



AC 43-0610-R2

SCANNED—BIRMINGHAM

DAVID W. BOLTZ
DIRECTOR QUALITY AND PRODUCT ENGINEERING
WHEELING CORRUGATING COMPANY

PHONE: 304-234-2619
FAX: 304-234-2343
BOLTZDW@WHEELINGCORRUGATING.COM

June 15, 2010

Attn: Mr. David Musselwhite, Sr. Staff Engineer

ICC Evaluation Service, Inc.
900 Montclair Road, Suite A
Birmingham, AL 35213

RECEIVED
JUN 16 2010
ICC-ES Evaluation Committee

Subject: AC43 Draft Comments, June 2010

Dear Mr. Musselwhite:

Wheeling Corrugating Company manufactures steel deck products from coast to coast, is an active member of the Steel Deck Institute, and the American Institute of Iron and Steel. We have been in business since 1890, and like many other companies are in the worst Economic Crisis in a very long time. Over the years we have invested millions of dollars in research, testing and product development, and have held Reports with recognized code councils.

That being said the Steel Deck Industry cannot afford design criteria that will burden companies with more testing or use of new methods of reasoning anytime a new method is developed, or the case that someone may not be comfortable with results or capacities simply because they do not have the experience, or knowledge of all of the applications or use of a product.

Many manufactures have held reports published by ICBO, ICC, etc. that have been used for many years without a design safety or life threatening issue. For example look at the ASD method for design. I was taught to design with the ASD method in college, but the very next year LRFD was the method that was taught. Now there is a new Direct Strength Method that is being taught. Point being there will always be new design developments, but that does not mean the previous method was wrong. They are just different, both resulting in a usable capacity for an element used in construction. New methods can be utilized when developing new products, but that does not mean the previous reports published by ICC were not developed correctly.

When was the last time ASD was revised? The Tri Services Method was last revised in 1992, but that does not mean that the theory is wrong or not applicable today.

The response number below corresponds to the number shown in the comments.

1c:

Mechanical Fasteners, Powder Actuated or Pneumatically Driven Fasteners have a long history of tested large scale diaphragms, and produce more repeatable results than welding, hence the lower safety factor. Their use should not be limited to wind velocities of less than 100 mph, or certain seismic zones.

1d:

This prevents new innovation. There is no reason to limit the reports to standard shape. Full scale test can be used to develop an empirical equation based on the TSM or SDI methods.

1e.

Concrete filled diaphragms have been used for many years based on early full scale testing, and derived capacities through empirical methods. The basic design of concrete has not changed, nor should it's uses. Full scale testing cost would be an unrealistic request; material cost, installation, tear down etc. would a drastic increase to a test program. TSM and SDI methods are based on full scale test.

5:

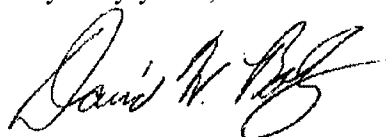
There is no conflict between TSM and SDI regarding 2.5 inches of cover over the deck. When diaphragm is considered 2.5 inched of cover is required in DDM03. 2 inches is required for composite action for vertical floor loading capacity.

8:

Uplift capacity based on the AISI S905 is for pullout. AISI or SDI methods also need to be calculated for pullover.

In closing Wheeling request that the ICC-ES should postpone the extensive revisions to AC43, except for the adoption of the 2009 IBC, or possibly with some of the changes that are acceptable to the majority of the manufacturers involved with reports for steel deck products. We are all working to design criteria that results in a consistent and even playing field. These reports have been used for many years, and all involved have vast experience in producing and using steel deck product safely in construction.

Very truly yours,



David W. Boltz
Director of Quality and Product Engineering

DWB

David Musselwhite

SCANNED—BIRMINGHAM

From: Thomas Sputo [sputoeng@mindspring.com]
Sent: Friday, June 11, 2010 2:45 PM
To: David Musselwhite
Cc: SDI; Bob Paul
Subject: Reply to AC43 questions

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JUN 14 2010

ICC ES B'ham

Dear David,

Here are responses to the questions that you posed. The slight delay in responding was because we ran these responses through several people (including Larry Luttrell) within SDI to ensure that they accurately reflected the intent of the SDI documents.

1. In our meeting with SDI in March of this year, we understood that all we need to do is test small scale connections using AISI S905 and use the results in the SDI DDM03 equations to find the diaphragm shear strength and stiffness. Is there any way we could have this confirmed in writing or at the criteria committee meeting next week?

RESPONSE: Yes, your understanding is correct. The SDI Method as embodied within DDM03 is a transparent analytical method that predicts diaphragm strength and stiffness from the strength and stiffness properties of the fasteners. The results of small scale tests in accordance with S905 will provide the necessary fastener strength and stiffness properties. No full scale testing is required.

2. Along the same line of thought, if small scale testing is all that is needed, will the magnitude of the connection strength ever be such that the diaphragm equations will not be valid? For example, if a connection value, Q_s or Q_s is 2 to 3 times larger than the typical value in DEMO, will the diaphragm shear equations still be valid without a full scale diaphragm test? Qp
DDM03

RESPONSE: There is no upper or lower bound to fastener strength that will cause the SDI DDM03 method to be invalid, or cause full scale testing to be required. The design strength of the diaphragm is the lesser of what is controlled by fastener strength and panel buckling. If the fasteners are extremely strong, panel buckling will then be the controlling limit state. Panel buckling is contained within the DDM03 method.

