

## **SSI Under-ride Protection Bumper**

### **Installation Instructions**

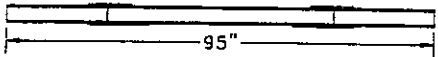
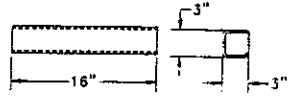
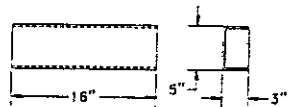
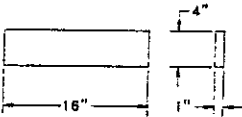
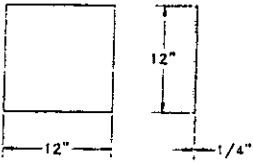
#### **Introduction:**

The SSI underride protection kit for truck mounted fork lifts may be installed on the rear of most semi-trailers, with special regard paid to the manner in which the under-ride protection bumper is installed. Any trailer over 10,000 pound GVWR, manufactured after January 26, 1998, must be outfitted with a certified under-ride protection bumper. If an installer removes a certified bumper from a trailer (identifiable by a certification tag on the forward facing surface of the bumper), it must be replaced with a certified bumper. A certified bumper which is compatible with most fork truck mounting kits may be obtained from Sun Systems Inc.

When installing the folding under ride protection bumper the following instructions must be followed in order to comply with FMVSS223 and FMVSS224. The bumper and mount kit were tested in combination to comply with NHTSA requirements and must be installed in a manner consistent with the testing. These instructions detail the manner in which the bumper and mount kit are to be installed, minimum chassis requirements, and proper use of the folding under-ride protection bumper.

**Installation of the SSI folding under-ride protection bumper:**

**WARNING:** Before beginning the installation, ensure that there is adequate space to mount the forklift and that the forks, forklift chassis, and bumper will not interfere with the suspension, air bags, or axles.

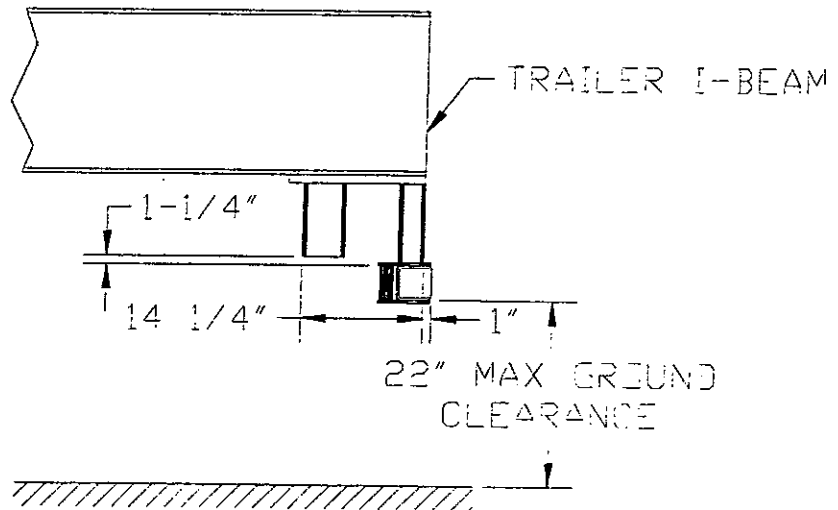
|                                      |  |
|--------------------------------------|--|
| Item #1<br>Bumper                    |   |
| Item #2<br>Bumper Upright            |   |
| Item #3<br>Forward Stabilizing Tubes |   |
| Item #4<br>Mount Pad                 |   |
| Item #5<br>Connecting plate          |  |

1. Remove all electrical cables and light fittings from the rear of the trailer as far forward as the rear axle to keep them safe when assembling and mounting the under-ride protection kit.

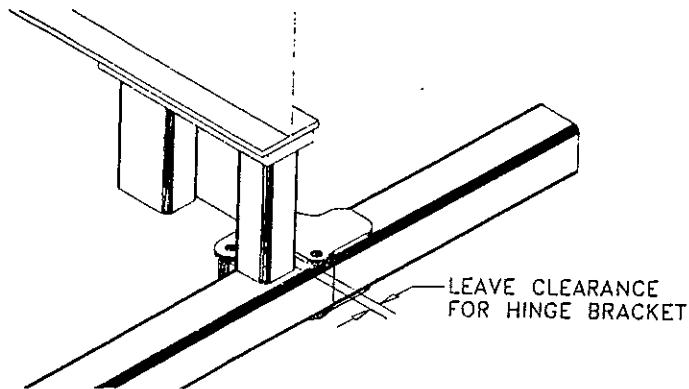
1. Remove all components from the chassis that would interfere with the installation of the SSI under-ride protection bumper, including the existing under-ride protection bumper.

