GENERAL

1.1 RELATED WORK

.1 The General Conditions and General Specifications form an integral part of this specification and must be read in conjunction herewith. Read also and be fully cognizant of all Mechanical Sections.

1.2 SCOPE OF WORK

.1 Provide all vibration isolation and mechanical noise control and measures to prevent transmission of objectionable noise and vibration to the building structure.

.2 Provide all necessary drawings, including isolator location, inertia and steel base drawings for the purpose of installation of sound and vibration control products.

.3 Supervise the work of the various sub-contractors pertaining to this Division. This includes the supervision of the installation of equipment mentioned in this Division. Submit written report to the Contract Administrator upon completion of supervision.

.4 The installation of sound isolators, vibration spring isolators, and concrete inertia bases shall be the responsibility of the mechanical contractor.

.5 The housekeeping pads shown on drawings and called for in this Division shall be provided by the mechanical contractor.

.6 All concrete to be supplied by the mechanical contractor.

MATERIALS

2.1 MANUFACTURER

.1 The work of this Division shall be carried out by a company that is engaged in the design, development and manufacture of vibration isolation and silencer products referred to hereinafter as the "manufacturer".

.2 The manufacturer to ensure that vibration in the structure induced by mechanical systems does not result in any sound level in excess to those defined in the latest edition of ASHRAE Fundamentals. The sound level in any part of the building not to exceed in any Octave Band the Noise Criteria as described in the guide mentioned above.

2.2 VIBRATION ISOLATION MANUFACUTERS:

.1 Amber-Booth Co./VMC Group

.2 Airmaster

.3 Vibro-Acoustics

2.3 PIPE ISOLATION MANUFACUTERS:

.1 Amber-Booth Co./VMC Group

.2 Airmaster

.3 Vibro-Acoustics

2.4 ISOLATION GUIDELINE TABLE

.1 Table 1 is an excerpt from ASHRAE APPLICATIONS Chapter 47, table 42.

.2 Where specification and table differ, select the more stringent requirement.

.3 Selection must be reviewed by Contract Administrator.

Table 1 – From ASHRAE Applications Handbook (Chapter 47, Table 42)

			Equipment Location											
						Floor Spans								
			Slab on Grade			Up to 6m (20')			6m to 9m (20' to 30')			9m to 12m (30' to 40')		
Equipment Type	*Horsepower and other*	*RPM*	*Base Type*	*Isolator Type*	*Min. Deflection mm (in)*	*Base Type*	*Isolator Type*	*Min. Deflection mm (in)*	*Base Type*	*Isolator Type*	*Min. Deflection mm (in)*	*Base Type*	*Isolator Type*	*Min. Deflection mm (in)*
Pumps														
End suction and split case	Up to 40	All	C	3	19 (0.75)	C	3	19 (0.75)	C	3	38 (1.50)	C	3	38 (1.50)
	50 to 125	All	C	3	19 (0.75)	C	3	19 (0.75)	C	3	38 (1.50)	C	3	63 (2.50)
	150 and up	All	C	3	19 (0.75)	C	3	38 (1.50)	C	3	63 (2.50)	C	3	89 (3.50)

Base Types:

A. No base, isolators attached directly to equipment

B. Integral Strucutal Steel or rails

C. Concrete inertia base

D. Curb-mounted base

Isolator Types:

1. Pad type

2. Pad type or Hanger type

3. Spring type or Hanger type

4. Spring type - Housed

2.5 EQUIPMENT VIBRATION ISOLATION

.1 Spring Isolator – Free Standing

.1 Spring isolators shall be free standing and laterally stable without any housing and complete with a moulded elastomeric cup or 6mm (¼") elastomeric acoustical friction pad between the bottom of the isolator and the support. Use for isolating equipment having a static deflection in excess of 25mm (1"), unless otherwise indicated.

.2 All mountings shall have levelling bolts that must be rigidly bolted to the equipment.

.3 Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated loads.

.4 Springs shall have a minimum additional travel to solid equal to 50% of the operating deflection.

.5 Springs shall support 200% of rated load, fully compressed, without deformation or failure.

.6 Hot dip galvanize all steel parts of isolators for outdoor use, with the exception of springs. Cadmium plate or neoprene coat springs.

.2 Spring Isolator – Housed Spring

.1 Housed spring mountings shall have a spring isolator within a rigid housing that includes vertical limit stops to prevent spring extension with weight removed. The housing shall serve as a blocking during erection. A minimum clearance of 6mm (¼") shall be maintained around restraining bolts and internal elastomeric deceleration bushings so as not to interfere with the spring action. Limit stops shall be out of contact during normal operation. Since housings may be bolted or welded in position there must be an internal isolation pad.

.2 All mountings shall have levelling bolts that must be rigidly bolted to the equipment.

.3 Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated loads.

.4 Springs shall have a minimum additional travel to solid equal to 50% of the operating deflection.

