidelines for metrication can be found in AASHTO R 1 (ASTM 380), “Standard Practice for Use of the International System of Units (SI).” Inertial and cross-sectional properties of structural steel shapes were taken from the AISC “Metric Properties of Structural Shapes.”⁽⁷⁾ For more specific metrication issues, the following guidelines and specifications are cited throughout the guide:

- Metrication definitions AASHTO R 1
- Tolerances ANSI B4.3
- Fasteners ANSI B18
 - Hex bolts ANSI B18.2.3.5M
 - Heavy hex bolts ANSI B18.2.3.6M
 - Heavy hex structural bolts ANSI B18.2.3.7M
 - Metric hex nuts, style 1 ANSI B18.2.4.1M
 - Metric hex nuts, style 2 ANSI B18.2.4.2M
 - Metric plain washers ANSI B18.22M
 - M Profile threads ANSI B1.13M
- Structural Shapes AASHTO M 160M
- Plate AASHTO M 183M

Abbreviations

The following list contains abbreviations used throughout the guide for various standards-making organizations.

AASHTO	American Association of State Highway and Transportation Officials
AISC	American Institute of Steel Construction
AGC	Associated General Contractors
ANSI	American National Standards Institute
ARTBA	American Road and Transportation Builders Association
ASTM	American Society for Testing and Materials
AWS	American Welding Society
FHWA	Federal Highway Administration
IFI	Industrial Fasteners Institute
SAE	Society of Automotive Engineers

There is a great deal of intentional duplication between the AASHTO and ASTM material specifications. Generally, the AASHTO version of a specification is considered the primary reference and the ASTM reference is included in parentheses for convenience. Table 2 shows abbreviations used in drawings throughout this guide.

Table 2. Abbreviations

CLR = Clear distance	D = Diameter	EA = Each
OC = On center	MAX = Maximum	MIN = Minimum
LNG = Long	TOL = Tolerance	TYP = Typical
R = Radius		

Component Nomenclature

Nomenclature for the components is presented on the following pages. Component designators begin with either an **F** or a **P** denoting a fastener or post component, respectively.

The remaining columns of the designator are defined below. A valid designator has three upper case letters, followed by two digits, followed by an optional lower case letter. In the tables on the following pages, valid options for the next column can be found between the two horizontal lines. Thus FPA01 is a valid designator and FPX01 is not.

COMPONENTS

	Function	Type	Sequence Number	Option
Fastener	Bolt/Screw	Button Head Bolt	01-99	a-b
		Carriage Bolt		
		Hook Bolt		
		Lag Screw		
		Cap Screw		
		Toggle Bolt		
		HeX Head Bolt		
	Nut	Square Nut	01-99	a-b
		HeX Nut		
	Plate	Anchor Plate	01-99	a-b
		Bearing Plate		
		Slipbase Plate		
		Post Fitting		
	Washer	Circular	01-99	a-b
		Rectangular		

The designator identifies a general functional group of components (fastener or post) followed by a more specific categorization of the component function. Thus, in a component designated as FWC20, the letter **F** indicates it is a fastener, and the letter **W** denotes it is a washer. The **C** designator further indicates this is a circular washer and is the twentieth in the series of circular washers. Post components are organized in a similar manner.

COMPONENTS

	Function	Type	Sequence Number	Option
Post	Aluminum tube	Sign Post	01-99	a-b
	C-section	Foundation		
	Wood			
	Flange Channel	Soil Plate		
	PLate			
	CONcrete			
	Plastic tube			
	S-section			
	Steel Tube			
	W-section			

System Nomenclature

The second type of designator describes the small sign support system where a system is an assembly of components. All system designators in both *A Guide to Standardized Highway Barrier Hardware* and *A Guide to Small Sign Support Hardware* begin with the letter S to indicate that the drawing is of a system rather than a fastener or post component. The second column identifies the type of system, S for all the sign support hardware in this document. The third column identifies a family of similar small sign supports. For example all slipbase sign supports are designated with an S so the user will immediately recognize an SSS01 to be the first variation of a slipbase small sign support system.

SYSTEMS

	Function	Type	Sequence Number	Option
System	Sign	Coupling Fracture Slip base SPliced	01-99	a-c

The last character in the designator indicates the number of posts that can be used within a 2100-mm wide distance. A vehicle could come in contact with all the posts that are located within the width of the vehicle so the FHWA approval letters indicate the number and type of posts that are acceptable for each system within a 2100-mm span (e.g., the assumed typical vehicle width). One-post systems are designated with the letter **a**. When two posts are acceptable within a 2100-mm span the system is designated with a **b**. When three posts are acceptable within a 2100-mm span the system is designated with a **c**.

Federal Highway Administration Approval Letters

In order for a small sign support system to be acceptable for use on a Federal Aid roadway, the system must have been approved by the FHWA. The FHWA routinely issues small sign support acceptance letters that indicate if a particular device is acceptable, the maximum number and size of posts acceptable in a 2100-mm span, and the type of soil support that is required. These letters are the definitive statement about what is acceptable practice for small sign supports. As of the end of 1996, some 70 letters have been issued by the FHWA's Office of Engineering. These letters are summarized in Tables 3 and 4. Table 3 is a list of all the FHWA approval letters issued to date (September 1996) along with the date of issue, the recipient of the approval, and a brief description of the contents of the letter. Table 4 is a synthesis of the letters listed by the systems that are included in the Guide. The table lists the system name and designator, manufacturer, the number and size of posts acceptable within a 2100-mm span, the acceptable soil support conditions, and the number of the FHWA approval letter.

**Table 3. Summary of Federal Highway Administration Small Sign
Support Acceptance Letters[†]**

No.	Date	Addressee	Description
1	5/13/86	Southwestern Pipe, Inc.	POZ-LOC anchor system with 60-mm diameter post with maximum 2.41-mm wall thickness. [‡]
2	8/19/86	Truss Joist MacMillan	MICRO-LAM 378-mm by 200-mm plywood box section post tested in S-2 soil.
3	10/3/86	Allied Tube & Conduit	QUIK-PUNCH tube system with maximum size 57-mm square 2.67 mm post set in reinforced sleeve base.
4	1/29/87	Minute Man Anchors, Inc.	Breakaway coupling for use with a 4.46 kg/m steel flanged channel post (superseded by new hardware in SS-6).
5	6/15/87	Memorandum to Regions	a. Perforated 51-mm square 2.67-mm thick steel tube (maximum size). [‡] b. Single 4.46 kg/m steel flanged channel post. [‡] c. Dual 4.46 kg/m steel flanged channel post. [‡] d. Arizona dual leg slipbase with S200x11.5 post. e. Texas dual leg slipbase with W310x67 post.
6	3/10/88	Minute Man Anchors, Inc.	Breakaway Coupling for use with steel flanged channel supports. [‡]
7	9/01/88	Region 5 Memorandum	Wisconsin large slipbase sign support system with W310x32.7 post and no upper hinge sign attachment clips.

[†] Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

[‡] These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 "standard" soil). Should an agency wish to use this system in a "weak" soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign
Support Acceptance Letters[†] (continued)**

No.	Date	Addressee	Description
8	3/31/89	Unistrut Corporation	Telespar small sign supports with a maximum post size of 57-mm square and 2.67-mm thick.
9	3/16/89	Franklin Steel	EZE-Erect sign support system—maximum 6.0 kg/m flanged channel posts.
10	5/11/89	Hwycom Corporation	75.2-mm diameter 3.2-mm thick wall fiber-reinforced plastic post (See SS-12).
11	5/18/89	Allied Tube & Conduit	Quick-Punch post—maximum size 57-mm square 1.9-mm thick post in non-reinforced 1.27-mm thick sleeve base.
12	8/03/89	Hwycom Corporation	Dual Post Installations of 76.2-mm FRP sign post.
13	8/31/89	Marion Steel	Single to triple 4.5 kg/m and single or dual 6/0 kg/m Rib-Bak post installations with ground splice. [‡]
14	10/27/89	Marion Steel	Rib-Bak Post with Minute Man Coupling. [‡]
15	12/12/89	Memorandum to Region I	Single 76-mm and 102-mm diameter aluminum 4.76-mm thick wall. Direct burial tube [‡] (See SS-26 for 102-mm tube rescinded).
16	12/19/89	Minute Man Breakaway	MMB-1HD breakaway device for 4.5 kg/m steel flanged channel U-post.
17	1/08/90	Transpo Industries	Type A and Type B breakaway couplings (then type AUX for S-1 soil only, others are foundation mounted). Posts limited to 66 kg/m below the hinge within a 2100-mm span.

