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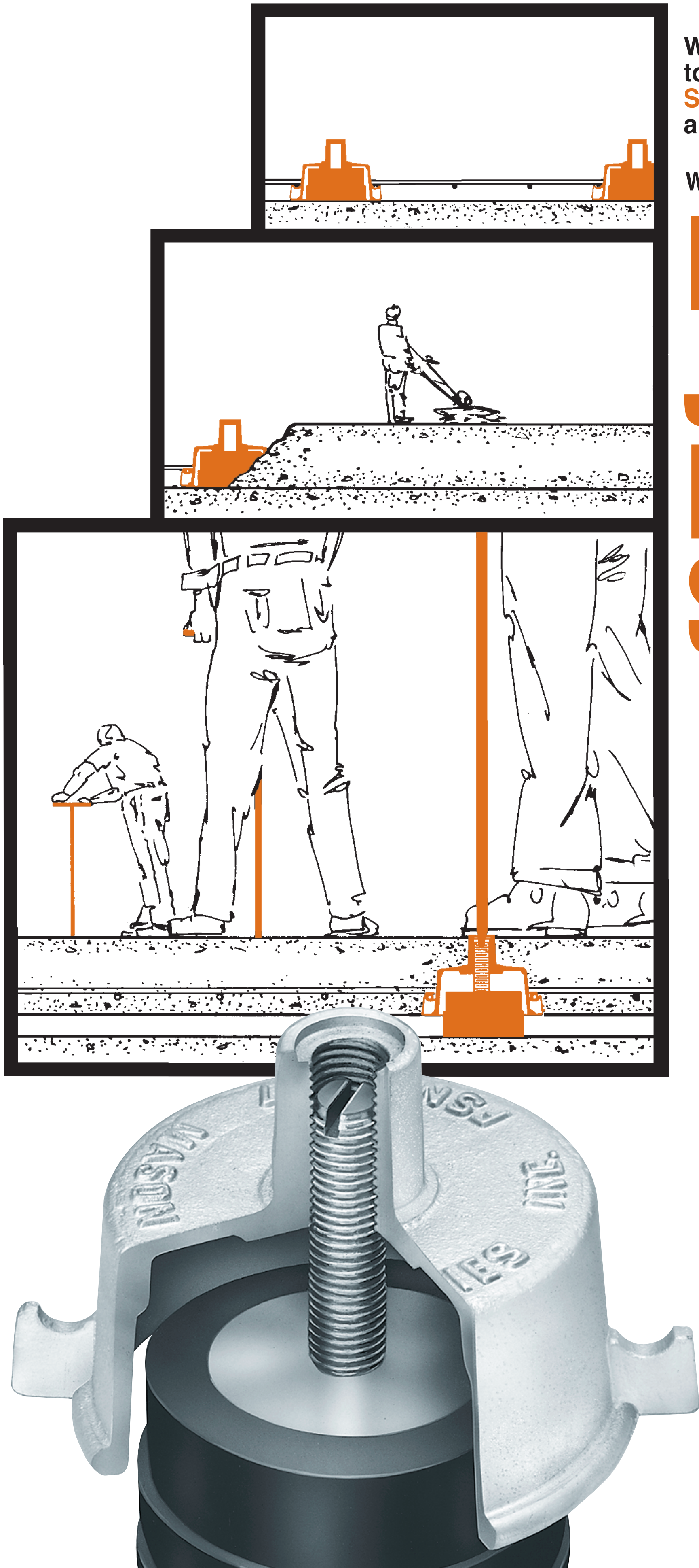


BULLETIN
ACS-102-2

When you need a floating floor to dramatically Increase your Sound Transmission Class and Impact Noise Rating

Why not use the

MASON JACK-UP FLOOR SLAB SYSTEM

and eliminate the cost and need for:

- Combustible, rot prone plywood forms.
- A myriad of transmission paths through closely spaced supports.
- Moisture retaining fiberglass infill that plugs sub-drains and encourages vermin.

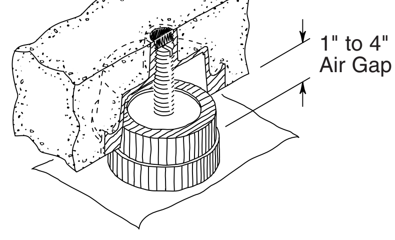
while gaining:

- An easier isolation method.
- A positive air gap.
- A floor supported by DuPont Neoprene -the time tested, low frequency, exposure-proof and truly structural material, at lower cost.

Our Riverbank Test Data demonstrates that a four-inch thick concrete floor floating on neoprene mounts improves the STC by 25 if raised two inches and that the INR goes up by 44... These are tremendous improvements.

Remember. The air gap is the isolator, the jack-screw lifts the floor to achieve it, and the resilient neoprene element supports the weight while working in parallel with the air.

Mason Industries originated this system, so why not work with the company that creates ideas.



MASON INDUSTRIES, Inc.
International Manufacturers of Shock, Seismic and Vibration Control Products, Acoustical Floor Systems and Rubber Expansion Joints for Piping

To the Architect:

We have been floating floors, resiliently suspending ceilings and isolating walls for close to 40 years. The need for this acoustical reinforcement has been well established in textbooks, sales literature and acoustical engineering recommendations. Therefore, we thought it would be helpful to offer a handbook of specific methods and suggested specifications rather than just print another interesting but rather general brochure.

1. There are basically two methods of reducing airborne sound transmission. The first is to increase the mass of the walls, floors or ceilings and the second is to introduce an air gap between relatively airtight constructions.

2. When dealing with a monolithic building component such as a solid concrete floor doubling the mass raises the STC by a maximum of 5. Actual test results are shown graphically on page 3. Because of this it becomes impractical to rely on mass alone as a 6" solid concrete floor has an STC of 54. Doubling to 12" raises the STC to 59. Doubling again to an unacceptable 24" raises the STC to only 64.

3. Once you decide on the maximum practical weight for the construction the next acoustical step is to split this mass into two components sandwiching an air gap. This air gap triggers a tremendous improvement in STC as shown by the Riverbank Tests of a floating floor with flanking protection. (Test Two, page 3.) Notice that the addition of a 4" concrete pour on the original 6" raised the STC from 54 to only 57. The introduction of a 2" air gap between these sections raised the STC to 79 for a dramatic improvement of 22. Increasing the air gap to 4" raised the STC to 82. Doubling the air gap raises the STC a theoretical 5, but the actual result is more like 3 because of resonances.

4. The introduction of lightweight fiberglas in the air space between massive structural elements such as concrete floors or walls is expensive and unimportant. The experimental inclusion in a 2" void increased the STC by 3 beyond the original 79. (Test Two, page 3.) This is meaningless at these levels as the 79 is all but unattainable in a commercial structure because of flanking. Fiberglas is an important addition over suspended ceilings, however, where the mass is light and the contribution noticeable.

5. The air gap is the isolator. The purpose of the vibration mounting is to provide structural support without voiding the air gap. Since each mount is a potential transmission path, it is logical that the fewer mounts or support points, the better the chance of protecting and not bypassing the air gap.

6. Specifications should be written by the professional for the protection of the client and not the protection of the vendor. Specifications should emphasize performance characteristics, physical properties and construction rather than manufacturing techniques. In describing a steel spring it would be unimportant whether the steel was produced by the Bessemer or Open Hearth method. The neoprene molder need not be told the proper curing temperature or carbon black particle size and certainly, the glass people know the specific technique for manufacturing fiberglas. It would be important in specifying steel springs to keep the operating stresses well within the elastic limit; to describe neoprene mounts in terms of tensile strength, permanent set, elongation, compression set, etc. A proper dialogue regarding fiberglas would similarly cover permanent set, dynamic frequency and most importantly waterproofing tests of this sensitive material that fails when wet.

7. All vendors tend to favor their own products rather than those of their competitors. As opposed to this, an acoustical expert studies all of the available materials and recommends what in his unbiased judgment is best for the application. If there is no such person within your own organization, we continue to suggest that you retain an outside acoustical consultant to help you in this most critical field of client sensitivity.

We would appreciate your comments as to subjects not covered, our method of presenting this information or any other suggestions to make this booklet more valuable to yourselves and other people in the architectural and acoustical disciplines.

Very truly yours, MASON INDUSTRIES, INC.

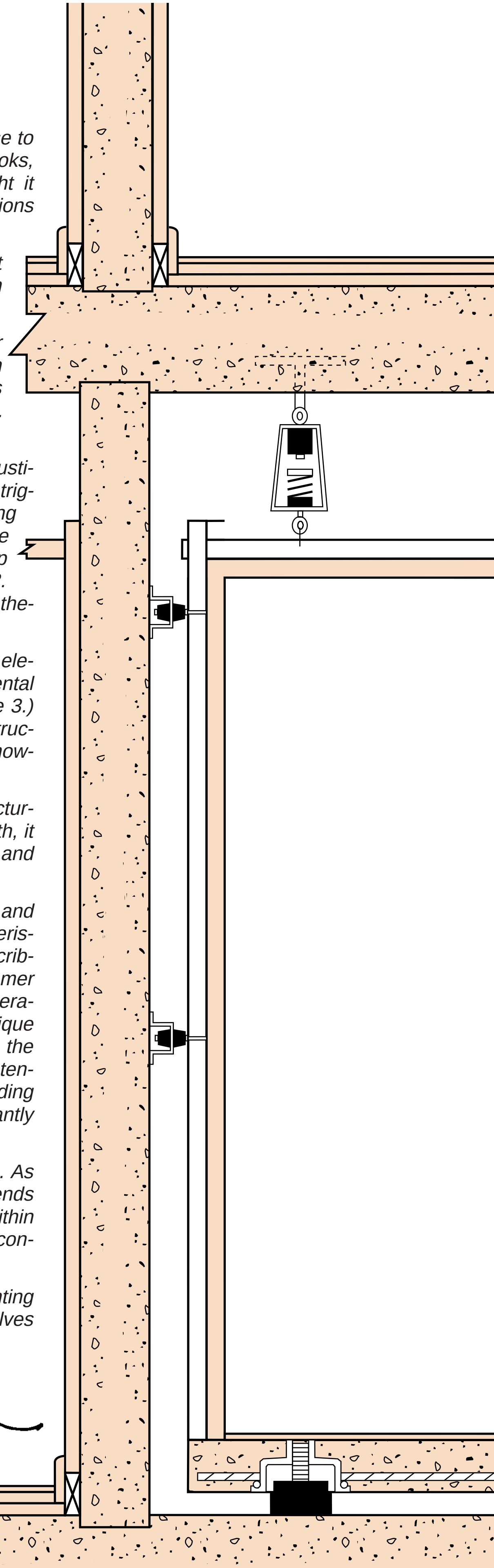
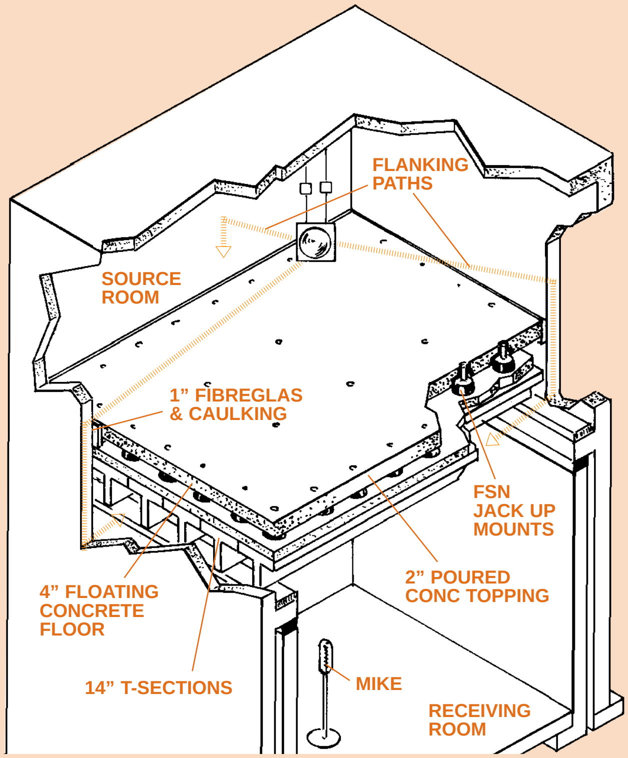
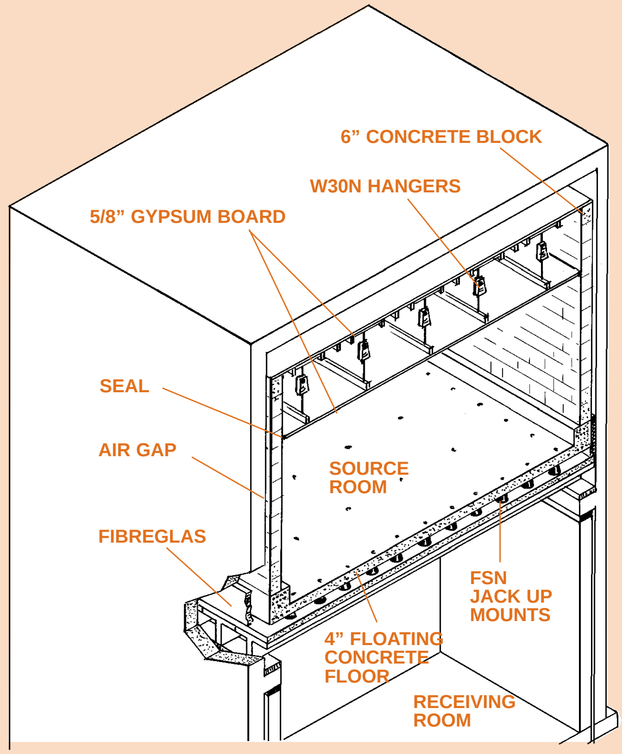


