DEPARTMENT OF COMMERCE
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FIRE RESISTANCE OF SAFES WITH CAST-IRON DOOR FRAMES AND JAMBS

A summary of results of examination and fire tests of safes having cast-iron door frames and jambs, so-called "iron" or "old line" safes, is given herein, the tests being conducted in accordance with methods given in Federal Specification No. AA-S-81 for Insulated Safes. While few safes of this type are now manufactured, a great number of them are in use.

The body thickness given in the table is that of the incombustible insulating materials. In addition, there was present approximately 1 inch of wood or pulpboard lining, or combined lining and air space. Under the bolt work the door insulation would be thinner by 1 1/4 to 1 1/2 inches than given in the table. In the case of the reference B the thickness of insulation under the lock was only 7/8 inch. References H to K, inclusive, were tests of boxes having filling and interior wood cabinetwork the same as safes A and G but without any door. By comparison some idea of the effect the cast-iron frame and door jamb have on the fire resistance of the safe may be obtained. It will be seen that while generally the fire resistance is dependent on thickness of body insulation, it is dependent to an even greater extent on the thickness of the door, due apparently in part to resulting difference in the depth of the door jambs.

Another detail found to affect fire resistance was the clearance between the tongue and the groove that is usually present near the outside of the door joint. While a tight fit may not be necessary it appears very desirable that this clearance should not be greater than 1/32 or 1/16 inch. An asbestos gasket in the groove is fairly effective although with time it may become worn. Several of the safes tested had, however, combustible felt gaskets.

In the fire and impact tests all of the safes were heated for one hour and then given a clear drop of 30 feet to a concrete slab and again reheated for one hour. The failure in the two cases occurred in the drop due to stripping of door plate or body plates from the door jambs or shearing of rivets connecting the body plates whereby openings were formed into the safe. The general weakness of the "old line" safes in this particular appears to be lack of adequate riveting to hold the heavy plates and members together. Where safes are on the first floor of buildings of not over two or three stories the impact resistance may not seriously limit the fire resistance of the safe.

All of these safes were tested within at most a few months after they were filled. While with this type of safe there is some loss of insulating value with age it is probably not very pronounced, since the fire resistance is determined mainly by the door details.

We have made no tests of safes having insulation thicker than 4 1/4 inches. Presumably there would be some increase in resistance with increase of wall and door thickness that would, for the 6-inch commercial thickness, give the safe a rating of about two hours with reasonably well executed construction details and door thickness at least equal to that of the walls.

A number of the safes had an inside iron plate door. This added a little to the resistance in increasing depth of the door jamb, but generally the insulation afforded is dependent on that given by the outside insulated door.

In summary, the estimation of the fire resistance of "old line" safes will require measurement of total wall thickness deducting about one inch for cabinet work, determination of thickness of door insulation and also that under the lock and bolt work, the clearance between the tongue and groove around the door joint and examination of construction details such as riveting and welding. We have found it convenient to measure the clearance between the tongue and groove by means of a fairly stiff putty placed at points in the groove along the door openings. To remedy too much clearance between the tongue and groove asbestos fillers can be used. These can be obtained in strips from any concern manufacturing safes. While some firms claim that a small clearance is better than a tight fit, it is quite apparent that for "old line" safes at least, clearances of 1/16 inch or more are objectionable, since there is only one fire stop of this kind between the outside and the inside of the safe.

The above is submitted for your information and is not released for publication.

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Ref.	Av. thickness of filling inches		Fire endurance rating	Result of fire and impact test
	Body	Door		
A	1 1/4	2 1/2	25 min.	No test
B	2 3/8	3	45 min.	do
C	3	2 3/4	45 min.	Failed
D	2 1/2	2 1/2	One hour	No test
E	4 1/4	3 1/4	1 hour 1 1/4 hour	Passed
F	2 1/2	3 1/2	1 1/4 hour	Failed
G	3 1/4	4 1/8	2 hours	No test
H	1 1/4	No door	One hour	do
I	2	do	1 1/2 hours	do
J	3	do	3 hours	do
K	4	do	4 hours	do