

## ATTACHMENTS AND FASTENERS

### DESCRIPTION OF SURFACES ENCOUNTERED

#### 2. SURFACES ENCOUNTERED

**2.01** In order to obtain secure attachments and to avoid damage to building surfaces, follow the instructions described in this section for each type of surface. Of particular importance are the clearance and lead holes for wall fasteners as a means of preventing wall damage. Refer to Table A.

##### Cement or Cinder Block

**2.02** Recommended fasteners are:

- B, C, or D masonry fasteners
- B or C plastic anchors
- B, C, or D drive anchors
- D plastic anchor (used with wood screws)

If the wall is old and the fastener is not secure, use:

- Toggle bolts
- B wall screw anchor

If these attachments pull out, install a carriage bolt through the wall. Equip the bolt with two metal washers or boards, one under its nut and the other under the head of the bolt.

##### Masonry or Substantial Brick Veneer

**2.03** In general, the same fasteners apply in making attachments to masonry and substantial brick veneer. Veneering is considered substantial when:

- (a) The veneer thickness is 3-3/4 inches (as observed at an outside corner).
- (b) The bricks are joined firmly with mortar.
- (c) There are no indications that trouble will result from making attachments in the manner specified for masonry.

On masonry and substantial brick veneer, drill holes for all attachments as close to the center of bricks as practicable and exercise care to avoid damaging and loosening the bricks. In the case of face brick or ornamental types of brick, holes for intermediate and last attachments may be drilled in the seam to avoid breakage.

##### Thin-Wall Brick Veneer

**2.04** Thin-wall brick veneer is considered as veneering having a thickness of less than 3-3/4 inches (as observed at an outside corner) or having bricks that loosen or crack easily when drilled. Make attachments to thin wall veneering as follows:

*A. First Attachment.* Attach to suitable woodwork with wood screws. Where suitable woodwork is not available, attach to the brick veneer surface by drilling a clearance hole in the seam to permit a wood screw to be passed through the brick portion of the wall and screwed into the wood backing or studding. The screw should penetrate at least 1 inch into the wood backing or studding.

*B. Intermediate and Last Attachments.* Attach to brick veneer with suitable anchoring device. Drill holes in center of bricks; if bricks crack or loosen, make the attachments to seams or to wood trim. On slab-type veneering (approximately 1 inch thick), secure intermediate and last attachments to the wood backing in the manner specified for first attachments.

##### Wood

**2.05** Staples, wood screws, or nails are generally the standard fasteners on wood; however, B wall screw anchors, B and C plastic anchors, or toggle bolts are recommended as fasteners on plywood and masonite when a more substantial fastener is need for heavier apparatus.

**2.06** On woodwork, drill lead holes for fasteners and screw-type fixtures to avoid splitting the wood and to obtain maximum holding power. Locate fasteners in studding where practicable.

**2.07** Studs in buildings of wood frame construction may usually be located by one of the following methods:

- (a) Building finished with clapboards:
  - By location of heads of nails used in fastening clapboards to studding.
- (b) Buildings finished with shingles or stucco
  - By sounding.
  - By locating studs in cellar or attic.
  - By location of heads of nails used in fastening trim to studding.

#### Stucco on Wood

**2.08** On stucco on wood building, attach to substantial wood trim with wood screws. Where required to install fixtures on stucco finished walls, drill a clearance hole for wood screw or screw-type fixture, preferably by means of an installer drill in a ratchet brace or with an L masonry drill, as specified in 2.04, using care to avoid cracking the stucco. Locate screws in studding where practicable.

#### Plaster on Lath, Rock Lath, Plaster Board

**2.09** Plastic anchors, B wall screw anchors, or toggle bolts are used to make attachments. However, when a substantial fastener is required for heavier apparatus, it will be necessary to locate the studding as in 2.07 and use wood screws. The holding power of hollow wall fasteners is such that any movement or shifting of weight tends to loosen them.

#### Rigid Composition Shingles

**2.10** In general, wood screws are required in making attachments through composition singles.

**2.11** On buildings finished with rigid composition shingles, make attachments to substantial wood trim where practicable. If suitable wood trim is not available, locate the clearance holes for fasteners on the shingles as outlined in the following:

- (a) Rectangular shaped shingles installed with the long dimension horizontal: Locate the hole midway between the vertical edges of the shingle and approximately 3/4 inch above the bottom edge.
- (b) Rectangular shaped shingles installed with the long dimension vertical: Locate the hole at the midpoint of the visible shingle height and approximately 3/4 inch from either vertical edge.
- (c) Shingles installed in diamond formation: Locate the hole near a nail hole and approximately 3/4 inch from either exposed edge of the shingle.

**2.12** When more than one screw is required to attach a drop wire fixture, observe the following in locating the clearance hole for the screw:

- (a) House bracket: The distance between the edge of the shingle and the nearest hole should be approximately 3/4 inch.
- (b) S or L corner bracket: The bracket should be located so as to bear evenly on the shingles with the hole nearer the porcelain knob located approximately 3/4 inch from the edge of the single.
- (c) W leader bracket: The bracket should be located so as to bear evenly on the shingles with at least one of the holes located approximately 3/4 inch from the edge of the shingle.

