

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

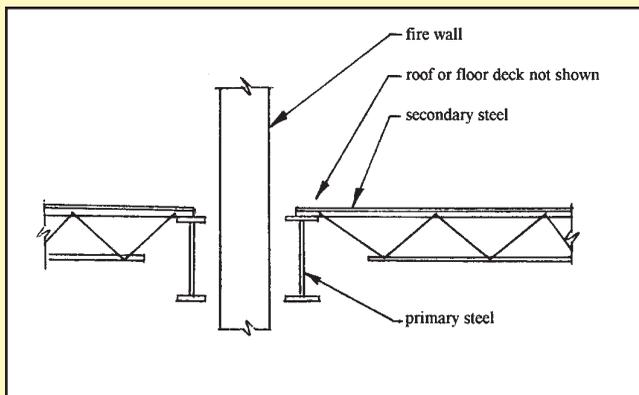
Answers and/or questions should be typewritten and double-spaced.

*** Questions and answers can now be e-mailed to: aiscpmn@interaccess.com ***

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

For fire-wall construction, building codes say the wall shall have sufficient stability under fire conditions to allow for collapse of construction on either side without collapse of the wall. In a tied fire-wall application, a flexible anchor or break-away connection is recommended to laterally stabilize the wall and under fire conditions to let go and not to pull down the wall due to the collapse of the structure on the fire side. What is the optimum detail (effective and economical) for this type of connection?

(This response is intended as a clarification of a response in the January 1996 Steel Interchange.)



The figure in the original question more accurately portrays a free-standing fire wall. This design is also known as a "cantilevered fire wall" and is described in Section 2-3 of the 1994 edition of NFPA 221, Standard for Fire Walls and Fire Barrier Walls, available from the Nation Fire Protection Association. "Tied fire walls" are described in Section 2-4 of NFPA 221 with some design guidance given in the appendix of the standard. They were also discussed in "Steel Interchange" in the May 1995 issue of *Modern Steel Construction*. I also agree with the January response that true fire walls are difficult to properly detail and construct.

Where I take exception is in the nomenclature used

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.

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in the phrasing of the original question. Fire walls using flexible anchors or breakaway connections should actually be considered a distinct hybrid between the traditional cantilevered fire walls and tied fire walls. Terms which may be used to describe these fire walls are "laterally-restrained fire walls" or "area separation walls" Research performed by Consulting Engineers Group, Inc.; Underwriters Laboratories Inc.' Inchcape Testing Services/Warnock Hersey International, Inc.; and others generally agree that the L-shaped aluminum alloy break-away/melt-away clips should be horizontally opposed on each side of the wall at each stud in the fire wall (or approximately 24"(600 mm) on center). Clips may only be needed where they intersect the primary steel framing as the limiting height of the wall is generally dictated by an engineering analysis of the steel studs or by available limiting height tables. Some manufacturers of proprietary area separation wall systems have details for alternate clip placement for cases when the fire wall is enclosed by adjacent construction.

Laterally-restrained fire walls or area separation walls are easily constructed and have a proven record of exceptional performance in both multi-family residential and commercial/industrial applications for over 20 years. The designer should check with the insurance underwriter, especially in "highly protected risk" facilities to verify that the proposed design and materials are acceptable to them. Several different designs for area separation walls may be found in the listings or classification directories from various fire test laboratories or in the Gypsum Association's Fire Resistance Design Manual.

Karl D. Houser

Gypsum Association

Washington DC

What are the permissible variation in surface condition for structural shapes?

ASTM A6/A6M defines the permissible variation in the surface condition of structural steel plates and shapes as they are produced at the rolling mill. Since structural steel is usually furnished in the as-rolled condition, it should be recognized that surface imperfections (e.g., seams, scabs, etc.) Within the limits specified in ASTM A6/A6M may be present on the material received at the fabrication shop. Any special surface-condition requirements,

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when needed in the as-rolled product, must be specified in the contract documents.

It should be remembered that material purchased to meet the requirements of ASTM A6/A6M is subject to acceptance or rejection based upon visual inspection both at the rolling mill and at the time of receipt by the fabricator. Occasional surface imperfections will appear that were not visible before fabrication and blast cleaning. Furthermore, because of the higher finishing temperatures and special problems associated with producing heavy-weight cross-sections, and the inherent surface finish problems associated with certain steel chemistries (e.g., ASTM A588-weathering steel, the finish of these materials cannot be expected to be as fine as thinner, lighter-eight cross-sections and materials of other chemistries.

Surface variations that are discovered or occur after receipt of the material from the rolling mill or after blast cleaning and which are determined to be non-detrimental to the strength of the member need not be repaired or removed for cosmetic reasons, unless otherwise specifically stated in the contract documents. The responsibility for such repairs should be a contractual agreement, clearly understood by all parties involved, including the general contractor (owner), fabricator, erector, and painter.

Surface imperfections in heavyweight sections or weathering steel that are parallel to the line of stress and not detrimental to the end use of the member should be acceptable. The surface may appear mottled, pock-marked, pitted, alligatored, as having washboard ridges, etc. However, if these imperfections are detrimental to the intended service, they may be repaired by the fabricator by grinding or welding.

What is the tolerance on sweep for curved girders?

AWS D1.1 stipulates permissible variations in sweep for horizontally curved welded plate girders. Since the method of measurement for this sweep dimension is not defined, the tolerance is sometimes misapplied. The permissible variation specified is the deviation of the theoretical mid-ordinate from a chord through the ends of a single fabricated girder section. Additionally, it should be remembered that most girders have sufficient lateral flexibility to easily permit the attachment of diaphragms, cross-frames, lateral bracing, etc., without damaging the structural member or its attachment, even if this tolerance is exceeded.

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 or by e-mail to aiscpmn@interaccess.com.

Questions and responses will be printed in future editions of Steel Interchange. Also, if you have a question or problem that readers might help solve, send these to the Steel Interchange Editor.

When should an engineer specify camber? What are appropriate cambers for different size beams?

What is the effect on the design when a rubber pad is placed under a base plate?

What are the equations for the plastic (Z_x , Z_y) and torsional properties (J , C_w) of the built-up shapes, for instance a W shape or S shape welded with channels or cover plates on one or both flanges; two or three shapes with or without lacing; castellated beams; etc.

Arnaldo Gutierrez
Miami, FL

Are there any references on maintenance of weathering steel wall panels or structural members?

An effective net tension area is required by the Specification for tension members when the tension load is transmitted to some but not all of the cross-sectional elements. How can one calculate U by the LRFD formula B3-2 for welded connections? What is the value of x bar, examples of x bar are given for bolted connections in the commentary but there are no figures shown for welded connections.