PIP STF05521
Details for
Angle Railings for
Walking and Working Surfaces
PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

In an effort to minimize the cost of process industry facilities, this Practice has been prepared from the technical requirements in the existing standards of major industrial users, contractors, or standards organizations. By harmonizing these technical requirements into a single set of Practices, administrative, application, and engineering costs to both the purchaser and the manufacturer should be reduced. While this Practice is expected to incorporate the majority of requirements of most users, individual applications may involve requirements that will be appended to and take precedence over this Practice. Determinations concerning fitness for purpose and particular matters or application of the Practice to particular project or engineering situations should not be made solely on information contained in these materials. The use of trade names from time to time should not be viewed as an expression of preference but rather recognized as normal usage in the trade. Other brands having the same specifications are equally correct and may be substituted for those named. All Practices or guidelines are intended to be consistent with applicable laws and regulations including OSHA requirements. To the extent these Practices or guidelines should conflict with OSHA or other applicable laws or regulations, such laws or regulations must be followed. Consult an appropriate professional before applying or acting on any material contained in or suggested by the Practice.

This Practice is subject to revision at any time.

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1. **Scope**

This Practice provides requirements for designers, fabricators, and installers of angle railing. This Practice provides fabrication and installation details for standard angle railing for in this Practice are intended to meet U.S. Occupational Safety and Health Administration (OSHA) requirements for process facilities, they may not meet the requirements of local or national building codes.

**Comment:** As of the effective date of January 17, 2017, this Practice is no longer fully compliant with new *OSHA Regulations 29 CFR 1910 Subpart D – Walking-Working Surfaces* that were published on November 18, 2016. This Practice will need to be supplemented or modified by the user to be in full compliance with the new OSHA regulations until the complete revision of this Practice incorporating the changes is published by PIP.

2. **References**

Applicable requirements in the following PIP Practices, codes and standards, and government regulations shall be considered an integral part of this Practice. The edition in effect on the date of contract award shall be used, except as otherwise noted. Short titles will be used herein when appropriate.

2.1 **Process Industry Practices (PIP)**

- PIP STF05501 - *Fixed Ladders and Cages Details*
- PIP STS05120 - *Fabrication of Structural and Miscellaneous Steel Specification*
- PIP STS05130 - *Erection of Structural and Miscellaneous Steel Specification*

2.2 **Industry Codes and Standards**

- American Institute of Steel Construction (AISC)
  - *Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings*
  - *Metric Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings*
  - *Specification for Structural Steel Buildings, Allowable Stress Design (ASD) and Plastic Design*

- American Society for Testing and Materials (ASTM)
  - ASTM A36 - *Standard Specification for Carbon Structural Steel*
  - ASTM A53 - *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*
  - ASTM A307 - *Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength*
  - ASTM A500 - *Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes*
3. **Definitions**

The following definitions from *OSHA 1910, Subpart D*, shall apply to this Practice:

**handrail**: A single bar or pipe supported on brackets from a wall or partition to provide a continuous handhold for persons using a stair. Refer to page 14 of this Practice.

**stair railing**: A vertical barrier erected along exposed sides of a stairway to prevent falls of persons

**standard railing**: A vertical barrier erected along exposed edges of a floor opening, wall opening, ramp, platform, or runway to prevent falls of persons

4. **Requirements**

4.1 Refer to project design documents for the location, orientation, and arrangement of railing for regular operational use, special fabrication details, and any changes to the requirements of this Practice.

4.2 Railing that meets the requirements of this Practice is designed to withstand a concentrated load of 200 pounds (890 N) applied in any direction at any point along the top rail, in accordance with OSHA requirements.

4.3 Wall-mounted handrail shall be carbon steel, round structural tubing, or pipe conforming to *ASTM A500* Grade B or *ASTM A53* Grade B, standard weight, 1.9-inches (48-mm) O.D. (1.5 inches [38 mm] nominal diameter).

4.4 All structural steel shall be *ASTM A36* unless otherwise noted.

4.5 All bolts for railing connections shall be 5/8-inch (16-mm) diameter and in accordance with *ASTM A307* unless otherwise noted.

