

Fire Ratings Explained

The National Fire Protection Agency (NFPA) reported that there were 383,500 home fires in the United States accounting for \$5.5 billion of property damage.

The following information applies to both Fire Rated Safes and Burglar/Fire Rated Safes. **Remember that a Fire Safe without a Burglar Rating is not recommended for Burglar Resistance.** If you need both Fire and Burglar resistance, always consider a **Burglar/Fire Rated Safe** over a **Fire Rated safe** only.

There are many types of Fire Ratings. **Safe** Manufacturer's will provide testing from a variety of sources such as:

- Private Laboratory Testing
- K.I.S. (Korean Industrial Standard) Fire Test
- U.L. (Underwriters Laboratory) Class of Fire Protection

There are other Fire Ratings not mentioned such as various European fire rating standards. Many manufacturers hire a reputable private laboratory to test their fire or burglar/fire safes for a fire rating. **Safe's** made in Korea usually have the K.I.S. Fire Test which is a Korean Fire Lab test. The most thorough and recognized fire test is the U.L. Class of Fire Protection. (see description below)

Private Fire Label Testing:



Private Label Fire Testing is where a safe manufacturer hires an Independent Testing Laboratory to test their safe for a specific time period of fire rating. Just like the Korean or Underwriter Lab fire tests, the Independent Lab places heat sensors inside the safe. The safe is placed in a burn chamber and the temperature is brought up to between 1350-1750 degrees. Once the desired temperature is achieved the Independent Lab starts timing how long the temperature stays below 350 degrees fahrenheit. If the inside temperature stays below 350 degrees for 1 hour or more, then the fire rating is 1 hour. Same for 1.5 hours, 2 hours and so on. The importance of the 350 degrees fahrenheit is that paper (or money) will start to char at approximately 387 degrees and will

burst into flames at 451 degrees fahrenheit. For these reasons, maintaining a temperature below 350 degrees fahrenheit is what all fire tests look to achieve.

Korean Industrial Standards (K.I.S.) Fire Tests:



Here is an example of how the K.I.S. Fire Test is conducted on a **safe** for a 2 hour fire rating with an Explosion Test and a Fire Impact (drop test):

K.I.S. (Korea Industrial Standards) rated by the KSG-4500 fire resistance tests. Papers and valuable documents will remain protected in accordance with the rating standards against fire, explosion and drop impact during fires.

Fire Safe is tested 2 hours in a furnace with temperature rising to 1850° F.

Explosion- Heated in a furnace to 1852° F in 10 minutes, continued at temperature for 30 more minutes.

Fire Impact- Subjected to standard fire exposure for 45 minutes, dropped 13 feet, returned to furnace upside down, reheated 1 hour.

Safe's with the K.I.S. or a Private Laboratory Test still provide great fire resistance. However, the U.L. Class of Fire protection is recognized as the most complete fire testing today. **If you are on a budget, we recommend you consider at least a 1 hour fire rating (minimum) to insure ample protection for your documents or valuables.**

U.L. Classes of Fire Protection



Underwriters Laboratories established five fire resistant classifications for record protection. These classifications are based on the type, length, and severity of the test given each classification.

The classification ratings are:

- 350-4 hour
- 350-2 hour
- 350-1 hour
- Insulated record container 350-1 hour
- Insulated record device 350-1 hour

3 Tests for Fire Protection

Three basic tests are provided by the Underwriters' Laboratories for the fire resistance of record protection equipment. These are:

1. Fire Endurance Test
2. Explosion Hazard Test
3. Fire Impact Test

Equipment in classes A, B, and C are subjected to all three tests. Equipment in classes D and E do not take the fire impact test

Fire Endurance Test

The Fire Endurance test measures the degree of resistance which the **safe** has to temperatures determined by standardized fire exposure conditions.

In preparation for the fire endurance test, the **safe** is placed in a cold furnace so that all exterior surfaces will be exposed except the bottom. Heat measuring apparatus is installed in the interior of the **safe** and papers are loosely distributed so that they are in contact with all interior surfaces. The doors of the safe are closed and locked, the furnace is closed and the fire is started.

The heat of the furnace is gradually increased according to set standards of time and temperature. The gas and air supply is adjusted carefully so that the fire is well distributed over the sample, and thermocouples symmetrically distributed in the furnace accurately record temperatures so that the test standards are maintained.

The test sample remains in the furnace for the period required for the desired classification. At the end of the time, the fire is extinguished and the sample is allowed to cool without opening the furnace. Here is the test times and temperatures for the various classifications:

	TIME IN FURNACE	TEMPERATURE REACHING
Class A	4 hours	2000 degrees Fahrenheit
Class B	2 hours	1850 degrees F
Class C	1 hour	1700 degrees F

Class D	1 hour	1700 degrees F
Class E	30 minutes	1550 degrees F

After the test sample has cooled, it is opened and the contents and interior surfaces are examined. **The records must still be usable and the interior must show no signs of undue heat transmission.** At no time during the test must the temperature inside the **safe** exceed 350 degrees Fahrenheit. The general security of the safe is also examined. The records are considered "usable" if they can be handled without breaking and if they are decipherable by ordinary means.

Explosion on Hazard Test

The Explosion on Hazard Test determines whether or not the design of the **safe** protects it against explosions in case of sudden intense heat exposure. If the **safe** construction is faulty, the sudden high temperature will cause hydrogen-air-stream mixtures in the insulating material to explode and rupture the insulation and **safe** walls. This rupture will destroy much of the **safe's** resistance to fire. The test for explosion is relatively simple. The empty, closed furnace is pre-heated to 2000 degrees F. The furnace is opened, the test sample is inserted, and the furnace is closed again for 30 minutes while the fire is maintained at 2000 degrees F. After the test, the sample is allowed to cool until it can be handled. If no rupture of the insulation can be found, the sample passes the test.

The Fire Impact Test

The Fire Impact Test measures the resistance of a safe to impact when in a heated condition. The test simulates the fall of a **safe** three floors to the basement of a burning building, then lying in the burning embers until cool. During the test, the sample is placed in a furnace and the fires are lighted. The time and temperature follow the same standards as for the fire endurance test for the length of time determined by the classification desired. At the end of the required time in the furnace, the fire is extinguished. The truck and sample is hoisted so that its bottom is 30 feet above a riprap of brick on a heavy concrete base, then dropped. The drop is made within two minutes of the time the fire is extinguished.

Pretty rough? Yes, but the test isn't over yet! When the **safe** has cooled sufficiently to handle, it is inverted, reinstalled in the furnace, and again subjected to the standardized time-temperature conditions for a period determined by the classification desired. After the time is over, the sample is allowed to cool before

the furnace is opened. When the doors are forced open, the records must be in usable condition.

The Underwriters' Laboratories Inc., is the most highly respected testing and grading agency in the world. Their testing label of whatever classification means that the **safe** has passed the highest standards they have established for safes. The integrity of Underwriters' Laboratories through the years is a guarantee to the consumer that no portion of any test which establishes the grade has been slighted in any way.

Caution: Read the Label

On occasion, a particular manufacturer or another association of manufacturers may attach their own grade label to their equipment. The customer should be aware that such a label on a piece of equipment does not necessarily mean that the equipment is comparable to another piece of equipment which bears the Underwriters' Laboratories grade label.