Table of Contents

TESTS Air Gap Effect on STC 4" Floating Concrete Floor on FSN Mounts
Dynamic Stiffness - MASS/STC



FLOOR ONLY - FLANKING PROBLEMS



COMPLETE ROOM - FLANKING PROTECTION

Test One

TRANSMISSION LOSS (dB)

Freq. (Hertz) (cps)	Basic T sections and 2" cover	Basic T sections & 2" concrete cover plus 4" floor	Air gaps without fiber glass infill 1"	2"	3"	4"
100	39	38	43	42	45	46
125	39	47	44	44	47	47
160	40	46	45	45	47	47
200	42	49	46	45	46	46
250	45	51	47	48	50	50
315	49	52	54	54	55	54
400	47	50	56	56	57	57
500	50	55	58	59	60	60
630	52	54	61	62	62	62
800	51	52	63	63	64	65
1000	52	55	68	68	69	69
1250	55	58	72	72	72	73
1600	58	61	74	73	74	75
2000	60	63	75	75	76	77
2500	62	65	80	79	79	80
3150	65	67	82	84	85	86
4000	68	71	87	90	92	91
5000	70	72	91	93	100	97
STC	54	57	61	61	63	63
INR		−27	+17	+17	+17	+18
IIC		−24	68	68	68	69

Riverbank TL-71-152 March 71

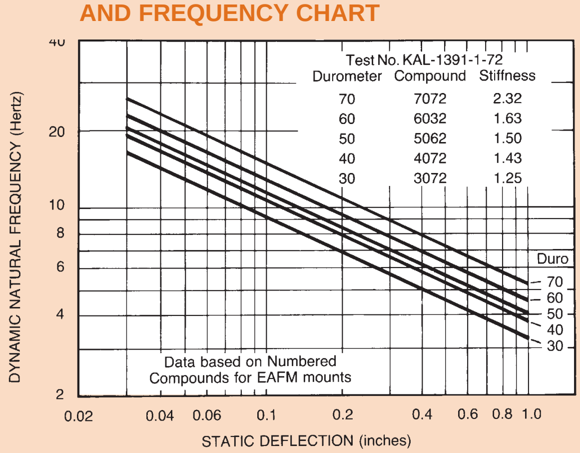
Test Two

TRANSMISSION LOSS (dB)

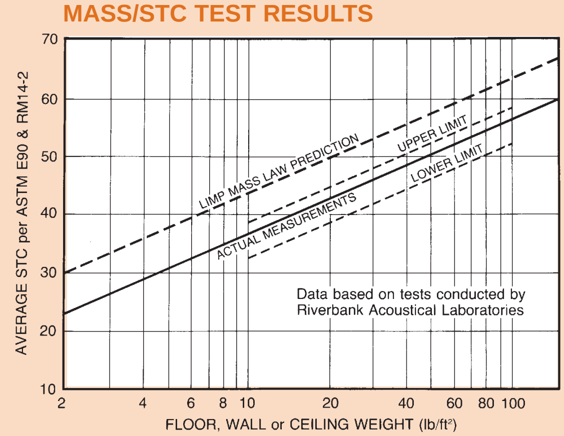
Freq. (Hertz) (cps)	Basic T sections and 2" cover	Basic T sections & 2" concrete cover plus 4" floor	Air gaps without fiber glass infill 1"	2"	3"	4"	2" air gap with 75% fiber glass infill
100	39	38	50	56	59	56	57
125	39	47	57	60	62	63	59
160	40	46	55	58	59	61	61
200	42	49	63	65	67	66	68
250	45	51	67	69	72	72	73
315	49	52	73	75	77	78	79
400	47	50	73	74	74	77	78
500	50	55	78	80	80	82	83
630	52	54	83	85	86	87	86
800	51	52	85	86	87	86	88
1000	52	55	88	88	88	87	89
1250	55	58	93	93	92	91	95
1600	58	61	97	96	95	93	97
2000	60	63	97	101	99	97	97
2500	62	65	101	104	101	101	100
3150	65	67	104	105	107	103	104
4000	68	71	105	106	105	104	106
5000	70	74	102	101	99	99	103
STC	54	57	76	79	80	82	82
INR		−27	+17	+17	+17	+18	
IIC		−24	68	68	68	69	

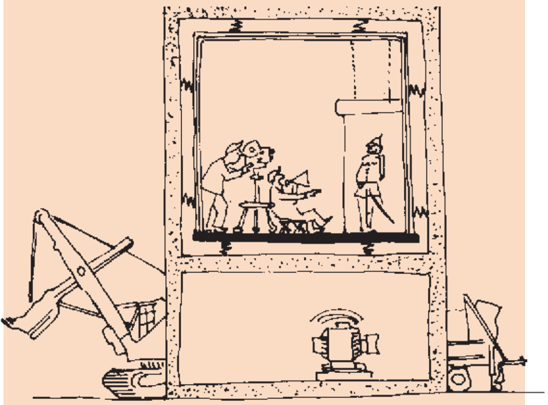
Riverbank TL-71-247 June 71

MASON BRIDGE BEARING NEOPRENE DYNAMIC STIFFNESS AND FREQUENCY CHART

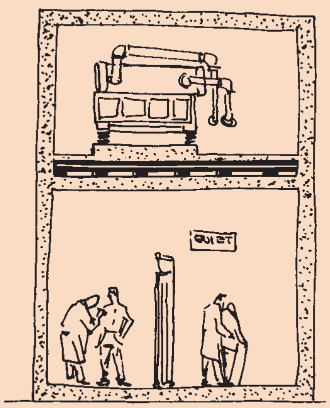


MASS/STC TEST RESULTS

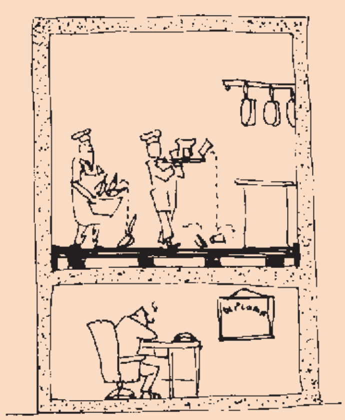




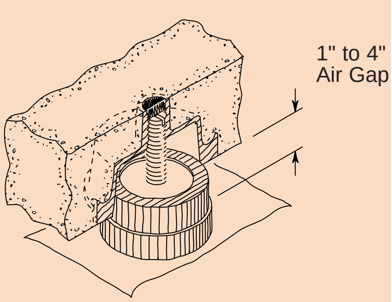
VIBRATION



SOUND



IMPACT



JACK-UP FLOOR
Recommended Spacing 54"

Concrete floating floors are used for many purposes. We have limited this bulletin to the following areas of Vibration, Sound and Impact Isolation.

1. VIBRATION ISOLATION

Buildings are unavoidably near busy streets, trains and subways even though they contain space that must be vibration free and have very low NC levels. Examples include television studios and theatres and in some cases sound test rooms located in the center of factories.

The frequency of the isolator supporting these floors is normally determined by the architect or an acoustical consultant depending on the input frequencies. Within our range of experience we recommend neoprene mountings with a dynamic frequency not exceeding 10 Hz for input no lower than 20 Hz providing frequencies below 30 Hz are limited in amplitude. Steel spring isolators come into their own when the input is more severe or below 20 Hz. The required deflection of the springs is dependent on the input frequency, but most spring floating floor work is done with deflections between 0.5" and 0.75" to provide frequencies in the 4.5 to 3.6 Hz range. When heavy impact is a major factor, springs are always required.

We have provided neoprene isolators to reduce subway vibration at grade. They were very effective as the lowest input frequency was measured at 20 Hz and the ground amplitudes were small. In another application, however, television studios were located on the third floor of an old building. Spring mountings were specified by the same acoustical consultant as the upper floor amplitudes were high and frequencies low, not only because of motor truck traffic outside the building, but the passage of heavy scenery wagons in halls between studios.

2. SOUND ISOLATION

Typical of these applications are the introduction of floating floors in very noisy equipment rooms located over prime office space or floating roofs as a protection against aircraft noises.

Since we are dealing with the prevention of airborne noise transmission only, neoprene mountings are always the choice. The lowest audible frequency is about 25 Hz so there is no need for mountings of greater deflection. Spring mountings manufactured with neoprene materials in series with the springs would work equally well in this application, but they are needlessly expensive. Since the floating floor's frequency is too high to isolate machinery, the only function is the prevention of airborne sound transmission. Machinery supported on the floating floor must have steel or air spring isolators.

3. IMPACT ISOLATION

Examples of straight impact isolation would normally include kitchens, weight rooms or bowling alleys. A commercial kitchen in an office building generates structurally transmitted noise. The noise level within the kitchen itself might not be very high, but the rolling of carts, the dropping of dishes, the rattling of cutlery on steel tables, the placing of pots on stoves, etc., all represent impact and mechanically transmitted sound. Neoprene isolators have been effective in most of these applications but springs are better.

Where gym floors are the problem and we must deal with running, jumping and bouncing balls, neoprene would be effective over a very rigid substructure, but once again springs are the safer approach.

JACK-UP (Lift-Slab) SYSTEM

We believe that the most fool-proof and safest way to establish the air gap is the jack-up or lift-slab method. Plastic sheeting is placed on the sub-floor as a breaker layer, isolators are placed on the plastic sheeting, reinforcing steel or mesh rests on the isolator housings, and the concrete floor is poured. After the concrete has cured, the slab is lifted to elevation by turning adjustment bolts above each isolator to any specified air gap between 1" and 4".

FORM-WORK SYSTEM

The alternate, almost obsolete, method is one whereby a continuous layer of the isolation media is used as a pouring surface. More commonly, individual isolators, the thickness of the air gap are placed in position in the field and covered with plywood or factory attached to plywood before delivery. The upper surface is covered with a plastic layer and then the reinforcing is placed on top of the plywood forms and the concrete poured at finished elevation.

