

TB-83 Impact Resistance of Solid Color Reinforced Composite (SCRC) Material

INDEPENDENT LABORATORY TESTING

Four samples of Solid Color Reinforced Composite (SCRC) material (both 1/2" and 3/4" thicknesses) were sent to an independent laboratory to test and evaluate material brittleness. The tests were performed in accordance with the American National Standards Institute ANSI Z-97.1-1984 (R1994) "American National Standard for Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test." The purpose of this standard is to prescribe the safety properties of safety glazing materials in buildings where these materials possess the requisite and appropriate mechanical and functional properties for their intended purpose.

The 76" H x 34" W test samples are securely clamped into a clamping frame. The standard prescribes an impactor (leather punching bag filled with 100 lbs of lead shot) to be suspended from the test apparatus.

The impactor is then released so that it swings in a pendulum arc and strikes the test sample from various drop heights (12", 18", and 48" see Figure 1). The maximum 48" drop height generates an impact force of 400 ft-lbf. "This 400 ft-lbf impact level was established for relatively unlimited acceleration paths in which it might be reasonable to expect that an energetic teenager might develop something approaching his full impact velocity." A full description of the test is available from ANSI.

Bobrick selected this ANSI test standard because, in our opinion, this test procedure provided an objective, repeatable procedure with which to test for material brittleness under extreme impact forces. Copies of the independent laboratory test results are available upon request.

RESULTS OF TEST

The full-scale test samples were struck by the 100 lb impactor at the prescribed 12", 18" and 48" drop heights. All test samples (in both the 1/2" and 3/4" thicknesses) withstood the 100 ft-lbf, 150 ft-lbf, and 400 ft-lbf impact forces generated by these drop heights and remained in the test fixture with no visible fractures or signs of degradation.

CONCLUSION

Solid Color Reinforced Composite (SCRC) panels have been objectively tested by an independent laboratory to withstand significant impact forces. Consequently, SCRC is a durable material and should not be considered brittle.

¹ "For test purposes, Standards Committee Z97 decided, after extensive evaluation, to use a readily-available leather punching bag filled with 100 pounds of lead shot to simulate the running boy." ANSI Z97.1-1984(R1994), Appendix A3. *Development of Human Engineering Data*

² ANSI Z97.1-1984(R1994), Appendix A2. *Safe Performance Criteria*

³ "The impact levels included in standards are more relative measures of strength than they are simulations of real-world conditions." "Test Methods and Common Sense Solve Safety Glazing Requirements," *The Construction Specifier*, May 2003, pg. 37

⁴ "Brittle: 1a: easily broken, cracked, or snapped," *Merrriam-Webster Online*, <http://www.webster.com/cgi-bin/dictionary?book=Dictionary&va=brittle&x=0&y=0>

Figure 1 – Impact test frame setup for ANSI Z.97.1 standard

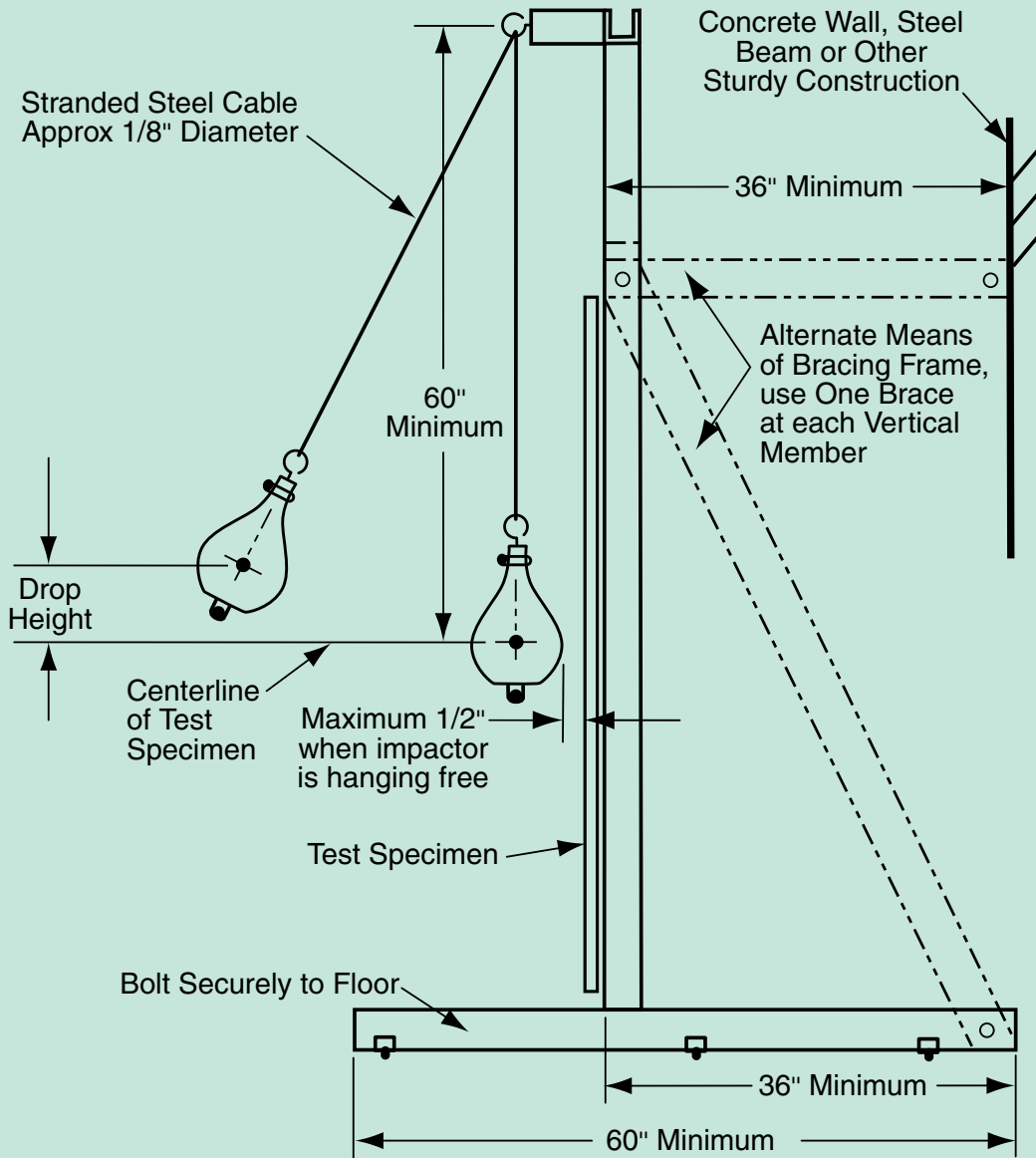


Table 1 – Approximate impact energies for humans at various weights and speeds⁵

Weight	Equivalent Speed	Impact Energy
31.8 kg (70 lb)	21.1 km/h (13.1 mph)	
54.4 kg (120 lb)	16.1 km/h (10.0 mph)	542 N-m (400 ft-lb)
81.6 kg (180 lb)	13.2 km/h (8.2 mph)	

Note: Normal walk = 4.8 km/h (3 mph)
 Fast walk/jog = 6.4 km/h to 12.9 km/h (4 mph to 8 mph)
 Run = 12.9 km/h to 24.1 km/h (8 mph to 15 mph)
 Sprint = 24.1 km/h to 32.2 km/h (15 mph to 20 mph)

⁵ "Test Methods and Common Sense Solve Safety Glazing Requirements," *The Construction Specifier*, May 2003, pg. 37