

**OFFICE STANDARDS**

**503.202 BUILDING COMPONENTS, BUILDING SHELL, EXTERIOR ENCLOSURE**

This document contains requirements for building shell elements for an office building and is in alignment with the UniFormat II, Level 2 classification – B20. The document is subdivided into the following parts per the UniFormat II, Level 3 classifications.

UNIFORMAT II classification						MoP Document Number
Level 1 Major Elements		Level 2 Group Elements		Level 3 Individual Elements		
B	Shell	B20	Exterior Enclosure	B2010	Exterior Walls	503.202
				B2020	Exterior Windows	
				B2030	Exterior Doors	

[ELEMENT B2010, EXTERIOR WALLS.](#) Includes general design requirements for exterior wall construction with facing materials, vapor retarders, insulation, etc. Specific items of note include:

1. Design requirements
2. Parapet walls
3. Veneer conditions
4. Sealants
5. Contract Document requirements

[ELEMENT B2020, EXTERIOR WINDOWS.](#) Includes general design requirements for windows, storefronts, curtain wall assemblies, etc. Specific items of note include:

1. Frame requirements
2. Design requirements
3. Glazing requirements
4. Testing requirements

[ELEMENT B2030, EXTERIOR DOORS.](#) Includes general design requirements exterior man doors, aluminum entrance systems, etc. Specific items of note include:

1. Hollow metal doors and frames
2. Aluminum entrance systems

**ELEMENT B2010, EXTERIOR WALLS**

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**PART 1 - GENERAL****1.01 OVERVIEW**

- A. These standards address non-loadbearing Cavity Wall Systems and loadbearing Barrier Wall Systems.
- B. These standards identify the types of exterior wall systems and include requirements for cladding, water management, back-up construction, framing, insulation, louvers, and soffits.
- C. These standards do not include requirements for non-typical or archaic wall systems such as existing multi-wythe composite masonry systems.

**PART 2 - DESIGN CRITERIA****2.01 GENERAL**

- A. All exterior materials must be approved for use by BJC Director of Design. Samples and mock-ups for initial selection may be required and Exterior mock-ups for final selection and approval will be required.**
- B. Aesthetic Requirements.
  - 1. When located on a hospital campus, the design of office buildings should respond to the existing context and hospital brand. Along with massing and form, selection of exterior materials and systems determine the character of the building. As such, the design of the exterior walls must follow the BJC approval process as directed by the BJC Director of Design.
- C. The selection of the materials that must work together to form an exterior wall system that prevents water infiltration and meets minimum thermal performance requirements in accordance with the current applicable code.
  - 1. Exterior wall u-values and air leakage shall meet or exceed the values noted in the current edition of ANSI/ASHRAE/IESNA 90.1, and in accordance with all governing codes and regulations.
  - 2. **Design team shall confirm the wall performance required by code including R value, U value, and dew point location by calculation method. Provide report to BJC Project Manager, BJC Corporate Architect, and BJC Corporate Engineer.**

- D. Provide fire department access box near building's main entry. Coordinate requirements and exact location with AHJ's.
- E. Minimize horizontal projections in exterior wall systems. Carefully detail projections so as to reduce staining of building exterior and to prevent water infiltration.

## 2.02 EXTERIOR WALL SYSTEMS

- A. Cavity Wall and Barrier Wall Systems are the two primary exterior wall assemblies that have been used on BJC HealthCare projects for this building type.
- B. Selection of a wall system is an important consideration for every building. Not only does this decision have an impact on construction cost and schedule, but also will affect the performance of the building over its life. In addition, adopted energy codes will drive the selection of wall systems and the types of materials/components within the system. All of these factors must be considered when selecting an exterior wall system. Design professionals shall be prepared to discuss these systems and determine the system best suited for the project.

