

Design and Construction Standards

Division 07 – Thermal and Moisture Protection

General

In general, follow the guidelines below when designing, specifying and installing roofing, waterproofing, exterior siding, insulation, fire stopping or sealant systems. Unless specifically indicated otherwise, these guidelines are not intended to restrict or replace professional judgment.

1. All systems and materials listed in this Division shall be in accordance with the manufacturer's recommendations as well as the NRCA Manual of Roofing and Waterproofing, Fifth Edition.
2. All systems and materials listed in this Division shall be in accordance with the manufacturer's recommendations as well as the NRCA Manual of Roofing and Waterproofing, Fifth Edition.
3. "Damp proofing" is not allowed. Waterproofing shall be considered the basic requirement.
4. For chemical compatibility purposes, specifications shall require that any "systems" (e.g. roofing) shall be by a single manufacturer. Furthermore only the manufacturers recommended accessories or adhesives shall be allowed.
5. For specialty roofing systems, or LEED compliant systems, provide adequate design criteria, data, cost and life cycle information to the EMU Physical Plant prior to the commencement of design to properly evaluate and determine appropriateness of use of the specialty roofing system.
6. For all Thermal or Moisture Protection Systems, materials shall be appropriately in a dry, safe environment. Wet or damaged materials shall not be used for roofs, waterproofing, insulation, sealants, etc.
7. For all pitched roofs, maintain proper ventilation, including accessories (e.g. baffles, vents, etc.) to prevent ice damming or moisture damage.
8. No power or powder driven tools to be used with roofing systems unless approved for use by the University Physical Plant.

Section 07 12 00 Waterproofing

1. Foundation Waterproofing shall be provided at all below grade vertical and horizontal surfaces.
2. Exposed bituminous type waterproofing shall not be allowed on surfaces of exterior walls and walls below grade.
3. Waterproofing at below grade surfaces shall also have a manufacturer's recommended protection board / mesh applied.
4. Waterproofing shall be at the exterior surface of the subject walls, floors, or ceilings. The design shall be to prevent moisture penetration of the perimeter shell.
5. Design and construction of waterproofing at and around elevator pits, mechanical pits, tunnels, or other similar below grade rooms, shall include a membrane waterproofing,

drain tile system, and waterstops at joints. Refer to Division 14 Conveying Equipment for additional information regarding elevator or equipment pits.

6. Refer to Division 04 Masonry for information regarding through-wall membrane waterproofing, weep holes, and other masonry related accessories.

Section 07 19 00 Water Repellants

1. Exposed surfaces of exterior brick, concrete block, and precast concrete shall have a clear coat water repellent. Where possible (specifically with concrete block), this shall be an integral water repellent agent. For cases when this agent cannot be integral, the surface shall be coated with penetrating, colorless, non-staining, mildew resistant, water repellent applied by an applicator experienced with the material applied. The product shall be a vapor permeable agent to allow moisture to escape from the substrate. The product specified shall be produced specifically for this application, and shall meet the substrate manufacturer's recommendations.

Section 07 21 00 Thermal Insulation (not including roofing insulation)

1. All insulation shall be non-asbestos containing.
2. Insulation shall be designed to meet the requirements of the Michigan Energy Code, and LEED requirements, and for energy conservation.
3. Professional shall provide a list of major building components and design R value level for the EMU Physical Plant to review and approve. At a minimum, provide the design R value for slab-on-grade, exterior walls below grade, exterior walls above grade, floor/ceiling construction (if needed), and roof/ceiling construction.
4. Where required, all vapor retarders shall be set with face to the warm side of the building.
5. Ensure that all concealed cavity areas are properly insulated, specifically next to structural components inaccessible after construction (e.g. joist cavity next to bond joists, outside face of structural steel at exterior walls, etc.).
6. Rigid insulation boards, specifically those used at wall construction shall not be utilized as structural wall sheathing. Direct application to stud construction is not allowed, and rigid insulation shall only be placed over appropriate wood or gypsum sheathing products.
7. All exterior block walls shall be core filled in non-grouted cores. Loose fill or injected foam are acceptable core insulation.
8. Masonry anchors, reglets, wall ties, or other construction accessories shall not anchor directly to insulation products, and shall anchor to the structural components.

