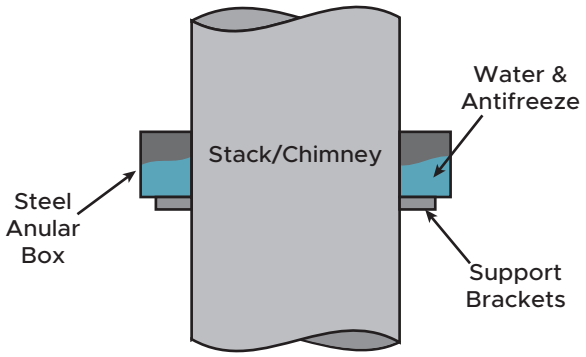
Tuned Liquid Damper

For Stacks

MECA Enterprises Inc.

How does it work?

Tuned Liquid Damper (TLD) consists of an annular sealed chamber that contains a liquid, which is typically a combination of water and ethylene glycol (anti-freeze) to prevent freezing. The chamber consists if internal baffles to control sloshing of the liquid, which will provide damping to the structure.



TLD used as Platform

Advantages:

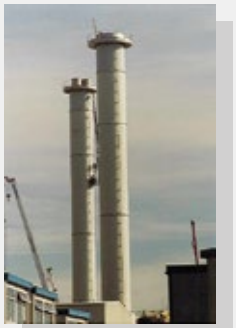
1. Can take different **shapes** and sizes
2. Accommodates **Ladders, Platforms and Piping**
3. Cost effective: Buy design only, and build it **locally**
4. No **moving** parts

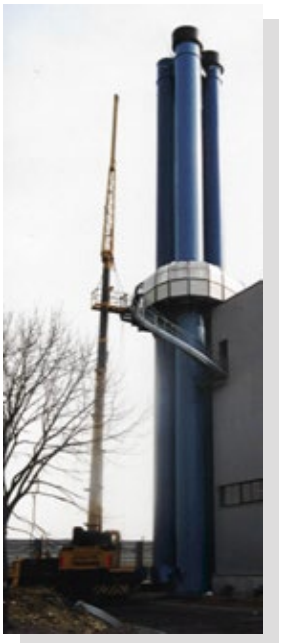
Disadvantages:

1. Special precautions when stack **hot**
2. **Radiation shields** needed on Flare Stacks
3. Can't visually see **lost liquid** from grade
4. **Corrosion** concern due to presence of liquid, although since it's a **sealed** chamber this isn't usually a problem.

TLD used as Platform

In some special circumstances a TLD can be designed to also serve as a **platform**. This can facilitate access to the TLD to perform **inspection** also. In other situations, the damper can be placed directly **below** the platform, and the fill nozzle extended up to be accessible from the platform.





Gangway fo
Multiple Stacks

Guyed Tower

Damper

Damper under Platform

Will the water freeze?

A mixture of water combined with **ethylene glycol (antifreeze)** is recommended with each design. Combining water with antifreeze will allow the damper to work well in very **low** ambient temperatures.

Is the Damper shipped full of fluid?

Typically, the damper is shipped empty. The customer is then responsible for **filling the damper** with the recommended mixture of water and antifreeze.

How will I know if the Damper is leaking fluid?

During fabrication a **pressure test** is performed to ensure that the damper will hold product under atmospheric conditions. To date, Meca is unaware of any TLD leaking.

Will the fluid cause corrosion?

Some **corrosion** will be experienced, as is expected with all carbon steel. However, only **modest** corrosion rates have been witnessed on damper installations. The chamber is sealed much as a radiator on a car, and so without air circulating the corrosion is minimal. The only required maintenance on a damper is to check fluid level every **3 to 5 years**.

What damping ratio should I expect with a damper?

The exact damping is **dependent** upon the design of the stack and TLD, and so it must be **estimated** on each project; however, generally you can conservatively achieve a structural damping of **0.006** and often much higher.

What if I have a hot stack?

In the case where the stack shell is hot, > **180 °F [80 °C]**, some special precautions must be taken. The damper will be designed so that there is a **gap** between the shell and the damper, to essentially break the thermal bridge. We do not want the damper to exceed the **boiling point** of water, which would cause the damper to experience internal pressure. By breaking the **thermal bridges**, we ensure that the temperature will stay below the boiling point.

Can a damper decrease my along wind loads?

Most along-wind codes account for structural damping in their wind load calculations, so as **damping increases**, the calculated wind loads generally **decrease**. Some codes, such as the **Euro** standard, appear to be more sensitive to changes in damping. By contrast, the **American** code provides only **minimal load reduction** as damping increases, so the resulting improvement is usually not significant.