MACHINERY SUPPORT

In our older publications we advocated the support of heavy machinery on full sized structurally supported pedestals or individual structurally supported pedestals as shown in the illustrations on page 5. While the performance of systems installed that way was excellent, it proved to be a major coordination problem because the pedestals had to be located, poured and anchored to the sub-floor before the system could go ahead. There was very little saving in cost as we provided isolators around the edges of these pedestals so there was no saving in the number of isolators. There was the additional labor of installing perimeter board and caulking. We gradually modified our approach to using this method for only the heaviest of machinery such as chillers, but based on our continued experience we are now suggesting continuous floating floors with all the housekeeping pads and equipment on top.

JACK-UP VERSUS FORM-WORK METHOD

When the form-work method is used, the spacing of the mountings is a function of the stiffness of the forms which support the wet concrete. In using half inch plywood, which is the most common form, we have tested 12", 16" and 24" spacing. We have found 24" spacing to be highly satisfactory. Closer spacing merely means more fussing with light capacity mountings and in comparing 12" with 24" spacing the introduction of four times as many transmission points.

Our development of the lift-slab method accelerated in 1962 when we isolated some 30,000 square feet of television studios for CBS using jack-up spring mountings. The mountings were designed to the performance specifications of an acoustical consultant. This new method was an immediate success.

When using the lift-slab technique, the spacing of the isolators is determined by the thickness of the floating floor and the reinforcement. When 4" slabs are used, a spacing of 54" in both directions is well within design limitations. Thus we have 1/20 the number of transmission pads offered by a form work or panel system using 12" spacing. Thicker slabs allow for wider spacing and 60" or more is not unusual.

Structural tests run in 1974 indicate that 48" spacing using 6x6x10 gauge mesh 1" from the bottom is a very safe system for live loads of 150 Lbs. per square foot, or rolling loads of 350 Lbs. per lineal foot. Rolling loads must be considered when rigging machines into place. These allowable loadings were derived from destruction tests, and based on a 3 to 1 safety factor. The full certified Jones Test Report is available on request. Extremely heavy concentrated loads are accommodated by isolators directly under the loads or by using heavier local reinforcing to carry the load to mountings paralleling the equipment. Heavier reinforcement allows greater spacing.

The most advantageous way of using the jack-up system is to roll the heavy equipment into position before the floor is raised, so there is no danger of cracking the areas of lighter capacity as the machinery rolls by. The floors are raised with the machinery in place. When it is done this way, all mountings have the most uniform deflection. While this is the ideal way, the concrete people usually want to be off the job and the machinery is placed after the floor is raised. This is no problem either, as a lifted floor is no different than a floor poured at elevation.

In thinking about longevity it seems to be a contradiction to use plywood as the form in series with the isolator. If moisture is present, even exterior plywood will eventually rot. Plywood between floors is a fire hazard that violates many state codes and fireproof plywood is very expensive. Why worry about these problems when the plywood can be omitted with the jack-up system?

When deformed metallic forms are specified, many of these objections no longer exist as in one direction the support mountings can be moved out to the larger centers. Fire and rotting is similarly no longer a problem. However, very few floors are installed this way as steel forms are expensive and difficult to install, particularly in odd shaped rooms.

We have omitted the use of lightweight fiberglas infill in all of our recommendations, because the acoustical improvement is negligible as shown in paragraph 4 of the opening letter on page 2. When water is present between floors, the breakdown of the lightweight fiberglas tends to clog drains and to hold and carry moisture up to the plywood. This accelerates rotting whether the drains are introduced in the sub-floor or not.

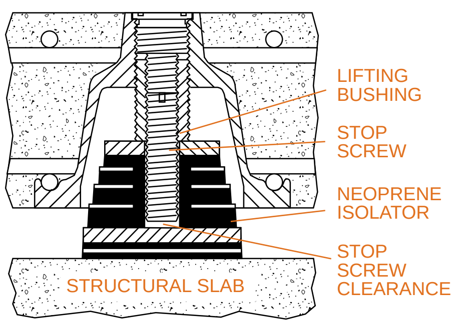
The jack-up system is easier to install since there is no need to fit unusual contours. The mountings are placed in position along the edges and the concrete flows to or around the odd shapes. Any air gap up to 4" can be used at no increase in cost. Perhaps the most important point is that there is no possibility of short circuiting of the air gap by concrete spills between plywood panels. When these accidents happen, there is no way to tell until the floor does not perform properly. In effecting repairs you must first locate the short circuit, break or cut out that area of the floor, somehow re-establish the reinforcing by welding or tying to the stubs that are left and then repouring the patch. This can never happen with a lift-slab system as the floors are lifted after the concrete has hardened so the air gap must be clear.

When using the jack-up system, the isolator is within the cast iron housing, so the thickness of the isolator remains 2", even if the floor is only elevated 1". If you try to save height with a plywood system, the thickness of the isolator must be reduced with a loss in efficiency because the isolator frequency increases. We have installed floors that are 3" thick with a 1" lift for a total height of 4". A plywood system with the same isolator frequency would have to be 5 1/2" high minimum. The 1 1/2" height saving can be important.

While we prefer the lift-slab system, we have also included specifications using plywood forms as there is the occasional application where the forms are practical or for reasons of your own you prefer this older technique.

EXTREME TRANSIENT LOAD CONDITIONS

Floating floors are sometimes subject to extremely high transient loads that would deflect the floor beyond structural limits and result in floor failure. Typical of these are stage floors, floating streets, convention exhibit centers and major production TV studios. Temporary loadings are buses, trailer trucks or lift trucks with concentrated loads as high as 10,000 lbs. in any location. These problems are handled with stop screw isolator designs. The main adjustment bolt is enlarged to a threaded brass bushing with a centered steel bolt set to a predetermined clearance above a secondary base isolation plate and isolation pad. Let us discuss these specialized applications with you as each problem is different.



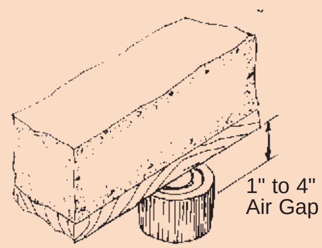
STOP SCREW FSN
Also available for FS (spring)

SEISMIC CONSIDERATIONS

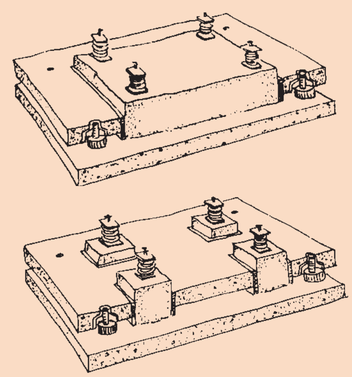
In seismic zones the peripheral walls or curbs must be studied and designed to withstand horizontal floating floor displacement at the maximum acceleration in the area. Typically a 5,000 square foot floor would weigh 250,000 Lbs. and the weight of any equipment attached to the floor would have to be added to that. If the system were in a 0.5g zone, the lateral force would be 125,000 Lbs. Assuming the dimensions were 50 ft. x 100 ft., the 50 ft direction would be most critical and the curb or perimeter wall designed to resist 2500 Lbs. per linear foot.

Another potentially serious problem is the curling and failure of the concrete floor from the forces introduced by the machinery restraints that must be anchored to the floating floor. The problem becomes apparent when you visualize a tall, narrow chiller. Acceleration at the center of gravity creates an overturning moment that pulls on the floor on one side and depresses it on the other. A 4" concrete floor has little inherent resistance to this type of bending and we have addressed this problem with a double acting resilient floor snubber type SFFS as illustrated on page 8 and 14.

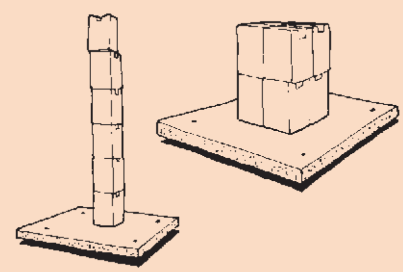
The snubber is anchored to the sub-floor and the housing cast into the floating floor. The up and down clearances are adjusted after the floor has been raised. The floor restraints are grouped near the points of tension and compression or on either side of the housekeeping pads. The inclusion of these snubbers keeps the floor captive and prevents damage. The generous clearances prevent short circuiting. We believe we are the first, if not the only company, to offer this engineering development.



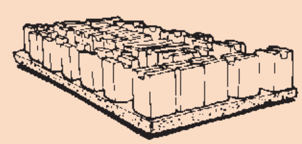
FORM-WORK FLOOR
Maximum Spacing 24"



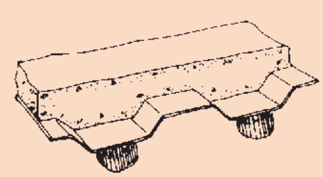
OLDER ALTERNATE PEDESTAL METHODS
See Page 6 for Present Method



CONCENTRATED LOAD TESTS

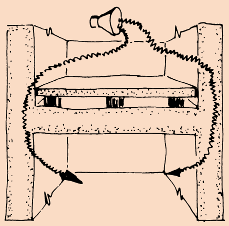


UNIFORM LOAD TEST

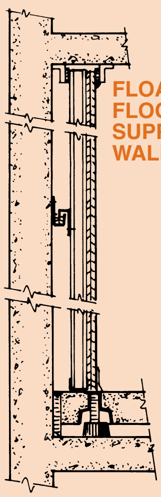


DEFORMED METALLIC FORMS

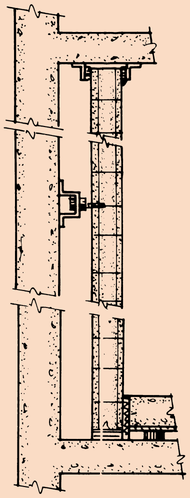
ISOLATED WALLS discussion



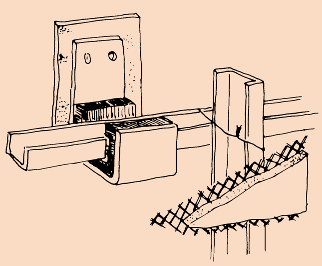
FLANKED FLOOR



FLOATING FLOOR SUPPORTED WALL



STRUCTURAL FLOOR SUPPORTED WALL



TYPICAL LIGHTWEIGHT WALL BRACE AND SUPPORT

Test Three
BROADCASTING STUDIO

Frequency (Hz)	Transmission Loss (dB)
100	47
125	48
160	50
200	54
250	60
315	66
400	71
500	79
630	85
800	90
1000	95
1250	92
1600	92
FSTC	71
INR	+24

Cerami Field Test 2501, July 1, 1974

Walls are isolated to prevent flanking around floating floors or to improve the STC between adjacent spaces.

The word "flanking" is used to describe a vibration or noise path that goes around an isolated component. If a structure is built with continuous walls so that in cross section it is as an H and we introduce a floating floor, the STC of the system will probably remain at only 60 or 63 regardless of the floor's rating. Sound energy vibrates the walls and this vibration continues in wave form to the lower spaces where the wall reintroduces the sound. This is flanking or bypassing the floating floor. The difference in results is shown in Test Two as opposed to Test One in the beginning of our discussion on page 3. The floor constructions were exactly the same. In Test One, however, the sound impinged directly on the walls and ceiling without the isolated barrier walls and ceiling used in Test Two.

To complete an envelope, secondary walls must be introduced with the same consideration given to mass and air gap as covered in the floor discussion. The problem is simpler, because the walls normally support only their own weight and they need not have the structural strength of the floor. Poured concrete or concrete block walls should approach the floor density. It is most important that block joints are properly filled with mortar and painting the walls so the construction is more nearly airtight helps.

The best approach is resting these walls on the perimeter of the floating floor so the floor isolation system serves the walls as well. If this is not possible, the second choice is supporting the isolated wall on the structural slab with continuous neoprene pads, and providing a caulked fiberglas seal between the floating floor and the wall as described for the perimeter in the previous specifications.

