A FREE BANKS INC. EDUCATION PRODUCT

California Glass & Glazing Foundations

Calculations • Glass Types • Safety Glazing • Accessibility
Wind & Loads • Framing • Installation • Retrofit • Cal/OSHA

12	110	33	5	Free
Modules	Checks	Sources	Tracks	Access

EDITION DISCIPLINE
California's 2025 Title 24 became effective January 1, 2026. Current-field Chapter 24 material is separated from older adjacent-code references so learners can see which edition supports each lesson.

Use this handbook with the Banks Trade Academy course. Complete each field assignment, reach 90% on calculations, and reach 85% on code and safety decisions before treating a module as mastered.

Updated 2026-07-29 | 12-module course | 110 original knowledge checks | 33-source registry

Educational material only. This course is not a license, certification, apprenticeship, union program, engineering service, or substitute for project documents and the authority having jurisdiction.

The two-minute memory sheet

Write this from memory before every practice set.

Prompt	Recall
Area	W x H / 144
Perimeter	2(W + H) / 12
Waste	net x (1 + waste%)
Pressure to force	psf x ft2 = lb (not glass sizing)
Door-adjacent glass	24 in arc / bottom below 60 in
Large panel	>9 ft2 / bottom <18 / top >36 / walk within 36
Accessible door	32 clear / 34-44 hardware / 1/2 threshold
Door behavior	5 lb open / 5 sec closer / lower 10 in smooth
Vision panel	43 in max / 66 in exception
Cal/OSHA listed fall exposure	>7.5 ft under section 1670

One-best-answer hierarchy

1. Protect people and stabilize the condition.
2. Follow approved plans, specifications, manufacturer instructions, and code.
3. Verify dimensions and materials before irreversible fabrication.
4. Preserve support, drainage, edge clearance, bite, and movement.
5. Only then optimize speed or convenience.

California Glass & Glazing Foundations

A free Banks Trade Academy course

California Glass & Glazing Foundations is an independent educational course from Banks Inc. It develops practical knowledge across planning, calculations, glass products, California code navigation, framing systems, sealants, installation, replacement, and safety.

It does not grant a license or certification, claim union or government affiliation, replace apprenticeship, or provide engineering or legal advice.

How to use this handbook

1. Work the twelve modules in order.
2. Complete each field assignment with a real or sample opening.
3. Use the calculation shop until units and the divisor 144 are automatic.
4. Take focused knowledge checks after each module.
5. Finish with two comprehensive assessments and review every missed answer.
6. Verify the adopted code, project documents, manufacturer instructions, and responsible design authority before applying a concept to real work.

The source hierarchy

Use authority before opinion:

1. adopted law, regulation, and code;
2. approved project documents and specifications;
3. referenced standards and evaluated/listed systems;
4. approved shop drawings and engineering;
5. manufacturer instructions;
6. industry manuals and training;
7. course summaries and memory aids.

The lower item helps navigate the higher item; it does not silently replace it.

Edition discipline

California's 2025 Title 24 edition became effective January 1, 2026. This course uses the captured 2025 CBC Chapter 24 as the current-field glass-and-glazing lane. The collected 2022 adjacent code chapters remain clearly labeled reference material until current-edition counterparts are captured and reviewed.

Module 1 - The California Glazing Trade

Glazing work coordinates estimating, layout, fabrication, frames, glass, sealants, access, safety, replacement, and closeout. Occupational classification information describes a state scope; it does not by itself authorize work, select a product, or resolve a project detail.

Before making a field decision, identify the jurisdiction, adopted edition, approved drawing set, specifications, manufacturer, listed or tested system,

and unresolved design questions. [S01-S04]

Field assignment: Create a project-authority sheet listing those items for a real or sample project.

Module 2 - Glazing Math and Estimating

Keep units attached:

- square feet: width in inches x height in inches / 144;
- perimeter: 2 x (width + height) / 12;
- order quantity: one-lite area x quantity x (1 + waste percentage);
- weight: area x pounds per square foot;
- distributed force: pressure in psf x area in square feet;
- sealant coverage: cartridge volume / joint area / 12.

Pressure multiplied by area does not select glass, framing, fasteners, or anchors. Glass resistance depends on lite dimensions, make-up, support, pressure, load duration, edge condition, and the applicable design method. [S01, S07, S12]

Field assignment: Measure three openings and calculate area, perimeter, quantity with waste, estimated weight, and the decisions that still require approved design information.

Module 3 - Glass Products and Safety Glazing

Heat-strengthened, fully tempered, laminated, insulating, wired, patterned, coated, and spandrel products have different fabrication and performance roles. Strength is not the same as impact-safety classification. A compliant safety-glazing decision connects the location, permitted product, required impact category, identification, and installed condition.

Resolve cutting, holes, notches, edgework, coating orientation, make-up, and marking before irreversible fabrication. Apply every condition in a hazardous location trigger, then check its exceptions. [S05, S13-S16]

Field assignment: Build a five-opening glass schedule including type, thickness, make-up, mark, fabrication, orientation, and selection basis.

Module 4 - Accessible Doors and Glazed Openings

Treat the opening as a system. Coordinate clear width, maneuvering space, thresholds, hardware height and operation, opening force, closer speed, smooth bottom surfaces, and vision glazing.

Memory ladder:

- 32 inches minimum clear opening for the common accessible-door condition;
- 34-44 inches for operable hardware;
- 1/2 inch maximum threshold, subject to change-in-level provisions;
- 5 pounds and 5 seconds for the common force and closer checks;
- lower 10 inches for the smooth push-side surface;
- 43-inch vision-panel bottom with the listed 66-inch exception.

Confirm whether commercial or housing-accessibility provisions govern. [S06, S17, S26]

Field assignment: Audit one glazed entrance from both approaches and record every measured condition.

Module 5 - Wind, Loads, Guards, and Design Handoff

Wind pressure is project-specific. Verify the specified positive and negative pressures and the design basis. Lite area alone cannot select glass.

Prepare complete design questions for unsupported edges, point support, guards, sloped glazing, unusual geometry, large lites, special hardware, or movement conditions. Include dimensions, support, loads, make-up, hardware, edgework, and the governing detail. [S07, S12, S16, S18]

Field assignment: Write a one-page design-question packet for a large exterior lite.

Module 6 - Egress, Guards, Window Openings, and Residential Glazing

Glazing work can change clear width, operation, thresholds, guards, emergency escape, and fall conditions. Do not narrow or disable an approved egress path.

Keep guard requirements, window-opening controls, fall prevention, safety glazing, and emergency escape as coordinated but distinct checks.

