

APPROXIMATE WEIGHTS OF FIREPROOF FLOORS,

Exclusive of Partitions.

Type of Arch.	Depth of I Beam, Ins.	Thick-ness of Arch, Ins.	Thick-ness of Floor, Ins.	Weight, in lbs., per Square Foot.					
				Arches.	Filling.	Floor-ing.	Ceil-ing.	Steel.	Total.
Ordinary Brick Arch.	8	4	12	40	18	4	4	8	74
	9	4	12	40	18	4	4	8	74
	10	4	13	40	24	4	4	9	81
	12	4	15	40	36	4	4	10	94
	15	4	18	40	54	4	4	11	113
Hollow Brick Flat Arch, Ordinary Type.	8	6	13	29	30	4	4	7	74
	8	8	13	35	18	4	4	7	68
	9	6	14	29	36	4	4	7	80
	9	9	14	37	18	4	4	7	70
	10	8	15	35	30	4	4	8	81
	10	10	15	41	18	4	4	8	75
	12	8	17	35	42	4	4	8	93
	12	12	17	48	18	4	4	8	82
	15	8	20	35	60	4	4	10	113
	15	12	20	48	36	4	4	10	102
Hollow Brick Flat Arch, End Construction Type.	8	8	13	30	18	4	4	7	63
	9	8	14	30	24	4	4	7	69
	9	9	14	32	18	4	4	7	65
	10	8	15	30	30	4	4	8	76
	10	10	15	34	18	4	4	8	68
	12	8	17	30	42	4	4	8	88
	12	12	17	37	18	4	4	8	71
	15	8	20	30	60	4	4	10	108
	15	12	20	37	36	4	4	10	91

In addition to the weight of the floor construction, which is called the dead load, the floors must be designed to carry a live load of sufficient amount, which is usually determined by the purpose for which the building is to be used. The live load comprises the people in the building, furniture, movable stocks of goods, small safes, and varying loads of any character. Large safes require special provision usually embodied in the construction. The following live loads, per sq. ft., are recommended as good practice in building construction :

Dwellings	50 lbs.
Offices	70 "
Hotels and apartment houses	70 "
Theatres and churches	120 "
Ball-rooms and drill-halls	120 "
Lofts for light manufacturing purposes ..	150 "
Factories	from 150 " up.
Warehouses ..	" 250 " "

The weight of a crowd of people is usually assumed at 80 lbs. per sq. ft., but the weight of a very densely packed crowd may be as much as 120 lbs. The latter load can scarcely occur under the conditions governing an office building. Large crowds seldom collect in offices except on the lower floors devoted to stores and banking purposes, for which floors proper allowance for live loads is usually made. The actual live loads on office floors are generally much less than given in the preceding table. Messrs. Blackall & Everett, Architects, of Boston, made a careful canvass of the live loads in 210 Boston offices, and found that the average live load for the entire number of offices was about 17 lbs. per sq. ft. The greatest live load in any one office was 40 lbs. per sq. ft., while the average live load for the heaviest 10 offices was 33 lbs. per sq. ft. These figures give some idea of the average actual live loads in such buildings; but the use of such light average loads is not to be recommended, as the actual live load is liable to be concentrated, thus producing an effect greater than represented by the average load. Provision should be made for all possibilities of extreme, either present or future. No single floor should be proportioned for a live load less than those previously given. In high office buildings, hotels, and apartment houses, the foundations and lower tiers of columns may safely be proportioned for a live load of 50 lbs. per sq. ft. on all the floors; but the floors themselves and the upper tiers of columns should be proportioned for the full live loads previously given. Factories, warehouses, and similar buildings should be proportioned throughout for the full live load on each floor.

Building ordinances regulate the design of buildings in several of the larger cities, and the designer must be governed accordingly. The salient features of the Building Laws of New York, Chicago, and Boston are embodied in the following table.

COMPARISON OF BUILDING LAWS.

	New York.	Chicago.	Boston.
Floor Loads, lbs. per sq. ft.			
Dwellings	70	70	70
Hotels and Apartments.....	70	70	70
Office Buildings	100	70	100
Places of Public Assembly..	120	70	150
Stores, Warehouses, Fac- tories, etc.	150 up	150 up	250 up
Allowable Strains, lbs. per sq. in.			
Rolled Steel Beams and Shapes	15,000	16,000	16,000
Tension, Steel Shapes.....	....	16,000	15,000
Compression Flanges, built Steel Beams	15,000	13,500	12,000
Shearing, Steel Web Plates .	7,000	10,000	10,000
Shearing, Shop Rivets, Steel.	9,000	9,000	10,000
Shearing, Field Rivets, Steel.	....	7,500	....
Bearing on Steel Pins and Rivets	15,000	....	18,000
Bending on Steel Pins.....	....	....	22,500
Steel Columns.....	$\frac{12,000}{l^2}$	17,000 — $60\frac{l}{r}$ and not to exceed	$\frac{12,000}{l^2}$
	$1 + \frac{36,000r^2}{l^2}$	13,500	$1 + \frac{36,000r^2}{l^2}$
Round Cast Iron Columns.	$\frac{16,000}{l^2}$	$\frac{10,000}{l^2}$	$\frac{10,000}{l^2}$
	$1 + \frac{400d^2}{l^2}$	$1 + \frac{600d^2}{l^2}$	$1 + \frac{800d^2}{l^2}$
Square Cast Iron Columns.	$\frac{16,000}{l^2}$	$\frac{10,000}{l^2}$	$\frac{10,000}{l^2}$
	$1 + \frac{500d^2}{l^2}$	$1 + \frac{800d^2}{l^2}$	$1 + \frac{1,066d^2}{l^2}$
Allowable Pressures, tons per sq. ft.			
Granite .....	....	38	60
Marble and Limestone.....	....	30	40
Sandstone .....	....	24	30
Brickwork in Portland Ce- ment Mortar .....	....	15	....
Brickwork in ordinary Ce- ment Mortar	15	12	15
Brickwork in Cement and Lime Mortar	11½	....	12
Brickwork in Lime Mortar..	8	8	8
Clay, 15 ft. thick.....	....	2	....
Dry Sand, 15 ft. thick .....	....	1¾	....
Clay and Sand .....	....	1½	....
Good Solid Natural Earth ..	4	....	....
Loads on piles, tons each ...	20	25	....