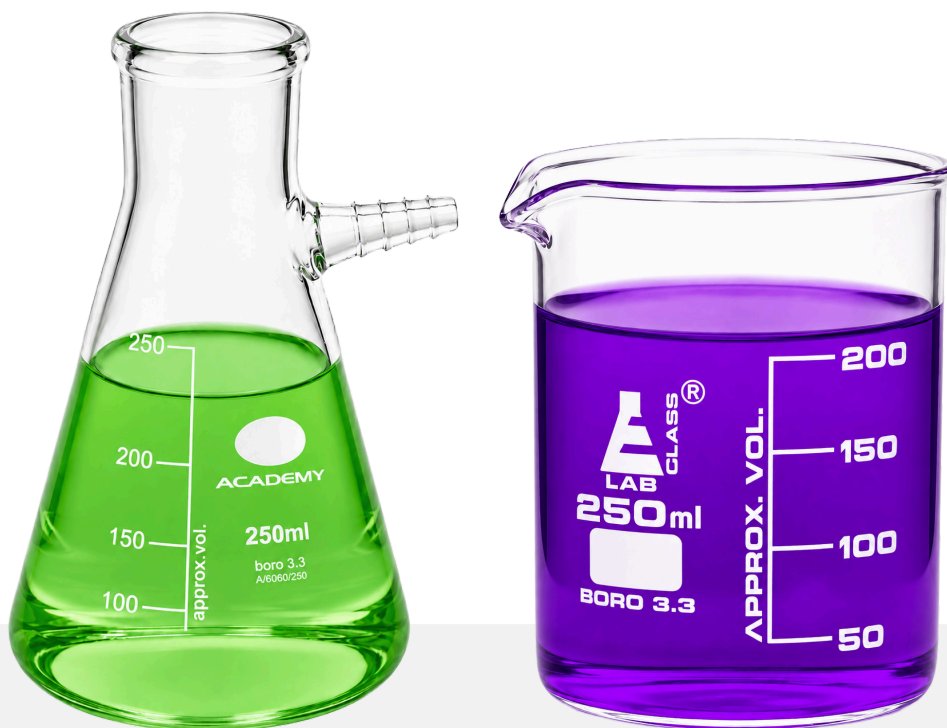


# Borosilicate Glassware Buying Guide



An essential guide to help you be **better** informed when purchasing borosilicate glassware.

Borosilicate glassware is the backbone of school labs, research environments, clinical settings, and industrial QC. While it looks similar across brands, performance varies by composition, wall thickness, annealing quality, joint precision, and compliance standards. This guide breaks down everything you should know before purchasing.



# Borosilicate Glassware

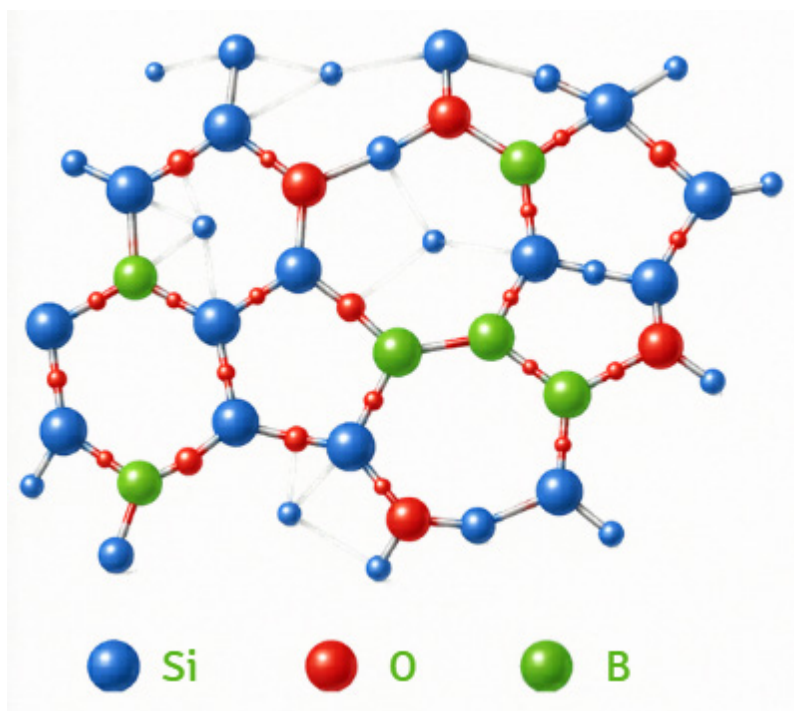
## Introduction

Borosilicate glass is a silicate glass that contains significant amounts of boron trioxide ( $B_2O_3$ ).