.5 Springs shall support 200% of rated load, fully compressed, without deformation or failure.

.6 Hot dip galvanize all steel parts of isolators for outdoor use, with the exception of springs. Cadmium plate or neoprene coat springs.

.3 Hanger Isolator – Spring Type

.1 Hangers shall consist of rigid steel frames containing a steel spring.

.2 Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated loads.

.3 Springs shall have a minimum additional travel to solid equal to 50% of the operating deflection.

.4 Springs shall support 200% of rated load, fully compressed, without deformation or failure.

.5 Hot dip galvanize all steel parts of isolators for outdoor use, with the exception of springs. Cadmium plate or neoprene coat springs.

.6 Hangers designed for insertion in a spilt rod for isolating equipment from the overhead construction.

.7 Where required, spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30° arc from

side to side before contacting the rod bushing and short circuiting the spring.

.8 Hanger locations requiring pre-compression for holding piping at fixed elevation shall be type pre-compressed or pre-positioning for all manufacturers.

.4 **Hanger Isolator – Elastomeric-in-Shear Type**

.1 Hangers shall consist of rigid steel frames containing minimum 32mm (1¼") thick elastomeric elements. The elastomeric element shall have resilient bushings projecting through the steel box.

.1 Single Elastomeric-In-Shear: Single element designed for static deflection of 1/4 inch.

.2 Double Elastomeric-In-Shear: Two single elements assembled in series, to provide for a static deflection of 1/2 inch.

.2 Steel retainer box encasing elastomeric mounting capable of supporting equipment up to four times the rated capacity of the element.

.3 Hangers designed for insertion in a spilt rod for isolating equipment from the overhead construction.

.5 **Hanger Isolator – Combination Spring/Elastomeric Type**

.1 Hangers shall consist of rigid steel frames containing minimum 32mm (1¼") thick elastomeric elements at the top and a steel spring. The elastomeric element shall have resilient bushings projecting through the steel box.

.2 Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated loads.

.3 Springs shall have a minimum additional travel to solid equal to 50% of the operating deflection.

.4 Springs shall support 200% of rated load, fully compressed, without deformation or failure.

.5 Hot dip galvanize all steel parts of isolators for outdoor use, with the exception of springs. Cadmium plate or neoprene coat springs.

.6 Hangers designed for insertion in a spilt rod for isolating equipment from the overhead construction.

.7 Where required, spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30° arc from side to side before contacting the rod bushing and short circuiting the spring.

.8 Hanger locations requiring pre-compression for holding piping at fixed elevation shall be type pre-compressed or pre-positioning for all manufacturers.

.6 **Pad Isolator – Elastomeric Standard Density Type**

.1 Provide elastomeric mountings, corrugated or waffle faced both sides, single or double layered, of size and thickness as specified for the particular equipment.

.2 Load distribution plates shall be used as required.

.7 **Pad Isolator – Elastomeric High Density Type**

.1 Provide laminated canvas duck and neoprene mountings, corrugated or waffle faced both sides, of size and thickness as specified for the particular equipment.

.2 Maximum loading 6.89 MPa (1000 psi), minimum thickness 12mm (½")

.3 Load distribution plates shall be used as required.

2.6 PIPING ISOLATION

.1 Piping to Isolated Equipment

.1 All piping connected to isolated equipment shall be supported with spring pipe hangers for at least the first three points of support. The first point of support shall have a static deflection of twice the deflection of the isolated equipment but not more than 50 mm (2"). The second and third support shall have a static deflection of 25 mm (1"). However, piping subject to space restrictions shall be isolated with flexible connectors as illustrated on the drawings. Care must be taken to ensure that there is no transmission of vibration to walls and floors.

.2 Flexible Connections

.1 Provide flexible stainless steel hoses to all equipment of stainless steel braid and carbon steel fittings construction. Sizes 75mm (3") and larger shall be flanged.

.2 Minimum Lengths of hose per below:

Connection Size		Length	
mm	*inches*	*mm*	*inches*
12	1/2	225	9
19	3/4	250	10
25	1	275	11
32	1 1/4	300	12
38	1 1/2	325	13
50	2	350	14
63	2 1/2	450	18
75	3	350	14
100	4	375	15
125	5	475	19
150	6	500	20
200	8	550	22
250	10	650	26
300	12	700	28
350	14	750	30
400	16	800	32

.3 Hoses shall be installed on the equipment side of the shut-off valves horizontally and parallel to the equipment shafts wherever possible.

.3 Piping Guides

.1 Pipe guides shall consist of a telescopic arrangement of two sizes of steel tubing separated by a minimum 12mm (½") thickness of elastomer.

.2 The height of the guides shall be present with a shear pin to allow vertical motion due to pipe expansion or contraction. Shear pin shall be removable and re-insertable to allow for selection of pipe movement.

.3 Guides shall be capable of ± 41mm (1 5/8") motion, or to meet location requirements.