Confirm whether the California Building Code or Residential Code governs the project. [S19, S22]

Field assignment: Mark every door, guard, operable window, and emergency escape opening on a sample residential elevation.

Module 7 - Exterior Envelope and Fenestration Installation

Identify the wall's water-control strategy before selecting a flashing method. Integrate sill, jamb, and head conditions so incidental water drains to the exterior. Keep anchors, shims, air/water seals, and drainage paths in their separate roles.

Survey, verify, prepare, flash, set, anchor without distortion, seal, preserve drainage, and inspect. Product instructions control conflicts with general practice. [S20, S23, S28]

Field assignment: Draw sill, jamb, and head transitions with arrows for the drainage plane and incidental water path.

Module 8 - Fire-Rated, Plastic, and Elevator Glazing

Specialty systems depend on labels, listings, tested assemblies, material classification, size, supports, framing, and cross-referenced requirements. Do not substitute a generic product based on appearance or thickness. Treat fire-rated glazing, light-transmitting plastics, and elevator or hoistway glazing as separate decision lanes. [S21, S24, S25]

Field assignment: Prepare an approval checklist for a fire-rated lite, polycarbonate canopy panel, and elevator enclosure panel.

Module 9 - Framing and Glazing Systems

Anchors transfer frame loads. Setting blocks support glass. Gaskets and sealants control interfaces. Stops and pressure plates retain. Weeps and gutters drain. Do not use one component to compensate for another. Fabricate from the actual storefront, curtain-wall, entrance, interior, heavy glass, railing, or point-supported system detail. Coordinate structural, thermal, acoustic, water, air, seismic, and movement performance. [S29, S32-S33]

Field assignment: Draw a captured and butt-glazed system and label every component's function.

Module 10 - Sealants, Joints, and Water Management

Select sealant by joint role, exposure, movement, substrates, coatings, adjacent materials, adhesion, compatibility, primer, back-up material, cure conditions, and required performance.

Backer rod controls depth and helps prevent three-sided adhesion. Tooling promotes contact and profile. Diagnose adhesive, cohesive, substrate, compatibility, staining, or bubbling failure before repeating the installation. [S29-S31]

Field assignment: Survey three joints and record geometry, substrates, back-up, condition, exposure, and evidence needed before repair.

Module 11 - Replacement, Retrofit, and Failure Diagnosis

Stabilize the glass, isolate exposure, survey the complete product and system, diagnose the cause, select the compliant replacement, restore the assembly, and verify.

Record dimensions, thickness, plies, spacer, coating surface, tint, heat treatment, marks, edgework, holes, support, bite, pocket, drainage, and orientation. Do not treat the removed condition as the specification.

[S05, S23, S28-S29]

Field assignment: Build and complete a replacement survey form for one sample lite.

Module 12 - California Jobsite Safety

Control exposure before production. Isolate workers and the public, select stable access and rated equipment, assign trained workers, plan the load path, and establish the landing and debris route.

Match PPE to cuts, flying particles, chemicals, overhead work, and entanglement. Verify programs, meetings, inspections, ladders, scaffolds, aerial devices, openings, skylights, fall protection, rescue, and elevated glazing conditions. [S08-S11, S27]

Field assignment: Write a pre-task plan for replacing an elevated storefront lite in a public area.

Course Mastery

Use these learning gates:

- all twelve modules complete;
- five correct divisor-144 recalls;
- at least twenty calculations at 90 percent or better;
- two comprehensive assessments at 80 percent or better;
- glass/glazing and safety practice at 85 percent or better.

These are Banks Trade Academy learning targets. They are not a state passing score, license, certification, apprenticeship credit, or union credential.

01 - Calculation Playbook

Write units on every line. Most mistakes come from mixing inches, feet, square feet, pounds per square foot, and linear feet.

1. Rectangular area

If dimensions are in inches:

area (ft2) = width (in) x height (in) / 144

Example: 42 x 62 inches

42 x 62 / 144 = 18.083 ft2, approximately **18.1 ft2**. The official trade-study example rounds this to 18 square feet. [S01]

Pattern: **multiply first, divide by 144 once.**

2. Quantity and waste

net area = one-lite area x quantity

order area = net area x (1 + waste percent / 100)

Always round to a purchasable quantity only after applying waste. If the question asks for whole sheets or tubes, round **up**.

Example: 12 lites at 30 x 48 inches with 10% waste:

- one lite = 30 x 48 / 144 = 10 ft2
- net = 10 x 12 = 120 ft2
- order = 120 x 1.10 = 132 ft2

3. Perimeter and linear material

perimeter (ft) = 2 x (width in + height in) / 12

Use perimeter for glazing tape, gasket, cap, perimeter sealant, and trim only when the detail shows a continuous run.

Example: a 48 x 84 inch frame:

2 x (48 + 84) / 12 = 22 linear ft

For multiple openings, check whether shared mullions are counted once. A frame takeoff is not always the sum of individual perimeters.

4. United inches

UI = width (in) + height (in)

This is a trade pricing/size classification, **not area**. A 36 x 60 lite is 96 UI and 15 ft2.

5. Glass weight

Using glass density approximately 0.091 lb/in3:

weight (lb) = area (ft2) x thickness (in) x 144 x 0.091

Quick factors:

Nominal monolithic thickness	Approx. lb/ft2
1/8 in	1.64
3/16 in	2.46
1/4 in	3.28
3/8 in	4.91

Nominal monolithic thickness	Approx. lb/ft2
1/2 in	6.55

Example: 40 ft2 of 1/4-inch glass:

40 x 3.28 = 131.2 lb

For laminated or insulating units, add the approximate weight of all glass plies. Interlayers, coatings, spacers, and frames add weight, so lifting plans should use verified product data.

6. Uniform pressure to total force

total force (lb) = pressure (psf) x area (ft2)

Example: a 5 x 8 foot lite under 30 psf:

- area = 5 x 8 = 40 ft2
- total distributed force = 30 x 40 = 1,200 lb

This does **not** size the glass or anchors. Actual glass load resistance depends on lite dimensions, thickness, glass type, support conditions, load duration, and other factors under ASTM E1300; wind pressures come from the project design/CBC 1609. [S07, CBC 2404.1; S12]

7. Sealant yield

For a rectangular joint, ignoring waste:

joint volume per linear foot (in3) = width (in) x depth (in) x 12

coverage (linear ft) = container volume (in3) / joint volume per linear foot

A 10.1-fluid-ounce cartridge is about 18.2 cubic inches. For a 1/4 x 1/4 inch joint:

- volume per foot = .25 x .25 x 12 = .75 in3
- theoretical coverage = 18.2 / .75 = 24.3 ft

Apply the waste factor given in the question. Do not assume a joint depth or tooling loss that is not stated.