[†] Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

[‡] These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 “standard” soil). Should an agency wish to use this system in a “weak” soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign
Support Acceptance Letters[†] (continued)**

No.	Date	Addressee	Description
18	6/19/90	Minute Man Breakaway	MMB-1HD breakaway device for use with two 4.5 kg/m flanged channel U-posts in strong soil (See SS-21 for weak soil letter).
19	7/31/90	Allied Tube and Conduit	Square-Fit sign post systems.
20	9/20/90	Franklin Steel	3/0 to 4.5 kg/m flanged channel U-posts.
21	12/26/90	Minute Man Breakaway	MMB-1HD breakaway device with two 4.5 kg/m flanged channel U-posts in both strong and weak soil.
22	1/04/91	Trust Joist MacMillan	Type 'L' MICRO-LAM with revised sawcut.
23	3/14/91	Memorandum to Region I	New Jersey breakaway coupling.
24	5/01/91	Unistrut Corporation	Triangular slipbases for square tube sign supports.
25	6/04/91	Memorandum to Regions	a. Single or dual 89x89-mm undrilled wood post. b. Single 140x184-mm wood with 75-mm holes. c. Single 140x140-mm wood with 50-mm holes. d. Single 89x140-mm wood with 48-mm holes. e. Dual W150x18 steel post on slipbase (up to 27 kg/m for dual supports are acceptable).
26	2/11/92	Unistrut Corporation	Telespar square perforated tube small sign supports without sleeve around base post.
27	5/15/92	Montana DOT	Round wood sign post supports.

[†] Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

[‡] These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 "standard" soil). Should an agency wish to use this system in a "weak" soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign
Support Acceptance Letters[†] (continued)**

No.	Date	Addressee	Description
28	5/26/92	Memorandum to Region 4	89-mm diameter thin walled aluminum tube single spliced Marion Steel or Franklin Steel 6 kg/m U-channel post.
29	7/15/92	A.B. Chance	Helical screw foundations for motorist aid call boxes.
30	9/17/92	Hapco Division	Cast aluminum shoe base for motorist aid call boxes.
31	10/22/92	Allied Tube and Conduit	Single perforated 57-mm square 2.0-mm steel tube post in anchor.
32	10/28/92	Memorandum to Region 7	Western red cedar for breakaway wood posts.
33	10/29/92	Transpo Industries	Model 201C and 301C breakaway couplings.
34	4/20/93	Louisiana DOTD	Omni-directional single-post sign support.
35	5/28/93	Imperial, Inc.	60.3-mm diameter aluminum tube sign post.
36	9/03/93	Memorandum to Regions	Large and small sign supports pooled fund study—Phase II, wood U-channel, steel tube, slipbase, FRP post.
37	8/13/93	Greenline	Delineator posts.
38	10/27/93	Unistrut Corporation	Telespar slipbase sign support system.
39	10/25/93 6/24/94	Recycled Plastic Products, Inc.	Square recycled plastic sign posts. Circular recycled plastic posts.

[†] Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

[‡] These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 “standard” soil). Should an agency wish to use this system in a “weak” soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign
Support Acceptance Letters[†] (continued)**

No.	Date	Addressee	Description
40	10/27/93	Unistrut Corporation	Direct burial single 50-mm square 2.7-mm thick Telespar perforated steel sign posts.
41	11/8/93	Richard Strizki, P.E.	Adjustable anchor and bracket assembly.
42	11/20/93	Marion Steel Company	2 kg/m and smaller A 36M delineator posts.
43	1/18/94	VSAR Systems	Speed-E-Rect breakaway device.
44	3/30/94	Unistrut Corporation	1.9-mm thick ASTM A 715M Grade 420 Telespar posts.
45	5/11/94	Memorandum to Regions	Direct burial wood sign posts.
46	6/17/94	Memorandum to Regions	Unmodified cedar posts.
47	9/14/94	South Dakota DOT	Splicing Marion posts to Franklin stubs.
48	9/23/94	SAFE	SAFE foundation support.
49	10/26/94	Galvacor Inc.	Flanged channel posts made of A 36M steel unacceptable as sign posts.
50	11/8/94	Memorandum to Regions	130x130-mm nominal unmodified wood posts.
51	1/23/95	Unistrut Corporation	Perforated square steel tube manufactured using A 570 steel considered acceptable.
52	2/8/95	Allied Highway Sales	Allied triangular slipbase for square perforated tube sign posts.
53	3/9/95	Lancaster Composite	102-mm diameter light-weight concrete-filled FRP post in steel drive-sleeve.

[†] Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

[‡] These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 "standard" soil). Should an agency wish to use this system in a "weak" soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign
Support Acceptance Letters[†] (continued)**

No.	Date	Addressee	Description
53a	3/19/96	Lancaster Composite	Acceptance of some post sizes in strong soil.
53b	9/20/96	Lancaster Composite	Acceptance of additional post sizes in various supports.
54	3/28/95	Chicago Heights Steel	Equivalence of Chicago Heights and Franklin posts.
55	4/24/95	Colorado DOT	90x140-mm wood posts with wide side perpendicular to traffic.
56	7/13/95	Marion Steel Company	Rib-bak lap splice for three posts in weak soil.
56a	3/14/96	Marion Steel Company	Modified design to use a "bar spacer."
57	9/26/95	Marion Steel Company	Report 350 testing of the Minute Man breakaway system with 4.5 kg/m posts in one-, two- or three-post installations.
58	9/27/95	Flexstake	Flexstake delineator post.
59	3/7/96	Chicago Heights	SafetySplice lap splice system for 5.9 kg/m posts or lighter.
59a	4/19/96	Chicago Heights	Modify design to use a "bar spacer."
60	10/27/95	Clifford Dent	Breakaway sign support coupling.
60a	10/21/96	Clifford Dent	Larger bolts with same necked-down diameter as SS-60.
61	2/27/96	FHWA Region 10	Revised design for the Oregon multi-directional slipbase.

[†] Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

[‡] These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 "standard" soil). Should an agency wish to use this system in a "weak" soil, further crash testing is recommended.

**Table 3. Summary of Federal Highway Administration Small Sign
Support Acceptance Letters[†] (continued)**

No.	Date	Addressee	Description
62	6/3/96	Western Highway Products	Ulti-mate square perforated steel tubes sign supports.
63	7/2/96	S-Square Tube Products	Perforated square steel tube sign supports.
64	7/18/96	Marion Steel	“Metric” Rib-Bak U-channel steel sign posts.
65	9/5/96	Southwestern Pipe	Steel tube slipbase system.
66	8/8/96	Universal Anchor	The Universal Anchoring System for FRP and PozLoc Posts.
67	9/9/96	Franklin Industries	U-channel post certification.
68	9/18/96	X-Cessories Squared	Slipbase support for a square steel tube post.
69	9/18/96	Safety Quest	U-channel slipbase system.
70	9/25/96	Richard Buhler	Sleeve for 100x100 timber posts.

[†] Supports conform to Federal Highway Administration Requirements based on the 1985 AASHTO *Standard Specifications for Highway Signs, Luminaires and Traffic Signals*. After May 1993, velocity change permitted is 5.0 m/s.

