BCM GLASS

BCM FIELD GUIDE · FOR ARCHITECTS

The Glazing Design and Specification Manual

Choosing the system, detailing the perimeter, sizing joints and mullions, designing entrances, specifying testing, and writing a glazing spec that prices cleanly.

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CHAPTER 1

How to use this manual

This manual is for architects detailing and specifying commercial glazing. It follows the design process: choose the system, detail the conditions, size the joints and framing, design the entrances, set the performance and testing requirements, and write the specification. It ends with a design review checklist you can use before drawings go out.

Each chapter expands one or more posts in our BCM Field Guide series on LinkedIn. Our companion Architect's Glass Selection Manual covers the glass itself.

> **The short version.** Most field glazing questions start at a condition nobody detailed. Draw every perimeter condition, not just the typical one. Keep the air barrier, the drainage path, and the thermal break continuous. Size joints for the movement they take. Remember that span drives mullion depth more than anything else. State testing requirements exactly, and say every requirement once.

BASIS AND LIMITS

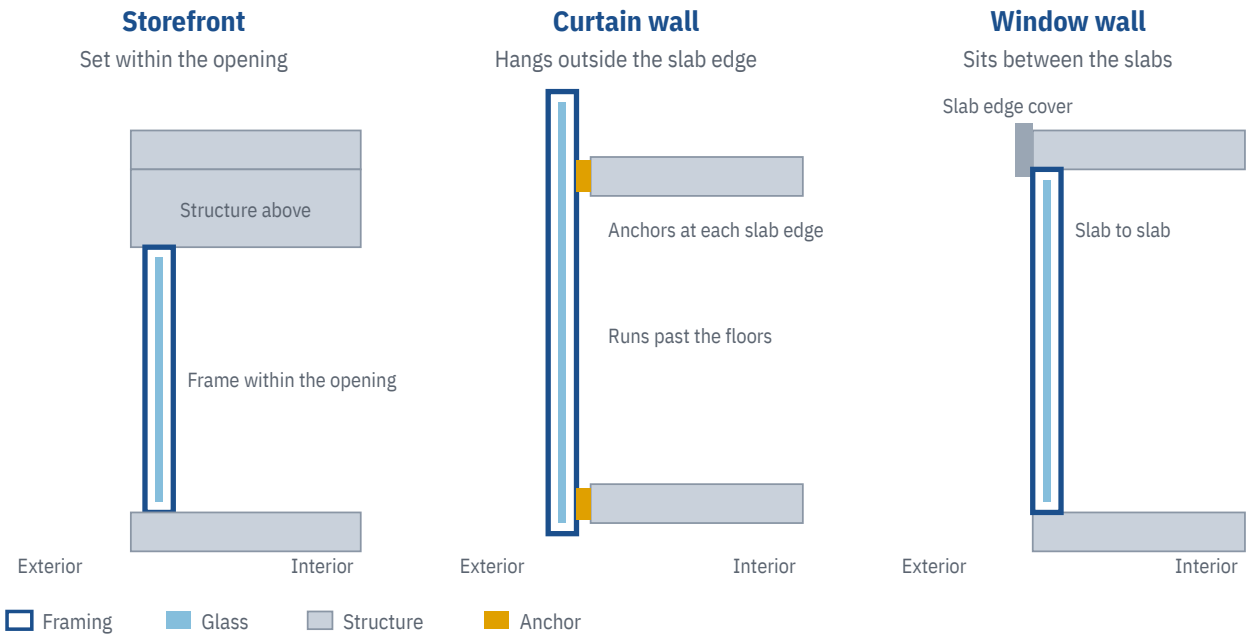
This manual is general guidance from a commercial glazing contractor. Project conditions, the building code, the manufacturer's installation requirements, and the system engineering govern the final design. Figures and calculations here show trends and typical practice; they are not a design.

CHAPTER 2

Storefront, curtain wall, or window wall?

