

Sprinkler Pipes – Truss Loading & Connections

Purpose of this Bulletin

Fire sprinkler piping, when supported by trusses, introduces additional loads to the trusses which must be considered during the truss design process. This Technical Bulletin addresses the origin of the minimum sprinkler pipe loads that the structure must be able to resist, what loads the connection must be able to resist, how to calculate them, TrusSteel Standard Details that are available for sprinkler pipe-to-truss connections, and responsibilities for specifying these loads.

Applicable Loads for Structure and for Connection

At the locations of sprinkler pipe connections to trusses, the structure (e.g. the trusses) must be designed to resist different loads than the connection (e.g. the sprinkler pipe hanger). Schedule 40 steel pipe sizes and weights are given in Table A. For other pipe materials, contact the pipe manufacturer for appropriate weights.

Loads for Connection:

Per section 9.1.1.2 (1) of NFPA 13, the connection of the sprinkler pipe to the supporting structure must be able to resist 5 times the weight of the water filled pipe plus 250 lbs. Assuming Schedule 40 steel pipe, and the maximum pipe spacing given in Table 9.2.2.1 of NFPA 13, the minimum load that the connection must be designed to resist can be calculated.

Loads for Structure:

The structure only has to be designed to resist the weight of the water filled pipe plus 250 lbs at each connection per section 9.2.1.3.1 of NFPA 13.

Table A. Sprinkler Pipe Sizes and Weights¹

Pipe Size (diameter) in	Dry Pipe Weight plf	Wet Pipe Weight plf
1	1.7	2.1
1 1/4	2.3	3
1 1/2	2.7	3.6
2	3.7	5.2
2 1/2	5.8	7.9
3	7.6	10.8
3 1/2	9.2	13.5
4	10.9	16.4
5	14.8	23.5
6	19.2	31.7
8	28.6	50.8
10	40.5	74.6

1. Weights assume Schedule 40 steel pipe.
2. Dry pipe weights do not include weight of water.
3. Wet pipe weights are weights of the water filled pipe.

Calculating Sprinkler Pipe Loads for Structure and Connection

1. Determine the diameter of the sprinkler pipe.
2. Determine the wet weight, W (plf) of the pipe from Table A for Schedule 40 steel pipe. For other pipe materials, contact the pipe manufacturer for wet weights.
3. Determine the spacing, S (ft) for the pipe supports. Maximum spacing is given in Tables 9.2.2.1 in NFPA 13. In general, for schedule 40 steel pipe up to and including 1¼" diameter, maximum sprinkler pipe hanger spacing is 12'0". For pipe diameters larger than 1¼", maximum sprinkler pipe hanger spacing is 15'0".
4. The load, P (lbs) that must be applied to the structure is calculated as follows:

$$P = (W \times S) + 250$$

5. The load, R (lbs) that the connection must be able to resist is calculated as follows:

$$R = [5 \times (W \times S)] + 250$$

TrusSteel Pipe Connection Details

Sprinkler pipes must be properly supported from the trusses. Table B shows TrusSteel Standard Details that are available to properly support sprinkler pipes.

Table B. TrusSteel Standard Detail for Sprinkler Pipe Connection to Trusses

Maximum Pipe Size (diameter) in	Connection Location and Description	TrusSteel Standard Detail
8	Bottom Chord (steel angles)	TS049
1 1/2	Top Chord (steel angles)	TS049A
8	Top Chord (steel angles)	TS049B
2	Bottom Chord (C- Stud trapeze)	TS049C
2	Bottom Chord (TSC trapeze)	TS049D
2	Top Chord (C-stud trapeze)	TS049E
2	Top Chord (TSC trapeze)	TS049F
5	Bottom Chord (Double C-Stud trapeze)	TS049G
5	Top Chord (Double C-Stud trapeze)	TS049H
8	Bottom Chord (Double C-Stud trapeze)	TS049I
6	TSC2.75 Top Chord (Double C-Stud trapeze)	TS049J
8	TSC4.00 Top Chord (Double C-Stud trapeze)	TS049K
4	Bottom Chord (Sammys XP-35)	TS049L

Responsibility

It is the responsibility of the Building Designer to review and accept any sprinkler pipe loads, and their connection methods, that are to be applied to the trusses. The Building Designer may specify an additional uniform dead load to be applied to the truss designs to cover the sprinkler pipe loading for the structure in lieu of point loads. In this case, the Building Designer must make it clear in the construction documents that the uniform dead load applied to the structure includes the sprinkler pipe load per section 9.2.1.3.1 of NFPA 13 as outlined above.

Referenced Documents

TrusSteel Standard Details:

TS049	TS049E	TS049J
TS049A	TS049F	TS049K
TS049B	TS049G	TS049L
TS049C	TS049H	
TS049D	TS049I	

Other Documents:

NFPA 13, Standard for the Installation of Sprinkler Systems, National Fire Protection Association (NFPA), 2010

Revisions

- 2/01/01 to add responsibility disclaimer.
- 1/10/02 to add section on pipe connections.
- 1/15/03 to update all standard details attached to this technical bulletin.
- 3/09/11 to revise entire bulletin referencing the most up to date codes, Standards, and Standard Details. Revised entire body of document and Tables A and B.
- 3/10/11 to fix minor grammatical error