3. We have some comments that concern the use of end-laps in the construction of steel deck diaphragms. One comment concerns the requirement of putting an end-lap in the test assemble to know how the end-lap affects the results. ICC-ES has a question for SDI. If the equations in DDM03 are used, do they allow or cover assemblies with end-laps or are the equations in DDM03 only for assemblies without end-laps?

RESPONSE: The equations in DDM03 are applicable for assemblies both with and without end-laps.

COMMENT: While reviewing the submitted public comments, several commenters noted concerns with including welding parameters such as flash time and amperage within an ER. The SDI DDM03 method relies only upon being able to quantify fastener (in this case, a weld) strength and stiffness, and not how the weld is made. Field conditions, including temperature, varied support framing thickness, and individual welder practices will influence the weld settings needed to create a quality weld with the necessary strength. It is therefore necessary for the welder performing the work to be able to adjust these welding parameters to create welds that meet the requirements of AWS D1.3. We believe that this level of prescription for the welding process is not appropriate in an ER.

COMMENT: While reviewing the submitted public comments, several commenters responded to your question about concrete coverage over steel deck. If DDM03 Equation 5.3-1 is used, concrete coverage of 2 to 6 inches are permitted for structural concrete. Equation 5.3-2 is essentially Equation 5.3-1, with 2-1/2" substituted into the equation. Therefore, DDM03 will permit as little as 2 inches or as much as 6 inches of cover if Equation 5.3-1 is used. Equation 5.3-2 may be used with as little as 2-1/2" of cover, and will be conservative for coverage over 2-1/2 inches. The diaphragm tables within the DDM03 are based on a 2-1/2" coverage, but this should not be considered as forbidding 2 inches of cover, as long as the proper equation is used.

Hopefully this additional information is useful

Tom Sputo

Thomas Sputo, Ph.D., P.E., S.E., SECB
Technical Director
Steel Deck Institute
10 SW 1st Avenue, Gainesville, FL 32601
Phone: 352-378-0448
Fax: 352-373-1331
Email: sputoeng@mindspring.com

Main Office:
PO Box 25, Fox River Grove, IL 60021

David Musselwhite

From: David Musselwhite
Sent: Monday, June 07, 2010 5:12 PM
To: 'Thomas Sputo'; Steve A. Roehrig; 'Luttrell-LD@comcast.net'
Cc: Gary Nichols; Russ Krivchuk; Elyse Levy; Woods McRoy
Subject: AC43

To All Above,

We are working on the comments we received from our notice of AC43 changes. In doing so, we have a few questions we would like to ask SDI. The questions are as follows:

1. In our meeting with SDI in March of this year, we understood that all we need to do is test small scale connections using AISI S905 and use the results in the SDI DDM03 equations to find the diaphragm shear strength and stiffness. Is there any way we could have this confirmed in writing or at the criteria committee meeting next week?
2. Along the same line of thought, if small scale testing is all that is needed, will the magnitude of the connection strength ever be such that the diaphragm equations will not be valid? For example, if a connection value, Q_f or Q_s is 2 to 3 times larger than the typical value in DDM03, will the diaphragm shear equations still be valid without a full scale diaphragm test?
3. We have some comments that concern the use of end-laps in the construction of steel deck diaphragms. One comment concerns the requirement of putting an end-lap in the test assemble to know how the end-lap affects the results. ICC-ES has a question for SDI. If the equations in DDM03 are used, do they allow or cover assemblies with end-laps or are the equations in DDM03 only for assemblies without end-laps?

Thank you for your time and help in resolving these issues.

J. David Musselwhite, P.E.
Senior Staff Engineer
ICC Evaluation Service, Inc.
Birmingham Regional Office
900 Montclair Road, Suite A
Birmingham, Alabama 35213
800-423-6587 x 5681
205-599-9800 phone
205-599-9850 facsimile
dmusselwhite@icc-es.org
www.icc-es.org

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AC43-0610-R2

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PACIFIC
ERECTORS, INC

4460 YANKEE HILL ROAD
ROCKLIN, CA 95677

916-632-0600
FAX 916-632-0611
www.pacificerectors.com

June 9, 2010

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JUN 16 2010

ICC-ES Evaluation Committee

ICC Evaluation Service, Inc.
Birmingham Regional Office
900 Montclair Road, Suite A
Birmingham, AL 35213

Attention: Mr. David Musselwhite, Senior Staff Engineer

SUBJECT: AC43-0610-R2

Proposed Revisions to the Acceptance Criteria for Steel Deck Roof and Floor Systems

Dear Mr. Musselwhite:

We are writing regarding the proposed changes to the AC43 Acceptance Criteria for Steel Roof and Floor Systems as shown in the draft of AC43 dated May, 2010.

We are a steel roof and floor deck installer and are therefore concerned specifically about the proposed provisions of Section 4.4.4 of AC43. As we read this, it appears that specific welding procedures would be dictated by ICC reports if the proposed wording is adopted. Currently, the ICC reports and catalogs for the products we install define the required finished weld results. As the installer, we then develop and qualify welding procedures which provide the specified results. The procedures may change based on the specific project conditions, the required result and the expertise of our staff.

We do not feel it is appropriate for ICC or the deck manufacturers to dictate specific means and methods to deck installers. We are concerned that this provision mandating weld procedures is different than AWS D1.3 or prequalified procedures currently being used and could negatively impact weld quality and cause us economic harm by unnecessarily raising our costs. The need to develop weld procedures specific to individual deck manufacturers compounds those concerns.