This boron component reduces the glass's thermal expansion, making it far more resistant to cracking when heated or cooled quickly.

A typical composition is roughly: 70–80% silica ( $SiO_2$ ), 7–13% boron oxide ( $B_2O_3$ ), Small amounts of sodium oxide, aluminium oxide, etc.

The most common laboratory grade is Borosilicate 3.3, meaning it has a very low thermal expansion coefficient of  $3.3 \times 10^{-6} /K$ .



**Boron (B) atoms enter the silica ( $SiO_2$ ) network and create more flexible bonds and open up the structure.**

**This reduces thermal expansion and increases resistance to thermal shock.**

# 1. Identify Your Primary Use Case

Start with where and how the glassware will be used, this determines wall thickness, joint type, and durability.

Environment	Requirements
School/Teaching Labs	Robust, thick wall items; beaded rims on beakers; clear, easy read graduations; economical sets; high break resistance.
Research/Professional Labs	Borosilicate 3.3; tight tolerances; Class A volumetrics; standard ground joints; autoclavable caps/stoppers.
Clinical/Diagnostics	Reliable Class A volumetric accuracy; colourfast markings; resistance to frequent cleaning/sterilisation..
Industrial / Quality Testing	Heavy duty ware; interchangeable joints; compatibility with heating/cooling cycles; clear part coding for SOP traceability.

[Click to view our range](#)

## 2. Why Borosilicate 3.3?

The industry workhorse is borosilicate 3.3, valued for:

### Low thermal expansion

Excellent thermal shock resistance, It can withstand rapid temperature changes without cracking. This is why beakers, flasks, and test tubes can be heated over a flame (with proper technique).

### Chemical Durability

Highly resistant to:

- Acids
- Organic solvents
- Salts
- Autoclave sterilisation

### Clarity & Hardness

It stays clear after repeated use and is fairly scratch resistant compared to other glasses.

### Dimensional Stability

Ideal for precise volumetric items because it does not warp during normal laboratory use.

**Note: It is not resistant to hydrofluoric acid (HF) or hot, concentrated alkalis.**



# 3. Standards & Compliance

For consistent quality, look for references to recognised standards in datasheets or on the glassware itself.

## Volumetric accuracy:

**Class A** highest accuracy; individually calibrated, often with certificate

**Class B** teaching/general use; wider tolerance

## Common standards cited by manufacturers:

**ISO series** for volumetrics (e.g., ISO 1042 Class A for volumetric flasks; ISO 385 for burettes; ISO 4788 for graduated cylinders; ISO 835 for pipettes)

**ASTM/USP** references for certain lab items

**Interchangeable joints:** Standard taper (e.g., 24/29, 19/26), cones/sockets/adapters per ISO/ASTM dimensions

What to ask suppliers: Tolerance tables ( $\pm$  mL or %), calibration method (at 20°C), and whether Class A items include certificates or batch numbers.



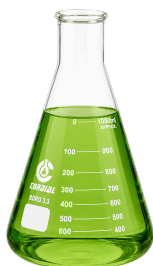
# 4. Form Factors & When to Choose Each



## Beakers

Griffin/low form for general heating/mixing; Berzelius/tall form for better splash control.

Beaded rim adds chip resistance; spouts should pour cleanly without dribble.



## Flasks

Erlenmeyer/Conical for swirling and titrations; Volumetric (Class A) for precise dilutions; Round bottom for even heating under mantles.

Narrow neck minimises evaporation; wide neck eases transfers/cleaning.



## Cylinders

Class A for prep and standard solutions; hex base improves stability; look for ring guards in teaching labs.



