



# Standard Practice for Use of Branch Connections<sup>1</sup>

This standard is issued under the fixed designation F681; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the U.S. Department of Defense.*

## 1. Scope

1.1 This practice lists commonly used types of branch connections for carbon steel, chromium-molybdenum steel pipe and copper-nickel alloy tubing. Branch to run size applications are given in [Table 1](#), [Table 2](#), and [Table 3](#). Other types of branch connections ([Fig. 1](#)) may be used provided they comply with the requirements of Title 46 CFR Subparts 56.07-10(f) and 56.70-15(g) of the USCG Regulations.

1.2 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.11 on Machinery and Piping Systems.

Current edition approved Oct. 1, 2022. Published October 2022. Originally approved in 1980. Last previous edition approved in 2018 as F681 – 82 (2018). DOI: 10.1520/F0681-82R22.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

### F722 Specification for Welded Joints for Shipboard Piping Systems

### 2.2 ASME Standard:<sup>3</sup>

#### B31.1 Power Piping

### 2.3 Other Document:<sup>4</sup>

#### Title 46 Code of Federal Regulations (CFR) Shipping, Parts 41 to 69

## 3. General Requirements

3.1 Weld joint designs shall be in accordance with Specification F722 and the limitations therein.

3.2 Fabricated branch connections shall meet the reinforcement requirements of Section 104.3 of ASME B31.1 as modified by Title 46, CFR Subparts 56.07-10(f) and 56.70-15(g) of the USCG regulations.

3.3 Threaded fittings shall be subject to the limitations of Title 46 CFR, Subpart 56.30-20 of the USCG Regulations.

## 4. Keywords

4.1 branch connections; carbon steel connections; chromium-molybdenum steel pipe; copper-nickel alloy tubing

<sup>3</sup> Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

<sup>4</sup> Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.



F681 – 82 (2022)

TABLE 1 Branch Connection Matrix for Carbon Steel Piping

LEGEND (see Fig. 1)

- 1 = Tee or lateral (butt weld)
- 2 = Tee or lateral (socket weld or threaded)
- 3 = Welded outlet (butt weld end)
- 4 = Welded outlet (socket weld or threaded end)
- 5 = Fabricated joint (cut-in branch)

BRANCH SIZE (NPS), in.

		$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6	8	10	12	14	16	18		
MAIN OR RUN SIZE (NPS), in.	$\frac{1}{4}$		2																				
	$\frac{3}{8}$	2																					
	$\frac{1}{2}$	2	2																				
	$\frac{3}{4}$	2	2	2																			
	1	2	2	2	2																		
	$1\frac{1}{4}$	2	2	2	2	2																	
	$1\frac{1}{2}$	2	2	2	2	2	2																
	2	2	2	2	2	2	2	2															
	$2\frac{1}{2}$	4	4	4	4	4	4	4	4														
	3	4	4	4	4	4	4	4	4, 5	1	1	1	1										
	$3\frac{1}{2}$	4	4	4	4	4	4	4	4, 5	1	1	1	1	1	1								
	4	4	4	4	4	4	4	4	4, 5	1	1	1	1	1	1	1							
	5	4	4	4	4	4	4	4	4, 5	1	1	1	1	1	1	1	1						
	6	4	4	4	4	4	4	4	4, 5	1	1	1	1	1	1	1	1						
	8	4	4	4	4	4	4	4	4, 5	1	1	1	1	1	1	1	1	1					
	10	4	4	4	4	4	4	4	4, 5	3	3	3	3	3	3	3	3	3					
	12	4	4	4	4	4	4	4	4, 5	3	3	3	3	3	3	3	3	3	1	1	1	1	1
	14	4	4	4	4	4	4	4	4, 5	3	3	3	3	3	3	3	3	3	1	1	1	1	1
16	4	4	4	4	4	4	4	4, 5	3	3	3	3	3	3	3	3	3	1	1	1	1	1	
18	4	4	4	4	4	4	4	4, 5	3	3	3	3	3	3	3	3	3	1	1	1	1	1	

https://standards.itec

1-822022



# F681 – 82 (2022)

### TABLE 2 Branch Connection Matrix for Chrome Moly Piping

LEGEND (see Fig. 1)

- 1 = Tee or lateral (butt weld)
- 2 = Tee or lateral (socket weld)
- 3 = Welded outlet (butt weld end)
- 4 = Welded outlet (socket weld end)
- 5 = Fabricated joint (cut-in branch)

## BRANCH SIZE (NPS), in.

	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6	8	10	12	14	16	18
$\frac{1}{4}$	2																			
$\frac{3}{8}$	2	2																		
$\frac{1}{2}$	2	2	2																	
$\frac{3}{4}$	2	2	2	2																
1	2	2	2	2	2															
$1\frac{1}{4}$	2	2	2	2	2	2														
$1\frac{1}{2}$	2	2	2	2	2	2	2													
2	4	4	4	4	2	2	2	2												
$2\frac{1}{2}$	4	4	4	4	4	2	2	2	1											
3	4	4	4	4	4	4	4	4	$\frac{1}{3}$	1										
$3\frac{1}{2}$	4	4	4	4	4	4	4	4	$\frac{1}{3}$	$\frac{1}{3}$	1									
4	4	4	4	4	4	4	4	4	$\frac{1}{5, 3}$	$\frac{1}{5, 3}$	$\frac{1}{5}$	1								
5	4	4	4	4	4	4	4	4	$\frac{1}{5, 3}$	$\frac{1}{5, 3}$	$\frac{1}{5}$	$\frac{1}{5}$	1							
6	4	4	4	4	4	4	4	4	$\frac{1}{5, 3}$	$\frac{1}{5, 3}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	1						
8	4	4	4	4	4	4	4	4	$\frac{1}{5, 3}$	$\frac{1}{5, 3}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	1					
10																				
12																				
14																				
16																				
18																				