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°. 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.

Greater load is used to score Corning glasses than to score soda lime glass. EAGLE2000™ 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.

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.
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

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

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

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.samsungcp.co.kr

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