FIRE-RESISTANCE AND SOUND-INSULATION RATINGS

FOR

WALLS, PARTITIONS, AND FLOORS

UNITED STATES DEPARTMENT OF COMMERCE

National Bureau of Standards

Technical Report on Building Materials 44

TECHNICAL REPORT ON BUILDING MATERIALS
FOR USE IN THE DESIGN OF BUILDINGS

****

TRBM-44

THE NATIONAL BUREAU OF STANDARDS
UNITED STATES DEPARTMENT OF COMMERCE
WASHINGTON 25, D. C.

FIRE-RESISTANCE AND SOUND-INSULATION RATINGS FOR WALLS, PARTITIONS, AND FLOORS

I.--INTRODUCTION

In the construction of buildings, particularly those of the residential type, partition and floor constructions should provide safety to life from the spread of fire and should reduce transmitted sounds and objectionable noises to inaudible levels. The ability of a construction to prevent the spread of fire may be expressed in periods of fire resistance, that is, the time for which the construction may be exposed to a fire of a standard intensity without collapse, passage of flame, or the transmission of heat sufficient to cause ignition of combustible material. The sound insulation may be measured by the decrease in intensity of the sound as it travels through the wall.

This paper gives the fire-resistance and sound-insulation ratings of walls, partitions, and floors. Most of the fire-resistance ratings are based on tests made at the National Bureau of Standards. Some are based on tests made at Underwriters' Laboratories or at Ohio State University. All of the sound-insulation ratings are based on tests made at the National Bureau of Standards. The detailed results of many of the fire tests of wood- and metal-framed partitions have been published in Building Materials and Structures Report BMS71, "Fire Tests of Wood- and Metal-Framed Partitions."[1] The details of the sound-insulation tests are given in Building Materials and Structures Report BMS~~47~~ 144, "Sound Insulation of Wall and Floor Construction", and Supplement 1.[2]

Since the present objective is to present information of value in selecting or designing constructions suitable for use as subdivisions between family units in multiple dwellings, those having fire-resistance ratings of less than 1/2 hr are not included. The ratings are applicable to walls and floors in other types of buildings.

---

[1] Obtainable from Superintendent of Documents, Washington 25, D.C. for 30¢.
[2] Obtainable from Superintendent of Documents, Washington 25, D.C. for ~~20¢~~ 40¢, 5¢.

030151/B

II.--METHOD OF PRESENTING RESULTS

The fire-resistance and sound-insulation ratings are given in separate sets of tables. The constructions are grouped on the basis of type or special feature. Each construction has been assigned a reference number which is a subnumber of the group number, and, where both fire-resistance and sound-insulation ratings are available, the cross reference number is also given. Where the two ratings are based on similar rather than identical constructions the cross reference number is given in parenthesis. The original test panel number for the sound tests is also given for use in reference to Building Materials and Structures Report BMS17 and Supplements.

The group numbers are as follows:

Fire-Resistance Ratings

F1 - Masonry walls
- F1.1 - Load-bearing brick walls (Table 1)
- F1.2 - Load-bearing walls of cored brick (Table 2)
- F1.3 - Load-bearing walls of structural clay tile (Table 3)
- F1.4 - Monolithic concrete walls (Table 4)
- F1.5 - Load-bearing walls of concrete masonry units (Table 5)
- F1.6 - Nonbearing partitions of structural clay tile (Table 6)
- F1.7 - Nonbearing partitions of gypsum blocks (Table 7)
- F1.8 - Nonbearing partitions of magnesium-oxysulfate bonded wood-fiber blocks (Table 8)
- F1.9 - Nonbearing partitions of concrete masonry units (Table 9)

F2 - Wood-stud partitions
- F2.1 - Load-bearing partitions faced with plaster on combustible lath (Table 10)
- F2.2 - Load-bearing partitions faced with plaster on gypsum lath (Table 11)
- F2.3 - Load-bearing partitions faced with plaster on metal lath (Table 12)
- F2.4 - Load-bearing partitions with board facings (Table 13)

F3 - Steel-stud partitions
- F3.1 - Hollow, load-bearing partitions faced with plaster on metal lath (Table 14)
- F3.2 - Hollow, nonbearing partitions faced with plaster on metal lath (Table 15)

F4 - Solid plaster partitions
- F4.1 - Steel-framed, nonbearing solid plaster partitions (Table 16)

F7 - Wood- or steel-joist floors
- F7.1 - Wood-joist floors (Table 17)
- F7.2 - Steel-joist floors (Table 18)

F8 - Concrete floors
- F8.1 - Reinforced-concrete slab floors (Table 19)
- F8.2 - Concrete-slab floors on precast joists of lightweight concrete (Table 20)
- F8.3 - Combination tile and concrete floors (Table 21)

F9 - Miscellaneous floors
- F9.1 - Steel-plate floors (Table 22)

Sound-Insulation Ratings

S2 - Wood- and steel-stud partitions
- S2.1 - Wood-stud partitions faced with plaster on wood lath (Table 23)
- S2.2 - Wood-stud partitions faced with plaster on metal lath (Table 23)
- S2.3 - Wood-stud partitions faced with plaster on gypsum lath (Table 23)
- S2.4 - Wood-stud partitions faced with combustible materials (Table 23)
- S2.5 - Wood-stud partitions with miscellaneous finishes (Table 23)
- S2.6 - Partitions with various arrangements of wood studs (Table 23)
- S2.7 - Load-bearing steel-stud partitions (Table 23)
- S2.8 - Nonbearing steel-framed partitions (Table 23)

S3 - Masonry walls and partitions
- S3.1 - Nonbearing brick walls (Table 24)
- S3.2 - Load-bearing brick walls (Table 24)
- S3.3 - Nonbearing structural clay tile partitions (Table 25)
- S3.4 - Load-bearing structural clay tile partitions (Table 25)
- S3.5 - Miscellaneous masonry partitions (Table 26)

S4 - Wood-stud partitions with special attachment of gypsum lath
- S4.1 - Partitions with lath fastened with large-headed nails (Table 27)
- S4.2 - Partitions with lath fastened with resilient clips (Table 27)

S5 - Nonbearing solid plaster partitions
- S5.1 - Partitions of plaster on metal lath supported by steel studs (Table 28)
- S5.2 - Partitions of plaster on metal lath or gypsum lath cores (Table 28)

S6 - Miscellaneous partitions and doors
- S6.1 - Partitions of plaster on portland cement-bonded excelsior blocks (Table 29)
- S6.2 - Partitions of fiberboard facings on fiberboard cores (Table 29)
- S6.3 - Heavy wooden doors (Table 29)

S7 - Wood- and steel-joist floors
- S7.1 - Wood-joist floors with wood subfloor and finish floor (Table 30)
- S7.2 - Wood-joist floors with special finishes above joists (Table 30)
- S7.3 - Wood-joist floors with special finishes below joists (Table 30)
- S7.4 - Wood-joist floors with special arrangement of joists (Table 30)
- S7.5 - Wood-joist floors with fiberboard soffits (Table 30)
- S7.6 - Steel-joist floors (Table 31)

S8 - Concrete floors
- S8.1 - Reinforced-concrete slab floors (Table 32)
- S8.2 - Flat-arch tile floors (Table 33)
- S8.3 - Combination tile and concrete floors (Table 34)

S9 - Miscellaneous floors
- S9.1 - Steel-plate floors (Table 35)

III.--CONSTRUCTION OF TEST PANELS

The test panels were generally constructed by skilled craftsmen working on a contract basis under specifications designed to give constructions representative of those which would be obtained in actual buildings.

1. Sound-Test Panels

Ordinary plasters were used for the sound-test panels. For lime plaster, the proportions were 1 part (by weight) of lime putty to 5 parts of sand for the scratch coat and 1 part of putty to 7 1/2 parts of sand for the brown coat. For gypsum plaster, the proportions were 1 part (by weight) of fibered gypsum plaster to 2 parts of sand for the scratch coat, and 1 part of plaster to 3 parts of sand for the brown coat. The plaster thicknesses were measured from the outside face of wood and gypsum lath and from the face of the studs with metal lath bases. A white finish coat was used on all sound-test panels except as indicated in the tables.

2. Fire-Test Panels

The kind of structural materials and the plaster proportions have a decided effect on the fire-resistance ratings. Hence, the construction details and plaster proportions are given with the tables to which they are applicable.

IV.--DISCUSSION OF FIRE-RESISTANCE RATINGS

The fire-resistance ratings are based on the results of fire tests conducted in substantial accord with the Standard Specifications for Fire Tests of Building Construction and Materials, ASA No. A2-1934. Most of the ratings were taken directly from these test results. A few of the ratings for walls of intermediate thicknesses were derived by interpolation according to the methods given in Appendix B, Building Materials and Structures Report BMS92, "Fire-Resistance Classifications of Building Constructions."[1]

According to the fire-test specifications, one side of walls and the under side of floors are exposed to fire of increasing intensity as indicated by the following temperatures:

1,000° F at 5 min.
1,300° F at 10 min.
1,550° F at 30 min.
1,700° F at 1 hr.
1,850° F at 2 hr.
2,000° F at 4 hr.
2,300° F at 8 hr.

The following conditions determine the fire-resistance ratings:

(a) The time at which an average temperature rise of 250 deg F or a maximum rise of 325 deg F, as measured by five or more thermocouples under asbestos pads, is attained on the unexposed side;

---

[1]Obtainable from Superintendent of Documents, Washington 25, D.C. for ~~30¢~~ 35¢

(b) The time at which heat or gases hot enough to ignite cotton waste, pass through the construction;

(c) The time at which the construction, if load-bearing, fails under the design load or otherwise collapses.

The design loads were 120 to 160 lb/in.^{2} for solid brick walls; 80 lb/in.^{2} for hollow walls of brick, for walls of cored brick, or for hollow masonry units; and 360 lb/in.^{2} of net stud area for the wood-stud walls. The loads for the floors were calculated on a basis of 1000 lb/in.^{2} maximum fiber stress for wood-supporting members and 18,000 lb/in.^{2} for steel-supporting members.

The fire-resistance ratings are given to the nearest 5 minutes up to and including 45 minutes, to the nearest 15 minutes from there on up to and including 2 hours, at 30-minute intervals from 2 to 4 hours, and at 1-hour intervals for longer periods. With the exception of the wood-joist floor without soffit protection the constructions, which by test gave ratings of less than 30 minutes, are not listed in these tables.

V.--DISCUSSION OF SOUND-INSULATION RATINGS

1. Sound-Transmission Loss

General principles of sound insulation are discussed in BMS17. A brief statement of those principles is given in this report.

A measure of the sound-insulation efficiency of a wall or floor structure may be obtained by determining the sound-transmission loss in decibels. The latter is merely an expression of the amount by which sound energy incident on a wall or floor between two rooms is reduced by its passage through the wall or floor.

In general, the sound-transmission loss of a given wall is a function of frequency. The loss usually increases with frequency so that the partition is a better insulator at high frequencies. Measurements of transmission loss which have been made in the Sound Laboratory of the National Bureau of Standards since about 1930 have been conducted at nine frequencies: 128, 192, 256, 384, 512, 768, 1024, 2048, and 4096 cycles per second. The average transmission loss given in the tables in this report is the arithmetical average of the losses at each of these individual frequencies. This numerical value is an approximate way of expressing the average insulation of a construction for typical sounds. If the spectrum is known in advance, the actual transmission loss may be computed from the transmission losses at the individual frequencies. The individual frequency measurements for panels numbered up to 200 are given in BMS 17 and Supplement No. 1; frequency measurements for panels having higher numbers than 200 are given in Supplement No. 2.

The computed average transmission loss depends on the range of frequencies over which the measurements were made. Prior to 1930, a more restricted range of frequencies was used, the individual frequencies being 256, 512, 1024, 2048, and 3100 cycles per second. Consequently, the average for the range 256 to 3100 c/s will differ from that for 128 to 4096 c/s. In the

tables of this report, two columns of average values appear corresponding to these two different ranges. The values in any one column are comparable. However, a value in the first average column should not be compared with a value in the second. It is possible in a limited number of cases to reduce the two sets of values to a common basis. In these cases values are given in both average columns.

Whether a given partition will provide adequate insulation depends to a large extent on the existing noise levels in the rooms separated by the partition. For average conditions existing in apartment buildings and other dwelling units, it has been found that a wall or floor having a loss of 45 decibels for the frequency range of 128 to 4096 cycles per second will reduce conversation at normal speech levels to inaudibility. Some housing projects have used partitions having a loss as low as 40 decibels. For quiet conditions, ordinary conversation transmitted through such partitions will be audible and partially intelligible.

2. Effect of Weight and Method of Construction on Transmission Loss

Two important factors, weight and method of construction, should be considered in estimating transmission loss of walls which have not been subjected to sound tests. For a homogeneous partition the sound-transmission loss is dependent principally upon the weight. The loss increases slowly as the mass is increased. It has been found experimentally that if the weight is doubled the loss is increased by approximately 4 decibels. A homogeneous wall must be relatively massive to give satisfactory sound insulation. Thus, a thin steel wall and a thick plywood wall having the same weight per square foot would have approximately the same transmission loss. Furthermore, the sound-transmission loss of a homogeneous wall is, to a large extent, independent of the wall material provided the material is not porous.

Efficient sound-insulating structures without excessive weight may be constructed by connecting the individual lamina in the partition as loosely as possible. Wood-stud partitions, Sound Group S4.2, finished with plaster on plasterboard lath fastened with resilient spring clips are examples of this type. In this type of construction, the two wall faces are very loosely coupled and the insulation loss is about 45 decibels. Since spring clips of different designs vary in the degree of resilience they interpose between the plaster face and the stud, the transmission loss will also vary. Consequently the values corresponding to the different clips in Sound Group S4.2 vary over a range of about 10 decibels. Variations occur also in Group S4.2 because there are differences in the mass of the walls. Additional information concerning these clips will be found in BMS17.

Variation in kind and proportion of plaster have no decided effect on the sound-insulation efficiency provided the weight of the panel is approximately the same. Lime plaster is an exception. In comparable sound-transmission tests, lime-plaster partitions have shown higher sound-insulation efficiencies then gypsum-plaster partitions. Apparently this is caused by the greater internal friction resulting from the softness of the lime plaster.

It should be noted that the application of sound absorbing finishes to the walls has little to do with making a room "soundproof". It is necessary to prevent the transmission of sound into or out of the room and this depends upon the sound-insulation ratings of the wall, floor, and ceiling constructions.

3. Rating of Floors

Two ratings for floors are given in the tables: (1) The sound-transmission loss, which is a measure of the insulation of the panel for airborne sounds, and (2) the tapping loss, which is a measure of the insulation for impact sounds. Airborne sounds are those that originate within the room, are carried through the air, and then through the walls, partitions, or floor; impact sounds are those that are caused by tapping or other mechanical contacts. Floor or other constructions may be good insulators against airborne sounds, yet, may be very poor insulators against impact sounds. The type of floor and surface treatment determines the effectiveness of the construction in providing insulation against tapping noises. Soft coverings may be applied to floors to reduce tapping noises. Rubber- or asphalt-tile improves the insulation of a bare concrete or wood floor; a heavy pile rug gives still further improvement.

The method of rating the floors against impact sound given as "tapping loss" in tables 30 to 35 in this report is based on the difference between the noise levels in the rooms above and below the floor construction resulting from the operation of a standard machine for producing impact sounds. This device is described in BMS144.

It should be noted that it is possible to rate floor coverings by two other methods in addition to the tapping loss already discussed. One of these methods would be to rank floor coverings in accordance with their ability to reduce the noise level generated by the mechanical impacts in the source room itself. The other would be to rank floor coverings on the basis of the amount of noise generated in the room below. The techniques of obtaining the latter two types of impact rating are still under development. Hence, data of this nature have not been included here. The relative rating of floors when ranked in terms of tapping loss will not necessarily be the same as when ranked by either of the two latter methods.

Table 1.--FIRE-RESISTANCE RATINGS OF LOAD-BEARING BRICK WALLS. GROUP F1.1

The 8-in. brick walls having the ratings given in the following table should be loaded to not more than 160 lb/in.^{2} and may be laid with 1:1:6 portland cement-lime mortar, 1:3 portland cement mortar or 1:3 lime mortar. The 4-in. walls should be loaded to not more than 80 lb/in.^{2} and the mortar mix should be not leaner than the 1:1:6 proportion.