**Figure 144 - Bumper kit parts**

2. Tack weld the mount pads, item 4, to the underside of the trailer I-beams, lined up with the rear edge of the bottom flange, and centered side-to-side. Position the new under-ride protection bumper, item 1, as shown in figure 2.



**Figure 222 - Bumper installation height**

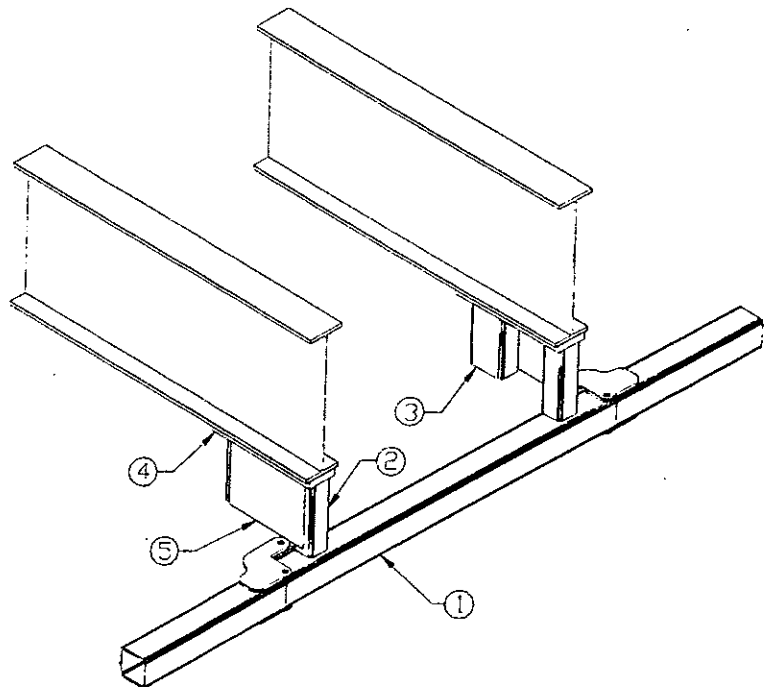


**Figure 333 - Installation on a 44" frame**

1. Cut the bumper verticals, item 2 so that they fit between the chassis and the bumper. Tack weld them into position as shown in figure 2. For trailers with frame rails on 38" centers, position the uprights in the middle of the flange, lined up with the rear edge of the mount pads. For trailers with frame rails on 44" centers, position the uprights such their inside edges line up with the inside edges of the mount pads. This allows adequate clearance for the bumper to fully extend without the bumper upright interfering with the bumper hinge bracket. See figure 3.

5. Cut item 3, the forward stabilizing tubes, 1-1/4" shorter than the length of the bumper uprights. Align the forward stabilizing tubes with the bumper verticals such that their outside edges line up and position them as shown in figure 2.

6. Position the connector plate as shown in figure 4. Trim it to the height of the front stabilizer tube if necessary. Tack-weld it into position. Once the entire kit is tack-welded in position, fully weld the under-ride protection kit.



**Figure 4 - Assembled bumper kit**

**Chassis Requirements:**

The under-ride protection guard is intended for installation on flatbed semi-trailers over 10,000 pound GVW, with longitudinal frame rails extending to within 2" of the rear, spaced at 38" or 44" – measured center-to-center, with the bottom of the frame rails configured as a horizontal surface at least 4 inches wide composed of steel that is at least 1/2" thick, tandem axles, and welded steel frame rail construction.

The frame section to which the bumper and uprights are attached must have sufficient strength and rigidity. The frame must extend continuously to the rear of the trailer to provide a mounting surface of adequate strength onto which to mount the bumper. The material used in the frame rails of the trailer must be fabricated from a steel alloy which will not lose significant strength or become brittle as a result of welding the mounting kit to it. If unsure, it is the responsibility of the installer to verify with the trailer manufacturer that there will be no adverse effects from welding the kit to the trailer frame's lower flange. For reference, the steel from which the mounting kit is fabricated is A500, Grade B for the tubing and A36 for the plate. All welding must be performed in accordance with ANSI/AWS D1.1-90.