If the wall is so high as to be unstable it must be protected against buckling or toppling by means of resilient sway braces anchored to the structural walls. Sway braces are mandatory for all independent walls resting on pads if they are not locked at the top. Braces are normally placed 4' apart horizontally with the vertical spacing of rows dependent on the height and thickness of the wall. It is seldom that more than two rows of braces are required.

Occasionally we have used double acting springs for sway braces in conjunction with spring mounted floors. In most cases, however, our recommended design is the neoprene Type DNSB as illustrated on page 20. When space is limited, the WIC clip is the logical alternate. (Page 20)

Yet another variation, Type WCL, consists of a channel shaped bracket that is lined with 5/16" neoprene waffle pad and a 1/4" thick felt backing. With this arrangement the bracket is bolted to the structural wall so that horizontal steel furring can be laid in the isolated pocket as illustrated. (Page 20)

When we did our test work at Riverbank, we did not place lightweight fiberglas fill between the walls of our inner room and the walls of the laboratory. Concrete short circuited the air gap and we had to break it out. Therefore, under Construction Procedure you will find that we have said that "special care must be taken to completely butter all joints and concrete must not be allowed to drop behind the wall and short circuit the air gap".

If you wish to be more cautious about concrete droppings, you can call for 1 1/2" or 2" thick three pound minimum density fiberglas to fill this vertical void. Call for the fiberglas in the materials portion of the specification and then in the construction procedure advise the contractor to cement the fiberglas to the structural wall in advance of the placing of the concrete blocks. Thus, the fiberglas will serve to prevent accidental short circuiting of the air gap. It is primarily a mechanical rather than an acoustical aid.

We must also be concerned with sound leakage over the top of the wall. If a wall is short and rigid and need not be locked at the top, the least expensive approach is the inclusion of a fiberglas pad over the last course of masonry with acoustical caulking on both sides of the pad. In most cases, it is easier to both lock the walls in place and seal them by the use of continuous angle brackets type AB-716 which are placed on both sides of the wall as illustrated on page 20.

If the walls are stable and it is possible to rest the floating ceiling on the floating walls to complete the box, there is no need for these top details.

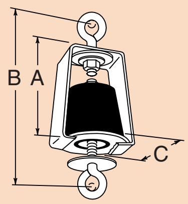
When an isolated wall abuts the rigid structure, it is usual to place a fully caulked strip of fiberglas or 1/2" neoprene sponge at the end to prevent short circuiting. AB-716 angle braces can be used vertically as well for locking purposes or a caulked vertical section of channel iron lined with 1/2" neoprene sponge makes another neat joint as the wall fits between the flanges.

If some lesser STC values are satisfactory, it is not necessary to use masonry. Good results can be obtained with gypsum board walls or various of the prefabricated acoustical partitions as shown by Test Three of a small broadcasting studio using a 4" jack-up concrete floor, gypsum board walls on three sides and an isolated ceiling. You will note that rather than the 79 STC obtained with the 2" air gap in the Riverbank Test, this room came in at FSTC 71 with an INR of plus 24. These are excellent results and probably more than satisfactory for most situations. This less expensive construction should certainly be considered. The type WCL clip was used to resiliently support horizontal runners and we had included fiberglas behind the walls as always for lightweight construction.

Isolated walls are often used without floating floors to reduce sound transmission between adjacent spaces. Here the floor provides a possible flanking path, but if results in the STC 60 range are satisfactory this is certainly a valid technique. All of the wall specifications are meant to be used with or without the floor specifications as required.

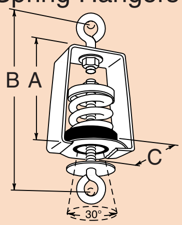
PRODUCT DETAILS

WHD Neoprene Hangers



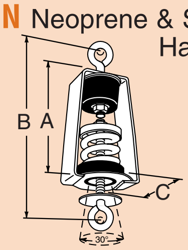
Load Range (lbs)	A (in)	B (in)	C (in)
Up to 125	2 3/4	4 1/8	2
Up to 650	4 1/2	7	4 1/4

W30 Spring Hangers



Load Range (lbs)	A (in)	B (in)	C (in)
12 to 95	4 1/2	7 1/4	2 3/4
138 to 336	4 3/8	7 3/8	4

W30N Neoprene & Spring Hangers



Load Range (lbs)	A (in)	B (in)	C (in)
12 to 95	5 1/2	10	3 1/2
138 to 336	8 1/4	11	4 3/4

Test FOUR
TRANSMISSION LOSS TEST
(KAL-714-9-69)

Frequency (Hz)	Lightweight Gypsum 3" Floor Only	3" Lightweight Gypsum Floor & Suspended 5/8" Ceiling
125	27	35
160	26	32
200	31	36
250	32	39
315	30	39
400	33	43
500	38	47
630	38	50
800	41	53
1000	43	57
1250	44	59
1600	45	64
2000	48	67
2500	51	69
3150	51	71
4000	54	76
STC	41	50

5/8" Gypsum board ceiling suspended 12" below 3" gypsum concrete floor and hung from W30N hangers.

There are two types of resiliently suspended ceilings.

The most common is a lightweight mechanical ceiling that contains the lighting fixtures, the outlets for the air conditioning system, etc. These lightweight ceilings consist of light steel framing drop-in absorptive tiles that are generally 24"x24" or 24"x36". The primary purpose is to absorb sound within the room and to lower the reverberation rate. Because the material is so light, there is virtually no reduction in transmitted noise either in or out of the room.

Acoustical barrier ceilings are entirely different. In years past they might have been plaster on wire lathe, but modern construction is two layers of 5/8" gypsum board screwed together with staggered joints. Every effort is made to seal the perimeter as well as any penetrations. While these ceilings are still lightweight as compared to concrete floating floors, they do have sufficient mass to act as sound barriers and the fact that they are carefully caulked and sealed puts them in a totally different category than the mechanical ceilings described above.

Barrier ceilings are primarily used to reduce noise transmission from the floor above. In most cases an architect will choose either a floating floor in the equipment room or a barrier ceiling in the space below. However, the two methods are sometimes used in conjunction with one another.

In other applications the ceilings help contain noise. Thus, an equipment room may have a suspended ceiling to complete the isolated wall and floor design. This is a common procedure for adjacent music practice rooms, particularly when the double partition walls do not reach all the way to the structural ceiling.

Barrier ceilings are light as compared to floating concrete floors, so the effectiveness of the ceiling is far more dependent on the air gap than mass or rigidity. Since the air must allow for the inclusion of the hangers and support steel, a minimum air gap is about 12". Lightweight fiberglas bats are placed over the barrier ceiling to further improve the performance.

The building service ducts, electrical conduits, etc., pass beneath it and above a removable tile mechanical acoustical ceiling. The acoustical hangers are located in the supporting rods or wires common to both ceilings. When the barrier ceiling is penetrated by wires, rods or straps, these members must be isolated by means of resilient sleeves and they should be caulked as well.

While the double ceiling method is probably the most effective approach to the problem, vibration hangers are commonly used to support single ceiling systems as well. If the single ceiling is of the sound barrier type, the vibration isolator helps to prevent the passage of structural noise just as in the case of the double ceiling. Hangers used to support simple mechanical ceilings prevent rattling of the ceiling members.

A mounting that "looks into" or rests on a rigid structure has a simpler task than one working against something that is flimsy. In the case of floating floors, the neoprene isolators or springs rest on the main structure, which is comparatively rigid. In the case of ceiling hangers, we often start with the noise and vibration at the concrete building structure and move down a rod or wire to the vibration control hanger and then on to the suspended ceiling. Under the best of circumstances, when this is a plastered ceiling, it is still a very flexible diaphragm without concentrated mass as compared to the concrete floor that a floor mounting rests on. Therefore, a hanger must be very carefully designed or it will not have the comparative flexibility to do the job.

Very little test work has been done to show the effectiveness of acoustical ceilings using isolation hangers. In 1969 we tested lightweight components. We started with a 3" gypsum concrete floor with an STC of 41 and suspended a single 5/8" gypsum board ceiling using W30N hangers with 1" static deflection. The air gap was 12" . The STC went up to STC 50 for an improvement of nine as tabulated in Test Four. Most ceilings are made up of two layers of 5/8" gypsum board with lightweight fiberglas bats laid over the top. Therefore, it is safe to assume that the average barrier ceiling provides an improvement of STC 14.

We manufacture a very wide range of ceiling hangers in order to be competitive when other vendors are specified. In this bulletin, however, we are discussing only three major categories consisting of the WHD, W30 and W30N. Our suggestions are as follows:

Series WHD *- Simple neoprene vibration hangers are used in low budget applications or for those installations where it has been clearly established that there is little or no structural vibration. The hangers serve as noise breaks only, as static deflection is limited.*

Series W30 *- Steel coil spring vibration hangers are far superior to the neoprene designs because the higher deflection spring element will serve to isolate building vibration. The design includes a neoprene cup in series with the spring that acts as a partial high frequency noise barrier.*

Series W30N *- Combination hangers make use of the WHD neoprene element in series with the W30 spring. Thus the design combines the best features of the all neoprene and the spring hangers and we recommend them for all critical applications.*

15° Misalignment Tolerance *- Both our spring and combination spring and neoprene hangers are designed so that the hanger rod or wire can be off vertical by as much as 15° without rubbing on the steel hanger box and transmitting noise. We continue to manufacture lower priced competitive hangers that do not have this angular tolerance, but we invented the 30° sweep design, because most field problems stem from a contractor's difficulty in lining up what may be hundreds of hangers perfectly. If they do not, the wires and rods rub.*

Precompression *- We strongly recommend that all spring hanger installations have the spring elements partially precompressed at the factory before they are installed. If the springs are not precompressed, the ceiling will descend as much as an 1" when the spring deflects as weight is added. The contractor will have great difficulty in preventing cracks in plaster ceilings or finishing with a flat ceiling at the proper elevation. When the spring hangers are precompressed 70% of the total travel, the ceiling will not descend at all until the installation is about completed and the travel will only be 0.30" to completion.*

The architectural drawings should show the construction of the isolated ceilings and the spacing of the ceiling hangers. They are usually on 48" centers in both directions. The hanger most commonly used on our jobs and our standard recommendation is the Type W30N. Under Materials and Manufacturer, however, we have repeated the specification for each type so you can select your preference. Since the construction procedure is the same in all cases, it was pointless to keep rewriting the same specification over again. By the same token, the specification can be changed slightly to cover any type of construction such as a sand plaster ceiling or a simple acoustical tile ceiling by substituting your materials where we call for two layers of 5/8" Gypsum Board.