8. Cut-size logic

Use the detail's relationship, not a memorized universal deduction.

- If glass size equals daylight opening plus two bites: glass = DLO + 2(bite).
- If glass size equals pocket opening minus two edge clearances: glass = pocket - 2(clearance).
- If a frame outside dimension is built from two jambs and a head/sill between them, subtract member widths only as the fabrication detail shows.

Never fabricate heat-treated glass until holes, notches, cutouts, dimensions, and edgework are verified; those operations must occur before heat treatment. [S13]

9. Frame takeoff

For a simple storefront elevation:

1. draw each continuous member;
2. mark whether verticals run through or horizontals run through;
3. count perimeter members once;
4. count intermediate members once;
5. apply the detail's deductions at intersections;
6. add stock-length waste only after net cut lengths are known.

10. Shape formulas worth knowing

- triangle: A = base x height / 2

- circle: A = pi x radius2
- trapezoid: A = (parallel side 1 + parallel side 2) / 2 x height
- rectangle with cutout: gross area - cutout area

Ten-second arithmetic audit

Before selecting an answer, ask:

- Are all dimensions in compatible units?
- Did I use 144 for square inches to square feet, not 12?
- Is the question asking net, order, or billable quantity?
- Does the answer need rounding up?
- Is it area, perimeter, volume, weight, pressure, or total force?

02 - Glass Types and Safety-Glazing Decisions

Glass-type decision table

Type	Break/behavior concept	Field-use distinction
Annealed	Base float glass; breaks into larger sharp shards	Do not call it safety glazing merely because it is thick
Heat-strengthened	Heat treated for greater thermal/mechanical strength than annealed; not automatically a safety glazing product	Often selected for thermal stress/load needs; must be fabricated before treatment [S13]
Fully tempered	Heat treated; intended to break into small particles and can qualify as safety glazing when properly tested/labeled	Cannot be cut, drilled, notched, or edgeworked after tempering [S13]
Laminated	Two or more lites bonded with an interlayer; fragments tend to be retained after breakage	Can serve safety, retention, security, sound, and other roles depending on tested make-up [S14]
Insulating glass unit	Two or more sealed lites separated by spacer/gas space	Thermal unit, not a glass safety type by itself; each relevant pane must satisfy the location requirement
Wired/patterned	Specialty glass with code and standard limitations	Do not assume traditional wired glass satisfies human-impact safety requirements
Mirror	Reflective glass product	Mirrors in hazardous locations still require compliant safety treatment/product or protection
Plastic glazing	Acrylic/polycarbonate or other approved product	Check flame, support, movement, scratch, and code requirements for the application

Safety glazing is a **tested and identified product in a required location**, not a nickname for strong glass. CBC 2406 uses CPSC 16 CFR Part 1201 and, in permitted cases, ANSI Z97.1 classifications. [S05, CBC 2406.2-2406.3; S15]

Hazardous-location memory system

Doors: assume yes

Glazing in fixed and operable panels of swinging, sliding, and bifold doors is a hazardous location, subject to listed exceptions. One course-relevant exception is an opening through which a 3-inch-diameter sphere cannot pass. [S05, CBC 2406.4.1]

Adjacent to doors: remember 24 / 60

Safety glazing is generally triggered when:

- the nearest vertical edge is within a 24-inch arc of either vertical door edge in the closed position; **and**
- the bottom exposed edge is less than 60 inches above the walking surface.

Then check the code's exceptions rather than stopping at the two numbers. [S05, CBC 2406.4.2]

Large panels near walking surfaces: remember 9 / 18 / 36 / 36

All four conditions must be true:

1. exposed area of one side is greater than 9 ft2;

2. bottom edge is less than 18 inches above the floor/walking surface;
3. top edge is greater than 36 inches above the floor/walking surface;
4. a walking surface is within 36 inches horizontally in a straight line.

If one condition is false, this specific large-panel trigger is false; another hazardous-location rule may still apply. [S05, CBC 2406.4.3]

Guards and railings: always hazardous

Glass in guards and railings, including structural balusters and nonstructural infill, is hazardous regardless of area or height. Additional glass-guard requirements apply beyond basic safety glazing. [S05, CBC 2406.4.4 and 2407]

Wet areas: remember 60 vertical / 60 horizontal exception

Glazing in walls, enclosures, or fences containing or facing tubs, showers, pools, spas, steam rooms, and similar wet areas is hazardous when the bottom exposed edge is below 60 inches. The stated exception is glazing more than 60 inches horizontally, measured straight from the water's edge for the listed water features. This applies to all panes in multiple glazing. [S05, CBC 2406.4.5]

Stairs and ramps: remember 60 / 36 / 18

Glazing with a bottom edge below 60 inches above the adjacent stair, landing, or ramp plane is hazardous. Exceptions include glazing 36 inches or more horizontally from the walking surface, and certain guarded conditions where the glass plane is more than 18 inches from the railing. [S05, CBC 2406.4.6]

Bottom stair landing: remember a 60-inch arc

Glazing less than 60 inches above the landing and within the defined 60-inch horizontal arc from the bottom tread nosing is hazardous, subject to the guard exception. [S05, CBC 2406.4.7]

Identification

Safety glazing in hazardous locations must bear the required permanent manufacturer designation unless a specific exception applies. Tempered glass identification is permanent; do not accept a removable sticker as the permanent safety mark for ordinary tempered glazing. [S05, CBC 2403.1 and 2406.3]

Replacement rule

Replacement glazing must meet the requirements for new installations. The fact that the removed lite was annealed is not proof that annealed replacement is allowed. [S05, CBC 2402.1]

Fast decision flow

1. Identify the exact location: door, door-adjacent, large panel, guard, wet area, stair/ramp, bottom landing, athletic/specialty.
2. Test every required condition and exception.
3. If hazardous, select a product tested for the required safety category and verify its permanent mark.
4. Then check additional demands: fire rating, fall retention, guard loading, wind, thermal stress, security, or energy.

Tempered and laminated are not universally interchangeable. The application and tested assembly control.

03 - California Accessibility for Glaziers

California accessibility is commonly called "ADA" in the field, but the governing technical rules may come from CBC Chapter 11B or another applicable accessibility lane. Use the section number in your reasoning.

