STEEL INTERCHANGE

Steel Interchange is an open forum for *Modern Steel Construction* readers to exchange useful and practical professional ideas and information on all phases of steel building and bridge construction. Opinions and suggestions are welcome on any subject covered in this magazine. If you have a question or problem that your fellow readers might help you to solve, please forward it to *Modern Steel Construction*. At the same time, feel free to respond to any of the questions that you have read here. Please send them to:

Steel Interchange
Modern Steel Construction
One East Wacker Dr., Suite 3100
Chicago, IL 60601-2001

Answers and/or questions should be typewritten and double-spaced. Submittals that have been prepared by word-processing are appreciated on computer diskette (either as a Wordperfect file or in ASCII format).

The opinions expressed in *Steel Interchange* do not necessarily represent an official position of the American Institute of Steel Construction, Inc. and have not been reviewed. It is recognized that the design of structures is within the scope and expertise of a competent licensed structural engineer, architect or other licensed professional for the application of principals to a particular structure.

Information on ordering AISC publications mentioned in this article can be obtained by calling AISC at 800/644-2400.

The following responses from previous Steel Interchange columns have been received:

Given a wall of sheet metal or plate subjected to fluid pressure and stiffened by same size parallel members spaced regularly, what section (or width) of the wall shall be used that contributes to the section of a stiffener? The stiffening member may be a flat bar, an angle, a channel (see figure) or any other section.

The effective width of the plate to be used in computing design properties (i.e. moment of inertia and section modulus, etc.) Of the section may be determined based on the limiting width-thickness ratio for compression elements formula:

$$\frac{b}{t} = \frac{95}{\sqrt{F_y}}, \text{ as } b_e = 2b \text{ and } t = t_2,\ b_e = \frac{190t_2}{\sqrt{F_y}}$$

where t_2 = thickness of the plate.

For the channel used as a stiffener, $b_e = t_1 + \frac{190t_2}{\sqrt{F_y}}$,

where t_1 = flange width of the channel section.

It may be noted that be is independent of the value of the thickness of the stiffener.

Another independent reference source, USS Steel Design Manual, 1974, page 86 (Authors: R.L. Brockenbrough and B.G. Johnston), uses the following formula for a similar situation:

$$b = \frac{6000t}{\sqrt{F_y}}$$

where $b = b_e$ = effective width of the plate.

t = plate thickness, in.

F_y = yield strength of the plate steel, psi

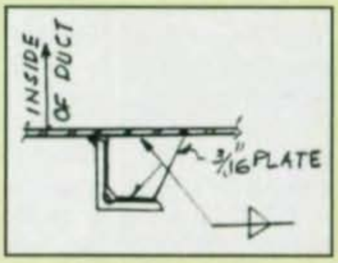
It may be noted that this formula is derived from the same AISC requirements for b/t. When the unit for F_y is changed from psi to ksi, it is noticed that the formula becomes:

$$b = \frac{6000t}{\sqrt{F_y \times 1000}} = \frac{190t}{\sqrt{F_y}}$$

which is the same as given in AISC Allowable Stress Design Table B5.1.

The above formula is widely utilized for the design of duct stiffeners. However, a 4 in. limit for be is conservatively used by design engineers to compensate and account for the two way bending in the plate.

For negative pressure in the duct or wind load acting on the duct surface, stiffener's outstanding leg will become the compression flange. This will require that either the allowable stress be reduced in accordance with AISC provisions or additional lateral support be provided at required spacing not exceeding the calculated L_u for the effective section. The suggested lateral support detail is shown.