Therefore, we respectfully request that you delete the words "in the ICC-ES report" from the end of the second sentence of this section so that specific weld procedures are not specified in ICC reports. The reports should continue to specify only the required weld results. The second sentence of the section would then read:

4.4.4 WELDING:

Welding process, filler metal weld size, fusion diameter, electrode amperage setting and flash time for welds used in tests shall be reported. ~~in the ICC-ES report.~~

Thank you for your consideration of this request

Sincerely,

Pacific Erectors, Inc.

Trent J. Earl
Structural Division Manager

te:dd

AC43

AC43-0610-R2

11



**STRUCTURAL ENGINEERS ASSOCIATION
OF CALIFORNIA**

555 CAPITOL MALL, SUITE 755
SACRAMENTO, CA 95814
916.447.1198 • 916.442-0812 FAX
info@seaoc.org • www.seaoc.org

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JUN 16 2010

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Mr. David Musslewhite
Senior Evaluation Specialist
900 Montclair Road, Suite A
Birmingham, Al 35213

16 June, 2010

**RE: AC43-0610-R2, Steel Deck Roof and Floor Systems
SEAOC Evaluation Report Committee Position and Comments**

Dear David,

In response to the ICC-ES request for input regarding the modified AC43, dated June 10, 2010, the SEAOC Evaluation Report Committee has reviewed the AC, vetted, and voted on the position provided herein.

Background

At the February ISS-ES committee meeting, we suggested that the consequence of eliminating reference to the Tri-Services Manual (in particular, Table 2 which contains prescriptive deck aspect ratio limitations for diaphragm flexibility control) would lead to significant detrimental design and construction issues when used under certain jurisdictions, such as Office of Statewide Health, Planning and Development and, potentially, the industry as a whole. This is based on the widespread and historic use of the Manual and inclusion of it as a code reference by some jurisdictions. Based on this, we respectfully requested that the February version of the AC43 be held over as said Committee meeting, which did occur.

Subsequently, we revisited this issue in consultation with the SEAOC Seismology and Structural Standards Committee, and, again, we recommend that the AC43 include reference to the Tri-Services Manual and, now, afford the option to use a rational testing and/or analysis approach to assess steel deck systems. We understand that reference to the Manual has occurred in the current version of AC43 but comes with some caveats. We have endeavored to address some of those caveats herein, as well as AC edits based on the above.

RecommendationsSection 6.2 and Table 2 of AC43-0610-R2)

As stated above, we appreciate the positive response to our request during the February 2010 hearing that reference to the Diaphragm Flexibility Limitations Table (Table 2) be retained based on the fact that it is currently referenced in the California Building Code and widely used in the industry. We also note, to the best of our knowledge, that there have been no reported “failures” or excessive fiscal cost ramifications from the use of this approach. We also recommend that the Acceptance Criteria and resulting Evaluation Reports acknowledge an alternative for rational analysis to determine aspect ratios. The proposed version of Section 6.2 below incorporates this recommendation:

6.2 Evaluation reports that include recognition of the steel deck panels for use in steel deck diaphragms shall include a table similar to Table 2 of this criteria and include, within a Diaphragm Design Considerations section of the report, requirements that the diaphragm design take into account the following:

- *Diaphragm classification (flexible or rigid) shall comply with ~~Section 1630.6 of the UBC or~~ Section 1602 of the IBC; the diaphragm deflection (Δ) shall be calculated using the equations noted in the Diaphragm Flexibility Limitations Table (Table No. XXX).*
- *Diaphragm flexibility limitations shall be limited per Table xx or based on rational analysis shall comply with the table.*
- *Diaphragm deflection limits shall comply with ~~Section 1633.2.9 of the UBC or~~ Sections 12.10.1 and 12.12.2 of ASCE 7.*
- *Horizontal shears must be distributed in accordance with ~~Sections 1630.6 and 1630.7 of the UBC or~~ Sections 12.8.4, 12.9.5, or 12.14.8.3 of ASCE 7.*

Section 4.4.4 of AC43-0610-R2)

The specific weld procedure utilized to attain a specified weld should not be included in either Evaluation Reports or in the Acceptance Criteria. The development and qualification of welding procedure specifications (WPS's) for specified welds is currently, and should remain so, the responsibility of the applicator/installer, and should be addressed by the inspection requirements of Chapter 17 of the IBC. To shift the welding quality control and assurance responsibilities to the manufacturer and away from the installer, will lead to a lower quality control level and higher risk of inferior connections occurring.

We would therefore request that the words “in the ICC-ES report” at the end of the second sentence of this section be deleted from the proposed wording for this section. Thus the second sentence of the section would read:

4.4.4 WELDING: ... Welding process, filler metal weld size, fusion diameter, electrode amperage setting, and flash time for welds used in tests shall be reported. ~~in the ICC-ES report. ...~~

Use of Pin Connectors – Item 1c (not vetted with SEAOC SSSC)

Powder-actuated or pneumatically installed pins, historically, and in accordance with ICC-ES practice, have been a means of deck attachment and have been permitted based on test data analyzed with the concepts of the Tri-Services Manual. The Tri-Services Manual has an antiquated exception due to well founded concerns (lack of knowledge of this then-new connection method) at the time the exception was written regarding pin-to-substrate tenacity. There are “no bodies” to be observed regarding the use of this connection type. In fact, the use of pins, like nails in wood, is readily capable of providing strength reliability and ductility. The acceptance of a type of connection should be based on predefined test method and acceptance criteria; hence, we foresee no rational reason to exclude the application of AC to pin connectors.