The door-number ladder

Rule	Number	Source
Minimum clear opening at a typical accessible door	32 in	11B-404.2.3 [S06]
Deep opening over 24 in	36 in minimum clear	11B-404.2.3 [S06]
Hardware operable-part height	34-44 in AFF	11B-404.2.7 [S06]
Threshold maximum	1/2 in	11B-404.2.5 [S06]
Door closer sweep, 90 to 12 degrees	5 sec minimum	11B-404.2.8.1 [S06]
Spring hinge, 70 degrees to closed	1.5 sec minimum	11B-404.2.8.2 [S06]
Opening force for manual hinged exterior/interior, sliding, folding	5 lb maximum, with listed exceptions	11B-404.2.9 [S06]
Smooth push-side bottom surface	lower 10 in	11B-404.2.10 [S06]
Bottom of at least one viewing panel	43 in maximum AFF	11B-404.2.11 [S06]
Vision-light exception	lowest glazing above 66 in	11B-404.2.11 [S06]
Two hinged doors in series	48 in plus door/gate width swinging into space	11B-404.2.6 [S06]

AFF means above finish floor or ground.

Clear width

Measure a swinging door clear opening with the leaf open 90 degrees, from the face of the door to the stop. The nominal leaf width is not the clear width. Projections are restricted: none into the required width below 34 inches AFF, and no more than 4 inches between 34 and 80 inches AFF, subject to listed exceptions. [S06, 11B-404.2.3]

Maneuvering clearances: core six

Approach	Side	Perpendicular	Latch/hinge-side clearance
Front	Pull	60 in	18 in latch side
Front	Push	48 in	0 in; add the table-required 12 in when both closer and latch are provided
Hinge side	Pull	60 in	36 in hinge side

Approach	Side	Perpendicular	Latch/hinge-side clearance
Hinge side	Push	44 in	22 in hinge side, with table conditions
Latch side	Pull	60 in	24 in latch side
Latch side	Push	44 in	24 in latch side, with table conditions

Use the actual Table 11B-404.2.4.1 for exceptions and footnotes. The field coordination problem is approach + push/pull + latch clearance, not memorizing a single rectangle. [S06]

Hardware

Operable parts must be usable with one hand and without tight grasping, pinching, or twisting of the wrist under 11B-309.4. Hardware is 34-44 inches AFF. When a sliding door is fully open, operating hardware must remain exposed and usable from both sides. [S06, 11B-404.2.7 and 11B-309.4]

Bottom rails and all-glass doors

The push side generally needs a smooth surface across the full width for the bottom 10 inches. A tempered glass door without stiles can use the specific tapered bottom-rail/shoe exception; recognize that it is an exception with conditions, not a blanket waiver for all-glass doors. [S06, 11B-404.2.10]

Vision lights

If doors, gates, or adjacent sidelights contain viewing glazing, the bottom of at least one viewing panel must be no higher than 43 inches AFF. The exception applies where the lowest glazed part is more than 66 inches AFF. [S06, 11B-404.2.11]

Door force and closer speed are different tests

- Opening force: maximum force to push/pull the door open under the section.
- Closing speed: minimum elapsed time over the defined arc.
- Latch-release force is not included in the 11B-404.2.9 opening-force values.

Do not solve a closer-speed question with the 5-pound number.

Accessibility field-check sequence

1. Confirm which entrance/route and which CBC chapter applies.
2. Measure clear opening at 90 degrees.
3. Measure threshold and changes in level.
4. Verify approach-side maneuvering space and slopes.
5. Verify hardware type and 34-44 inch height.
6. Test force with the correct procedure and condition.
7. Time the closer/spring hinge.
8. Check lower 10-inch surface and vision-panel height.
9. Check safety glazing separately under CBC 2406.

Accessibility compliance does not prove safety-glazing compliance, and safety glazing does not prove accessibility.

04 - Wind and Load Reasoning

What a glazing learner should know

You should be able to read a specified design pressure, calculate lite area and total distributed force, compare product/test ratings to the project requirement, preserve the designed support/anchor path, and recognize when engineering is required.

You should **not** improvise a wind pressure from a city name or select glass thickness from total pounds alone.

Code chain

For vertical exterior glass, CBC 2404.1 directs:

1. wind load comes from CBC 1609 components and cladding;
2. glazed curtain walls/storefronts/partitions also have seismic requirements through ASCE 7;
3. uniform-load resistance of glass is determined under ASTM E1300. [S07, CBC 2404.1]

ASTM E1300 considers specified glass constructions under uniform lateral load. Its scope and assumptions include glass type/construction, support condition, lite dimensions, load duration, probability of breakage, edge condition, and support stiffness. It does not replace checks for every consequence or application. [S12]

Pressure is not total force

- **Pressure** is distributed load, typically psf.
- **Total force** is pressure times area, in pounds.
- **Glass adequacy** is not determined from total force alone.

Two lites can have the same area and total force but different aspect ratios and different load resistance.

Example:

- lite = 60 x 96 in = 40 ft2
- specified pressure = +35 psf / −45 psf
- inward total = 35 x 40 = 1,400 lb
- outward total magnitude = 45 x 40 = 1,800 lb

The larger magnitude does not automatically become the only design case; the approved design checks each applicable load direction and component behavior.

Inputs that matter

- positive and negative design pressures;
- lite width and height (aspect ratio), not area alone;
- monolithic, laminated, or IGU construction;
- annealed, heat-strengthened, or fully tempered plies;
- nominal thickness and actual product;
- one-, two-, three-, or four-edge support;
- short- versus long-duration load;
- edge damage, holes, notches, surface treatment, and fabrication;
- deflection, bite, gasket/seal performance, frame and anchor capacity;
- building movement and seismic drift;
- windborne debris, guard, overhead, post-breakage, or other special requirements.

Vertical versus sloped

CBC Chapter 24 treats glass more than 15 degrees from vertical as sloped glazing. Sloped glazing introduces critical combinations of dead, snow, and inward/outward wind loads and has material/retention requirements. [S07, CBC 2404.2 and 2405]

Do not apply a vertical-lite shortcut to a skylight.

Who owns what

- The design professional establishes project wind pressures and engineered criteria.
- The manufacturer/test report establishes system ratings and limitations.
- The glazing contractor verifies that ordered products, fabrication, anchors, supports, bites, clearances, and installation match approved documents.
- The authority having jurisdiction enforces the applicable code and local amendments.