**2.13** *Precaution:* Because of the brittleness of rigid composition shingles, the following precautions shall be observed:

- (a) Place ladder carefully against the shingles.
- (b) Use only well sharpened drills.
- (c) Never employ drills which require the use of a hammer.
- (d) Do not apply excessive pressure to the brace when drilling clearance holes through the singles.

- (e) Wood screws should not be tightened excessively as the pressure on the shingle might cause it to break

#### **Metal (Siding, Paneling, or Desks)**

**2.14** Be sure protrusion of fasteners will not cause damage or injury. Fasteners for siding, paneling, or desks can be of the following variety: self-tapping metal screw, B or C plastic anchor, toggle bolts, or B wall screw anchors. There is also a possibility of using an adhesive clip for a wire.

**2.15** Aluminum siding presents other problems. The customer should be contacted to determine the type of siding and method used to install it. This will determine type of fastener or attachment to be used. Permission should be obtained at this time for proposed wire runs, etc.

**2.16** When using an extension ladder against aluminum siding, use precaution to prevent damage.

*Caution: It is possible for foreign voltage to be present on buildings covered with metal siding. Test siding with B voltage tester before starting any work.*

TABLE A

## CLEARANCE AND LEAD HOLES FOR FASTENERS AND SCREW-TYPE FIXTURES

| Fastener or<br>Fixture                                                                                                                             | Clearance Hole                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                              |                    | Lead Hole      |                   |                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------|----------------|-------------------|--------------------|
|                                                                                                                                                    | Size and Type of Drill                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                              |                    |                |                   |                    |
|                                                                                                                                                    | Installer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Point                        | Carbon Steel Twist | Installer      | Point             | Carbon Steel Twist |
|                                                                                                                                                    | in.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                              |                    |                |                   |                    |
| Toggle Bolt<br>3/16                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Clearance Hole<br>1/2 or 5/8 |                    |                |                   |                    |
| 1/4                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5/8 or 3/4                   |                    |                |                   |                    |
| 5/16                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5/8 or 7/8                   |                    |                |                   |                    |
| Toggle Bolt<br>Ring<br>5/8 and 1-1/4                                                                                                               | 3/4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                              |                    |                |                   |                    |
| S and L<br>Insulated<br>Screw Eyes                                                                                                                 | 3/16 by<br>5-1/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              | No. 12 or<br>3/16  |                | 3/32              | No. 42 or 3/32     |
| C Bridle Rings<br>1-1/4 - 1-5/8 - 3                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                              |                    |                | 1/8               | No. 30 or 1/8      |
| 7/8                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                              |                    |                | 3/32              | No. 42 or 3/32     |
| Drive Rings<br>5/8 and 7/8                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                              |                    |                | 3/32              | No. 42 or 3/32*    |
| 1-1/4                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                              |                    |                | 11/64             |                    |
| Angle Screw<br>5/16                                                                                                                                | 5/16 by<br>7-1/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              | 5/16               |                | 11/64             | No. 18 or 11/64    |
| 3/8                                                                                                                                                | 3/8 by 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                              | 3/8                | 1/4 ×<br>6-1/2 |                   | 1/4                |
| Wood Screw<br>No. 4                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | No. 33                       |                    |                | 1/16              |                    |
| No. 6                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5/32                         | No. 22             |                | 1/16              |                    |
| No. 8                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | No. 13                       | 11/64              |                | 3/32 or<br>No. 33 |                    |
| No. 10                                                                                                                                             | 3/16 by<br>5-1/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              | No. 12 or 3/16     |                | 3/32              | No. 42 or 3/32     |
| No. 14                                                                                                                                             | 1/4 by<br>6-1/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                              | 1/4                |                | 1/8               | No. 30 or 1/8      |
| No. 18                                                                                                                                             | 5/16 by<br>7-1/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                              | 5/16               |                | 11/64             | No. 18 or 11/64    |
| B, C, and D<br>Masonry<br>Fasteners<br>B, C, and D<br>Drive Anchors<br>B and C Plastic<br>Anchors<br>D Plastic<br>Anchor<br>B Wall Screw<br>Anchor | The maximum holding power of these anchoring devices in any given quality of masonry depends upon obtaining a drilled hole corresponding to the outside diameter of the unexpanded anchor and of sufficient depth to allow the nail to be driven its full length. The diameter and length are generally indicated on the anchor. The depth of hole required varies with the thickness of the fixture to be installed at the point of support. In all installations the minimum depth of hole required is equivalent to the length of the anchor plus the distance the nail or screw will extend beyond the anchor (approximately 3/16 inch). |                              |                    |                |                   |                    |

**Note 1:** Installer drills are bit stock twist drills and are used in the ratchet brace.

**Note 2:** Carbon steel twist drills are straight shank drills and are used in the hand drill.

**Note 3:** Drill points are used in the automatic drill and will drill lead holes approximately 1-1/2 inches deep. Where deeper holes are required, use twist drills in the hand drill.

**Note 4:** Use L masonry drills for drilling the seam between bricks.

**Note 5:** Use L masonry drills or star-faced stone drills in drilling holes for toggle bolts. Two sizes of holes are listed to cover the different types of approved toggle bolts. Drill the smaller hole if it will accommodate the toggle bolt.

**Note 6:** Apply paraffin wax or soap to the threads of wood screws or screw-type fixtures to facilitate turning them into wood.

\* Do not drill lead hole in poles.