FIELD GUIDE NO. 07

From the street, the three systems can look alike. They are built differently, and the differences affect cost, schedule, performance, and how the facade meets the structure.



Section view. Storefront sits within an opening; curtain wall hangs outside the slab edges; window wall sits between the slabs.

Storefront

Storefront is typically ground-floor glazing set within an opening, with shorter spans, usually about one story. It is supported at the sill and head by the surrounding structure. It is the common choice for retail, lobbies, and building entries, and it integrates directly with aluminum entrance doors. Storefront systems are usually shallower and less expensive than curtain wall, with lower structural and water-resistance performance.

Curtain wall

Curtain wall hangs on the outside of the structure and runs continuously past the floor slabs. It carries its own weight and the wind loads back to the building through anchors at the slab edges. Curtain wall comes in two main forms:

- **Stick-built curtain wall** is assembled in the field, piece by piece: mullions, then horizontals, then glass. It suits low- and mid-rise buildings and irregular geometry.

- **Unitized curtain wall** is assembled and glazed in the shop as large units, then hung on the building. It shifts labor into a controlled shop environment and speeds installation, especially on taller buildings, at the cost of more engineering and earlier commitment to dimensions.

Because curtain wall passes the floors, the gap between the slab edge and the wall needs perimeter fire containment where floors are rated.

Window wall

Window wall is installed slab to slab, sitting between the floors. Each floor's glazing is supported by the slab below and anchored to the slab above, and the slab edge is finished separately, usually with a slab edge cover. It is common in multifamily and mixed-use buildings, and it allows the glazing to proceed floor by floor.

Side by side

	Storefront	Curtain wall	Window wall
Sits	Within the opening	Outside the slab edge	Between slabs
Typical use	Ground floor, retail, entries	Mid- to high-rise facades	Multifamily, mixed-use
Span	Short, about one story	Continuous past floors	Floor to floor
Slab edge	Not applicable	Covered by the system	Finished separately
Fire safing at slab edge	Not usually	Yes, where floors are rated	Joints at the slab edge may need a tested firestop system where floors are rated; confirm
Installed from	Usually the outside	Outside, from lifts, scaffold, or a crane	Often from inside, floor by floor

Entrances and fire safing

Entrances are the most-used part of the system and where most of the coordination lives: hardware schedules, access control, power, and accessibility. Chapter 6 covers them.

Fire safing at the slab edge should be settled in design: where the safing sits, how it is supported, which tested assembly it follows, who installs it, and how it is inspected. Perimeter fire containment systems are commonly tested to ASTM E2307.

How to choose

Building height, wind loads, budget, schedule, thermal performance, and the look the design calls for all drive the choice. The right answer is often a mix of systems on one building: curtain wall on the main facade, window wall on residential floors, and storefront at the base.

BASIS AND LIMITS

This is a general comparison. Actual limits depend on the manufacturer's system, project loads, and code requirements.

CHAPTER 3

Glazing details to settle in design development

FIELD GUIDE NO. 03

Glazing conditions are still flexible in design development. The details drawn now become the shop drawings, the price, and the field conditions later. Odd conditions drive most field questions, so draw the atypical conditions too: corners, transitions to other cladding, door heads, rooflines, and soffits.

The perimeter: head, jamb, and sill

Draw every perimeter condition, not just the typical one. For each, show:

- Where the glazing meets the structure, and what it anchors to.
- Where the air and water barrier connects to the glazing, and with what material.
- The flashing, sill pan, or receptor, and where water drains.
- The perimeter sealant joints, inside and out, with their sizes.
- The adjacent finish and how it terminates against the frame.

The air and water barrier tie-in

Show how the barrier connects at every edge, including corners, transitions between systems, and penetrations. This is where leaks start. Identify the transition membrane, how it laps (shingle-style, so water sheds outward), and the sequence: the barrier is typically installed and inspected before the glazing goes in.