The proposed changes have significant ramifications and should be well vetted, particularly those that invoke more restrictions and where there appears no improvement to safety or fiscal advantages for the industry as a whole are to be gained. We will continue our review of this AC and welcome your targeted questions.

Respectfully,

A handwritten signature in black ink, appearing to read "Mark A. Moore". The signature is fluid and cursive, with a period at the end.

SEAOC, Evaluation Report Committee, Chair
Mark A. Moore, SE

ICC-ES Acceptance Criteria Hearing

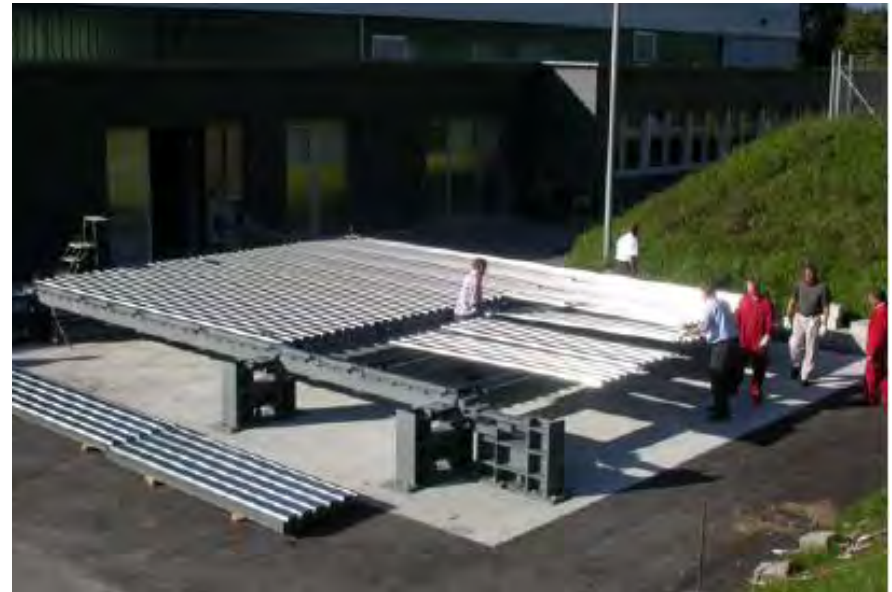
Acceptance Criteria for Steel Deck Roof and Floor Systems
(AC43)

Public Comments
Hilti, Inc.

Birmingham, AL
June 16th, 2010

Diaphragm System Performance

Diaphragm system strength and stiffness is determined through structural system tests **and** small element connection tests. One type of test should not be considered a substitute for the other...the tests complement one another.





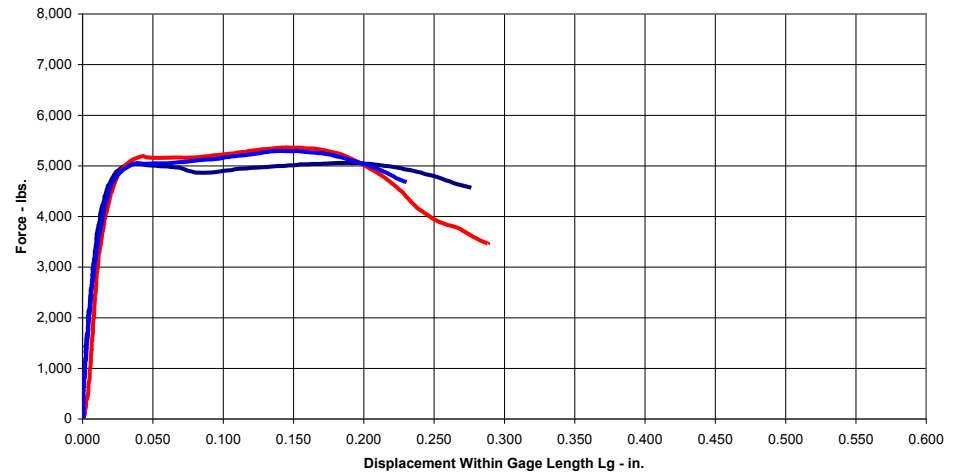
Multiple test laboratories, manufacturers and research universities maintain similar diaphragm test equipment

Qualification testing – small element connections

AISI S905-08 test method for mechanically fastened cold-formed steel connections (lap-joint shear)



**AISI Lap Joint Shear Tests
Steel Deck Fastened to 3/8 Inch Base Steel
with Hilti X-ENP-19 Power Actuated Fasteners (2)**



Small scale connection performance provides only a basis for understanding of the diaphragm system behavior. What it misses: edge effects of steel deck panels, endlaps influence, diaphragm system effects among others... Under this AC43 draft, essentially to qualify a fastener for diaphragm use, less tests are required than even for an AC118 screw fastener qualification, despite the fact that the connections are a critical part of a larger structural system that's recognized for seismic resistance!