## 2.03 CAVITY WALL SYSTEM

- A. General. The most common system, it includes an exterior cladding layer, drainage cavity, drainage plane, either an inboard or outboard insulating layer, and non-structural stud framing. The basic characteristic is its double-skin design that provides a secondary means to prevent water from entering the building.
- B. Exterior Cladding.
  - 1. Clay Masonry. Permitted and the predominant cladding choice in most instances.
    - a. Masonry veneer systems shall be braced as required with adjustable wire brick ties and attached into structural metal studs. Corrugated masonry anchors are not permitted. Where insulation occurs in the drainage cavity, coordinate anchor requirements, penetration details and air/vapor barrier continuity.
    - b. Weep and vent system to be corrugated plastic type installed in open head joints system and spaced no greater than 24" on center. Weeps shall be installed at flashing locations and vents shall be installed at top of air space chambers and top of masonry walls in order to promote stack effect drying.
    - c. Do not apply waterproofing sealers to clay masonry in a cavity wall system unless approved by BJC Corporate Architect. Sealers can lead to premature deterioration (spall due to freeze/thaw), affect the appearance, and will require regular applications to maintain a waterproof system.
    - d. Use solid brick where cores or frogs would otherwise be exposed.
    - e. Coordinate foundation design and brick shelf conditions with civil and structural engineer.

- f. Avoid conditions where masonry units extend below grade, unless overriding project circumstances exist. Masonry units extending below grade shall be waterproofed and provide free-draining soil or gravel and protection board as necessary.
  - g. Consider site conditions and environmental factors when selecting a masonry cleaning process. Protect work in place and provide MSDS sheets to BJC Project Manager for approval.
  - h. For typical cavity wall designs with masonry unit cladding, the deflection limit of the steel studs shall not exceed  $L/600$ .
2. EIFS. Conditionally permitted but only in limited locations. Considerations will be given to using EIFS where other claddings are prohibitive. Use of EIFS must be approved by BJC Corporate Architect and BJC Director of Design. When approved, EIFS shall have an integral drainage channel and plane. Sheathing and air/water barrier to be compatible with methods of attachment and manufacturer's requirements.
    - a. Provide flashing and weep/vent systems approved for use by manufacturer.
    - b. Provide joint systems and materials as approved for use by manufacturer.
    - c. EIFS window sills shall slope away from windows a minimum of 1" vertical in 2" horizontal.
    - d. Minimum warranty for EIFS shall be 12 years, minimum.
  3. Manufactured Stone/Cast Stone. As an alternate to limestone, manufactured stone is conditionally permitted for use in this building type but typically cost prohibitive and its use is limited. Approval by BJC Director of Design is required.
    - a. Specify conditions and materials for patching/repairing cast stone materials to match. Provide patch sample on exterior mockup for review and approval.
  4. Stone. This includes limestone, marble, granite, and similar stone units. Conditionally permitted for use in this building type but typically cost prohibitive and its use is very limited. Selection and approval by BJC Director of Design is required.
  5. Metal Panels, Bonded. Conditionally permitted but typically cost prohibitive for these building types in large quantities. Requires approval for use by BJC Corporate Architect and Director of Design.
    - a. Metal panel system shall be comprised of an outer and inner aluminum sheets, each .02" minimum thick, and thermally bonded to polyethylene core.
    - b. Provide flashing and weep/vent systems approved for use by manufacturer.
    - c. Provide joint systems and materials as approved for use by manufacturer.
    - d. Minimum warranty shall be 5 years.
  6. Metal Panels, Un-Bonded. Conditionally permitted but typically used as a primary cladding material. Requires approval for use by BJC Corporate Architect and Director of Design. Gauge, metal type, finish, fastening means,

and dissimilar metals are among the factors that would need to be considered prior to use.

Table. Exterior cladding material requirements for Cavity Wall Systems

Note: "Conditionally Permitted" requires pre-approval of use by BJC Director of Design and Corporate Architect		OFFICE BUILDING	notes/comments
component	Material		
Cavity Wall System Exterior Cladding	Clay masonry units	permitted	BJC Director of Design is responsible to select the brick and mortar for the building. The design professional shall assist the Director of Design as requested. Unless specific materials are known and identified, 3 brick colors/blends and 3 mortar color options may be considered. When matching existing masonry, construct mock up so that it may be viewed adjacent to the existing wall.
	Exterior Insulation and Finish System	Conditionally Permitted	EIFS is conditionally permitted for this building type only when other claddings are prohibitive (due to weight, cost, etc.) and when aesthetics are not critical. EIFS must include a drainage system behind the insulation. Approval of use by BJC Director of Design and Corporate Architect is required. Texture and color samples will be selected by BJC Director of Design.
	Manufactured stone, cast stone	permitted	Often used along the base of buildings and as accents (openings and tops of walls) as consistent with the context and desired aesthetic. Coordinate manufactured stone types, shapes, colors, and materials with Director of Design.
	stone	Conditionally permitted	Similar to Cast Stone above, coordinate with Director of Design.
	Metal panels, bonded	Conditionally permitted	Often used as an accent material in feature areas, bonded metal panels are conditionally permitted and its use must be approved by BJC Director of Design. Cost of bonded metal panels is a limiting factor for this building type.
	Metal panels, un-bonded	Conditionally permitted	Coordinate metal panel types with Director of Design

