# GENERAL

## Summary

1. Section contains the JR Butler Inc. architectural factory assembled and glazed aluminum storefront system and all components and installation accessories supplied with the system.
	1. J450x Storefront
		1. 2” x 4-1/2”
		2. Center Plane Infill
		3. Screw spline frame construction
		4. Polyamide Thermal Barrier

## references

### Related Documents: General contract provisions including Division 01 Specification Sections, supplementary conditions, and drawings apply to this Section.

### Definitions: Refer to AAMA AG-13, *AAMA Glossary*, for fenestration industry standard terminology and definitions.

### Industry Standards: Refer to AAMA SFM-1, *Aluminum Storefront and Entrance Manual*, for a complete list of references and industry standards.

#### Industry Standards

##### AAMA – American Architectural Manufactures Association

###### AAMA AG-13: *AAMA Glossary*

###### AAMA CW-10: *Care and Handling of Architectural Aluminum from Shop to Site*

###### AAMA SFM-1: *Aluminum Storefront and Entrance Manual*

###### AAMA QAG-2-12: *Voluntary Quality Assurance Processing Guide for Polyamide Thermal Barriers*

###### AAMA 503: *Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing*

###### *AAMA 611: Voluntary Specification for Anodized Architectural Aluminum*

###### AAMA 501.1: *Standard Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure*

###### AAMA 501.4: *Recommended Static Testing Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drift*

###### AAMA 501.5: *Test Method for Thermal Cycling of Exterior Walls*

###### AAMA 501.7: *Recommended Static Test Method for Evaluating Windows, Window Wall, Curtain Wall, and Storefront Systems Subjected to Vertical Inter-Story Movements*

###### AAMA 503: *Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls, and Sloped Glazing Systems*

###### AAMA 609 & 610: *Cleaning and Maintenance Guide for Architecturally Finished Aluminum*

###### AAMA 1503: *Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections*

###### AAMA 2603: *Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels*

###### AAMA 2604: *Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels*

###### AAMA 2605: *Voluntary Specification, Performance Requirements and Test Procedures for Superior Performance Organic Coatings on Aluminum Extrusions and Panels*

##### ASTM - American Society for Testing and Materials

###### ASTM A36: *Standard Specification for Carbon Structural Steel*

###### ASTM A123: *Standard Specification of Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products*

###### ASTM B209: *Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate*

###### ASTM B221: *Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes*

###### ASTM C1184: *Standard Specification for Structural Silicone Sealants*

###### ASTM E90: *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

###### ASTM E283: *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*

###### ASTM E330: *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

###### ASTM E331: *Standard Test Method for Water Penetration of Exterior Window, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*

###### ASTM E413: *Classification for Rating Sound Insulation*

###### ASMT E547: *Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference*

##### NFRC – National Fenestration Rating Council

###### NFRC 100: *Procedure for Determining Product U-Factors*

###### NFRC 200: *Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence*

### Related Sections:

#### 01 40 00 Quality Requirements

#### 01 60 00 Product Requirements

#### 07 62 00 Membrane / Metal Flashing

#### 07 92 00 Joint Sealants

#### 08 44 13 Aluminum Framed Curtainwall

#### 08 51 13 Aluminum Windows

#### 08 71 00 Door Hardware

#### 08 80 00 Glazing

## PERFORMANCE REQUIREMENTS

### Design Wind Loads based on Allowable Stress Design (ASD) *<specify>*

#### Design pressures

##### [ ] positive psf, [ ] negative psf, (typical zones)

##### [ ] positive psf, [ ] negative psf, (corner zones)

#### Design pressures based on [ ] Building Code, [ ] Edition

##### Wind speed: [ ] mph

##### Importance Factor: [1], [1.15], [ ]

##### Exposure Category: [I], [II], [III]

#### Design loads base on Wind Study dated [ ].

*NOTE: Determining building design loads is the responsibility of the Engineer of Record for the building, not JR Butler Inc.*

### Air Performance

#### Air Infiltration: Shall not exceed 0.06 cfm/ft2 at 6.24 psf static air pressure differential tested per ASTM E283.

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### Water Performance

#### Static Water: No uncontrolled water entry at 15 psf static pressure differential with water applied at a minimum of 5 gal/ft2hr tested per ASTM E331.