Seismic Diaphragm Testing

Hilti AG Schaan

Fastening Systems
Research Laboratory

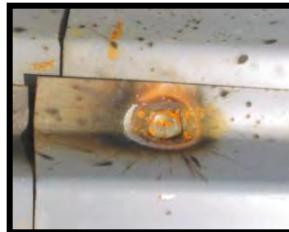
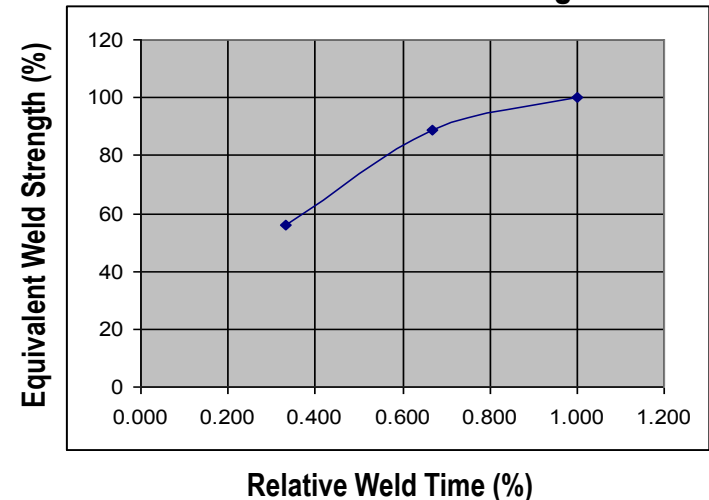
Diaphragm Decking Test
May 15, 2007

Cyclic / seismic testing is not currently part of AC43, but similar to AC230 and AC269 racking shear wall tests, this should be included to verify the ductility of the diaphragm system. Similar to AC118, AC120, AC193 and AC308, various product performance levels should be allowed / recognized.

Independent Research on Arc Spot Welds for Steel Deck

- Recent research at Virginia Tech has found that proper arc spot welding of steel deck takes an average of 8.1 seconds per weld for a 5/8 in. arc spot puddle weld and 12.8 seconds per weld for a 3/4 in. arc spot puddle weld
- Arc time has a tremendous effect on weld strength (reference graph)
- Arc spot welding of double deck layers up to 0.15 in. is possible, although the strength scatter increases significantly
- Arc spot welding of four deck layers is not possible to make in 22 to 16 ga thickness. Arc spot welds should not be made in four layer conditions
- Research recommendation is to improve the AWS welding qualification procedure to include weld time

Arc Time vs. Weld Strength



Research Report on Strength of Arc-Spot Welds made in Single and Multiple Steel Sheets. Gregory L. Snow and W. Samuel Easterling, Virginia Polytechnic Institute and State University, June 2008; 19th International Specialty Conference on Cold-Formed Steel Structures, October 2008.

Steel Deck – Frame Fasteners after Cyclic Loading

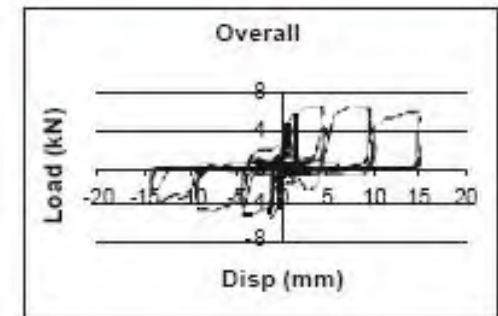
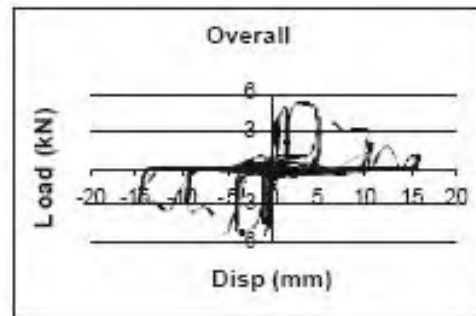
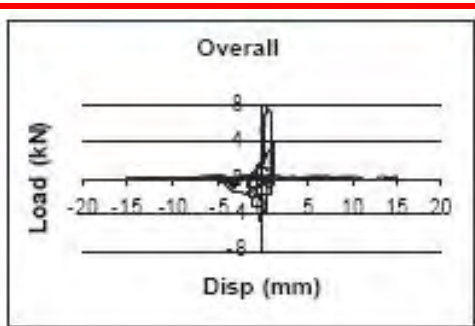
Weld



Screw



Powder-Actuated



“Welded deck-to-frame fasteners provide diaphragms with limited ductility capability. Substantial degradation of strength occurs when the diaphragm is subjected to cyclic loading within the inelastic range”



Inelastic Seismic Response of Frame Fasteners for Steel Roof Deck Diaphragms

J. Struct. Engrg. Volume 129, Issue 12, pp. 1647-1657 (December 2003)

Issue Date: December 2003

Colin A. Rogers¹ and Robert Tremblay²

¹Assistant Professor, Dept. of Civil Engineering and Applied Mechanics, McGill Univ., Montreal QC, Canada H3A 2K6.

²Professor, Dept. of Civil, Geological and Mining Engineering, École Polytechnique, Montreal QC, Canada H3T 1J4.

An experimental program was undertaken to investigate the inelastic seismic response of metal deck roofing systems. The load carrying capacity of roof diaphragms for low-rise steel buildings, subjected to lateral loads from wind and/or earthquakes, is directly dependent on the performance of the connections. This paper provides information on the inelastic cyclic response, including load versus displacement hysteresis and energy absorption capacity of 144 deck-to-frame screwed, powder-actuated fastener, and welded connection tests for different steel deck and structure thickness. Powder-actuated fastener connections were able to provide the highest energy dissipation results, followed closely by screwed connections. In many cases, the welded connections exhibited significant ultimate capacities, but failed at small displacements, resulting in low energy dissipation values. However, when welds with washers were used, the ductility and energy absorption ability of the connection were substantially improved.

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Behavior of Roof Deck Diaphragms under Quasi-static Cyclic Loading

J. Struct. Engrg. Volume 129, Issue 12, pp. 1658-1666 (December 2003)

Issue Date: December 2003

Hesham S. Essa¹, Robert Tremblay² and Colin A. Rogers³

¹Post-Doctoral Research Associate, Dept. of Civil, Geological, and Mining Engineering, Ecole Polytechnique, Montreal PQ, Canada H3C 3A7.