The 8-in. hollow rolok walls were built with the outside courses of brick laid on edge with alternate header bricks on edge as required by the design, leaving a 3- to 3 1/2-in. air space in the middle of the wall. The mortar mix for these walls should be not leaner than the 1:1:6 proportion and the working load should be not more than 160 lb/in.^{2} If the hollow spaces surrounding the ends of combustible members projecting into the wall are filled solidly with mortar or masonry, the ratings for 8-in. unplastered hollow rolok walls will be 2 hr and for the 8-in. plastered walls 2 1/2 hr.

The cavity walls were built of two wythes of brick laid flat with a 1/4-in. metal tie between them for each 3 sq ft of wall area. Such walls may have an average working load of 40 lb/in.^{2} of gross area which may be applied eccentrically to give a stress of not more than 80 lb/in.^{2}

The ratings for plastered brick walls are based on the use of not less than 1/2 in. of 1:3 sanded gypsum plaster.

FIRE REFERENCE NO.	STRUCTURAL WALL: THICKNESS	STRUCTURAL WALL: KIND OF BRICK	PLASTER	STRUCTURAL MEMBERS PROJECTING INTO WALL	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	IN.				HR	MIN	
F1.1.1	4	CLAY OR SHALE	NONE	NONE	1	15	—
F1.1.2	4	DO	BOTH SIDES	DO	2	30	S3.1.2
F1.1.3	8	DO	NONE	COMBUSTIBLE	2	00	—
F1.1.4	8	DO	DO	NONE OR INCOMBUSTIBLE	5	00	—
F1.1.5	8	DO	BOTH SIDES	COMBUSTIBLE	2	30	S3.2.1
F1.1.6	8	DO	DO	NONE OR INCOMBUSTIBLE	7	00	—
F1.1.7	8*	DO	NONE	COMBUSTIBLE	1	00	—
F1.1.8	8*	DO	DO	NONE OR INCOMBUSTIBLE	2	30	—
F1.1.9	8*	DO	BOTH SIDES	COMBUSTIBLE	1	30	—
F1.1.10	8*	DO	DO	NONE OR INCOMBUSTIBLE	4	00	—
F1.1.11	9 TO 10**	DO	NONE	COMBUSTIBLE	2	00	—
F1.1.12	9 TO 10**	DO	DO	NONE OR INCOMBUSTIBLE	5	00	—
F1.1.13	9 TO 10**	DO	BOTH SIDES	COMBUSTIBLE	2	30	—
F1.1.14	9 TO 10**	DO	DO	NONE OR INCOMBUSTIBLE	7	00	—
F1.1.15	4	CONCRETE	NONE	NONE	1	30	—
F1.1.16	4	DO	BOTH SIDES	DO	3	00	(S3.1.2)
F1.1.17	8	DO	NONE	COMBUSTIBLE	2	30	—
F1.1.18	8	DO	DO	NONE OR INCOMBUSTIBLE	6	00	—
F1.1.19	8	DO	BOTH SIDES	COMBUSTIBLE	3	00	(S3.2.1)
F1.1.20	8	DO	DO	NONE OR INCOMBUSTIBLE	8	00	—
F1.1.21	4	SAND-LIME	NONE	NONE	1	45	—
F1.1.22	4	DO	BOTH SIDES	DO	3	00	(S3.1.2)
F1.1.23	8	DO	NONE	COMBUSTIBLE	2	30	—
F1.1.24	8	DO	DO	NONE OR INCOMBUSTIBLE	7	00	—
F1.1.25	8	DO	BOTH SIDES	COMBUSTIBLE	3	00	(S3.2.1)
F1.1.26	8	DO	DO	NONE OR INCOMBUSTIBLE	9	00	—

*HOLLOW ROLOCK TYPE WALL
**CAVITY TYPE WALL

Table 2.--FIRE-RESISTANCE RATINGS OF LOAD-BEARING WALLS OF CLAY OR SHALE CORED BRICK. GROUP F1.2

The 8-in. walls of cored brick having the ratings given in the following table should be loaded to not more than 120 lb/in.^{2} when the percentage of solid material is between 70 and 87; when 87 percent or more, the load may be 160 lb/in.^{2} of gross area. This assumes they are laid with mortar not leaner than the 1:1:6 cement-lime mortar.

The given ratings for plastered walls have been based on the use of not less than 1/2 in. of 1:3 sanded gypsum plaster.

FIRE REFERENCE NO.	STRUCTURAL WALL: THICKNESS	STRUCTURAL WALL: UNITS IN THICKNESS	STRUCTURAL WALL: CELLS IN WALL THICKNESS	STRUCTURAL WALL: MINIMUM SOLID MATERIAL IN UNITS	PLASTER	STRUCTURAL MEMBERS PROJECTING INTO WALL	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	IN.		NO.	PERCENT			HR	MIN	
F1.2.1	8	1	1	70	NONE	COMBUSTIBLE	1	00	—
F1.2.2	8	1	1	70	DO	NONE OR INCOMBUSTIBLE	2	30	—
F1.2.3	8	1	1	70	BOTH SIDES	COMBUSTIBLE	1	30	—
F1.2.4	8	1	1	70	DO	NONE OR INCOMBUSTIBLE	4	00	—
F1.2.5	8	2	2	87	NONE	COMBUSTIBLE	2	00	—
F1.2.6	8	2	2	87	DO	NONE OR INCOMBUSTIBLE	5	00	—
F1.2.7	8	2	2	87	BOTH SIDES	COMBUSTIBLE	2	30	—
F1.2.8	8	2	2	87	DO	NONE OR INCOMBUSTIBLE	7	00	—

Table 3.--FIRE-RESISTANCE RATINGS OF LOAD-BEARING WALLS OF STRUCTURAL CLAY TILE. GROUP F1.3

All tiles for which the ratings given in the following table apply should conform with ASTM specifications from the standpoint of strength and absorption. They should be laid with not leaner than 1:1:4 portland cement-lime mortar and loaded to not more than 80 lb/in.^{2}

The ratings for walls with combustible members projecting into the walls may be increased to those given for similar walls with incombustible members if the spaces surrounding the ends of the members are filled solidly with mortar or masonry, but in no case may it exceed 2 hr for 8-in. unplastered walls or 2 1/2 hr for 8-in. plastered walls.

The ratings for plastered walls have been based on the use of not less than 5/8 in. of 1:3 sanded gypsum plaster.

FIRE REFERENCE NO.	STRUCTURAL WALL: NOMINAL WALL THICKNESS	STRUCTURAL WALL: CELLS IN WALL THICKNESS	STRUCTURAL WALL: MINIMUM SOLID MATERIAL IN UNITS	PLASTER	STRUCTURAL MEMBERS PROJECTING INTO WALL	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	IN.	NO.	PERCENT			HR	MIN	
F1.3.1	8	2	40	NONE	COMBUSTIBLE	0	45	—
F1.3.2	8	2	40	DO	NONE OR INCOMBUSTIBLE	1	15	—
F1.3.3	8	2	40	BOTH SIDES	COMBUSTIBLE	1	30	S3.4.3
F1.3.4	8	2	40	DO	NONE OR INCOMBUSTIBLE	3	00	—
F1.3.5	8	2	43	NONE	COMBUSTIBLE	0	45	—
F1.3.6	8	2	43	DO	NONE OR INCOMBUSTIBLE	1	30	—
F1.3.7	8	2	43	BOTH SIDES	COMBUSTIBLE	1	30	S3.4.3
F1.3.8	8	2	43	DO	NONE OR INCOMBUSTIBLE	3	00	—
F1.3.9	8	2	46	NONE	COMBUSTIBLE	1	00	—
F1.3.10	8	2	46	DO	NONE OR INCOMBUSTIBLE	1	45	—
F1.3.11	8	2	46	BOTH SIDES	COMBUSTIBLE	1	45	S3.4.3
F1.3.12	8	2	46	DO	NONE OR INCOMBUSTIBLE	3	30	—
F1.3.13	8	2	49	NONE	COMBUSTIBLE	1	15	—
F1.3.14	8	2	49	DO	NONE OR INCOMBUSTIBLE	2	00	—
F1.3.15	8	2	49	BOTH SIDES	COMBUSTIBLE	2	00	S3.4.3
F1.3.16	8	2	49	DO	NONE OR INCOMBUSTIBLE	4	00	—
F1.3.17	8	3 OR 4	40	NONE	COMBUSTIBLE	0	45	—
F1.3.18	8	3 OR 4	40	DO	NONE OR INCOMBUSTIBLE	1	45	—
F1.3.19	8	3 OR 4	40	BOTH SIDES	COMBUSTIBLE	1	30	S3.4.4
F1.3.20	8	3 OR 4	40	DO	NONE OR INCOMBUSTIBLE	3	30	—
F1.3.21	8	3 OR 4	43	NONE	COMBUSTIBLE	0	45	—
F1.3.22	8	3 OR 4	43	DO	NONE OR INCOMBUSTIBLE	2	00	—
F1.3.23	8	3 OR 4	43	BOTH SIDES	COMBUSTIBLE	1	30	S3.4.5
F1.3.24	8	3 OR 4	43	DO	NONE OR INCOMBUSTIBLE	4	00	—
F1.3.25	8	3 OR 4	48	NONE	COMBUSTIBLE	1	00	—
F1.3.26	8	3 OR 4	48	DO	NONE OR INCOMBUSTIBLE	2	30	—
F1.3.27	8	3 OR 4	48	BOTH SIDES	COMBUSTIBLE	1	45	S3.4.5
F1.3.28	8	3 OR 4	48	DO	NONE OR INCOMBUSTIBLE	4	00	—
F1.3.29	8	3 OR 4	53	NONE	COMBUSTIBLE	1	15	—
F1.3.30	8	3 OR 4	53	DO	NONE OR INCOMBUSTIBLE	3	00	—
F1.3.31	8	3 OR 4	53	BOTH SIDES	COMBUSTIBLE	2	00	S3.4.5
F1.3.32	8	3 OR 4	53	DO	NONE OR INCOMBUSTIBLE	5	00	—

Table 4.--FIRE-RESISTANCE RATINGS OF MONOLITHIC CONCRETE WALLS. GROUP F1.4

The four walls in this series were made of concrete composed of portland cement, Potomac River siliceous gravel and sand.

The 6 and 8 in. thick walls were tested under load with no collapse of either. The load on the 8-in. wall was limited to 200 lb/in.^{2} by the strength of the test frame.

The fire resistance of the 4 in. thick wall as tested under load of 100 lb/in.^{2} with height of 10 ft was limited by load failure induced by high lateral deflection at midheight. As tested, built into the 10- by 16-ft test frame with contact therewith on all four edges, the fire resistance was limited by the temperature rise on the unexposed side.

FIRE REFERENCE NO.	WALL CONSTRUCTION			LOAD	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	DETAILS	MIX, BY VOLUME	THICKNESS				
			IN.	LB/IN.^{2}	HR	MIN	
F1.4.1	CONCRETE, WITH 4- BY 4-IN. NO. 6 WIRE-WELDED FABRIC NEAR THE CENTER PLANE OF THE WALL	1:2.5:3.5	4	100	0	45	—
F1.4.2	DO	1:2.5:3.5	4	NON-BEARING	1	15	—
F1.4.3	DO	1:2.5:3.5	6	300	2	30	—
F1.4.4	CONCRETE, NO WIRE FABRIC	1:2.5:3.5	8	200	5	00	—

Table 5.--FIRE RESISTANCE RATINGS OF LOAD-BEARING WALLS OF CONCRETE MASONRY UNITS. GROUP F1.5

The ratings for the walls given in the following table apply when the units are laid with mortar not leaner than 1:1:6 portland cement-lime mortar and when the walls are loaded to not more than 80 lb/in.^{2} of gross area.

The ratings for walls with combustible members projecting into the wall may be increased to that given for similar walls with incombustible members if the spaces surrounding the ends of members are filled solidly with mortar and masonry, but in no case may it exceed 2 hr for 8-in. unplastered walls or 2 1/2 hr for 8-in. plastered walls.

The ratings for plastered walls are based on the use of not less than 1/2 in. of 1:3 sanded gypsum plaster.

FIRE REFERENCE NO.	STRUCTURAL WALL: THICKNESS	STRUCTURAL WALL: CELLS IN WALL	STRUCTURAL WALL: MINIMUM SOLID MATERIAL IN UNITS	PLASTER	STRUCTURAL MEMBERS PROJECTING INTO WALL	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
A. UNITS MADE WITH EXPANDED BURNED CLAY OR SHALE, CRUSHED LIMESTONE, UNEXPANDED SLAG, OR CINDERS								
	IN.		PERCENT			HR	MIN	
F1.5.1	8	1	52	NONE	COMBUSTIBLE	0	45	—
F1.5.2	8	1	52	DO	NONE OR INCOMBUSTIBLE	2	00	—
F1.5.3	8	1	52	BOTH SIDES	COMBUSTIBLE	1	30	—
F1.5.4	8	1	52	DO	NONE OR INCOMBUSTIBLE	3	30	—
F1.5.5	8	1	62	NONE	COMBUSTIBLE	1	00	—
F1.5.6	8	1	62	DO	NONE OR INCOMBUSTIBLE	2	30	—
F1.5.7	8	1	62	BOTH SIDES	COMBUSTIBLE	1	30	—
F1.5.8	8	1	62	DO	NONE OR INCOMBUSTIBLE	4	00	—
F1.5.9	8	1	70	NONE	COMBUSTIBLE	1	30	—
F1.5.10	8	1	70	DO	NONE OR INCOMBUSTIBLE	3	00	—
F1.5.11	8	1	70	BOTH SIDES	COMBUSTIBLE	2	00	—
F1.5.12	8	1	70	DO	NONE OR INCOMBUSTIBLE	5	00	—
F1.5.13	10	1	60	NONE	COMBUSTIBLE	1	30	—
F1.5.14	10	1	60	DO	NONE OR INCOMBUSTIBLE	4	00	—
F1.5.15	10	1	60	BOTH SIDES	COMBUSTIBLE	2	00	—
F1.5.16	10	1	60	DO	NONE OR INCOMBUSTIBLE	6	00	—
F1.5.17	12	1	55	NONE	COMBUSTIBLE	1	30	—
F1.5.18	12	1	55	BOTH SIDES	DO	2	00	—
F1.5.19	12	1	62	NONE	DO	2	00	—
F1.5.20	12	1	62	BOTH SIDES	DO	2	30	—
F1.5.21	8	2	65	NONE	COMBUSTIBLE	1	15	—
F1.5.22	8	2	65	DO	NONE OR INCOMBUSTIBLE	3	30	—
F1.5.23	8	2	65	BOTH SIDES	COMBUSTIBLE	1	45	—
F1.5.24	8	2	65	DO	NONE OR INCOMBUSTIBLE	5	00	—
F1.5.25	10*	2	62	NONE	COMBUSTIBLE	1	15	—
F1.5.26	10*	2	62	DO	NONE OR INCOMBUSTIBLE	3	30	—
F1.5.27	10*	2	62	BOTH SIDES	COMBUSTIBLE	2	00	—
F1.5.28	10*	2	62	DO	NONE OR INCOMBUSTIBLE	5	00	—

*CAVITY TYPE, 2-IN. AIR SPACE

(TABLE 5 CONTINUED ON PAGE 13)

