

Noise Annoyance Prevention Design of Pump Room and Ventilation System

Pump rooms and ventilation systems in a building if not properly designed may cause noise annoyance to residents of the same or a nearby building. This practice note sets out guidelines regarding design measures to be adopted and installed to prevent possible noise problem.

Design of Pump Room

2. Preference should be given to separating pump rooms from residential flats by using non-sensitive areas like stairwells or switch rooms as buffer. In addition, both air-borne and structure-borne noise transmission should be carefully considered in the design. The following guidelines are announced for general reference:-

(a) **Minimizing air-borne noise**

- Use quieter pump and/or motor models. If the total sound power level of the pumps installed exceeds 100 dB(A), a higher insulating capacity than that as indicated below should be considered.
- Build walls and ceilings/floors adjoining noise sensitive receivers (such as residential flats and school premises) with a minimum insulating capacity of Sound Transmission Class 50.
- Locate away from sensitive areas or acoustically treat with acoustic louvre or silencer wall openings (such as air grilles or ventilation fan outlets).
- Install doors facing sensitive areas with a minimum insulating capacity of Sound Transmission Class 25.

(b) **Minimizing structure-borne noise**

- Isolate pumps and motors with anti-vibration mount according to the load to be carried, and with flexible joint (refer to Appendix A).

/• Isolate

- Isolate pipes and hangers with spring or rubber isolator (refer to Appendix A). Pipes passing through building walls should be provided with rubber sleeve and gasket.
- Select appropriate pipe size to avoid noise due to excessive water flow velocity, especially through the piping components, eg valves.

Design of Ventilation System

3. It is good design practice to achieve a noise level of 5dB(A) below the relevant acceptable noise levels promulgated in paragraph 2 of the "Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites" issued under the Noise Control Ordinance. In the design of ventilation system, building professionals are advised to consider the following:-

(a) **For all systems**

- Select appropriate capacity and quieter models (these are usually more energy efficient).
- Isolate rotating or vibrating parts by providing anti-vibration mount according to the load to be carried, flexible connection, damping material and sound absorbing lagging (refer to Appendix B).

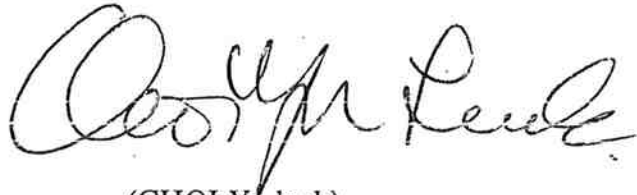
(b) **For systems located near noise sensitive receivers (such as residential premises and school)**

- Locate the noise sources away from noise sensitive receivers.
- Ascertain whether key noise sources (such as large ventilation fans or air cooled chillers) are likely to cause annoyance.
- Incorporate, where necessary, noise abatement measures such as acoustic panels, enclosures, silencers or louvres for those noise sources facing noise sensitive receivers.

Reference

4. Technical guidance could be found in the booklet *A Practical Guide for the Reduction of Industrial Noise* or other noise control pamphlets produced by the Environmental Protection Department.

5. Reference may also be made to the Noise Control Ordinance and the Technical Memorandum issued under the Ordinance which stipulate the maximum allowable noise levels generated from pump rooms and ventilation systems (and those associated with air conditioning systems).

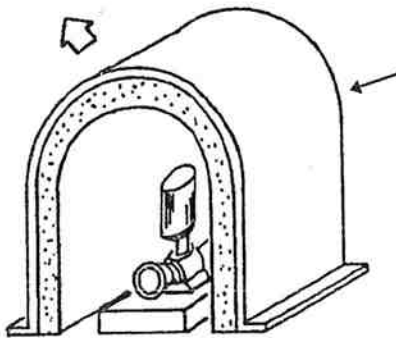


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Building Authority

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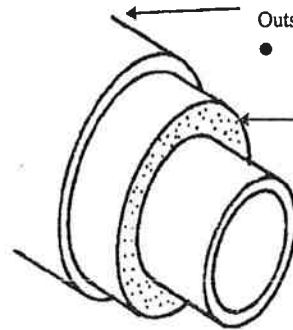
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Partial enclosure

- use minimum 1mm thick G.I. sheet for partial enclosure
- use minimum 50mm thick fibre glass with porous protective facing as sound absorbing internal lining of the partial enclosure



