

DEPARTMENT OF COMMERCE

BUREAU OF STANDARDS

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UNITED STATES GOVERNMENT MASTER SPECIFICATION FOR
TILE, HOLLOW, CLAY, LOAD-BEARING WALL

FEDERAL SPECIFICATIONS BOARD SPECIFICATION No. 507

This specification was officially promulgated by the Federal Specifications Board on July 11, 1927, for the use of the departments and independent establishments of the Government in the purchase of clay hollow load-bearing wall tile.

[The latest date on which the technical requirements of this specification shall become mandatory for all departments and independent establishments of the Government is October 11, 1927. They may be put into effect, however, at any earlier date, after promulgation.]

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I. GENERAL SPECIFICATIONS

There are no general specifications applicable to this specification.

II. CLASSES

This specification is applicable to hollow units of burnt clay intended for load-bearing purposes in walls and piers, and are classified as: H, hard; M, medium; and S, soft.

As different types of clay are used in the manufacture of hollow tile, color can not be taken as indicative of classification.

III. MATERIAL AND WORKMANSHIP

Tile under this specification shall be of burnt surface clay, fire clay, shale, or mixtures thereof.

Tile shall be sound, well burnt, free from large drying or burning cracks, reasonably free from laminations, and without excessive warpings or variations of more than 3 per cent from the specified dimensions.

At the completion of the absorption test the tile shall show no evidence of disintegration.

IV. GENERAL REQUIREMENTS

1. WEIGHT.—Load-bearing wall tile shall have the following dry weights:

Size of units (inches)	Number of cells	Standard weights	Size of units (inches)	Number of cells	Standard weights
Thickness by width by length:			Thickness by width by length:		
		<i>Pounds</i>			<i>Pounds</i>
3¾ by 12 by 12.....	3	20	8 by 5 by 12.....	2 or 3	16
6 by 12 by 12.....	6	30	8 by 5 by 12 (L shaped).....		16
8 by 12 by 12.....	6	36	8 by 6¾ by 12 (T shaped).....	4	16
10 by 12 by 12.....	6	42	8 by 8 by 8 (cube).....	9	18
12 by 12 by 12.....	9	52	8 by 7¾ by 12 (square).....	6	24
3¾ by 5 by 12.....	1	9	8 by 10¾ by 12 (H shaped).....	7	32

A tolerance of not more than 5 per cent under will be allowed from the above standard weights and not more than 3 per cent over or under in dimensions.

V. DETAIL REQUIREMENTS

The tile shall meet the following absorption requirements and also, if specified by the purchasing officer, the following compressive-strength requirements. Unless otherwise specified in the request for bids, medium (M) tile shall be accepted in lieu of soft (S) tile.

Where end-construction tile are used on side, they shall meet the requirements of that construction, and vice versa.

Class	Absorption		Compressive strength on gross area			
			End construction		Side construction	
	Average of five	Individual maximum	Average of five	Individual minimum	Average of five	Individual minimum
	<i>Per cent</i>	<i>Per cent</i>	<i>Lbs./in.²</i>	<i>Lbs./in.²</i>	<i>Lbs./in.²</i>	<i>Lbs./in.²</i>
H.....	12 or less.....	15	2,000 or more..	1,400	1,000 or more..	700
M.....	12 to 16.....	19	1,400 or more..	1,000	700 or more....	500
S.....	16 to 25.....	28	1,000 or more..	700	500 or more....	350

The gross area shall be taken as the total area inclosed by the outside dimensions of the unit in a direction perpendicular to that in which the load is carried.

VI. METHOD OF SAMPLING AND TESTS

1. SAMPLING.—A set of five representative tiles for test shall be taken at random from shipments not exceeding 100 tons, and additional sets of five for each 100 tons for larger shipments. Where a shipment contains tile from several sources, separate sets of samples shall be taken of the tile from each kiln or from each 100-ton lot for continuous kilns. Separate samples shall be taken of each size or design of tile included. Additional representative samples may be taken at the discretion of the inspector.