Table 5.--FIRE-RESISTANCE RATINGS OF LOAD-BEARING WALLS OF CONCRETE MASONRY UNITS. GROUP F1.5--Continued

FIRE REFERENCE NO.	STRUCTURAL WALL: THICKNESS	STRUCTURAL WALL: CELLS IN WALL	STRUCTURAL WALL: MINIMUM SOLID MATERIAL IN UNITS	PLASTER	STRUCTURAL MEMBERS PROJECTING INTO WALL	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	IN.		PERCENT			HR	MIN	
B. UNITS MADE WITH EXPANDED SLAG OR PUMICE AGGREGATE								
F1.5.29	6	1	70	NONE	NONE OR INCOMBUSTIBLE	3	00	—
F1.5.30	6	1	70	BOTH SIDES	DO	5	00	—
F1.5.31	6	1	76	NONE	DO	3	30	—
F1.5.32	6	1	76	BOTH SIDES	DO	5	00	—
F1.5.33	8	1	55	NONE	COMBUSTIBLE	1	15	—
F1.5.34	8	1	55	DO	NONE OR INCOMBUSTIBLE	3	00	—
F1.5.35	8	1	55	BOTH SIDES	COMBUSTIBLE	1	45	—
F1.5.36	8	1	55	DO	NONE OR INCOMBUSTIBLE	5	00	—
F1.5.37	8	1	62	NONE	COMBUSTIBLE	1	30	—
F1.5.38	8	1	62	DO	NONE OR INCOMBUSTIBLE	4	00	—
F1.5.39	8	1	62	BOTH SIDES	COMBUSTIBLE	2	00	—
F1.5.40	8	1	62	DO	NONE OR INCOMBUSTIBLE	6	00	—
F1.5.41	10	1	60	NONE	COMBUSTIBLE	2	00	—
F1.5.42	10	1	60	DO	NONE OR INCOMBUSTIBLE	5	00	—
F1.5.43	10	1	60	BOTH SIDES	COMBUSTIBLE	2	30	—
F1.5.44	10	1	60	DO	NONE OR INCOMBUSTIBLE	7	00	—
F1.5.45	10*	2	62	NONE	COMBUSTIBLE	1	30	—
F1.5.46	10*	2	62	DO	NONE OR INCOMBUSTIBLE	4	00	—
F1.5.47	10*	2	62	BOTH SIDES	COMBUSTIBLE	2	00	—
F1.5.48	10*	2	62	DO	NONE OR INCOMBUSTIBLE	6	00	—
C. UNITS MADE WITH CALCAREOUS SAND AND GRAVEL.								
F1.5.49	10*	2	62	NONE	COMBUSTIBLE	1	15	—
F1.5.50	10*	2	62	DO	NONE OR INCOMBUSTIBLE	1	15	—
F1.5.51	10*	2	62	BOTH SIDES	COMBUSTIBLE	1	45	—
F1.5.52	10*	2	62	DO	NONE OR INCOMBUSTIBLE	5	00	—
D. UNITS MADE WITH SILICEOUS SAND AND GRAVEL								
F1.5.53	8	1	54	BOTH SIDES	NONE, COMBUSTIBLE OR INCOMBUSTIBLE	0	30	—
F1.5.54	12	1	57	DO	COMBUSTIBLE	2	30	—
F1.5.55	12	1	57	DO	NONE OR INCOMBUSTIBLE	6	00	—
F1.5.56	12	2	55	NONE	COMBUSTIBLE	2	00	—
F1.5.57	12	2	55	DO	NONE OR INCOMBUSTIBLE	5	00	—
F1.5.58	12	2	55	BOTH SIDES	COMBUSTIBLE	2	30	—
F1.5.59	12	2	55	DO	NONE OR INCOMBUSTIBLE	7	00	—

*CAVITY TYPE, 2-IN. AIR SPACE

Table 6.--FIRE-RESISTANCE RATINGS OF NONBEARING PARTITIONS OF STRUCTURAL CLAY TILE. GROUP F1.6

The ratings for the structural clay-tile partitions given in the following table are based on several series of tests made at The Ohio State University and the National Bureau of Standards with some of the ratings derived by means of the formula given in National Bureau of Standards report BMS92. The fire resistance is dependent on the type of clay used and the hardness of burning. Consequently, separate ratings are given for hard-burned tile and for medium-burned tile.

The ratings apply when the partitions are built with mortar not leaner than 1:1:4 cement-lime mortar and for plastered partitions when not less than 5/8-in. gypsum plaster is used.

FIRE REFERENCE NO.	STRUCTURAL WALL: THICKNESS	STRUCTURAL WALL: KIND OF TILE	STRUCTURAL WALL: CELLS IN THICKNESS	STRUCTURAL WALL: MINIMUM SOLID MATERIAL IN UNITS	PLASTER	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	IN.			PERCENT		HR	MIN	
F1.6.1	4	HARD BURNED CLAY	1	40	BOTH SIDES	0	45	(S3.3.5)
F1.6.2	4	MEDIUM BURNED CLAY	1	40	DO	1	00	S3.3.5
F1.6.3	4	HARD BURNED CLAY	1	50	DO	1	00	(S3.3.5)
F1.6.4	4	MEDIUM BURNED CLAY	1	50	DO	1	15	(S3.3.5)
F1.6.5	6	HARD BURNED CLAY	1	30-40	DO	1	15	—
F1.6.6	6	MEDIUM BURNED CLAY	1	30-40	DO	1	30	(S3.3.12)
F1.6.7	4	HARD BURNED CLAY	2	50	DO	1	15	(S3.3.5)
F1.6.8	4	MEDIUM BURNED CLAY	2	50	DO	1	30	(S3.3.5)
F1.6.9	4	HARD BURNED CLAY	2	60	DO	1	30	(S3.3.5)
F1.6.10	4	MEDIUM BURNED CLAY	2	60	DO	2	00	(S3.3.5)
F1.6.11	6	HARD BURNED CLAY	2	45	NONE	0	45	—
F1.6.12	6	DO	2	45	BOTH SIDES	1	30	S3.4.2
F1.6.13	6	MEDIUM BURNED CLAY	2	45	NONE	1	00	—
F1.6.14	6	DO	2	45	BOTH SIDES	2	00	—

Table 7.--FIRE-RESISTANCE RATINGS OF NONBEARING PARTITIONS OF GYPSUM BLOCKS. GROUP F1.7

The ratings for gypsum-block partitions given in the following table are based on tests made at the Underwriters' Laboratories and the Ohio State University, and are limited by considerations of stability of the partition when exposed to fire in addition to rise of temperature on the unexposed side. They apply when the hollow blocks have not more than 30 percent voids, laid up with not leaner than 1:3 sanded gypsum mortar and for plastered partitions when not less than 1/2 in. of 1:3 sanded gypsum plaster is applied.

FIRE REFERENCE NO.	STRUCTURAL WALL		PLASTER	FIRE RESIST-ANCE RATING		SOUND REFERENCE NO.
	NOMINAL THICKNESS	MINIMUM PERCENTAGE OF SOLID MATERIALS IN UNITS				
	IN.			HR	MIN	
F1.7.1	2	100	NONE	1	00	—
F1.7.2	3	70	NONE	1	00	—
F1.7.3	3	70	BOTH SIDES	2	00	—
F1.7.4	4	70	BOTH SIDES	3	00	—
F1.7.5	5	100	NONE	4	00	—
F1.7.6	5	100	BOTH SIDES	6	00	—

Table 8.--FIRE-RESISTANCE RATINGS OF NONBEARING PARTITIONS OF MAGNESIUM-OXYSULFATE BONDED WOOD-FIBER BLOCKS. GROUP F1.8

The ratings for the partitions made of magnesium-oxysulfate wood-fiber blocks given in the following table are based on tests made at the Underwriters' Laboratories and the National Bureau of Standards. The blocks were made of shredded-wood fiber (excelsior) bonded with magnesium-oxysulfate cement. They were laid with portland cement-lime mortar and were plastered with 1/2 in. of 1:3 sanded gypsum plaster.

FIRE REFERENCE NO.	STRUCTURAL WALL		PLASTER	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	NOMINAL THICKNESS	MINIMUM PERCENTAGE OF SOLID MATERIALS IN UNITS				
	IN.			HR	MIN	
F1.8.1	2	100	BOTH SIDES	1	00	(86.1.1)
F1.8.2	3	100	DO	2	00	86.1.1

Table 9.--FIRE-RESISTANCE RATINGS OF NONBEARING PARTITIONS OF CONCRETE MASONRY UNITS. GROUP F1.9

The ratings for partitions of hollow-concrete masonry units as given in the following table are based on tests made at the Underwriters' Laboratories and the National Bureau of Standards. The given ratings apply when the partitions are laid with mortar not leaner than 1:1:6 portland cement-lime mortar and for plastered partitions when not less than 1/2 in. of 1:3 sanded gypsum plaster is applied.

FIRE REFERENCE NO.	STRUCTURAL WALL: NOMINAL THICKNESS	STRUCTURAL WALL: CELLS IN WALL THICKNESS	STRUCTURAL WALL: MINIMUM OF SOLID MATERIAL IN UNITS	PLASTER	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
A. UNITS MADE WITH EXPANDED SLAG OR PUMICE AGGREGATE							
	IN.		PERCENT		HR	MIN	
F1.9.1	3	0	73	BOTH SIDES	2	00	S3.5.7
F1.9.2	4	0	62	NONE	1	15	S3.5.6
F1.9.3	4	1	62	BOTH SIDES	2	30	S3.5.4
F1.9.4	4	0	73	NONE	1	30	(S3.5.6)
F1.9.5	4	1	73	BOTH SIDES	2	30	(S3.5.4)
F1.9.6	6	1	49	NONE	1	30	—
F1.9.7	6	0	49	BOTH SIDES	2	30	—
F1.9.8	6	1	62	NONE	2	00	—
F1.9.9	6	1	62	BOTH SIDES	3	30	—
F1.9.10	6	0	73	NONE	3	00	—
F1.9.11	6	0	73	BOTH SIDES	5	00	—
B. UNITS MADE WITH EXPANDED BURNED CLAY, BLAST FURNACE SLAG, CINDERS, AND EXPANDED BURNED CLAY AGGREGATE							
F1.9.12	3	0	73	BOTH SIDES	1	45	S3.5.1
F1.9.13	4	0	65	NONE	1	00	—
F1.9.14	4	1	65	BOTH SIDES	2	00	S3.5.2
F1.9.15	4	0	73	NONE	1	15	—
F1.9.16	4	0	73	BOTH SIDES	2	00	S3.5.2
F1.9.17	6	0	49	NONE	1	15	—
F1.9.18	6	0	49	BOTH SIDES	2	00	—
F1.9.19	6	1	62	NONE	1	30	—
F1.9.20	6	1	62	BOTH SIDES	2	30	—
F1.9.21	6	0	73	NONE	2	30	—
F1.9.22	6	1	73	BOTH SIDES	4	00	—
C. UNITS MADE WITH CALCAREOUS SAND AND GRAVEL							
F1.9.23	4	0	62	BOTH SIDES	1	45	—
D. UNITS MADE WITH SILICEOUS SAND AND GRAVEL AGGREGATE							
F1.9.24	4	0	73	BOTH SIDES	0	45	—

Table 10.--FIRE-RESISTANCE RATINGS OF WOOD-STUD, LOAD-BEARING PARTITIONS FACED WITH PLASTER ON COMBUSTIBLE LATH. GROUP F2.1

The studs for the partitions of this group were 2- by 4-in. yellow pine or Douglas fir spaced 16 in. on centers in a single row. Wood laths were nailed with either 3d or 4d nails, one nail to each bearing, and the end joinings broken every 7th course. Fiberboard in the 1/2 in. thickness used as plaster base was nailed with 3d or 4d common wire nails spaced 4 to 6 in. on centers. Those in the 7/8 in. thickness were nailed with 5d nails. Plaster mixes were proportioned by weight of the dry materials, the first of two values given being for the scratch coat, the second, the brown coat. The mineral wool bats for fills between the studs had waterproofed-paper backings. All partitions of this group are rated combustible.

FIRE REFERENCE NO.	FACINGS					FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	PLASTER BASE	KIND OF PLASTER	FILL BETWEEN STUDS	MIX, BY WEIGHT	THICKNESS			
					IN.	HR	MIN	
F2.1.1	WOOD LATH	GYPSUM	NONE	1:2 1:2	1/2	0	35	S2.1.2
F2.1.2	DO	DO	MINERAL WOOL BATS, 1.05 TO 1.25 LB/FT^2	1:2 1:3	1/2	1	00	—
F2.1.3	1/2-IN. FIBERBOARD	DO	NONE	1:2 1:2	1/2	0	35	S2.3.4
F2.1.4	7/8-IN. FLAMEPROOFED FIBERBOARD	DO	NONE	1:2 1:2	1/2	1	00	(S2.3.4)
F2.1.5	WOOD LATH	LIME	NONE	1:5 1:7 1/2	1/2	0	30	S2.1.1
F2.1.6	DO	DO	MINERAL WOOL BLOWN IN 2.2 LB/FT^2	1:5 1:7 1/2	11/16	0	45	—
F2.1.7	DO	DO	MINERAL WOOL BATS, 1.4 LB/FT^2	1:5 1:7	3/4	0	40	—
F2.1.8	DO	LIME KEENE'S CEMENT AND SAND	MINERAL WOOL BATS, 1.4 LB/FT^2	2:1:12 2:1:18	1/2 1/2	1	00	—
F2.1.9	DO	DO	DO	3:1:8 3:1:12	1/2	1	00	—
F2.1.10	DO	DO	DO	1:6 1/4 1:6 1/4	1/2	0	30	—

Table 11.--FIRE-RESISTANCE RATINGS OF WOOD-STUD, LOAD-BEARING PARTITIONS FACED WITH PLASTER ON GYPSUM LATHS. GROUP F2.2

Two- by four-in. yellow pine or Douglas-fir studs spaced 16 in. on centers in a single row except as noted. Where studs were in two rows, spacings were staggered. All constructions of this group are rated combustible.

Gypsum laths were of four types: plain surface; indented surface; indented and perforated, and perforated. All were 3/8 in. thick.

FIRE REFERENCE NO.	FACINGS				FIRE RESISTANCE RATING		BOUND REFERENCE NO.
	PLASTER BASE	KIND OF PLASTER	MIX, BY WEIGHT	THICKNESS			
				IN.	HR	MIN	
F2.2.1	3/8-IN. PLASTERBOARD	GYPSUM	1:2 1:2	1/2	0	45	(82.3.1)
F2.2.2	GYPSUM LATH	DO	1:2 1:2	1/2	0	45	82.3.1
F2.2.3	GYPSUM LATH*	DO	1:2 1:2	1/2	1	00	82.3.1
F2.2.4	GYPSUM LATH	WOOD-FIBERED	NEAT	1/2	1	00	—
F2.2.5	INDENTED GYPSUM LATH	GYPSUM	1:2 1:2	1/2	0	45	(82.3.1)
F2.2.6	INDENTED AND PERFORATED GYPSUM LATH**	DO	1:2 1:2	1/2	0	45	(82.3.1)
F2.2.7	PERFORATED GYPSUM LATH	DO	1:2 1:2	1/2	1	00	(82.3.1)
F2.2.8	PERFORATED GYPSUM LATH**	DO	1:2 1:2	1/2	0	45	(82.3.1)
F2.2.9	PERFORATED GYPSUM LATH ON TWO ROWS OF STUDS	DO MINERAL WOOL BAT FILL; 0.9 LB/FT^2	1:2 1:2	1/2	1	00	—
F2.2.10	PERFORATED GYPSUM LATH OVERLAID WITH 2- BY 2-IN. BY NO. 16-GAGE WIRE FABRIC; TWO ROWS OF STUDS	GYPSUM (NO FILL)	1:2 1:2	5/8	1	15	—

*SIX ROOFING NAILS WITH METAL-LATH PADS AROUND HEADS TO EACH 16- BY 48-IN. LATH.
**AREAS OF HOLES LESS THAN 2 3/4 PERCENT OF AREA OF LATH.

Table 12.--FIRE-RESISTANCE RATINGS OF WOOD-STUD, LOAD-BEARING PARTITIONS FACED WITH PLASTER ON METAL LATH. GROUP F2.3

Studs were of 2- by 4-in. yellow pine or Douglas fir spaced 16 in. on centers in a single row, the partitions being rated combustible on account of wood framing.

The expanded metal lath and wire lath were nailed to the wood studs in nearly all instances with 6d common wire nails spaced not over 7 in. on centers on each stud driven to about one inch depth and bent over. The overlapped edges of laths were tied midway between studs with No. 18-gage galvanized wire ties.

Mineral-wool fills were made with paper-backed bats of nominal 4 in. thickness and weighed from 1 to 1.4 lb/ft^2.

