

Fact Sheet

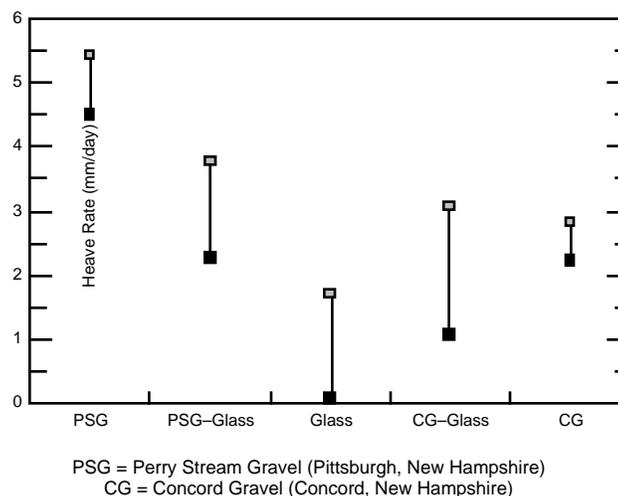
RECYCLED CRUSHED GLASS CULLET AS A CONSTRUCTION AGGREGATE

PROBLEM

Recycled crushed glass cullet recovered from recycling programs is sometimes used as unbound construction aggregate or blended with gravel or crushed rock for use as such. Glass cullet is a strong, clean, safe, and economical construction aggregate. However, the susceptibility of the glass cullet and cullet-gravel blends to frost heave and thaw weakening was unknown. Therefore, the New Hampshire Department of Transportation asked CRREL to determine the frost susceptibility of the glass cullet and cullet-gravel blends.

RESULTS

Laboratory freezing tests indicated that recycled crushed glass cullet, containing less than 1% by weight particles finer than 0.075 mm, has very low frost susceptibility. Adding 30% by weight cullet to gravel did not increase either 1) wear in abrasion tests or 2) frost susceptibility. For Perry Stream gravel from northern New Hampshire, the addition of cullet in the amount of 30% by weight lowered the rate of frost heave (see figure).



Ranges of heave rates in open system freezing tests for glass cullet, gravel, and cullet-gravel blends.

INFORMATION ON CRUSHED GLASS CULLET IN CONSTRUCTION

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Mechanical properties of glass cullet and blends of cullet and aggregate.

<i>Property</i>	<i>Material (Percentage by weight)</i>	<i>Method</i>	<i>Result</i>
Specific Gravity	100% cullet	ASTM D 854	2.49–2.52
Maximum Density (standard effort)	100% cullet	ASTM D698	1.59–1.72 Mg/m ³ (99.3–107.5 pcf)
Maximum Density (modified effort)	100% cullet	ASTM D1557	1.78–1.89 Mg/m ³ (111.0–117.8 pcf)
Maximum Index Density	100% cullet	ASTM D 4253	1.58–1.75 Mg/m ³ (98.4–109.3 pcf)
Maximum Index Density	50% cullet/ 50% gravelly sand	ASTM D 4253	1.96–2.08 Mg/m ³ (122.6–130.0 pcf)
Friction Angle	50% cullet/ 50% crushed rock	ASTM D 1557 (triaxial shear)	42–43°
Friction Angle	100% cullet	ASTM D 3080 (direct shear)	51.2–51.3°
Friction Angle	50% cullet/ 50% gravelly sand	ASTM D 3080 (direct shear)	51.8–53.0°
Wear (abrasion)	100% cullet	ASTM C 131	30–42%
California Bearing Ratio	50% glass cullet/ 50% crushed rock	ASTM D 1883	42–115%

Source: *Glass Feedstock Evaluation Project: Engineering Suitability Evaluation* (1993) Prepared for the Clean Washington Center, Seattle, Washington 98121, by Dames and Moore, 27 p.

Note: ASTM publishes the construction testing methods used in these tests. Contact ASTM at 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428 (telephone 610-832-9500).