Chaper 4 Pipe Support Design

(last update 20 March 2002 by Piya K.)

Stress analysis work is the Piping Engineer 's role to solve thermal, dead weight and vibration problems in piping and equipment.

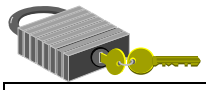
Key ♥:	1. Thermal 2. Dead Weight 3. Vibration

Now we are going to learn about how to solve the problem. One thing important to understand for Piping Engineer is Pipe Support Design.

Introduction to Pipe Support Design

Definition

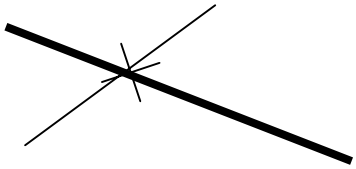
1) **Anchors** is a mechanical connection (welded and/or bolted) between a pipe (or Exchanger,etc.) and a structure.



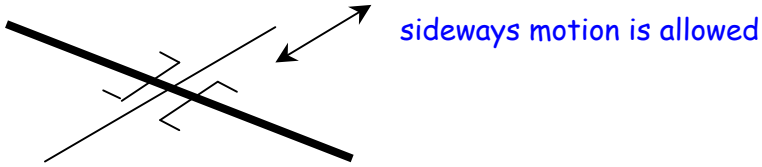
Key : a structure or Pipe Support must be strong enough so that it cannot bend excessively under large forces.

Example : Let's Trainee See TTCL Pipe Support Standards

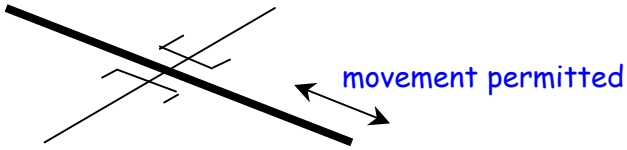
2) **Full Anchors** will not allow the pipe to move or twist in any direction at the point it is anchored.



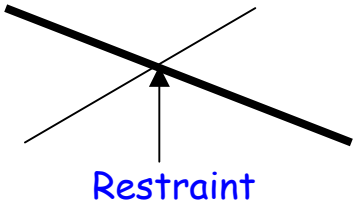
3) **Directional Anchors** stops movement parallel to the center line of the pipe, but permits sideways pipe motion



4) **Guide** stop sideways movement of a pipe , but allows movement parallel to the pipe's centerline



5) **Rest Supports** prevents downward motion of a pipe. If the weight of the pipe acting down on the support is great enouh, upward motion of the pipe may not be possible.



Equipment

Most equipment is anchored to a foundation. Therefore equipment nozzles are also anchors. Generally they are full anchors. The anchors are mechanically rigid but may have additional expansion when the equipment is hot. Even if the equipment. Is not bolted down, the weight may be great enough to make the equipment an anchor point.

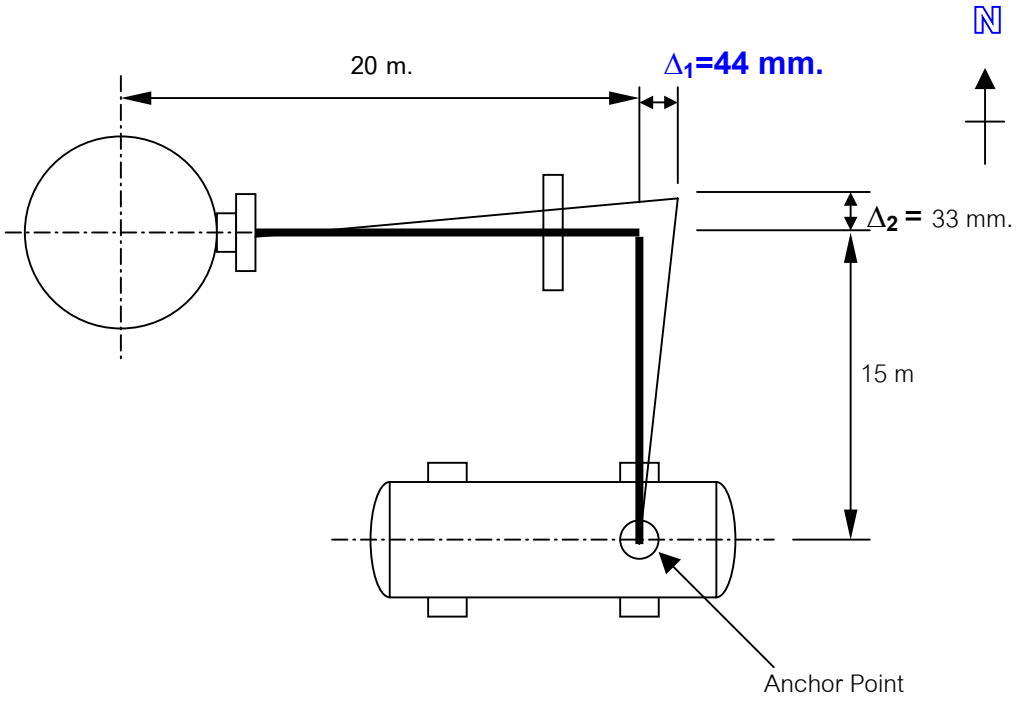
I would say the greatest thing for you as in box below :