FIRE REFERENCE NO.	FACINGS				FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	KIND OF PLASTER	FILL BETWEEN STUDS	MIX, BY WEIGHT	THICKNESS			
				IN.	HR	MIN	
F2.3.1	GYPSUM	NONE	1:2 1:3	3/4	0	45	(S2.2.3)
F2.3.2	DO	DO	1:2 1:3	7/8	1	00	(S2.2.3)
F2.3.3	DO	DO	1:2 1:2	3/4	1	00	(S2.2.3)
F2.3.4	DO	MINERAL WOOL, 1 LB/FT^2	1:2 1:2	3/4	1	30	—
F2.3.5	NEAT WOOD FIBERED GYPSUM	NONE	NEAT	3/4	1	30	—
F2.3.6	DO	DO	DO	7/8	1	45*	—
F2.3.7	NEAT WOOD FIBERED GYPSUM	DO	DO	1	2	00	—
F2.3.8	PORTLAND CEMENT	DO	1:2 1:3	3/4	0	30	—
F2.3.9	DO	DO	1:2 1:3	7/8	0	45	—
F2.3.10	PORTLAND CEMENT, ASBESTOS AND SAND	DO	1:1/30:2 1:1/30:2	3/4	0	45	—
F2.3.11	DO	DO	1:1/30:2 1:1/30:2	7/8	1	00	—
F2.3.12	LIME	NONE	1:4 1:7 1/2	3/4	0	30	(S2.2.1)
F2.3.13	LIME AND PORTLAND CEMENT	DO	2:1:8 2:1:10	3/4	0	30	—
F2.3.14	LIME AND KEENE'S CEMENT	DO	2:1:8 2:1:12	3/4	0	45	—

*RATED AS NONBEARING.

Table 13.--FIRE-RESISTANCE RATINGS OF WOOD-STUD, LOAD-BEARING PARTITIONS WITH BOARD FACINGS. GROUP F2.4

The wood studs for the partitions shown in the following table were 2- by 4-in. Southern pine or Douglas fir spaced 16 in. on centers in a single row unless otherwise noted. Where studs were set in two rows the spacings were staggered.

Gypsum facing boards were applied with 5d, 13 1/2-gage cement-coated gypsum wallboard or box nails or 5d, 12 1/2-gage common wire nails spaced generally 6 in. apart at edges and 9 in. apart on intermediate studs. For some tests they were spaced 7 in. apart for both edge and intermediate bearings. Cement-asbestos board facings over gypsum boards, however, were applied with 6d finish nails with the heads sunk a little below the surface. The spacing of nails was 6 to 7 in. apart at intermediate studs and 3 to 4 in. at edges.

Fills between studs were mineral wool except for one partition in which it was of paper-backed cotton blanket-type insulation, the cotton of which had been given flameproofing treatment; and for another it was made of 1 part portland cement, 5 parts gypsum to 22 parts hard-coal ashes mixed with water to a stiff consistency. The test of this partition continued for two hours without having reached the limit of its fire endurance.

The lightest of the mineral-wool fills consisted of a paper-covered 2 in. thick fiberglass blanket weighing 0.6 lb/ft^2. The other fills were of paper-backed mineral wool bats, some applied in two thicknesses, the heaviest weighing 2.4 lb/ft^2 for the two bats, each of 4 in. nominal thickness.

Most of the gypsum-board facings were finished with casein cold-water paint. Cement-asbestos board facings were finished with wax or a single coat of varnish stain. The tests produced no evidence to indicate that the surface finishes had any appreciable influence on the test results. All constructions in this group are rated combustible on account of the wood supports.

(Table 13 continued on page 22)

Table 13.--FIRE-RESISTANCE RATINGS OF WOOD-STUD, LOAD-BEARING PARTITIONS WITH BOARD FACINGS. GROUP F2.4--Continued

FIRE REFERENCE NO.	CONSTRUCTION OF PARTITION: FACINGS	FILL BETWEEN STUDS	FACING THICKNESS	WALL THICKNESS	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
			IN.	IN.	HR	MIN	
F2.4.1	GYPSUM WALLBOARD	NONE	1/2	4 5/8	0	40	—
F2.4.2	DO	FLAME-PROOFED COTTON BATS, 3 OZ/FT^2	1/2	4 5/8	0	30	—
F2.4.3	DO	MINERAL WOOL, 0.6 TO 1.2 LB/FT^2	1/2	4 5/8	0	45	—
F2.4.4	DO	DO (NAILED)	1/2	4 5/8	1	00	—
F2.4.5	DO	MINERAL WOOL, 0.6 TO 1.2 LB/FT^2 (NOT NAILED)	1/2	4 5/8	1	00	—
F2.4.6	1/2-IN. GYPSUM WALLBOARD OVERLAID WITH 3/16-IN. CEMENT-ASBESTOS BOARD	NONE	11/16	5	1	15	—
F2.4.7	3/8-IN. GYPSUM WALLBOARD OVERLAID WITH 3/16-IN. CEMENT-ASBESTOS BOARD	NONE	9/16	4 3/4	1	00	—
F2.4.8	3/16-IN. CEMENT-ASBESTOS BOARD	MINERAL WOOL BATS, 1.0 LB/FT^2	3/16	4	0	40	—
F2.4.9	1/2-IN. GYPSUM SHEATHING PLUS 3/8-IN. GYPSUM WALLBOARD, TWO ROWS OF STUDS	TWO THICKNESSES MINERAL WOOL BATS, 2 LB/FT^2	7/8	7 1/4	1	30	—
F2.4.10	1/8-IN. CEMENT ASBESTOS BOARDS OVER 1/2-IN. GYPSUM SHEATHING, TWO ROWS OF STUDS	MINERAL WOOL BATS, 2.2 LB/FT^2	5/8	6 3/4	1	30	—
F2.4.11	1/2-IN. GYPSUM SHEATHING PLUS 3/8-IN. GYPSUM WALLBOARD, TWO ROWS OF STUDS	ONE PLY 15 LB/100 FT^2 ASBESTOS PAPER BETWEEN FACING BOARDS	1 1/16	7 5/8	1	15	—
F2.4.12	1/2-IN. GYPSUM WALLBOARD, TWO ROWS OF STUDS	MINERAL WOOL BATS, 2.2 LB/FT^2	1/2	8 1/2	1	00	—
F2.4.13	DO	MINERAL WOOL BATS, 2.4 LB/FT^2	1/2	6 1/2	1	00	—
F2.4.14	TWO THICKNESSES OF 3/8-IN. GYPSUM WALLBOARD, TWO ROWS OF STUDS	FIBERGLASS BLANKET, 0.6 LB/FT^2	3/4	7	1	00	—
F2.4.15	TWO THICKNESSES OF 1/2-IN. GYPSUM WALLBOARD, TWO ROWS OF STUDS	NONE	1	7 1/2	1	15	—
F2.4.16	1/2-IN. GYPSUM SHEATHING PLUS 3/8-IN. GYPSUM WALLBOARD, TWO ROWS OF STUDS	MINERAL WOOL BATS, 1.1 LB/FT^2	7/8	7 1/4	1	15	—
F2.4.17	3/8-IN. GYPSUM WALLBOARD, TWO ROWS OF STUDS	FILL OF CEMENT, GYPSUM AND ASHES	3/8	6 1/4	2	00	—
F2.4.18	TWO STUD WALLS SEPARATED 1/2 IN. ADJACENT FACINGS 1/2-IN. GYPSUM SHEATHING, OUTSIDE FACINGS OF 1/2-IN. GYPSUM WALLBOARD	NONE	1/2	9 3/4	1	15	—

Table 14.--FIRE-RESISTANCE RATINGS OF HOLLOW, LOAD-BEARING STEEL-STUD PARTITIONS FACED WITH PLASTER ON METAL LATH. GROUP F3.1

Only stiffened expanded-metal laths were used on load-bearing steel-stud partitions. These were fastened with Simplex nails or No. 6 common wire nails driven into nailing slots along the edges of the studs. The studs were of I section formed of two 3 5/8- by 1-in. by 16-gage steel channels welded back to back with a narrow space between to receive nails. Studs were spaced 24 in. on centers and attached to 3 3/4- by 12-in. by 16-gage runner channels, or bearing plates, by means of self-tapping screws. The partitions were loaded to 5120 lb/in.^{2} of net section of the studs.

FIRE REFERENCE NO.	FACINGS			PARTITION THICKNESS	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	PLASTER	MIX, BY WEIGHT	THICKNESS				
			IN.	IN.	HR	MIN	
F3.1.1	WOOD-FIBERED GYPSUM	NEAT	1	5 5/8	2	00	—
F3.1.2	DO	DO	3/4	5 1/8	1	30	—
F3.1.3	GYPSUM	1:2 1:2	7/8	5 3/8	1	15	(82.7.4)
F3.1.4	DO	1:2 1:3	3/4	5 1/8	1	00	(82.7.4)
F3.1.5	PORTLAND CEMENT AND SAND WITH 25 LB LIME PUTTY AND 3 LB ASBESTOS PER BAG CEMENT	1:2.1 1:3.2	7/8	5 3/8	0	40	—
F3.1.6	PORTLAND CEMENT AND SAND WITH 25 LB PUTTY AND 25 LB ASBESTOS PER BAG OF CEMENT FOR SCRATCH COAT AND 25 LB PUTTY AND 37 1/2 LB ASBESTOS PER BAG OF CEMENT FOR BROWN COAT	1:1.1 1:1.6	3/4	5 1/8	0	45	—

Table 15.--FIRE-RESISTANCE RATINGS OF HOLLOW, NONBEARING STEEL-STUD PARTITIONS FACED WITH PLASTER ON METAL LATH. GROUP F3.2

The facings were of plaster applied on expanded-metal lath attached to steel-channel studs which were of two kinds. One was in the form of a truss made by punching triangular openings in the web of a 3 1/4- by 1/2-in. by 18-gage strip-steel channel. The other consisted of two 3/4-in. strip-steel channels with spacers to hold them parallel. Studs were attached to runner channels by means of clips wired on or by wiring bent ends of the 3/4-in. channels.

The truss type studs were spaced 24 in. on centers and lathed with stiffened expanded metal weighing 3 1/4 lb/yd.^{2} The double-channel studs were spaced 16 in. on centers and lathed with plain flat expanded-metal lath weighing 2.5 or 3 lb/yd.^{2} Laths were tied to studs at intervals of 6 to 8 in. and the lapped edges of sheets also were tied midway between studs with 18-gage galvanized-wire ties.

FIRE REFERENCE NO.	STUDS CHANNEL	FACINGS			PARTITION THICKNESS	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
		PLASTER	MIX, BY WEIGHT	THICKNESS				
	IN.			IN.	IN.	HR	MIN	
F3.2.1	3 1/4	GYPSUM	1:2 1:3	3/4	4 3/4	0	45	(S2.7.1)
F3.2.2	3 1/4	DO	1:2 1:2	7/8	5	1	15	—
F3.2.3	3/4*	DO	1:2 1:3	3/4	4 1/2 TO 5 1/2	0	45	S2.8.3
F3.2.4	DO	DO	1:2 1:2	3/4	4 3/4 TO 7 5/8	1	00	(S2.8.3)
F3.2.5	DO	DO	1:2 1:2	11/16	4 1/2	0	45	(S2.8.3)
F3.2.6	DO	GYPSUM**	1:2 1:2	3/4	4 1/2	1	00	S2.8.3
F3.2.7	DO	GYPSUM	1:1 1/2 1:1 1/2	1	5 1/8	2	00	(S2.8.3)
F3.2.8	DO	WOOD-FIBERED GYPSUM	NEAT	7/8	4 7/8 TO 5	2	00	—
F3.2.9	DO	DO	NEAT	1	5	2	30	—
F3.2.10	DO	PORTLAND CEMENT	1:2 1:3	3/4	4 1/2	0	30	—

*TWO ROWS OF 3/4-IN. CHANNELS TO MAKE TWO WALLS WITH SPACE.
**CALCAREOUS SAND WAS USED FOR THIS PLASTER. SILICEOUS SAND FOR ALL OTHERS.

Table 16.—FIRE-RESISTANCE RATINGS OF STEEL-FRAMED, NONBEARING SOLID PLASTER PARTITIONS. GROUP F4.1

The framework for most of these partitions consisting of 3/4- or 1-in. steel channels was assembled by tying the studs, which were spaced 12, 13 1/2, or 16 in. on centers, to runner channels with No. 18-gage galvanized-wire ties. The lath was likewise attached with such ties spaced 6 to 7 in. on centers, the lapped edges of the sheets being tied between the studs. Where two values of plaster mix are given, the first is for the scratch coat; the second, the brown coat. The partition for which the body material was placed with a spray gun was not framed, the metal mesh being attached to the test frame and stayed from wooden formwork backing in a position to be near the midplane of the partition.

FIRE REFERENCE No.	CONSTRUCTION				FIRE RESISTANCE RATING		SOUND REFERENCE No.
	PLASTER BASE	PLASTER	MIX, BY WEIGHT	THICKNESS			
				IN.	HR	MIN	
F4.1.1	1-IN. BOARD OF MAGNESIUM OXYSULPHATE CEMENT AND WOOD SHAVINGS	GYPSUM	1:2.5	2 1/2	1	00	—
F4.1.2	ASBESTOS LATH (SOFT)	DO	1:2	2	0	45	—
F4.1.3	3/8-IN. FULL LENGTH GYPSUM LATH (NO STUDS)	DO	1:2 1:3	2	0	35	S5.2.2
F4.1.4	EXPANDED-METAL LATH	DO	1:2 1:3	2	0	45	S5.1.3
F4.1.5	DO	DO	1:2 1:3	2 1/2	1	00	S5.1.4
F4.1.6	DO	DO	1:2	2	0	45	—
F4.1.7	DO	DO	1:2	2 1/4	1	00	—
F4.1.8	DO	DO	1:2	2 1/2	1	00	—
F4.1.9	DO	DO	1:1 1/2	2	0	45	—
F4.1.10	DO	DO	1:1	2	1	00	—
F4.1.11	DO	DO	1:1	2 1/4	1	15	—
F4.1.12	DO	DO	1:1	2 1/2	1	30	—
F4.1.13	DO	DO	1:1/2	2	1	30	—
F4.1.14	DO	DO	1:1/2	2 1/4	1	45	—
F4.1.15	DO	DO	1:1/2	2 1/2	2	00	—
F4.1.16	DO	WOOD-FIBERED GYPSUM	NEAT	2	1	45	—
F4.1.17		DO	NEAT	2 1/4	2	00	—
F4.1.18	DO	DO	NEAT	2 1/2	2	30	—
F4.1.19	DO	PORTLAND CEMENT, LIME AND SAND	1:0.1:2 1:0.1:3	2	0	30	—
F4.1.20	DO	DO	1:0.1:2 1:0.1:3	2 1/2	0	35	—
F4.1.21	DO	DO	1:0.4:4	2	0	35	—
F4.1.22	WELDED-WIRE FABRIC 4- BY 4-IN. BY 6-GAUGE WIRES (NO STUDS)	PORTLAND CEMENT, SAWDUST AND SAND APPLIED WITH A SPRAY GUN	4.5:1:6.5 (1:2:2 BY VOL.)	2 1/2	1	00	—

Table 17.--FIRE-RESISTANCE RATINGS OF WOOD-JOIST FLOORS. GROUP F7.1

The ratings for wood-joist floors given in the following table are based on results of fire tests made at the National Bureau of Standards. All of the floors had 2- by 10-in. No. 1 common pine joists spaced 16 in. on centers and spanning 13 ft 2 in. and 8 ft for the large and small floors, respectively.

The top finish of all floors consisted of 1 in. nominal thickness wood subflooring, a layer of paper, and 1 in. nominal thickness tongued-and-grooved finish flooring laid perpendicular to the joists. Either tongued-and-grooved or square-edge boards laid diagonal to the joists and nailed with 8d common wire nails were used for the subflooring. For ratings of 45 min. or over, asbestos paper of not less than 12 lb per 100 sq ft weight should be placed between the subflooring and finish floor and for all ratings with square-edge subflooring. Otherwise the diaphragm can be of rosin-sized building paper.

The thickness of plaster is to be taken from the face of wood lath and gypsum lath, and from the back of the flat portion of metal lath. In the column under plaster mix, the first ratio is for the scratch coat and the other for the brown coat.

The ratings given apply for floors loaded to give not more than 1000 lb/in.^{2} maximum fiber stress in the bottom of the joists.

