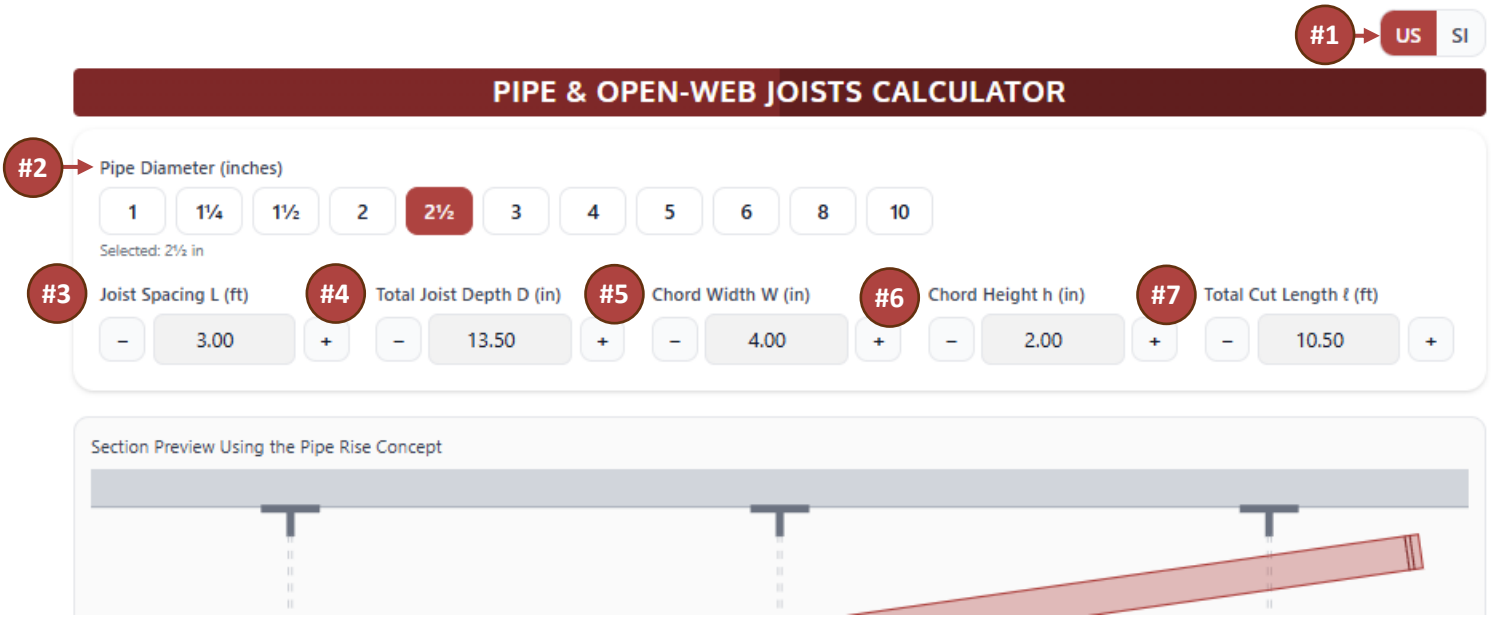
PIPE-IN-JOIST CALCULATOR

A USER'S GUIDE



DESCRIPTION

PURPOSE: The purpose of this tool is to calculate, during design, the maximum length of a pipe that can still slide up and into an open-web joist.

Larger diameter and longer-cut pipe are more difficult to slide up and into open-web joists without cutting a hole into the side of a building. This tool allows us to find the maximum cut-length for a pipe that will fit into an open-web joist, showing three difficult calculation methods to do so.

#1 UNIT TOGGLE: Switch between US customary and SI metric units. The tool computes internally in US units but converts all inputs, labels, and outputs dynamically. When toggled, diameter labels update automatically.

#2 PIPE DIAMETER: Select the nominal pipe size to analyze.

Each represents a common pipe diameter (in inches or millimeters). The selected size determines the overall pipe depth and directly affects all three max length calculations.

The larger the pipe diameter, the more difficult it is to fit within an open-web joist.

#3 JOIST SPACING (L): Distance between adjacent open-web joists, measured in feet (or meters) on-center.

This defines the clear horizontal span the pipe must pass through. Increasing spacing generally increases the maximum permissible length.

#4 TOTAL JOIST DEPTH (D): The overall vertical depth of the open-web joist, from the top of the top chord to the bottom of the bottom chord, in inches (or millimeters).

This depth defines the total "rise" available for the pipe to pass between chords.

#5 CHORD WIDTH (W): The outside-to-outside total horizontal width of the joist chords in inches (or millimeters). This is commonly in the 3-6 inch range (75-150 mm).

