Application Guide

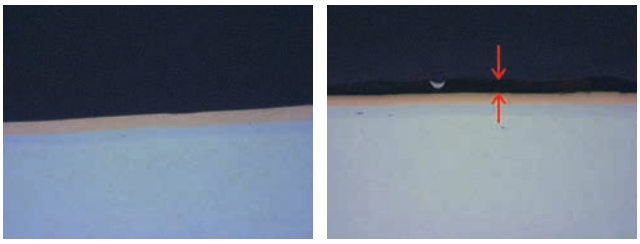
Mounting

BUEHLER

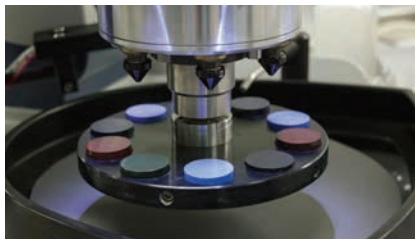
Solutions for Materials Preparation, Testing and Analysis

Mounting

The two primary reasons for mounting are ease of handling and edge retention. Edge retention is the preservation of the edge of the specimen and is crucial if you are evaluating that surface for structural integrity. Ease of handling comes into play both for manual polishing as well as placing the mounts into an automated polisher. When deciding on which mounting technique to use consider the size and geometry of your part, the part's susceptibility to heat and pressure, the number of samples that must be prepared routinely and the time you have to achieve the task.



(left) Micrograph of mount showing good edge retention and no visible shrinkage gap. (right) Micrograph of a mount showing poor edge retention.



Mounting enables specimens to be easily held during semi-automated or manual grinding and polishing.

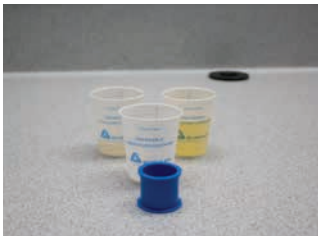
Compression Mounting

Compression mounting uses heat and pressure to encapsulate the sample in a mounting compound. This technique minimizes shrinkage thereby protecting and preserving edges as well as surface defects during preparation steps. Many presses include a controlled cool down cycle to further enhance the edge retention while decreasing the overall mounting cycle time. The resulting mount is consistent in size and shape and can be readily labeled. Compression mounting is more economical than castable mounting for high volume labs.

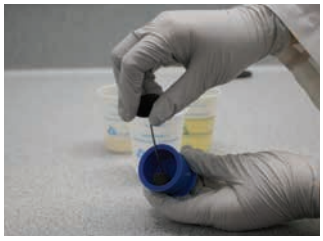
Castable Mounting

Epoxy and acrylic castable mounting systems are recommended for mounting specimens that are sensitive to high pressures and temperatures. Epoxy mounting systems provide good physical adherence, low shrinkage and excellent infiltration into pores and cracks. Acyrlic mounting systems are typically selected for their short cure time. Dyes can be added to either system to enhance pores and highlight the interface between the media and specimen. Fillers can allow epoxy mounting systems to be used in an SEM without additional processing and can improve the abrasion resistance of all castable systems, and therefore edge retention, when preparing hard materials. Castable systems are more economical than compression mounting systems in low volume labs.

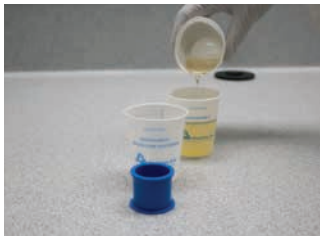
Vacuum systems are used to evacuate air trapped in epoxy systems and specimens. This reduces or eliminates the gap at the specimen/epoxy interface, fills pores in the specimen with epoxy and enhances the end results.



