



## Standard Specification for 2<sup>5</sup>/<sub>8</sub>-in. and 4-in. Diameter Metal Shear Plates for Use in Wood Constructions<sup>1</sup>

This standard is issued under the fixed designation D 5933; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This specification covers standardizing the dimensions and materials for the manufacture of 2<sup>5</sup>/<sub>8</sub> and 4-in. diameter steel or cast iron shear plates used in the fabrication of connections in wood constructions. The referencing of this specification in design, construction, and purchase order documents gives the using parties assurance that the shear plates to be used in an assembly meet minimum materials quality standards and that dimensions for fabrication and finish can be relied on to ensure connection performance. This specification provides regulatory agencies with a set of standards by which to judge the acceptability of shear plates encountered in the field and in fabricators' shops.

1.2 The values stated in inch-pound units are to be regarded as standard. The values in parentheses are for information only.

1.3 *Safety Hazards*—There are no known hazards with the use of this specification. The products manufactured to this specification should not be brittle or difficult to install with proper tools.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

A 47/A 47M Specification for Ferritic Malleable Iron Castings<sup>2</sup>

A 153 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware<sup>3</sup>

A 570/A 570M Specification for Structural Steel, Sheet and Strip, Carbon, Hot-Rolled<sup>4</sup>

A 653/A 653M Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process<sup>3</sup>

A 924/A 924M Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot Dip Process<sup>3</sup>

#### 2.2 Other Document:

AISI/SAE No. 1010 Carbon Steel, Steel Products Manual, Plates, Iron and Steel Society

### 3. Terminology

#### 3.1 Definition:

3.1.1 *shear plate*—A round, cast, or stamped disk-like load-transfer device having a flat base and a perimeter bearing rim protruding in one direction normal to the base, with a hole passing through the center of the disk to accommodate an attachment bolt or lag screw.

3.1.1.1 *Discussion*—The fastener hole at the center may have an additional bearing hub. If a bearing hub is present it projects in the same direction as the bearing rim. A shear plate is installed into one or more faces of a piece of wood to transfer shear forces between the member containing the shear plate or plates and adjacent members which may be of wood or steel. This shear transfer is accomplished through the bolt or lag screw.

### 4. Classification

4.1 This specification covers the two basic diameters of metal shear plates commonly used in North American timber construction—2<sup>5</sup>/<sub>8</sub> in. (66.7-mm) diameter stamped steel or malleable cast iron, and 4-in. (102.1-mm) diameter malleable cast iron. The use of these shear plates is covered in the National Design Specification for Wood Construction<sup>5</sup> and other wood design documents.

### 5. Materials and Manufacture

#### 5.1 General:

5.1.1 Cast iron shear plates shall be free from any casting defects such as voids, irregular holes or sharp burrs greater than 0.03 in. (0.8 mm), or any other casting defect that would hinder normal installation and performance. All residual metal at casting gate locations and any other protrusions that would prevent the proper installation and fit of the plates shall be ground smooth or otherwise removed.

