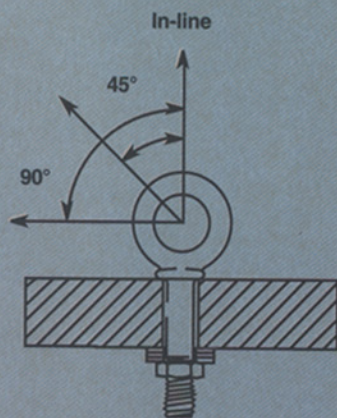


Figure 4. H-bridle suspension places a horizontal wire rope between the sloped bridle legs to load the loudspeaker suspension hardware in the vertical plane only.



Direction of pull	Adjusted working load
45°	30% of rated working load
90°	25% of rated working load

Figure 5. A Crosby shoulder eyebolt. (Courtesy the Crosby Group)



Figure 6. An offset swivel ring fitting.

sure hardware and the enclosure in such a way as to distribute an equal load over the greatest number of loudspeaker enclosure points. (See Figure 2.) Because loudspeaker enclosures are typically tilted, it is appropriate to use the forward two suspension points on the top of the enclosure as the primary suspension points. This also provides redundant suspension points. It is not appropriate to use the third point on the top of the enclosure because the tension will increase on the rear point as the enclosure is tilted, and the load will no longer be distributed equally or optimally across the loudspeaker enclosure as a whole. Because tilting the loudspeaker enclosure is usually a requirement, you must pull the bottom of the loudspeaker enclosure up until the desired tilt is achieved. The tilt attachment is not considered a primary suspension point, so you can construct it without the 5:1 design factor if you wish.

- *Vertical loading:* The strongest method of loading a loudspeaker enclosure is to apply a vertical load to a surface perpendicular to the load tension. (See Figure 3.) For most applications, this means attaching to the sides of the loudspeaker enclosure. Unfortunately, this can be extremely problematic because of hardware load-rating restrictions and cluster designs requiring tight coupling between loudspeaker enclosures. Very few hardware components are intended for a perpendicular load, and many of those have a load capacity reduction of 75% or more. Take great care to ensure manufacturer certification of the use of the hardware and the loudspeaker before suspending a loudspeaker enclosure in this fashion. Proper hardware and enclosure ratings are necessary in order for the respective manufacturers to assume product liability.

- *H-bridle suspension:* It is not unusual to have to suspend a loudspeaker where a structural suspension point is not directly above the loudspeaker enclosure location. With a situation such as this, it is common to install a bridle system consisting of two or more wire ropes attached to the structure at one end that converge at the loudspeaker on the other end. (See Figure 4.) When assembling a bridle, it is important to load the loudspeaker in the proper direction. Because the tension in a bridle leg increases as the slope of the bridle leg increases, it is common to find bridle leg tensions exceeding loudspeaker enclosure weights by three to five times the gross loudspeaker enclosure weight. Loudspeaker enclosures are not made for this type of longitudinal tension, and a load applied in this direction can quickly compromise the loudspeaker enclosure's structural integrity. To prevent the longitudinal tension from reaching the loudspeaker enclosure, insert a properly sized horizontal wire rope between the bridle legs. The horizontal wire rope absorbs the damaging lateral tension so that the loudspeaker enclosure is subjected only to vertical tension, as if it were being suspended from a point directly above.

Loading the loudspeaker hardware properly

A loudspeaker sold to be used in an overhead suspension application must be accompanied by an official certification by the loudspeaker manufacturer stating this fact. Without this certification, the product liability for the loudspeaker will be directed toward the contractor and the loudspeaker manufacturer. In short, if the contractor wants to take responsibility for the structural capacity of the loudspeaker, then a certification is not necessary; if the contractor wants minimal product liability exposure, then certification is mandatory.

Many loudspeaker enclosures are made using hardware from hardware vendors who do not provide the loudspeaker manufacturers with a certification for overhead suspension. In regard to product liability, this does not concern the contractor as long as the loudspeaker manufacturer is willing to provide the certification for overhead suspension on the loudspeaker enclosure assembly. In this case, it is the