4.6 Railing shall be welded construction except as shown in design drawings and/or in the attached details. All joints and welds in the top rail shall be finished smooth. Railing systems shall be surfaced in a manner to prevent injury from punctures or lacerations and clothing snags.

4.7 Railing assemblies shall be coated after fabrication in accordance with the design drawings and specifications governing the project. Galvanizing shall be done after fabrication and in accordance with *PIP STS05120*. Field damage to coating shall be repaired with materials equivalent to original coating according to *PIP STS05130*.

4.8 The minimum clearance between handrail or the top rail of stair railing/standard railing and any obstruction shall be 3 inches (75 mm).

4.9 If the size of fillet weld is not shown on the drawings, provide the minimum fillet as shown in Table J2.4 of the *AISC LRFD, Metric LRFD*, or *ASD Specification for Structural Steel Buildings*.
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SECTION G-G
BEAMS 14 (350) DEEP (NOM) AND UNDER

FOR DIMENSIONS NOT SHOWN, REFER TO DETAIL 1, PAGE 7

SECTION H-H
BEAMS DEEPER THAN 14 (350) (NOM)

FOR DIMENSIONS NOT SHOWN, REFER TO DETAIL 1, PAGE 7

SECTION J-J
CHANNELS TOED-IN

POST CONNECTIONS TO STRUCTURAL STEEL
DIMENSIONS ARE GIVEN IN FEET AND/OR INCHES. METRIC DIMENSIONS IN PARENTHESES ARE IN MILLIMETERS, UNLESS NOTED OTHERWISE

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PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS

DETAILS FOR ANGLE RAILINGS FOR WALKING AND WORKING SURFACES

FOR DIMENSIONS NOT SHOWN, REFER TO DETAIL 1, PAGE 7

SECTION G–G (ALTERNATE)
BEAMS 14 (350) DEEP (NOM)
AND UNDER WHERE RAIL POST ADJUSTMENT IS REQUIRED

NOTE:
POSTS AT 2'-0 (600) MAY BE OMITTED IF RAILS AND TOE PLATE ARE ATTACHED TO COLUMN. (NOT PERMITTED IF COLUMN IS FIREPROOFED)

SECTION H–H (ALTERNATE)
BEAMS DEEPER THAN 14 (350) (NOM)
WHERE RAIL POST ADJUSTMENT IS REQUIRED

RAILING TERMINATION AT COLUMNS (IF REQUIRED)

DIMENSIONS ARE GIVEN IN FEET AND/OR INCHES. METRIC DIMENSIONS IN PARENTHESES ARE IN MILLIMETERS, UNLESS NOTED OTHERWISE

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DETAIL 5

2-15/16 (24) dia holes in angle for 3/4 (19) dia adhesive anchors on gage of angle (adhesive anchors not by steel fabricator)

5 (125)  
4 1/4 (108)  
3/16 (5)  
2 (50)

TOP OF CONC. FLOOR

PL 1/2 (13)

DIRECTION OF RAILING

1 1/2 (38)

2 3/4 (69)

5 (125)

2-15/16 (24) dia holes in pl for 3/4 (19) dia adhesive anchors anchors (min distance from anchor to edge of concrete: 4-7/8 (125) adhesive anchors not by steel fabricator)

DETAIL 6

POST CONNECTIONS TO CONCRETE

Dimensions are given in feet and/or inches. Metric dimensions in parentheses are in millimeters, unless noted otherwise.

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WALL MOUNTED HANDRAIL

PIPE HANDRAIL ATTACHMENT TO WALL DETAILS

Dimensions are given in feet and/or inches. Metric dimensions in parentheses are in millimeters, unless noted otherwise.
RAILING POST

DETAIL 4, PAGE 11

NOTE:
1) SEE PIP STF05501 FOR SAFETY GATE REQUIREMENTS
2) SEE PIP STF05501 FOR LADDER DETAILS

RAILING POST ATTACHMENT DETAILS
AT STEP THRU LADDER

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