Measure hardener & resin separately



Coat SamplKup with Release Agent



Pour hardener into resin

Mix for 2 minutes

Pour into third cup, scraping sides

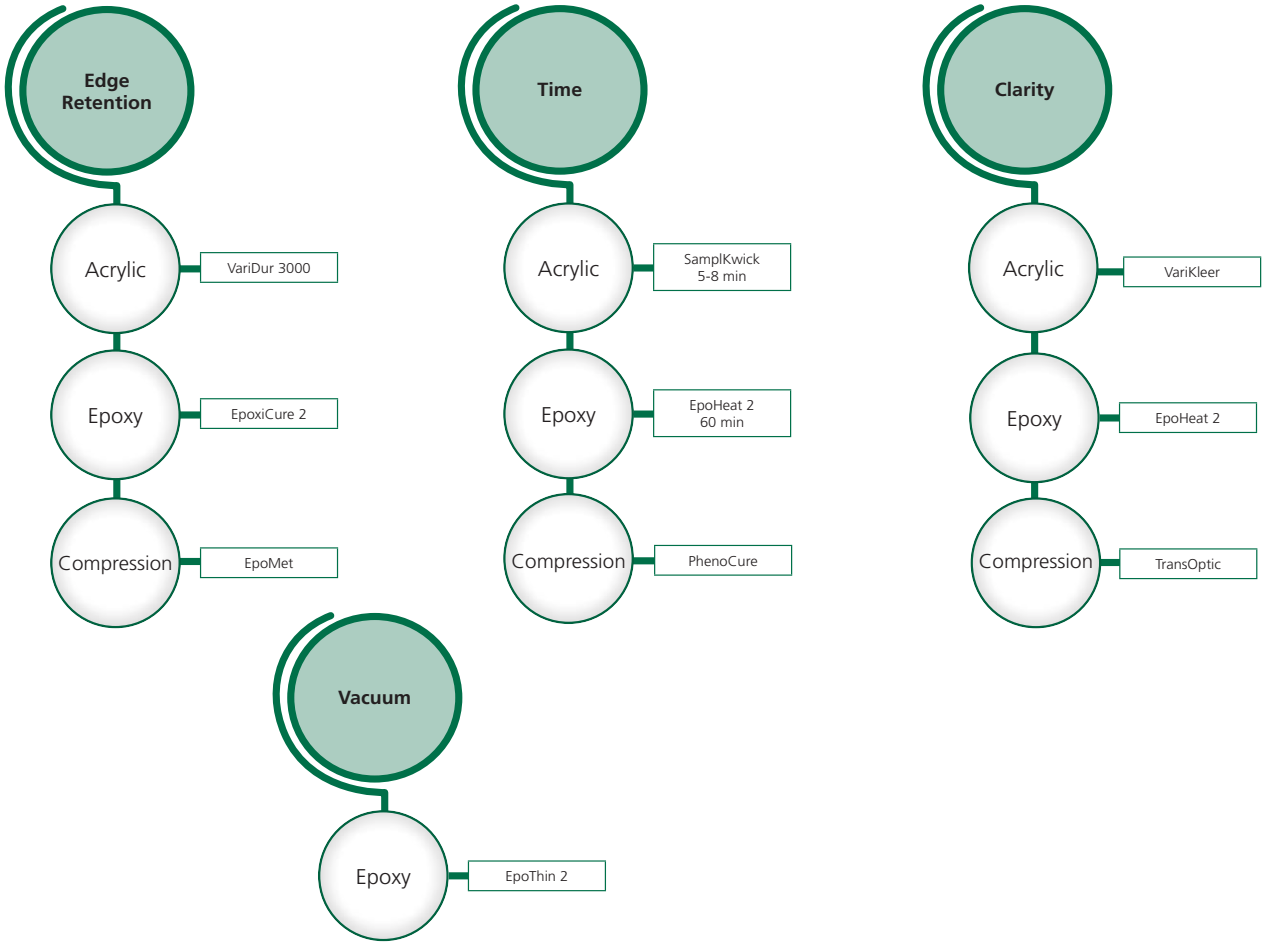
Pour into SamplKup

Method Selection

Each material, application and need can require specialized mounting methods. When selecting a mounting consumable, consideration should be given to the following: abrasion resistance of the material, conductivty requirements, further analysis needs, clarity level required, single or central force grinding and polishing.

When selecting a material for your application take into account your needs for edge retention, time, clarity and vacuum infiltration before you select a mounting compound. The best system for each targeted characteristic is shown below.

Hardness	Compression Mounting Compounds (Shore D)	Castable Systems (Shore D)
Harder	EpoMet™ (96) EpoVit™ (94) ProbeMet™ (94)	VariDur™ 3000 (90)
	Diallyl Phthalate (91)	VariDur 200 (90), SamplKwick (85), VariDur (85), VariDur 10 (85)
	PhenoCure™ (88) KonductoMet™ (88)	VariKleer™ (84) EpoKwick™ (82), EpoColor™ (82), EpoxiCure™ 2 (80)
Softer	TransOptic™ (80)	EpoThin™ 2 (78), EpoHeat™ 2 (75)

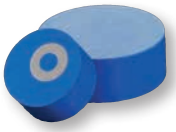


Compression Mounting Compounds

The most common type of mounting used is compression mounting, using heat and pressure to encapsulate the specimen, minimizing shrinkage, protecting and preserving edges as well as surface defects during the following preparation steps.

