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## Best Practices in Glass Recycling

### *Typical Contaminants in Recycled Glass*

#### **Material: Recycled Glass**

**Issue:** *This Best Practice describes contaminants found in cullet feedstock and contaminant tolerances in some applications.*

**Best Practice:** Contaminants, defined as anything that is not container glass, can generally be separated into these categories:

**Ceramics** Ceramic contamination is a broad category including dishware, porcelain caps, pottery, heat resistant cookware (Pyrex™, Visionware™), mirror glass, laboratory glass, light bulbs, crystal, and window glass. Ceramics can be removed manually or with automated systems.

**Metal** Metal contaminants are generally in the form of container lids or seals. Typical ferrous metals include iron and steel, which are magnetic, and can be removed through magnetic separation techniques. Non-ferrous metal contamination includes brass, aluminum, lead, and stainless steel. This material is not magnetic, and must be removed with non-ferrous electrical detection or manual removal.

**Organics** Organic contamination includes paper and plastic labels and caps, cork, paper bags, wood debris, plants, food residue, and any other material composed of hydrocarbons. Organic material can be removed by washing, passing the cullet through a size-specific screening device, or burning out.

One good characteristic of both metal and organic contaminants is that they are less friable than glass. Therefore, they do not fracture as easily in glass crushers and can be removed through screening.

**Other Inorganic** Other inorganics include bricks, concrete, stones, dirt, and ambient dust. They can be mixed with the glass during collection, transportation, or while stockpiled. Inorganic dirt and dust can be an especially insidious contaminant because it can stick to the surface of whole bottles or processed glass, and resists screening strategies or automated removal strategies.

**Hazardous or Toxic** There should be NO hazardous or toxic materials introduced into recycled glass supplies at any point in collection or processing. It is the responsibility of the collector to insure that such materials are kept out of the system.

The following is a list of cullet applications and their tolerance for classes of contaminants:

**Glass Container Manufacturing and Fiberglass Insulation Manufacturing** Glass container manufacturers and fiberglass manufacturers require batch cullet to be free of coarse ceramics, and ferrous and non-ferrous metals. Many ceramic contaminants smaller No. 12 mesh melt in the furnace, but larger pieces can result in ceramic inclusions in finished glass containers and clogged fiberglass forming equipment. Ferrous and non-ferrous metals melt but do not dissolve, and can cause corrosion damage to the furnace and glass forming equipment. Too much organic material in the cullet can affect

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the oxidation state of the melt, requiring modifications in temperature control. Each container and fiberglass manufacturing plant has its own explicit specifications for contaminants.

**Art and Fused Glass** These specialty applications are the most intolerant of ANY kind of contamination. Inorganics will cause aesthetic problems with final products. Organics burn off during firing, but may leave ash which also ruins the looks of final products.

**Portland Cement Concrete** When used as aggregate in non-structural Portland Cement Concrete (PCC), cullet must contain a minimum of organic residue, particularly sugar. When mixed in PCC, sugar causes an increase in setting time, and a decrease in the ultimate strength of the concrete.

**Septic Treatment Filter Medium** It may be necessary to rinse cullet prior to use in filtration to minimize sources of biological degradation. Ferrous and some non-ferrous (e.g. lead) metals are detrimental to effluent quality.

**Construction Applications** Construction applications include general backfill, roadways, utility backfill, as well as landfill cover and glassphalt. Cullet used for these applications should generally have no more than 5% to 10% debris as determined using a visual inspection method described in other Best Practices. The decay of excess organics can cause potential settlement of the engineered fill.

The following table summarizes the impact of contaminants on the various cullet applications.

### Notes on Contaminants:

**X:** May have an adverse impact in generally expected amounts

**O:** May not have an adverse impact in generally expected amounts

Many applications and contaminant removal strategies described above are detailed in other Best Practices.

Application	Contaminant		
Container Manufacturing	X	X	O
	X	X	O
Art and Fused Glass	X	X	X
	O	O	X
Septic Trtmt Filtration	O	X	X
Construction Backfill	O	O	O

**Implementation:** Cullet users should carefully evaluate the potential effects of each type of contaminant on the intended application, and develop specifications for contaminant tolerance and removal.

**Benefits:** Awareness of typical recycled glass contaminants will help end-users develop application-specific standards for cullet grades. Understanding these standards will enable material recycling facilities to implement processing strategies for cullet production.

**Application Sites:** Glass processors, glass end-users.

**Contact:** For more information about this Best Practice, contact CWC at (206) 443-7703, e-mail [info@cw.org](mailto:info@cw.org).

### **References:**

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