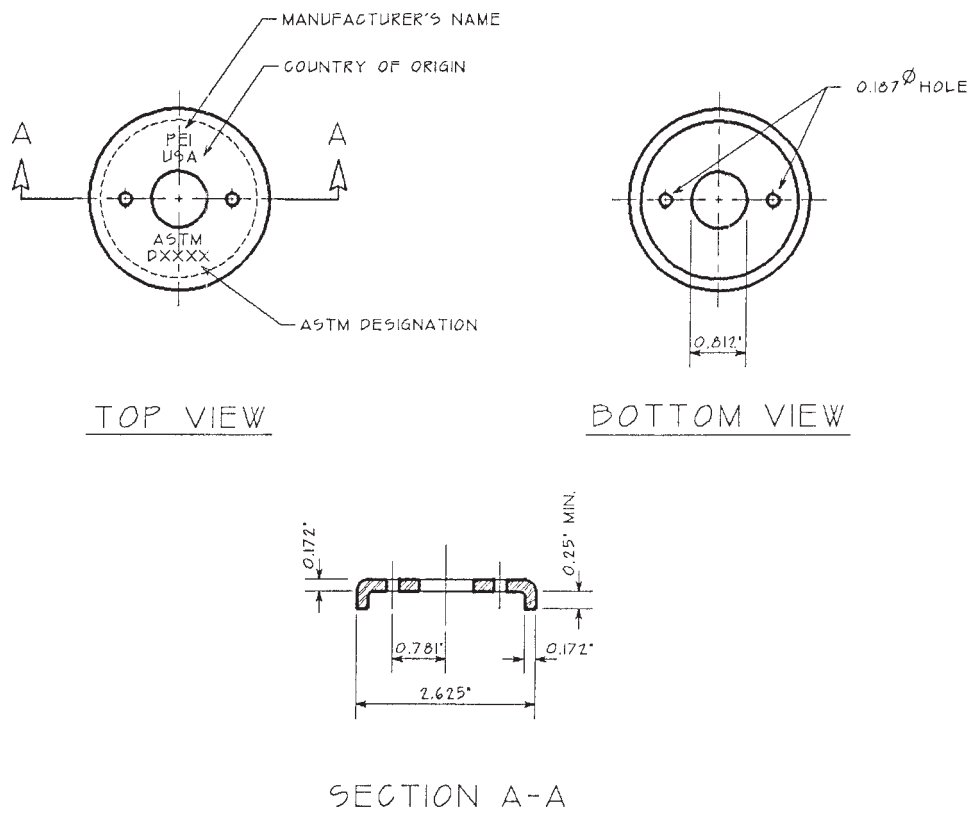
<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D7 on Wood and is the direct responsibility of Subcommittee D07.05 on Wood Assemblies. Current edition approved April 10, 1996. Published August 1996.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 01.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 01.06.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol. 01.03.

<sup>5</sup> Available from the American Forest and Paper Association, 1111 19th St., NW, Suite 800, Washington, DC 20036.



NOTE 1—Make from Specification A 570/A 570M or AISI/SAE No. 1010 carbon steel. Tolerance on all dimensions except sheet steel thickness:  $\pm 0.020$  in. Tolerance on sheet steel thickness per manufacturing specifications.

FIG. 1 2 $\frac{5}{8}$ -in. Diameter Stamped Steel Shear Plate

5.1.2 Shear plates shall be permanently marked with the manufacturer's name or a readily recognizable logo, or both; the number of this ASTM standard; the country of origin; and the model number, if applicable. Such marking may be on any nonbearing surface and shall be recessed into the device so as not to interfere with installation or weaken the finished shear plate.

5.1.3 Shear plates shall have two diametrically opposed holes which can be used to nail-attach the plate in the piece of wood in which it is installed to facilitate shipping and handling without dislodging of the plate. See Fig. 1, Fig. 2, and Fig. 3.

5.1.4 Casting draft on the rim and the hub, if present, of cast iron shear plates shall be minimal and as shown to facilitate removal from the mold without diminishing strength or creating a poor fit into cutterhead grooves (see Fig. 2 and Fig. 3).

5.1.5 Central bolt or lag screw holes shall be of the diameter shown and have uniformly straight sides to promote full bearing (see Fig. 1, Fig. 2, and Fig. 3).

5.1.6 Shear plates may be furnished with or without galvanization depending on the exposure of the installed device. Galvanization shall conform to Specification A 653/A 653M or Specification A 924/A 924M for stamped steel shear plates or Specification A 153 for cast iron shear plates.

5.1.7 Since slight variations in some dimensions are permitted, each shear plate manufacturer shall have available the special groove cutting tools necessary to properly install the standard shear plates of his manufacture.

