

PREL-GARD

Tempered Heat-Soaked Glass Heat Soak Test

DESCRIPTION

INTRODUCTION

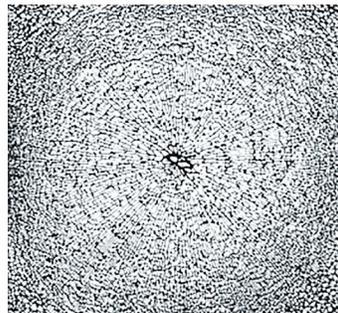
The heatsoak test aims to minimize spontaneous breakage in tempered glass. Spontaneous breakage is a rare occurrence caused by nickel sulfide inclusions. When tempered glass cannot be replaced by heat strengthened glass because safety glass is required, the heat soak test provides additional reassurance for concerns about spontaneous breakage.

NICKEL SULFIDE STONE INCLUSIONS

During the manufacturing of glass, foreign objects in the glass batch can result in inclusions in the finished product. There are over 50 known types of inclusions, including nickel sulfide stones (crystals), which are often the cause of spontaneous breakage. Foreign inclusions are generally so small – just 0.003" to 0.015" of an inch – that they are invisible. Nickel enters the mixture during production of the raw material. During the tempering process, glass is heated to just below the softening point (1148 °F (620 °C)), then rapidly cooled by blowing air onto both surfaces. Because this heating and rapid-cooling process induces substantial tension in the glass, nickel sulfide stone inclusions can cause spontaneous breakage well after the tempering process. Annealed glass (glass that is not tempered) or heat-strengthened may also contain such inclusions, but there is practically zero risk of breakage because there is so little tension in annealed glass.

SPONTANEOUS BREAKAGE DUE TO NICKEL SULFIDE STONE INCLUSIONS

When tempered glass is heated, nickel sulfide stone inclusions expand with the heating time and temperature. If the stone is near the centre of the compression layer, the added tension resulting from its expansion can cause spontaneous breakage.



Spontaneous breakage in thermally tempered glass.

HEAT SOAKING

Heat soaking involves heating the glass to 500 °F ±18 °F (260 °C ±10 °C) for a given period of time, then slowly cooling it. This process accelerates expansion of nickel sulfide stones. At this temperature, glass with nickel sulfide stones will shatter.

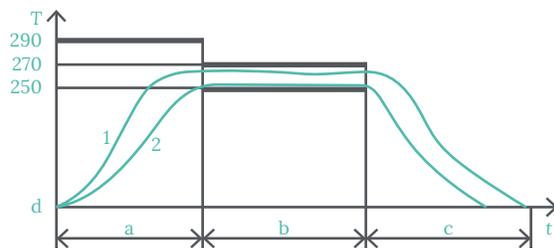
The purpose of heat soaking is to eliminate the tempered glass that is most likely to break spontaneously following installation. While the heatsoak test does not guarantee there will be no spontaneous breakage, it is an essential tool for identifying batches with a high incidence of nickel sulfide stone inclusions.

PREL-GARD HST APPLICATIONS

Prel-Gard HST glass is used in the same applications as standard Prel-Gard tempered glass, namely:

- High-value-added sealed units
- Spandrel glass in hard-to-reach places
- Skylights
- Etc.

Prel-Gard HST glass minimizes the risk of injuries and replacement costs due to spontaneous breakage.



LEGEND

- | | |
|------------------------------------|---------------------------|
| T Glass temperature on every point | d Ambient temperature, °C |
| t Time (hours) | a Heating phase |
| 1 First glass to reach 250 °C | b Holding phase |
| 2 Last glass to reach 250 °C | c Cooling phase |

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