## Bottles & Media Storage

GL threaded (e.g., GL45) with PTFE lined caps for solvent resistance; pouring rings reduce drips.

Amber (low actinic) to protect light sensitive reagents.



## Joints, Adapters & Assemblies

Standard taper ground glass joints (e.g., 24/29) for interchangeability; Keck clips or PTFE joint clamps for secure setups; PTFE stopcocks for chemical resistance.

# 5. Wall Thickness, Annealing & Durability

## Thick wall items

beakers, boiling flasks etc are better for teaching/rough handling.

## Uniform wall thickness

prevents stress points and thermal fractures.

## Proper annealing

(stress relief during manufacturing) extends life. Quality brands usually state this.

## Reinforced features

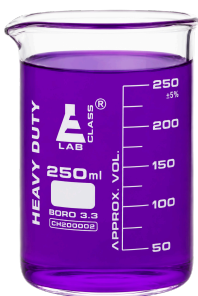
like beaded rims and heavy bases reduce chipping and tipping.

**Rule of thumb: For frequent flame/heating use, prioritise heavy duty, well annealed pieces with uniform walls.**



# 6. Markings, Graduations & Readability

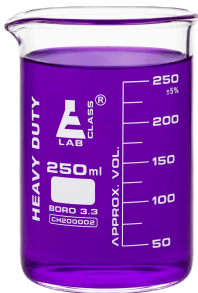
## Look for:



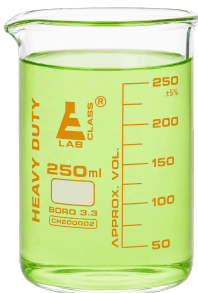
➤ **Fired on ceramic** or diffusion etched markings last longer than ink that rubs off.



➤ **High contrast** (white or amber) graduations suit different liquid colours.



➤ **Volume scale type:** To contain (TC) vs to deliver (TD) matters for pipettes and burettes.



➤ **Meniscus reference:** Lines and numbering should be crisp and evenly spaced.

# 7. Caps, Stoppers & Closures

Match closure materials to your chemicals and sterilisation methods.



➤ **Glass stoppers**

ground for inert storage; avoid where seizure is likely (drying out can “freeze” joints).



➤ **PTFE stoppers/caps**

for aggressive solvents; PP or PBT for general use; ETFE for high chemical/thermal resistance.



➤ **Septum caps**

(PTFE/silicone) for sampling without opening.



➤ **Autoclavable closures**

if you sterilise media bottles/flasks.

## 8. Heating, Cooling & Thermal Shock Practices

### Heating:

Heat gradually & use wire gauze or ceramic pads between flame and glass.

### Thermal Shock:

Do not place hot glass on cold surfaces or into cold liquids (and vice versa).

### Vacuum or Pressure Applications:

Use glass specifically rated for the intended differential and avoid flaws (scratches, cracks).

### Frequent High Temperatures:

Frequent work above 200°C or with open flames, consider heavy wall and round bottom flasks, and ensure proper support (mantle, clamps, rings).

## 9. Cleaning, Sterilisation & Chemical Compatibility

- General cleaning: Lab detergent, warm water, soft brushes; rinse with DI water.
- Solvent rinses for organics; chromic acid is largely discouraged - use safer oxidisers if needed.
- Autoclaving: Most borosilicate is autoclavable, loosen caps and avoid over tightening after cycles.

**Avoid: Hydrofluoric acid (HF) and hot, concentrated alkalis, which attack glass network; use PTFE vessels instead.**



# 10. Sustainability & Lifecycle

- Choose replaceable parts (caps, rings, stopcocks).
- Spare components (Keck clips, joints, stoppers) extend assemblies' life.
- Repair services (re-grinding joints, replacing stopcocks) can be cost effective for high value items.
- Segregate broken glass bins; keep separate from sharps/biohazard.

