

Rohr Damper Selection Guide

Description

This document was generated to provide guidance on how to select Rohr dampers for a particular application. The methods shown below are applicable for any mechanical system although the details are using a piping run for the example.

Reviewing The Application

ZetaQuest Rohr dampers are an excellent choice to add vibration damping to a piping run. The need for the dampers is usually identified by excessive vibration on the piping. To confirm this, it is ideal to compare the vibration near the middle of the span (or at least at locations away from supports) to the vibration near the supports.

If the pipe run vibration is being amplified due to mechanical resonance (presence of a natural frequency close to the exciting frequency), the vibration away from the supports will be much higher than the vibration at the supports even though the vibration source is commonly transmitted vibration through the supports or from associated equipment.

In some cases, elevated vibration can be caused by forced response on the pipe due to high internal forces such as from pressure pulsations. When this occurs, vibration amplification from resonance may not be a contributor and the vibration could be all forced response. If this is the case, dampers will provide little value and the appropriate action is to reduce forces instead of addressing piping vibration response.

Evaluating the Damper Addition

Ideally, there would be confirmation that a natural frequency on the piping system is near or at the response frequency. If the actual natural frequency is not known and there is no convenient method to measure or calculate it, you can add the appropriate damper(s) as detailed below. If the vibration is dramatically reduced with the addition of damper(s), then you can conclude it was resonant. If not, then it is likely that the vibration is caused by forced response and not resonance.

The damper application can be validated either by field test and basic hand calculations or using some numerical modeling tool (ANSYS, Autopipe, Cesar, etc.). The method below describes how to proceed with either method.



Empirical Damper Selection and Validation

The need for the damper can be confirmed using a field test with one of two methods: bump test method or vibration response method.

Bump Test Method (preferred)

Impact test the piping section to confirm the measured natural frequency, F_m . Compare the measured natural frequency to the maximum vibration velocity frequency observed when running (and vibrating). If the two are close, it is confirmed resonance.

Either estimate or calculate the modal mass as detailed in the modal mass section below and select dampers with about 15% of the modal mass (you can combine multiple dampers) and with the target frequency closest to the measured natural frequency.

Maximum Vibration Method (2nd choice)

This method uses to maximum vibration frequency and assumes that is the natural frequency.

Either estimate or calculate the modal mass as detailed in the modal mass section below and select dampers with about 15% of the modal mass (you can combine multiple dampers) and with the target frequency closest to the measured natural frequency.

Determining Modal Mass

The modal mass is determined either using a simplified calculation method or by using a numerical modeling tool. The simplified method is often adequate for damper selection with the vibration response benefits can be validated by vibration measurements to determine if additional damper mass is required.