Slab edge and anchorage

Show the slab edge, anchor locations, embeds if any, and room for tolerance. Anchors need solid backup: confirm what is behind each anchor, and avoid anchoring into materials that cannot take the load, such as unreinforced masonry or thin slab edges near reinforcing.

Tolerances

Concrete, steel, and framing are each built to their own tolerances, and the glazing has to absorb all of them. Set realistic tolerances, and leave room at anchors and perimeter joints to take up the difference. Gaps that are too tight invite field fixes.

Sealant joints

Size joints for the movement they absorb (Chapter 4), and show who owns each one. Perimeter joints at the glazing are often split between the glazing contractor and the joint sealant trade.

Drainage and weeps

Water that gets into a system has to get out. Show the drainage path through the system and the sill, and keep weeps clear of finishes, sealant, and flashing. Most storefront and curtain wall systems are designed to drain any water that gets past the outer seals back to the outside.

Thermal breaks

Show where the thermal break is in the system and keep it continuous. Steel reinforcing, clips, or metal flashing that bridge the break can undo it, and can cause condensation on the interior.

Condition checklist

Condition	Show on the drawings	Watch for
Head	Anchorage, deflection room for the structure above, flashing	No room for the structure to move
Jamb	Air barrier tie-in, sealant joint	A gap too tight to seal
Sill	Drainage, sill pan or receptor, flashing, thermal break	Water with nowhere to go
Slab edge	Anchors, fire safing, movement	Anchors into poor backup
Corner	The transition between systems or planes	Barrier discontinuity
Penetration	Sleeves, conduits, and their seals	Unsealed openings
Transition to other cladding	Which trade's seal is outermost, and the lap direction	Reverse laps that direct water in
Roofline and soffit	Coping, termination, and the barrier connection	Water running behind the system

CHAPTER 4

Designing sealant joints

FIELD GUIDE NO. 19

Most sealant joint failures trace to the joint, not the sealant: joints that were too narrow, too deep, wrongly backed, or poorly prepared.

Joints move

Temperature, wind, and building movement open and close every joint. Sealant has to stretch and compress without tearing or losing adhesion. Metal framing moves the most with temperature, and dark finishes run hotter in sun than light ones.

How much aluminum moves

Aluminum expands about 12.9 millionths of an inch per inch for each degree Fahrenheit. Movement equals that coefficient times the member length times the temperature change.

Member length	80°F swing	120°F swing	160°F swing
4 ft	0.05 in.	0.07 in.	0.10 in.
6 ft	0.07 in.	0.11 in.	0.15 in.
8 ft	0.10 in.	0.15 in.	0.20 in.
10 ft	0.12 in.	0.19 in.	0.25 in.
12 ft	0.15 in.	0.22 in.	0.30 in.
16 ft	0.20 in.	0.30 in.	0.40 in.
20 ft	0.25 in.	0.37 in.	0.50 in.

The temperature swing is the range of the metal's surface temperature, not the air: from the coldest night to the hottest afternoon in sun. That range can be large on dark finishes.

Size the joint

Sealants are rated by their movement capability, often plus or minus 25 percent or plus or minus 50 percent of the joint width. Size the joint so the expected movement stays within the rating, with a margin for construction tolerance.

A worked example. A joint takes the movement of a 12 foot aluminum member with a 120°F surface temperature swing: about 0.22 inch.

- With a plus-or-minus 50 percent sealant, the minimum width is 0.22 ÷ 0.50 = about 0.45 inch. Detail it at 1/2 inch or wider.
- With a plus-or-minus 25 percent sealant, the minimum width is 0.22 ÷ 0.25 = about 0.9 inch. Detail it at 1 inch, or choose a higher-movement sealant.

Add construction tolerance on top of the movement width. A joint detailed at its theoretical minimum will be undersized somewhere on the building.

Depth and backing

- **Depth matters.** Sealant depth is commonly about half the joint width, within the minimum and maximum depths the sealant manufacturer recommends. A joint that is too deep cannot stretch; one that is too thin tears.
- **Backer rod** controls depth, gives the sealant an hourglass profile, and prevents three-sided adhesion. Sealant should bond to the two sides of the joint only.
- **Bond breaker tape** does the same job where the joint is too shallow for backer rod.