♥ ***Greatest Thing*** *" The free thermal expansion does not depend on the piping arrangement but depends only on the relative locations of the anchor points."*

I show you how it 's come. Please see the example below.

Example 1 Find the thermal expansion between the tower and the drum.

pipe carbon steel A106 Gr.B at 200 °C (coefficient of expansion = 2.2 mm/m.)



Answer

In the E-W Direction the expansion to be absorbed is :

Δ_1 = α L

= 2.20 x 20

= 44 mm

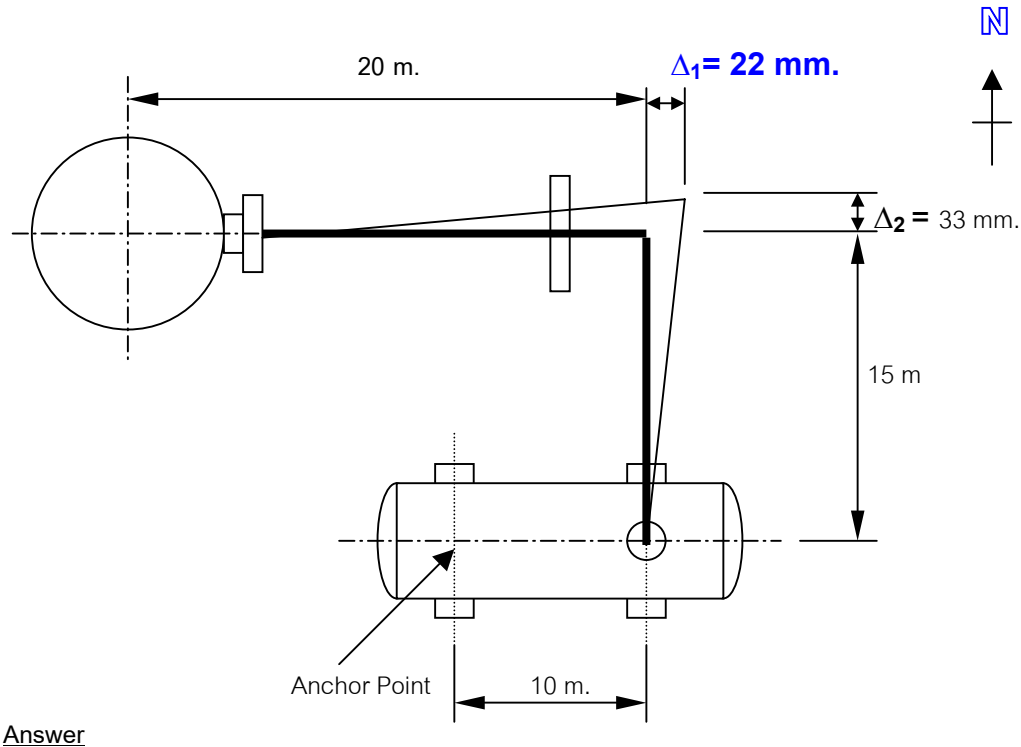
In the N-S Direction the expansion to be absorbed is :

Δ_2 = α L

= 2.20 x 15

= 33 mm

Example 2 Same as before , except change the anchor end of the drum.



Answer

In the E-W Direction the expansion to be absorbed is :

$\Delta 1$ = α L

= 2.20 x 10

= 22 mm

In the N-S Direction the expansion to be absorbed is :

$\Delta 2$ = α L

= 2.20 x 15

= 33 mm

The N-S expansion of example1 have not been changed from the example 2. The E-W expansion was reduced considerably by just shifting the anchor end of the drum.

" Do you see the free thermal expansion does not depend on the piping arrangement."

Pipe Support Design – Rest Support