FAST, LOW-COST, ONE TRADE SHELF ANGLE INSTALLATIONS
The FAST™ (FERO Angle Support Technology) system was devised to meet a demand for building technology that offers fast, low-cost, and effective shelf angle installations. Thoroughly tested and proven both in the laboratory and the field, the pre-engineered FAST™ system is used to support dead load from:

- Masonry Veneer
- Thin Granite Veneer
- Pre-Cast Concrete
- Large Stone Panels
- And More!

The FAST™ system eliminates the need for welded connections, and therefore:

- Can be installed by one trade
- Requires less time to install
- Ensures integral corrosion protection
- Lowers overall costs

The system is designed to offset the shelf angle from the structural backing, and to allow cavity insulation and the air/vapour barrier (AVB) to be continuous behind the steel shelf angle, which:

- Dramatically reduces thermal bridging
- Reduces the number of penetrations through the insulation
- Minimizes joints/junctions in the AVB
- Reduces shelf angle cross-section and material cost
- Reduces insulation and AVB installation time

When compared to alternative offset shelf angle supports, such as gusset plates, the FAST™ system requires a fraction of the time to install and is proven to be more economical and buildable, and better performing. In fact, the supply and installation cost for the FAST™ system is about 50% less than other support systems. With the FAST™ system, the size of the shelf angle remains the same, and the supporting brackets vary in size to accommodate a wide range of design cavity widths. The FAST™ system uses a 100 x 100 x 6 mm (4" x 4" x 1/4") angle which is readily available from local suppliers, and less expensive than using larger non-standard angles.
The FAST™ system consists of a FAST™ bracket, anchor bolt, (optional) Shim Plates and Wedge Shims. FERO supplies the FAST™ bracket, Shim Plates and Wedge Shims. The anchor bolt and shelf angle are obtained readily from local suppliers.

All steel components supplied by FERO, including the FAST™ brackets, Shim Plates and Wedge Shims, bolt washers, and retaining pins are hot dip galvanized after fabrication in accordance with ASTM A123. FERO brackets, Shim Plates, and bolt washers are manufactured from 4.76 (3/16") mild steel plate.

To accommodate tolerances in the position of the structural backing that otherwise cannot be accommodated by selecting a different sized bracket, FAST™ Shim Plates are placed between the structural backing and the backside of the bracket. The Shim Plates must bear directly against the structural backing and extend over the full surface and height of the bracket. Where the number of Shim Plates per bracket would exceed two, the next size bracket should be installed in lieu of shimming. Each bracket is installed so that the shelf angle rests firmly on the lower supporting legs of the bracket. After adjusting and positioning the brackets, the anchor bolts are seated by torquing in accordance with the manufacturer's recommendations. The lower end of the angle's vertical leg (heel) must rest against the back of the bracket slot, as shown in Figure 1, and the upper end of the leg (toe) should be in direct contact with the bracket claw (see side view of Figure 2). FERO Wedge Shims are inserted between the shelf angle and bracket, as required, to ensure that the vertical leg of the shelf angle bears properly against the bracket at the toe and heel. Care must be taken to ensure that the shelf angle properly contacts and bears against the bracket so the angle will not rotate or drop under the weight of the veneer. If an air/vapour barrier membrane is installed behind the FAST™ bracket, only use one layer of membrane, and destroy the plastic finish (if present) to reduce the likelihood of bracket rotation and slip under load. Once all adjustments have been made, veneer can be laid on the angle, respecting the requirements of all applicable standards for veneer installation and positioning with respect to the toe of the angle. Figure 3 shows the installation sequence. To temporarily brace a shelf angle so that it will not dislodge from the FAST™ bracket during construction (by vertical impact, before placement of the veneer), FERO provides a 9.5 mm (3/8") diameter steel pin that is driven between the backside of the vertical leg of the angle and the bracket claw. Only one pin per length of angle is required. The pin is hot dipped galvanized and can be left in-place if desired.

**FIG. 2 - Typical installation**

**FIG. 3 - Typical installation**

1. SNAP A CHALK LINE, MARK THE APPROXIMATE LOCATION OF THE ANCHORS, AND DRILL ANCHOR HOLES.

2. INSTALL FAST™ BRACKETS AND FINGER TIGHTEN ANCHOR BOLTS.

3. INSERT SHELF ANGLE, ADJUST BRACKETS (Step 4), AND TIGHTEN ANCHOR BOLTS SECURELY TO STRUCTURAL BACKING.

4. INSTALL SHIM PLATES (if required); INSTALL WEDGE SHIMS (if required) TO ENSURE THAT THE VERTICAL LEG OF ANGLE IS IN CONTACT WITH (back of) BRACKET CLAW/(front of) BRACKET SLOT.