Compatibility, preparation, and maintenance

- **Compatible materials.** Sealants, gaskets, setting blocks, and the surfaces they touch must be compatible. Ask for compatibility and adhesion testing from the sealant manufacturer on the actual project substrates.
- **Prepared surfaces.** Joint surfaces must be clean, dry, and sound. Some substrates need primer, and some finishes, such as natural stone, can stain from certain sealants.
- **Maintenance.** Sealant does not last forever. Leave access to inspect and replace it, and include it in the owner's maintenance plan.

Structural silicone glazing, where sealant holds the glass to the frame, is a separate engineered design with its own requirements; see ASTM C1401.

BASIS AND LIMITS

Movement = 12.9×10^{-6} per °F × length × temperature change, for aluminum. Joint design should follow the sealant manufacturer, ASTM C1193, and ASTM C1472 (calculating movement and joint width).

CHAPTER 5

What drives mullion size

FIELD GUIDE NO. 10

Mullions resist wind and carry glass weight. How deep they must be depends mostly on span, load, and the deflection limit, and span has the biggest effect of all.

Span

The longer the vertical span between supports, the deeper the mullion needs to be. Floor-to-floor height is often the single biggest factor, and a tall lobby or a double-height space can push a system to a deeper profile or reinforcing.

Wind load

Taller buildings, exposed sites, and higher wind speed regions see higher wind pressure. Building corners and edges see higher pressures than the middle of a wall: the components and cladding provisions of ASCE 7 define these zones. The mullion has to resist the load without bending too far.

Glass weight and size

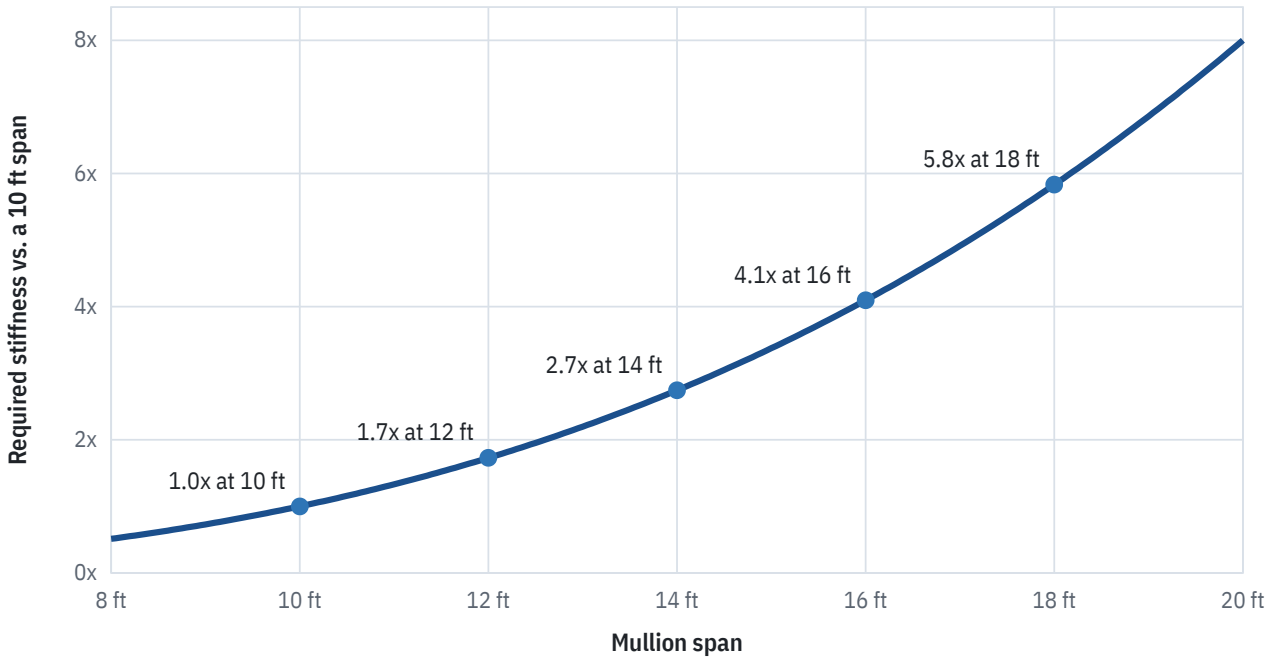
Larger, thicker lites weigh more. Laminated and insulating units add weight that the horizontals and anchors must carry. Glass thickness itself is selected for wind load using ASTM E1300.