5.1.8 Overall fit and finish shall be uniform.

5.2 2 $\frac{5}{8}$ -in. Diameter Stamped Steel Shear Plates:

5.2.1 Shear plates shall be stamped from Specification A 570/A 570M or AISI/SAE No. 1010 carbon steel.

5.2.2 The geometry and dimensions of the finished shear plate shall be as shown in Fig. 1.

5.3 2 $\frac{5}{8}$ -in. Diameter Cast Iron Shear Plates:

5.3.1 Shear plates shall be cast from Specification A 47/A 47M, Grade 32510 malleable iron.

5.3.2 The geometry and dimensions of the finished shear plate prior to application of any protective coating shall be as shown in Fig. 2.

5.4 4-in. Diameter Cast Iron Shear Plates:

5.4.1 Shear plates shall be cast from Specification A 47/A 47M, Grade 32510 malleable iron.

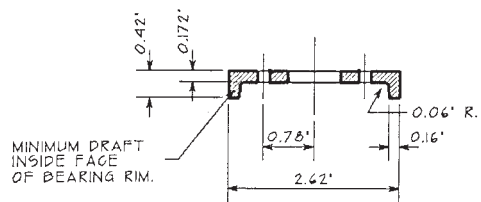
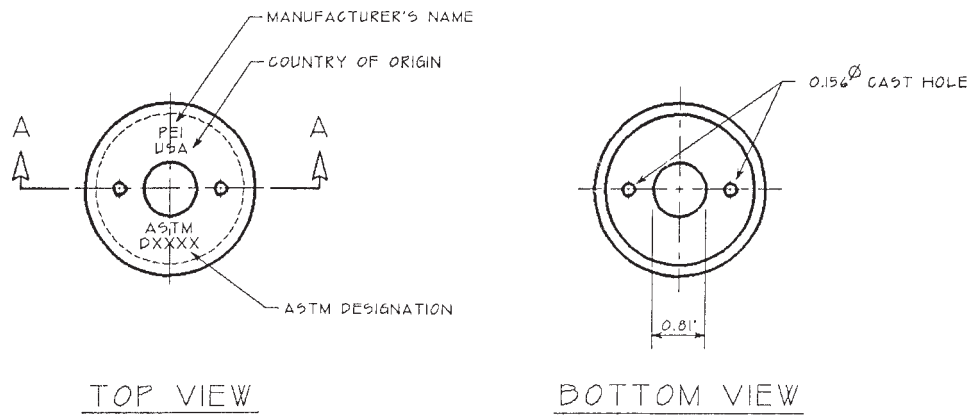
5.4.2 The geometry and dimensions of the finished shear plate prior to application of any protective coating shall be as shown in Fig. 3.