MECHANICAL EQUIPMENT

Products

Acoustic

Neoprene Jack-Up Mounts

Vibration & Rubber
Engineering Solutions

MASON INDUSTRIES, Inc.
Manufacturers of Vibration Control Products

350 Rabro Drive
Hauppauge, NY 11788
631/348-0282
FAX 631/348-0279
Info@Mason-Ind.com

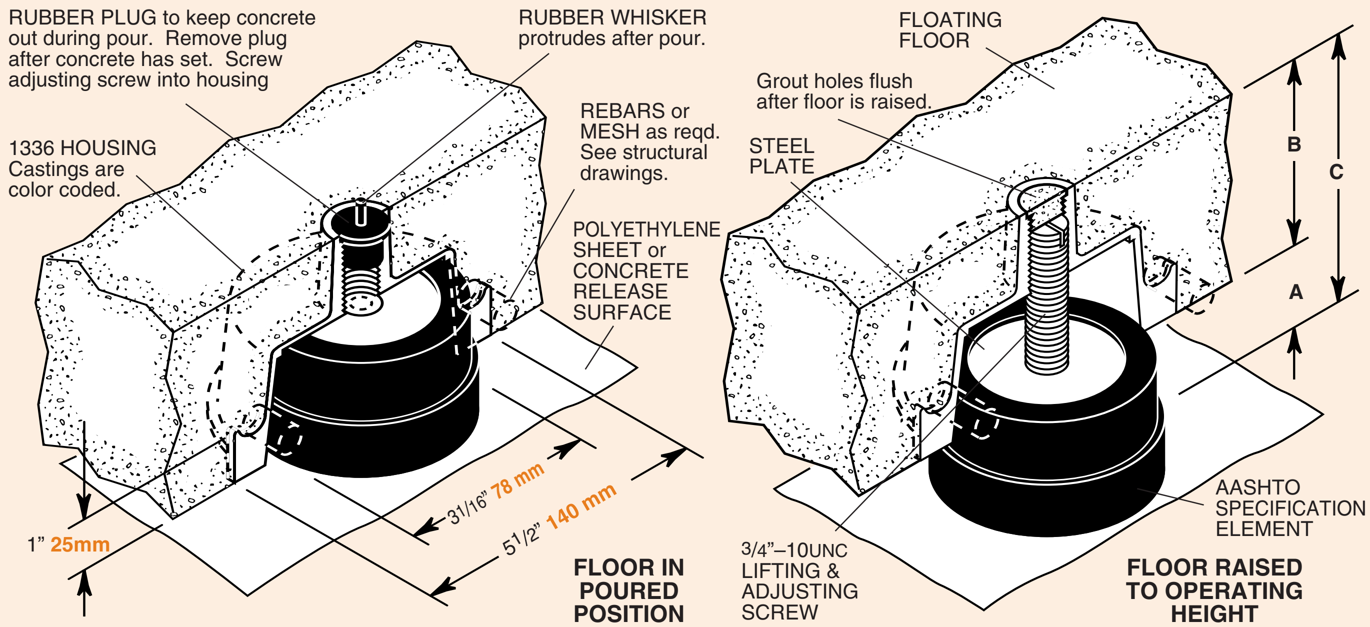
2101 W. Crescent Ave., Suite D
Anaheim, CA 92801
714/535-2727
FAX 714/535-5738
Info@MasonAnaheim.com

Website: www.Mason-Ind.com

FLOATING FLOOR LDS JACK-UP MOUNTINGS

TYPE **FSN**

DATA SHEET DS-50-4



TYPE FSN RATINGS (1336 Housing)

Type	Size	EAFM LDS Element: Element No.	Color Mark	Duro-meter ±5	Load Capacity: 0.2" Defl (lbs)	5 mm Defl (kgs)	0.3" Defl (lbs)	8 mm Defl (kgs)	Casting Color Code
FSN*-(3,4,5,6)	500	12530	Green	40	335	152	500	227	Green
	700	12530	Red	50	470	214	700	318	Red
	900	12530	White	60	600	273	900	409	White
	1300	11901	Red	50	875	396	1300	590	Orange
	1700	11901	White	60	1140	517	1700	771	Yellow

*FSN Housing Height matches floor thickness. Housing suffix indicates housing height, i.e. FSN4 indicates 4" 100mm floor and housing; FSN6, 6" 150mm floor and housing, etc.

NOTE: Castings can be modified for floors over 6" 150mm thick.

A Air Gap	B Floor Thickness	C Overall Height
Most Common 1" or 2" 25 or 50mm Occasionally 3" or 4" 75 or 100mm	3" 75mm– Minimum 4" 100mm– Most Common 5" 125mm– Seldom 6" 150mm– Common Thicker Floors or Fractional Dimensions As Required	Air Gap Plus Floor Thickness

Mounts are designed for 0.3" 8 mm maximum deflection under constant load. Temporary loadings may greatly exceed these numbers without damage or permanent set. See graph below right.

All mountings are molded to AASHTO specifications

The theoretical natural frequency of mounts without Dynamic Stiffness correction: At 0.2" 5 mm - 7.0 Hz, At 0.3" 8 mm - 5.7 Hz

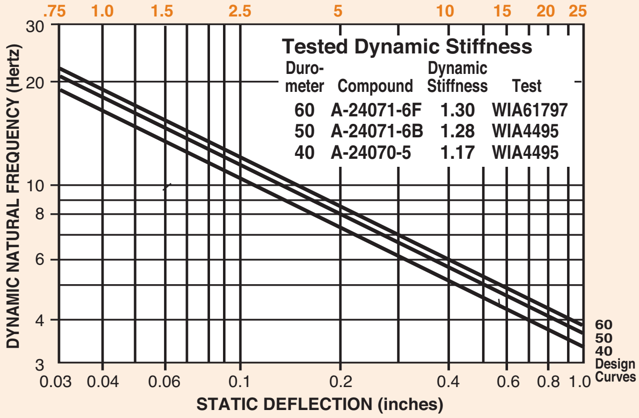
Actual frequencies may be read from the chart below.

AASHTO Bridge Bearing Specifications for Polyisoprene

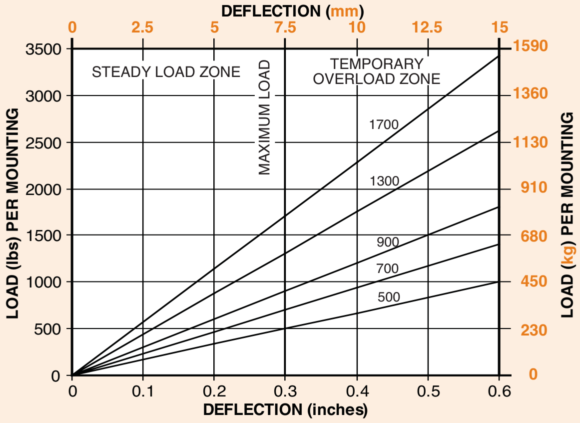
ORIGINAL PHYSICAL PROPERTIES (*Tests:* ASTM D-2240 & D-412): Duro-meter Shore A	Tensile Strength (min)	Elongat. at Break (min)	TESTED FOR AGING – OVEN AGING(70hrs/158°F) ASTM D-573: Hard-ness (max)	Tensile Strength (max)	Elongat. at Break (max)	OZONE ASTM D-1149: 25 pphm in air by Vol. 20% Strain 100°F	COMPRES-SION SET ASTM D-395 22hrs/158°F Method B	LONG TERM CREEP ISO8013 168 hrs
40±5*	2000 psi	500%	+10%	-25%	-25%	No Cracks	25%(max)	5%(max)
50±5	2250 psi	450%	+10%	-25%	-25%	No Cracks	25%(max)	5%(max)
60±5	2250 psi	400%	+10%	-25%	-25%	No Cracks	25%(max)	5%(max)
70±5	2250 psi	300%	+10%	-25%	-25%	No Cracks	25%(max)	5%(max)

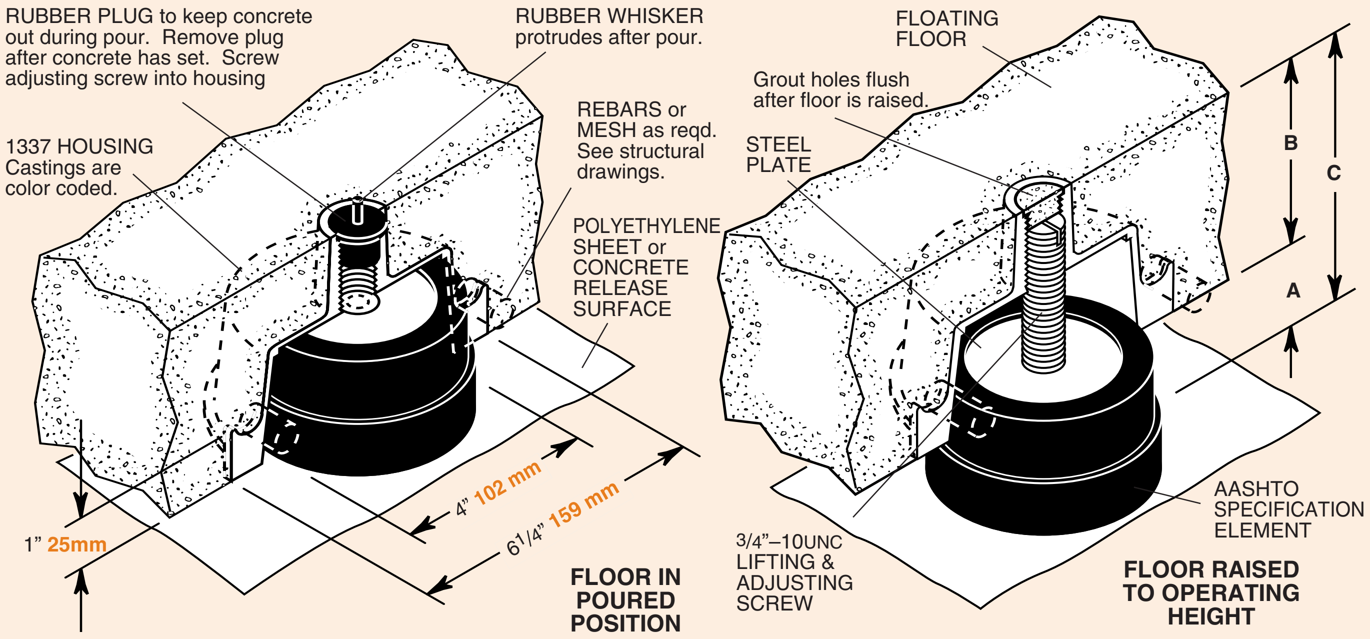
*AASHTO does not spec 40 Duro. 40 Duro by Mason.

MASON LOW DYNAMIC STIFFNESS (LDS) BRIDGE BEARING COMPOUNDS. DYNAMIC NATURAL FREQUENCY/DEFLECTION CHART



LOAD DEFLECTION CURVES





TYPE FSN RATINGS (1337 Housing)

Type	Size	EAFM LDS Element Element No.	Color Mark	Duro-meter ±5	Load Capacity 0.2" Defl (lbs)	5 mm Defl (kgs)	0.3" Defl (lbs)	8 mm Defl (kgs)	Casting Color Code
FSN*-	2800	12147	Red	50	1675	760	2500	1134	Black
(3,4,5,6)	3500	12147	White	60	2350	1066	3500	1588	Gray

*FSN Housing Height matches floor thickness. Housing suffix indicates housing height, i.e. FSN4 indicates 4" 100mm floor and housing; FSN6, 6" 150mm floor and housing, etc.

NOTE: Castings can be modified for floors over 6" 150mm thick.

A Air Gap	B Floor Thickness	C Overall Height
Most Common 1" or 2" 25 or 50mm Occasionally 3" or 4" 75 or 100mm	3" 75mm– Minimum 4" 100mm– Most Common 5" 125mm– Seldom 6" 150mm– Common Thicker Floors or Fractional Dimensions As Required	Air Gap Plus Floor Thickness

Mounts are designed for 0.3" 8 mm maximum deflection under constant load. Temporary loadings may greatly exceed these numbers without damage or permanent set. See graph below right.

All mountings are molded to AASHTO specifications.

The theoretical natural frequency of mounts without Dynamic Stiffness correction:

At 0.2" 5 mm - 7.0 Hz, At 0.3" 8 mm - 5.7 Hz

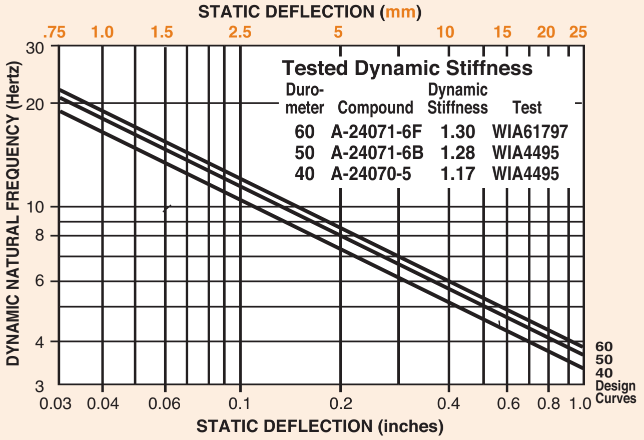
Actual frequencies may be read from the chart below.

