THRUST FORCES – RESTRAINT LENGTH CALCULATOR

Thrust forces are developed in a pressure pipe when there is a change in flow. Therefore, thrust restraint may be required when the pipeline:

- Changes direction at a fitting (tee, bend, elbow, or crossing)
- Changes size at a reducer
- Stops at a dead end
- Develops thrust at a closed valve or hydrant

Additional information on thrust restraint is provided in Uni-Bell's *Handbook of PVC Pipe*, section 11.5.3.5. The section provides tables, figures, and a design example.
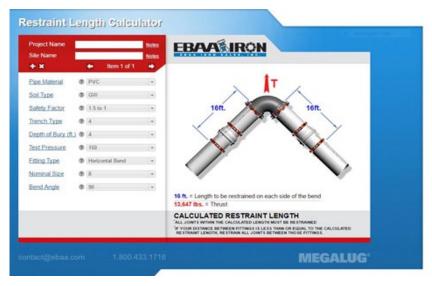
AN EASIER WAY – EBAA IRON'S ON-LINE CALCULATOR

Thrust restraint for PVC pipe can be easily and efficiently accomplished with mechanical-joint restraint devices designed specifically for use on PVC. Since these devices transfer the thrust force back into the pipe for dissipation along its length, it is necessary to calculate how far back on either side of a fitting all joints must also be restrained. This calculation can be cumbersome, with several variables interacting at the same time.

EBAA Iron has developed the "Restraint Length Calculator" program to easily perform these calculations. The design engineer enters the job specific variables to include:

- Pipe material
- Soil type
- Safety factor
- Trench type
- Depth of bury
- Maximum test pressure
- Type of fitting or appurtenance
- Pipe size

Example output page from EBAA Iron's "Restraint Length Calculator"

The calculator provides the length of pipe that must be restrained to control pipe movement. The result is a length of restrained joints that mobilizes the surrounding soil to provide a stable pipe/soil structural system.

Additional information on thrust-restraint topics as well as the calculator program itself are available on the EBAA website www.ebaa.com. (To go directly to the restraint length calculator, the address is www.ebaa.com/calculator.)

References: EBAA Iron website: www.ebaa.com; *Handbook of PVC Pipe,* Uni-Bell (2013)