² Professor, Dept. of Civil, Geological, and Mining Engineering, Ecole Polytechnique, Montreal PQ, Canada H3C 3A7.

³ Assistant Professor, Dept. of Civil Engineering and Applied Mechanics, McGill Univ., Montreal PQ, Canada H3A 2K6.

A series of 18 large-scale tests was carried out on corrugated cold-formed steel deck diaphragms for single-story buildings to investigate the diaphragm's ability to function as the main source for absorbing earthquake induced energy through inelastic behavior. Tests were performed using a cantilever type configuration for the test setup, in which the steel deck was laid in a horizontal plane. Diaphragm assemblies made with 0.76 and 0.91 mm thick metal deck sheets and with nine combinations of deck-to-frame and deck-to-deck (side lap) fasteners were tested. For each fastening combination, two tests were conducted: monotonic and quasistatic cyclic. Both the strength and failure modes under quasistatic cyclic loading are different from those under monotonic loading. Test results indicate that diaphragms with welded deck-to-frame fasteners without washers have limited ductility and cannot sustain cyclic loading at relatively large displacement amplitudes. The use of mechanical and welded-with-washer deck-to-frame fasteners enhances the strength, ductility and energy dissipation characteristics of the diaphragm considerably.

Tri-Services Manual 1992

Allowance was made in the Tri-Services Manual 1992 for use of other fastening methods besides welding:

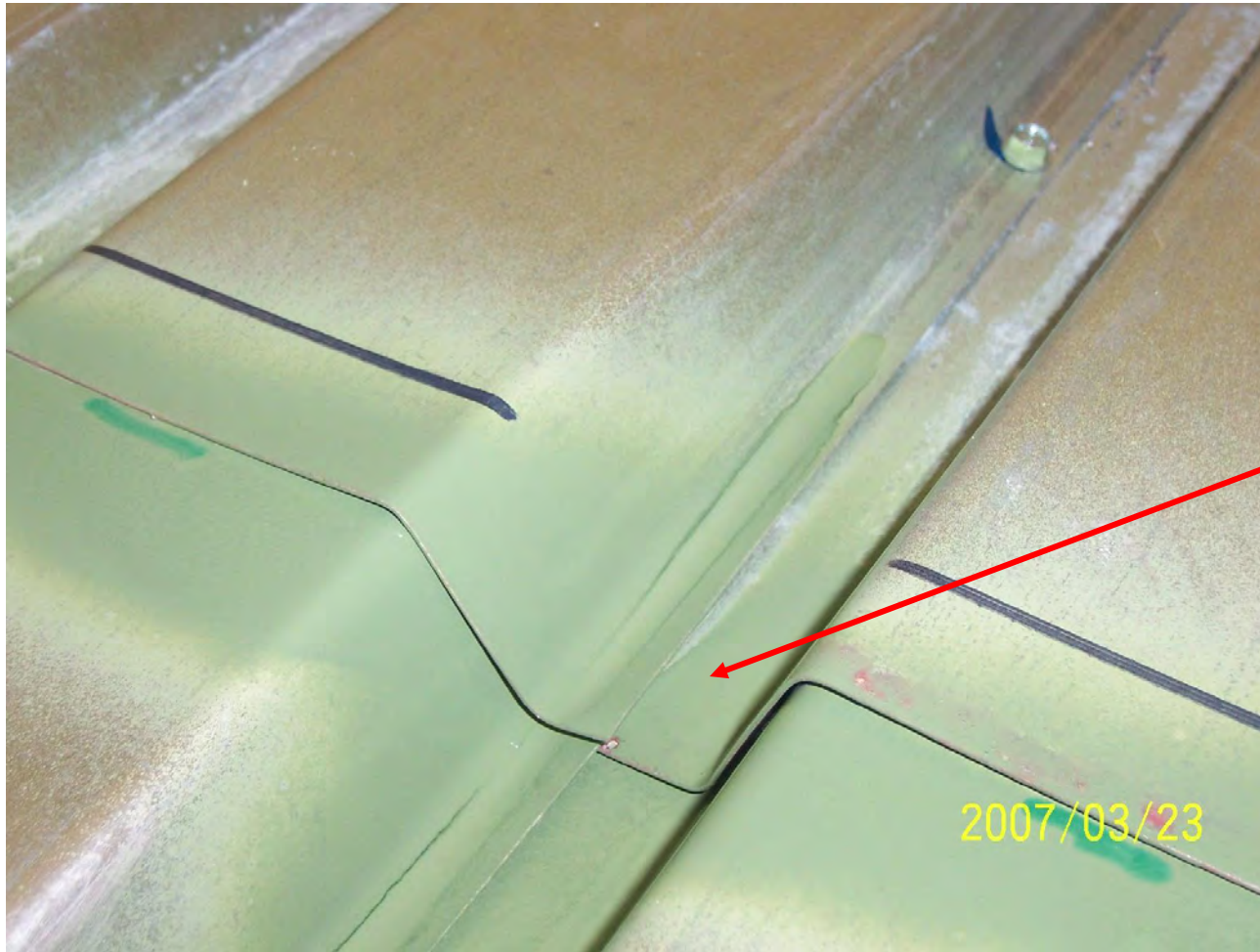
(5) Nonwelded fasteners. Fastening methods other than welds—such as self-drilling, powder actuated, or pneumatically driven fasteners—may be used provided that equivalence to the welded method can be shown by approved test data. The results of such test data will be presented by means of equations or tables for q and F in a manner similar to that used in paragraphs 5-9b, 5-9c, and 5-9d.