**B. Drainage Cavity.**

1. The air/vapor barrier system shall be continuous and without interruptions and shall meet the permeability requirements as required. Attachment considerations for positive and negative pressure conditions
2. A cavity drainage system shall be used within cavities of masonry veneer systems. Complete systems by a single manufacturer, such as those provided by Mortar Net, are required.
3. Provide a minimum of 1-1/2" clear between back side of masonry and sheathing/rigid insulation board (air space). Architect shall inspect the work at regular intervals to ensure the air space is kept clean and free of excess mortar within cavity space.
4. Base flashing shall be at least one full course above finished grade. Cavity beneath base flashing shall be grouted solid and anchored to foundation wall and the masonry attached to the foundation wall with masonry anchors.

**C. Drainage Plane.**

1. Through-wall flashing shall extend beyond the exterior face of masonry and turned down to form a drip edge. Termination of flashing at or behind the exterior face of the veneer material is prohibited. Base flashing shall extend 8" vertically, minimum.

2. PVC and TPO flashings are not permitted. Aluminum and sheet metal flashings are conditionally permitted but must be approved for use by BJC Corporate Architect as galvanic action and corrosion must be considered.
3. Fully-adhered (self-adhered) flexible membranes are permitted with the following conditions.
  - a. The top of the flashing must be secured to the exterior sheathing with a continuous and mechanically-fastened termination bar. The termination bar must be properly sealed along the top edge and the sheet air/vapor barrier must be properly lapped over the system.
  - b. Flexible rubber membranes must have an integral metal drip edge extending beyond the exterior face of the cladding system.
4. End dams shall be identified and included where drainage planes are interrupted, flashing is discontinuous, and as necessary.
5. Weeps and vents installed no more than 24" on center.

#### D. Exterior Sheathing.

1. Exterior glass-fiber mat faced sheathing panels are permitted for masonry veneer wall systems. Paper-surfaced gypsum sheathing will only be permitted when both paper and core are waterproof (exterior grade).
2. All sheathing seams and edges shall be properly sealed with compatible and approved tape or sealant.
3. Sheathing must be installed with corrosion-resistant screws.

#### E. Insulating Layer.

1. The drainage cavity between the masonry veneer and drainage plane may include a continuous closed cell insulation, depending on thermal performance requirements.
2. The cavity space between the metal studs can be insulated with faced fiberglass insulation. Unless otherwise required for thermal and vapor performance, kraft-faced insulation is preferred.

#### F. Non-Loadbearing Metal Framing.

1. Provide steel studs that comply with the flexural, lateral and axial loading requirements of the components of the exterior wall assembly. Steel studs shall be 0.043" thick, minimum (18 gauge).
2. Deflection limits of steel studs shall be in accordance with the requirements of the materials and components of the exterior wall system. Refer to specific requirements for clay masonry units.
3. Vapor barrier restriction. In cavity wall construction (for climate zone 4A), use of a vapor impermeable barrier (plastic sheet) behind the drywall is not permitted. Design professionals must prove its need based on calculated R value, U value, and dew point. Provide documentation to BJC Corporate Architect and BJC Corporate Engineer for consideration and approval.

