

1. GENERAL

1.1 Scope

- .1 Supply all labour, materials and equipment required and necessary to isolate and restrain the equipment as indicated on the Drawings and specified herein and guarantee the function of the materials and equipment supplied.
- .2 Install 300 mm (12 in) long flex connection on all duct work connected to isolated equipment.

1.2 Qualifications

- .1 All vibration isolators and bases shall be supplied by an acceptable supplier with the exception of isolators, which are factory installed and are standard equipment with the machinery.
- .2 Provide shop and placement drawings for all vibration isolation elements for review, before materials are ordered. The drawings shall bear the stamp and signature of the responsible supplier's technical representative.
- .3 The work shall be carried out in accordance with the specification and, where applicable, in accordance with the manufacturer's instructions and only by workmen experienced in this type of work.

1.3 Samples

- .1 Samples of materials required to complete the work of this section shall be submitted to the Contract Administrator for review, prior to submission of the shop drawings.

2. PRODUCTS

2.1 Isolators

- .1 Spring isolators located out of doors or in humid areas shall have Rustoleum painted housing and neoprene coated springs, unless otherwise indicated on drawings.
- .2 Isolation mounts for equipment with operating weights substantially different from the installed weights, such as chillers or boilers, shall have adjustable limit stops.

2.2 Open Spring Isolators

- .1 Springs shall be "ISO-Stiff" having equal stiffness in the horizontal and vertical planes with a working deflection between 0.3 and 0.6 of solid deflection.
- .2 Spring mounts shall be complete with levelling devices, minimum 6 mm (1/4 in) thick neoprene sound pads and zinc chromate plated hardware.

- .3 Sound pads shall be sized for a minimum deflection of 1.2 mm (1/16 in) and shall meet the requirements for neoprene isolators.

2.3 Closed Spring Isolators

- .1 Compression springs shall be used both for hangers and floor mount isolators.
- .2 Springs shall be stable under operating conditions.
- .3 Housings shall incorporate a minimum 6 mm (1/4 in) thick sound pad sized for a minimum static deflection of 1.2 mm (1/16 in) meeting the requirements for neoprene isolators.
- .4 Floor mount units shall incorporate neoprene side stabilisers with a minimum 6 mm (1/4 in) clearance.

2.4 Neoprene Isolators

- .1 All neoprene isolators shall be tested to latest ASTM specifications.
- .2 Where a ribbed pad is used, the height of the ribs shall not exceed 0.7 times the width of the rib. A steel layer shall be used to distribute the load in a multi-layered unit.
- .3 Neoprene pads or elements shall be selected at the manufacturer's optimum recommended loading and shall not be loaded beyond the limit specified in the neoprene manufacturer's literature.

2.5 Spring Hangers

- .1 Hangers capable of a 10° misalignment shall be provided unless otherwise specified.

3. EXECUTION

3.1 Application

- .1 Provide vibration isolator for mechanical motor driven equipment throughout, unless specifically noted otherwise.
- .2 Set steel bases for 25 mm (1 in) clearance between housekeeping pad and base. Set concrete inertia bases for 50 mm (2 in) clearance. Adjust equipment level.
- .3 Deflections 12 mm (1/2 in) and over shall use steel spring isolators.
- .4 Deflections 5 mm (0.2 in) and under shall use neoprene isolators.
- .5 Horizontal limit springs shall be provided on fans in excess of 1.5 kPa (6 in wg) static pressure except vertical discharge fans and on hanger supported, horizontally mounted axial fans where thrust due to static pressure exceeds 300 N (68 lbs).

VIBRATION ISOLATION

- .6 All equipment mounted on vibration isolators shall have a minimum clearance of 50 mm (2 in) to other structures, piping equipment, etc. All isolators shall be adjusted to make equipment level.
- .7 Prior to making piping connections to equipment with operating weights substantially different from installed weights, the equipment shall be blocked up with temporary shims to the final heights. When full load is applied, the isolators shall be adjusted to take up the load just enough to allow shim removal.
- .8 Adjustable, horizontal stabilisers on close spring isolators shall be adjusted so that the side stabilisers are clear under normal operating conditions.
- .9 All piping connections to isolated equipment shall be supported resiliently for the following distances or to the nearest flexible pipe connector.

Pipe Size	Distance, m (ft)
15 - 40 mm (1/2 in - 1-1/2 in)	3.0 (10)
50 - 65 mm (2 in - 2 1/2 in)	4.5 (15)
75 - 100 mm (3 in - 4 in)	7.0 (25)
125 - 200 mm (5 in - 8 in)	9.0 (30)
225 - 275 mm (9 in - 11 in)	13.5 (45)
300 - 350 mm (12 in - 14 in)	15.0 (50)

The three closest hangers to the vibration source shall be selected for the lesser of a 25 mm (1 in) static deflection or the static deflection of the isolated equipment. The remaining isolators shall be selected for the lesser of the 25 mm (1 in) static deflection or 1/2 the static deflection of the isolated equipment.

- .10 Spring hangers shall be installed without binding.
- .11 Adjust isolators as required and ensure springs are not compressed.
- .12 Provide neoprene side snubbers or retaining springs where side torque or thrust is developed.
- .13 Where movement limiting restraints are provided, they shall be set in a position with minimum 6 mm (1/4 in) air gap. Restraints, isolator equipment and attachment points shall be designed to withstand the impact of the isolated equipment subjected to an acceleration not exceeding 3 g without permanent distortion or damage.
- .14 Wiring connections to isolated equipment shall be flexible.

3.2 Performance

- .1 Install isolators of type and deflection as indicated on the following table.

The required static deflection of isolators for equipment exceeding 0.35 kW (1/2 Hp) is indicated below. Spring isolators shall be "open spring". Closed spring isolators shall only be used where specified.

Machine Speed r/min	Basement		Upper Floor	
	Under 15 kW (20 Hp)	Over 15 kW (20 Hp)	Normal	Critical
Under 400	Special*	Special*	Special*	Special*
400 - 600	25 mm (1 in)	50 mm (2 in)	90 mm (3 1/2 in)	Special*
600 - 800	12 mm (1/2 in)	25 mm (1 in)	50 mm (2 in)	90 mm (3 1/2 in)
800 - 1100	5 mm (3/16 in)	12 mm (1/2 in)	25 mm (1 in)	50 mm (2 in)
1100 - 1500	3 mm (1/8 in)	4 mm (5/32 in)	5 mm (3/16 in)	12 mm (1/2 in)

* "Special" indicates as directed by the acoustical consultant.

END OF SECTION