(Table continued on page 27)

Table 17.--FIRE-RESISTANCE RATINGS OF WOOD-JOIST FLOORS. GROUP F7.1--Continued

FIRE REFERENCE NO.	BASE FOR PLASTER	PLASTER OR FINISH			FIRE RESISTANCE RATING		SOUND REFERENCE NO.
		PLASTER	MIX, BY WEIGHT	THICKNESS			
				IN.	HR	MIN	
F7.1.1	NONE	NONE			0	10	—
F7.1.2	WOOD LATH WITH ONE 30 NAIL AT EACH BEARING	LIME	1:4 1/2	5/8	0	30	—
F7.1.3	DO	GYPSUM	1:2 1:3	1/2	0	35	—
F7.1.4	TWO LAYERS OF 3/8-IN. GYPSUM WALLBOARD WITH 1 1/2-IN. NAILS ON COMBINED SPACING OF 6 IN.	COLD WATER			0	30	—
F7.1.5	1/2-IN. GYPSUM SHEATHING UNDER 3/8-IN. GYPSUM WALLBOARD NAILED, RESPECTIVELY, WITH 1 3/4 IN. LONG, 13-GAGE, 3/8-IN. HEAD AND 2 3/8 IN. LONG, 11 1/2-GAGE, 1/4-IN. HEAD NAILS WITH 8-IN. SPACING	DO			0	35	—
F7.1.6	3/8-IN. GYPSUM LINER BOARD UNDER 1/2-IN. GYPSUM WALLBOARD NAILED AS FOR F7.1.5	DO			0	40	—
F7.1.7	3/8-IN. PERFORATED GYPSUM LATH NAILED WITH 1 1/8-IN., 13-GAGE, 3/4-IN. HEAD NAILS SPACED 4 IN. APART	GYPSUM	1:2	1/2	0	45	—
F7.1.8	DO	DO	1:1	1/2	0	45	—
F7.1.9	DO	WOOD-FIBERED GYPSUM	NEAT	1/2	0	45	—
F7.1.10	SAME AS F7.1.9 PLUS 3-IN. STRIPS OF METAL LATH NAILED WITH 1 3/4 IN. LONG, 12-GAGE, 1/2- IN. HEAD NAILS SPACED 5 IN. APART	GYPSUM	1:2	1/2	1	00	—
F7.1.11	METAL LATH FASTENED WITH 1 1/4 IN. LONG, 11-GAGE, 3/8-IN. HEAD NAILS SPACED 6 IN. OR 6D COMMON NAILS DRIVEN 1 IN. AND BENT OVER	DO	1:2 1:3	3/4	0	45	—
F7.1.12	SAME AS F7.1.7 WITH AUXILIARY TIES OF 18-GAGE WIRE ON 27-IN. SPACING FASTENED TO NAILS DRIVEN 1 1/4 IN. INTO SIDE OF JOISTS 2 IN. UP	DO	1:2 1:3	3/4	1	15	—
F7.1.13	METAL LATH FASTENED WITH 1 1/2 IN. LONG, 11-GAGE, 7/16-IN. HEAD BARBED ROOFING NAILS SPACED 6 IN. OR 8D, 11 1/2-GAGE, BARBED BOX NAILS 2 1/2 IN. LONG DRIVEN ON SLANT AND BENT OVER, 6-IN. SPACING	DO	1:2 1:3	3/4	1	00	—
F7.1.14	DO	PORTLAND CEMENT*	1:2 1:3	3/4	1	00	—

*3-LB ASBESTOS AND 15-LB HYDRATED LIME PER BAG OF CEMENT WAS ADDED TO THIS PLASTER.

Table 18.--FIRE-RESISTANCE RATINGS FOR STEEL-JOIST FLOORS. GROUP F7.2

The ratings for steel-joist floors given in the following table are based on fire tests of floors made at the National Bureau of Standards. The steel joists were of the welded open-web type or light-rolled sections and were loaded to give a maximum extreme fiber stress of 18,000 lb/in.^{2} The concrete in the top slabs should not be leaner than 1 part portland cement to 6 1/2 parts fine and coarse aggregates by weight.

The metal lath was of the appropriate weight for the spacing of the joists and was fastened with ties equivalent to single 18-gage steel wire ties on 7-in. centers. For ratings over 2 hr, double-wire ties should be used or single-wire ties on closer spacings. The thickness of the plaster was measured from the back of the flat portion of the lath and the concrete from the top of the joists. Because of the sagging of the (form) floor lath or the settling of the rigid forms, the average thickness of the concrete in the top of the floors for which these ratings apply would be 1/4 in. greater than given in the table.

The sprayed-on asbestos-fiber plaster consisted of short asbestos fibers mixed with a binder and wetted as the stream of material was sprayed from a gun. The other plasters were applied by trowel, the first ratio given being for the scratch coat, and the second for the brown coat.

(Table 18 continued on page 29)

Table 18.--FIRE-RESISTANCE RATINGS FOR STEEL-JOIST FLOORS. GROUP F7.2--Continued.

FIRE REFERENCE NO.	TOPPING		PLASTER			FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	MATERIAL	THICKNESS	KIND	MIX, BY WEIGHT	THICKNESS	HR	MIN	
		IN.			IN.			
F7.2.1	1-IN. T&G WOOD FLOORING NAILED TO 2- BY 2-IN. WOOD STRIPS BOLTED TO JOIST	13/16	GYPSUM	1:2 1:3	3/4		45	—
F7.2.2	REINFORCED CONCRETE	2	SPRAYED-ON ASBESTOS FIBER	—	5/8	1	30	—
F7.2.3	DO	2 1/2	DO	—	3/4	2	00	—
F7.2.4	DO	2 1/2	DO	—	1	2	30	—
F7.2.5	REINFORCED CONCRETE OR 2-IN. PRECAST REINFORCED GYPSUM TILE	2	GYPSUM OR PORTLAND CEMENT*	1:2 1:3	3/4	1	30	—
F7.2.6	REINFORCED CONCRETE OR 2-IN. REINFORCED PRECAST GYPSUM SLABS, THE LATTER WITH 1/4-IN. MORTAR FINISH	2 1/4	GYPSUM	1:2 1:3	3/4	2	00	—
F7.2.7	REINFORCED CONCRETE OR 2-IN. REINFORCED PRECAST GYPSUM TILE, THE LATTER WITH 1/4-IN. MORTAR FINISH	2	GYPSUM OR VERMICULITE**	NEAT 2:1 3:1	1 3/4	2	30	—
F7.2.8	REINFORCED CONCRETE OR 2-IN. REINFORCED PRECAST GYPSUM SLABS, THE LATTER WITH 1/2-IN. MORTAR FINISH	2 1/2	GYPSUM OR VERMICULITE**	NEAT 2:1 3:1	1 3/4	3	00	—
F7.2.9	DO	2 1/2	VERMICULITE**	2:1 3:1	1	4	00	—

*3-LB ASBESTOS FIBER AND 15-LB HYDRATED LIME PER BAG OF CEMENT WAS ADDED TO THE PORTLAND CEMENT PLASTER.
**THE VERMICULITE PLASTER CONSISTED OF MIXTURES OF GYPSUM AND EXFOLIATED VERMICULITE IN THE GIVEN PROPORTIONS (BY WEIGHT).

Table 19.--FIRE-RESISTANCE RATINGS OF REINFORCED CONCRETE SLAB FLOORS. GROUP F8.1

The ratings are based on the use of siliceous sand and pebble aggregates. They will apply with a considerable margin of safety with calcareous trap rock, slag, burned clay, or high-grade cinder aggregates. Ratings are given for high-strength and lower-strength concrete as made with the siliceous aggregates. It was found in the tests that concrete made with siliceous aggregates and of strength appreciably exceeding 2500 lb/in.^{2} would be likely to spall to an extent that would limit the fire resistance of the construction, assuming full or nearly full restraint at the borders. Large reinforced-concrete slabs can be taken as restrained except near the edges. The limit of size inducing restraint cannot be given but it is probable that slabs with least dimension not over 30 ft and not built into heavy framing are not greatly restrained. For concrete made with other than siliceous aggregates no spalling would be expected even for fully restrained slabs. The slabs are assumed supported on walls or properly protected steel- or reinforced-concrete beams.

FIRE REFERENCE NO.	THICKNESS OF SLAB	CONCRETE STRENGTH AT 28 DAYS	CONCRETE PROTECTION UNDER REINFORCING STEEL	CONDITION OF RESTRAINT	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	IN.	LB/IN.^{2}	IN.		HR	MIN	
F8.1.1	3	OVER 2500	5/8	FULLY RESTRAINED	0	30	—
F8.1.2	3	2500 TO 1500	5/8	FREE OR PARTLY RESTRAINED	0	45	—
F8.1.3	4	OVER 2500	5/8	FULLY RESTRAINED	0	40	(S8.1.3) (S8.1.4)
F8.1.4	4	2500 TO 1500	3/4	FREE OR PARTLY RESTRAINED	1	15	(S8.1.3) (S8.1.4)
F8.1.5	5	OVER 2500	3/4	FULLY RESTRAINED	1	00	—
F8.1.6	5	2500 TO 1500	3/4	FREE OR PARTLY RESTRAINED	1	30	—
F8.1.7	6	OVER 2500	1	FULLY RESTRAINED	1	30	—
F1.1.8	6	2500 TO 1500	1	FREE OR PARTLY RESTRAINED	2	00	—

Table 20.--FIRE-RESISTANCE RATINGS OF CONCRETE FLOORS ON PRECAST JOISTS OF LIGHTWEIGHT CONCRETE, GROUP F8.2

The ratings for precast concrete-joist floor constructions given in the following table are based on tests made at the National Bureau of Standards, of floors with 8-in. joists made with lightweight burned-clay or expanded-slag aggregate, when loaded to stress the tension steel to not more than 20,000 lb/in.^{2} The joists should also be imbedded 1/2 in. into the bottom of 2 1/2-in. floor slabs and 1 in. into 3-in. slabs.

The 1/2-in. gypsum wallboard for soffit protection was nailed to 2-in. wood strips wired to the bottom of the joists. The nails for the wallboard were 6d cement-coated, 13 1/2-gage box nails, 1 7/8 in. long, 1/4-in. heads, spaced 6 in. apart.

The floor of the higher-strength concrete made with coarse siliceous aggregate failed by spalling through the slab. The lower-strength concrete with pea gravel aggregate did not spall, the fire resistance with the latter type of aggregate being limited by temperature rise on the top of the slab or by breaking of the bond between the joists and the slab.

FIRE REFERENCE NO.	PROTECTION UNDER JOIST STEEL	CONCRETE SLAB			SOFFIT PROTECTION	FIRE RESISTANCE RATING		SOUND REFERENCE NO.
		THICKNESS	MIX, BY VOLUME	STRENGTH OF CONCRETE				
	IN.	IN.		LB/IN.^{2}		HR	MIN	
F8.2.1	3/4	2 1/2	1:2 3/4:3 1/4	4750	NONE	0	30	—
F8.2.2	3/4	3	1:3 1/2:4	2760	1/2-IN. GYPSUM WALLBOARD	0	45	—
F8.2.3	1	3	1:3 1/2:4	2700	NONE	0	45	—
F8.2.4	1	3	1:3 1/2:4	2700	1/2-IN. GYPSUM WALLBOARD	1	00	—

Table 21.--FIRE-RESISTANCE RATINGS OF COMBINATION TILE AND CONCRETE FLOORS. GROUP F8.3

The ratings for combination tile and concrete floors given in the following table are based on tests made at the National Bureau of Standards.

The 12- by 12-in. fire-clay tiles were laid end to end in rows spaced 2 1/2 or 4 in. apart. The reinforcing steel was placed between these rows and the concrete cast around them and over the tile to form the structural floor. The floor construction with molded-excelsior block (shredded-wood bonded with portland cement) differed in that the blocks were 20 in. wide except near the supports where they were narrower, to give a larger section of concrete to resist the higher shearing stresses, thereby increasing the width of ribs from 5 in. to 9 in.

FIRE REFERENCE NO.	STRUCTURAL TILE				PLASTER			FIRE RESISTANCE RATING		SOUND REFERENCE NO.
	TOTAL THICKNESS	KIND OF TILE	THICKNESS OF TILE	CONCRETE ABOVE TILE	KIND	THICKNESS	MIX, BY WEIGHT			
	IN.		IN.	IN.		IN.		HR	MIN	
F8.3.1	5 1/2 TO 8	FIRE CLAY	4 OR 6	1 1/2 OR 2	NONE	—	NONE	1	00	—
F8.3.2	5 1/2	DO	4	1 1/2	GYPSUM	5/8	1:3	1	30	S8.3.2
F8.3.3	8	DO	6	2	DO	5/8	1:3	2	00	S8.3.4
F8.3.4	5 1/2	MOLDED EXCELSIOR BONDED WITH PORTLAND CEMENT	3	2 1/2	DO	3/4	1:2 1:3	2	00	—

Table 22.--FIRE-RESISTANCE RATINGS OF STEEL-PLATE FLOORS. GROUP F9.1

The ratings for the steel-plate floors given in the following table are based on tests made at the National Bureau of Standards. The top flanges of these floors were continuous steel plates welded to supporting steel joists not less than 3 in. deep. The metal laths for the plaster were attached to furring channels or rods, suitably welded or otherwise secured to solid-web joists or directly to open-web joists, the ties for the lath being equivalent to not less than single 18-gage steel wire ties spaced 7 in. apart. For ratings over 2 hr, double-wire ties or single-wire ties on closer spacings should be used.

Concrete on top of steel plates shall be not leaner than 1 part portland cement to 6 1/2 parts of fine and coarse aggregates by weight. Lightweight aggregates may be used and also gas-expanded concrete of appropriate strength. It should be secured to the steel with metal mesh embedded in the slab and weighing not less than 1.7 lb/yd^2.

The first ratio under plaster mix is for the scratch coat and the other for the brown coat.

FIRE REFERENCE No.	TOPPING		SOFFIT PROTECTION			FIRE RESISTANCE RATING		SOUND REFERENCE No.
	THICKNESS	MATERIAL	KIND	THICKNESS	PLASTER MIX, BY WEIGHT			
	IN.			IN.		HR	MIN	
F9.1.1	13/16	T&G WOOD FLOOR UNDERLAID WITH 14 LB/100 FT^2 ASBESTOS PAPER CEMENTED TO PLATE	GYPSUM PLASTER	3/4	1:2 1:3	1	00	—
F9.1.2	1	CONCRETE	DO	3/4	1:2 1:3	1	00	—
F9.1.3	1 1/2	DO	DO	3/4	1:2 1:3	1	30	—
F9.1.4	2	DO	DO	3/4	1:2 1:3	2	00	—
F9.1.5	2	DO	PORTLAND CEMENT PLUS 10% LIME PLASTER	1	1:2 1:2 1/2	2	00	—
F9.1.6	2 1/2	DO	GYPSUM PLASTER	1	1:2	2	30	—
F9.1.7	3	DO	DO	1	1:1	3	00	—
F9.1.8	2	DO	2-IN. UNREINFORCED GYPSUM TILE PLUS 1/2-IN. GYPSUM PLASTER	2 1/2	1:3	2	00	—
F9.1.9	2	DO	2-IN. REINFORCED GYPSUM PLUS 1/2-IN. GYPSUM PLASTER	2 1/2	1:3	4	00	—

TABLE 23.—SOUND-INSULATION RATINGS OF WOOD- AND STEEL-STUD PARTITIONS. GROUPS S2.1 TO S2.8, INC.

