# VIBRATION MANAGEMENT CORPORATION

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# FLOATING FLOORS

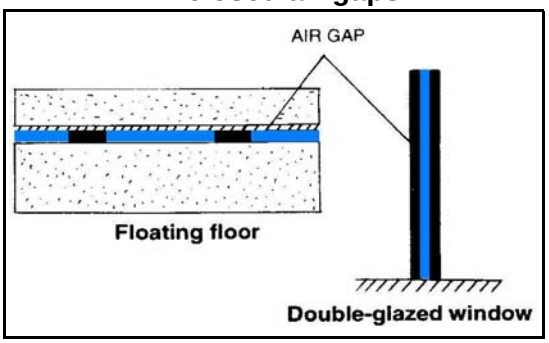
**VIMCO** floating floors provide a solution to the problem where the transmission loss of the standard structural floor is not sufficient to prevent noise from passing from mechanical rooms to noise-sensitive areas above or below it. Floating floors primarily control airborne sound transmissions; they are not intended to be used in place of vibration isolators and/or inertia bases.

**VIMCO** floating floors ensure a transmission loss far greater than that predicted by the Mass law which predicts a maximum STC rating increase of 6 by doubling the mass (height) of the original structural slab. A 150mm concrete structural floor has an STC of only 54. Doubling the mass/height of the concrete to 300mm would *theoretically* still only yield an STC of 60. Floating floors offer a dramatic improvement with tests having shown transmission loss ratings exceeding STC 75 !!!

**VIMCO** floating floors perform acoustically on the same principle as a double-glazed window : The separation of the masses, with an air gap, gives a much greater transmission loss than if the two masses are combined into a continuous floor. The "*enclosed air cavity*" is the primary isolator.

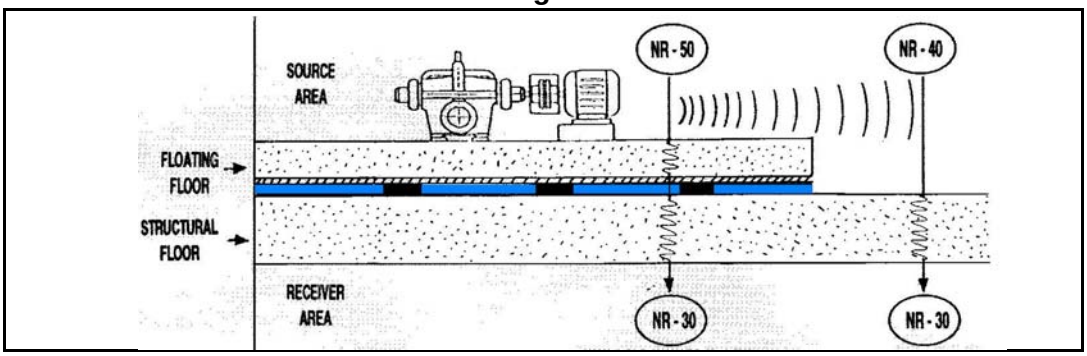
A double-glazed window can be held in place without compromising the air gap, but in a floating floor, mounts are required to support the floating floor. Since each mount is a potential "*short circuit*" point for noise transmission, care should be taken in selecting the type of mount.

**Enclosed air gaps**




STC ratings of 75-80 obtained in test conditions, are possible, and can be approached in the field, if care is paid to the elimination of "*flanking*". Flanking paths represent all alternate routes through which sound from the source area can bypass the primary separating element (i.e. floating floor) and enter the receiving area. Common sound flanking paths include return air plenums, doors, and windows. The structural floor adjacent to the floating floor is also a possible flanking path, and this should be considered by the consulting engineer when designing the extent of the floating floor area. In most cases a 1000-1500mm extension of the floating floor area beyond the equipment footprint is required, to ensure required sound levels in the receiver area. This allows natural attenuation of the equipment noise to a level for which the transmission loss through the structural floor is sufficient.

