

GROUND GLASS AND GLASSWARE CLEANING SAFETY

Up-dated September 2013

I. Principle:

Ground glass is commonly used in laboratories. Any abrasion reduces the strength of glass, making it more susceptible to breakage under impact, pressure, and/or thermal shock. Thermal shock may result from sudden changes in temperature or use on a burner or hot plate. Serious injuries could result if breakage occurs while glass is pressurized or holds heated and/or corrosive liquid. To avoid accidents, follow these tips for safely using and cleaning glassware.

II. Personal Protective Equipment:

1. Lab coat
2. Safety glasses/goggles
3. water resistant rubber gloves

III. Handling

1. Borosilicate glassware is recommended for all laboratory glassware except for special experiments that use UV or other light sources
2. Careful handling and storage procedures should be used to avoid damaging glassware.
3. Inspect the glassware before each use and discard if scratched on inner surfaces, chipped, cracked or damaged in any way.
4. Use heavy gloves to protect the hands when inserting glass tubing into rubber stoppers/corks or when placing rubber tubing on glass hose connections.
 - a. Tubing should be fire polished or rounded and lubricated, and hand should be held close together to limit movement of glass should fracture occur.
 - b. The use of plastic or metal connectors should be considered.
5. Glass-blowing operations should not be attempted unless proper annealing facilities are available.
6. Vacuum jacketed glass apparatus should be handled with extreme care to prevent implosions.
 - a. Equipment such as Dewar flasks should be taped or shielded.
 - b. Only glassware designed for vacuum work should be used for that purpose.
7. Tongs, a dustpan, and a broom are the best tools for cleaning up broken glass.
 - a. If hands are used to pick up glass, only handle large pieces of glass and wear heavy leather gloves to protect the hands.
 - b. Broken glass must be packaged in labeled, rigid and sealed containers before disposal in the trash. Take broken glass containers directly to the dumpsters. Do not leave them for custodial staff to transport.
8. Proper instruction should be provided in the use of glass equipment designed for specialized tasks, which can represent unusual risks for the first-time user.
9. Use good glass cleaning techniques.

IV. Proper Cleaning Procedures

1. Wear heavy, water-resistant rubber gloves during glassware cleaning operations.
 - a. Gloves with textured or slip-resistant palms are recommended. Also wear protective eyewear to prevent cleaning agents from entering the eyes
2. Washing machines may be used.
 - a. Support racks on the washer must be well maintained.
 - b. The support pins should be coated with a non-abrasive material to prevent metal to glass contact and scratching

3. For manual washing, use only plastic core brushes that have soft non-abrasive bristles or soft, clean sponges/rags.
 - a. Use brushes to clean inside of deep glassware.
 - b. Do not reach inside of glassware while cleaning to prevent cuts should the glassware break
4. Many commercial glass cleaners are available.
 - a. Follow the manufacturer's directions for the use of these products since some are corrosive and can damage the glass
 - b. Organic solvents are acceptable cleaning agents when conditions warrant their use.
5. Do not use strong alkaline products and hydrofluoric acid as cleaning agents.
 - a. These materials dissolve glass, leading to damage and eventual breakage
6. Do not use any abrasive cleansers, including soft cleansers (e.g., Ajax, Comet, Old Dutch, Soft Scrub etc.), as these will scratch the glass and cause eventual breakage and possible injury.
 - a. Do not use abrasive cleaners. Scotch Brite and similar scouring pads will scratch glass and should not be used
7. Do not place metal or other hard objects, such as spatulas, glass stirring rods, or brushes with metal parts inside the glassware. This will scratch the glass and cause eventual breakage and injury.
8. Do not place hands inside glassware while wearing any jewelry, particularly diamond rings, as these will score the inside of the glassware and eventually cause breakage and injury.
9. Do not use heat as a method to remove carbon residues. Heating glassware to temperatures $>800^{\circ}\text{F}$ will cause permanent stresses in the glass and eventual breakage.
10. AVOID IMPACT – Glass will break as a result of impact. Use care when handling to avoid impacting hard objects, such as spigots, other glassware, counter tops, etc.
11. Store glassware carefully during drying operations. Do not place round or oddly shaped glassware on countertops or other flat surfaces where they might roll off and break. Drying racks are the best option.

V. Ground-Glass Surfaces

Ground-glass joints and stopcocks should never be used when dry. Although ground-glass surfaces seal well without the use of lubricants, it is advisable to lubricate them to prevent sticking and breakage.

1. Ground surfaces must be cleaned prior to lubrications – dust, dirt and particulate matter may score the surface and cause leakage
2. Different lubricants are used for these operating conditions:
 - a.) Silicone grease – for high temperature and high vacuum
 - b.) Glycerin – for long term reflux or extraction
 - c.) Hydrocarbon grease – for general laboratory use
3. Lubricate joints that must be airtight and when glassware contains strong alkaline solutions
4. Lubricate only the upper part of the inner joint. A properly lubricated joint appears clear, without striations
5. Spread two circular bands of grease around the stopcock plug. Insert the plug into the barrel and twist several times until the assembly is completely transparent. Be careful not to use too much lubricant or the bore will become plugged