ALTERNATE INSTALLATION OF RIGHT & LEFT BRACKET CONFIGURATION TO PREVENT BRACKET SLIP.
A 15.9 mm (5/8") diameter anchor bolt is recommended for use with the Shim Plate FAST™ Bracket.

### Table 1 - Design Information

<table>
<thead>
<tr>
<th>Bracket Size</th>
<th>Maximum Allowable Vertical Load per Bracket</th>
<th>Clay Brick</th>
<th>Lightweight Concrete Block</th>
<th>Normal Weight Concrete Block</th>
<th>Natural Stone</th>
</tr>
</thead>
<tbody>
<tr>
<td>D mm (in)</td>
<td>W mm (in) H mm (in)</td>
<td>[kN (lb. ft.)]</td>
<td>[m (ft.)]</td>
<td>[m (ft.)]</td>
<td>[m (ft.)]</td>
</tr>
<tr>
<td>25 (1.0)</td>
<td>95 (3.75) 188 (7.5)</td>
<td>6.7 (1500)</td>
<td>6.0 (20.0)</td>
<td>8.4 (28.75)</td>
<td>5.5 (18.0)</td>
</tr>
<tr>
<td>38 (1.5)</td>
<td>95 (3.75) 188 (7.5)</td>
<td>6.2 (1400)</td>
<td>4.0 (13.0)</td>
<td>5.6 (18.3)</td>
<td>3.7 (12.0)</td>
</tr>
<tr>
<td>51 (2.0)</td>
<td>95 (3.75) 151 (6.0)</td>
<td>9.3 (2100)</td>
<td>3.0 (10.0)</td>
<td>4.2 (13.8)</td>
<td>2.7 (9.0)</td>
</tr>
<tr>
<td>64 (2.5)</td>
<td>95 (3.75) 151 (6.0)</td>
<td>9.3 (2100)</td>
<td>2.4 (8.5)</td>
<td>3.2 (10.2)</td>
<td>2.1 (7.1)</td>
</tr>
<tr>
<td>76 (3.0)</td>
<td>95 (3.75) 151 (6.0)</td>
<td>9.3 (2100)</td>
<td>2.4 (8.5)</td>
<td>3.2 (10.2)</td>
<td>2.1 (7.1)</td>
</tr>
<tr>
<td>89 (3.5)</td>
<td>95 (3.75) 151 (6.0)</td>
<td>9.3 (2100)</td>
<td>2.4 (8.5)</td>
<td>3.2 (10.2)</td>
<td>2.1 (7.1)</td>
</tr>
<tr>
<td>102 (4.0)</td>
<td>95 (3.75) 151 (6.0)</td>
<td>8.6 (2105)</td>
<td>2.4 (8.5)</td>
<td>3.2 (10.2)</td>
<td>2.1 (7.1)</td>
</tr>
<tr>
<td>114 (4.5)</td>
<td>95 (3.75) 151 (6.0)</td>
<td>7.8 (2000)</td>
<td>2.4 (8.5)</td>
<td>3.2 (10.2)</td>
<td>2.1 (7.1)</td>
</tr>
<tr>
<td>127 (5.0)</td>
<td>95 (3.75) 151 (6.0)</td>
<td>7.0 (1900)</td>
<td>2.4 (8.5)</td>
<td>3.2 (10.2)</td>
<td>2.1 (7.1)</td>
</tr>
<tr>
<td>140 (5.5)</td>
<td>95 (3.75) 151 (6.0)</td>
<td>6.2 (1800)</td>
<td>2.4 (8.5)</td>
<td>3.2 (10.2)</td>
<td>2.1 (7.1)</td>
</tr>
<tr>
<td>152 (6.0)</td>
<td>95 (3.75) 151 (6.0)</td>
<td>5.6 (1700)</td>
<td>2.4 (8.5)</td>
<td>3.2 (10.2)</td>
<td>2.1 (7.1)</td>
</tr>
<tr>
<td>165 (6.5)</td>
<td>95 (3.75) 151 (6.0)</td>
<td>4.9 (1600)</td>
<td>2.4 (8.5)</td>
<td>3.2 (10.2)</td>
<td>2.1 (7.1)</td>
</tr>
</tbody>
</table>