**Direct and flanking noise attenuation**




**Local Representative :**

*Due to our policy of continual product development and improvement, all specifications are subject to change without prior notice. Please consult your local rep. for updates.*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## Design considerations

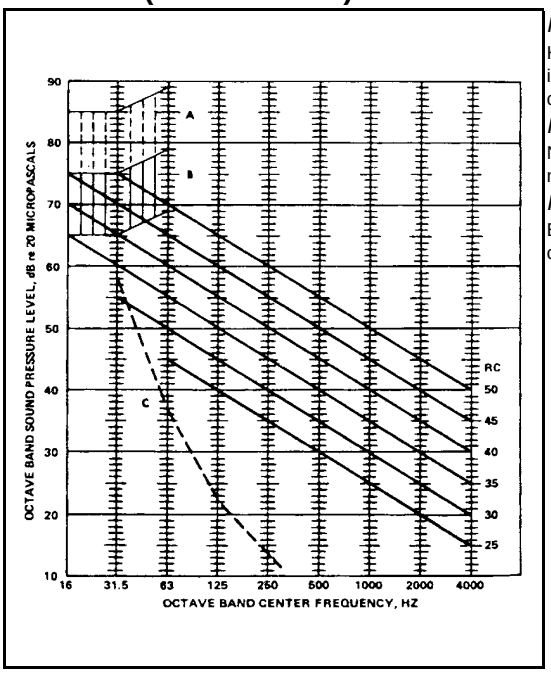
The first step in floating floor design is to determine what the acceptable level of background sound shall be. The following table lists normally accepted background sound levels for a variety of space uses :

**Design guidelines for HVAC System Noise in Unoccupied Spaces**

| Occupancy | RC (N) Level | Occupancy | RC (N) Level |
|---|---|---|---|
| Private residences | 25-30 | Hospitals and clinics | |
| Apartments | 30-35 | Private rooms | 25-30 |
| Hotels/Motels | | Wards | 30-35 |
| Individual rooms or suites | 25-35 | Operating rooms | 25-30 |
| Meeting/banquet rooms | 25-35 | Laboratories | 35-40 |
| Halls, corridors, lobbies | 35-40 | Corridors | 30-35 |
| Service/support areas | 35-45 | Public areas | 30-40 |
| Offices | | Schools | |
| Executive | 25-30 | Lecture and classrooms | 25-30 |
| Conference rooms | 25-30 | Open-plan classrooms | 35-40 |
| Private | 30-35 | Legitimate theaters | 20-25 |
| Open-plan areas | 30-40 | Movie theaters | 30-35 |
| Public circulation | 40-45 | Restaurants | 40-45 |
| Churches, mosques | 25-35 | Concert and recital halls | 15-20 |
| Libraries | 30-40 | Recording studios | 15-20 |
| Courtrooms | 25-40 | TV studios | 20-25 |

The above noise levels should be specified in terms of RC(N) noise ratings whenever the quality of space dictates the need for a neutral, unobtrusive background sound. NC ratings may be used when the quality of space use is not as demanding, and can tolerate a rumbly, hissy, or tonal characteristic in the background sound, as long as it is not too loud.

**RC (Room criteria) curves**

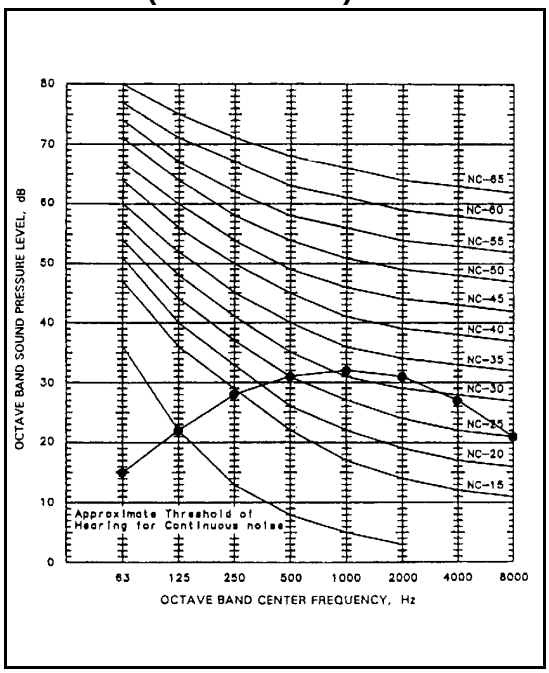



*Region A :*
High probability that noise induced vibration levels will be clearly feelable

*Region B :*
Noise induced vibration levels may be moderately feelable

*Region C :*
Below threshold of hearing for continuous noise

**NC (Noise criteria) curves**




Based on above data, equipment noise levels, and STC rating of existing structural slab, a determination has to be made whether any further transmission loss is required between the mechanical and receiver rooms. If so, a **VIMCO** floating floor offers a possible solution.
What remains to be determined is the extent of the mechanical room area that needs to be "*floated*" The following factors (among others) need to be considered by an acoustical engineer :

1. Sound attenuation capabilities of standard structural floor.
2. The extent to, and ease with which flanking noise can be *reliably* contained.