Deflection limits

Specifications set how much a member may bend under design load. A common limit for framing members supporting glass is the span divided by 175 (L/175) for spans up to 13 feet 6 inches. Longer spans commonly use L/240 plus 1/4 inch. Tighter limits mean deeper or reinforced members. Check the project specification and the code adopted by the jurisdiction.

Span changes everything

For a simple span under uniform wind load with a fixed L/175 limit, the required stiffness grows with the cube of the span. A 14 foot mullion needs about 2.7 times the stiffness of a 10 foot mullion carrying the same load (the limit is held at L/175 here for comparison).



Same wind pressure and tributary width, same L/175 limit, simple span. Required stiffness relative to a 10 ft span.

The math. Midspan deflection of a simply supported beam under uniform load is $5wL^4 \div 384EI$. Setting it equal to L/175 and solving shows the required moment of inertia, I, is proportional to wL^3. Hold the load constant and the stiffness needed grows with the cube of the span: $(14 \div 10)^3 \approx 2.74$.

Reinforcement and sightlines

- **Reinforcement.** Steel or aluminum inserts add stiffness without a wider face. They add cost and weight, and steel can affect thermal performance.
- **Sightlines.** Face width shapes the look; depth is a separate choice. Ask about options before you fix the face dimension. Intermediate supports, such as a horizontal tied back to structure, can shorten the span instead.

Delegated design

On most projects, the glazing contractor's engineer designs the system for the project loads, with calculations stamped by a professional engineer licensed in the project's state. State the design criteria clearly in the specification: wind load basis, deflection limits, glass design standard, thermal movement range, and building movements (floor deflection, drift) the system must accommodate.

BASIS AND LIMITS

The chart uses a simple-span beam model with a uniform load and a constant L/175 limit. It shows a trend, not a design. System engineering governs.

CHAPTER 6

Designing the storefront entrance

FIELD GUIDE NO. 06

Entrances are the part of a building people touch every day. They bring together glass, framing, hardware, power, accessibility, and weather, so small mistakes show up fast.

Door type

Swing, sliding, revolving, folding, or automatic. The choice affects traffic flow, accessibility, energy, security, and cost. Decide it early, because it drives the framing, the hardware, the power, and the floor.

Automatic doors follow their own standards: ANSI/BHMA A156.10 for power-operated pedestrian doors and A156.19 for low-energy power-operated doors. A156.10 covers sensors, signage, and guide rails for full-power doors; A156.19 sets lower opening speed and force limits, with its own signage requirements.

Stile and rail sizes

Stile	Typical use
Narrow stile	Light-traffic interiors and a minimal look; limited hardware options
Medium stile	General commercial entrances
Wide stile	Heavy traffic, schools, and public buildings; room for robust locks and exit devices

Match the door to the hardware and the use. A narrow-stile door may not accept the exit device or electrified lock the hardware schedule calls for.

Hardware

Pivots or hinges, closers, exit devices, locks, pulls, and thresholds affect both the look and the function. For each piece, specify the finish, the function, and who furnishes it. The hardware schedule in Section 08 71 00 usually covers hardware for aluminum entrances; coordinate it with the entrance section so nothing is specified twice or not at all.

