

To: Whom It May Concern
From: Dave Panning (dpanning@bifma.org)
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Subject: **Spontaneous Breakage of Tempered Glass**

BIFMA and its members are aware of occasional occurrences of spontaneous glass breakage in various furniture products. The glass industry suggests the breakage rate may be as high as 1%, however, BIFMA members report experiencing much lower rates – only a small fraction of the glass industry’s prediction. Typically, glass used in furniture is tempered glass. Tempering glass makes it stronger and if it breaks, will cause it to break into many small pieces or “cubes” rather than sharp and potentially dangerous shards. This is exactly what it was designed to do. Tempered glass is often referred to as “safety glass” for this very reason. ASTM has performance requirements for glass that specifies such traits as its resistance to impacts and/or the type of breakage allowed to minimize injury. Other types of safety glass include glass with polymeric laminations sandwiched in or adhered to the outside of the glass to minimize injury in the event of breakage.

Glass breakage in furniture can occur for a variety of reasons. Tempered glass is particularly prone to breakage from edge damage (scratches, nicks, etc.) that may occur during shipping, handling, installation and/or routine use or maintenance. Breakage may occur immediately from such damage, or in the weeks or months that follow. Exposure to rapid changes in temperature or concentrated temperature zones (heat from candles, cold from iced drinks, etc.) can also cause breakage.

In addition to the use and handling types of breakage, tempered glass is also known to break due to a specific type of imperfection or “inclusion” that occurs within the glass during its manufacture. When this condition exists, glass breakage sometimes appears to occur without any obvious cause. This is often referred to as “spontaneous” breakage and can be quite dramatic. There are many types of inclusions that may be present in tempered glass. One well-known, but quite rare inclusion, is that of nickel sulfide particles.

When glass goes through the tempering process, it becomes four to five times stronger than standard annealed glass, thus greatly increasing its level of safety. However, this process can cause nickel sulfide

“stones” to form during the production of float glass due to nickel contamination. These inclusions can end up in the center tension zone of tempered glass making it prone to breakage. When that piece of tempered glass is later exposed to varying temperatures in its final installed position, this tiny stone – which can measure from 0.003 to 0.015 of an inch in diameter – may grow in size, and cause the glass to shatter for no apparent reason. This same condition can lead to spontaneous breakage months or even years after glass products are in use.

There are several facts to keep in mind about nickel sulfide and its role in glass breakage:

1. Spontaneous breakage caused by nickel sulfide stones occurs only in tempered glass, not in annealed or heat-strengthened glass. Most North American glassmakers have controls that greatly reduce the likelihood of nickel sulfide formation.
2. There is no known technology that completely eliminates the possible formation of nickel sulfide stones in float glass. Because nickel sulfide stones are so small, there is no practical way to inspect their presence in float glass.
3. ASTM guidelines permit blemishes of between 0.020 and 0.100 of an inch depending on glass size and quality level...much larger than any typical nickel sulfide stone size.
4. Heat-soaking (heat treating) after fabrication may destroy some flawed glass panels, but the procedure does not guarantee 100 percent elimination of nickel sulfide inclusions. In addition, the heat-soaking procedure will increase costs, cycle times and scrap rates.

Spontaneous glass breakage is not unique to any specific manufacturer nor even our industry; it occurs across all industries that utilize tempered glass.

Please contact the Director of Technical Services at BIFMA with any questions.