# 10. Popular Brand Comparison

Nb the below comparison is based on a 250ml Beaker. For Price Index comparison we have used pricing on [www.betterequipped.co.uk](http://www.betterequipped.co.uk) (May 2026) for items we stock plus the lowest visible market price on google shopping search for products we don't stock to give a rough guide to a pricing index. This is meant for guide purposes only but a price comparison can be easily conducted online. For Typical Thickness we have referenced ASE data ([Green Tick: Eisco LabGlass | www.ase.org.uk](http://www.ase.org.uk)) "The thickness of the glassware, measured at four approximately equally spaced points around the circumference of the 250 ml beakers, about 1 cm below the rim, was as follows." Other data is direct from manufacturers websites

In terms of measurement the ASE conclusion was "Based on these measurements, the LabGlass® glassware appears to be of as consistent thickness or better than that commonly found in schools and so in principle should be at least as robust, assuming, of course, that this was a typical sample."

Brand	Material	Typical Thickness (mm)	Strain Point	Annealing Point	Softening Point	Conforms To	Price Index
Academy	Boro 3.3	1.86 1.90 1.82 1.83	510°C	560°C	825°C	ISO 3819; ISO 3585; ISO 719 / 720; ISO 4796	54.6
Labglass	Boro 3.3	2.45 2.34 2.23 2.53	515°C	565°C	820°C	I.S.O. 3819 ASTM E960; DIN 12231	100
Simax	Boro 3.3	1.77 1.94 1.80 1.96	510°C	560°C	825°C	ISO 3819; ISO 3585; ISO 719 / 720; ISO 4796; DIN 12331; ASTM E438 (Type I, Class A)	106.5
Pyrex	Boro 3.3	1.59 1.92 1.90 1.88	510°C	560°C	825°C	ISO 3819; ISO 3585; ISO 719 / 720; ISO 4796; DIN 12331; ASTM E438 (Type I, Class A)	536.1

# 12. Buying Checklist

**Before purchasing, make sure you confirm:**

## □1. Material Verification

- Confirm glass is true borosilicate (e.g. 3.3 grade)
- Manufacturer clearly states glass composition
- Not soda lime glass or mixed formulations

## □2. Standards & Compliance

- Manufactured to recognised standards (ISO, DIN, ASTM)
- Volumetric glassware marked Class A or Class B where applicable
- Calibration markings compliant with stated standard
- Certificates available for Class A items (if required)

## □3. Build Quality & Finish

- Uniform wall thickness
- No visible cracks, chips, bubbles, inclusions, or scratches
- Smooth, well finished rims and edges
- Flat, stable base
- Reinforced rims or heavy duty variants available (if needed)

## □4. Accuracy & Graduation

(For beakers, cylinders, flasks, burettes, etc.)

- Clear, legible graduations
- Graduations etched or chemically resistant (not painted only)
- Tolerance values stated
- Marked TC (to contain) or TD (to deliver) as appropriate

## □5. Thermal Performance

- Suitable for heating (hotplate / Bunsen burner if required)
- Maximum operating temperature specified
- Good thermal shock resistance
- Suitable for autoclaving (if required)

# 12. Buying Checklist (contd.)

## □6. Chemical Resistance

- Resistant to acids, alkalis, and solvents used
- Suitable for long term chemical contact (if applicable)
- Compatible with cleaning agents and detergents
- Caps, stoppers, or seals chemically resistant

## □7. Design & Practical Use

- Pouring spouts function cleanly (no dribbling)
- Neck size appropriate for filling and cleaning
- Frosted or labeled writing area present
- Compatible with standard lids, caps, or stoppers

## □8. Joints & Fittings (If applicable)

- Standard ground glass joint sizes clearly marked (e.g. 24/29)
- Joints smooth, consistent, and well matched
- No chips, grinding defects, or poor fit
- Compatible with existing laboratory glassware
- Replacement stoppers/adapters available

## □9. Cleaning & Maintenance

- Dishwasher safe (per manufacturer guidance)
- No difficult to clean dead spaces
- Resistant to staining and clouding
- Replacement consumables available (caps, stoppers)

## □10. Safety & Durability

- Stable when empty and filled
- Suitable for routine laboratory handling
- Heavy duty options available for teaching or high use labs
- Supplier breakage or DOA replacement policy

## □11. Supplier & Cost Considerations

- Reputable supplier with consistent quality
- Batch consistency assured
- Bulk purchase options available
- Cost appropriate for accuracy class and durability