1. Design load is based on results of testing 25 mm (1") and 89 mm (3.5") FAST™ brackets using a 102 x 102 x 6 mm (4" x 4" x 1/4") stiffened shelf angle. Brackets were connected to a steel column with a 12.7 (1/2") bolt vertically centred in the bracket slot. A point load was applied 20 mm (0.79") o/c from the end (toe) of the angle. Allowable loads in Table 1 are (unfactored) service loads, and have been established by test and calculation, and demonstrate a level of safety and performance consistent with North American design standards. Allowable veneer heights in Table 1 are calculated as (maximum allowable vertical load per bracket) ÷ (weight of veneer per unit area x bracket spacing).

2. Bolt slip resistance is higher than the stated design loads.

3. Veneer weights used are: 170 kg/m² (34.8 lb/ft²) for clay brick; 125 kg/m² (25.6 lb/ft²) for 1600 kg/m³ (100 lb/ft³) concrete block; 190 kg/m² (38.9 lb/ft²) for 2400 kg/m³ (150 lb/ft³) concrete block, and 220 kg/m² (45.0 lb/ft²) for natural stone. All veneer widths are 90 mm.

4. The FAST™ system can be used to support masonry veneer of all types. It can also be used to support granite panels and precast concrete. The system is ideal to accommodate construction tolerances because it is available in a wide range of sizes, and provides adjustability in all directions.

5. Only use the heavy duty washer manufactured by FERO under the bracket bolt head of the FAST™ system.

6. If bracket spacing is designed/intended to exceed 1200 mm, contact FERO for additional design information.

7. The bracket spacing may vary by ±100 mm (4”).

8. If bracket spacing is designed/intended to exceed 1200 mm, contact FERO for additional design information.

**Recommended Use**

The FAST™ system can be used to support masonry veneer of all types. It can also be used to support granite panels and precast concrete. The system is ideal to accommodate construction tolerances because it is available in a wide range of sizes, and provides adjustability in all directions.

**Technical Information**

The FAST™ system is pre-engineered by assuming a line load acts near the edge (toe) of the shelf angle. Table 1 shows maximum allowable veneer heights for various bracket spacings.

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FERO FAST™ Bracket: US Patent US 6,128,883. Canadian Patents CA 2,284,069; CA 2,254,510; CA 2,591,687; CA 2,759,747; CA 2,759,837; and CA 2,759,778. Other Patents Pending

Printed in Canada
FERO ANGLE SUPPORT TECHNOLOGY

SHELF ANGLE SUPPORT - Type II

OPTIONAL SHELF ANGLE SUPPORT - FLUSH MOUNTS TO TOP OF FOUNDATION
For Flush Angle Support at the Top of Foundations

The FAST™ Bracket Type II has been engineered to the same high standards as the original FAST™ Bracket and allows the angle to sit flush with the top of the foundation where this option is desirable. The Type II bracket can be ordered to the same specifications as the original FAST™ bracket to maintain the same wall design specifications in Table 1.

FERO FAST™ Bracket Type II uses the same 100 x 100 x 6 mm (4 x 4 x 1/4 in) steel angle, shim plates and spacers as the original bracket.

The FAST™ bracket Type II offers the same great advantages of FERO’s Angle Support Technology and:

- Takes less time than other angle support methods
- Allow flush mounting at the top of the foundation
- Can be installed by one trade

**FIG. 1 - TYPICAL FAST SHELF ANGLE SUPPORT - Type II**

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**TECHNICAL INFORMATION**

For further information on the FAST™ system and FAST BRACKET, please consult the FERO Angle Support Technology technical brochure.

The FAST™ system is pre-engineered by assuming a line load acts near the edge (toe) of the shelf angle. Refer to Table 1 of the FAST BRACKET technical brochure for maximum allowable veneer heights for various bracket spacings.

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FERO ANGLE SUPPORT TECHNOLOGY
LINTEL SHELF ANGLE

CLEAN WALL OPENINGS
QUICK WINDOW/DOOR INSTALLATIONS
Our FAST™ Lintel is a unique approach to shelf angle installations over wall openings. The FAST™ (FERO Angle Support Technology) system now also offers a lintel shelf angle to support masonry veneer above window/door openings. With the ease of installation of our FAST™ system, the use of FAST™ Lintel creates a clean reveal on the underside of openings making them ready to receive window or door framing without any treatment.