**VIMCO** along with our factory authorised representatives are technically qualified to assist in the design of specific floating floor applications. All vendors, however tend to favor and be more familiar with their own products than those of their competitors. We continue to suggest, in the interests of the client, that floating floor design be handled independently by an acoustical expert within your organization. If such a person does not exist, we strongly recommend to retain the services of an outside acoustical consultant, in this area of extreme client sensitivity.

## Construction

**Vibration Management Corporation** prefers and recommends a form-work floating floor construction over the lift slab / jack-up system offered by other manufacturers.

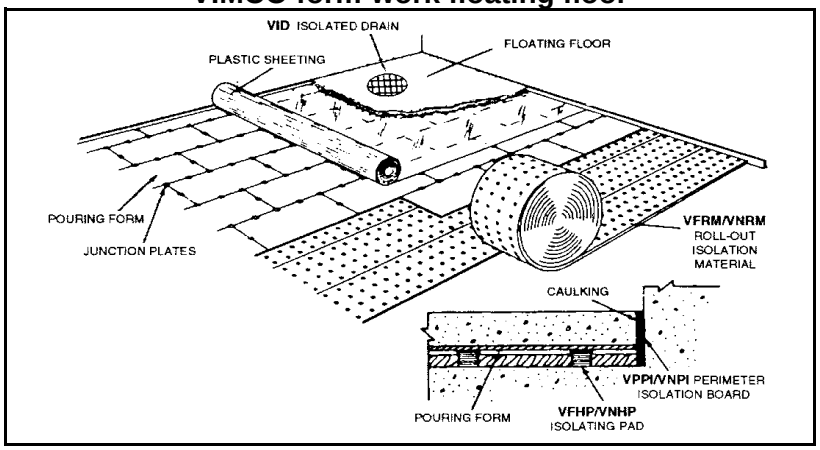
All types of floating floor construction perform the same acoustically as long as the dynamic natural frequency of the isolation mount, the air gap, and masses are the same. The choice of construction method therefore depends on economy, reliability, and ease of installation.
Jack-up system manufacturers generally claim lower installed costs. This cost differential tends to disappear though, for larger areas where many equipment are supported on the floor, or where many plinths project through the floating floor for equipment, piping support. In both cases the number of cannisters has to be increased to provide proper edge and weight support. Most jack-up systems are designed for a 4" floating floor, with thicker slabs resulting in higher costs, not only due to extensions required on the canisters, but again in causing canister spacing to decrease. The **VIMCO** form-work system easily accommodates thicker floating floors with correct isolator selection. The form-work construction also offers the provision of a fiberglass infill which in addition to preventing a sound "*tunneling*" effect, provides extra transmission loss. Independent lab tests by a competitor show that a 2" air gap with fiberglass infill gives a STC rating increase equivalent to doubling the air gap to 4" !!!

## Materials

**VIMCO**'s form-work floating floor system consists of the following materials :

1. Roll-out isolation material provided with neoprene / fiberglass pads.
2. Closed cell perimeter isolating boards
3. Plywood / cement board form-work
4. Polyethylene bond-breaker sheeting
5. Polyurethane perimeter sealant
6. Neoprene contact adhesive
7. Floating floor isolated drains
8. High load pads (neoprene / fiber -glass)

**VIMCO form-work floating floor**




VFRM-xx / VNRM-xx (*xx denotes pad spacing in inches*): Roll-out isolation material

**VIMCO** roll-out isolation material consists of low-density fiberglass with 2" high, resilient, fiberglass / neoprene isolation pads, embedded at 24" centers as standard. Closer spacing between pads can be factory installed, or achieved at site using additional high load pads.

VPPI-xx / VNPI-xx (*xx denotes height in inches*): Perimeter isolating boards

**VIMCO** incorporates closed cell expanded polyethylene / neoprene sheets for perimeter isolation. These sheets have excellent weather-resistant characteristics and aid in preventing flanking noise along the edges of the floating floor area, by completing the isolation of the floating floor from the building structure.

VFHP / VNHP : High load pads

**VIMCO** provides individual fiberglass/neoprene isolation pads for areas with additional, uneven loading. These pads can be factory installed with the roll-out isolation material or can be furnished separately for installation at site, by a **VIMCO** authorized representative.