Section 07 24 00 Exterior Insulation Finish Systems (EIFS)

1. EIFS systems shall only be used with the prior permission of the EMU Physical Plant. Use of EIFS as a primary exterior building material is discouraged where exposed to potential vandalism or public access, or large expanses of surface area creating a detrimental aesthetic. Use of EIFS may be allowed in elevated areas, areas generally

- difficult to access by the public, visual accent areas, or areas where lightweight siding applications are necessary.
2. Installation of EIFS shall only be performed by installers certified by the manufacturer and having at least 10 years experience with EIFS applications.
 3. Where EIFS is installed, it shall have the following characteristics:
 - a. Utilize the manufacturer's standard construction and installation details.
 - b. EIFS shall never terminate at or below grade. Terminations shall finish at least 2" above the finished grade or adjacent flat surface.
 - c. If the lower termination is at a roof surface, provide a minimum 4" termination block at the base, fully flashed with sheet metal (or similar).
 - d. All joints and corners shall be reinforced with mesh.
 - e. Minimum thickness shall be 3/4". Reveals shall not decrease the 3/4" thickness – where reveals are planned, provide thicker insulation to allow for the recess at reveals.
 - f. Overlay insulation panels on appropriate substrate, specifically a Dens-Glas Gold or similar product. See Division 09 Finishes for Gypsum related product standards.
 - g. Provide minimum 24" x 24" mock-up of actual color and finish texture on actual mesh and insulation for review and approval.

Section 07 31 00 Shingles and Roofing Tiles

1. Acceptable Pitched Roof finished surfaces shall be:
 - a. Asphalt Shingles
 - b. Standing Seam Metal Roofing
 - c. Slate (of type and style to match slate on University campus)

Section 07 31 13 Asphalt Shingles

1. Asphalt Roof Shingles shall meet the following characteristics:
 - a. Specify only wind resistant type 280# or greater.
 - b. Fire resistant rating shall be UL Class A.
 - c. Install shingles and roofing tiles per requirements of manufacturer's maximum recommended quality standards for the deck to be roofed. The shingle installation shall conform to the National Roofing Contractors (NRCA) Steep Roofing Manual recommendations.
 - d. Sheet metal shingle flashing installations for asphalt roof shingle projects shall conform to the Sheet Metal and Air Conditioning Contractors National Association, Inc (SMACNA) Architectural Sheet Metal Manual recommendations.
 - e. Use of pneumatic powered nails or staples is prohibited.
 - f. Use of staples is prohibited.
 - g. Warranty of shingles shall be a minimum of 20 years and applicator's warranty shall be for Five (5) years.

- h. Shingle underlayment shall be an Ice/Water Guard type self-adhering, self-healing, underlayment. Fifteen pound (15#) and thirty pound (30#) felts are prohibited.
 - i. Preferred vendors for Ice/Water Guard:
 1. W.R. Grace “Ice and Watershield”
 2. University Approved Other meeting specifications
2. Asphalt shingles are preferred to fiberglass shingles.
3. Asphalt shingles shall be an “architectural” type shingle.
4. Preferred vendors of asphalt shingles shall be:
 - a. GAF / Timberline
 - b. Owens Corning
 - c. University Approved Other meeting specifications

Section 07 31 26 Slate Roof Shingles

1. Slate Roofing shall be utilized at existing slate roofs to match existing style, color, cut, pattern, and installation.
2. New slate roofs shall be use only with prior authorization of the EMU Physical Plant.
3. Slate shall be natural slate; artificial slate is prohibited. Underlayment shall be an Ice/Water Guard-type self-adhering underlayment. The shingle installation shall conform to the National Roofing Contractors (NRCA) Steep Roofing Manual recommendations. Sheet metal shingle flashing installation for slate shingles shall conform to the Sheet Metal and Air Conditioning Contractors National Association, Inc (SMACCNA) Architectural Sheet Metal Manual recommendations.

