



PUMMEL ADHESION TEST

Application

This procedure describes a method of determining the interlayer/glass adhesion of a laminate section. Adequate adhesion is required to ensure that the laminate (windshield) will have adequate impact resistance.

Apparatus and Materials Required

- Laminate (windshield) sections (typically 150 x 150mm, or 150 x 300 mm)
- A one pound hammer
- A cold air cabinet set at -18°C (0°F)
- Heavy insulated gloves
- Safety glasses
- A pummel box that can take hammer blows and catch glass particles
- Pummel Reference Standards rated from 2 to 9 (Standards are to be obtained from Solutia Inc)
Solutia General Inquiries 1-800-325-4330 or www.eastman.com

Conditioning and Test Conditions

Laminated samples are to be cold (-18°C) prior to testing. The actual pummeling will take place in standard laboratory conditions of 23 +/- 2 °C and 50 +/- 5 % relative humidity.

Chemicals, materials, parts, and equipment referenced in this document must be used and handled properly conforming to local regulatory requirements.

Procedure

1. Place test samples in a cold air chamber at -18°C for a minimum of 2 hours. Longer hold times are acceptable. Test samples need to be separated so all glass surfaces are exposed to the cold air.
2. Remove one sample at a time and pummel the outer surface of the specimen using a one pound hammer and the pummel box. Sample needs to be pummeled within seconds after removal. The sample is held at about a 5 degree angle to the pummel plate, see Figure #1. Only the edge of the unbroken glass makes contact with the plate. The laminate is pounded progressively in 1/2" increments along the bottom 3/4" of the laminate. When the bottom edge has been completely pulverized, the next 3/4" is pulverized, see Figure #2. This is repeated until about one half of the laminate is pummeled. All the glass needs to be pulverized without tearing the interlayer.
3. Let the pummeled samples come to room temperature.
4. The pummeled samples are then compared to the Pummel Reference Standards. The tested sample and one reference standard are tilted together to minimize surface reflections when making a comparison. This is repeated with each standard until a match is found. If a sample is between two standards, it is given an average of the two standards rating.
5. Previous step is repeated for the opposite side.

Date	Action	Revisions	Rev. 01
2018 04 18	Revision	See Summary of Revisions	P. Konopka, R. Surowiec, NA
2017 10 27	Released		P. Konopka, R. Surowiec, NA

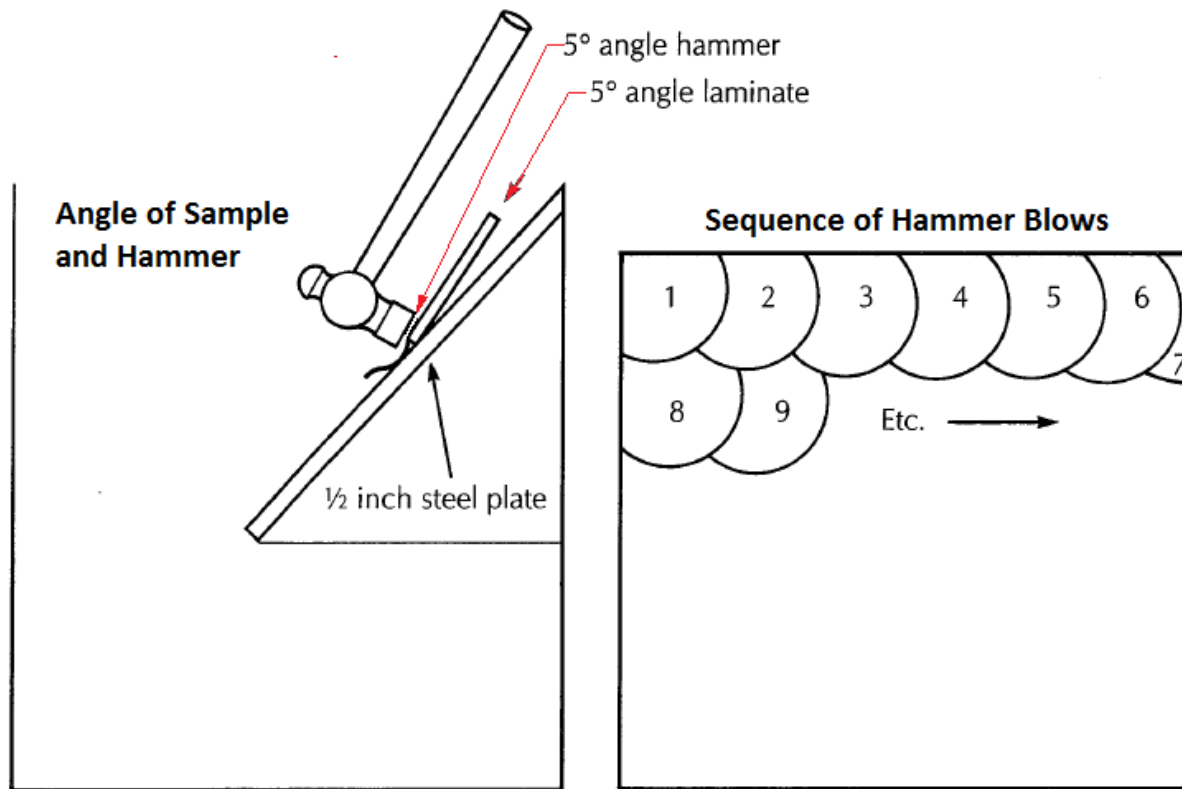


Figure #1

Figure #2

Evaluation

- Report pummel rating for the outer and inner surface of each sample.
- If a group of samples are pummeled from the same windshield, provide an average value to the nearest 0.1 pummel unit and the range.

Summary of Revisions

2018 04 18 Step 1 changed soak time from 1 hour to 2 hours minimum at -18 °C