Electrified hardware and access control

Card readers, electric strikes, electrified exit devices, door position switches, and automatic operators need power and low-voltage wiring through the frame. Show the conduit path, the power transfer device, and the

location of power supplies. Assign who furnishes, who installs, who wires, and who connects and tests each piece. These items routinely span the glazing, hardware, electrical, and security trades.

Weather and drainage

Entrances take water, wind, and salt. Plan the sill, the threshold, the mat recess, and the drainage so the door works year-round. Exposed entrances benefit from a vestibule or canopy.

Accessibility: 2010 ADA door basics

Item	2010 ADA Standards
Clear width	32 inches minimum, measured with the door open 90 degrees
Clear height	80 inches minimum (door closers and stops may project to 78 inches)
Threshold	1/2 inch maximum
Hardware height	Operable parts 34 to 48 inches above the floor
Hardware force	5 pounds maximum to operate
Opening force	5 pounds for interior hinged, sliding, or folding doors; fire doors at the minimum the authority allows
Door bottom	10 inch smooth surface on the push side

Maneuvering clearances at the door depend on the approach direction and door type; check them on plan, including at vestibules. ADA figures are from the 2010 ADA Standards for Accessible Design, Section 404. State and local codes can set different requirements, and fire-rated doors, exterior doors, and sliding or automatic doors have their own rules. Confirm requirements with your code consultant and the local authority.

Coordinate early

Hardware, access control, and electrical are often split across several trades. Put one coordination meeting on the schedule during construction documents, with the hardware consultant, the electrical engineer, and the security consultant in the room.

CHAPTER 7

Specifying performance testing

FIELD GUIDE NO. 11

Laboratory and field tests turn a promise into evidence. They are the main way owners and designers verify that a glazing system keeps out air and water and carries its loads. A system can pass the lab and still leak, which is why both matter.

The laboratory tests

- **Air infiltration:** how much air leaks through the system under a pressure difference. Commonly tested to ASTM E283.
- **Static water penetration:** water sprayed on the system while it is held under pressure. Commonly tested to ASTM E331.
- **Dynamic water penetration:** a more severe test that uses a wind generator to simulate wind-driven rain. Commonly tested to AAMA 501.1.
- **Structural performance:** confirms the system carries design wind loads without exceeding deflection limits or failing. Commonly tested to ASTM E330.
- **Seismic and building movement:** confirms the system tolerates interstory drift. Commonly tested to AAMA 501.4 (static horizontal), AAMA 501.6 (dynamic), or AAMA 501.7 (static vertical interstory movement), where the project requires it.
- **Thermal performance:** U-factor, SHGC, and condensation resistance, rated under NFRC procedures or AAMA 1503.

Common curtain wall criteria

Test	Standard	Typical specified criterion
Air leakage	ASTM E283	0.06 cfm per sq ft at 6.24 psf
Static water	ASTM E331	No uncontrolled leakage at the specified pressure
Dynamic water	AAMA 501.1	No uncontrolled leakage at the specified pressure
Structural	ASTM E330	L/175 deflection at design load; no glass breakage or failure, and limited permanent set, at 1.5 times design load
Seismic drift	AAMA 501.4 / 501.7	As required by the project

Storefront and window wall criteria differ, and water test pressures are set by the project specification, often as a fraction of the design wind pressure.

Mockups

A performance mockup (PMU) is a full-scale section of the system built and tested in a laboratory chamber. A visual mockup (VMU) is built for appearance and workmanship review, sometimes on the building. Specify which you need, the size and configuration, the tests and their sequence, and whether the mockup can remain as part of the work.

Field testing

Field tests check the installed system, not a laboratory sample. They are performed by an independent third-party testing agency. Common standards include AAMA 503, which sets field-testing requirements for newly installed storefronts and curtain walls, ASTM E1105 for field water testing under pressure, ASTM E783 for field air leakage, and AAMA 501.2 for hose testing of joints. AAMA 503 sets field test values relative to the laboratory values, for example field water testing at two-thirds of the laboratory test pressure and allowable air leakage at 1.5 times the laboratory rate.