SOUND REFERENCE NO.	PANEL NO.	NOMINAL THICKNESS	KIND OF STUDS	KIND OF PLASTER, PLASTER BASE, OR SPECIAL FEATURES	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	FIRE REFERENCE NO.
		IN.			LB/FT^2	DECIBELS	DECIBELS	
S2.1.1	162	4	2- BY 4-IN. WOOD, 16-IN. SPACING	1/2-IN. LIME PLASTER ON WOOD LATH	15.6	42.1	—	F2.1.5
S2.1.2	163	4	DO	1/2-IN. GYPSUM PLASTER ON WOOD LATH	15.1	35.7	—	F2.1.1
S2.1.2	201	4	DO	DO	17.1	37.5	—	F2.1.1
S2.2.1	164	4	DO	7/8-IN. LIME PLASTER ON METAL LATH	19.8	44.4	—	(F2.3.12)
S2.2.2	165	4	DO	7/8-IN. GYPSUM PLASTER ON METAL LATH	20.0	39.2	—	F2.3.2
S2.2.3	174	4	DO	3/4-IN. GYPSUM PLASTER ON PAPER-BACKED WIRE MESH LATH	12.6	35.0	—	(F2.3.1)
S2.3.1	148	4	DO	1/2-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM LATH	15.2	41.1	—	F2.2.2
S2.3.1	177	4	DO	1/2-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM LATH FASTENED TO STUDS WITH SOLID-STEEL CLIPS	14.4	35.9	—	(F2.2.2)
S2.3.1	202	4	DO	1/2-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM LATH	15.0	34.9	—	F2.2.2
S2.3.2	203	4	DO	1/2-IN. VERMICULITE PLASTER ON 3/8-IN. GYPSUM LATH	9.6	32.7	—	—
S2.3.3	204	4	DO	7/8-IN. VERMICULITE PLASTER ON 3/8-IN. PERFORATED GYPSUM LATH	12.9	36.7	—	—
S2.3.4	205	4	DO	1/2-IN. GYPSUM PLASTER ON 1/2-IN. FIBERBOARD LATH	12.6	40.9	—	F2.1.3
S2.4.1	179A	4	DO	3/8-IN. PLYWOOD WITH LIGHTWEIGHT COTTON FABRIC GLUED ON ONE SIDE AND HEAVY COTTON DUCK GLUED ON OTHER SIDE	4.6	31.1	—	—
S2.4.2	179B	4	DO	SAME AS S2.4.1 WITH FLAMEPROOFED 4 IN. THICK COTTON BATS BETWEEN STUDS	4.8	35.0	—	—
S2.4.3	179C	4	DO	SAME AS S2.4.1 WITH FLAMEPROOFED 1 IN. THICK COTTON BATS BETWEEN STUDS	4.6	34.6	—	—
S2.4.4	179D	4	DO	SAME AS S2.4.1 WITH 4- BY 4-IN. FIRE-RETARDANT TREATED COTTON BATS TACKED TO SIDE OF STUDS	4.7	34.3	—	—
S2.4.5	206	4	DO	1/2-IN. SOFT FIBERBOARD WALL FINISH	3.8	32.2	—	—
S2.4.6	207	4	DO	3/4-IN. SOFT FIBERBOARD WALL FINISH	4.3	32.7	—	—
S2.5.1	86	4	DO	1/2-IN. SOFT FIBERBOARD ON BOTH FACES OF STUDS PLUS 1/2-IN. GYPSUM PLASTER ON WOOD LATH, FURRED OUT WITH 1- BY 2-IN. FURRING STRIPS	14.7	—	48.2	—

TABLE 23.—SOUND-INSULATION RATINGS OF WOOD- AND STEEL-STUD PARTITIONS. GROUPS S2.1 TO S2.8, INC.—CONTINUED

SOUND REFERENCE NO.	PANEL NO.	NOMINAL THICKNESS	KIND OF STUDS	KIND OF PLASTER, PLASTER BASE, OR SPECIAL FEATURES	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	FIRE REFERENCE NO.
		IN.			LB/FT²	DECIBELS	DECIBELS	
S2.5.2	127	4	2- BY 4-IN. WOOD, 16-IN. SPACING	ONE SIDE FINISHED WITH 1/2-IN. FIBERBOARD AND PLASTERED BOTH INSIDE AND OUTSIDE WITH 1/2-IN. GYPSUM PLASTER; OTHER SIDE FINISHED WITH 7/8-IN. GYPSUM PLASTER ON METAL LATH	20.9	—	49.9	—
S2.5.3	213	4	DO	SAME AS S2.3.4 PLUS 1/2-IN. GYPSUM PLASTER ON 1/2-IN. FIBERBOARD FASTENED AT TOP AND BOTTOM 2 IN. FROM ONE SIDE OF ORIGINAL WALL WITH 2- BY 2-IN. WOOD STRIPS	18.2	51.3	53.3	—
S2.6.1	124	6	2- BY 4-IN. WOOD, SPACED 16 IN. AND STAGGERED	1/2-IN. SOFT FIBERBOARD	4.9	—	42.2	—
S2.6.2	125	6	DO	SAME AS S2.6.1 PLUS 7/8-IN. GYPSUM PLASTER ON PAPER-BACKED WIRE MESH LATH	16.1	—	54.5	—
S2.6.3	126	6	DO	SAME AS S2.6.1 PLUS 1/2-IN. GYPSUM PLASTER DIRECTLY ON FIBERBOARD	13.1	—	54.2	—
S2.6.4	175	6	2- BY 4-IN. WOOD, SPACED 16 IN., STAGGERED AND THOSE ON ONE SIDE SET WITH 4-IN. FACE OUT	7/8-IN GYPSUM PLASTER ON METAL LATH	19.8	49.8	50.9	—
S2.6.5	208	—	2- BY 4-IN. WOOD, 16-IN. SPACING	1/8-IN. CEMENT-ASBESTOS BOARD ON EACH SIDE OF 7/8-IN. CANE FIBER CORE, ON ONE SIDE OF STUDS ONLY	—	28.3	—	—
S2.6.6	209	—	DO	SAME AS S2.6.5 BUT FINISHED ON BOTH SIDES	8.3	39.8	—	—
S2.6.7	210	—	2- BY 2-IN. WOOD STUDS	1/4-IN. SOFT FIBERBOARD FACING	—	29.7	—	—
S2.6.8	216	4 3/4	TWO ROWS OF 2- BY 2-IN. WOOD STUDS	TWO PLIES OF 1/2-IN. GYPSUM WALLBOARD IN THE 1-IN. SPACES BETWEEN THE TWO ROWS OF STUDS; 1/4-IN. PLYWOOD GLUED ON OUTER FACES OF STUDS	7.9	34.9	—	—
S2.6.9	217	4	DO	1/4-IN. PLYWOOD IN 1/4-IN. SPACE BETWEEN THE TWO ROWS AND ALSO ON OUTSIDE FACES OF STUDS; PAPER-BACKED MINERAL WOOL BATS IN AIR SPACES	5.1	37.1	—	—
S2.6.10	218	6 1/2	DO	1/2-IN. GYPSUM WALLBOARD NAILED TO INSIDE FACE OF BOTH ROWS OF STUDS, LEAVING 1-IN. AIR SPACE BETWEEN GYPSUM BOARDS; 1/4-IN. PLYWOOD GLUED TO OUTER FACES OF STUDS	7.4	38.7	—	—

TABLE 23.—SOUND-INSULATION RATINGS OF WOOD- AND STEEL-STUD PARTITIONS. GROUPS S2.1 TO S2.8, INC.—CONTINUED

SOUND REFERENCE NO.	PANEL NO.	NOMINAL THICKNESS	KIND OF STUDS	KIND OF PLASTER, PLASTER BASE, OR SPECIAL FEATURES	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3200 C/S	FIRE REFERENCE NO.
		IN.			LB/FT^2	DECIBELS	DECIBELS	
S2.6.11	219	7 1/2	TWO ROWS OF 2- BY 2-IN. WOOD STUDS	1/2-IN. FIBERBOARD SET LOOSE IN 2-IN. SPACE BETWEEN ROWS OF STUDS; 3/4-IN. FIBERBOARD ON OUTER FACES OF STUDS	6.2	42.8	—	—
S2.6.12	220	8	DO	SAME INTERIOR CONSTRUCTION AS S2.6.11; FINISHED WITH 1/2-IN. GYPSUM PLASTER ON 1/2-IN. FIBERBOARD	14.3	52.3	—	—
S2.6.13	211	3 1/2	1- BY 3-IN. WOOD, 16-IN. SPACING	1/4-IN. PLYWOOD FACING	2.5	24.5	—	—
S2.6.14	212	4 1/2	DO	SAME AS S2.6.13 PLUS 1/2-IN. GYPSUM WALLBOARD	6.6	40.4	—	—
S2.6.15	214	4 1/2	1- BY 3-IN. WOOD, 8 IN. O.C. STAGGERED	1/4-IN. PLYWOOD GLUED TO BOTH SIDES	2.6	26.0	—	—
S2.6.16	215	5 1/2	1- BY 3-IN. WOOD, 16-IN. SPACING, STAGGERED	SAME AS S2.6.15 PLUS 1/2-IN. GYPSUM WALLBOARD	7.0	46.4	—	—
S2.7.1	166A	4 3/4	3-IN. STEEL, 16-IN. SPACING	7/8-IN. GYPSUM PLASTER ON METAL LATH	19.6	36.9	—	F3.2.2
S2.7.2	166B	4 3/4	DO	SAME AS S2.7.1 WITH 4.3 LB/FT^3 DENSITY MINERAL WOOL BETWEEN STUDS	21.1	38.0	—	—
S2.7.3	143A	3 1/4	1 1/2-IN. STEEL, 16-IN. SPACING	7/8-IN. GYPSUM PLASTER ON PAPER-BACKED WIRE-MESH LATH	17.6	34.2	—	—
S2.7.4	143B	3 1/4	DO	SAME AS S2.7.3 WITH MINERAL WOOL BETWEEN STUDS	—	42.0	—	—
S2.8.1	159	2	3/4-IN. STEEL, 16-IN. SPACING	1/2-IN. GYPSUM PLASTER ON METAL LATH; ON ONE SIDE ONLY	8.1	33.3	—	—
S2.8.2	160A	10	DO	TWO PANELS LIKE S2.8.1 PLACED BACK TO BACK AND RESTING ON 1 IN. THICK CORK	17.2	55.2	—	—
S2.8.3	160E	4 1/2	DO	DO	17.2	52.9	—	—
S2.8.4	160F	4 3/8	DO	SAME AS S2.8.2 PLUS BRACES AT CORNERS IN CONTACT WITH EACH OTHER	17.2	51.0	—	—
S2.8.5	160G	4 1/2	DO	SAME AS S2.8.2 WITH PANELS RESTING ON 1 IN. THICK WOOD INSTEAD OF 1 IN. THICK CORK	17.2	51.3	—	—
S2.8.6	160H	4 1/2	DO	SAME AS S2.8.1 WITH PANELS RESTING ON CONCRETE	17.2	48.1	—	—
S2.8.7	160I	4 1/2	DO	SAME AS S2.8.6 WITH PANELS TIED TOGETHER WITH 3/4-IN. CHANNEL IRON SHOES AT TWO POINTS	17.2	45.7	—	—

TABLE 23.—SOUND-INSULATION RATINGS OF WOOD- AND STEEL-STUD PARTITIONS. GROUPS S2.1 TO S2.8, INC.—CONTINUED

SOUND REFERENCE NO.	PANEL NO.	NOMINAL THICKNESS	KIND OF STUDS	KIND OF PLASTER, PLASTER BASE, OR SPECIAL FEATURES	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	256 TO 3100 C/S	FIRE REFERENCE NO.
		IN.			LB/FT²	DECIBELS	DECIBELS	
S2.8.8	221	5	3/4-IN. STEEL, 16-IN. SPACING	3/4-IN. HEAT-INSULATING PLASTER ON METAL LATH ON ONE SIDE OF CHANNELS; TWO PANELS BACK TO BACK RESTING ON 1 1/2-IN. CORK BASE	9.1	46.0	—	—
S2.8.9	222	5	3/4-IN. STEEL,* 16-IN. SPACING	3/4-IN. GYPSUM PLASTER ON PAPER-BACKED METAL LATH ON ONE SIDE OF STUDS; 1-IN., 6 LB/FT³ DENSITY FIBERGLASS BOARD BETWEEN STUD AND METAL LATH; TWO PANELS BACK TO BACK	—	54.4	—	—
S2.8.10	223	5	DO	SAME AS S2.8.9 EXCEPT THAT DENSITY OF FIBERGLASS BOARD WAS 4 1/2 LB/FT³	—	52.5	—	—

*STUDS FOR NOS. S2.8.9 AND S2.8.10 HAD GROOVES FOR HOLDING SPECIAL NAILS.

TABLE 24.—SOUND-INSULATION RATINGS OF BRICK WALLS AND PARTITIONS. GROUPS S3.1 AND S3.2

SOUND REFERENCE NO.	PANEL NO.	NOMINAL THICKNESS	TYPE OF WALL	KIND OF BRICK	KIND OF PLASTER OR SPECIAL FEATURES	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	256 TO 3100 C/S	FIRE REFERENCE NO.
		IN.				LB/FT²	DECIBELS	DECIBELS	
S3.1.1	25	4	SOLID	CLAY	5/8-IN. LIME PLASTER ON BOTH SIDES	—	—	50.2	(F1.1.1)
S3.1.2	26	4	DO	DO	5/8-IN. GYPSUM PLASTER ON BOTH SIDES	—	—	53.7	F1.1.2
S3.1.3	85	2 1/2	DO	NEW HAMPSHIRE CLAY	1/2-IN. GYPSUM PLASTER ON BOTH SIDES; BRICK LAID ON EDGE	31.6	—	48.8	—
S3.1.4	82	2 1/2	DO	DO	1/2-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM PLASTERBOARD ON FURRING STRIPS WIRED TO BRICK WALL	36.5	—	53.5	—
S3.1.5	83	2 1/2	DO	DO	SAME AS S3.1.4 EXCEPT THAT FURRING STRIPS WERE NAILED TO BRICK WALL	38.2	—	55.2	—
S3.1.6	84	2 1/2	DO	DO	1/2-IN. GYPSUM PLASTER ON 1/2-IN. SOFT FIBERBOARD ON FURRING STRIPS NAILED TO BRICK WALL	33.3	—	54.6	—
S3.2.1	79	8	DO	DO	1/2-IN. GYPSUM PLASTER ON BOTH SIDES; BRICK LAID WITH POOR WORKMANSHIP	92.0	—	53.6	F1.1.6
S3.2.2	80	8	DO	DO	1/2-IN. GYPSUM PLASTER ON BOTH SIDES	97.0	—	56.7	F1.1.6
S3.2.3	81	8	DO	MISSISSIPPI CLAY	DO	87.0	—	57.2	F1.1.6

TABLE 25.—SOUND-INSULATION RATINGS OF STRUCTURAL CLAY TILE WALLS AND PARTITIONS. GROUPS S3.3 AND S3.4

SOUND REFERENCE No.	PANEL NO.	NOMINAL THICKNESS	CELLS IN WALL THICKNESS	KIND OF TILE	KIND OF PLASTER OR SPECIAL FEATURES	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	FIRE REFERENCE NO.
		IN.				LB/FT^2	DECIBELS	DECIBELS	
S3.3.1	27	3	1	PARTITION	5/8-IN. LIME PLASTER	—	—	42.4	—
S3.3.2	28	3	1	DO	5/8-IN. GYPSUM PLASTER	—	—	47.8	—
S3.3.3	68	3	1	DO	1/2-IN. GYPSUM PLASTER	28.0	—	44.4	—
S3.3.3	69	3	1	DO	DO	28.0	—	45.4	—
S3.3.4	302	3	1	DO	3/4-IN. GYPSUM PLASTER OVER 5/8-IN. LAYER OF SPRAYED SOFT MINERAL WOOL ON ONE SIDE; 3/4-IN. GYPSUM PLASTER ON OTHER SIDE	29.6	41.3	44.6	—
S3.3.5	66	4	1	DO	1/2-IN. GYPSUM PLASTER	29.0	—	44.0	F1.6.2
S3.3.5	67	4	1	DO	DO	29.0	—	43.5	F1.6.2
S3.3.6	71	4	1	DO	3/4-IN. GYPSUM PLASTER ON METAL LATH OVER PAPER ON WOOD FURRING STRIPS	34.0	—	57.5	(F1.6.4)
S3.3.7	72	4	1	DO	SAME AS S3.3.6 WITH PADS UNDER FURRING STRIPS	34.0	—	58.3	(F1.6.4)
S3.3.8	73	4	1	DO	1/2-IN. GYPSUM PLASTER ON FIBERBOARD ON WOOD FURRING STRIPS	28.0	—	60.7	(F1.6.4)
S3.3.8	74	4	1	DO	DO	34.0	—	57.5	(F1.6.4)
S3.3.9	140	4	1	DO	5/8-IN. GYPSUM PLASTER; NEW JERSEY POROUS TILE	42.1	42.1	43.5	(F1.6.4)
S3.3.10	142	4	1	DO	5/8-IN. GYPSUM PLASTER; NEW JERSEY STANDARD TILE	33.4	44.3	45.2	(F1.6.2)
S3.3.11	303	4	1	DO	5/8-IN. VERMICULITE PLASTER	25.2	38.3	41.9	—
S3.3.12	64	4	1	PARTITION, MEDIUM-BURNED	5/8-IN. GYPSUM PLASTER	37.0	—	45.7	(F1.6.6)
S3.3.13	65	4	1	PARTITION, SOFT-BURNED	DO	37.0	—	44.6	(F1.6.6)
S3.3.14	75	8	3	PARTITION	TWO PARTITIONS OF 3-IN. TILE, SPACED 1 3/4 IN. APART WITH 1 IN. THICK FIBERBOARD BETWEEN; ONE SIDE OF PARTITION BEDDED AT BOTTOM WITH 1/2-IN. FIBERBOARD	50.0	—	59.2	—
S3.4.1	141	4	1	LOAD-BEARING, SOFT-BURNED	5/8-IN. GYPSUM PLASTER	37.5	46.9	49.3	F1.6.4
S3.4.2	63	6	2	DO	DO	39.0	—	47.1	F1.6.12
S3.4.3	62	8	2	DO	DO	48.0	—	49.8	F1.3.3
S3.4.4	70	8	3	DO	DO	55.0	—	51.0	F1.3.19
S3.4.5	60	12	3	DO	5/8-IN. GYPSUM PLASTER. WALL BUILT OF 4- AND 8-IN. TILES; END CONSTRUCTION	65.0	—	48.6	—
S3.4.6	61	12	3	DO	5/8-IN. GYPSUM PLASTER. WALL BUILT OF 4- AND 8-IN. TILES; SIDE CONSTRUCTION	66.0	—	50.0	—