If glass lacks firm support or faces unusual loads, CBC calls for detailed documents, shop drawings, and analysis/test data by a registered design professional. [S07, CBC 2403.2]

Field-decision traps

- using basic wind speed as if it were design pressure;
- treating positive and negative pressures as interchangeable;
- selecting by square footage without dimensions;
- assuming fully tempered glass solves frame or anchor weakness;
- blocking weeps to stop a leak;
- reducing bite or edge clearance to make a mis-sized lite fit;
- field cutting or drilling tempered glass;
- treating a product rating from a different size/configuration as universal.

Fast workflow

1. Read the project pressure and load direction.
2. Verify opening and glass dimensions.
3. Verify glass make-up and support condition.
4. Match the approved ASTM E1300 analysis or tested system.
5. Verify frame, anchors, fasteners, bite, clearances, and sealant/gasket details.
6. Escalate deviations before fabrication or installation.

05 - Framing and Installation

The universal installation sequence

1. Review approved plans, details, schedules, specifications, and product instructions.
2. Field-verify substrate, opening, elevations, plumb, level, square, access, and tolerances.
3. Resolve conflicts before irreversible fabrication.
4. Lay out and fabricate members; deburr and clean cuts/holes.
5. Install sill/receptor and perimeter members in the specified sequence.
6. Shim at load/anchor points; plumb, level, square, and align.
7. Anchor to the structure with specified fasteners and spacing.
8. Seal end dams, fasteners, splices, perimeter conditions, and transitions as detailed.
9. Keep weeps, gutters, baffles, and drainage paths open.
10. Clean glazing pockets; install setting blocks and glazing components.
11. Set glass without edge damage; center it and verify bite/clearance.
12. Install stops, gaskets, beads, pressure plates, caps, and sealant in sequence.
13. Tool/finish, water-test or inspect as required, clean, protect, and document.

Geometry checks

- **Level:** horizontal relative to gravity.
- **Plumb:** vertical relative to gravity.
- **Square:** diagonals equal for a rectangle.
- **Plane/alignment:** adjacent members and glass faces line up as designed.

If a frame is racked, forcing glass into it transfers stress to the edges and is not a correction.

Load path versus water path

Load path

glass -> setting/support components -> frame -> anchors/fasteners -> building structure

Water path

exterior collection -> glazing pocket/gutter -> weep path -> exterior discharge

Sealant is not a structural anchor unless the approved system is specifically designed as structural sealant glazing. A fastener does not complete a water seal unless the detail says how it is sealed.

Setting blocks and clearances

Trade practice:

- setting blocks support dead load and position the lite;
- edge blocks/anti-walk blocks control movement where specified;
- edge clearance prevents glass-to-metal contact and accommodates movement;
- face clearance prevents glass contact with stops or pocket walls;
- bite is the supported engagement of glass into the framing/glazing system.

Use the approved system dimensions and product instructions. Do not invent a universal block location or bite for every system.

Sealant logic

Before using a sealant, verify:

- substrates and coatings;
- adhesion and primer requirements;
- compatibility with gaskets, tapes, IGU edge seals, laminating interlayers, and backer rods;
- joint width/depth and movement;

- cleanliness, dryness, temperature, tooling, and cure;
- whether the joint is weather seal, perimeter seal, heel/toe bead, cap bead, or structural seal.

Three-sided adhesion restrains joint movement; backer rod or bond breaker is used where the joint design requires two-sided adhesion.

Storefront versus curtain wall reasoning

Do not choose by appearance alone.

- Storefront is commonly lower-rise, internally drained, and installed between floors/openings.
- Curtain wall spans or attaches across structural floors and must accommodate greater wind, movement, stack-joint, anchor, and pressure-equalization demands.

The approved system and project detail control. Substituting one for the other based on member width alone is unsafe.

Common failure diagnoses

Symptom	First checks
Water at sill	blocked/missing weeps, failed end dams, discontinuous seals, reversed gaskets, perimeter transition
IGU fogging	edge-seal failure; confirm moisture is inside the sealed space
Glass edge break	glass-to-metal contact, damaged edge, insufficient clearance, frame movement, setting-block problem
Door drags/rubs	frame out of square, pivots/hinges, closer, threshold, settlement, fasteners
Gasket shrinkage	wrong cut/installation, stretch during install, corner treatment, material/temperature
Sealant separation	adhesion/cleaning/primer/compatibility/joint-design/cure failure

Choose inspection and root-cause correction before cosmetic cover-up.

06 - Replacement, Retrofit, and Worker Safety

Replacement survey

Before ordering or removing glass, record:

- exact location and access;
- frame/system manufacturer if known;
- opening, daylight, pocket, and existing glass dimensions;
- glass type, thickness, tint, coating surface, pattern orientation, heat treatment, laminate/IGU make-up;
- safety mark, fire label, product label, and special rating;
- bite, edge/face clearances, setting blocks, gaskets, tapes, beads, stops, and fasteners;
- drainage and perimeter seals;
- damage cause and surrounding movement;
- handling weight, route, equipment, barricades, fall exposure, and disposal plan.

Replacement glass must meet new-installation requirements. [S05, CBC 2402.1]

Broken-glass sequence

1. Isolate the area above, below, inside, and outside as exposure requires.
2. Wear task-appropriate PPE and establish stable access. [S08]
3. Stabilize loose fragments before removing stops or remaining support.
4. Remove glass in a controlled direction into a suitable container.
5. Remove old compounds, fasteners, debris, and hidden shards from the backset/pocket.
6. Inspect frame, anchors, drainage, and substrate; correct the cause before reglazing.
7. Verify replacement make-up, size, mark, orientation, and edge quality.
8. Reglaze to the approved system; protect people from walking through new glass with barriers or durable markings. [S09]

The official trade-study example specifically treats removal of all debris from the backset area as the critical step before installing a new lite. [S01]

Retrofit decision rules

- Do not cover active leakage without tracing the drainage and perimeter transition.
- Do not drill an unknown heat-treated lite.
- Do not reuse damaged gaskets, blocks, fasteners, or contaminated sealant surfaces merely to match the old work.
- Do not assume an existing noncompliant condition can be repeated.
- Confirm whether the retrofit changes dead load, anchor demand, egress, accessibility, energy, fire, safety glazing, or fall protection.

California safety anchors

PPE

Employers must require required PPE; it must be approved for intended use, used per manufacturer instructions, maintained safely/sanitarily, and properly fitted. [S08]

For glass work, the hazard assessment commonly considers eye/face, cut-resistant hand/arm, foot, head, hearing, respiratory, and body protection. The exact PPE follows the task and hazard; gloves can create an entanglement hazard around moving machinery.