Any trailer frame onto which this kit is installed must have a Resistance to Bending Moment (RBM) equal to or greater than that used in the certification testing. RBM may be found by multiplying the section modulus of the frame section (in<sup>3</sup>) by the material's yield strength (lb/in<sup>2</sup>):

$$RBM = S \times \sigma_y$$

Minimum RBM required for installation of the certified underride protection bumper is 2,488,290 in-lb *per rail*. The table below may be used as a reference to determine the required section modulus for various common frame materials. In addition to meeting the minimum RBM requirement, the bottom flange of the frame section to which the guard is to be attached must be at least 1/2" thick and 4" wide.

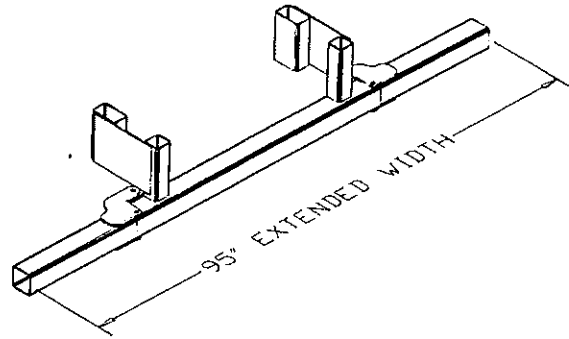
| Frame Steel Strength<br>(psi) | Minimum Required Section Modulus<br>(in <sup>3</sup> ) |
|-------------------------------|--|
| 110,000                       | 24.88  |
| 80,000                        | 31.10  |
| 50,000                        | 49.77  |
| 36,000                        | 69.12  |

These frame strength recommendations should be used only to ensure compliance with the FMVSS standards, and not as a guide for designing a trailer. The section moduli in table 2 do not account for anything but providing adequate strength for the mount kit and bumper and do not ensure an adequate frame design for the rest of the trailer.

**Use of the Folding Underride Protection Bumper**

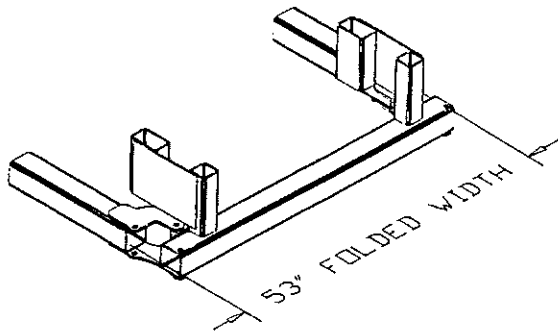
The folding ends of the bumper are assembled to the center section by inserting the 3/4"x6-1/2" bolts through the pivot hole in the hinge brackets, assembling it to the pivot boss in the forward facing side of the bumper. Tighten the lock nuts until snug, but do not overtighten. Use one 3/4" washer between the head of the bolt and the upper hinge bracket and one between the nut and the lower hinge bracket.

The folding underride protection bumper acts as a FMVSS223 and 224 compliant bumper when the forklift is not installed and the bumper is folded out to its fully extended position. When the forklift is not



**Figure 5 - Pinned in extended position**

installed, the folding ends of the bumper must be pinned into their fully extended position as shown in figure 5. The pins must be inserted completely through the bumper tube and the lynch pin retainers must be in place to hold them in.



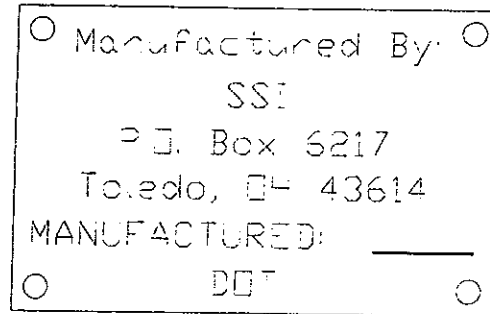
**Figure 6 - Pinned in folded position**

fully folded position. The pins must be inserted completely through the bumper tube and the lynch pin retainers must be in place to hold them in.

At installation of the bumper, the certification tag must be stamped with the date of installation. The tag is located on the forward facing surface of the bumper, near the right end of the guard. The tag must be stamped with the month and year of installation on the line following

MANUFACTURED: \_\_\_\_\_

When the forklift is installed on the mounting kit, the bumper must be folded and pinned into its stowed position, as shown in figure 6, to allow the tires and main frame of the forklift to fit into place on the mount kit. The folding ends of the bumper must be pinned into their



**Figure 7 - Certification tag**