high density filing system floor loads vs. design floor loads

The subject of actual floor loading vs. design floor loading often becomes misunderstood. The **Uniform Building Code** requires that as a minimum, floors be designed to support the dead load of the floor and the required live load. For an office building, the live load is usually a uniform load of **50 pounds per square foot (PSF)** over the entire tributary floor area for a framing member or a **2,000 pound load placed upon any 2 1/2 x 2 1/2 foot square space**. The load producing the greatest stress in a framing member is the governing load for that member.

The requirement to design a floor for a uniform load of 50 PSF over the entire tributary area for a particular member does not mean that this is the largest load that can be placed on the floor. The load is an average value for a typical office space with desks, filing cabinets, aisles, etc. As displayed by the concentrated load requirement, the 2,000 pounds in 6.25 square feet (2 1/2 ft. x 2 1/2 ft.) is a load of 320 PSF. This high loading presumes that the area around the concentrated load is unloaded. This would occur if the heavy object was surrounded by aisle space. Each loading condition must be reviewed individually.

The **typical floor load for high density filing is 250 PSF**. This is obviously greater than the 50 PSF uniform design load. Since the design load is presumed over every square foot of floor area, including aisles, the floor is not overloaded if there is four square feet of aisle area for each square foot of file storage floor area. This statement is a simplification of the issue and cannot be used as a basis of approval for every high density storage application. Each installation must be considered as a separate case. To avoid the danger of overloading the floor, the approximate weight of the system and the materials stored should be calculated and evaluated individually by a licensed architect or engineer

floor loading calculations

As mobile storage increases the capacity in a given area, the weight of the system automatically increases also. To verify whether a mobile storage system is within the approved floor loading weight as indicated by building specifications, the following calculations must be used.

NOTE: It is extremely important to obtain the approved floor loading for each individual system and installation, prior to any calculations and final evaluations being made.

1. Determine the area the mobile system will utilize. Take the actual length and width and add 3' to the width for main walking aisle. In some cases, if the mobile system is the only equipment within a room, take the area of the entire room. This will be the floor area as noted in the example below.

2. Calculate the weight of the system, including the mobile components, storage units and stored material. The mobile product and storage unit weights can be calculated from the estimate of what is to be included in the system. The weight of the stored material is calculated by multiplying the capacity (linear measurement) by the stored material weight (per linear measurement).

NOTE: In many cases, a mobile system will never be loaded to more than 80% of its full capacity.

3. To obtain the total system floor loading, divide the total weight of the system by the system floor area.

4. Ensure the total system weight does not exceed the specified building floor plan.

EXAMPLE: 4/3 Bi-File, Letter Tiers, 8 high, in a 10' x 17' room.

1. Floor area 10' x 17' = 170 sq. ft.

2. System weight:
Mobile (Bi-file) Weight - 190 lbs.
Storage Unit (Tier) Weight - 1,240 lbs.
Stored Material Weight - 7 units x 8 shelves/unit x 90 lbs./shelf = 5,040 lbs. x 80% (average load factor) = 4,032 lbs.
TOTAL SYSTEM WEIGHT = 5,462 lbs.

3. Floor Loading: 5,462 lbs./170 sq. ft. = 32 lbs/sq. ft.

4. Approved Floor Loading (Data obtained from Engineer/Architect) = 50 lbs./sq. ft.

As shown in the above example, based on floor loading data provided by an Architect/Engineer and through estimating the contained weights of the file units, mobile units and materials, the system complies with the floor loading requirements specified.

weight of stored material

Some commonly stored items and their approximate weights are listed below. For storage of other types of materials - parts, industrial supplies, samples, dry goods, etc. - an estimate should be obtained.

	Lbs. Per Inch	Lbs. Per Foot	Lbs. Per 36" Section
Letter size documents	**2**	**24**	**70**
Medical records	**2**	**24**	**70**
Legal size documents	**2 1/2**	**30**	**90**
X-Ray film w/jackets	**8**	**96**	**280**
Printouts (in binders)	**3 1/2**	**42**	**125**
Books	**1 1/4**	**15**	**45**