Walking through glass

Employees must be protected from walking through glass by barriers or conspicuous durable markings. [S09]

Fall protection

For the exposures listed in Title 8 section 1670, approved fall arrest/restraint/positioning systems are required when a worker is exposed to falling more than 7.5 feet and is not otherwise adequately protected. Systems have specific anchorage, inspection, rigging, and rescue requirements. [S10]

Do not memorize "7.5 feet" as a universal answer for every platform, scaffold, ladder, roof, or work activity; other Title 8 sections impose situation-specific rules.

Skylights and glazed surfaces

Workers approaching within 6 feet of a skylight need one of the allowed protections in section 3212, subject to its conditions. Access on glazed roofs, canopies, vaults, or skylights is not permitted unless an experienced California registered engineer certifies the surface for anticipated loads; fall protection is still required. [S11]

One-best-answer safety pattern

If the choices are "work faster," "warn the crew," "use PPE," and "barricade/engineer out the exposure," the best answer generally uses the highest feasible level of control required for the exact hazard, with PPE as part of—not a substitute for—the protection system.

08 - Technical Manual Maps

California glazing education draws on technical resources in addition to the codes. Learn the **decision lane** owned by each resource. Do not invent requirements that are not present in the source material available to you.

ASTM E2112 - Installation of Exterior Windows, Doors and Skylights

What it owns: installation of windows, sliding patio doors, swinging patio doors, and skylights in new and existing residential and light-commercial construction. [S28]

Study these decisions:

- identify whether the wall is a surface-barrier or membrane/drainage system;
- preserve continuity between fenestration, WRB, flashing, pan/subsill, and the surrounding envelope;
- inspect the rough opening before installation;
- coordinate anchors, fasteners, shims, sealants, materials, and trade sequence;
- protect materials and prevent construction damage;
- follow the product manufacturer's instructions when they conflict with the practice;
- distinguish partial from complete replacement methods;
- perform post-installation inspection.

What it does **not** do:

- select the correct product for the application;
- replace egress, safety-glazing, structural, or project-specific design;
- make a generic detail correct for every wall and water-shedding strategy.

Source boundary: the local source object contains the complete public catalog scope, significance summary, contents hierarchy, and revision note. The purchased body, figures, tables, and installation details are not locally captured. The original trade-study resource list does not identify a revision. [S01, S28]

NGA's GANA Glazing Manual - 2022 IYOG

What it owns: the broad product, design, safety, and glazing-system map. The official 170-page PDF is the source of truth for its diagrams, tables, qualifications, and detailed procedures. [S29]

Twelve top-level lanes:

1. primary glass products;
2. fabricated architectural glass products;
3. reference standards;
4. labeling;
5. safety glazing in hazardous locations;
6. design considerations;
7. daylighting and biophilia;
8. sound transmission;
9. fire-rated glazing;
10. general glazing guidelines;

11. system-specific glazing guidelines;
12. appendices and industry references.

High-value course page groups:

PDF pages	What to recognize
15-46	Surface numbering, edgework, heat-treated, coated, spandrel, laminated, insulating, bent, decorative, mirror, and heavy-glass products
54-63	Product labeling, impact categories, and hazardous locations
64-85	Structural, thermal-bridge, and seismic design considerations
94-112	Design/shop/material review and recommended glazing-operation sequence
114-129	Setting, wet/dry/pressure/butt-joint/structural glazing, tapes, shims, sealants, and sloped glazing
133-151	Laminated, heat-treated, IGU, interior, mirror, heavy-glass entrance, railing, all-glass, point-supported, and protective systems

Retrieval check:

- Product strength, safety impact, fire rating, acoustic rating, and post-breakage retention are different performance questions.
- A system-specific page is a prompt to follow its complete details, not permission to improvise from the topic heading.

GANA Sealant Manual

What it owns: interior and exterior glazing sealant selection and application, failure causes, structural glazing, and accessories. NGA's published apprentice curriculum assigns the manual six competency areas. [S30-S31]

Six competency lanes:

1. identify common sealants and joint types;
2. explain building-envelope use and installation challenges;
3. identify substrates, contacting materials, and compatibility concerns;
4. describe good application practice;
5. remove and reapply sealant during remediation;
6. recognize protective-glazing applications.

One-best-answer sequence:

1. identify exposure, movement, substrate, and contacting materials;
2. verify product and accessory compatibility;
3. follow preparation, primer, geometry, and application requirements;
4. preserve drainage and the intended envelope function;
5. diagnose the failure before remediation;
6. remove failed material, prepare correctly, and reapply the approved system.

Source boundary: the public product description and official training competencies are captured. The full manual body, detailed formulations,

tables, and figures are not. [S30-S31]

AAMA GAG-1-97 - Glass and Glazing

What it owns: the legacy AAMA curtain-wall glass resource identified in the trade-study source list.

FGIA describes it as a guide to architectural glass types and applications and to structural, acoustical, and thermal performance characteristics. FGIA's virtual library classifies it under Metal Curtain Walls. [S32-S33]

Study these decisions:

- match the glass product to its architectural application;
- separate structural, acoustic, and thermal performance criteria;
- read the current specification, glass schedule, shop drawings, and tested system requirements;
- coordinate the selected lite with support, drainage, clearances, movement, and the curtain-wall framing system;
- request manufacturer or design-professional data when the criteria exceed contractor selection authority.

Source boundary: the publisher identity, scope, and library classification are verified. The purchased GAG-1-97 body and any detailed procedures are not captured. Study inferences are labeled as such. [S32-S33]

Four-resource sorting drill

Scenario	First resource lane
Window flashing must integrate with a drainage-wall WRB	ASTM E2112
Need the product and system map for laminated, IGU, mirror, heavy glass, or point-supported glazing	GANA Glazing Manual
Need to diagnose sealant incompatibility or remediation	GANA Sealant Manual
Need the legacy curtain-wall glass/performance guide	AAMA GAG-1-97
Need to size glass for project wind pressure	Approved criteria + ASTM E1300, not these four manuals alone
Need to decide whether a location requires safety glazing	California code + applicable impact standard