Outside cladding

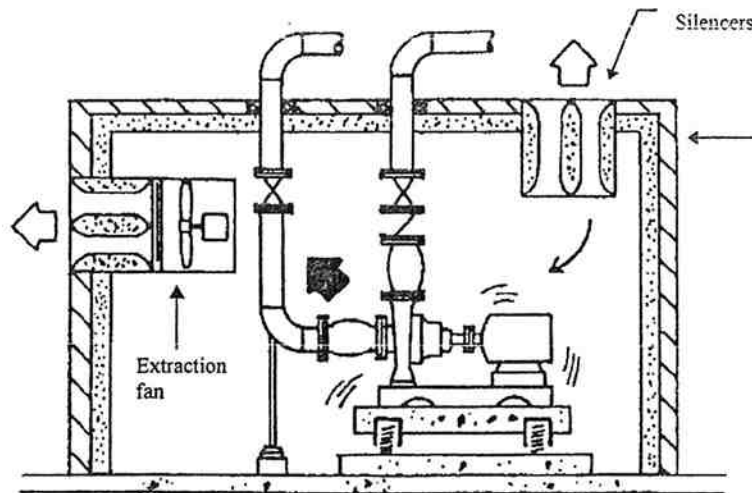
- use minimum 13mm thick plastering or loaded vinyl fabric

Sound absorbing material

- use minimum 50mm thick fibre glass blanket

Partial enclosure for water pump

Application of composite lagging to reduce noise from ringing pipe

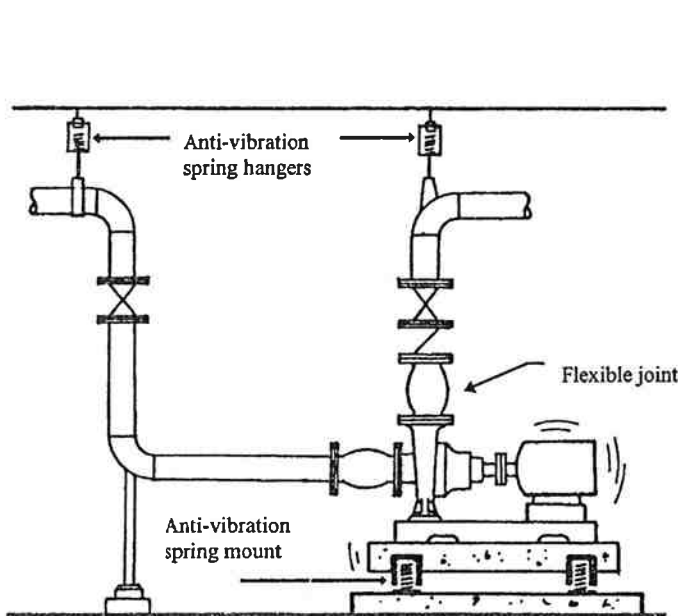


Silencers

Acoustic enclosure

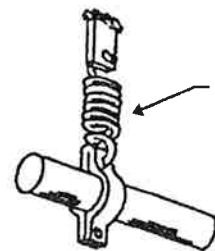
- use minimum 10mm plywood or 1mm thick G.I. sheet for enclosure
- use minimum 50mm thick fibre glass with porous protective facing as sound absorbing internal lining of the enclosure