The FAST™ Lintel system uses the original FAST™ Bracket and incorporates a modified 150 x 100 x 8 mm (6 x 4 x 5/16 in) steel angle. The 150 mm (6 in) vertical leg of the angle is perforated at spacing that matches that for the 6 in high steel supporting brackets. Perforations are made to accommodate the two lower supporting legs of the bracket and create a clean underside for the opening as shown in FIG. 1.

The FAST™ Lintel offers the same great advantages of FERO’s Angle Support Technology and:

- Takes less time than other angle support methods
- Eases door and window installations
- Can be installed by one trade

**FIG. 1 - TYPICAL FAST - LINTEL DETAIL AND INSTALLATION**

**TECHNICAL INFORMATION**

For further information on the FAST™ system and FAST BRACKET, please consult the FERO Angle Support Technology technical brochure.

The FAST™ system is pre-engineered by assuming a line load acts near the edge (toe) of the shelf angle. Refer to Table 1 of the FAST BRACKET technical brochure for maximum allowable veneer heights for various bracket spacings.

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FERO FAST™ Bracket: US Patent US 6,128,883. Canadian Patents CA 2,284,069; CA 2,254,510; CA 2,591,687; CA 2,758,747; CA 2,759,837; and CA 2,759,778. Other Patents Pending
FERO ANGLE SUPPORT TECHNOLOGY
EXTENDED SHELF BRACKET

FULLY CUSTOMIZABLE SHELF BRACKETS
- SUPPORTS VENEER BELOW THE FLOOR LEVEL
Custom Bracket Supports Veneer Below the Floor Level.

The FAST™ Extended Bracket has been engineered to the same high standards as the original FAST™ Bracket and allows the angle to support veneers below the floor level where this option is desirable. The Extended Bracket can be customized to any specifications to maintain the same wall design specifications in Table 1 of the FAST brochure.

FERO FAST™ Extended Bracket can be used with either the standard 100 x 100 x 6 mm (4 x 4 x 1/4 in) steel angle, shim plates and spacers as the original bracket or can be specified to accommodate the modified FAST™ Lintel 150 x 100 x 8 mm (6 x 4 x 5/16 in) shelf angle.

**FIG. 1 - TYPICAL FAST EXTENDED SHELF ANGLE BRACKETS**

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**TECHNICAL INFORMATION**

For further information on the FAST™ system and FAST BRACKET, please consult the FERO Angle Support Technology technical brochure.

The FAST™ system is pre-engineered by assuming a line load acts near the edge (toe) of the shelf angle. Refer to Table 1 of the FAST BRACKET technical brochure for maximum allowable veneer heights for various bracket spacings.

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FERO EXTENDED FAST™ Bracket: US Patent US 6,128,883. Canadian Patents CA 2,284,069; CA 2,254,510; CA 2,591,687; CA 2,759,747; CA 2,759,837; and CA 2,759,778. Other Patents Pending
CUSTOM MADE I-BEAM SHELF BRACKETS

FULLY CUSTOMIZABLE SHELF BRACKETS TO SUPPORT MASONRY VENEER FROM STEEL I-BEAMS

HAB 3” Bracket

HAB 0” Bracket

I-Beam Lintel Bracket

I-Beam Middle Bracket
Custom Brackets Support Veneer from an I-Beam.

All FAST™ I-Beam Shelf Brackets have been engineered to the same high standards as the original FAST™ Bracket and allows the angle to support veneers from an I-Beam where this option is desirable. These I-Beam Shelf Brackets can be customized to any specifications to maintain the same wall design specifications in Table 1 of the FAST brochure.

**FAST™ I-Beam Lintel Bracket**

The I-Beam Lintel Shelf Bracket supports veneer flush with the base of I-Beam. FERO FAST™ I-Beam Bracket uses a modified FAST™ Lintel 150 x 100 x 8 mm (6 x 4 x 5/16 in) shelf angle (locally sourced).

**FIG. 1 - TYPICAL FAST I-BEAM LINTEL SHELF ANGLE BRACKET**

**TOP VIEW**

**FRONT VIEW**
FAST™ I-Beam Middle Bracket

The FAST™ I-Beam Middle Bracket allows the Shelf Angle to be located in the vertical middle (can also be manufactured to located at any height as specified by project engineer) of the I-Beam and uses a standard 100 x 100 x 6 mm (4” x 4” x 1/4”) angle which is readily available from local suppliers, and less expensive than using larger non-standard angles.