PhenoCure™
Wood-flour filled phenolic thermoset resin, provides good edge retention and moderate shrinkage. ~88 Shore D

PhenoCure PreMolds
Preformed PhenoCure, reduces mess and saves time. ~88 Shore D



Diallyl Phthalate
Filled thermoset resin recommended for moderately hard materials, glass filled is recommended for etching; mineral filled is harder, provides good edge retention. ~91 Shore D

EpoMet™
Mineral filled epoxy thermoset recommended for preserving edge information and mounting very hard materials, available in F (fine) for enhanced flow and G (granular) for general use. ~96 Shore D

EpoVit™
Mineral and glass fiber filled epoxy thermoset, for preserving edge information. ~94 Shore D

ProbeMet™
Copper and mineral filled epoxy thermoset, conductive with good edge retention, for use when copper is not of interest, can cause galvanic coupling with aluminum samples. ~94 Shore D

KonductoMet™
Graphite and mineral filled phenolic thermoset, conductive with moderate edge retention, for use when carbon is not of interest. ~88 Shore D

TransOptic™
Transparant, thermoplastic acyrlic, reheating mount allows for extraction of specimen, requires special cooling cycle. ~ 80 Shore D

Tips, Tricks & Techniques:

To permanently label specimens when using opaque mounting compound:

- Place specimen in mold
- Fill most of the mold cylinder with mounting compound
- Add a thin layer of TransOptic™ Powder
- Place a typed label over the TransOptic Powder
- Cover the label with a second layer of TransOptic Powder
- Run the mounting cycle as usual

Did You Know:
Compression mounting compounds can be used in either single or central force mode of grinding and polishing.

For easy loading and the best edge retention, you can fill the bottom of the mold with EpoMet and then place a PreMold on top.

Compression Mounting Selection

- Specimens that are NOT sensitive to heat and pressure
- More than 20 specimens are prepared per day

Specific compression compounds are designed for your needs:

SEM Analysis?

ProbeMet™

Use in SEM analysis when copper is not of interest

KonductoMet™

Use in SEM analysis when carbon is not of interest

Need General Use?

PhenoCure™

Red, Black or Green

Need a mount resistant to agressive etching?

Diallyl Phthlate

Mineral or glass filled

EpoMet™

Fine or granular

Need speed & general usage?

PreMolds

Red, Black or Green

Did You Know:

- You can miminze shrinkage and improve edge retention by cooling the mount to room temperature before removing it from the mounting press.

- Unfused or frosted mounting compound is often a sign of insufficient molding temperatures or pressures. Ensure that the temperature setting on the mount press is 300°F [150°C] or higher.

- Uncured mounts can be caused by too much moisture in the mounting compound. Make sure to properly close the container between uses.

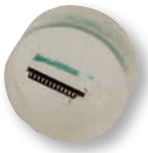
- Radial splitting of mounts is often caused by sharp edges on the sample or by samples that are too large for the mold size.

- Bulging or soft mounts are caused by insufficient cure times. Increase the cure time.

Castable Mounting

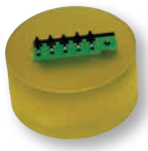
Epoxy and Acrylic castable mounting systems are recommended for mounting specimens that are sensitive to high pressures and temperatures. Epoxy mounting systems provide good physical adherence, low shrinkage and excellent infiltration into pores and cracks. Acrylic mounting systems are typically selected for their short cure times. Dyes and fillers can be added to either system. Dyes can enhance pores and highlight the interface between the media and sample. Conductive fillers allow epoxy mounting systems to be used in an SEM without additional processing. Fillers can improve the abrasion resistance of all castable systems.

Acrylic Systems

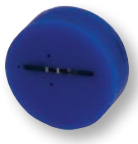


SamplKwick™
Translucent, general purpose acrylic system, 5-8 minute cure time, ~179°F [79°C] Peak Temperature. ~85 Shore D Hardness

VariKleer™
Clear, general purpose acyrlic system, requires pressure vessel for clear mounts, 5-15 minute cure, ~212°F [100°C] Peak Temperature. ~84 Shore D Hardness



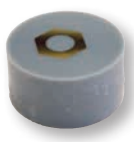
VariDur™ 10
Semi transparent, low odor system, low shrinkage, high viscosity, 8 minute cure time, 100°C Peak Temperature.



VariDur 200
Dark blue, low odor system, low shrinkage, high viscosity, 8 minute cure time, ~100°C Peak Temperature.