TABLE 26.—SOUND-INSULATION RATINGS OF MISCELLANEOUS MASONRY PARTITIONS. GROUP S3.5

SOUND REFERENCE No.	PANEL No.	NOMINAL THICKNESS	STRUCTURAL WALL	KIND OF PLASTER OR SPECIAL FEATURES	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	FIRE REFERENCE No.
		IN.			LB/FT^2	DECIBELS	DECIBELS	
S3.5.1	145	3	HOLLOW CINDER BLOCK	5/8-IN. GYPSUM PLASTER	32.2	45.1	49.4	F1.9.12
S3.5.2	144	4	DO	DO	35.8	45.6	49.3	F1.9.14
S3.5.3	139	4	HOLLOW CINDER BLOCKS OF DIFFERENT TYPE	DO	29.7	42.9	44.9	F1.9.14
S3.5.4	173A	4	HOLLOW PUMICE-CEMENT BLOCK	1/2-IN. GYPSUM PLASTER	25.3	37.4	39.4	F1.9.5
S3.5.5	173B	4	DO	1/2-IN. GYPSUM PLASTER ON ONE SIDE ONLY	20.4	34.6	36.3	(F1.9.4)
S3.5.6	173C	4	DO	NO PLASTER OR OTHER FINISH	15.5	11.0	12.9	F1.9.4
S3.5.7	30B	3	DO	5/8-IN. GYPSUM PLASTER	—	—	42.0	(F1.9.1)
S3.5.7	161	3	DO	1/2-IN. GYPSUM PLASTER	21.0	38.1	41.4	(F1.9.1)
S3.5.8	138	3	DO	1/2-IN. GYPSUM PLASTER ON ONE SIDE; 3/4-IN. GYPSUM PLASTER ON METAL LATH ATTACHED TO BLOCK WITH RESILIENT CLIPS ON OTHER SIDE	—	57.6	—	(F1.9.1)
S3.5.9	301	3	DO	3/4-IN. GYPSUM PLASTER ON ONE SIDE; 3/4-IN. GYPSUM PLASTER OVER 5/8-IN. LAYER OF SPRAYED SOFT MINERAL WOOL ON OTHER SIDE	27.5	41.9	44.1	—
S3.5.10	155	3 3/4	GLASS BLOCK	NO PLASTER	—	40.8	—	—

TABLE 27.—SOUND-INSULATION RATINGS FOR WOOD-STUD PARTITIONS WITH SPECIAL ATTACHMENTS FOR GYPSUM LATH. GROUPS S4.1 AND S4.2

SOUND REFERENCE No.	PANEL No.	NOMINAL THICKNESS	KIND OF STUDS	KIND OF PLASTER, PLASTER BASE, OR SPECIAL FEATURES	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	FIRE REFERENCE No.
		IN.			LB/FT^2	DECIBELS	DECIBELS	
S4.1.1	149	4	2- BY 4-IN. WOOD, 16-IN. SPACING	1/2-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM LATH FASTENED WITH LARGE HEAD NAILS DRIVEN IN JOINTS AT STUDS	15.7	47.7	—	(F2.2.3)
S4.1.2	401	4	DO	SAME AS S4.1.1 PLUS 1/4-IN. FELT PADS BETWEEN STUDS AND LATH	13.6	40.8	—	(F2.2.3)
S4.1.3	402	4	DO	1/2-IN. GYPSUM PLASTER ON 3/8-IN. PERFORATED GYPSUM LATH, WITH SPECIAL NAILING	15.8	42.3	—	(F2.2.2)
S4.1.4	403	4	DO	DO	15.9	38.7	—	(F2.2.2)
S4.1.5	404	4	DO	1/2-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM LATH, WITH SPECIAL NAILING	14.5	38.4	—	(F2.2.2)
S4.1.6	405	4	DO	DO	15.2	39.4	—	(F2.2.2)
S4.1.7	406	4	DO	DO	14.8	40.5	—	(F2.2.2)
S4.1.8	407	4	DO	DO	14.4	41.3	—	(F2.2.2)
S4.1.9	408	4	DO	DO	14.8	42.3	—	(F2.2.2)
S4.1.10	409	4	DO	DO	15.2	42.0	—	(F2.2.2)
S4.1.11	410	4	DO	DO	13.6	42.9	—	(F2.2.2)
S4.1.12	411	4	DO	DO	14.3	42.7	—	(F2.2.2)
S4.1.13	412	4	DO	SAME AS S4.1.12 PLUS 1/4-IN. FELT PADS BETWEEN STUDS AND LATH	14.0	47.1	—	(F2.2.2)
S4.2.1	150	4	DO	1/2-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM LATH FASTENED WITH RESILIENT CLIPS	—	51.8	—	(F2.2.3)
S4.2.2	151	4	DO	3/8-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM LATH WITH 1/2-IN. FELT GLUED TO THE BACK OF THE LATH AND BOTH FASTENED TO STUDS WITH STIFF CLIPS	—	49.7	—	(F2.2.2)
S4.2.3	152	4	DO	SAME AS S4.2.2 EXCEPT THAT PLASTER WAS 1/2-IN. THICK	17.2	50.9	—	(F2.2.2)
S4.2.4	153	4	DO	3/8-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM LATH, FASTENED WITH STIFF CLIPS	—	46.7	—	(F2.2.2)
S4.2.5	167	4	DO	1/2-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM LATH, FASTENED WITH RESILIENT CLIPS	15.7	51.9	—	(F2.2.2)
S4.2.6	168	4	DO	SAME AS S4.2.5 PLUS 1.5 LB/FT^3 GLASS WOOL IN AIR SPACE	16.9	54.8	—	(F2.2.2)
S4.2.7	176	4	DO	1/2-IN. GYPSUM PLASTER ON 3/8-IN. PERFORATED GYPSUM LATH, ATTACHED WITH SPECIAL CLIPS	16.4	48.3	—	(F2.2.2)

TABLE 27.—SOUND-INSULATION RATINGS FOR WOOD-STUD PARTITIONS WITH SPECIAL ATTACHMENTS FOR GYPSUM LATH. GROUPS S4.1 AND S4.2—CONTINUED.

SOUND REFERENCE NO.	PANEL NO.	NOMINAL THICKNESS	KIND OF STUDS	KIND OF PLASTER, PLASTER BASE, OR SPECIAL FEATURES	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	256 TO 3100 C/S	FIRE REFERENCE NO.
		IN.			LB/FT^2	DECIBELS	DECIBELS	
S4.2.8	178	4	2- BY 4-IN. WOOD, 16-IN. SPACING	1/2-IN. GYPSUM PLASTER ON 3/8-IN. PERFORATED GYPSUM LATH, ATTACHED WITH SPECIAL CLIPS	14.9	45.8	—	(F2.2.2)
S4.2.9	413	4	DO	1/2-IN. GYPSUM PLASTER ON 3/8-IN. GYPSUM LATH, ATTACHED WITH SPECIAL CLIPS	12.4	41.8	—	(F2.2.2)
S4.2.10	414	4	DO	DO	14.1	45.7	—	(F2.2.2)
S4.2.11	415	4	DO	DO	13.9	42.4	—	(F2.2.2)
S4.2.12	416	4	DO	DO	14.9	44.5	—	(F2.2.2)
S4.2.13	417	4	DO	DO	15.5	43.6	—	(F2.2.2)
S4.2.14	418	4	DO	DO	14.3	47.0	—	(F2.2.2)
S4.2.15	419	4	DO	DO	15.1	45.1	—	(F2.2.2)

NOTE: SEE ALSO PANELS S2.8.9, S2.8.10, S3.5.8, S5.2.5, S5.2.6 AND S5.2.7.

TABLE 28.—SOUND-INSULATION RATINGS OF SOLID PLASTER PARTITIONS. GROUPS S5.1 AND S5.2

SOUND REFERENCE NO.	PANEL NO.	NOMINAL THICKNESS	PLASTER BASE	PLASTER OR FACING MATERIAL	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	FIRE REFERENCE NO.
		IN.			LB/FT³	DECIBELS	DECIBELS	
S5.1.1	154	2	WIRE-WOVEN LATH ON 3/4-IN. STEEL-CHANNEL STUDS ON 12-IN. CENTERS	GYPSUM PLASTER	—	39.9	—	(F4.1.4)
S5.1.2	170	2	3/4-IN. PERFORATED-GYPSUM LATH ON 3/4-IN. CHANNELS ON 12-IN. CENTERS	DO	19.4	36.5	—	(F4.1.2)
S5.1.3	171A	2	EXPANDED-METAL LATH ON 3/4-IN. STEEL-CHANNEL STUDS ON 12-IN. CENTERS	DO	16.4	37.6	—	F4.1.4
S5.1.3	171B	2	DO	DO	17.7	35.1	—	F4.1.4
S5.1.3	171C	2	DO	DO	18.8	36.0	—	F4.1.4
S5.1.4	172	2 1/2	DO	DO	22.4	39.2	—	F4.1.5
S5.1.5	501	2	EXPANDED-METAL LATH ON 3/4-IN. STEEL-CHANNEL STUDS ON 16-IN. CENTERS	VERMICULITE PLASTER	8.8	34.3	—	—
S5.2.1	503	2	EXPANDED-METAL LATH WITHOUT STUDS	GYPSUM PLASTER	18.4	38.2	—	—
S5.2.2	504	2	3/8-IN. GYPSUM LATH WITHOUT STUDS	DO	16.8	37.3	—	F4.1.3
S5.2.2	510	2	DO	DO	16.0	36.1	—	F4.1.3
S5.2.3	506	2 1/2	DO	DO	19.7	38.6	—	(F4.1.3)
S5.2.3	511	2 1/2	DO	DO	19.8	39.8	—	—
S5.2.4	512	3	DO	DO	24.5	39.9	—	—
S5.2.5	505	2	DOUBLE CORE OF 3/8-IN. GYPSUM LATH, SPACED 1/4-IN. APART WITH FELT; STRIPS OF METAL LATH OVER JOINTS	1/2-IN. GYPSUM PLASTER ON EACH SIDE	15.3	37.9	—	—
S5.2.6	513	2 1/2	DOUBLE CORE 3/8-IN. GYPSUM LATH, SPACED 1/8 IN. APART WITH FELT	13/16-IN. GYPSUM PLASTER ON EACH SIDE	17.6	41.5	—	—
S5.2.7	514	2 1/2	DO	1/2-IN. GYPSUM PLASTER ON ONE SIDE, 1 1/8-IN. GYPSUM PLASTER ON OTHER SIDE	18.8	42.0	—	—
S5.2.8	507	2 5/8	DOUBLE CORE OF 1/2-IN. AND 3/8-IN. GYPSUM PLASTERBOARD WITH STEEL CLIPS AT JOINTS AND WITH 1/4-IN. AIR SPACE	5/8-IN. GYPSUM PLASTER ON EACH SIDE	12.9	40.2	—	—
S5.2.9	515	2 1/2	DOUBLE CORE OF 3/8-IN. GYPSUM PLASTERBOARD HELD TIGHTLY TOGETHER BY STEEL CLIPS AT BUTT JOINTS	7/8-IN. GYPSUM PLASTER ON EACH SIDE	17.8	41.2	—	—
S5.2.10	508	2 7/16	SAME AS S5.2.8 EXCEPT ALL PLASTERBOARD WAS 1/2 IN. THICK	1/2-IN. GYPSUM PLASTER ON ONE SIDE AND 11/16-IN. GYPSUM PLASTER ON OTHER SIDE	13.6	41.7	—	—

TABLE 28.—SOUND-INSULATION RATINGS OF SOLID PLASTER PARTITIONS. GROUPS S5.1 AND S5.2—CONTINUED

SOUND REFERENCE NO.	PANEL NO.	NOMINAL THICKNESS	PLASTER BASE	PLASTER OR FACING MATERIAL	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	FIRE REFERENCE NO.
		IN.			LB/FT³	DECIBELS	DECIBELS	
S5.2.1	509	2 7/8	SAME AS S5.2.10 WITH AN ADDITIONAL LAYER OF 1/2-IN. FIBERBOARD IN MIDDLE ATTACHED TO PLASTERBOARD BY MEANS OF STEEL CLIPS AND WITH 1/4-IN. AIR SPACE ON EACH SIDE OF FIBERBOARD	1/2-IN. GYPSUM PLASTER	15.9	46.9	—	—

TABLE 29.—SOUND-INSULATION RATINGS OF MISCELLANEOUS PARTITIONS AND DOORS. GROUPS S6.1 TO S6.3 INC.

SOUND REFERENCE NO.	PANEL NO.	NOMINAL THICKNESS	PLASTER BASE	PLASTER OR FACING MATERIAL	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	FIRE REFERENCE NO.
		IN.			LB/FT³	DECIBELS	DECIBELS	
S6.1.1	146	5	3-IN. PORTLAND CEMENT-BONDED EXCELSIOR BLOCKS LAID WITH GYPSUM MORTAR	1/2-IN GYPSUM PLASTER	—	34.8	—	Fl.8.2
S6.1.2	147A	5	SAME AS S6.1.1 PLUS 1-IN. SHEET OF SAME TYPE OF MATERIAL NAILED TO CORE BEFORE PLASTERING	DO	23.5	41.7	—	(Fl.8.2)
S6.1.3	149B	5	SAME AS S6.1.2 EXCEPT THAT SISALKRAFT PAPER WAS PLACED BETWEEN THE TWO LAYERS OF THE CORE	DO	—	47.4	—	(Fl.8.2)
S6.2.1	601	7/8	3/8-IN. SOFT FIBERBOARD FACINGS FURRED OUT 3/8 IN. FROM 7/16-IN. FIBERBOARD CORE	NO PLASTER	3.8	30.2	—	—
S6.2.2	181		HEAVY WOODEN DOOR APPROXIMATELY 2 1/2 IN. THICK; SPECIAL HARDWARE; RUBBER GASKETS AROUND SIDES AND TOP; SPECIAL FELT STRIP AT BOTTOM TO CLOSE CRACK		—	28.1	—	—
S6.3.2	182		SIMILAR DOOR TO S6.3.1 BUT MADE BY DIFFERENT MANUFACTURER		12.5	29.7	—	—

TABLE 30.—SOUND-INSULATION RATINGS OF WOOD-JOIST FLOORS. GROUPS S7.1 TO S7.5 INC.