[‡] These small sign supports were only tested in NCHRP Report 230 S-1 strong soil (Report 350 “standard” soil). Should an agency wish to use this system in a “weak” soil, further crash testing is recommended.

Table 4. SUMMARY OF SIGN SUPPORT SYSTEMS ACCEPTABLE TO FHWA

Number of posts allowed within a 2100 mm span													
System Name	Manufacturer	System Designator	1			2			3			FHWA Letter	
			Largest Post			Largest Post			Largest Post				
			Des.	Mass (kg/m)	Soil	Des.	Mass (kg/m)	Soil	Des.	Mass (kg/m)	Soil		
Break-Safe BS25-LP System	Transpo Industries	SSC01a-b	--	66	F	--	33	F	--	--	--	17	
Break-Safe BS50-LP System	Transpo Industries	SSC02a-b	--	66	F	--	33	F	--	--	--	17	
Break-Safe A116-LP System	Transpo Industries	SSC03a-b	--	66	F	--	33	F	--	--	--	17	
Break-Safe AS4-LP System	Transpo Industries	SSC04a-b	--	66	F	--	33	F	--	--	--	17	
Break-Safe AU4-LP, AU6-LP, AU8-LP	Transpo Industries	SSC05a-b	--	66	F	--	33	F	--	--	--	17	
Break-Safe AUX4, AUX6 & AUX8	Transpo Industries	SSC06a-b	PFP06 PFP16 PFP26	6.0	S	PFP06 PFP16 PFP26	6.0	S	--	--	--	17	
Break-Safe AP3-QLP - AP4-5LP	Transpo Industries	SSC07a-b	--	66	F	--	33	F	--	66	F	17	
Minute Man Breakaway System	Minute Man Breakaway	SSC10a-c	PFP25	4.5	SW	PFP25	4.5	SW	PFP25	4.5	SW	4 6 14 18 21 57	
Direct Burial Perforated Steel Tube	Allied Highway Sales Ultimate Highway Sales	SSF01a-b	PTP12a PTP22b PTP42b	3.6	S	PTP21b PTP41b	3.1	SW	--	--	--	3 19 40 51 62	
Perforated Steel Tube in Anchor Base	Allied Highway Sales Ultimate Highway Sales	SSF02a-c	PTP23b PTP43b	4.7	SW	PTP22b PTP42b	3.6	SW	PTP21b PTP41b	3.1	SW	8 36 51 62	
FRP Sign Post in Concrete	HwyCom, Inc.	SSF10a-b	PPP01	1.4	S	PPP01	1.4	S	--	--	--	10 12 66	
Direct Burial Wood Post	Generic	SSF20a-b	PDP24	NK	SW	PDP22	NK	SW	--	--	--	25 32 36 45 46 50	
Direct Burial Circular Wood Post	Generic	SSF21a	PDP37	NK	--	--	--	--	--	--	--	27 36	
Rectangular Wood Post in Concrete	Generic	SSF22a-b	PDP24	NK	SW	PDP22	NK	SW	--	--	--	32 36	
Direct Burial Tubular Aluminum post	Generic	SSF30a	PTP32	NK	SW	--	--	--	--	--	--	15 28 35	
Lancaster Direct Burial CP40 Post	Lancaster Composite	SSF31a-b	PPP02 PPP03 PPP04	NK	S	PPP02 PPP03 PPP04	NK	S	--	--	--	53 53a 53b	

Soil: F = Foundation Mounted S = Strong Soil W = Weak Soil
Mass: NK = Not Known

Table 4. SUMMARY OF SIGN SUPPORT SYSTEMS ACCEPTABLE TO FHWA

Table 4. SUMMARY OF SIGN SUPPORT SYSTEMS															
Number of posts allowed within a 2100 mm span															
			1			2			3			FHWA Letter			
			Largest Post			Largest Post			Largest Post						
System Name	Manufacturer	System Designator	Des.	Mass	Soil	Des.	Mass	Soil	Des.	Mass	Soil	Des.	Mass	Soil	
Lancaster CP40 Post in Concrete	Lancaster Composite	SSF32a-b	PPR02 PPR03 PPR04	NK	S	PPR02 PPR03 PPR04	NK	S	-	-	-	-	-	-	53 53a 53b
Lancaster CP40 Post in Sleeves	Lancaster Composite	SSF33a-b	PPR02 PPR03 PPR04	NK	S	PPR02 PPR03 PPR04	NK	S	-	-	-	-	-	-	53 53a 53b
Direct Burial U-Channel Post	Marion Steel Chicago Heights Franklin Industries	SSF40a-b	PEP05 PEP15 PEP25 PEP35	4.5	S	PEP05 PEP15 PEP25 PEP35	4.5	S	-	-	-	-	-	-	5 36
Franklin Base-Bolted Breakaway System	Franklin Industries	SSP01a-c	PEP36	6.0	SW	PEP35	4.5	SW	PEP36	6.0	SW	PEP36	6.0	SW	20 59 67
Marion Lap Splice Breakaway System	Marion Steel Company	SSP04a-c	PEP06	6.0	SW	PEP06	6.0	SW	PEP06	6.0	SW	PEP06	6.0	SW	13 56 56a
Safety Splice Breakaway System	Chicago Heights Steel	SSP05a-c	PEP26	6.0	SW	PEP26	6.0	SW	PEP26	6.0	SW	PEP06	6.0	SW	59
Erect Ease Breakaway System	Chicago Heights Steel	SSP06a	PEP26	6.0	SW	PEP26	6.0	SW	-	-	-	-	-	-	9
Bracer Bar Breakaway System	Chicago Heights Steel	SSP07a-c	PEP26	6.0	SW	PEP26	6.0	SW	PEP26	6.0	SW	PEP26	6.0	SW	59 59a
Franklin Eze-erect	Franklin Industries	SSP08a-b	PEP36	6.0	S	PEP36	6.0	S	PEP36	6.0	S	-	-	-	9 32 67
Pos-Loc Yielding Sign Support System	Southwestern Pipe, Inc.	SSP10a-b	PTP01c	NK	S	PTP01c	NK	S	-	-	-	-	-	-	1
Marion Steel Metric Lap Splice Breakaway System	Marion Steel Company	SSP14a-c	PEP16	6.0	SW	PEP16	6.0	SW	PEP16	6.0	SW	PEP16	6.0	SW	13 56 56a
Rectangular Uni-Directional Slipbase	Generic	SSS01a	PWF15a	67	F	-	-	-	-	-	-	-	-	-	5 25
Inclined Rectangular Slipbase	Generic	SSS02a	PWF25a	67	F	-	-	-	-	-	-	-	-	-	36
Omni-Directional Slipbase with Tube Post	Generic	SSS03a	PTF05a	14	F	-	-	-	-	-	-	-	-	-	36
Omni-Directional Slipbase with W Post	Generic	SSS04a	PWF07a	18	F	-	-	-	-	-	-	-	-	-	36
Unistrut Square Tube Slipbase	Unistrut	SSS05	PTP24b	4.7	F	PTP24b	4.7	F	PTP24b	4.7	F	PTP24	4.7	F	52
Round Post Triangular Slipbase Assembly	Southwestern Pipe	SSS06a-b	PTP02c	-	F	PTP02c	-	F	-	-	-	-	-	-	65
Inclined Rectangular Slipbase with Tubular Post	Generic	SSS07a	PTF06a	21	F	-	-	-	-	-	-	-	-	-	36
Marion Steel Slip Safe (Single)	Marion Steel Company	SSS11a-c	PEP06	6.0	SW	PEP06	6.0	SW	PEP06	6.0	SW	PEP06	6.0	SW	64
Marion Steel Slip Safe (Back-to-Back)	Marion Steel Company	SSS12a-c	PEP06	6.0	SW	PEP06	6.0	SW	PEP06	6.0	SW	PEP06	6.0	SW	64