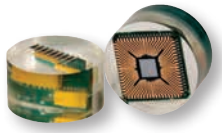
VariDur 3000
Blue, minimal shrinkage, high viscosity, 15-30 minute cure time, ~252°F [122°C] Peak Temperature. ~90 Shore D Hardness

VariKwick™
Blue, fast curing system, moderate shrinkage and viscosity, ~5 minute cure time ~85°C Peak Temperature. ~85 Shore D



VariDur
Grey, filled acrylic system, 10 minute cure time, ~170°F [77°C] Peak Temperature. ~85 Shore D Hardness

Epoxy Systems



EpoxiCure™ 2
Clear, general purpose epoxy system, 6 hr cure time, <104°F [40°C] Peak Temperature. ~80 Shore D Hardness

EpoThin™ 2
Clear, very low viscosity epoxy system, 9 hr cure, <86°F [30°C] Peak Temperature. ~78 Shore D Hardness

EpoColor™
Red epoxy system to highlight pores and cracks, 90 min cure time, <293°F [145°C] Peak Temperature. ~82 Shore D Hardness

EpoHeat™ 2
Transparent yellow epoxy system, long pot-life for mixing large batches, 60 min cure time in oven at 149°F [65°C], <338°F [170°C] Peak Temperature. ~75 Shore D Hardness

EpoKwick™
Clear, fast curing epoxy system, 90 min cure time, <293°F [145°C] Peak Temperature. ~82 Shore D Hardness

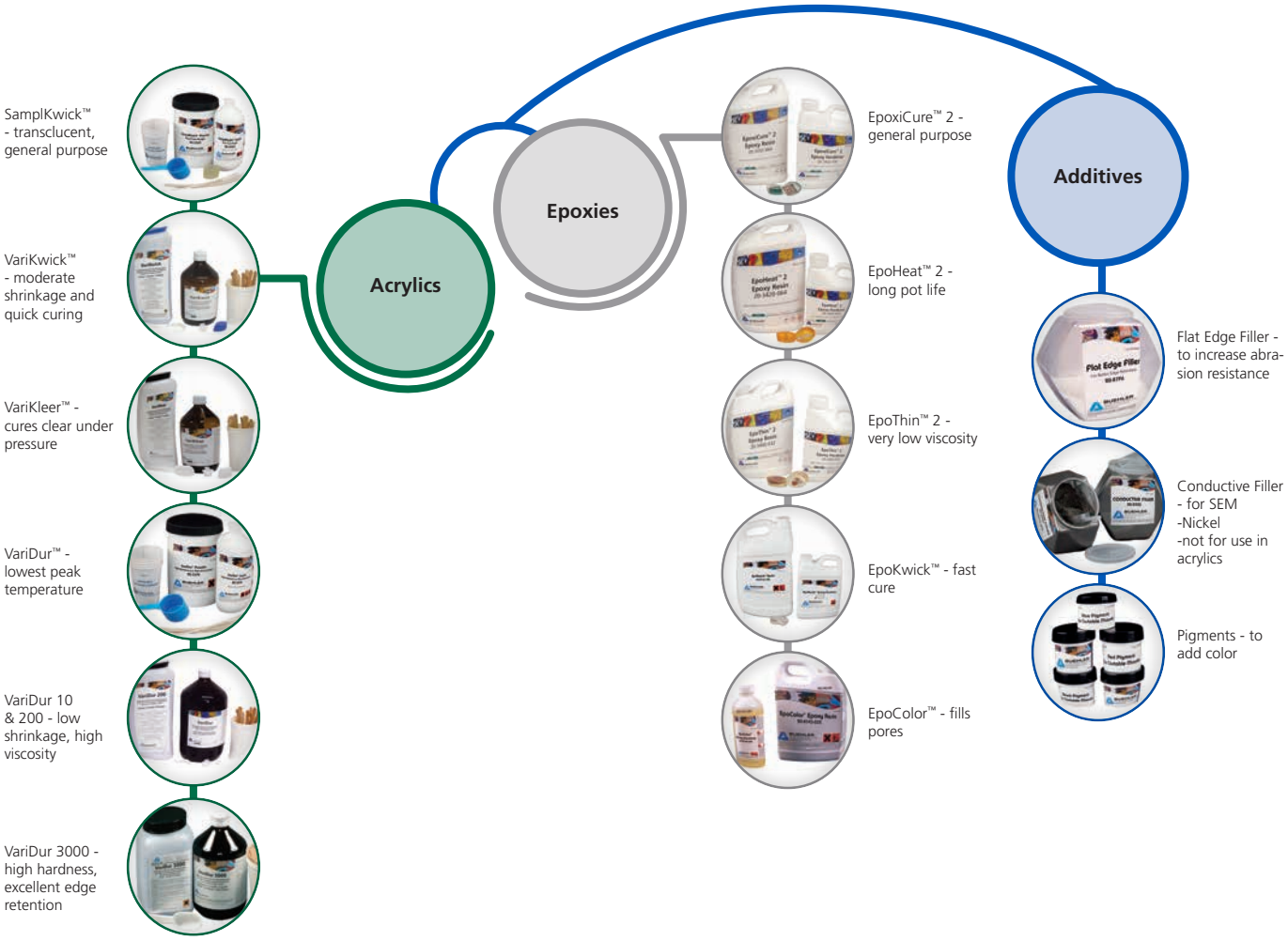
Tips, Tricks & Techniques:

- To get the best results, use a vacuum system to evaucate air trapped in epoxy systems and samples. This reduces or elimates the gap at the sample/epoxy interace, fills pores in the specimen with epoxy and enhances the end result.
- To improve edge retention for acrylic systems, coat the sample in the liquid hardener before pouring in mixed compound.

Castable Mounting Selection

- Specimens are sensitive to heat and pressure
- Pores in a sample must be filled with media before grinding and polishing
- You want to mount many samples at the exact same time

Full selection of Acrylics, Epoxies for every application, and additives for to meet your needs:



Tips, Tricks & Techniques:

Acrylic

- Quickly pour mixture into mold to prevent gelling in the mixing cup.
- Not meant for use with Vacuum Systems or Disposable Mounting Cups.

Epoxy

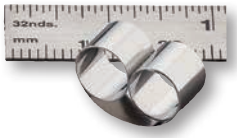
- Decrease cures times by gently heating epoxies in oven. Do not exceed 149°F [65°C]. Not recommended for EpoKwick and EpoColor.
- For best results, tilt the cup containing the resin and hardener slightly and gently work the resin and hardener together using a lift and stir motion.

Did You Know?

- EpoHeat 2 can be mixed in large batches
- The viscosity drops when placed in the oven at 149°F [65°C]
- Low viscosity causes fillers to fall to the bottom of the mount

Mounting Clips

Support clips are used to support samples during mounting. The weight and hardness of the clip should be considered when choosing a clip. For metallic samples that are to be etched after preparation, one of the polymer clips is best to avoid interfence during etching.



SamplKlip
- Stainless Steel
- Dimensions: 0.25 H x 0.55 W x 0.35in L [6 x 14x 9mm]

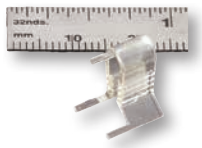
For use with all mounting systems

SamplKlip I
- Plastic, best when used in castable systems
- Available in 2 sizes
- Dimensions (large clip): 0.25 H x 0.475 W x 0.3in L [6 x 12 x 8mm]
- Dimensions (small clip): 0.25 H x 0.425 W x 0.3in L [6 x 11 x 8mm]

Specimen Support Clip
- Plastic, for use in compression systems
- Dimensions: 0.25 H x 0.29 W x 0.375in L [6 x 7 x 9.5mm]

UniClip
- Plastic, for use with all mounting systems

When compression mounting, best when oriented with "legs" upward
- Dimensions: 0.4 H x 0.360 W x 0.500in L [10 x 9 x 12mm]



Ring Forms

- Consumable plastic ring strengthens castable mount
- Use with Epoxy or Acyrlic of your choice
- Strengthens mount for polishing in central force mode

Tips, Tricks & Techniques:

Ring forms enable you to use castable mounting systems in central force mode. To use a ring form:

1. Place a ring form in an EPDM mounting cup
2. Place sample in cup
3. Fill with castable mounting compound of your choice
4. Remove EPDM up before grinding

Mounting Cups

SamplKup™

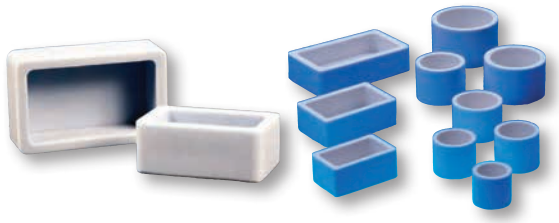
- Best dimensional stability
- Suitable for use with all Buehler castable systems
- Not for use in ovens

Ethylene propylene diene monomer (EPDM) Cups & Rectangular Molds

- Suitable for use with all Buehler castable systems
- Best choice when curing mounts in ovens
- Best choice for large, rectangular mounts

Blue Mounting & Silicone Molds

- Suitable for use with all Buehler castable systems
- Can be used in ovens



Disposable Mounting Cups

- Best when used for mounting low exotherm castable systems like EpoxiCure™ 2 and EpoThin™ 2
- Not for use in ovens

Did You Know?
Disposable mounting cups can also be used as a specimen cap to protect your sample.