2. TESTS.—(a) *Absorption tests.*—The tiles shall be dried in an oven until the weight is constant, at a temperature of 212 to 220° F., and their separate dry weights taken. These dry weights shall be taken as the required dry weights of the tile.

The five tiles shall then be placed in soft, distilled or rain water and boiled one hour, after which they shall remain immersed until they have cooled to room temperature. They shall then be removed from the water, allowed to drain for not more than one minute, have their surface water removed by wiping with a damp cloth, and be weighed separately. The increase in weight of the tile, divided by the weight of the dry tile and multiplied by 100, shall be taken as the percentage absorption. The scale used shall be sensitive to within one-half of 1 per cent of the smallest piece weighed.

In cases where it is not convenient to dry or boil the whole tile two pieces from the shell and one from the webs of each tile may be used. Where the strength tests are made, the absorption determinations may be made on sound fragments from the broken tile. The rough or sharp edges of the pieces shall be rounded off. The size of the pieces shall be determined by the sensitivity of the scale used, but each shall weigh not less than 8 ounces (227 grams). The percentage absorption shall then be obtained by the method given above for whole tile, the average absorption of the three pieces being taken as the absorption of the tile from which they were taken.

When pieces are used as above, the dry weight of the tile as required under Section IV shall be computed by multiplying the weight of the undried tile by the ratio the dry weight of the pieces bears to the weight of the same pieces before drying.

Where means are not available for the boiling test, the absorption test may be made by immersing the dry tile or pieces in soft, distilled, or rain water at ordinary temperature for five hours. When this method is used, the absorption limits for the different classes shall be reduced one-fourth below the values given in Section V for both the average and the individual maximums.

In cases of disagreement as to the resulting classification the absorption shall be determined by the boiling method and the full

percentage absorption for the respective classes given in Section V applied. The same tile or pieces, redried to constant weight, may be used in any such retest.

(b) *Compression test.*—When the compression test is to be made, five additional representative tiles shall be selected and their bearing surfaces coated with shellac and made plane and parallel with a plastic capping consisting preferably of 3 parts (by volume) of Portland cement and 1 part of unretarded calcined gypsum (plaster of Paris), and aged three days or more before testing. Where the test must be made sooner, a neat unretarded calcined gypsum cap may be used if allowed to set one hour or more before testing. Where tile tested with neat gypsum caps fail to meet the specification requirements on the score of strength, they shall be retested with Portland cement-gypsum caps aged not less than three days. In testing, the tile shall be placed under a spherical bearing block of proper design and loaded in a testing machine in which the speed of the moving head is not more than 0.05 inch per minute. The maximum load divided by the gross sectional area shall be reported as the strength of the tile.

VII. PACKING AND MARKING OF SHIPMENTS

VIII. NOTES

1. **BASES OF ACCEPTANCE.**—The requirements have been simplified to permit acceptance based on weight, absorption, material, and workmanship in cases where the tile is used under loads considerably below working-load values, which is frequently the case. These determinations can be made, if necessary, at the site of the work or at the plant with equipment that can be provided without much difficulty. For more exacting use the compression tests should be made and acceptance based on their results in addition to those from the weight and absorption determinations, the standing of any set of samples being determined by the requirement which gives it the lowest classification.

2. **WEATHERING RESISTANCE.**—The classification is based on requirements chosen so that hollow tile grading as medium (M) or hard (H) can be considered as suitable for use in exterior walls. This should not be taken as a rigid distinction on account of the wide range in the character of clays and processes used in tile manufacture, which makes it difficult to define weathering resistance in terms of properties that can be determined in acceptance tests. The purchasing officer should be guided in part by the experience with comparable material in the locality where those under test are to be used. In cases of doubt, and where the time and equipment are available, acceptance in point of weathering resistance can be based on ability

to withstand 100 alternations of freezing and thawing conducted according to Standard C34-26 of the American Society for Testing Materials. Failure is to be considered as reached when the samples are cracked or show superficial disintegration or spalling, with loss of weight of more than 5 per cent of the initial dry weight.

Where the wall is faced with 3 inches or more of stone, terra cotta, brick, or other veneer, the weathering resistance of the material in the backing is without significance.

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