4. Provide sill sealer/capillary break at metal runners and studs in contact with concrete surfaces.

#### 2.04 BARRIER WALL SYSTEM

- A. General. Barrier wall systems include both pre-cast and site-cast tilt-up concrete panel systems in which the outer-most face of the wall system is designed to prevent water infiltration. The advantage of a barrier wall system includes initial cost and schedule, however the trade-off can be in its thermal performance, potential for water infiltration, maintenance, and aesthetics. While some redundancies can be built in, it is generally considered a single skin approach which means that it is imperative for proper material selection and detailing to prevent water penetration at the outer face of the exterior cladding.
- B. Exterior Cladding. Cladding for a precast or site cast concrete wall is usually finished with an embedded thin brick or by specifying an architectural finish to the as-cast concrete panel.
  1. Concrete shall be 5,000 psi minimum compressive strength.
  2. The exposed exterior surfaces shall be treated with a suitable penetrating sealer. When sealers are used, air entrainment of concrete is not necessary.
  3. All insulation shall be closed cell types since it will be exposed to wetting conditions.
  4. Provide double row of sealant joints where possible. Interior most sealant joint serves as a drainage plane and shall provide drainage.
  5. Window sills and other sloped horizontal panel surfaces shall be sloped away from building a minimum of 4” vertical in 12” horizontal.
- C. Panel facings and finishes.
  1. Embedded thin brick facing. The selection and approval of the brick material shall be by BJC Director of Design.
    - a. The concrete coloration of the panels is an important consideration for thin brick applications since it becomes the “mortar joint”. Provide cast concrete samples to BJC Director of Design for selection and approval.
    - b. Coordinate details at openings to maintain watertight conditions.
  2. Architectural concrete finish. Comply with latest edition of the *Tilt-up Concrete Association’s Guideline Specifications*.
    - a. Avoid the use of fly-ash in concrete where concrete panels are not faced or otherwise concealed with opaque coatings and finish systems.
    - b. Where patching and repairing of the concrete surface is required, and in accordance with the requirements, repair defects with cementitious fill material, rubbed and finished in a manner to match the color, finish, texture and overall appearance of the as-cast surface. Provide samples of patching on exterior mock-up for approval.

- c. Coordinate coatings, sealers, and other finish systems with other manufacturers as required.
- d. Where panels are visible up to 25 feet away, the surface of the panels shall be Grade A, Architectural, as follows.
  - 1) All panel surfaces will be free of all voids, holes, pockets and other surface deformations greater than 1/8 inch (3 mm). In
  - 2) Surfaces of panels must not project reinforcing patterns, floor joints, or other projections or voids from the casting surface.
  - 3) Cracks are not permissible in excess of 1/32 inch (0.8 mm).
  - 4) All surface repairs must be performed in such a way as to prevent the projection of repair strokes through the intended finish.
  - 5) All holes shall be filled with patching material to present a smooth surface ready for painting unless the designed finish is to result in exposed aggregates whereby the patching material shall match the intended color and texture.
  - 6) Reveals must be maintained in their designed positions. Deviation from any horizontal or vertical line shall not exceed 1/8 inch over 10 feet (3 mm over 3.05 m).
- e. Where panels are visible over 25 feet away, the surface of the panels shall be Grade B, Standard, as follows.
  - 1) All panel surfaces will be free of all voids, holes, pockets and other surface deformations greater than 1/4 inch (6 mm).
  - 2) Surfaces of panels may be repaired sufficiently to prevent excessive projection of blemishes through intended finish.
  - 3) Cracks are permissible as naturally resulting from curing. Cracks are not permissible as caused by erection forces.
  - 4) Surface repairs shall improve the appearance of the panels within the descriptions above provided they do not result in additional blemishes that are visible within the distance set.
  - 5) All holes shall be filled with patching material to present a smooth surface ready for painting unless the designed finish is to result in exposed aggregates whereby the patching material shall match the intended color and texture.
  - 6) Reveals must be maintained in their designed positions. Deviations greater than 1/4 inch (6 mm) from any location will not be permissible.

## 2.05 SEALANTS

- A. Provide double row of sealant at exterior joints.
- B. Sealant joints shall be installed so as to not block weeping systems.



- C. Sealant color shall match adjacent surfaces and shall be approved by the BJC Director of Design and Design Project Manager. The following chart indicates general design intent for selecting sealant colors.