Castable Mounting Additives

Pigments

- Pigments can be added to epoxy systems to enhance contrast between sample and mount
- Pigments are available in red, black and blue and are predispersed in an epoxy base
- Blue dye is also available for epoxy systems only

Conductive Filler

- Fine nickel -based filler makes epoxy mounting systems conductive
- Systems will be more viscous once mixed with filler

Flat Edge Filler

- Enhances edge retention in castable systems
- For use when castable mounting is required
- Ceramic powder falls to grinding surface to increase the abrasion resistance
- Not recommended for use with VariDur™ 3000

Ordering Information *(available online at www.buehler.com)*

Compression Mounting Compounds

PhenoCure

Black	20-3100-080	5lbs [2.3kg]
Black	20-3100-100	25lbs [11.3kg]
Black	112031◊	3kg
Black	112034◊	10kg
Black	112007◊	25kg
Red	20-3200-080	5lbs [2.3kg]
Red	20-3200-400	25lbs [11.3kg]
Red	112032◊	3kg
Red	112035◊	10kg
Red	112008◊	25kg
Green	20-3300-080	5lbs [2.3kg]
Green	20-3300-400	25lbs [11.3kg]
Green	112033 ◊	3kg
Green	112036 ◊	10k
Green	112009 ◊	25kg

PhenoCure Premolds - 500 qty.

Black	20-3111-501	1in [25mm]
Black	20-3112-501	1.25in [32mm]
Black	20-3113-501	1.5in [38mm]
Black	20-10090	2in [50mm]
Red	20-3212-501	1.25in [32mm]
Red	20-3213-501	1.5in [38mm]
Green	20-3312-501	1.25in [32mm]
Green	20-3313-501	1.5in [38mm]

Diallyl Phthalate

Blue, mineral filled	20-3330-080	5lbs [2.3kg]
Blue, glass filled	20-3340-080	5lbs [2.3kg]

EpoMet

Black, fine	20-3381-070	4lbs [2.3kg]
Black, fine	20-3381-160	10lbs [4.5kg]
Black, fine	20-3381-400	25lbs [11.3kg]
Black, coarse	20-3380-064	4lbs [2.3kg]
Black, coarse	20-3380-160	10lbs [4.5kg]
Black, coarse	20-3380-400	25lbs [11.3kg]

EpoVit, mineral & glass filled

Black	112013 ◊	3kg
Black	112017 ◊	10kg
Black	112019 ◊	25kg

ProbeMet

Copper & mineral filled	20-3385-064	4lbs [2.3kg]

KonductoMet, graphite & mineral filled

Black	20-3375-016	1lb [0.45kg]
Black	20-3375-400	25lbs [11.3kg]

TransOptic

Clear	20-3400-080	5lbs [2.3kg]

Castable Mounting Systems

Epoxy Systems

EpoxiCure™ 2

Resin		Hardener	
20-3430-064	64oz [1.9ℓ]	20-3432-016	16oz [0.48ℓ]
20-3430-128	1gal [3.8ℓ]	20-3432-032	32oz [0.95ℓ]

EpoThin™ 2

Resin		Hardener	
20-3440-032	32oz [0.95ℓ]	20-3442-016	16oz [0.48ℓ]
20-3440-128	1gal [3.8ℓ]	20-3442-064	64oz [1.9ℓ]

EpoHeat™ 2

Resin		Hardener	
20-3420-064	64oz [1.9ℓ]	20-3422-016	16oz [0.48ℓ]

EpoKwick™

Resin		Hardener	
20-8136-128	1gal [3.8ℓ]	20-8138-032	64oz [1.9ℓ]

Kits

Small

20-8128 *(includes 32oz [0.95ℓ] resin, 8oz [0.24ℓ] hardener, 20 paper cups, 20 stirring sticks and 12 -1.25in SamplKups)*

Large

20-8129 *(includes 128oz [3.8ℓ] resin, 32oz [0.95ℓ] hardener)*

EpoColor™

Resin		Hardener	
20-8143-032	32oz [0.95ℓ]	20-8144-008	8oz [0.24ℓ]