AASHTO BRIDGE BEARING SPECIFICATIONS FOR POLYISOPRENE

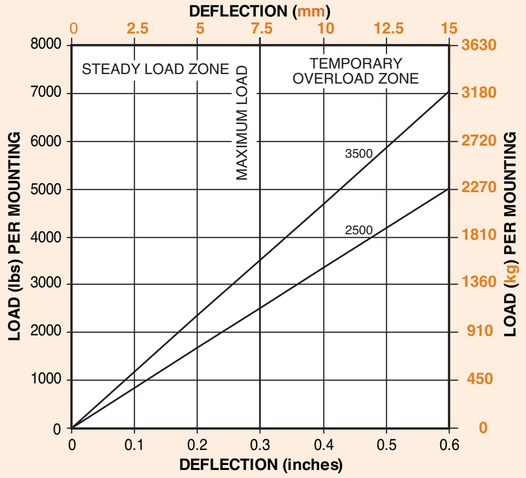
ORIGINAL PHYSICAL PROPERTIES			TESTED FOR AGING OVEN AGING(70hrs/158°F)			OZONE	COMPRES-SION SET	LONG TERM CREEP
Tests: ASTM D-2240 & D-412			ASTM D-573			ASTM D-1149	ASTM D-395	ISO8013
Duro-meter Shore A	Tensile Strength (min)	Elongat. at Break (min)	Hard-ness (max)	Tensile Strength (max)	Elongat. at Break (max)	25 pphm in air by Vol. 20% Strain 100°F	22hrs/158°F Method B	168hrs
40±5*	2000 psi	500%	+10%	-25%	-25%	No Cracks	25%(max)	5%(max)
50±5	2250 psi	450%	+10%	-25%	-25%	No Cracks	25%(max)	5%(max)
60±5	2250 psi	400%	+10%	-25%	-25%	No Cracks	25%(max)	5%(max)
70±5	2250 psi	300%	+10%	-25%	-25%	No Cracks	25%(max)	5%(max)

*AASHTO does not spec 40 Duro. 40 Duro by Mason.

MASON LOW DYNAMIC STIFFNESS (LDS) BRIDGE BEARING COMPOUNDS. DYNAMIC NATURAL FREQUENCY/DEFLECTION CHART



LOAD DEFLECTION CURVES



MECHANICAL EQUIPMENT

Products

Acoustic

Spring Jack-Up Mounts

Vibration & Rubber
Engineering Solutions

MASON INDUSTRIES, Inc.
Manufacturers of Vibration Control Products

350 Rabro Drive
Hauppauge, NY 11788
631/348-0282
FAX 631/348-0279
Info@Mason-Ind.com
www.Mason-Ind.com

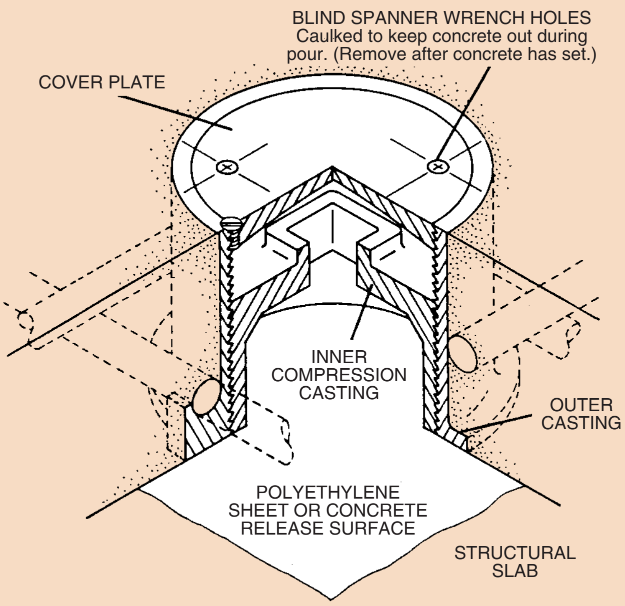
2101 W. Crescent Ave., Suite D
Anaheim, CA 92801
714/535-2727
FAX 714/535-5738
Info@MasonAnaheim.com
www.MasonAnaheim.com

SPRING JACK-UP MOUNTS for CONCRETE FLOATING FLOORS

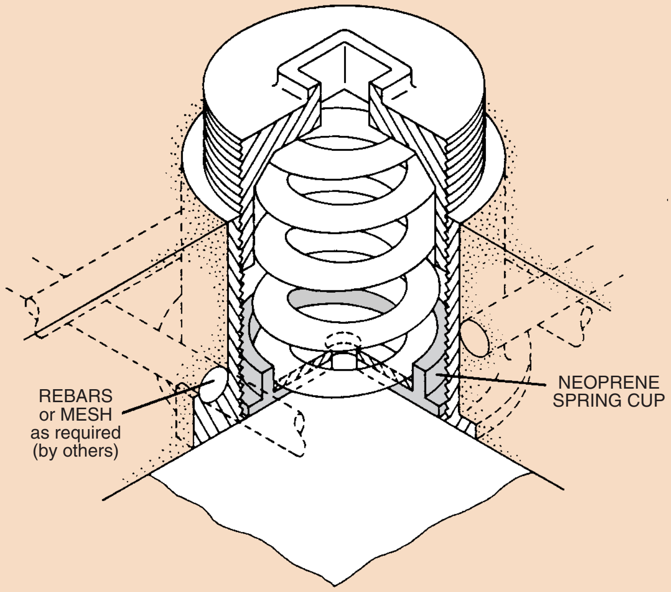
TYPE **FS**

DATA SHEET DS-55-3

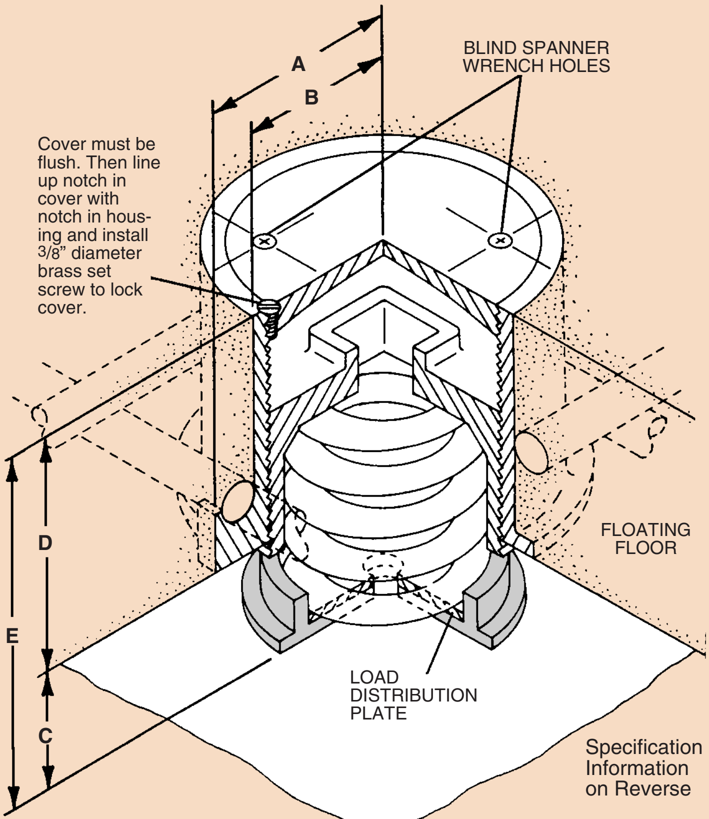
POSITION 1 FLOOR IN POURED POSITION



POSITION 2 SPRING & NEOPRENE CUP INSTALLED



POSITION 3 FLOOR IN RAISED POSITION WITH COVER PLATE INSTALLED



Specification Information on Reverse

Illustrated housing is for 4" **100mm** thick floating floors. Other outside configurations available for 3" **75mm**, 5" **125mm** and 6" **150mm** thick floating floors as required.

†Requires 2" **50mm** minimum Air Gap

TYPE FS RATINGS

Size	Rated Capacity (lbs)	Rated Capacity (kgs)	Rated Defl (in)	Rated Defl (mm)	Mount Constant (lb/in)	Mount Constant (kg/mm)	Spring Color/ Stripe
FS-B-450	450	204	1.31	33	344	6.2	Red
FS-B-750	750	340	1.12	28	670	12.1	White
FS-B-1000	1000	454	1.00	25	1000	18.2	Blue
FS-C-1000	1000	454	1.00	25	1000	18.2	Black
FS-C-1350	1350	612	1.00	25	1350	24.5	Yellow
FS-C-1750	1750	794	1.00	25	1750	31.8	Black*
FS-C-2100	2100	953	1.00	25	2100	38.1	Yellow*
FS-C-2385	2385	1082	1.00	25	2385	43.3	Yellow**
FS-C-2650	2650	1202	1.00	25	2650	48.1	Red*
FS-C-2935	2935	1331	1.00	25	2935	53.2	Red**
FS-B2-450‡	450	204	2.00	51	224	4.0	Tan
FS-B2-680‡	680	308	2.00	51	340	6.0	Gray
FS-C2-610‡	610	277	2.00	51	305	5.4	Green
FS-C2-880‡	880	399	2.00	51	440	7.8	Gray
FS-C2-1210‡	1210	549	2.00	51	605	10.8	Silver
FS-C2-1540‡	1540	699	2.00	51	770	13.7	Gray*
FS-C2-1870‡	1870	848	2.00	51	935	16.6	Silver*

*with RED inner spring **with GREEN inner spring

‡Published ratings allow minimum 25% additional travel to solid. For a full 50% specified minimum use the following ratings:

Size	Derated Capacity (lbs)	Derated Capacity (kgs)	Defl (in)	Defl (mm)	Size	Derated Capacity (lbs)	Derated Capacity (kgs)	Defl (in)	Defl (mm)
B2-450	410	186	1.83	46	C2-1210	1010	458	1.67	42
B2-680	565	256	1.66	42	C2-1540	1285	583	1.67	42
C2-880	800	363	1.82	46	C2-1870	1560	708	1.67	42

TYPE FS DIMENSIONS

Type & Size	Housing Dimensions A	Housing Dimensions B	C Air Gap	D Floor Thickness	E Overall Height
FS-B & B2	23/4" 70mm	2" 50mm	Most Common 1" or 2" 25 or 50mm	Minimum 3" 75mm†	Air Gap Plus Floor Thickness
FS-C & C2	31/4" 83mm	21/2" 65mm	Occasionally 3" or 4" 75 or 100 mm	Most Common 4" 100mm Occasionally 6" thru 12" 150 or 300mm	

SPECIFICATION INFORMATION

A. Scope

Isolate floating floor from building structure by means of steel spring jack-up isolators and perimeter isolation board.

B. Materials

1. Plastic sheeting: 6 mil(0.15mm)
2. Isolators: Castings or weldments consisting of an outer housing with internal threads and an inner housing with external threads. Outer housing shall have a removable cover plate, lifting flange, and lugs to position the steel reinforcement. The inner housing forms a protective cover over the spring element and shall be designed for spring adjustment. Springs shall be free standing, laterally stable and seated in a minimum 1/4"(6mm) thick neoprene acoustical cup. Spring deflection shall be a minimum of ______inches under the combined dead and live load. Air gap shall be ______inches.
3. Perimeter Isolation Board: 3/4"(20mm) thickness 10 lb. fiberglass or 1/2"(12mm) neoprene sponge.
4. Caulking Compound: Non-hardening, non-drying and non bleeding.
5. Floating Floor Drains: Cast iron pipe buckets with cast iron grills and large flanges to cover structural openings complete with waterproofing clamping ring. Upper member shall float with floating floor and sound leakage prevented by an interlocking water trap. Drains shall have weep holes where indicated on drawings.
6. Riser Seals: Steel cylinders containing neoprene sponge seals for both structural and floating floors.