#### Static Cyclic Water: No uncontrolled water entry at 15 psf static pressure differential with water applied at a minimum of 5 gal/ft2hr when tested per ASTM E547.

#### Dynamic Water: No uncontrolled water entry at 15 psf static pressure differential with water applied at a minimum of 5 gal/ft2hr when tested per AAMA 501.1.

### Structural Performance

#### Design Loads: System to withstand up to +/- 25 psf tested per ASTM E330.

##### Maximum allowable deflection of L/175 of the clear span for spans up to 13’-6” or L/240 of clear spans plus 1/4” for spans greater than 13’-6” or an amount that restricts edge deflection of individual lites of glass to 3/4” whichever is smaller.

##### No air or water leakage above primary performance requirements.

##### No glass breakage, damage or disengagement following positive and negative design loads.

#### 1.5x Design Loads: System to withstand up to +/- 37.5 psf when tested per ASTM E330.

##### There shall be no permanent deformation of main frame members exceeding 0.2% of its clear span, no glass breakage, or permanent damage to anchors or fasteners.

#### Vertical Interstory Movement tested per AAMA 501.7

##### System to allow +/- 1/2” vertical interstory movement.

##### There shall be no failures including glass breakage, anchorage, or permanent deformation after completing three positive and negative cycles in the vertical direction parallel to the main elevation.

#### Seismic Movement tested per AAMA 501.4

##### Elastic Interstory Horizontal Movement: Design displacement at 1% of the story height.

###### 3 cycles: 1.20” left, back to zero, 1.20” right, back to zero (one complete cycle)

###### Glazing gaskets may not disengage and weather seals may not fail. There shall be no failures or permanent deformation of anchors, frame members, or glass.

##### Inelastic movement: 1.5x design displacement

###### 3 cycles: 1.80” left, back to zero, 1.80” right, back to zero (one complete cycle)

###### There shall be no glass breakage, permanent damage to frame members or anchors.

### Acoustic Performance

#### System shall have a sound transmission class (STC) and an outdoor-indoor transmission class (OITC) rating tested per ASTM E90 and in accordance with ASTM E1332.

##### 1” IGU: STC [31], OITC [26] (1/4”, 1/2” air, 1/4”)

##### 1-1/16” laminated IGU: STC [37], OITC [31] (1/4”, 7/16” air, 3/16”- 0.030 PVB – 3/16” )

#### Test results using glass only values are not acceptable.

### Thermal Cycling

#### There shall be no air or water infiltration exceeding primary performance requirements, no breakage, disengagement, or damage when tested per AAMA 501.5 at the following conditions:

##### Interior ambient air temperature: 70 OF (+/- 5 OF) for hot and cold cycles

##### Temperature range: -20 OF (exterior ambient) to 180 OF (surface temperature)

### Thermal Transmittance

#### U-factor for storefront system shall not exceed: *<specify>*

##### [ ] BTU/hr-ft2- OF per NFRC 100

#### Coordinate storefront assembly U-factor performance with 08 80 00 Glazing.

#### U-factor performance reference data per NFRC 100 thermal simulations.

|  |  |
| --- | --- |
|  | **J450x SYSTEM U-FACTOR**(BTU/hr-ft2-OF) |
| **CENTER OF GLASS U-FACTOR** (BTU/hr-ft2-OF) | **Standard, Medium, and Heavy verticals***(aluminum)* | **Standard, Medium, and Heavy verticals***(warm edge)*  | **Expansion****verticals***(aluminum)*  | **Expansion****verticals***(warm edge)*  |
| 0.32 | **0.41** | **0.39** | **0.41** | **0.39** |
| 0.31 | **0.40** | **0.38** | **0.41** | **0.38** |
| 0.30 | **0.40** | **0.37** | **0.40** | **0.37** |
| 0.29 | **0.39** | **0.36** | **0.39** | **0.37** |
| 0.28 | **0.38** | **0.35** | **0.38** | **0.36** |
| 0.27 | **0.37** | **0.35** | **0.37** | **0.35** |
| 0.26 | **0.36** | **0.34** | **0.37** | **0.34** |
| 0.25 | **0.36** | **0.33** | **0.36** | **0.33** |
| 0.24 | **0.35** | **0.32** | **0.35** | **0.32** |
| 0.23 | **0.33** | **0.31** | **0.34** | **0.31** |
| 0.22 | **0.33** | **0.30** | **0.33** | **0.31** |
| 0.21 | **0.32** | **0.29** | **0.32** | **0.29** |
| 0.20 | **0.31** | **0.28** | **0.31** | **0.29** |
| 0.19 | **0.30** | **0.27** | **0.31** | **0.28** |
| 0.18 | **0.29** | **0.27** | **0.30** | **0.27** |

*Note: The above table is for reference only. Contact a JR Butler representative for project specific requirements. Values determined in accordance with NFRC 100 for a glazed wall configuration. Glass makeup: 1” IGU with 1/4” lites and 1/2” gap*

#### Solar Heat Gain Coefficient (SHGC) for the storefront shall not exceed [ ] as determined by NFRC 200. Coordinate with 08 80 00 Glazing.

### Condensation Resistance Factor (CRF) as determined by AAMA 1503 shall not exceed:

#### [68] CRFFRAME, [70] CRFGLASS  *<specify>Note: CRF Values above were tested using a COG = 0.24 and warm edge spacer The formation of condensation on interior surfaces is affected by many different variables outside of JR Butler’s control. Variables include but are not limited to: surrounding conditions, air flow / air circulation issues, extreme weather, HVAC settings, and humidity levels. JR Butler cannot guarantee performance of system as stated above unless conditions are identical to those present in the testing procedure specified above.*

## submittals

### Action Submittals

#### Product Data:

##### Provide manufacturer’s product literature for the specified systems.

##### Provide data for components in the systems including finishes, infill, glazing components, and hardware.

##### Recycled Content (optional): Provide documentation that the aluminum has a minimum of 45% post-industrial scrap, and 20% post-consumer recycled content.

#### Shop Drawings:

##### Must be prepared by the manufacturer or a qualified service under the employ of the manufacturer.

##### Include plans, elevations, sections, details, hardware, and attachments to other work necessary to demonstrate installation requirements for aluminum-framed storefronts and entrances.

##### Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.

##### Include details showing connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

#### Samples:

##### System components: Submit corner sample, anchors, trim, and other components as requested by the architect.

##### Finish: Submit [two] aluminum sheet stock samples [2” x 3”] for each finish type. *<specify>*

#### Warranty: Submit manufacturer’s sample limited warranty.

#### Optional [LEED Reports] or [Sustainable Design Submittals]

##### EA Credit 1 - Optimize Energy Performance: Submit manufacturer documentation showing energy performance of system beyond the prerequisite standard.

##### MR3.1 and MR3.2 - Resource Reuse: Submit manufacturer documentation showing use of a minimum of 5% up to 10% (based on weight) salvaged, refurbished or reused materials.

##### MR4.1 and MR4.2 - Recycled Content: Submit manufacturer documentation for weights of pre-consumer and post-consumer recycled content for the product specified.

##### MR5.1 and MR5.2 - Regional Materials: Submit manufacturer documentation showing use of a minimum of 10% up to 20% (based on cost) of products or building materials harvested, extracted, recovered, or manufactured within 500 miles of the project site.

##### IEQ Credit 7.1 - Thermal Comfort: Submit manufacturer documentation showing the use of natural ventilation products.

##### IEQ Credit 8.1 – Daylight and Views: Submit manufacture documentation showing the introduction of daylight and views into regularly occupied areas as a function of the percentage of these spaces exposed to such daylight and views.