Official Source Registry

Last verified: 2026-07-26

ID	Authority	Source and scope	Edition/status	URL
S01	Exam authority	CSLB, *Glazing (C-17) License Examination Study Guide*: weights, format, sample style, named resources	For exams on/after 2023-04-01; live guide checked 2026-07-21	<https://www2.cslb.ca.gov/Resources/StudyGuides/C17StudyGuide.pdf>
S02	Exam authority	CSLB Examination FAQ: computer delivery and official-guide role	Current page checked 2026-07-21	<https://www.cslb.ca.gov/About_Us/Examination_FAQ.aspx>
S03	Regulatory	CSLB C-17 classification scope, Title 16	Current page checked 2026-07-21	<https://www.cslb.ca.gov/about_us/library/licensing_classifications/Licensing_Classifications_Detail.aspx?Class=C17>
S04	California code authority	California Building Standards Commission code index and effective dates	2022 and 2025 triennial editions	<https://www.dgs.ca.gov/bsc/codes>
S05	California code publisher linked by S04	2022 CBC Chapter 24, glass and glazing	2022 CBC with July 2024 supplement	<https://codes.iccsafe.org/content/CABC2022P4/chapter-24-glass-and-glazing>
S06	California code publisher linked by S04	2022 CBC Chapter 11B, accessibility, especially 11B-404	2022 CBC with July 2024 supplement	<https://codes.iccsafe.org/content/CABC2022P4/chapter-11b-accessibility-to-public-buildings-public-accommodations-commercialbuildings-and-public-housing>
S07	Current California code publisher linked by S04	2025 CBC Chapter 24, current-field comparison	Effective 2026-01-01	<https://codes.iccsafe.org/content/CABC2025P1/chapter-24-glass-and-glazing>
S08	Cal/OSHA regulation	Title 8 section 1514, construction PPE	Current page checked 2026-07-21	<https://www.dir.ca.gov/title8/1514.html>

ID	Authority	Source and scope	Edition/status	URL
S09	Cal/OSHA regulation	Title 8 section 1525, protection from walking through glass	Current page checked 2026-07-21	<https://www.dir.ca.gov/title8/1525.html>
S10	Cal/OSHA regulation	Title 8 section 1670, personal fall arrest/restraint/positioning	Current page checked 2026-07-21	<https://www.dir.ca.gov/title8/1670.html>
S11	Cal/OSHA regulation	Title 8 section 3212, openings, skylights, roofs, and glazed-surface access	Current page checked 2026-07-21	<https://www.dir.ca.gov/title8/3212.html>
S12	Consensus standard publisher	ASTM E1300, determining load resistance of glass under uniform lateral loads	E1300-24 active when checked	<https://store.astm.org/standards/e1300>
S13	Consensus standard publisher	ASTM C1048, heat-strengthened and fully tempered flat glass; fabrication before heat treatment	Active version catalog	<https://store.astm.org/standards/c1048>
S14	Consensus standard publisher	ASTM C1172, laminated architectural flat glass	C1172-24e1 active when checked	<https://store.astm.org/standards/c1172>
S15	Federal regulation	16 CFR Part 1201, safety standard for architectural glazing materials	Current eCFR	<https://www.ecfr.gov/current/title-16/chapter-II/subchapter-B/part-1201>
S16	Current California code publisher linked by S04	2025 CBC Chapter 24, direct browser capture of the complete chapter	Effective 2026-01-01; January 2026 Errata version captured 2026-07-26	<https://codes.iccsafe.org/content/CABC2025P2/chapter-24-glass-and-glazing>
S17	California code publisher linked by S04	2022 CBC Chapter 11B, glazing-relevant commercial accessibility sections	2022 exam lane with July 2024 Supplement; captured 2026-07-26	<https://codes.iccsafe.org/content/CABC2022P4/chapter-11b-accessibility-to-public-buildings-public-accommodations-commercialbuildings-and-public-housing>
S18	California code publisher linked by S04	2022 CBC Chapter 16, glazing-relevant structural, wind, snow and guard-load sections	2022 exam lane with July 2024 Supplement; captured 2026-07-26	<https://codes.iccsafe.org/content/CABC2022P4/chapter-16-structural-design>

ID	Authority	Source and scope	Edition/status	URL
S19	California code publisher linked by S04	2022 CBC Chapter 10, glazing-relevant door, guard, window-opening and emergency-escape sections	2022 exam lane with July 2024 Supplement; captured 2026-07-26	<https://codes.iccsafe.org/content/CABC2022P4/chapter-10-means-of-egress>
S20	California code publisher linked by S04	2022 CBC Chapter 14, glazing-relevant exterior-envelope, weather-protection and flashing sections	2022 exam lane with July 2024 Supplement; captured 2026-07-26	<https://codes.iccsafe.org/content/CABC2022P4/chapter-14-exterior-walls>
S21	California code publisher linked by S04	2022 CBC Chapter 7, fire-rated glazing and opening-protective sections	2022 exam lane with July 2024 Supplement; captured 2026-07-26	<https://codes.iccsafe.org/content/CABC2022P4/chapter-7-fire-and-smoke-protection-features>
S22	California code publisher linked by S04	2022 CRC Chapter 3, residential glazing, wind, egress, guard and window-fall sections	2022 exam lane with July 2024 Supplement; captured 2026-07-26	<https://codes.iccsafe.org/content/CARC2022P3/chapter-3-building-planning>
S23	California code publisher linked by S04	2022 CRC Chapter 6, exterior-window and door installation sections	2022 exam lane with July 2024 Supplement; captured 2026-07-26	<https://codes.iccsafe.org/content/CARC2022P3/chapter-6-wall-construction>
S24	California code publisher linked by S04	2022 CBC Chapter 26, light-transmitting plastic glazing and skylight sections	2022 exam lane with July 2024 Supplement; captured 2026-07-26	<https://codes.iccsafe.org/content/CABC2022P4/chapter-26-plastic>
S25	California code publisher linked by S04	2022 CBC Chapter 30, elevator-glazing cross-references	2022 exam lane with July 2024 Supplement; captured 2026-07-26	<https://codes.iccsafe.org/content/CABC2022P4/chapter-30-elevators-and-conveying-systems>
S26	California code publisher linked by S04	2022 CBC Chapter 11A, housing-accessibility door and window sections	2022 exam lane with July 2024 Supplement; captured 2026-07-26	<https://codes.iccsafe.org/content/CABC2022P4/chapter-11a-housing-accessibility>
S27	Cal/OSHA regulation index	Expanded C-17 safety collection covering selected glazing-applicable Construction and General Industry Safety Orders	Live DIR regulation pages captured 2026-07-26	<https://www.dir.ca.gov/title8/sub4.html>