Soil: F = Foundation Mounted S = Strong Soil W = Weak Soil
Mass: NK = Not Known



Index to Names

Fastener Components

Class 4.6 Corner Bolt & Nut	FBH05-06
Class 4.6 Hex Bolt & Nut	FBX06a-24a
Class 9.8 Hex Bolt & Nut	FBX06b-14b
Class 10.9 Hex Bolt & Nut	FBX06c-24c
Class 12.9 Splice Bolt, Washer & Nut	FBX08d
Structural Hex Bolt & Nut	FBX16b-36b
Break-Safe Type A & Type B Anchor	FMA01a-b
Universal Signpost Anchors	FMA02
Class 5 Hex Nuts	FNX06a-36a
Class 12 Hex Nuts	FNX06b-14b
Class 10 Hex Nuts	FNX06c-36c
Class 10S Hex Nuts	FNX16b-36b
Slipbase Shim	FPP11a-15b
Fuse Plate	FPP21-25
Perforated Fuse Plate	FPP31-35
Rectangular Keeper Plate	FPS01-06
Omni-Directional Keeper Plate	FPS10-11
Plain Round Washer	FWC06a-36a
Hardened Round Washer	FWC12b-36b

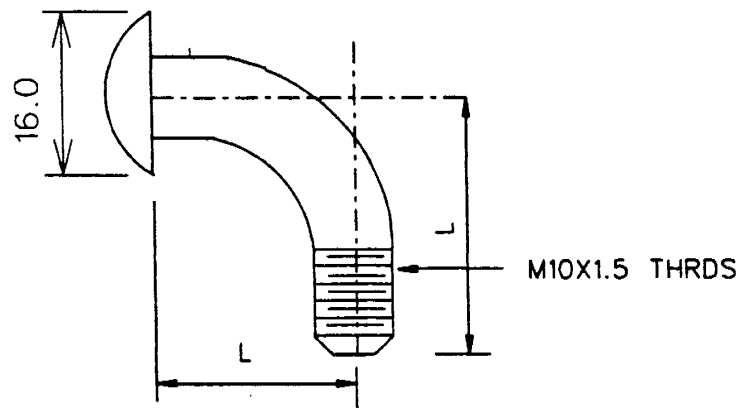
Post Components

Rectangular Timber Sign Support Post	PDP20-24
Circular Timber Sign Post	PDP30-36
Rib-Bak U-Channel Posts	PFP02-06
Metric Rib-Bak U-Channel Posts	PFP12-16
U-Channel Sign Post	PFP23-26
Franklin U-Channel Sign Post	PFP33-36
Trapezoidal Soil Plate	PLS02
Rectangular Soil Plate	PLS03
Soil Plate (Minute Man)	PLS04
Concrete Foundation with Steel Tube	POF05-08
Lancaster Concrete Foundation with Steel Tube	POF09-11
FRP Sign Post	PPP01
Lancaster CP40 Sign Post	PPP02-04
Omni-Directional Slipbase Base & Sign Post	PTF05a-b
Rectangular Slipbase Tube Sign & Base Post	PTF06a-b
Lancaster Steel Tube Drive Sleeve	PTF07-09
Poz-Loc Round Sign Post	PTP01a-02c
Qwik-Punch Perforated Steel Sign Post	PTP12a
Telespar Perforated Steel Sign Post	PTP20a-24b
Aluminum Tube Post	PTP30-32
Ulti-mate Square Tube Steel Signpost	PTP40a-44b
Omni-Directional Slipbase W-Sign & Base Post	PWF07a-b
Wide Flange Base & Sign Post	PWF11a-15b
Inclined Wide Flange Base & Sign Post	PWF21a-25b

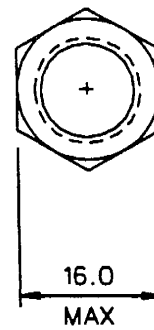
Sign Support Systems

Break-Safe B525-LP System	SSC01a-b
Break-Safe B-650-LP System	SSC02a-b
Break-Safe A16-LP System	SSC03a-b
Break-Safe AS4-LP System	SSC04a-b
Break-Safe AU4-LP, AU6-LP, AU8-LP System	SSC05a-b
Break-Safe AUX4, AUX6, AUX8 System	SSC06a-b
Break-Safe AP3.0-LP - AP4.5-LP System	SSC07a-b
Minute Man Breakaway System	SSC10a-c
Direct Burial Perforated Steel Tube	SSF01a-b
Perforated Steel Tube in Anchor Base	SSF02a-c
FRP Sign Posts in Concrete	SSF10a-b
Direct Burial Wood Post	SSF20a-b
Direct Burial Circular Wood Post	SSF21a
Rectangular Wood Post in Concrete	SSF22a-b
Direct Burial Tubular Aluminum Post	SSF30a
Lancaster Direct Burial CP40 Post	SSF31a-b
Lancaster CP40 Post in Concrete	SSF32a-b
Lancaster CP40 Post in Drive Sleeves	SSF34a-b
Direct Burial U-Channel Post	SSF40a-b
Franklin Base-Bolted Sign Support System	SSP01a-c
Marion Lap Splice Breakaway System	SSP04a-c
Chicago Heights Safety Splice System	SSP05a-c
Chicago Heights Erect Ease System	SSP06a
Chicago Heights Bracer Bar System	SSP07a-c
Franklin EZE-Erect Sign Support System	SSP08a-b
Poz-Loc Yielding Sign Support System	SSP10a-b
Marion Steel Metric Lap Splice Breakaway System	SSP14a-c
Rectangular Uni-Directional Slipbase	SSS01a-b
Inclined Rectangular Uni-Directional Slipbase	SSS02a
Omni-Directional Slipbase with Tube Post	SSS03a
Omni-Directional Slip Base with W-Post	SSS04a
Unistrut Square Tube Slipbase	SSS05a-c
Round Post Triangular Slipbase System	SSS06a-b
Inclined Rectangular Slipbase with Tubular Post	SSS07a
Marion Steel Slip Safe Sign Support System	SSS11a-c
Marion Steel Slip Safe Sign Support System	SSS12a-c

FASTENER COMPONENTS



DESIGNATOR	L
FBH05	25
FBH06	30



CLASS 4.6 CORNER BOLT & NUT



FBH05-06

SHEET NO.

DATE

1 of 2

Documents

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SPECIFICATIONS

Corner bolts shall have M10x1.5 metric threads as defined in ANSI B1.13M for Class 6g threads. Zinc-coated hook bolt material shall conform to ASTM F568 for Class 4.6 bolts (tensile strength 400 MPa and yield strength of 240 MPa). The end of the hook bolt shall be marked with the symbol "4.6". The corner bolt shall conform to the dimensions and tolerances given in IFI 524 for round bend hook bolts.

Zinc-coated nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.1M for metric Style 1 hex nuts (shown in drawing). Corrosion resistant nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.6M (not shown in drawing). Threads shall be M10x1.5 Class 6H as defined in ANSI B1.13M. Zinc-coated nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 5 nuts.

Zinc-coated bolts and nuts shall be treated according to AASHTO M232 (ASTM A153) for Class or AASHTO M298 (ASTM B695) for Class 50.

Designator	Stress Area of Threaded Bolt Shank (mm ²)	Minimum Bolt Strength (kN)
FBH05-06	58.0	23.2

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

INTENDED USE

This corner bolt is for fastening posts to base posts (PTP20a-24b or PTP12a) in the perforated steel tube in anchor base small sign support system (SSF02a-c)

CLASS 4.6 CORNER BOLT & NUT

FBH05-06

SHEET NO.