- Pages 5-17 & 5-18

Tightly Nested Endlaps



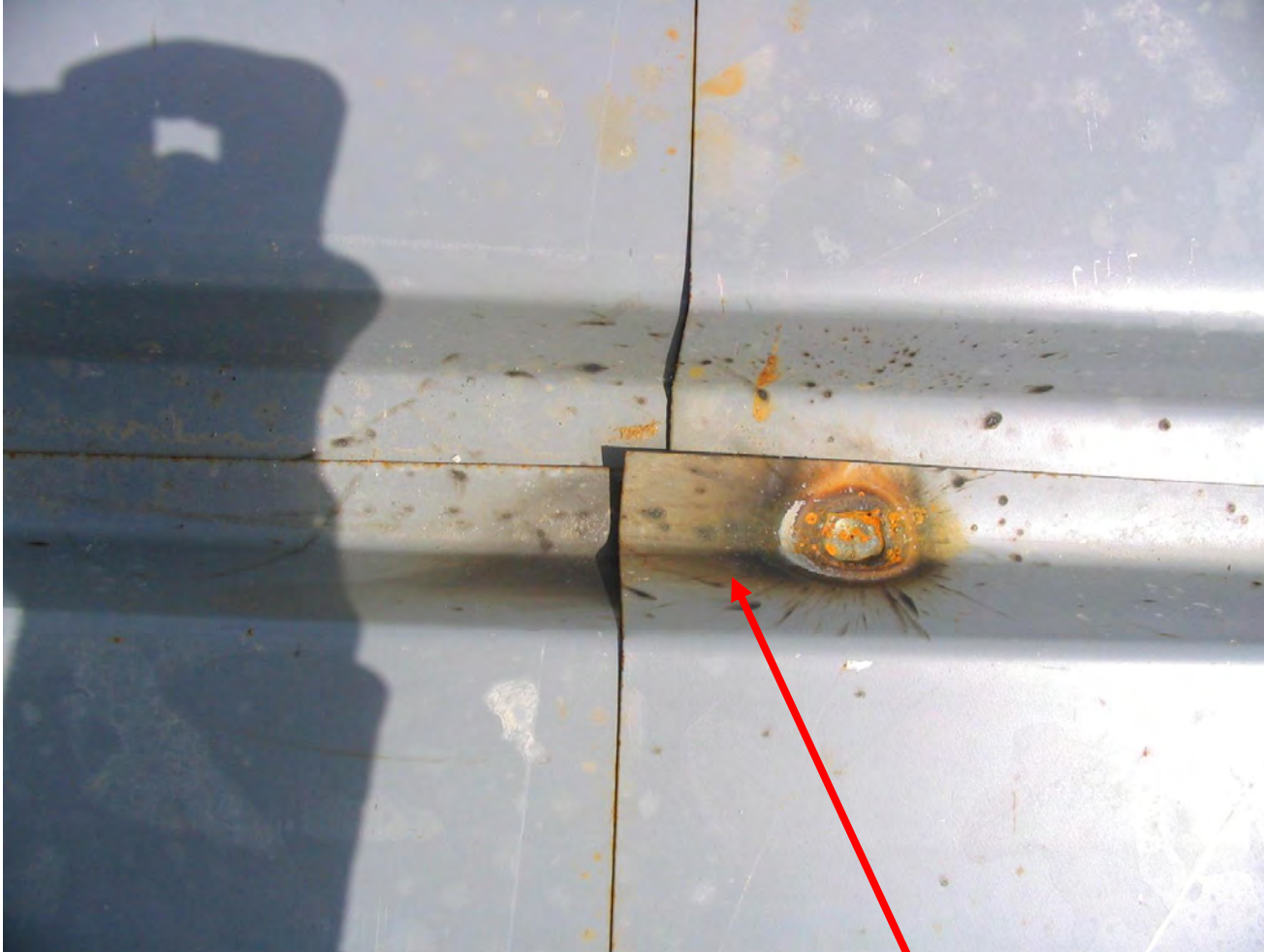
4 Layer Condition – Nestable Steel Deck Panel (22 ga)



Tight nesting

2007/03/23

Welded Endlap Connection



Loose endlap / corner connection
Weld capacity could be questionable (ref. Easterling research)