Acrylic Systems

SamplKwick™

Resin		Hardener	
20-3562	1 lb [0.45kg]	20-3564	12oz [0.36ℓ]
20-3566	5 lbs [2.3kg]	20-3568	64oz [1.9ℓ]
20-3562-025	25 lbs [11.3kg]	20-3564-320	2.5gal [9.5ℓ]
20-3562-100	100 lb [45kg]	20-3564-640	5gal [19ℓ]

Kit

20-3560 *(includes 1 lb [0.45kg] resin, 12oz [0.36ℓ] hardener, 5 paper cups, 10 stirring sticks and 5 paper cups)*

VariKleer™

Resin		Hardener	
203591◊	1kg	203592◊	500mℓ
203591002◊	2kg	203592001◊	1ℓ
203591010◊	10kg	203592005◊	5ℓ

Kit

20-3590 *(includes 2.2lbs [1kg] resin & 16.9oz [500mℓ] hardener, measuring scoop, 2 paper cups and 10 stirring sticks)*

VariDur™

Resin		Hardener	
20-3572	1 lb [0.45kg]	20-3574	12oz [0.36ℓ]
20-3576	5 lbs [2.3kg]	20-3578	64oz [1.9ℓ]

Kit

20-3570 *(includes 1lb [0.45kg] resin & 12oz [0.36ℓ] hardener, measuring scoop, 5 paper cups and 10 stirring sticks)*

VariKwick™

Resin		Hardener	
20-3596	1kg	20-3597	500mℓ

Kit

20-3595 *(includes 1kg resin & 500mℓ hardener)*

VariDur 10◊

Resin		Hardener	
111027◊	1kg	111029◊	500mℓ
111031◊	10kg	111033◊	5ℓ

Kit

111037◊ *(includes 1kg resin & 500mℓ hardener, measuring scoop, 2 paper cups and 10 stirring sticks)*

VariDur 200◊

Resin		Hardener	
111030◊	1kg	111029◊	500mℓ
111034◊	10kg	111033◊	5ℓ

Kit

111039◊ *(includes 1kg resin & 500mℓ hardener, measuring scoop, 2 paper cups and 10 stirring sticks)*

VariDur3000

Resin		Hardener	
203581◊	1kg	203582◊	500mℓ
203583◊	10kg	203584◊	5ℓ

Kit

20-3580 *(includes 1kg resin & 500mℓ hardener, measuring scoop, 2 paper cups and 10 stirring sticks)*

◊ *Product only available in Europe, Africa, Middle East and Asia.*

Ordering Information

(available online at www.buehler.com)

Mounting Clips & Clamps

SamplKlip Support Clip – Stainless Steel (qty 100)*
20-4000-100
0.25 H x 0.550 W x 0.350in L [6 x 14 x 9mm], 0.575g

Specimen Support Clip – Plastic (qty 1000)†
20-4001-000
0.25 H x 0.290 W x 0.375in L [6 x 7 x 9.5mm], 0.145g

UniClip Support Clip – Plastic (qty 100)†
20-5100-100
0.4 H x 0.360 W x 0.500in L [10 x 9 x 13mm], 0.290g

113043◊ Black
113068◊ Red
113069◊ Green

SamplKlip I Support Clip – Plastic (qty 100)*
20-4100-100
0.25 H x 0.475 W x 0.3in L [~6 x 12 x 8mm], 0.230g

20-4100-100S
0.25 H x 0.425 W x 0.25in L [~6 x 11 x 6mm], 0.230g

** Compatible with specimens up to 0.200in [5mm] thick*
† Compatible with specimens between 0.0035 – 0.090in [0.9 – 2.3mm]
◊ Product only available in Europe, Africa, Middle East and Asia.

Additives

Pigments for castable systems
20-8501 SO Blue, 1oz [3mℓ]
20-8502 SO Black, 1oz [3mℓ]
20-8504 SO Red, 1oz [3mℓ]

Conductive Filler
20-8500 2 lb [0.9kg]

Flat Edge Filler
20-8196 1 lb [0.45kg]

Release Agent
20-8185-002† 2oz [6mℓ]
20-8185-008† 8oz [237mℓ]
20-8185-016† 16oz [470mℓ]
20-8185-032† 32oz [950mℓ]

EpoBlue
111068◊ 25g

SO - Special Order. Items may have long lead times and minimum orders.
† Restricted article, requires special packaging
◊ Product only available in Europe, Africa, Middle East and Asia.

