In HVAC systems it is important to identify the path of sound and noise transmissions. Sound / noise created by a source gets transmitted through one or more paths. By evaluating the various sources of noise generation, adequate noise control measures need to be incorporated to reduce unwanted noise.

In order to meet this regulation and background noise levels criteria stated in *Regulation 403.01: Acoustic Control*, the silencers or sound attenuators are required to reduce noise transmitted from source (such as fans, pulley etc.) to receiver.

There are three types of HVAC duct silencers available commercially, which includes dissipative type, fibre-free reactive type and active type. The most common type used is static dissipative type (fig. 403.02(1)) which has sound absorbing material such as fiberglass encased in perforated liners. This static dissipative type silencer is rated in terms of insertion loss and air pressure drop which is critical in designing any ducting system.

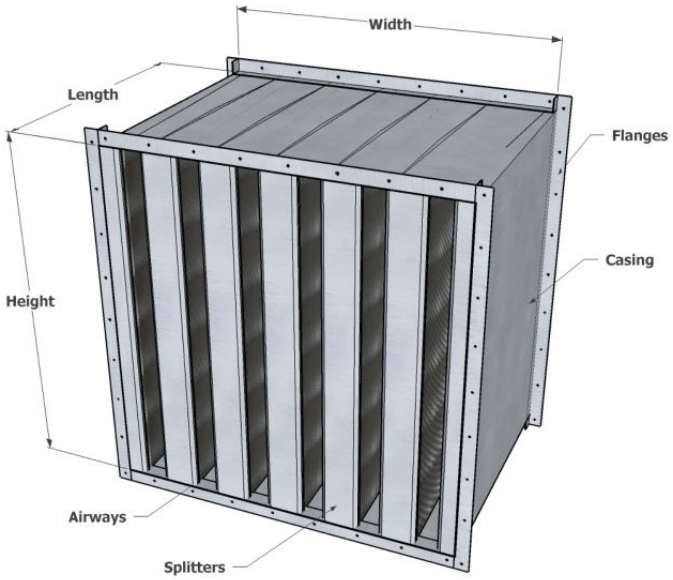

Fig 403.02 (1): Silencer / Sound Attenuator

The location of silencer in any ducting is very important which can affect its effectiveness in reducing noise and the installation of silencer close to bends can cause increases in pressure drop and self-generated noise. The ideal location of silencers is the location where the duct leaves the plant room.

The silencer selected shall be tested according to ASTM standard E477 or ISO standard 7235 which defines its acoustic and aerodynamic performance in terms of dynamic insertion loss, self-generated noise and pressure drop. Some of the other measures to mitigate noise from HVAC systems include addition of sound enclosures around equipment, increasing duct length to attenuate noise and addition of acoustic liner in ductworks.

Water flow noise from chilled water piping networks is also a significant contributor to the background noise level of any living space, hence this regulation intends the designer to consider noise control measures to reduce its transmission. This can be achieved by considering foam rubber wrapping or resilient clamps and hangers to isolate chilled water piping from the building structure. Also, flexible pipe connectors have to be installed to attenuate noise and vibration transmission along the piping from equipment such as pumps.

Additional guidance on acoustic design techniques are provided in ASHRAE Handbook - HVAC Applications, Chapter 48 - Noise and Vibration control and ASHRAE Handbook - Fundamentals, Chapter 8 - Sound and Vibration.