**FIG. 1 - TYPICAL FAST I-BEAM MIDDLE SHELF ANGLE BRACKET**
The FAST™ HAB I-Beam Bracket allows the Shelf Angle to be mounted above the top of the I-Beam and uses a 100 x 100 x 6 mm (4” x 4” x 1/4”) angle which is readily available from local suppliers, and less expensive than using larger non-standard angles.

**HAB - 0”**
All dimensions can be customized on client’s request.
FAST™ HAB (Hold Above Beam) 3” I-Beam System

All dimensions can be customized on client’s request. The behavior of the I-Beam to be evaluated by the project structural engineer.

*Every customization may cause engineering issues, please contact us for technical support.
The Fero FAST™ I-Beam Shelf Angle Support systems are completely customizable—all dimensions can be to the project’s specifications, please consult us for technical support to ensure all engineering issues are addressed before production.

1. Design load is based on results of testing 25 mm (1") and 89 mm (3.5") FAST™ brackets using a 90 x 90 x 6 mm (3-1/2" x 3-1/2" x 1/4") stiffened shelf angle. Brackets were connected to a steel column with a 12.7 (1/2") bolt vertically centred in the bracket slot. A point load was applied 20 mm (0.79") o/c from the end (toe) of the angle. Allowable loads in Table 1 are (unfactored) service loads, and have been established by test and calculation, and demonstrate a level of safety and performance consistent with North American design standards. Allowable veneer heights in Table 1 are calculated as (maximum allowable vertical load per bracket) ÷ (weight of veneer per unit area x bracket spacing).

2. Bolt slip resistance is higher than the stated design loads.

3. Veneer weights used are: 170 kg/m² (34.8 lb/ft²) for clay brick; 125 kg/m² (25.6 lb/ft²) for 1600 kg/m³ (100 lb/ft³) concrete block; 190 kg/m² (38.9 lb/ft²) for 2400 kg/m³ (150 lb/ft³) concrete block; and 220 kg/m² (45.0 lb/ft²) for natural stone. All veneer widths are 90 mm.

4. A 15.9 mm (5/8") diameter anchor bolt is recommended for use with the FAST™ system. Comply with all manufacturer’s design and installation requirements pertaining to capacity, edge distances, torquing, etc.

5. Where the FAST™ system is designed/intended to support masonry veneer having panel height exceeding 11m (36’), contact FERO for additional design information.

6. The bracket spacing may vary by ±100 mm (4").

7. Only use the heavy duty washer manufactured by FERO under the bracket bolt head of the FAST™ system.

8. If bracket spacing is designed/intended to exceed 1200 mm, contact FERO for additional design information.

**TECHNICAL INFORMATION**

For further information on the FAST™ system and FAST BRACKET, please consult the FERO Angle Support Technology technical brochure.

The FAST™ system is pre-engineered by assuming a line load acts near the edge (toe) of the shelf angle. Refer to Table 1 of the FAST BRACKET technical brochure for maximum allowable veneer heights for various bracket spacings.

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FERO ANGLE SUPPORT TECHNOLOGY

CUSTOM BRACKET SUPPORTS FOR VENEER FROM THE TOP OF A THIN SLAB

FULLY CUSTOMIZABLE SHELF BRACKETS
Custom Bracket Supports for Veneer from the Top of a Thin Slab.

The FAST™ Vertical Bracket has been engineered to the same high standards as the original FAST™ Bracket and allows the angle to support veneers from a slab where this option is desirable. The Vertical Bracket can be customized to any specifications to maintain the same wall design specifications in Table 1 of the FAST brochure.

FERO FAST™ Vertical Bracket can be used with a standard 102 x 102 x 6.4 mm (4 x 4 x 1/4 in) shelf angle.

**FIG. 1 - TYPICAL FAST VERTICAL SHELF ANGLE BRACKETS**

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**TECHNICAL INFORMATION**

For further information on the FAST™ system and FAST BRACKET, please consult the FERO Angle Support Technology technical brochure.

The FAST™ system is pre-engineered by assuming a line load acts near the edge (toe) of the shelf angle. Refer to Table 1 of the FAST BRACKET technical brochure for maximum allowable veneer heights for various bracket spacings.

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