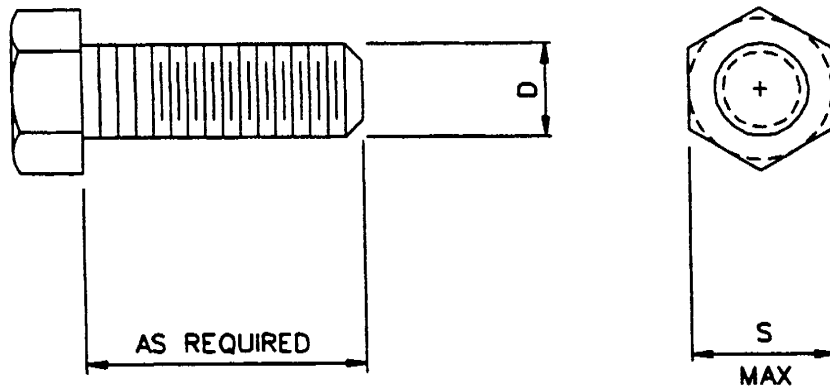
DATE

2 of 2

12-28-96



Documents
Document Sharing Hub



DESIGNATOR	ANSI SIZE	D	M	S
FBX06a	M6x1	6	5.2	10.0
FBX08a	M8x1.25	8	6.8	13.0
FBX10a	M10x1.5	10	8.4	16.0
FBX12a	M12x1.75	12	10.8	18.0
FBX14a	M14x2	14	12.8	21.0
FBX16a	M16x2	16	14.8	24.0
FBX20a	M20x3	20	18.0	30.0
FBX24a	M24x3	24	21.5	36.0



CLASS 4.6 HEX BOLT & NUT



FBX06a-24a

SHEET NO.

DATE

1 of 2

1996

Documents

Document Sharing Hub

SPECIFICATIONS

Class 4.6 bolts shall be manufactured according to the geometric specifications included in ANSI B18.2.3.5M. Threads shall conform to ANSI B1.13M for Class 6g threads. Material for zinc-coated bolts shall conform to ASTM F568 for Class 4.6 (400 MPa tensile strength and 240 MPa yield strength). Material for corrosion resistant bolts shall conform to ASTM F568 for Class 8.8.3 (830 MPa tensile strength and 660 MPa yield strength). Bolt heads shall be marked as specified in ASTM F568 Section 9 with the manufacturer's identification symbol and the symbol "4.6" if zinc-coated and "8.8.3" if corrosion resistant steel is used. ASTM F569 Class 4.6 bolts are essentially equivalent to SAE J429 Grade 2 bolts.

Zinc-coated nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.1M for metric Style 1 hex nuts (shown in drawing). Corrosion resistant nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.6M for heavy hex nuts (not shown in drawing). Threads shall conform to ANSI B1.13M for Class 6H. Zinc-coated nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 5 nuts. Corrosion resistant nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 8S3 nuts.

Zinc-coated bolts and nuts shall be treated according to either AASHTO M232 (ASTM A153) or AASHTO M298 (ASTM B695) for Class 50.

	Stress Area of Designator Threaded Bolt Shank (mm ²)	Minimum Bolt Strength (kN)
FBX06a	20.1	8.0
FBX08a	36.6	14.6
FBX10a	58.0	23.2
FBX12a	84.3	33.7
FBX14a	115.0	46.0
FBX16a	157.0	62.8
FBX20a	245.0	98.0
FBX24a	353.0	141.0

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

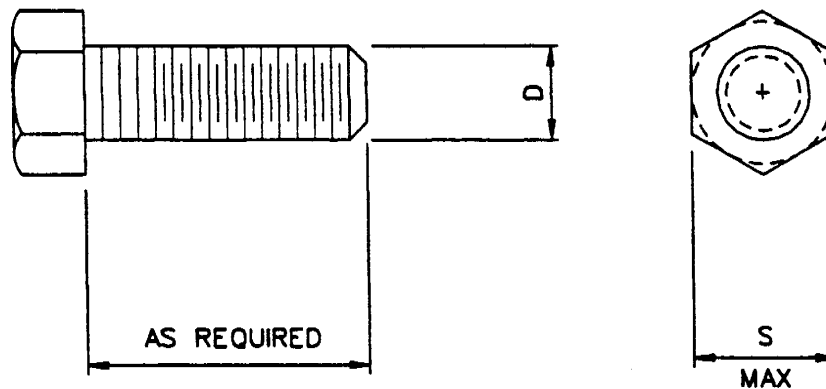
INTENDED USE

These bolts and nuts are used in various sign systems.

CLASS 4.6 HEX BOLT AND NUT

FBX06a-24a	
SHEET NO.	DATE
2 of 2	12-28-96





DESIGNATOR	ANSI SIZE	D	M	S
FBX06b	M6x1	6	5.7	10.0
FBX08b	M8x1.25	8	7.5	13.0
FBX10b	M10x1.5	10	9.3	16.0
FBX12b	M12x1.75	12	12.0	18.0
FBX14b	M14x2	14	14.1	21.0



CLASS 9.8 HEX BOLT & NUT



FBX06b-14b

SHEET NO.

DATE

1 of 2

1996

Documents

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SPECIFICATIONS

Class 9.8 bolts shall be manufactured according to the geometric specifications included in ANSI B18.2.3.5M using material conforming to ASTM F568 Class 9.8 (900 MPa tensile strength and 720 MPa yield strength). Threads shall conform to ANSI B1.13M Class 6g. Bolt heads shall be marked with the symbol "9.8" and the manufacturer's identification symbol as specified in ASTM F568 section 9. ASTM F569 Class 9.8 bolts are essentially equivalent to SAE J429 Grade 5 bolts.

Nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.2M specifications for metric Style 2 hex nuts. Zinc-coated nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 12 nuts. Nut threads shall conform to ANSI B1.13M for Class 6H.

Bolts and nuts shall be zinc-coated according to either AASHTO M232 (ASTM A153) for Class C or AASHTO M298 (ASTM B695) Class 50, Type 1.

	Stress Area of Designator Threaded Bolt Shank (mm ²)	Minimum Bolt Strength (kN)
FBX06b	20.1	18.1
FBX08b	36.6	32.9
FBX10b	58.0	52.2
FBX12b	84.3	75.9
FBX14b	115.0	104.0

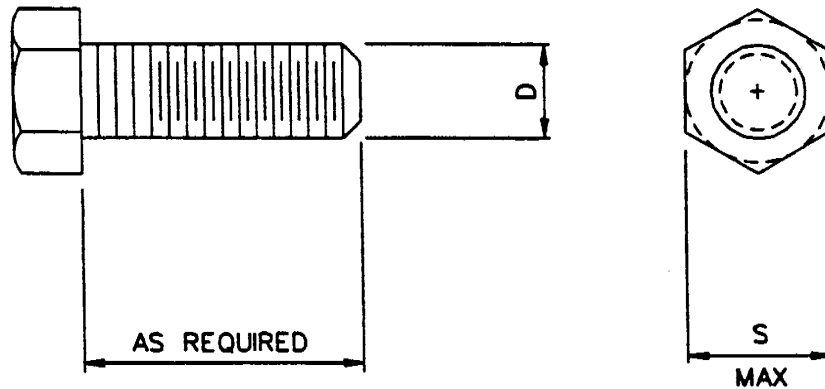
Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

INTENDED USE

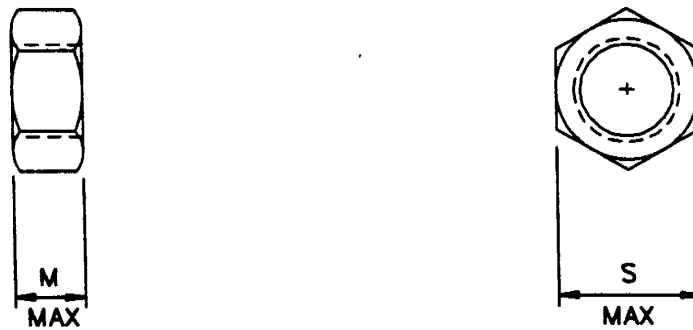
These bolts and nuts are used in various sign systems.