Adjoining exterior surfaces		Sealant color
Surface 1	Surface 2	
Masonry wall	Masonry wall	Match predominant mortar color
Masonry wall	Anodized aluminum frame	Match mortar color
Masonry wall	Painted metal frame	Match mortar color
Masonry wall	Metal panel	Match mortar color
Metal panel	Metal panel	Match metal panel color

**2.06 PARAPET WALLS**

- D. Parapet walls shall extend a minimum of 42 inches high above the adjacent finished roof surface, unless approved in writing by BJC Corporate Architect and BJC Risk Management. If maintained across the entire roof area, tie-offs and fall arrest systems may not be required for anyone accessing that roof area according to OSHA requirements.
- E. Roofing membrane shall extend up the inside face of the parapet and lap over the top of the parapet and return down the outer face a minimum of 2”.
- F. At parapet caps, provide a prefinished metal coping, the top of which slopes toward the exterior of the building. Exposure on the outside face of the coping shall be a minimum of 4”. A secondary flashing shall be provided under the metal coping/cap flashing.
- G. Provide parapet scuppers if overflow drains are not utilized on the roof. Where overflow drains discharge at or near ground level, provide a removable stainless steel wire screen at opening. Overflow discharge shall be located in an area that is visible but not located close to building entrances or where storm water discharge will wash across pedestrian areas.
1. Coordinate location of thru wall scuppers and leaders to avoid interference with exterior openings, signage and other wall mounted objects. Coordination with BJC Project Manager for owner-furnished items including but not limited to exterior signage is required.
- H. Soffits shall be designed to withstand both positive and negative wind loads in accordance with applicable building code. Soffit systems utilizing flexible wire suspension shall incorporate rigid framing members or other means to comply with negative pressure design requirements.

**PART 2 - SPECIAL CONTRACT DOCUMENT REQUIREMENTS**

**2.01 GENERAL**

- A. An exterior mock-up is required for all projects with new exterior walls. Mock-up will be reviewed for aesthetic purposes as well as for workmanship and craftsmanship. An elevation, plan, and section(s) shall be shown in the contract documents. Minimum mock up size shall be 4'-0" wide x 8'-0" high. Coordinate with Project requirements, including testing requirements, if necessary. Coordinate size, configuration of materials, and location of mock-up with BJC Corporate Architect and BJC Project Manager.
- B. Call out end dams and flashing on drawings.
- C. Provide thermal performance calculations, as stated above, in the contract documents.

**PART 3 - PRODUCTS****3.01 GENERAL**

- A. Not applicable.

End of B2010 – Exterior Walls

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**ELEMENT B2020, EXTERIOR WINDOWS**

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**PART 1 - GENERAL****1.01 OVERVIEW**

- A. Includes windows, curtainwall and storefront systems.

**PART 2 - DESIGN CRITERIA****2.01 GENERAL**

- A. Glass shall be insulated, low E type, and shall meet or exceed u-value, solar heat gain coefficient, and gross wall area requirements per ANSI/ASHRAE/IESNA 90.1 and in accordance with all governing codes and regulations.
- B. Aluminum frame finish shall match existing buildings when conditions exist, unless otherwise indicated. When no existing conditions occur, frames shall be anodic coating.
- C. Frames identified as painted finish shall be fluoropolymer coatings and shall comply with the requirements of AAMA 2604 and 2605. Coating warranty shall be manufacturer's standard to meet or exceed AAMA 2605 (10 years).
- D. Glazing to match existing buildings when conditions exist and unless otherwise indicated.
- E. Window systems shall include four-sided glass capture in aluminum frames using conventional mechanical attachment methods.
- F. If wall construction requires a sill extension at windows, provide aluminum sill extensions to match window frame. Extensions shall be sharp corner extruded aluminum, in lieu of brake metal type.
- G. Sealant joints shall be installed so as to not block weeping systems.
- H. Windows and curtainwall systems shall have sill pans with end dams that extend from the exterior face of the frame and turn up two (2) inches on the interior side.

**2.02 CURTAINWALL SYSTEM**

- A. Stick-system curtainwall fabrication is acceptable.
- B. Engage a qualified building enclosure consultant to assist with developing the design, detailing, and testing parameters for curtainwall systems.

- C. Frames for curtain wall systems shall thermally-broken.
- D. Glazing panels shall be insulated glass units. Coordinate color options with Director of Design. Coordinate thermal performance with Mechanical Engineer and BJC Corporate Engineer.
- E. Coordinate structural requirements including imposed loading on structural system with Structural Engineer and BJC Project Manager.