Write it clearly

For each test, state:

1. The test standard and edition.
2. The test pressure or criterion.
3. The number, size, and location of test specimens or field test areas.
4. When testing happens in the sequence of work (for example, field testing early, after the first areas are installed).
5. Who engages and pays the testing agency.
6. What happens after a failure, and who pays for retests.

Unclear language leads to pricing gaps, because each bidder fills the gap with a different assumption.

BASIS AND LIMITS

Criteria shown are commonly specified values for curtain wall. Storefront and window wall criteria differ, and water pressures are set by the project specification.

CHAPTER 8

Writing a clear glazing spec

FIELD GUIDE NO. 25

A clear specification lowers the price risk bidders carry, shortens the RFI period, and gets you the system you designed. Conflicts get priced both ways.

Choose the approach

Decide whether each requirement is performance or prescriptive. Performance specifications state the results the system must achieve and let the bidder choose how. Prescriptive specifications name products and methods. Mixing the two in one requirement causes confusion: a named product that cannot meet the stated performance leaves every bidder guessing which one governs.

Name acceptable products

List the basis-of-design manufacturer and system, the acceptable manufacturers, and how substitutions are handled, referencing the Division 01 substitution procedures.

Coordinate with the drawings

Specification and drawings should agree on glass types, system names, and locations. Use the same tags (such as GL-1 or SF-1) in both. Conflicts get priced both ways, and the owner pays for whichever answer costs more.

Define the glass types

Use a complete glass type schedule: type, location, makeup, coatings and surfaces, heat treatment, and safety requirements for each. Our Glass Selection Manual has a checklist and a sample entry.

State testing, mockups, and warranty exactly

- **Testing and mockups:** state exactly what is required, and who pays for retests (Chapter 7).
- **Warranty:** spell out durations by component: installer's workmanship, framing system, insulating glass, laminated glass, finish, and hardware.

Delegated design

If the glazing contractor is responsible for the structural design, say so plainly, state the design criteria, and require calculations stamped by a professional engineer licensed in the project's state, submitted with the shop drawings.

The three-part section format

Part	What goes here
Part 1: General	Summary, references, performance requirements, delegated design, submittals, quality assurance, mockups, warranty
Part 2: Products	Manufacturers, system description, glass makeups, finishes, accessories, fabrication
Part 3: Execution	Examination, installation, tolerances, field quality control and testing, adjusting, cleaning, protection

Say it once, then check it

Put each requirement in one place only. Repeating it in several sections invites conflicts, and conflicts get priced both ways. Before the documents go out, read the glazing sections against Division 01, the joint sealants section, the door hardware section, and the drawings.

Common pitfalls

- A basis-of-design system that cannot meet the stated performance criteria.
- Performance criteria copied from a high-rise master spec onto a two-story storefront.
- Glass types in the schedule that do not appear on the drawings, or the reverse.
- Field testing required with no number of tests, no pressure, and no retest language.
- Warranty durations stated once for "the work," with no breakdown by component.
- Perimeter sealant specified in both the glazing section and the joint sealants section.
- Entrance hardware specified in both the entrance section and the door hardware section.

CHAPTER 9

Early glazing input, phase by phase

FIELD GUIDE NO. 22

A change on paper costs little. The same change after shop drawings or fabrication costs far more. Glazing decisions made in design have the most leverage on cost and schedule, and a glazing contractor can help before bid day.