CLASS 9.8 HEX BOLT AND NUT

FBX06b-14b		  
SHEET NO.	DATE	
2 of 2	12-28-96	



DESIGNATOR	ANSI SIZE	D	M	S
FBX06c	M6x1	6	5.2	10.0
FBX08c	M8x1.25	8	6.8	13.0
FBX10c	M10x1.5	10	8.4	16.0
FBX12c	M12x1.75	12	10.8	18.0
FBX14c	M14x2	14	12.8	21.0
FBX16c	M16x2	16	14.8	24.0
FBX20c	M20x3	20	18.0	30.0
FBX24c	M24x3	24	21.5	36.0



CLASS 10.9 HEX BOLT & NUT



FBX06c-24c

SHEET NO.

DATE

1 of 2

Documents

Document Sharing Hub

SPECIFICATIONS

Class 10.9 bolts shall be manufactured according to the geometric specifications included in ANSI B18.2.3.5M. Threads shall conform to ANSI B1.13M for Class 6g threads. Material for zinc-coated bolts shall conform to ASTM F568 for Class 10.9 (1040 MPa tensile strength and 940 MPa yield strength). ASTM F569 Class 10.9 is essentially equivalent to SAE J429 Grade 8 bolts. Bolt heads shall be marked as specified in ASTM F568 Section 9 with the symbol "10S", and the manufacturer's identification symbol.

Zinc-coated nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.1M for metric Style 1 hex nuts and shall conform to AASHTO M291M (ASTM A563M) for Class 10 nuts. Threads shall conform to ANSI B1.13M for Class 6H.

Zinc-coated bolts and nuts shall be treated according to either AASHTO M232 (ASTM A153) for Class C or AASHTO M298 (ASTM B695) for Class 50, Type 1.

Designator	Stress Area of Threaded Bolt Shank (mm ²)	Minimum Bolt Strength (kN)
FBX06c	20.1	20.9
FBX08c	36.6	38.1
FBX10c	58.0	60.3
FBX12c	84.3	87.7
FBX14c	115.0	120
FBX16c	157.0	163
FBX20c	245.0	255
FBX24c	353.0	367

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

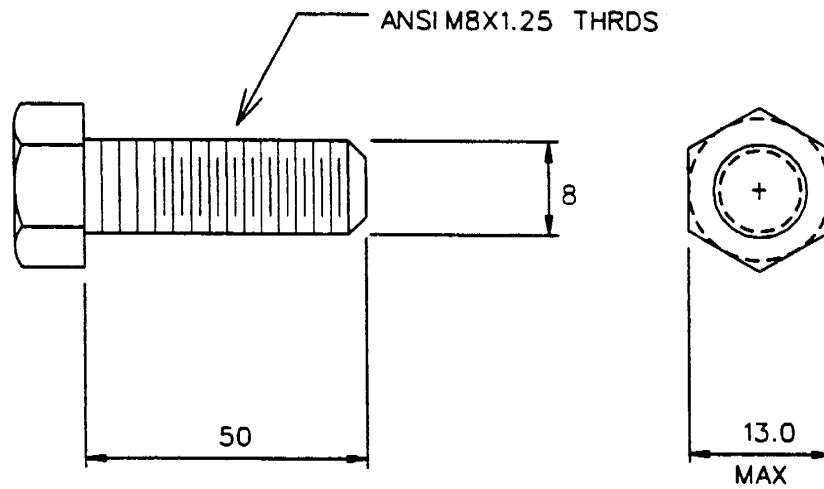
INTENDED USE

These bolts and nuts are used in various sign systems.

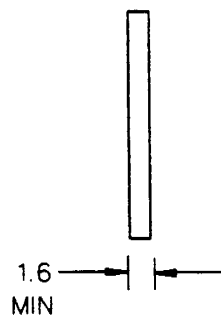
CLASS 10.9 HEX BOLT AND NUT

FBX06c-24c	
SHEET NO.	DATE
2 of 2	12-28-96

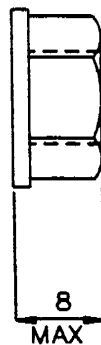
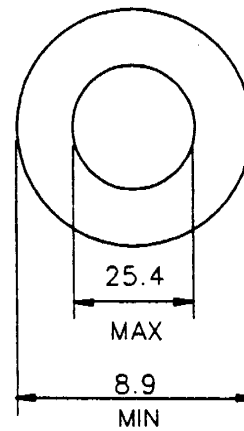




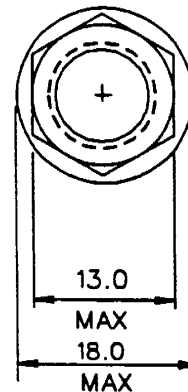
BOLT



WASHER



FLANGE NUT



CLASS 12.9 SPLICE BOLT, WASHER & NUT



FBX08d

SHEET NO.

DATE

152

1996

Documents

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SPECIFICATIONS

Class 12.9 bolts shall be manufactured according to the geometric specifications included in ANSI B18.2.3.5M. Threads shall conform to ANSI B1.13M for Class 6g threads. Material for bolts shall conform to ASTM F568 for Class 12.9 (1220 MPa tensile strength and 1100 MPa yield strength). Bolt heads shall be marked as specified in ASTM F568 Section 9 with the manufacturer's identification symbol and the symbol "12.9".

Nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.4M for metric hex flange nuts. The M8x1.25 threads shall conform to ANSI B1.13M for Class 6H. Nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 12 nuts. Plain round steel washers shall be manufactured according to the dimensional and tolerances in ANSI B18.22M for regular series washers.

Bolts, nuts, and washers shall be zinc-coated according to either AASHTO M232 (ASTM A153) or AASHTO M298 (ASTM B695) for Class 50.

Designator	Stress Area of Threaded Bolt Shank (mm ²)	Minimum Bolt Strength (kN)
FBX08d	36.6	44.7

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

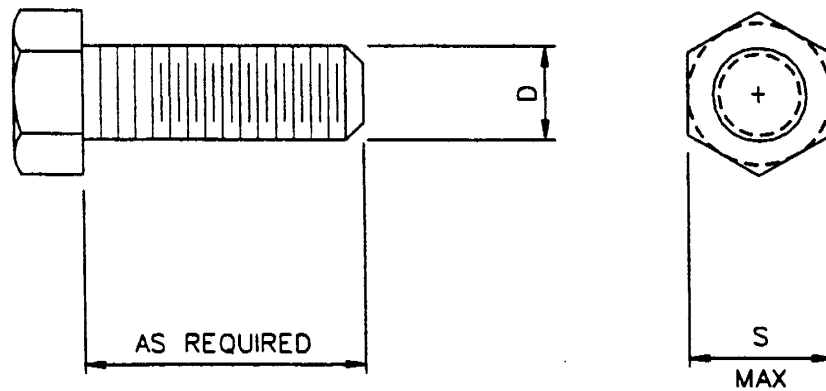
INTENDED USE

These bolts, nuts, and washers are used in the SSP04a-c, SSP05a-c, SSP07a-c and SSP14a-c u-channel post splice systems.

CLASS 12.9 HEX BOLT, WASHER & NUT

FBX08d	
SHEET NO.	DATE
2 of 2	12-28-96





DESIGNATOR	ANSI SIZE	D	M	S
FBX16b	M16x2	16	17.1	27.0
FBX20b	M20x2.5	20	20.7	34.0
FBX22b	M22x2.5	22	23.6	36.0
FBX24b	M24x3	24	24.2	41.0
FBX27b	M27x3	27	27.6	46.0
FBX30b	M30x3.5	30	30.7	50.0
FBX36b	M36x4	36	36.6	60.0



STRUCTURAL HEX BOLT & NUT



FBX16b-36b

SHEET NO.