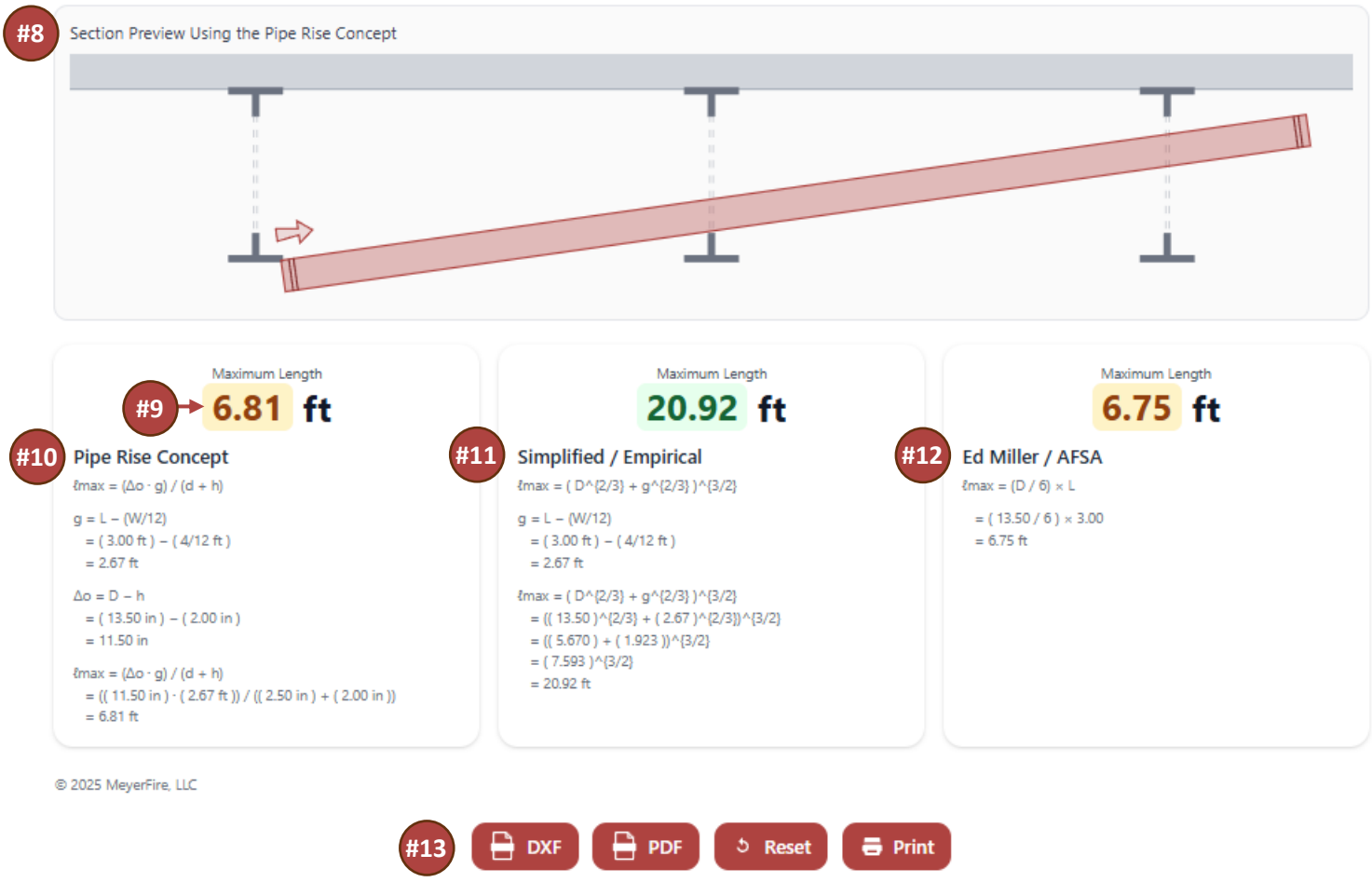
This value is subtracted from the joist spacing (L) value to determine the clear distance between joists.

#6 CHORD HEIGHT (h): The vertical thickness of a single chord, in inches (or millimeters). This is commonly in the 2-6 inch range (50-150 mm), and is taller for heavier members and shorter for lighter members.

#7 TOTAL CUT LENGTH (ℓ): The actual pipe length to be installed through the joists, measured along the pipe centerline (ft or m). It's the actual (cut) length of the pipe.

Using this selector is optional; it's used to compare the three methods for computing the maximum length.

If your proposed ℓ is longer than the computed ℓ_{max}, the pipe cannot pass cleanly through.



#8 SECTION PREVIEW: A live cross-section drawing of the joist and pipe geometry. Top and bottom chords are shaded gray; the pipe appears red. Dashed lines represent joist webs, and small red ticks mark pipe grooves. The red arrow shows pipe orientation. As you adjust inputs, the geometry scales automatically to maintain correct proportions.

#9 RESULT MAXIMUM LENGTH VALUE: Displays the computed ℓ_{max} for each method in feet (or meters). The colored chip indicates compliance:

- **Green** → Your entered $\ell \leq \ell_{max}$ (acceptable)
- **Amber** → Your entered $\ell > \ell_{max}$ (exceeds limit)

#10 PIPE RISE CONCEPT: A method derived from the geometric relationship that calculates the maximum length a pipe can be to split into a horizontal and vertical opening for a directly vertical pipe. The basis is a conservative, geometrically grounded approach as is the MeyerFire preferred method.

In the field, there are cross-members of the open-web joist (the 'V' and the 'A' shapes) to contend with, but the pipe can also be skewed slightly horizontally to account for these.

This method incorporates the dimensions and spacing of the joist (opening size, chord members, and spacing) as well as the pipe diameter.

#11 SIMPLIFIED / EMPIRICAL METHOD: This method accounts for the gap (g) between joists and the pipe diameter using another empirical method. This has appeared in dated handbook references but isn't sourced; we are not sure of the origin, but the results suggest it's far less conservative than the Pipe Rise or Ed Miller methods.

#12 ED MILLER / AFSA METHOD: This is an easy-and-quick method created by Ed Miller from AFSA in 1992. It's regarded as quick and conservative because it only depends on the pipe diameter and joist spacing. Anecdotes suggest the idea is even older in sprinkler handbooks and legacy shop resources. Use it as a conservative upper bound when you need a fast yes/no.

#13 EXPORT OPTIONS:

DXF: Downloadable, scaled vector CAD drawing with AIA-style layers (deck, joists, webs as hidden, pipe, grooves, arrow).

PDF: Vector print view—use "Save as PDF."

Reset / Print: Utility actions.