Phase	Input that helps
Schematic design	System type, budget range, rough performance targets
Design development	Details, thermal and structural approach, mockup plan
Construction documents	Specification language, glass schedule, testing requirements
Bid	Scope clarity and alternates
Submittals	Shop drawing coordination and samples

What early input looks like:

- **Budget checks** that confirm the glazing design is on budget before the documents are final.
- **System selection,** talking through the cost, schedule, and performance trade-offs between storefront, curtain wall, and window wall.
- **Schedule drivers:** custom framing, special finishes, and specialty hardware can drive the schedule. Knowing that before bid lets the team plan for it.
- **Constructability:** details that look fine on paper can be hard to build. Field experience helps catch them early.
- **Value options** that keep the design intent while helping cost and schedule.
- **Scope clarity:** a clear split with adjacent trades, such as sealants, blocking, and electrical, avoids gaps at buyout.

Design phases vary by delivery method. Design-build and CM-at-risk teams may bring a glazing contractor in earlier still.

CHAPTER 10

Design review checklist

Use this before drawings and specifications go out.

Drawings

- [ ] Every perimeter condition is drawn: head, jamb, sill, slab edge, corners, transitions, rooflines, and soffits.
- [ ] The air and water barrier is continuous at corners, transitions, and penetrations, with laps that shed water out.
- [ ] Anchor locations, backup, and room for tolerance are shown.
- [ ] The drainage path and the thermal break are continuous.
- [ ] Sealant joints are sized for movement, with responsibility assigned.
- [ ] Fire safing at rated slab edges is shown, with the tested assembly identified.
- [ ] Glass type tags on the elevations match the glass schedule.
- [ ] Safety glazing locations are identified.
- [ ] Entrance hardware, power, and access control are coordinated, with conduit paths shown.
- [ ] Accessible clear widths, thresholds, and maneuvering clearances are checked.

Specifications

- [ ] Each requirement is performance or prescriptive, not both.
- [ ] The basis-of-design system can meet the stated performance criteria.
- [ ] Delegated design criteria are stated: wind load basis, deflection limits, glass standard, movements.
- [ ] Testing states the standard, pressure, number of tests, timing, who pays, and retest rules.
- [ ] Mockup type, size, tests, and disposition are stated.
- [ ] Warranties are listed by component and duration.
- [ ] Perimeter sealant and entrance hardware are each specified in one section only.
- [ ] Substitution procedures reference Division 01.

Want a second set of eyes?

Send us the drawings or the glazing sections. We're glad to review them for buildability before they go out.

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CHAPTER 11

Sources and basis

This manual reflects BCM Glass's practice as a commercial glazing contractor and the standards below. Standards and codes are revised periodically; use the editions the project and jurisdiction reference.

- ASTM E283, E330, E331, E783, and E1105, laboratory and field test methods for air leakage, structural performance, and water penetration. ASTM International.
- AAMA 501.1, 501.2, 501.4, 501.6, 501.7, and 503, test methods and specifications for curtain wall and storefront. FGIA.
- AAMA 1503, thermal transmittance and condensation resistance of windows, doors, and glazed wall sections. FGIA.
- NFRC 100 and NFRC 200. National Fenestration Rating Council.
- ASTM E2307, fire resistance of perimeter fire barriers. ASTM International.
- ASTM C1193, standard guide for use of joint sealants. ASTM C1472, standard guide for calculating movement and other effects when establishing sealant joint width. ASTM C1401, standard guide for structural sealant glazing. ASTM International.
- ASTM E1300, standard practice for determining load resistance of glass in buildings. ASTM International.
- ASCE 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures. American Society of Civil Engineers.
- AAMA TIR-A11, maximum allowable deflection of framing systems for building cladding components at design wind loads. FGIA.
- 2010 ADA Standards for Accessible Design, Section 404 (doors, doorways, and gates) and Section 309 (operable parts). U.S. Department of Justice.
- ANSI/BHMA A156.10 and A156.19, power-operated and low-energy power-operated pedestrian doors. Builders Hardware Manufacturers Association.
- CSI MasterFormat and SectionFormat. Construction Specifications Institute.

General guidance only. Project conditions, the building code, the manufacturer's requirements, and the system engineering govern. Prepared by BCM Glass, Ashland, Virginia. Questions: estimating@bcmglassco.com.