### Information Submittals

#### Structural Calculations: Prepared and signed by a Professional Engineer registered in the state where the project is located. Calculations shall be in complete compliance with specified project performance and code requirements.

#### Test Reports: Submit certified independent laboratory test reports or performance summary verifying compliance to tests outlined in Section 1.3.

#### Pre-Construction Sealant Compatibility and Adhesion Testing: Submit test results.

### Closeout Submittals

#### Maintenance Instructions: Submit information describing the devices and procedures required for cleaning, adjusting, and maintaining the storefront.

##### Include information for maintaining operable doors, operating hardware, and replacing weather stripping, and reglazing.

## quality assurance

#### Manufacturer Qualifications: Company specializing in designing and manufacturing factory glazed systems with at least ten years of experience.

#### Installer Qualifications: Company approved by the manufacturer to install specified storefront products in accordance with manufacturer’s written installation instructions and shop drawings.

#### Single Source: To ensure quality of appearance and performance, obtain storefront system through one source from a single manufacturer.

#### Mockups: Provide mockup(s) as required to demonstrate specified Visual and Performance requirements.

#### Pre-installation Conference: Conduct a pre-installation conference at least one week prior to scheduled installation of storefront system.

#### In-house auditing and testing: Conduct detailed quality audits and ASTM E331 static water testing up to 5% of the project panels prior to shipping. Provide documentation of in-house audits and testing upon request.

## PROject conditions

### Field Measurements: Verify locations and dimensions of storefront openings and structural members prior to fabrication and indicate on the shop drawings.

### Weather Limitations: Install storefront systems only when weather conditions permit. Work to be performed in accordance with manufacturer’s installation instructions, shop drawings, and warranty requirements.

### Coordinate installation with all applicable trades.

### Delivery, Storage, and Handling

#### Materials to be packaged, loaded, shipped, unloaded, and stored and protected in accordance with AAMA CW-10.

## warranty

### Aluminum Storefront Warranty

#### Framing and Workmanship: Manufacturer agrees to repair or replace storefront components determined to be defective by the manufacturer for a period of [10] years from the date of shipment. *<specify>*

#### Finish: Warranty covers factory-applied anodized and organic finished on exposed aluminum surfaces without water accumulation against, cracking, peeling, chalking, and change of color per applicable AAMA specifications.

##### Anodized Finish *<specify>*

###### AAMA 611 Class I: 5 years

###### AAMA 611 Class II: 2 years

##### Painted Finish *<specify>*

###### AAMA 2605 70% PVDF: 10 [20] *<20 years optional>*

###### AAMA 2604 50% PVDF: 5 [10] *<10 years optional>*

###### AAMA 2603 Baked Enamel (interior): 5 years

#### Glass: Provide written warranty for a period of [10] years against defects in workmanship or materials resulting in the failure of insulating glass units from the date of shipment. *<specify>**Note: Refer to the JR Butler Standard Limited Warranty for detailed limitations, qualifications, and exclusions. Verify with Owner’s counsel that the warranties and periods under this section meet project requirements and are not less than available under prevailing local laws.*

### Installer Warranty

#### Provide Installer warranty to provide labor required to repair or replace work which exhibits workmanship defects for a period of [1] year from Substantial Completion. *<specify>*

##### “Defects” includes but not limited to, deterioration or failure to perform as required by project specifications.

# products

## manufacturer

### Basis of Design System

#### JR Butler Inc. J450x Storefront

##### 2” x 4-1/2” center plane

##### Factory assembled and glazed

#### Substitutions

##### Manufacturer’s product meeting the specified requirements may be considered as a substitute. Requests must include the following and submitted within 10 business days prior to bid date or if post bid, a written assurance of avoiding installation and project delays.