Acoustic enclosure for water pump



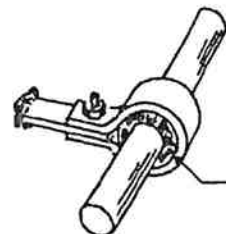
Vibration isolation for pumping system

Ceiling mounting



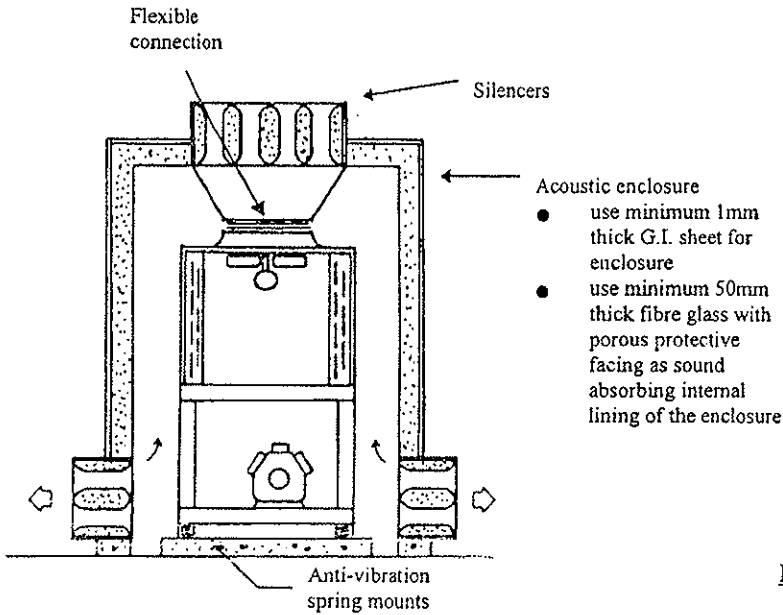
Spring isolator

Wall mounting

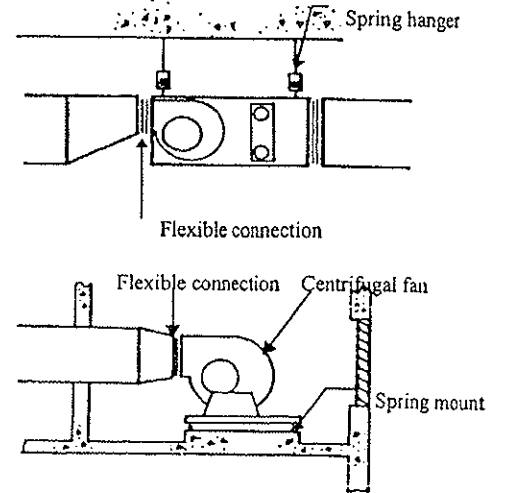


Rubber isolator

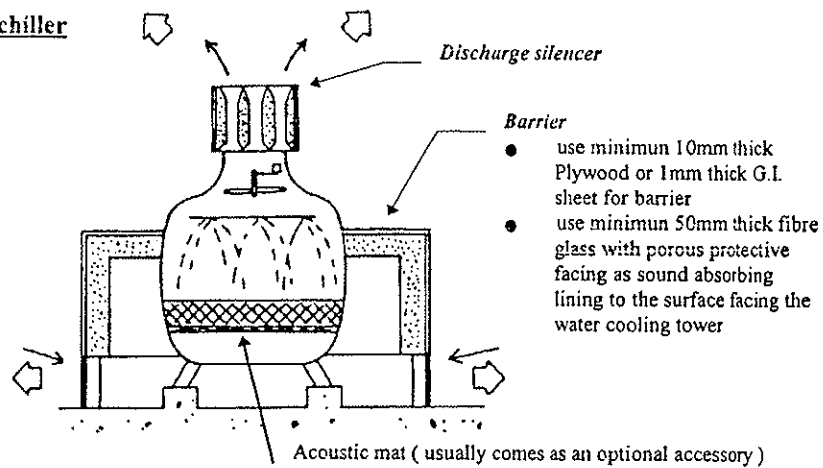
Anti-vibration mounts for pipes



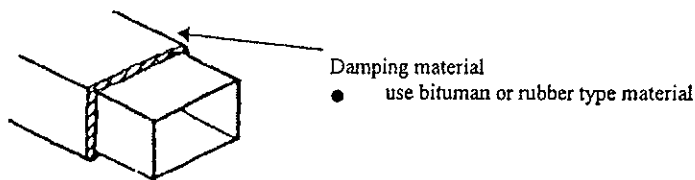
Acoustic enclosure and silencer package for air-cooled condensing unit/chiller



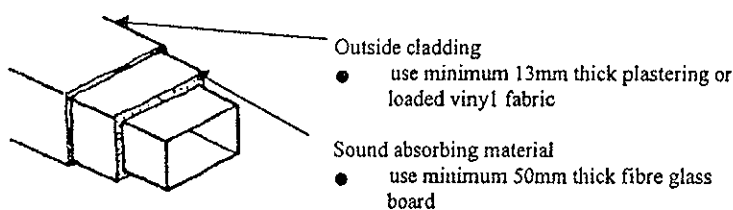
Examples of Vibration isolation for ventilating system



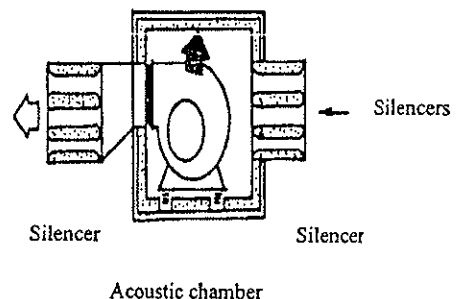
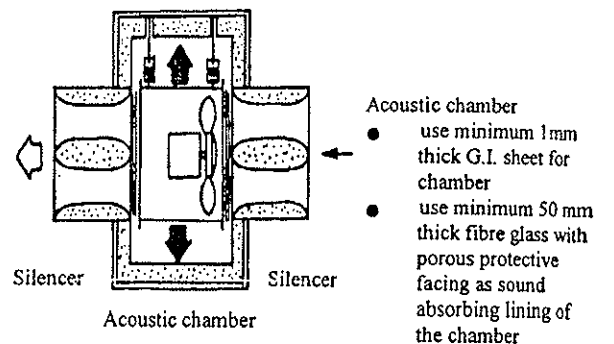
silencer and barrier for a water cooling tower



Application of damping compound to reduce noise from vibrating ductwork



Application of composite lagging to reduce noise breakout from ductwork



Application of acoustic chamber and silencer for fans