5.4.2.1 Nail attachment holes shall have nail head recesses 0.05 in. (1.3 mm) deep as shown in Fig. 3.

5.4.2.2 Additional lightening holes may be provided as shown in Fig. 3.

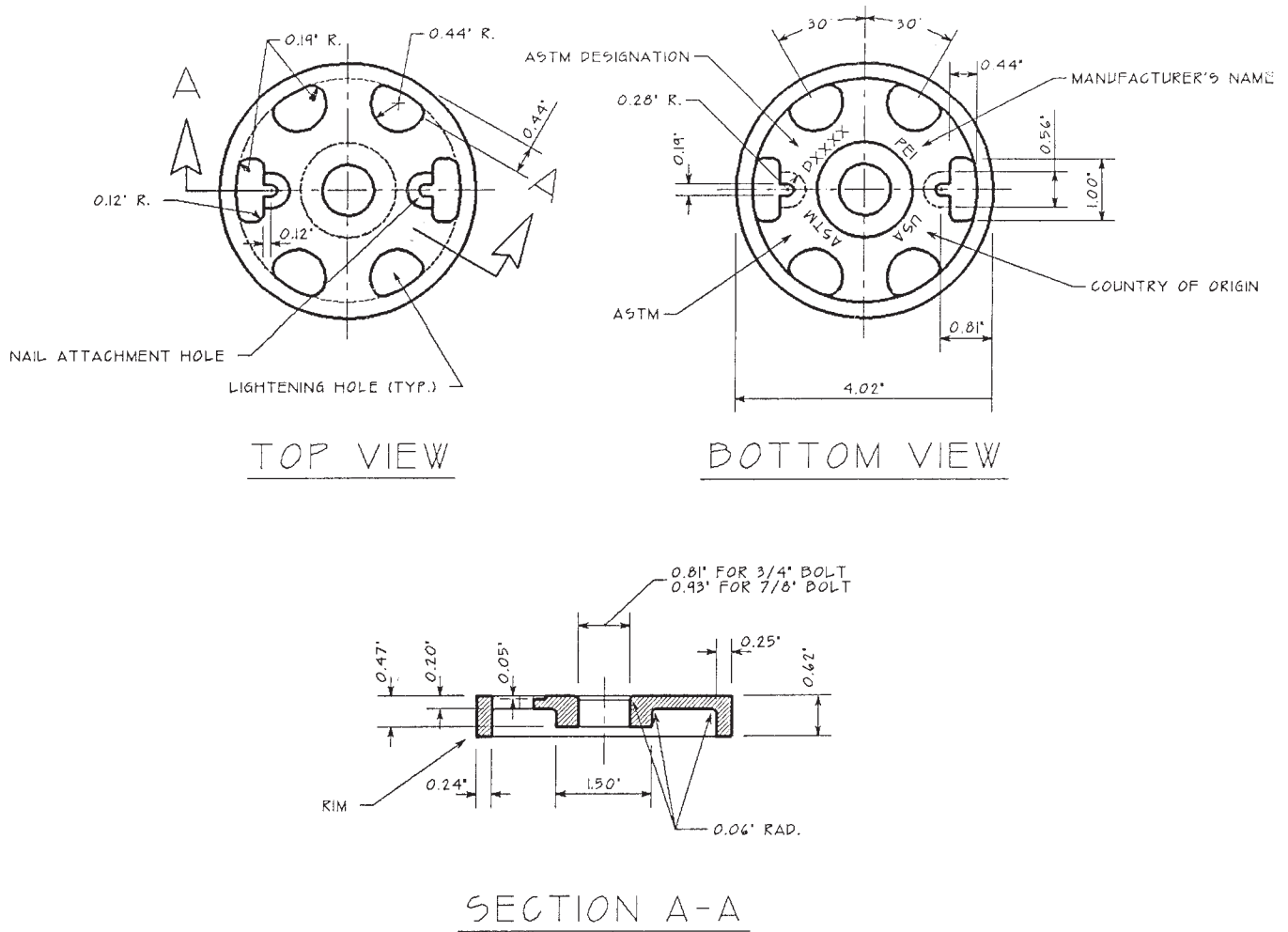
## 6. Keywords

6.1 connections; connectors; structural timber; timber joints; wood; wood constructions



NOTE 1—Make from Specification A 47/A 47M, Grade 32510 malleable cast iron. Bolt hole shall be round and reamed as necessary.  
TOLERANCES—All dimensions:  $\pm 0.030$  in.

FIG. 2 2 $\frac{5}{8}$ -in. Diameter Cast Iron Shear Plate



NOTE 1—Make from Specification A 47/A 47M, Grade 32510 malleable cast iron. Bolt hole shall be round and reamed as necessary.  
TOLERANCES—Overall diameter  $\pm 0.040$  in. All other dimensions:  $\pm 0.030$  in.

FIG. 3 4-in. Diameter Cast Iron Shear Plate

## APPENDIX

(Nonmandatory Information)

### X1. RATIONALE

X1.1 The importation into North America of metal shear plates of questionable quality and workmanship demonstrated the need for an ASTM standard specification for metal shear plate manufacture. Despite the fact that stamped steel and cast iron shear plates have been used in timber construction in North America since the 1930s, no consensus standard exists to

ensure that metal shear plates in the marketplace are of uniform size and quality and can be counted on to perform as intended. This specification is based on the manufacturing standards of several North American shear plate producers that have proven the quality and reliability of their products over time.

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