VID-xx (*xx denotes drain inlet size in inches*): Isolated drains

**VIMCO** floating floor isolated drains consist of a two member housing, to drain water from the floating floor down to existing drainage piping system, without compromising the structural isolation.

Ancillary materials :

Depending on economic considerations, local availability, the following materials may either be supplied by **VIMCO** or sourced by your local **VIMCO** representative. Materials must however comply to **VIMCO** specifications to ensure proper installation.

| | |
|---|---|
| Plywood / Cement board | Neoprene spray adhesive |
| Polyethylene sheeting | Polyurethane sealant |

The following text is provided to serve as a guide for the consulting engineer in specifying concrete floating floors. Due to the relative inexperience in this area, greater attention has been paid to installation methods and procedures, for the benefit of the contractor.
While adaptation of these suggested specifications for your application shall invariably be required, care should be taken to retain engineering data and procedures that are for the protection of the client.

Suggested specifications

## Part 1 - General

1. *The extent of the sound isolation floor is shown on the drawings.*
2. *Related work specified elsewhere :*
    a. Concrete in floating slab ( see Section _____ )
    b. Reinforcing in floating slab ( see Section _____ )
    c. Permanent waterproofing ( see Section _____ )
    d. Isolated drain installation ( see Section _____ )
3. *The floating floor shall be completely isolated from the building structure by resilient isolation mountings supporting the floating floor, and by resilient perimeter isolation material at all adjoining curbs. All penetrations e.g. piping, ductwork, drains shall be isolated from the floating floor so that no rigid contact exists between floating floor and structure.*
4. *All sound isolation materials shall be provided by a single manufacturer to assure single responsibility for proper performance.*
5. *Installation of materials is to be done by workmen familiar with this type of work and by a firm acceptable to the manufacturer.*

## Part 2 - Execution

### A - Materials

1. Roll-out isolation material shall consist of 2" high isolation mounts bonded to a 1 1/2" thick low density fiberglass noise absorption blanket. Mount spacing and location shall be as per manufacturers recommendation and drawings.
2. Perimeter isolating boards shall be 3/4" thick, closed cell neoprene / expanded polyethylene.
3. Perimeter sealant shall be non-hardening, non-drying, and non-bleeding rubber based sealant.
4. Plywood pouring forms shall be minimum 1/2" thick exterior grade attached using metal junction plates.
5. Polyethylene sheeting for bond breaker and temporary waterproofing shall be of 6 mil thickness.
6. Isolated drains shall consist of a two member housings designed to be cast into the floating slab and structural slab with no rigid contact between the two members.

Subject to compliance with specifications the following products of Vibration Management Corporation, Texas are approved for use : Type VFRM-xx / VNRM-xx* roll-out isolation material, type VPPI-xx / VNPI-xx* perimeter isolating boards, type VFHP / VNHP* mounts, type VID-xx isolated drains. (* Consult factory/representative for appropriate system.)

### B - Inspection

Notification shall be given by the contractor to the architect and field representative of the isolation material manufacturer to inspect the installation at the following stages :

1. Upon completion of all areas prior to the placement of the isolation materials. All surfaces shall receive their approval before installation of isolation materials.
2. Upon completion of placement of isolation material prior to placement of form-work. The manufacturer's representative shall be on hand to assist in the initial stages of placement of isolation material to insure the proper procedures and techniques are strictly followed.
3. Upon completion of the finished floor and installation of sealant. The final inspection of the isolation system shall be made at this time. Any evidence of faulty performance shall be evaluated and such imperfections shall be corrected at no cost to the owner.

### C - Installation

1. Ensure all areas to receive sound isolation are dry, level, and cleared of debris.
2. Set and adhere perimeter isolating boards to all curbs and penetrations.
3. Roll out isolation material with mounts and acoustical blanket attached in accordance with manufacturer's drawings and installation instructions. Insert additional mounts for high load areas as detailed in drawings.
4. Lay plywood pouring form sheets on top of isolation mounts, staggering joints, and connect edges using junction plates and screws as per manufacturer's recommendations.
5. Install two layers of polyethylene film over entire floor area, extending up and over perimeter isolation. Seams shall be overlapped 4" and continuously taped to prevent against concrete leakage.
6. Install reinforcing and pour floating slab.
7. After concrete has cured, remove filler strip from perimeter and caulk all joints with perimeter sealant.

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