

# Glass Basics: Scoring and Separating Recommendations

## Technical Information Paper



Display  
Technologies

### TIP 305

Issued: November 2004

Supersedes: xxxxx

Scoring is performed to separate a sheet of glass into smaller pieces with good quality edges. A score wheel, and typically a scoring machine, is used to create a small “flaw” or shallow crack by drawing the score wheel across the glass under load. This crack is called a median crack.

The glass is then bent to extend the median crack through the thickness of the sheet, creating two pieces. The quality of the median crack controls the ease of separation and the quality of the edges. The crack should be continuous throughout the length of the score and have a consistent depth. This provides ease of separation and minimizes unwanted chips and cracks.

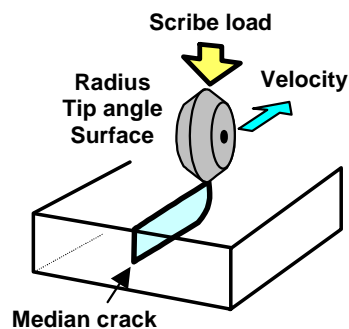


Figure 1. Downward pressure on the scoring wheel should be applied in a manner that creates a median crack of a consistent depth throughout the length of the score.



Figure 2. A photo of a score wheel in the process of creating a median crack

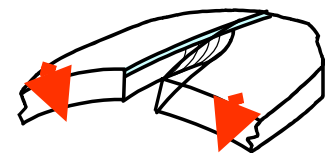


Figure 3. After creating the median crack, applying downward pressure on both sides of the scoreline will enable glass separation.

## Key Variables

Key variables affecting the quality of the score are: score wheel geometry, wheel tip finish, and scoring machine settings such as scoring load and speed.

Some general guidelines for the effects of score wheel geometry and finish on score quality are as follows:

- For a deeper median crack scored at the same load, use a narrower wheel tip angle or smaller diameter wheel. (Tip angle has a stronger influence than wheel diameter.) If a median crack is not deep enough more bending force will be necessary to separate the glass. If too high a force is needed to separate the glass, the crack may not follow the score line. A general rule to use when scoring glass is the depth of the median crack should be about one-tenth the glass's thickness.
- To reduce chipping and lateral cracks while scoring at the same load, use a wider wheel tip angle or larger diameter wheel. Chipping and lateral cracks reduce the edge strength of samples and chips can become adhered to the surface of the glass.
- A wheel with polished rather than ground finish reduces lateral cracks and chips.
- However, a ground finish makes it easier to get the median crack started.

Score wheels typically used to score Corning's glasses have an outer diameter of about 3 mm and the score wheel edge has a tip angle of about  $120^{\circ}$ . For optimum scoring performance, use a score wheel with a corrugated inner bore into which the axle fits.

## Scoring Machines

Scoring machines are used to apply load to the score wheel when creating the median crack and also to help position the wheel and control its speed.

Scoring load should be high enough to create a continuous median crack with a depth that allows for easy separation of the glass sheet yet not high enough to produce chips or lateral cracks.

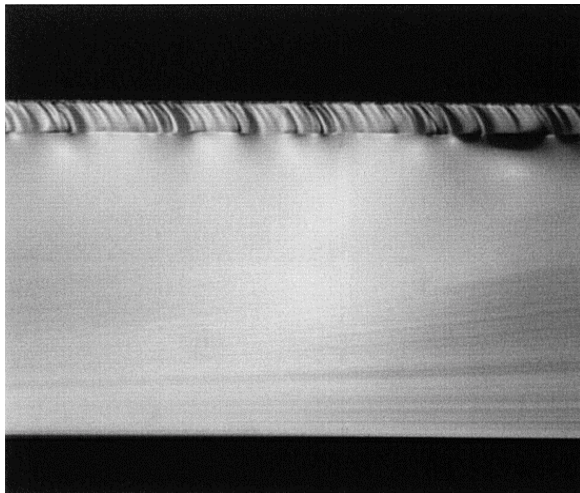


Figure 4. A Corning glass substrate at 50X magnification. A good Median crack is uniform in depth with smooth scallops as shown in the photograph above.

Greater load is used to score Corning glasses than to score soda lime glass. EAGLE<sup>2000™</sup> glass can be scored at slightly higher loads than Code 1737 glass to generate a similar median crack depth without creating chips. Scoring load may also have to be increased slightly when scoring at high speeds.

**North America and all other Countries**  
**Corning Display Technologies**  
MP-HQ-W1  
Corning, NY 14831  
United States  
Telephone: +1 607-974-9000  
Fax: +1 607-974-7097  
Internet: [www.corning.com/displaytechnologies](http://www.corning.com/displaytechnologies)

**Japan**  
**Corning Japan K.K.**  
Main Office  
No. 35 Kowa Building, 1st Floor  
1-14-14, Akasaka  
Minato-Ku, Tokyo 107-0052 Japan  
Telephone: +81 3-5562-2260  
Fax: +81 3-5562-2263  
Internet: [www.corning.co.jp](http://www.corning.co.jp)

Nagoya Sales Office  
Nagoya Bldg., 7 F  
4-6-18, Mei-eki, Nakamura-ku  
Nagoya-shi, Aichi 450-0002 Japan  
Telephone: +81 52-561-0341  
Fax: +81 52-561-0348

**China**  
**Corning (China) Ltd., Shanghai Representative Office**  
31/F, The Center  
989 Chang Le Road  
Shanghai 200031  
P.R. China  
Telephone: +86 21-5467-4666  
Fax: +86 21-5407-5899

**Taiwan**  
**Corning Display Technologies Taiwan Co., Ltd.**  
Room #1203, 12F, No. 205  
Tun Hua North Road,  
Taipei 105, Taiwan  
Telephone: +886 2-2716-0338  
Fax: +886 2-2716-0339  
Internet: [www.corning.com.tw](http://www.corning.com.tw)

**Korea**  
**Samsung Corning Precision Glass Co., Ltd.**  
20th Floor, Glass Tower Building  
946-1 Daechi-Dong  
Kangnam-Ku, Seoul 135-708  
Korea  
Telephone: +82 2-3457-9846  
Fax: +82 2-3457-9888  
Internet: [www.samsungscp.co.kr](http://www.samsungscp.co.kr)

EAGLE 2000 is a trademark of Corning Incorporated, Corning, N.Y.  
©2004, Corning Incorporated