C. Floor system adjustment procedure

1. Structural floor must be level, at mount locations, to specifications for upper surface of floating floor as mountings are used as screed points. Smoothness at mount locations plus or minus 0.03"(0.7mm).
2. Concrete perimeter forms must be set where required.
3. Cement perimeter material to wall, forms, around columns, etc. as shown on drawings and details.
4. Snap chalk lines showing mounting locations on structural floor. Spray paint or crayon intersections for clearer visibility through 6 mil(0.15mm) polyethylene sheeting.
5. Lay transparent polyethylene sheeting over entire floor area, lapping up and over perimeter isolation material and tape up to maintain position. Overlap sheeting one foot to increase width, where required and tape all seams.
6. Before placing castings, check to see if threads are greased and inner casting is flush with the bottom of the outer casting as on the Position 1 illustration. If not, turn casting to make it flush.
7. Place castings on maximum 48"(1200mm) centers in locations marked in Step 4 and in accordance with layout drawings.
8. Install reinforcing as shown on Mason or contract drawings.
9. Pour concrete to required thickness and finish flush with tops of floor mounts in a single pour. Work concrete around mountings and reinforcement to eliminate voids and entrapped air. Exercise caution to avoid shifting or lifting of mountings.
10. After concrete is fully cured and ready for lift, prepare each casting for spring installation as follow:
    A. Remove putty from 3/8" brass cover set screw and spanner holes. Remove set screw and store carefully.
    B. Unscrew cover plate by turning counter clockwise with 1" spanner wrench.
    C. Remove inner casting by turning counter clockwise with 1" square "T" wrench.
11. Install neoprene spring cup and proper spring in each locations. Replace inner casting as shown on the Position 2 illustration. Turn inner compression casting until it bears against top of spring.
12. Using square "T" wrench, take four clockwise turns on every inner casting. Work can proceed at one location at a time or with a gang of workers working simultaneously. Step 12 must be completed before proceeding to Step 13.
13. Take two additional clockwise turns on each inner casting.
14. Repeat Step 13 until floor is lifted to required elevation. Approximately eight turns are needed to compress the spring one inch and after springs are at design deflection, each additional eight turns lifts the floor one inch.
15. Install cover plate flush with top of floor and replace brass set screw to lock cover plate in position (see Position 3 illustration). This completes the spring adjustment procedure.
16. Caulk all around perimeter and penetrations as shown on drawing and details.

D. Submittals

1. Isolator layout drawings.
2. Isolator details.
3. Load and deflection curves of all isolators. (Steel spring mountings have dynamic frequencies which can be calculated from the deflection so that dynamic frequency tests are never run. To the best of our knowledge, no one has run acoustical tests on this type of installation because the steel springs function very close to the theoretical predictions.)
4. Drain details
5. Perimeter board details
6. Installation Procedure

E. Manufacturer

1. The setting of all isolation material and raising of the floor shall be performed by or under the supervision of the isolation manufacturer.
2. Subject to compliance with the specifications the following products are approved for use. Type FS Jack-up Mountings, AFG-10 Perimeter Board, CFD Floor Drains, SPS Spool Pipe Seals, Type CC-75 and CC-50 Caulking Compounds, all as manufactured by Mason Industries Inc.

SP808
8/00
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MECHANICAL EQUIPMENT

Products

Acoustic

Double Deflection Sway Braces

Vibration & Rubber
Engineering Solutions

MASON INDUSTRIES, Inc.
Manufacturers of Vibration Control Products

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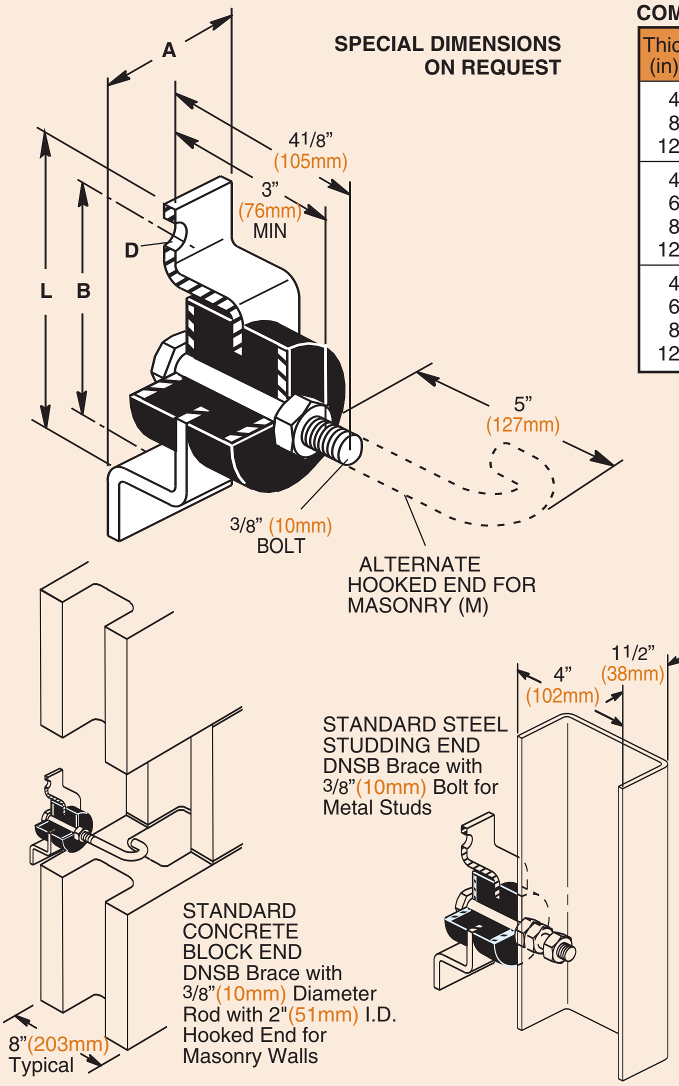
DOUBLE DEFLECTION SWAY BRACE FOR MASONRY OR DRY WALL CONSTRUCTION

TYPE **DNSB**

DATA SHEET DS-402-1.1 A



COMMON WALL WEIGHTS

Thickness (in) (mm)	Material	(lbs/ft²) (kg/m²)
4 102 8 203 12 305	Brick	35 175 75 365 115 560
4 102 6 152 8 203 12 305	Heavy Aggregate Hollow Concrete Block	35 175 50 245 58 285 90 440
4 102 6 152 8 203 12 305	Poured Concrete Masonry	48 235 72 350 96 470 144 705

Thickness (in) (mm)	Material	(lbs/ft²) (kg/m²)
4 102	Steel Studding Alone	1.5 7.5
2x4 51x102	Wood Studding Alone	2.0 10
1/2 13 5/8 16 3/4 19	Gypsum Board	2.1 10 2.7 13 3.2 16
1 25	Cement Plaster	10.0 50
1 25	Gypsum Plaster	5.0 25
-	Metal Lathe	0.5 2.5
-	Gypsum Lathing Board	2.0 10

PHYSICAL PROPERTIES OF BRIDGE BEARING NEOPRENE ELEMENTS

Grade (Durometer A)	60
Original Physical Properties	
Hardness ASTM-D676	60±5
Tensile strength, minimum psi ASTM-D412	2500
Elongation at break, minimum percentage	350
Accelerated Tests to Determine Long-term Aging Characteristics	
Oven Aging - 70 hrs @ 212 F, ASTM-D573	
Hardness, maximum change of points	+15
Tensile strength, maximum percentage of change	±15
Elongation at break, minimum percentage	-40
Ozone (1 ppm in air by volume @ 20% strain	
@ 100 + 2 F, ASTM-D1149, 100 hrs	No Cracks
Compression Set, ASTM-D395 - Method B,	
22 hrs at 158 F, maximum percentage of change	25

TYPE DNSB DIMENSIONS (in mm)

Type & Size	A	B	D Hole Diameter	L
DNSB-A DNSB-AM*	2 51	3 3/4 95	1/2 13	4 3/4 121
DNSB-B DNSB-BM*	2 1/2 64	4 1/4 108	1/2 13	5 1/4 133

TYPE DNSB LOAD RATINGS

Type & Size	Rated Axial Restraint & Deflection if Stressed				Maximum Assigned Wall Weight	Minimum Assigned Weight to Establish 10Hz	Resistance to Vertical Motion Created by Wall Pad or Floating Floor Deflection							
	Load (lb) (kg)	Defl (in) (mm)	Load (lb) (kg)	Defl (in) (mm)	(lb) (kg)	(lb) (kg)	Load (lb) (kg)	Defl (in) (mm)	Load (lb) (kg)	Defl (in) (mm)	Load (lb) (kg)	Defl (in) (mm)	Load (lb) (kg)	Defl (in) (mm)
DNSB-A DNSB-AM*	56 25	0.10 2.5	84 38	0.15 3.8	250 113	50 23	6 3	0.05 1.3	12 50	0.10 2.5	18 8	0.15 3.8	24 11	0.20 5.1
DNSB-B DNSB-BM*	260 118	0.10 2.5	390 177	0.15 3.8	1200 544	400 181	39 18	0.05 1.3	78 35	0.10 2.5	117 53	0.15 3.8	156 71	0.20 5.1

*“M” designates Hooked End for Masonry

1. Sway braces prevent buckling or overturning of tall or long walls.
2. Buckling forces are extremely small when braces are reasonably spaced both horizontally and vertically as the brace spacing maintains a very low l/r column ratio.
3. Our general recommendation is spacing on four foot centers both horizontally and vertically.
4. The maximum axial restraint rating is approximately 33% of the maximum assigned wall weight and extremely conservative.
5. Vertical resistance information is provided for checking embedment requirements in walls and shear or pullout forces on both ends of the sway braces. Sway braces are not to be used for vertical supports.
6. Response frequency is a function of the attached mass and the dynamic stiffness in the direction of vibration. The 10 Hz response is normally lower and more desirable than what is usually specified. Heavier weight assignments than the specified minimum will lower the response frequency by the square root of the ratio of the minimum weight to the assigned value multiplied by 10 Hz. Lighter loads will increase the frequency by the same proportion.

EXAMPLE: 8" Concrete Block Wall weighing 55 lbs. per sq/ft. Sway braces on 4 foot centers both ways.