###### Test reports and product information showing compliance to specified requirements.

###### Manufacturer’s warranty

###### Product details and samples

## storefront framing system

### System dimensions

#### Exterior face

##### standard mullion 2”

##### expansion mullion: 2-1/4”

#### Depth: 4-1/2”

#### Corner mullions, inside / outside

##### 90O: 4-1/2”

##### 135O: 3/4” x 2-5/8”

##### Rotational: 0O- 20O

#### Receptors

##### Head: 2-1/4” x 5”

##### Sill: 2” x 4-3/4”

### Glazing

#### Thickness: 1” to 1-1/8”

#### Position: center plane, 1-9/16” from exterior

#### Method: factory glazed from the interior with [single bead] [two-piece bead and cover] at head *<specify>*

### Thermal barrier

#### Vertical mullions:

##### 1-3/8” polyamide strut

##### Plug-in style PVC and pour-debridge polyurethane thermal barriers are not allowed.

#### Horizontal mullions

##### 5/8” hollow polyamide strut flush with frame.

##### Recessed thermal barriers are not allowed.

### Frame construction: screw spline

## materials

### Aluminum extrusions: Alloy 6063-T6 in accordance with ASTM B221 and with a minimum of 65% recycled content.

### Steel reinforcement structural shapes, plates, and bars per ASTM A36

### Primary extruded primary framing members to be 0.080” thick.

### Extruded or formed aluminum trim components to be a minimum of 0.060” thick.

### Flashing

#### Concealed: [ ]” thick [aluminum] [galvanized steel] [stainless steel] *<specify>*

#### Exposed: [ ]” thick aluminum sheet, finish to match framing members *<specify>*

### Thermal Barrier:

#### All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier defined as continuously extruded, multi-directional 25% minimum glass fiber reinforced 6/6 polyamide nylon strip.

##### Other thermal barrier assemblies such as rolled-in PVC, single or bi-directional glass fiber-reinforced polyamides, or pour-and-debridged polyurethane systems will not be accepted.

#### Fabricate aluminum frames with an integral, concealed, low-conductance thermal barrier; located between exterior materials and aluminum members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.

#### Aluminum framing members separated with a locking mechanical connection to the thermal strip(s) by properly knurling the aluminum cavity and crimping the strip(s) into place to create a composite thermal barrier assembly meeting the quality assurance guidelines described by AAMA QAG 2-12.

#### No thermal short circuits shall occur between the exterior and interior.

#### Structural performance values of the thermal barrier assembly to meet specific product/project design criteria or at a minimum certified testing criteria and procedures as described by the AAMA TIR-A8.

### Glazing and Gaskets

#### Glazing gaskets to be extruded EPDM rubber, replaceable, and compatible will all materials in contact.

#### Setting blocks and edge spacers to be extruded EPDM rubber.

#### Frame joinery sealants shall be suitable for the application specified and as tested and approved by the storefront manufacturer.

### Structural Reinforcement

#### Steel or aluminum internal reinforcement as required to meet design requirements of 1.3.D.

#### Concealed steel reinforcing and steel anchors shall be factory finished after fabrication with a rust-inhibitive finish.

## Entrance doors

### See Entrance Doors and Hardware specified in Division 084113 Aluminum-Framed Entrances and Storefronts Section.

## Aluminum Windows

### See Division 085113 Aluminum Windows.

## Fabrication

### The storefront system shall have the following characteristics.

#### Finish, fabricate, assemble, and glaze under the responsibility of one manufacturer. Field assembled members or field glazing is not acceptable unless required for shipping or erection constraints.

#### Vertical mullions shall be interlocking.

#### Extrusions shall be sharp, straight, and free of defects and deformations.

#### Screw spline frame joinery shall be tight, flush, and accurately fitted and secured.

#### All frame fasteners shall be concealed from view.

#### Internal reinforcement shall be factory installed.

#### System to allow glazing and re-glazing from the interior.

#### Drain all water entering the system and condensation occurring in the glazing channel to the exterior through weeps in the sill receptor.

#### Allow for movement between the storefront system and building without damage to components or seals.

#### Fabricate to allow for thermal movement of materials when subjected to a temperature differential from -20 OF (exterior ambient) to 180 OF (exterior surface) without damage.