ID	Authority	Source and scope	Edition/status	URL
S28	Consensus standard publisher	ASTM E2112, installation of exterior windows, doors and skylights: active-edition metadata, public catalog scope, significance and contents	E2112-23 active; catalog captured 2026-07-26	<https://store.astm.org/e2112-23.html>
S29	Industry manual publisher	NGA's GANA Glazing Manual: 2022 IYOG edition metadata, official PDF content index and C-17 topic map	2022 IYOG edition; official sources captured 2026-07-26	<https://www.glass.org/news/2023/nga-publishes-updated-gana-glazing-manual>
S30	Industry manual publisher	GANA Sealant Manual product record: selection, application, failure, structural-glazing and accessory scope	Current NGA catalog captured 2026-07-26; edition not stated	<https://members.glass.org/cvweb/cgi-bin/msascartdll.dll/ProductInfo?productcd=GANASEALANTMANUAL>
S31	Industry training authority	NGA Glazier Apprentice Curriculum: Sealants Manual learning objectives and assigned instructional hours	July 2020 curriculum captured 2026-07-26	<https://www.glass.org/sites/default/files/2020-10/NGA%20Glazier%20Apprentice%20Curriculum_072020.pdf>
S32	Industry publication publisher	AAMA GAG-1-97, *Glass and Glazing*: official FGIA product identity, availability and publisher-described scope	Legacy 1997 document; current product page captured 2026-07-26	<https://store.fgiaonline.org/AAMA-GAG-1-97/>
S33	Industry publication publisher	FGIA Virtual Library index: confirms GAG-1-97 title and Metal Curtain Walls classification	Current public index captured 2026-07-26	<https://fgiaonline.org/wp-content/uploads/2024/09/FGVL-Complete-TOC.pdf>

Claim-status notes

- **Confirmed:** CSLB publishes five weighted domains totaling 100%, closed-book multiple choice, calculator provided, no guessing penalty. [S01]
- **Confirmed:** CSLB's live C-17 guide names the 2022 California Building and Residential Codes in its resource list. [S01]
- **Confirmed:** the 2025 California Building Standards Code took effect January 1, 2026. [S04]
- **Confirmed:** 2025 CBC 2404.1 points uniform-load glass resistance to ASTM E1300 and design wind load to CBC 1609. [S07]
- **Confirmed:** The ICC-hosted 2025 CBC Part 2 page with January 2026 Errata was browser-captured through Section 2411.1.2, including Tables 2406.2(1) and 2406.2(2). [S16]
- **Confirmed:** The glazing-relevant adjacent-code collection contains 100 section entries across 10 official 2022 CBC/CRC chapter sources, including accessibility, structural/wind, egress, exterior-envelope, fire-rated, residential, plastic and elevator-glazing domains. [S17-S26]

- **Confirmed:** The Cal/OSHA C-17 safety object contains 26 live Title 8 sections covering program duties, glass hazards, PPE, scaffolds, fall protection, ladders, glazed-surface access and elevated work platforms. [S08-S11, S27]
- **Confirmed:** ASTM E2112-23 is the active catalog edition; CSLB names the practice but does not identify the exam's revision. [S01, S28]
- **Confirmed:** The official 2022 IYOG edition of NGA's GANA Glazing Manual is a 170-page, unencrypted PDF whose glazing topics are indexed locally by page. [S01, S29]
- **Confirmed:** NGA describes the GANA Sealant Manual as covering interior and exterior sealant selection/application, failures, structural glazing and accessories; its apprenticeship curriculum publishes six competencies. [S01, S30-S31]
- **Confirmed:** The CSLB-named AAMA Curtain Wall Series resource resolves to AAMA GAG-1-97, *Glass and Glazing*, which FGIA classifies under Metal Curtain Walls. [S01, S32-S33]
- **Unknown:** CSLB does not publish the operational item count, passing score, or exact mix of code-edition questions in S01. This project does not invent those values.
- **Queued for user verification:** compare the code/resources listed on the user's Notice to Appear against S01.

Local extracted code collection

Text extracted from user-supplied Chapter 24 screenshots and direct browser capture is stored in the single structured object sources/chapter-24-excerpts.json (chapter-24-excerpts.json). Screenshot-derived entries retain S07; browser-completed entries use S16. The collection is a local reference object rather than an independent authority.

- Coverage: 72 section entries spanning 2401.1 through 2411.1.2, including all substantive Chapter 24 sections shown on the official page, Equations 24-1 through 24-15, Table 2403.2.1, and Tables 2406.2(1) and 2406.2(2).

Adjacent code-domain collection

Glazing-relevant sections from the 2022 CBC and CRC exam lane are stored in sources/adjacent-code-excerpts.json (adjacent-code-excerpts.json). The collection contains 100 parent or leaf section entries from sources S17 through S26. Parent-section captures include the displayed child sections, exceptions, notes and tables.

- Commercial and housing accessibility: CBC Chapters 11B and 11A.
- Structural loads, wind, snow and guards: CBC Chapter 16.
- Doors, guards, window openings and emergency escape: CBC Chapter 10.
- Exterior-envelope weather protection and flashing: CBC Chapter 14.
- Fire-rated glazing and opening protectives: CBC Chapter 7.
- Residential glazing, egress and exterior window/door installation: CRC Chapters 3 and 6.
- Light-transmitting plastic and elevator-glazing cross-references: CBC Chapters 26 and 30.

Cal/OSHA safety collection

The public text and applicability metadata for 26 glazing-relevant Title 8 sections are stored in sources/cal-osha-c17-excerpts.json (cal-osha-c17-excerpts.json). Existing section-specific registry IDs S08 through S11 are preserved; the expanded selection uses S27.

- Coverage is deliberately tagged as foundation, core or supporting rather

than implying that every rule has equal exam weight.

- This is a live-regulation lane, separate from the 2022 CBC/CRC exam-edition lane.
- Project-specific hazards can trigger additional Title 8 requirements beyond this C-17 study collection.

Technical-resource objects

The public ASTM catalog record and the official NGA manual are organized as source-backed study maps:

- sources/astm-e2112-source-object.json (astm-e2112-source-object.json) captures E2112-23 metadata, summarized public scope/significance, the public contents hierarchy, and the revision uncertainty in the CSLB guide.
- sources/gana-glazing-manual-source-object.json (gana-glazing-manual-source-object.json) indexes the 2022 IYOG manual's 12 major domains and 31 detailed system-guideline page groups from the official 170-page PDF.
- sources/gana-sealant-manual-source-object.json (gana-sealant-manual-source-object.json) combines the current product description with NGA's six published apprenticeship competencies.
- sources/aama-gag-1-97-source-object.json (aama-gag-1-97-source-object.json) resolves the CSLB wording to the exact legacy AAMA designation, records the current FGIA catalog scope, and separates publisher facts from study inferences.