### PART 3 - SPECIAL CONTRACT DOCUMENT REQUIREMENTS

#### 3.01 GENERAL

- A. A mock-up shall be required for all projects with new exterior walls. Mock-up will be reviewed for aesthetic purposes and for craftsmanship.
- B. Preconstruction testing may be required including but not limited to water penetration, air infiltration, and structural performance.
- C. Curtainwall manufacturer shall prepare and seal all submittals including shop drawings and calculations.
- D. Include requirements in the contract documents for the following tests to be performed for all curtain wall and storefront assemblies. Perform tests on a minimum 10% (ten percent) of the total number of installed openings. For any one test that does not pass, the contractor shall be responsible to retest after correcting the deficiency and shall be responsible to provide testing for all other openings as directed by the Owner and Architect.
  - 1. Prior to glazed panel/panel installation, perform AAMA 502 “*Voluntary Specification for Field Testing of Newly Installed Fenestration Products*” tests for end dam and sub-sill fastener installation.
  - 2. After installation of glazed panel/panel, perform AAMA 501.2 “*Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems*” tests prior to installation of interior drywall.

### PART 4 - PRODUCTS

#### 4.01 GENERAL

- A. Not applicable.

End of B2020 – Exterior Windows

**ELEMENT B2030 – EXTERIOR DOORS**

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**PART 1 - GENERAL****1.01 OVERVIEW**

- A. Includes pedestrian and overhead door types.

**PART 2 - DESIGN CRITERIA****2.01 GENERAL**

- A. All door openings in veneer walls shall have proper thru wall flashing and weep system.
- B. Design team shall coordinate door function and door hardware requirements no later than during the design development phase.
- C. All exterior doors with patient access shall require a minimum clear opening dimension of 42”.

**2.02 ALUMINUM ENTRANCE SYSTEMS**

- A. Aluminum frame finish shall match existing building(s) when conditions exist, unless otherwise indicated. When no existing conditions occur, frames shall be anodic coating.
- B. Glazing to match building(s) when conditions exist and unless otherwise indicated.

**2.03 EXTERIOR HOLLOW METAL DOORS AND FRAMES**

- A. Fabricate doors and frames from cold-rolled steel sheet, hot-rolled steel sheet is not permitted.
- B. Doors shall be constructed of 0.053 inch (16 gauge) steel sheet minimum unless otherwise directed.
- C. Doors and frames shall factory primed and field painted.
- D. For exterior doors and frames located in areas exposed to public view, requiring a more durable finish or enhanced protection, steel shall be hot-dipped with a zinc-alloy-iron coating (galvannealed). For all other conditions, steel sheet shall be hot dipped with a zinc coating (galvanized).

- E. All frames will be manufactured with mitered corners and a full profile weld. Knock-down type frames are not permitted.
- F. Do not grout or spot grout internal cavity of door frames unless otherwise directed. Grouting will only be permitted when frames are required to meet high level security requirements and then all interior surfaces of the frame must be coated with cold-applied asphaltic mastic.
- G. Factory prepared doors and frames to receive hardware, security, and fire alarm devices.

### PART 3 - SPECIAL CONTRACT DOCUMENT REQUIREMENTS

#### 3.01 GENERAL

- A. Not applicable.

### PART 4 - PRODUCTS

#### 4.01 GENERAL

- A. Not applicable.

End of B2030 – Exterior Doors

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**RESPONSIBILITY MATRIX**

The following matrix identifies those individuals, roles or departments responsible for maintaining the accuracy of the information and those responsible for providing input. Refer to Preface for detailed explanation.

	BJC HealthCare												Hospital/Entity					
	PD&C						Clinical Asset Management (CAM)	Risk Management	Real Estate	Ergonomics	Infection Prevention (IP)	Info Systems, Data, Telecom (IS)	Other:	Standards Review Committee	Facilities Engineering	Housekeeping	Security	Other:
	Corporate Architect	Corporate Engineer	Director of Planning	Director of Design	Director of Construction	Other:												
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**DOCUMENT REVISION HISTORY**

The following table indicates the date the document originated and any subsequent revisions.

503.202 – Building Shell, Exterior Enclosure		
Issue	Description of Issue	Prepared by
2018 v1	Original Issue	G. Zipfel