## FINISHES

### Finish all exposed surfaces of aluminum storefront components in accordance with the AAMA Voluntary Finish Guide Specification.

|  |  |  |  |
| --- | --- | --- | --- |
| **SPECIFICATION** | **DESCRIPTION** | **DESIGNATION** | **COLOR** |
| AAMA 2605 | 70% PVDF [2][3][4] coat *<select>* | Exterior Paint | [ ] *<specify color name/number>* |
| AAMA 2604 | 50% PVDF [2][3][4] coat *<select>* | Interior Paint | [ ] *<specify color name/number>* |
| AAMA 2603 | Baked enamel | Interior Paint | [ ] *<specify color name/number>* |
| AAMA 611 | Class I - Clear anodize coating,acid etch (0.7 mils thick min) | AA-M10C21A41 | Clear |
| AAMA 611 | Class I –Color anodize coating,acid etch (0.7 mils thick min) | AA-M10C21A44 | [Black],[Light Bronze],[Medium Bronze],[Dark Bronze] [Extra Dark Bronze]],[Champagne], [other] *<select >* |
| AAMA 611 | Class II - Clear anodize coating,acid etch (0.4 mils thick min) | AA-M10C21A31 | Clear |
| AAMA 611 | Class II - Color anodize coating,acid etch (0.4 mils thick min) | AA-M10C21A34 | [Light Bronze],[Medium Bronze],[Dark Bronze] [Extra Dark Bronze]],[Champagne], [other] *<select >* |

### As defined by AAMA 612, combination anodic oxide and transparent organic coatings are not equivalent substitutions for the AAMA 611 finishes show above due to surface hardness disparities.

### Applicator Qualifications: Certified by AAMA and listed on the AAMA Verified Components List

# execution

## EXAMINATION OF CONDITIONS

### With the Installer present, examine building conditions, storefront openings, structural support, anchorage, and substrates for compliance with installation tolerance requirements and other conditions affecting performance of work.

### Notify the Contractor, Owner, and Architect in writing of any issues resulting in ability to properly install the storefront system according to the project schedule.

### Proceed with the installation only when all issues have been resolved.

## installation

### Install storefront system in accordance with approved Shop Drawings and manufacturer’s installation instructions.

### Do not install damaged components.

### Anchor to structure allowing sufficient adjustments to accommodate building construction tolerances.

### Install storefront system plumb, square, and level for proper weathering and drainage.

### Anchors shall have isolators to prevent metal corrosion and electrolytic deterioration.

### Aluminum that is not organically coated shall be insulated from direct contact with concrete, masonry, steel and other dissimilar metals by non-conductive shims, rust-inhibiting primer, bituminous paint, or other insulating material.

### Install perimeter sealant in accordance with Section 07 92 00.

## FIELD QUALITY CONTROL

### Conduct field testing in accordance with project requirements. Architect to determine units to be tested.

### Testing shall be performed by a qualified independent testing agency in accordance with AAMA 503.

## CLEANING and protection

### Cleaning

#### Clean aluminum per AAMA 609 & 610 following installation and for periodic maintenance.

#### Clean glass per glass manufacturer’s written recommendations for final cleaning and periodic maintenance.

### Protection

#### Protect installed product’s finish and glass surfaces from damage during construction.

#### Protect anodized finishes from prolonged exposure to alkaline, such as lime in masonry mortar, or acidic acid and other corrosive materials.

DISCLAIMER STATEMENT

*This guide specification is intended to be used by a qualified construction specifier and must be modified with the procedures of each design firm, and the requirements of a specific construction project. JR Butler reserves the right to change configuration without prior notice when deemed necessary for product improvement. JR Butler takes no responsibility for product selection or application, including but limited to compliance with laws, safety codes, building codes, merchantability, or fitness for a particular purpose. JR Butler disclaims all liability for the use of this Guide Specification in preparation of project documents.*

END OF SECTION 08 41 13

(supersedes all previous versions)