L. Sundar
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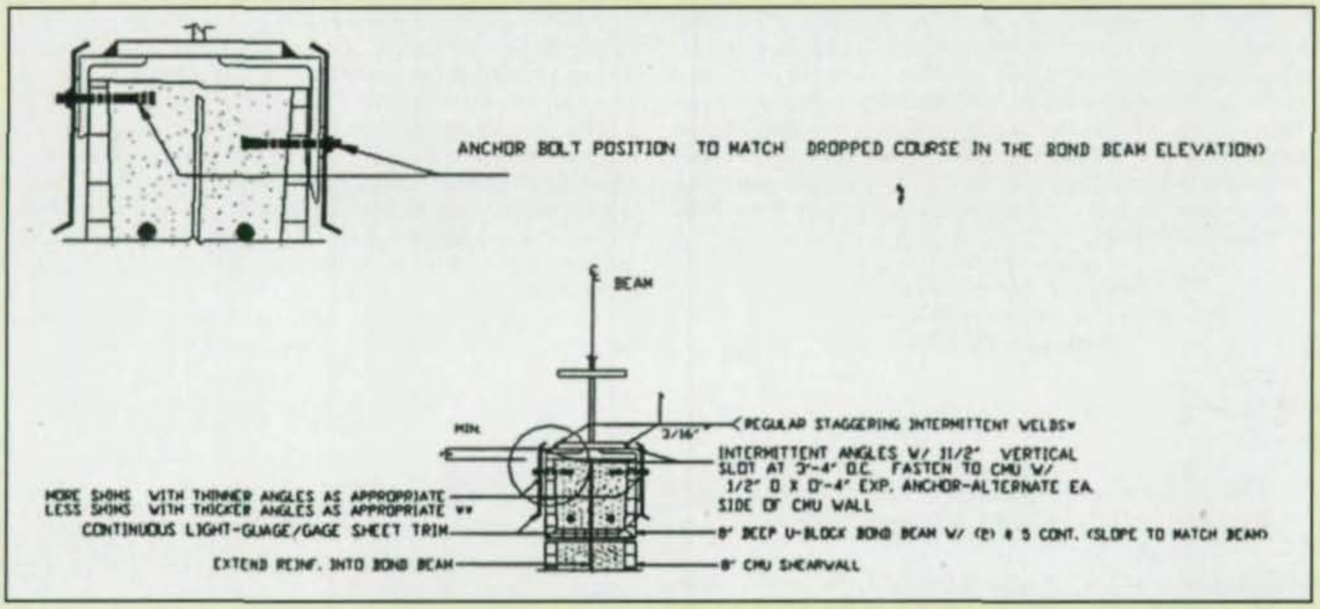
Tampa, FL

Is there a more efficient and cost-effective way to connect a masonry shear wall to structural steel framing? The most common problem with the following detail is that once the masonry is built up to the bottom flange of the beam, there is not enough room to install the grout and continuous reinforcing bars in the bond beam at the top of the wall. If the bond beam is dropped a course in elevation, the masonry to steel beam connecting angle vertical leg or bent plate vertical leg becomes excessively long.



The above detail might be somehow more efficient and cost-effective.

Hu, Fang
Butler Manufacturing Company
Shanghai P.R.C.

Are there special requirements for the design of high-strength A325 or A490 bolts that are going to be used in a high temperature service?

The term "high temperature" requires more definition in order to answer this question. The A325 and A490 bolts are not intended for high-temperature service., however, the A193 specification is specifically for high-temperature service. The allowable stresses will vary with temperature no matter what type of bolting material is selected.

The Manufacturers Standardization Society publishes SP-58 which serves as a guide for high-temperature pipe hanger design. Table A1 lists various bolting materials and allowable stresses at various temperatures.

Uncoated bolts designated as A325 or A490 can be used to their full capacity if the service temperature is within the range of -29 degrees C to 325 degrees C. Galvanized bolts should be limited to 120 degrees C to avoid problems with corrosion inhibiting properties. Corrosion inhibiting properties of alloy materials also vary with temperature and corrosive concentration, and should be investigated.

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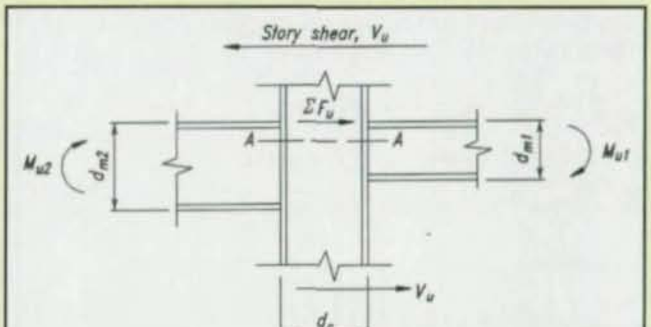
New Questions

Listed below are questions that we would like the readers to answer or discuss.

If you have an answer or suggestion please send it to the Steel Interchange Editor, Modern Steel Construction, One East Wacker Dr., Suite 3100, Chicago, IL 60601-2001. If you have a question or problem that readers might help solve, send these to the Steel Interchange Editor.



In checking panel zone web shear in a column member why is M_1 defined as the sum of the lateral load and gravity load moments on the leeward side of the connection, and M_2 defined as the difference between the lateral load and gravity load moments on the windward side of the connection? It seems to us that the difference of moments apply on the leeward side and that the sum of the moments should apply on the windward side.

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