DATE

1 of 2

Documents



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SPECIFICATIONS

High-strength heavy hex structural bolts shall conform to the requirements of AASHTO M164M (ASTM A325M) and shall be manufactured according to the geometric specifications included in ANSI B18.2.3.7M. Threads shall conform to ANSI B1.13M for Class 6g. Material for zinc-coated bolts shall conform to AASHTO M164M (ASTM A325M) for Type 1 bolts (800 MPa tensile strength and 660 MPa yield strength) and shall bear the head identification marking "8S" and "A-325M." Material for corrosion resistant bolts shall conform to AASHTO M164M (ASTM A325M) Type 3 bolts and shall bear the head identification marks "8S3", "A 325M", and a symbol identifying the manufacturer

Heavy hex nuts shall be manufactured according to AASHTO M291M (ASTM A563M) using the geometry of ANSI B18.2.4.6M. Threads shall conform to ANSI B1.13M for class 6H threads. Zinc-coated nuts shall conform to AASHTO M291M (ASTM A563M) for Class 10S nuts and shall bear the identification mark "10S", and the manufacturer's identification symbol. Corrosion resistant nuts shall comply to AASHTO M291M (ASTM A563M) for Class 8S3 nuts and shall bear the identification mark "8S3" and the manufacturer's identification symbol.

Zinc-coated bolts and nuts shall be treated according to either AASHTO M232 (ASTM A153) for Class C or AASHTO M298 (ASTM B695) for Class 50, Type 1.

Designator	Stress Area of Threaded Bolt Shank (mm ²)	Minimum Bolt Strength (kN)
FBX16b	157.0	130.0
FBX20b	245.0	203.0
FBX22b	303.0	251.0
FBX24b	353.0	293.0
FBX27b	459.0	381.0
FBX30b	561.0	466.0
FBX36b	817.0	678.0

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

INTENDED USE

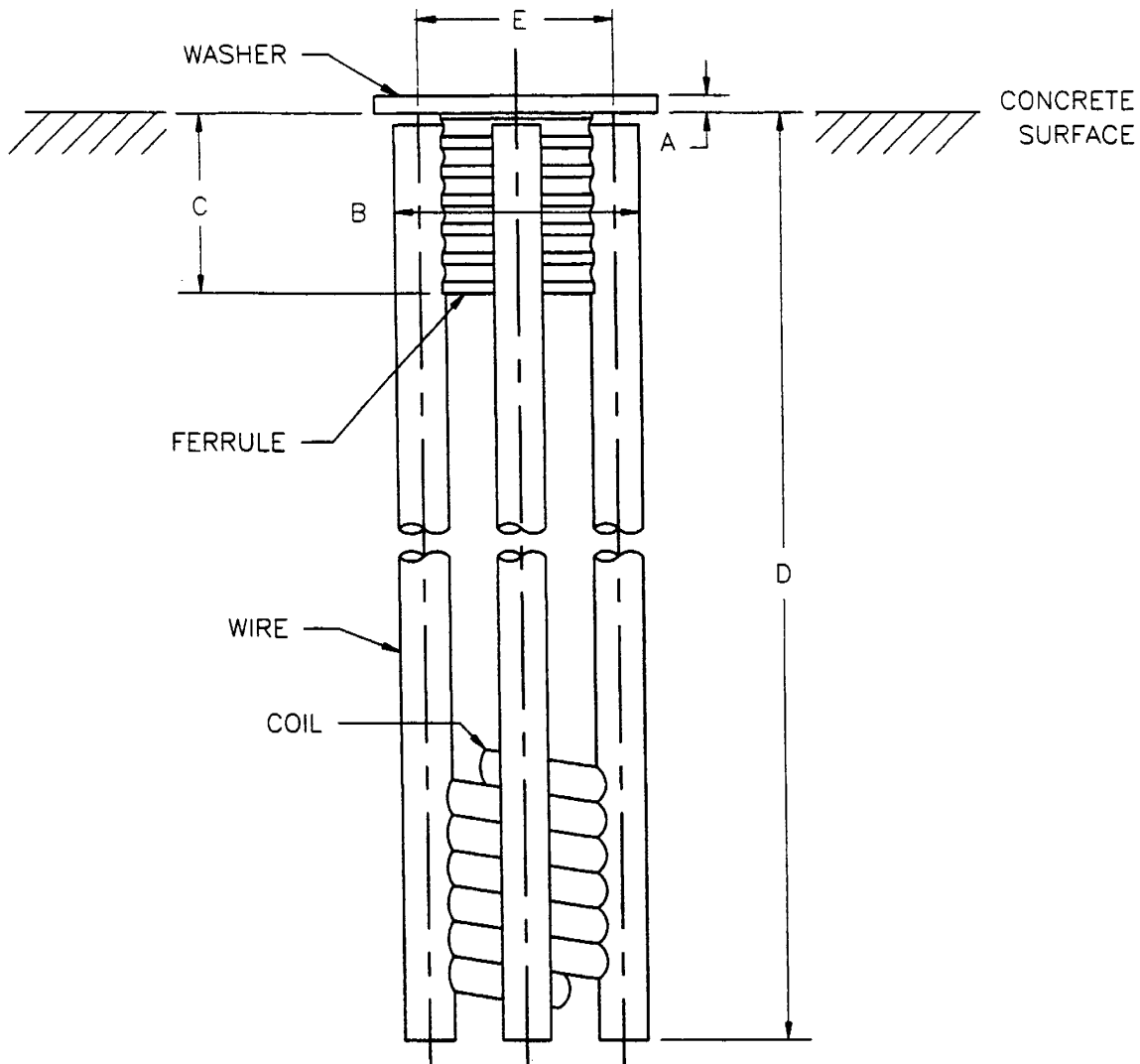
These bolts and nuts are used in various sign systems.

HIGH-STRENGTH STRUCTURAL HEX BOLT & NUT

FBX16b-36b

SHEET NO.	DATE
2 of 2	12-28-96

DESIGNATOR	A	B	C	D	E
FMA01a	1.9	39	41	305	16
FMA01b	3.0	56	41	381	25



BREAK-SAFE® TYPE A, TYPE B ANCHOR

TRANSPO®
INDUSTRIES, INC

FMA01a-b

SHEET NO:

DATE

1 OF 2

7/18/95

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SPECIFICATIONS

The Break-Safe Anchor is designed to be embedded in a concrete foundation. The ferrule shall be made using 304 Stainless Steel. The wire shall be AISI 1038 carbon steel and the coil shall be made using AISI 1008 carbon steel. The washer shall be made using 304 stainless steel.

Designator	A	B	C	D	E	Minimum Ultimate Tensile Force (kN)
FMA01a1.9	39	41	305	16	133	
FMA01b 3.0	56	41	381	25	227	

INTENDED USE

Transpo Type A and Type B Female Anchors are used with Transpo Industries Breakaway Support Couplings for sign posts or light poles or other systems requiring internally threaded anchor bolts. They minimize the maintenance problem often associated with bent anchor bolts.

CONTACT INFORMATION

Transpo Industries, Inc.
20 Jones Street
New Rochelle, NY 10801
Phone: 914-636-1000
Fax: 914-636-1282

BREAK-SAFE TYPE A & TYPE B ANCHOR

FMA01a-b

SHEET NO.

2 of 2

DATE

02-01-97

TRANSPO®
INDUSTRIES, INC.



