



AISI S922-19



**American
Iron and Steel
Institute**

AISI STANDARD

Test Standard for Determining the Strength and Stiffness of Bearing- Friction Interference Connector Assemblies in Profiled Steel Panels

2019 Edition



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2019 Edition

Approved by
the AISI Committee on Specifications for the Design of
Cold-Formed Steel Structural Members

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PREFACE

The American Iron and Steel Institute Committee on Specifications developed this Standard to provide a test method for determining the strength and stiffness performance of bearing-friction interference connector assemblies installed in cold-formed profiled steel panels including *steel deck* and *steel deck-slabs*.

This Standard is intended for adoption and use when performance testing for determining the strength and stiffness of bearing-friction interference connector assemblies installed in profiled steel panels is required.

The Committee acknowledges and is grateful for the contributions of the numerous engineers, researchers, producers and others who have contributed to the body of knowledge on this subject.

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of Cold-Formed Steel Structural Members**

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AISI S922-19 **TEST STANDARD FOR DETERMINING THE STRENGTH AND** **STIFFNESS OF BEARING-FRICTION INTERFERENCE CONNECTOR** **ASSEMBLIES IN PROFILED STEEL PANELS**

1. Scope

This Standard shall apply for the determination of the strength and stiffness of bearing-friction interference connector assemblies in profiled steel panels. This Standard applies to connector assemblies with cold-formed profiled steel panels including *steel deck* and concrete-filled *steel deck-slabs* using an interference connector in a bearing connection, friction connection, or a combination thereof.

This Standard is composed of Sections 1 through 12 inclusive and Appendix A.

User Note:

The following figures depict common wedge-nut connections to re-entrant steel deck that are typical of the category of connections covered by this Standard. See Appendix A and Commentary Section C1 for additional common connection types and test configurations.

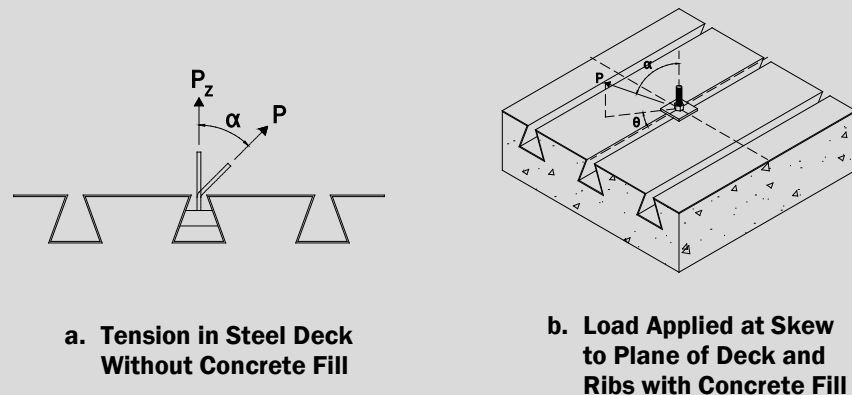


Figure 1-1

2. Referenced Documents

The following documents or portions thereof are referenced within this Standard and shall be considered as part of the requirements of this document.

- a. American Iron and Steel Institute (AISI), Washington, DC:
AISI S100-16, North American Specification for the Design of Cold-Formed Steel Structural Members, 2016 Edition
- b. American Concrete Institute (ACI), Farmington Hills, MI:
ACI 318-14, Building Code Requirements for Structural Concrete and Commentary
- c. ASTM International (ASTM), West Conshohocken, PA:
ASTM E4-16, Standard Practices for Force Verification of Testing Machines

A370-16, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*

E6-15, *Standard Terminology Relating to Methods of Mechanical Testing*

IEEE/ASTM SI10-10, *American National Standard for Use of the International System of Units (SI): The Modern Metric System*

d. Applied Technology Council, Redwood City, CA:

FEMA 461/June 2007, *Interim Testing Protocols for Determining the Seismic Performance Characteristics of Structural and Nonstructural Components*

3. Terminology

Where the following terms appear in this Standard, they shall have the meaning as defined herein. Terms not defined in Section 3 of this Standard, AISI S100, or ASTM E6 shall have the ordinary accepted meaning for the context for which they are intended.

Steel Deck. Profiled steel panels installed on support framing.

Steel Deck-Slab. Steel deck with structural or nonstructural concrete fill (topping).

Restrained Connection. A condition which provides transverse strength or stiffness to the ribs of the *steel deck* in addition to inherent transverse stiffness or strength of the *steel deck* to prevent the ribs from rolling open as manufactured. Connections in *steel deck-slabs* are always considered restrained.

Unrestrained Connection. A condition not meeting the *restrained connection* requirements.

4. Symbols

a, b	Location of the applied load relative to the span of the test specimen
D_d	Depth of <i>steel deck</i>
d_c	Depth of concrete fill above the <i>steel deck</i>
$e_{\min}$	Minimum eccentricity of the applied load in the plane of the <i>steel deck</i>
f'_c	Concrete compressive strength
L	Span length
P	Applied load
P_t	Adjusted applied load of a test for actual properties of the test to specified properties of the design
P_u	Ultimate applied load of a test
P_x, P_y, P_z	x, y, and z vector components of the applied load of the test relative to the plane of the <i>steel deck</i>
P_α	Applied load of a test for actual properties of the test to specified properties of the design at angle α
R	Reaction to applied load
R_x, R_y, R_z	x, y, and z vector components of reaction(s) relative to the plane of the <i>steel deck</i>
w_L	Length of the test specimen

w_T	Transverse width of the test specimen
α	Angle of the applied load measured relative to a line normal to the plane of the <i>steel deck</i>
θ	Angle of the applied load measured relative to the parallel direction of the <i>steel deck</i> in the plane of the deck

5. Units of Symbols and Terms

Any compatible system of measurement units is permitted to be used in this Standard, except where explicitly stated otherwise. The unit systems considered in this Standard shall include U.S. customary units (force in kips and length in inches) and SI units (force in Newtons and length in millimeters) in accordance with IEEE/ASTM SI10.

6. Precision

6.1 The rate of loading shall be controlled, constant loads shall be maintained, and the applied load shall be measured accurately within ± 1 percent of the full range of the measuring device.

User Note:

The capacity (range) of the load-measuring device should be appropriate to the expected maximum tested load. The use of a measuring device with a calibrated capacity greatly exceeding the anticipated load is not recommended. A target ratio of the load cell capacity to specimen strength of no greater than three is recommended.

The tests should be conducted on a testing machine that complies with the requirements of ASTM E4-16, *Standard Practices for Forces Verification of Testing Machines*.

6.2 Deflections shall be recorded to a precision of 0.001 in. (0.025 mm).

7. Test Fixture

7.1 Test fixtures shall be rigid enough to apply the loads in the intended orientation throughout the test without creating unintended eccentricities. When the test is for tension or compression loads, the test fixture shall not induce shear to the connection under the applied load. When the test is for shear loading, the test fixtures shall not induce tension or compression to the connection under the applied load. When the test is for combined shear and tension, that test fixture shall apply the load at the specified ratio of shear and tension under the applied load.

7.2 One of the following test fixtures shall be used for monotonic testing:

- (a) Hydraulic or screw-operated testing machine operating at a constant rate of displacement or a constant rate of loading with a calibrated force and deflection-measuring devices,
- (b) Hydraulic cylinder or screw-operated loading device with a rigid fixture and a calibrated force-measuring system,
- (c) An alternative test apparatus capable of applying load in a manner consistent with the