SOUND REFERENCE NO.	PANEL NO.	JOISTS	CONSTRUCTION ABOVE JOISTS	CONSTRUCTION BELOW JOISTS	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	TAPPING LOSS	FIRE REFERENCE NO.
					LB/FT^2	DECIBELS	DECIBELS	DECIBELS	
S7.1.1	114A	2- BY 4-IN., 16-IN. SPACING	1-IN. SUBFLOOR; 3/8-IN. FINISH FLOOR	1/2-IN. GYPSUM PLASTER ON WOOD LATH	—	—	47.0	14.0	—
S7.1.2	130	2- BY 8-IN., 16-IN. SPACING	1-IN. SUBFLOOR; 13/16-IN. OAK FINISH FLOOR	7/8-IN. GYPSUM PLASTER ON METAL LATH	17.1	38.1	—	11.1	—
S7.1.3	701	DO	1-IN. SUBFLOOR; 1/2-IN. PINE FINISH FLOOR	1/2-IN. GYPSUM PLASTER ON 1/2-IN. SOFT FIBERBOARD LATH	14.3	45.1	—	10.8	—
S7.2.1	114B	2- BY 4-IN., 16-IN. SPACING	1-IN. SUBFLOOR; 1/2-IN. SOFT FIBERBOARD; 3/8-IN. FINISH FLOOR	1/2-IN. GYPSUM PLASTER ON WOOD LATH	—	—	47.1	14.0	—
S7.2.2	114C	DO	1-IN. SUBFLOOR; 1/2-IN. SOFT FIBERBOARD; NAILING STRIPS; 1-IN. ROUGH FLOOR; 3/8-IN. FINISH FLOOR	DO	—	—	57.8	22.0	—
S7.2.3	114D	DO	SAME AS S7.2.2 WITH 1/2-IN. SOFT FIBERBOARD UNDER FINISH FLOOR	DO	—	—	57.8	22.0	—
S7.2.4	132A	2- BY 8-IN., 16-IN. SPACING	1-IN. SUBFLOOR; 1-IN. BALSAM WOOL; SMALL SQUARES OF HARD-PRESSED FIBERBOARD 16-IN. SPACINGS; NAILING STRIPS FASTENED TO SUBFLOOR WITH METAL STRAPS; 13/16-IN. FINISH FLOOR	7/8-IN. GYPSUM PLASTER ON METAL LATH	—	53.3	—	19.4	—
S7.2.5	132B	DO	SAME AS S7.2.4 CONSTRUCTED IN AN APARTMENT HOUSE	DO	—	52.3	—	19.4	—
S7.2.6	132C	DO	SAME AS S7.2.4 EXCEPT THAT BALSAM WOOL WAS 1/2-IN. THICK	DO	—	52.6	—	17.1	—
S7.2.7	133A	DO	1-IN. SUBFLOOR; 1/2-IN. BALSAM WOOL; 1-IN. HARD-PRESSED FIBERBOARD NAILING STRIPS, 16-IN. SPACING FASTENED WITH NAIL AT EACH END INTO SUBFLOOR 13/16-IN. OAK FINISH FLOOR	DO	15.0	51.6	—	15.3	—
S7.2.8	133B	DO	SAME AS S7.2.7 EXCEPT THAT 2 1/2-IN. WIDE STRIPS OF HARD-PRESSED FIBERBOARD WERE USED INSTEAD OF SHEETS OF HARD PRESSED FIBERBOARD	DO	—	53.7	—	20.2	—

TABLE 30.—SOUND-INSULATION RATINGS OF WOOD-JOIST FLOORS. GROUP S7.1 TO S7.5 INC.—CONTINUED

SOUND REFERENCE No.	PANEL No.	JOISTS	CONSTRUCTION ABOVE JOISTS	CONSTRUCTION BELOW JOISTS	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	256 TO 3100 C/S	TAPPING LOSS	FIRE REFERENCE NO.
					LB/FT²	DECIBELS	DECIBELS	DECIBELS	
S7.2.9	180A	2- BY 6-IN., 16-IN. SPACING	1-IN. SUBFLOOR; 2- BY 2-IN. STRIPS 16-IN. SPACING; 13/16-IN. FINISH FLOOR	3/4-IN. GYPSUM PLASTER ON METAL LATH	16.3	37.9	—	10.3	—
S7.2.10	180B	DO	SAME AS S7.2.9 WITH 1/2-IN. BALSAM WOOL OVER SUBFLOOR	DO	16.6	50.0	—	15.8	—
S7.2.11	180C	DO	SAME AS S7.2.9 WITH 1-IN. BALSAM WOOL OVER SUBFLOOR	DO	16.7	50.3	—	18.7	—
S7.2.12	180D	DO	1-IN. SUBFLOOR; 1/2- BY 6-IN. HARD-PRESSED FIBERBOARD STRIPS UNDER 2- BY 2-IN. SLEEPERS, 16-IN. SPACING; 1-IN. BALSAM WOOL BETWEEN SLEEPERS; 13/16-IN. HARDWOOD FINISH FLOOR	DO	16.7	50.4	—	17.6	—
S7.2.13	180E	DO	1-IN. SUBFLOOR; 1/2-IN. BALSAM WOOL; 2 1/2- BY 2 1/2-IN. SQUARES OF 1/2-IN. NUWOOD SPACED ON 16-IN. CENTERS; 2- BY 2-IN. SLEEPERS WITH METAL STRIP OVER SLEEPER NAILED TO SUBFLOOR; 13/16-IN. FINISH FLOOR	DO	16.5	46.3	—	13.4	—
S7.2.14	180F	DO	SAME AS S7.2.13 WITH 1-IN. BALSAM WOOL INSTEAD OF 1/2-IN. THICKNESS	DO	16.7	48.7	—	15.8	—
S7.2.15	702	2- BY 8-IN., 16-IN. SPACING	1-IN. SUBFLOOR; 1/2-IN. FIBERBOARD; 1- BY 3-IN. SLEEPERS; 1-IN. PINE FINISH FLOOR	DO	16.2	49.7	—	12.1	—
S7.3.1	703	DO	1-IN. SUBFLOOR; 1-IN. PINE FINISH FLOOR	SAME AS S7.1.3 PLUS 1- BY 3-IN. FURRING STRIPS THRU SECOND LAYER OF 1/2-IN. GYPSUM PLASTER ON 1/2-IN. FIBERBOARD LATH	19.0	45.4	—	9.8	—
S7.3.2	704	DO	DO	1/2-IN. FIBERBOARD; 1- BY 3-IN. FURRING STRIPS; 1/2-IN. FIBERBOARD LATH; 1/2-IN. GYPSUM PLASTER	15.9	47.4	—	14.2	—

TABLE 30.—SOUND-INSULATION RATINGS OF WOOD-JOIST FLOORS. GROUP S7.1 TO S7.5 INC.—CONTINUED

SOUND REFERENCE NO.	PANEL NO.	JOISTS	CONSTRUCTION ABOVE JOISTS	CONSTRUCTION BELOW JOISTS	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	TAPPING LOSS	FIRE REFERENCE NO.
					LB/FT^2	DECIBELS	DECIBELS	DECIBELS	
S7.3.3	705	2- BY 8-IN., 16-IN. SPACING	1-IN. SUBFLOOR; 1-IN. PINE FINISH FLOOR	SAME AS S7.3.1 EXCEPT THAT SECOND LAYER OF LATH AND PLASTER WAS SUSPENDED 2 1/2 IN. BY SCREW EYES AND WIRE LOOPS SPACED 36 IN. APART	20.3	55.5	—	25.7	—
S7.4.1	115A	2- BY 4-IN., 16-IN. SPACING WITH SECOND SET OF JOISTS SUPPORTING CEILING	1-IN. SUBFLOOR; 3/8-IN. FINISH FLOOR	1/2-IN. GYPSUM PLASTER ON 1/2-IN. FIBERBOARD LATH	12.6	—	53.4	22.0	—
S7.4.2	115B	DO	1-IN. SUBFLOOR; 1/2-IN. FIBERBOARD; 1- BY 2-IN. NAILING STRIPS; 1-IN. ROUGH FLOOR; 3/8-IN. OAK FINISH FLOOR	DO	16.1	—	63.5	30.0	—
S7.4.3	706	2- BY 8-IN., 16-IN. SPACING WITH 2- BY 4-IN. CEILING JOISTS SPACED 4 IN. FROM FLOOR JOISTS	1-IN. SUBFLOOR; 1/2-IN. FIBERBOARD; 1- BY 3-IN. SLEEPERS; 1-IN. PINE FINISH FLOOR	DO	16.7	54.1	—	24.6	—
S7.5.1	707	2- BY 8-IN., 16-IN. SPACING	1-IN. SUBFLOOR; 1-IN. PINE FINISH FLOOR	3/4-IN. FIBERBOARD; NO PLASTER	9.6	40.2	—	6.1	—
S7.5.2	708	DO	DO	1/2-IN. FIBERBOARD; 1/2-IN. GYPSUM PLASTER WITH 3/4-IN. FIBERBOARD FACE	15.8	42.2	—	10.8	—

TABLE 3[illegible].—SOUND-INSULATION RATINGS OF STEEL-PLATE FLOORS. GROUP S7.6

SOUND REFERENCE No.	PANEL No.	JOISTS	CONSTRUCTION ABOVE JOISTS	CONSTRUCTION BELOW JOISTS	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	TAPPING LOSS	FIRE REFERENCE No.
					LB/FT.^{2}	DECIBELS	DECIBELS	DECIBELS	
S7.6.1	137	8-IN. OPEN-WEB STEEL JOISTS, 20-IN. SPACING	3-IN. THERMAX; 1/2-IN. CONCRETE; 1/4-IN. BATTLESHIP LINOLEUM	1/2-IN. GYPSUM PLASTER ON 1-IN. THERMAX	—	52.8	—	11.7	—
S7.6.2	137A	DO	HIGH-RIBBED METAL LATH; 2 1/2-IN. 1:2:4 CONCRETE; 1/4-IN. BATTLESHIP LINOLEUM	DO	—	53.7	—	13.6	(F7.2.5)
S7.6.3	137B	DO	DO	3/4-IN. GYPSUM PLASTER ON RIBBED METAL LATH	—	54.9	—	13.1	(F7.2.5) (F7.2.6)

TABLE 32.—SOUND-INSULATION RATINGS OF REINFORCED-CONCRETE FLOORS OF 1:2:4 SILICEOUS GRAVEL CONCRETE. GROUP S8.1

SOUND REFERENCE NO.	PANEL NO.	THICKNESS OF CONCRETE	FINISH ABOVE CONCRETE	FINISH BELOW CONCRETE	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	TAPPING LOSS	FIRE REFERENCE NO.
		IN.			LB/FT²	DECIBELS	DECIBELS	DECIBELS	
S8.1.1	116A	4	NONE	FURRING STRIPS; 1/2-IN. SOFT FIBERBOARD; 1/2-IN. GYPSUM PLASTER	54.4	—	55.0	1.2	(F8.1.3) (F8.1.4)
S8.1.2	116B	4	1- BY 2-IN. NAILING STRIPS; 1-IN. SUBFLOOR; 3/8-IN. OAK FINISH FLOOR	DO	58.1	—	61.1	30.0	DO
S8.1.3	116C	4	SAME AS S8.1.2 WITH 1/2-IN. FIBERBOARD OVER CONCRETE	DO	58.9	—	61.3	33.0	DO
S8.1.4	156	4	NONE	RESILIENT COILED SPRING HANGERS EMBEDDED IN CONCRETE; RUNNER AND FURRING CHANNELS; 3/8-IN. GYPSUM LATH; 1/4-IN. GYPSUM PLASTER; 1/2-IN. ACOUSTIC PLASTER; 3-IN. THICKNESS OF GROUND CORK WAS PLACED OVER GYPSUM LATH	—	54.3	—	11.3	DO
S8.1.5	157	4	DO	SAME AS S8.1.4 EXCEPT THAT FLAT SPRING HANGERS WERE USED; ALSO THERMOFIL INSTEAD OF CORK	—	54.6	—	12.3	DO
S8.1.6	158	4	DO	SAME AS S8.1.4 EXCEPT THAT 4 IN. OF ROCK WOOL WAS USED INSTEAD OF CORK	—	54.8	—	11.5	DO

TABLE 33.—SOUND-INSULATION RATINGS OF FLAT-ARCH TILE FLOORS. GROUP S8.2

SOUND REFERENCE NO.	PANEL NO.	THICKNESS OF TILE	KIND OF TILE	FINISH ABOVE TILE	FINISH BELOW TILE	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	TAPPING LOSS	FIRE REFERENCE NO.
		IN.				LB/FT^2	DECIBELS	DECIBELS	DECIBELS	
S8.2.1	76	8	FIRE CLAY	2- BY 4-IN. WOOD SLEEPERS; CINDER CONCRETE FILL BETWEEN SLEEPERS; 3/4-IN. HARDWOOD FLOOR	1/2-IN. GYPSUM PLASTER	76	—	50.0	—	—
S8.2.2	77	8	DO	2-IN. CINDER CONCRETE; 1-IN. CEMENT MORTAR FINISH	DO	85	—	48.2	—	—

TABLE 34.—SOUND-INSULATION RATINGS OF COMBINATION TILE AND CONCRETE FLOORS. GROUP S8.3

SOUND REFERENCE NO.	PANEL NO.	THICKNESS OF STRUCTURAL FLOOR	KIND OF TILE	THICKNESS OF TILE	CONCRETE ABOVE TILE	FINISH ABOVE CONCRETE	FINISH BELOW CONCRETE	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	TAPPING LOSS	FIRE REFERENCE NO.
		IN.		IN.	IN.			LB/FT^2	DECIBELS	DECIBELS	DECIBELS	
S8.3.1	78A	8	FIRE CLAY	6	2	NONE	1/2-IN. GYPSUM PLASTER	83	—	52.4	—	F8.3.3
S8.3.2	78B	8	DO	6	2	2-IN. CINDER CONCRETE; 1-IN. CEMENT MORTAR FINISH	DO	109	—	50.6	—	(F8.3.3)
S8.3.3	117A	6	DO	4	2	NONE	FURRING STRIPS; 1/2-IN. FIBERBOARD; 1/2-IN. GYPSUM PLASTER	69.8	—	57.1	5.1	(F8.3.2)
S8.3.4	117B	8	DO	6	2	1- BY 2-IN. NAILING STRIPS; 1-IN. SUBFLOOR; 3/8-IN. OAK FINISH FLOOR	DO	73.5	—	65.6	34.0	(F8.3.3)
S8.3.5	117C	8	DO	6	2	SAME AS S8.3.4 PLUS 1/2-IN. FIBERBOARD UNDER NAILING STRIPS	DO	74.2	—	66.3	35.0	(F8.3.3)
S8.3.6	129A	8	DO	6	2	2- BY 2-IN. NAILING STRIPS GROUTED INTO CONCRETE; 13/16-IN. OAK FINISH FLOOR	1/2-IN. GYPSUM PLASTER	—	44.7	—	22.6	(F8.3.3)
S8.3.7	129B	8	DO	6	2	SAME AS S8.3.6 EXCEPT THAT NAILING STRIPS WERE SUPPORTED BY RESILIENT CLIPS EMBEDDED IN THE CONCRETE	DO	—	60.6	—	33.0	(F8.3.3)
S8.3.8	129C	8	DO	6	2	2- BY 2-IN. NAILING STRIPS ON RESILIENT CLIPS; 1/2-IN. GYPSUM WALLBOARD; 1 1/2-IN. HYDROCAL	DO	—	63.5	—	38.5	(F8.3.3)
S8.3.9	118	8	DO	6	2	SAME AS S8.3.3	2- BY 4-IN. WOOD JOISTS, 16-IN. O.C., SUSPENDED BY WIRE 2 IN. BELOW CONCRETE; 1/2-IN. FIBERBOARD; 1/2-IN. GYPSUM PLASTER	72.8	—	70.0	51.0	—

TABLE 35.—SOUND-INSULATION RATINGS OF MISCELLANEOUS FLOORS. GROUP S9.1

SOUND REFERENCE NO.	PANEL NO.	STRUCTURAL FLOOR	FINISH ABOVE STEEL PLATE	FINISH BELOW STEEL BEAMS	WEIGHT	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 128 TO 4096 C/S	AVERAGE SOUND-TRANSMISSION LOSS FOR FREQUENCIES 256 TO 3100 C/S	TAPPING LOSS	FIRE REFERENCE NO.
					LB/FT²	DECIBELS	DECIBELS	DECIBELS	
S9.1.1	134	CORRUGATED-STEEL PLATE WELDED ON 6-IN. KEYSTONE-SHAPED HOLLOW STEEL SEAMS SPACED ABOUT 6 IN. APART	NONE	NONE	13.9	28.3	—	-2.4	—
S9.1.2	135	SAME AS S9.1.1 EXCEPT THAT TOP PLATE WAS FLAT	NONE	NONE	13.0	26.8	—	-2.9	—
S9.1.3	136A	DO	2-IN. THICKNESS OF 1:2:4 GRAVEL CONCRETE	3/4-IN. GYPSUM PLASTER ON METAL LATH SUSPENDED 4 IN. BELOW STRUCTURAL STEEL	—	52.9	—	6.5	(F9.1.4)
S9.1.4	136B	DO	SAME AS S9.1.3 WITH 1/2-IN EMULSIFIED ASPHALT APPLIED DIRECT TO TOP OF STEEL	DO	—	61.2	—	21.1	(F9.1.2)