Assigned Weight = 16 x 55 = 880 lbs.
Selection DNSB-B (Maximum 1200 lbs)
Frequency = 10Hz x $\sqrt{400/880}$ = 6.74 Hz

ACTOM

MECHANICAL EQUIPMENT

Products

Acoustic

Space Saving Sway Braces

ARNOT

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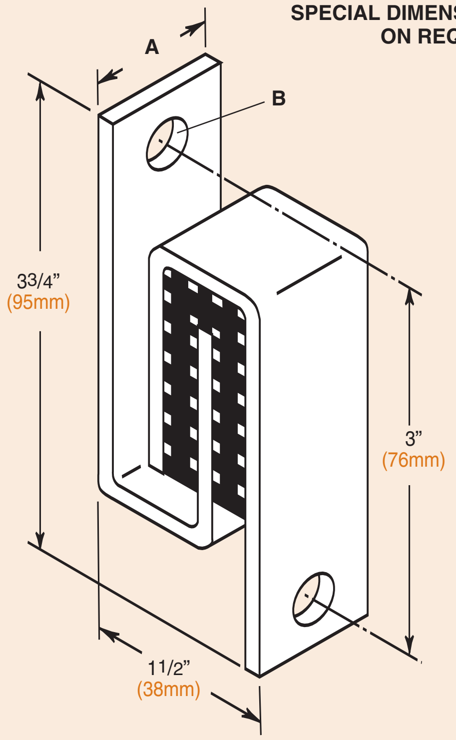
SPACE SAVING TYPE W NEOPRENE PAD INTERLOCKING CLIP (SWAY BRACE)

TYPE
WIC

DATA SHEET DS-402-1.1 B



COMMON WALL WEIGHTS

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Thickness (in)(mm)	Material	(lbs/ft^2) (kg/m^2)
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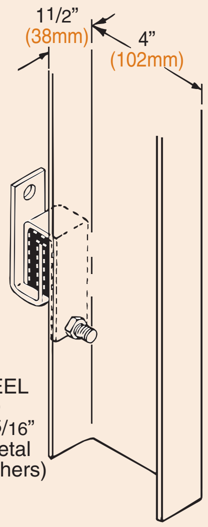
1/2 13 5/8 16 3/4 19	Gypsum Board	2.1 10 2.7 13 3.2 16
1 25 1 25	Cement Plaster Gypsum Plaster	10.0 50 5.0 25
- -	Metal Lathe Gypsum Lathing Board	0.5 2.5 2.0 10



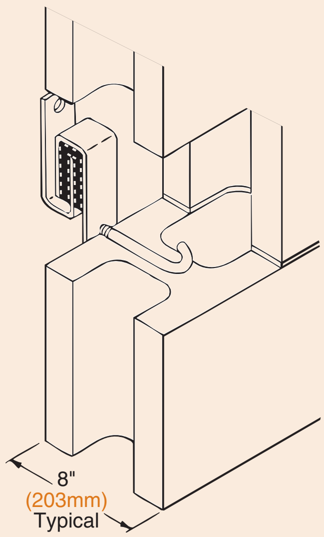
STANDARD STEEL STUDDING END
WIC Brace with 5/16" (8mm) Bolt for Metal Studs (Bolt by Others)

MATERIAL:

Standard 40 Durometer 5/16"(8mm) Neoprene Waffle Pad

TYPE WIC DIMENSIONS (in mm)

Type & Size	A	B Hole Diameter
WIC-1	1 25	3/8 10
WIC-2	2 51	3/8 10



STANDARD CONCRETE BLOCK END
WIC Brace with 5/16" (8mm) Diameter Rod with 2"(51mm) I.D. Hooked End for Masonry Walls (Hook by Others)

TYPE WIC LOAD RATINGS

Type & Size	Rated Horizontal Restraint & Deflection if Stressed: Load (lb)(kg)	Rated Horizontal Restraint & Deflection if Stressed: Defl (in)(mm)	Maximum Assigned Wall Weight (lb)(kg)	Minimum Assigned Weight to Establish 15Hz(lb)(kg)
WIC-1	90 41	0.05 1.3	250 113	50 23
WIC-2	260 118	0.05 1.3	500 227	100 45

1. Sway braces prevent buckling or overturning of tall or long walls.
2. Buckling forces are extremely small when braces are reasonably spaced both horizontally and vertically as the brace spacing maintains a very low l/r column ratio.
3. Our general recommendation is spacing on four foot centers both horizontally and vertically.
4. The maximum axial restraint rating is approximately 33% of the maximum assigned wall weight and extremely conservative.
5. Vertical resistance information is provided for checking embedment requirements in walls and shear or pullout forces on both ends of the sway braces. Sway braces are not to be used for vertical supports.
6. Response frequency is a function of the attached mass and the dynamic stiffness in the direction of vibration. The 15 Hz response is normally lower and more desirable than what is usually specified. Heavier weight assignments than the specified minimum will lower the response frequency by the square root of the ratio of the minimum weight to the assigned value multiplied by 15 Hz. Lighter loads will increase the frequency by the same proportion.

EXAMPLE: Steel stud wall with 2 layers of 3/4 inch gypsum board weighing 7.9 lbs. per sq/ft. Sway braces on 4 foot centers both ways.

Assigned Weight = 16 x 7.9 = 126 lbs.
WIC-1 Selection (Maximum 250 lbs)
Frequency = 15Hz x $\sqrt{126/250}$ = 10.65 Hz

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MECHANICAL EQUIPMENT

Products

ACOUSTIC

Spring Hangers

ARNOT

Vibration & Rubber
Engineering Solutions

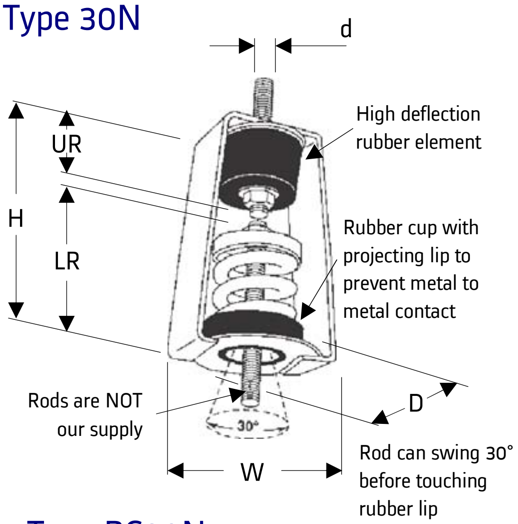
Type 30N and PC30N Spring Hangers

Selection Table

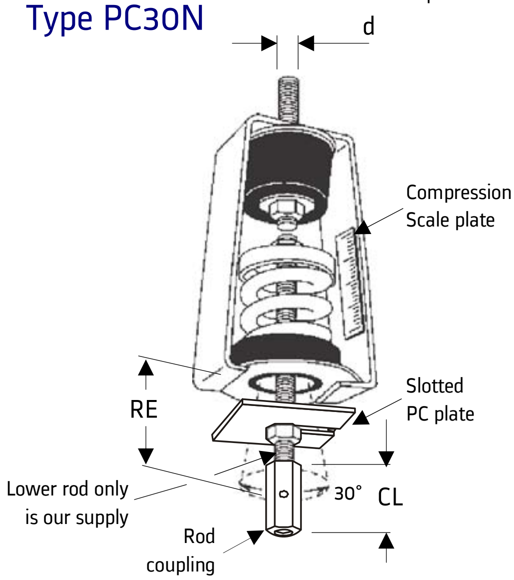
Type	Size	Rated Capacity [kg]	Rated Deflection [mm]	Spring Rate [kg/mm]	Spring Color	Average Rubber Defecltion [mm]
30N	12	5	25	0.2	Red	2
	25	11	25	0.44	Orange	2
	41	18.5	29	0.64	Red	4
	56	25	26	0.95	Black	4
	95	48	25	1.9	Green	4
	138	64	33	1.95	White	5
	278	125	27	4.6	Grey	5
	336	148	25	5.9	Red	5
	445	200	32	6.2	Brown	5
	800	350	27	13.0	Orange	5
	1500	665	34	19.6	Red	7
	2060	936	28	34.0	Black	7

All hangers can be tagged for identification, if specified

Type 30N



Type PC30N



LR = Allowance for length of lower rod above base of hanger – our supply only with PC30N

UR = Allowance for length of upper rod below top of hanger – rod not our supply

d = Rod diameter (M16 is standard for 30N and PC30N – 445 to 800. M12 can be supplied if specified)

RE = Rod extension – base of hanger to centre off rod coupling – our supply

CL = Length of rod coupling – our supply.

Prefix PC is used when pre-compression option is required.
Pre compression equipment comprises of slotted PC plate, threaded rod, top nut and lock nut, bottom nut, rod coupling and scale plate

Hanger supplied with spring pre-compressed to 80% of rated deflection, unless otherwise specified. Loosen nut and remove PC plate after hanger is fully loaded.

Dimensions in mm

Type	Size	H	W	D	LR	d	PC30N only	
							RE	CL
30N	12 - 25	145	85	50	75	M10	110	45
	41 - 95	145	85	50	80	M10	105	45
	138 - 336	170	120	50	105	M12	130	45
	445 - 800	273	135	65	125	M16 (M12)	120	50 (45)
	1500 - 2060	300	175	65	170	M20	120	50

Type DNHS and PCDNHS Spring Hangers

Selection Table

Type	Size	Rated Capacity [kg]	Rated Deflection [mm]	Spring Rate [kg/mm]	Spring Color	Average Rubber Deflection [mm]
DNHSA	45	20	40	0.5	Blue	4
	75	34	38	0.9	Orange	4
	125	56	33	1.7	Red	4
	200	90	29	3.1	Black	4
	310	152	25	6.1	Yellow	4
DNHSB	140	64	49	1.3	Orange	4.5
	280	128	40	3.2	Green	4.5
	450	207	33	6.3	Red	4.5
DNHSB	750	340	30	11.3	White	5
	1000	450	25	18.0	Blue	5
DNHSC	225	100	45	2.2	Blue	5.5
	435	200	39	5.1	Grey	5.5
	735	320	35	9.2	White	5.5
	1000	445	26	17.2	Black	5.5
DNHSC	1350	615	25	24.6	Yellow	6.5
	1675	765	25	30.6	Yellow[1]	6.5
	2100	950	25	38.0	Yellow[2]	6.5

1 with grey inner spring
2 with red inner spring

All hangers can be tagged for identification, if specified

LR = Allowance for length of lower rod above base of hanger – our supply only with PCDNHS

UR = Allowance for length of upper rod below top of hanger – not our supply

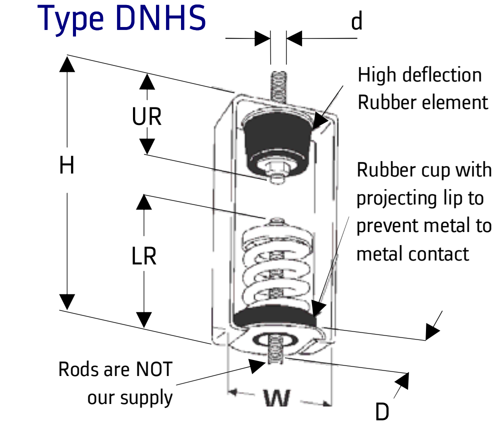
d = Rod diameter. First size shown is standard. Sizes in brackets are optional. Standard size will be supplied unless optional is specified.

RE = Rod extension – base of hanger to centre of rod coupling – our supply

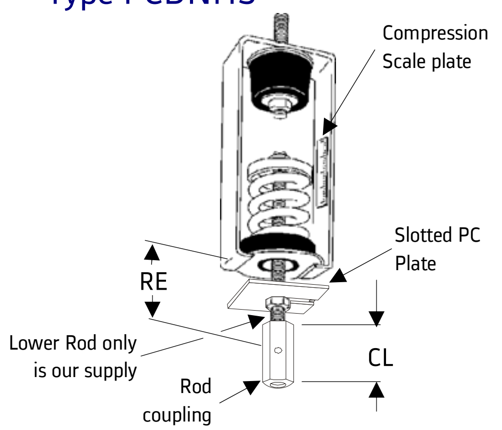
CL = Length of rod coupling – our supply.

DNHSD or PCDNHSD (2 springs) can be supplied for capacities up to 1900 kg. Dimensions are not published because they can be changed to meet the customer's particular requirements.

Type DNHS



Type PCDNHS



Hanger supplied with spring pre-compressed to 80% of rated deflection, unless otherwise specified. Loosen nut and remove PC plate after hanger is fully loaded.

Prefix PC is used when pre-compression option is required.
Pre compression equipment comprises of slotted PC plate, threaded rod, top nut and lock nut, bottom nut, rod coupling and scale plate

Dimensions in mm

Type	Size	H	W	D	LR	UR	d	PCHS only	
								RE	CL
DNHSA		170	83	50	100	55	M10	105	45
DNHSB	140 - 450	225	120	65	135	80	M12 (M16)	110	45 (50)
DNHSB	750 - 1000	225	120	65	135	80	M16 (M12)	110	50 (45)
DNHSC	225 - 435	275	135	65	140	80	M12 (M16)	110	45 (50)
DNHSC	735 - 1000	275	135	65	140	80	M16 (M12)	110	50 (45)
DNHSC	1350	275	135	65	150	90	M20	120	50
DNHSC	1675 - 2100	275	135	65	150	90	M20	120	50