Mounting Cups

SamplKup™ (qty 12)
20-9178 1in
20-8180 1.25in
20-9181 1.5in
20-9184 2in
20-9177 25mm
20-9179 30mm
20-9182 40mm
20-9183 50mm

Disposable Mounting Cups (qty 50)
can also be used as specimen caps
20-8280 1in
20-8281 1.25in
20-8282 1.5in
20-8283 2in

EPDM Mounting Cups (qty 5)
20-8181 1in
20-8182 1.25in
20-8183 1.5in
20-8184 2in

EPDM Rectangular Molds (qty 1)
20-6185 2.5 x 1.4 x 1.8in [63 x 25 x 46mm]
20-6186 6 x 4 x 2in [150 x 100 x 50mm]
20-6187 6 x 3 x 1in [150 x 76 x 25mm]

Ring Forms (qty 100)
20-8151-100 1in
20-8152-100 1.25in
20-8153-100 1.5in
20-8154-100 2in

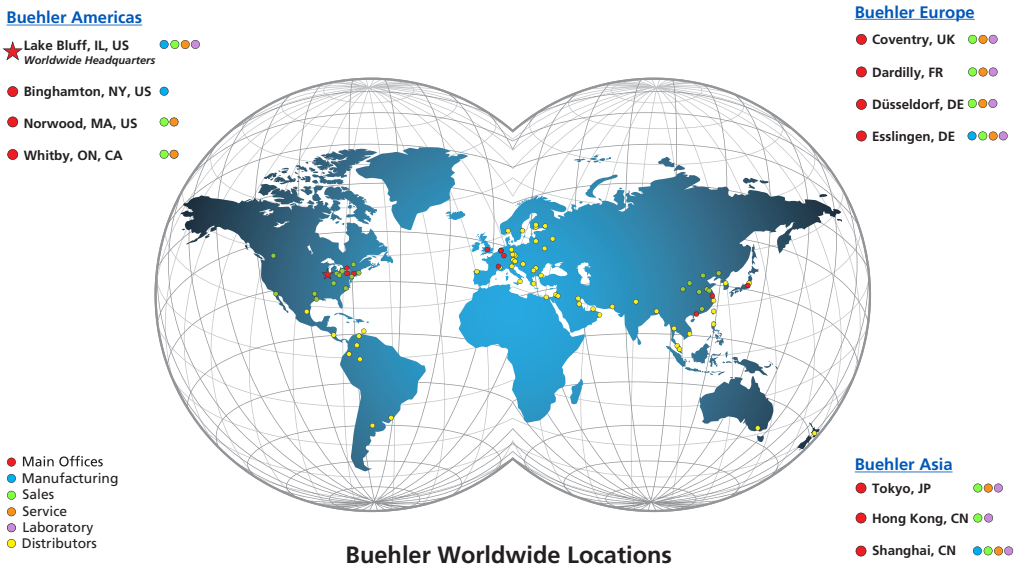
Recessed Discs (qty 1)
20-3521 SO 1in
20-3513 SO 1.25in
20-3514 SO 1.5in
20-3517 SO 2in

Silicone Molds (qty 1)
20-8483 SO 60mm
20-8484 55 x 30 x 22mm
20-8485 70 x 40 x 22mm

SO - Special Order. Items may have long lead times and minimum orders.

Buehler products are used throughout the world in manufacturing facilities, quality laboratories, and universities to analyze all types of materials, including:

- Aerospace
- Automotive
- Biomedical & Medical
- Ceramic, Plastics, Composites
- Education, Defense, Government
- Electronics & Optics
- Energy & Construction
- Petrography
- Primary Metals



Buehler Worldwide Locations

Other products from Buehler:

Sample preparation equipment includes: abrasive sectioning, precision cutting, mounting, grinding & polishing, electronics and petrography.

Consumables for sample preparation equipment include: abrasive wheels, precision blades, compression mounting compounds, castable systems, silicon carbide abrasive papers, diamond grinding discs, polishing cloths, diamond polishing suspensions, and final polishing suspensions.

Imaging & analysis and hardness testing equipment include: microscopes, cameras, imaging & analysis software, hardness testers, fixtures, test blocks and hardness software.

Shop online at www.buehler.com. *(US, DE, FR and UK only)*

For a complete listing of consumables, visit our website at www.buehler.com or refer our Product Catalogue. Buehler continuously makes product improvements; therefore technical specifications are subject to change without notice.

Sectioning	Mounting	Grinding & Polishing	Imaging & Analysis	Hardness Testing
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