Short Sidelap Edge on Steel Deck Panel



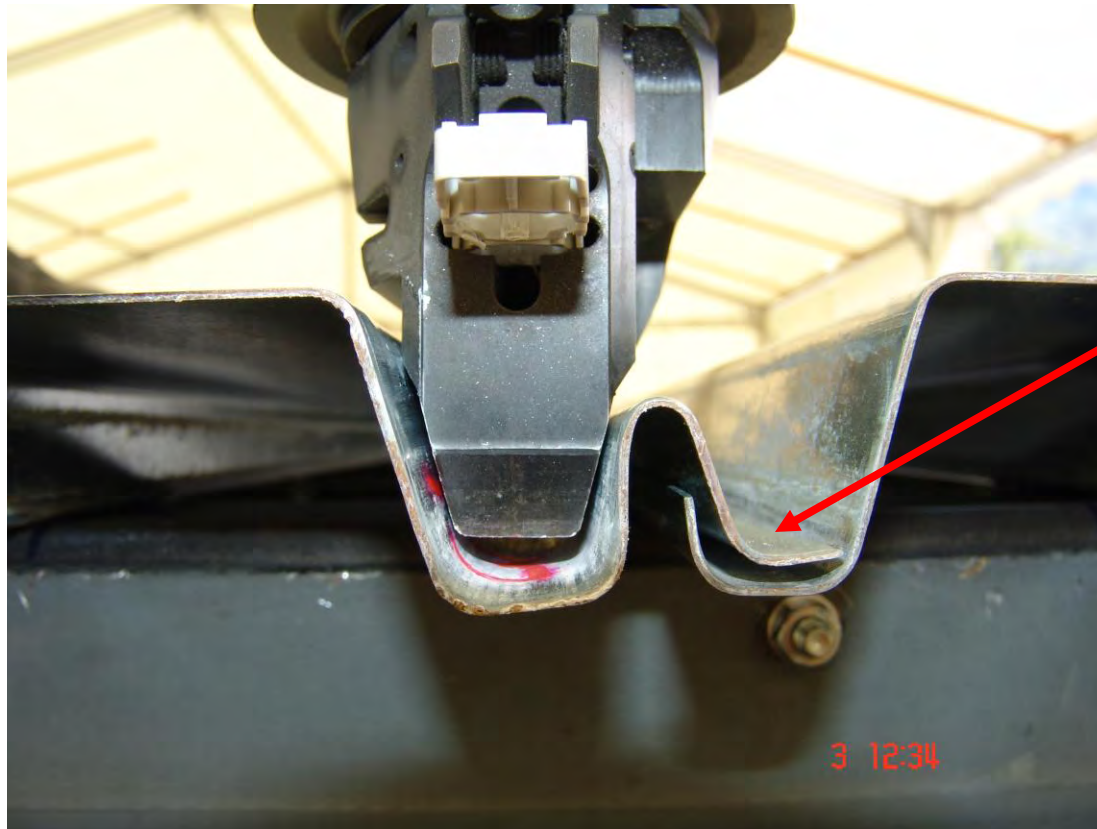
Nestable steel deck panels can be manufactured this way. The sidelap edge may not extend for a full lap across the lower flute.



Nestable steel deck panel may have a complete / full sidelap edge where it nests on top of the adjacent steel deck panel. It may also have a “short” sidelap edge. This condition is only captured in the full-scale diaphragm system test (AISI S907).

2007/03/07

Loose Edge – Interlocking Steel Deck Panel Typical with 18 and 16 ga.



**What happens
when you weld
this?**

AC120

ICC EVALUATION SERVICE, INC.
Evaluate • Inform • Protect



ACCEPTANCE CRITERIA FOR WOOD SCREWS USED IN HORIZONTAL DIAPHRAGMS AND VERTICAL SHEAR WALLS

AC120

Approved February 2006

Effective March 1, 2006

Previously approved September 1999, July 1997, July 1996

PREFACE

Evaluation reports issued by ICC Evaluation Service, Inc. (ICC-ES), are based upon performance features of the International family of codes and other widely adopted code families, including the Uniform Codes, the BOCA National Codes, and the CBC01 Standard Codes. Section 104.11 of the International Building Code® reads as follows:

The provisions of this code are not intended to prevent the installation of any materials or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

Similar provisions are contained in the Uniform Codes, the National Codes, and the Standard Codes.

This acceptance criteria has been issued to provide all interested parties with guidelines for demonstrating compliance with performance features of the applicable code(s) referenced in the acceptance criteria. The criteria was developed and adopted following public hearings conducted by the ICC-ES Evaluation Committee, and is effective on the date shown above. All reports issued or reissued on or after the effective date must comply with this criteria, while reports issued prior to this date may be in compliance with this criteria or with the previous edition. If the criteria is an updated version from the previous edition, a solid vertical line (|) in the margin within the criteria indicates a technical change, addition, or deletion from the previous edition. A deletion indicator (-) is provided in the margin where a paragraph has been deleted if the deletion involved a technical change. This criteria may be further revised as the need dictates.

ICC-ES may consider alternate criteria, provided the report applicant submits valid data demonstrating that the alternate criteria are at least equivalent to the criteria set forth in this document, and otherwise demonstrate compliance with the performance features of the code. Notwithstanding that a product, material, or type or method of construction meets the requirements of the criteria set forth in this document, or that it can be demonstrated that valid alternate criteria are equivalent to the criteria in this document and otherwise demonstrate compliance with the performance features of the code, ICC-ES retains the right to refuse to issue or renew an evaluation report, if the product, material, or type or method of construction is such that either unusual care with its installation or use must be exercised for satisfactory performance, or if malfunctioning is apt to cause unreasonable property damage or personal injury or sickness relative to the benefits to be achieved by the use of the product, material, or type or method of construction.

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Business/Regional Office • 1140 Wilshire Blvd Road, Wilshire, California 90017 • (310) 692-0743
Regional Office • 900 Monahan Road, Suite A, Birmingham, Alabama 35213 • (205) 359-0900
Regional Office • 4051 West Florence Road, Country Club Hills, Illinois 60478 • (708) 799-2303

ICC-ES has established a precedent for allowing the development of diaphragm performance data based on full-scale system level tests (ref. AC120).

The current AC43 draft implies that any performance data in the SDI DDM03 is “final” and can’t be improved upon...

Section 4.2 “...Full-scale horizontal diaphragm and vertical shear wall testing is required if the evaluation report applicant requests allowable load capacities of the assemblies constructed with the wood screws to be greater than those prescribed by the code for assemblies constructed with nails.”