Documents

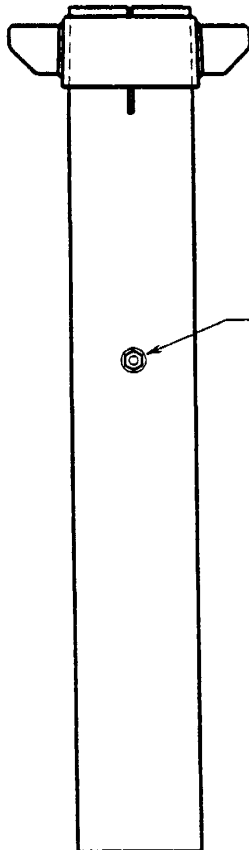
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COLLAR

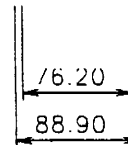
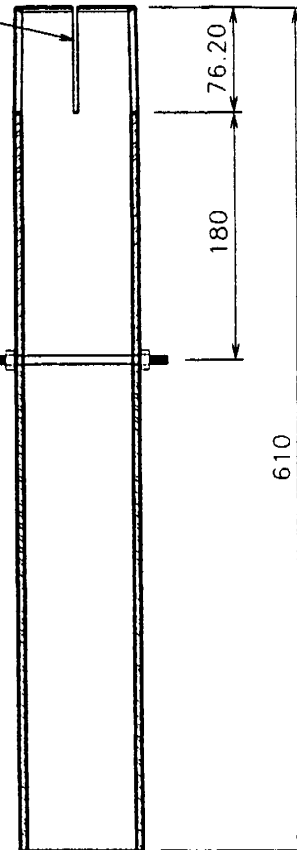


COLLAR SECTION

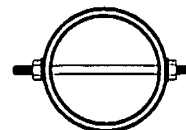


SIGN POST ANCHOR
ASSEMBLED

3.18 SLOT
(4 REQD.)



SIGN POST ANCHOR



UNIVERSAL SIGN POST ANCHORS



(915) 268-9332 FAX (915) 263-6449
110 WEST 22 ND STREET • P. O. BOX 3010
BIG SPRING, TX 79721-3010

FMA02

SHEET NO.

DATE

10/2

1996

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SPECIFICATIONS

Universal Anchor Systems' anchor consists of a FMA02 anchor consisting of a 76.2 mm pipe with a ductile iron tapered collar. Available with a sleeve insert for PTP01A or PTP01B application.

INTENDED USE

Universal Anchor Systems' FMA02 anchor can be used in either single or double installations for PTP51 or SSF10a-b. With optional sleeve insert may be used for single application for 60 mm post PTP01A or PTP01B. These systems have been crash tested in strong soil and have been judged to satisfy the requirements of 1985 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals".

REFERENCES

Seppo I. Sillan, "Geometric and Roadside Design", Federal Highway Administration Acceptance Letter, SS-66, August 8, 1996.

CONTACT INFORMATION

Universal Anchor Systems, L.L.C.
110 West 22nd Street
P. O. Box 3010
Big Spring, TX 79721-3010
Phone: 915/268-9332
Fax: 915/263-6449

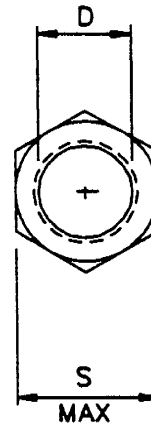
UNIVERSAL SIGN POST ANCHORS

FMA02	
SHEET NO.	DATE
2 OF 2	1996

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110 WEST 22ND STREET * P. O. BOX 3010
BIG SPRING, TX 79721-3010



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DESIGNATOR	ANSI SIZE	D	M MAX	S MAX
FNX06a	M6x1	6	5.2	10.0
FNX08a	M8x1.25	8	6.8	13.0
FNX10a	M10x1.5	10	8.4	16.0
FNX12a	M12x1.75	12	10.8	18.0
FNX14a	M14x2	14	12.8	21.0
FNX16a	M16x2	16	14.8	24.0
FNX20a	M20x3	20	18.0	30.0
FNX24a	M24x3	24	21.5	36.0
FNX30a	M30x3.5	30	25.6	46.0
FNX36a	M36x4	36	31.0	55.0

CLASS 5 HEX NUTS



FNX06a-36a

SHEET NO.

2

DATE

1996

Documents

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SPECIFICATIONS

Zinc-coated nuts shall be manufactured according to the dimensions and tolerances included in ANSI B18.2.4.1M for Style 1 hex nuts (shown in drawing). Corrosion resistant nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.6M for heavy hex nuts (not shown in drawing). Nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 5 nuts. Corrosion resistant nuts shall have geometric properties defined in ANSI B18.2.4.1M but shall have mechanical and material properties conforming to AASHTO M291M (ASTM A563M) for Class 8S3 nuts. Threads shall conform to ANSI B1.13M Class 6H. Zinc-coated nuts shall be treated according to either AASHTO M232 (ASTM A153) for Class C or AASHTO M298 (ASTM B695) for Class 50, Type 1.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

INTENDED USE

These nuts are used in various sign support systems.

CLASS 5 HEX NUTS

FNX06a-36a

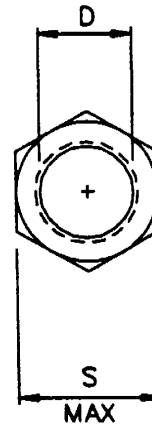
SHEET NO.

DATE

2 of 2

12-28-96





DESIGNATOR	ANSI SIZE	D	M MAX	S MAX
FNX06b	M6x1	6	5.7	10.0
FNX08b	M8x1.25	8	7.5	13.0
FNX10b	M10x1.5	10	9.3	16.0
FNX12b	M12x1.75	12	12.0	18.0
FNX14b	M14x2	14	14.1	21.0

CLASS 12 HEX NUTS



FNX06b-14b

SHEET NO.

DATE



1 of 2 Documents

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SPECIFICATIONS

Nuts shall be manufactured according to the dimensions and tolerances in ANSI B18.2.4.2M for Style 2 hex nuts. Zinc-coated nuts shall conform to AASHTO M291M (ASTM A563M) for Class 12 nuts. Corrosion resistant nuts shall conform to the requirements of AASHTO M291(ASTM A563M) for Class 8S3 nuts. Threads shall conform to ANSI B1.13M for Class 6H. Zinc-coated nuts shall be treated according to either AASHTO M232 (ASTM A153) Class C or AASHTO M298 (ASTM B695) Class 50, Type 1.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

INTENDED USE

High strength nuts are used in various sign support systems.

CLASS 12 HEX NUTS

FNX06b-14b

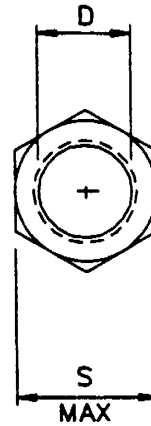
SHEET NO.

DATE

2 of 2

12-28-96





DESIGNATOR	ANSI SIZE	D	M MAX	S MAX
FNX06c	M6x1	6	5.2	10.0
FNX08c	M8x1.25	8	6.8	13.0
FNX10c	M10x1.5	10	8.4	16.0
FNX12c	M12x1.75	12	10.8	18.0
FNX14c	M14x2	14	12.8	21.0
FNX16c	M16x2	16	14.8	24.0
FNX20c	M20x3	20	18.0	30.0
FNX24c	M24x3	24	21.5	36.0
FNX30c	M30x3.5	30	25.6	46.0
FNX36c	M36x4	36	31.0	55.0

CLASS 10 HEX NUTS



FNX06c-36c

SHEET NO.

DATE

1 of 2

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SPECIFICATIONS

Zinc-coated nuts shall be manufactured according to the dimensions and tolerances included in ANSI B18.2.4.1M for Style 1 hex nuts (shown in drawing). Nuts shall conform to the requirements of AASHTO M291M (ASTM A563M) for Class 10 nuts. Threads shall conform to ANSI B1.13M Class 6H. Zinc-coated nuts shall be treated according to either AASHTO M232 (ASTM A153) Class C or AASHTO M298 (ASTM B695) Class 50, Type 1.

Dimensional tolerances not shown or implied are intended to be those consistent with the proper functioning of the part, including its appearance and accepted manufacturing practices.

INTENDED USE

These nuts are used in various sign support systems.

CLASS 10 HEX NUTS

FNX06c-36c

SHEET NO.

DATE

2 of 2

12-28-96