Section 07 41 13 Metal Roof Panels

1. Standing Seam Metal roofing shall meet the following characteristics:
 - a. Standing seam ribs shall be mechanically field lapped per the manufacturer’s standard installation. Use of “snap lock” or friction style seaming is not acceptable.
 - b. Hot dipped galvanized sheet steel, with aluminum-zinc alloy coating.
 - c. Seam spacing shall be minimum 12” and appropriately spaced per the building size for proper appearance.
 - d. Provide eave “clips” or accessories to break-up ice buildup over all entrances and walking paths (min. 5’-0” past either side of walking path width).

Section 07 46 00 Siding

1. At existing buildings, siding repairs shall be of a type and style to match existing.
2. At new buildings, type and style of siding shall be selected in cooperation between the Professional and the University. Goals for siding type and selection shall be as follows:
 - a. Low Maintenance
 - b. Integral color / Factory Finished (no need to painting)

- c. Aesthetic reflective of campus community. Natural materials or aesthetic imitation of natural materials.
3. Siding backing shall comply with manufacturers recommendations, and at a minimum may be required to include:
 - a. Vapor Retarder Wrap (e.g. Tyvek or similar)
 - b. Building Felts
 - c. Substrate appropriate for anchoring siding, including sheathing, furring, battens, etc.

Section 07 50 00 Membrane Roofing (including roofing insulation)

1. Roofing Design: New “flat” roofing applications shall be designed with the following characteristics:
 - a. Provide ¼” pitch in roof slope where possible. In no case shall a roof be pitched less than 1/8” per foot.
 - i. Sloping structure is preferred as primary roofing pitch.
 - ii. Tapered insulation is preferred as secondary roofing pitch.
 - b. Preferred Roofing Systems: University preferred roofing systems shall be as follows:
 - i. New or Replacement Roofs: Single ply, elastomeric EPDM rubber roofing membrane, minimum 60 mil, fully adhered, mechanically fastened or Reflexcon-TPO by Firestone. Roofs shall be structurally designed to accommodate ballast loading, however new or replacement roofing systems shall not install ballast.
 - ii. Preferred Manufacturer:
 1. Firestone
 2. Carlisle
 3. University Approved Other meeting specifications
 - iii. Repairs to “flat” roofing shall be specified to match the existing manufacturers roofing materials.
 - iv. Test cuts shall be performed by the EMU Physical Plant, or under the supervision of the Physical Plant. All contractor performed test cuts shall be scheduled
 - v. Built-up Roofing systems shall not be used, unless for repairs only.
 - vi. Alternative or Specialized Roofing Systems will be considered only on an project by project basis, for appropriate requirements such as heavy duty use, chemical presence, or LEED requirements. When necessitated by project requirements the Professional or Contractor shall prepare recommendations and information for the EMU Physical Plant to evaluate prior to determining roofing type.
 - c. Roofing Insulation: Insulation utilized under the single ply membrane roof systems shall meet the following characteristics:
 - i. Chemically compliant with the membrane and adhesives.

- ii. Minimum thickness shall provide a minimum R value of 15, however shall also be required to meet the Michigan Energy Code and any LEED requirements. Minimum thickness shall be 2” regardless of type used in order to provide appropriate tapering and positive drainage. Tapering shall not decrease the minimum thickness.
 - iii. Polyisocyanurate and polystyrene rigid insulation boards are acceptable.
 - iv. When tapered insulation is used, factory taper insulation when possible to avoid field fabrication and maintain pitch tolerance.
- d. All flashings, accessories, fasteners, adhesives, etc. shall be provided as necessary to provide a complete, watertight roofing system.
- e. Provide appropriate parapet heights that allow for membrane roof system to run up and over parapet (beneath copings / caps).
- f. Maintain all membrane roofing seams minimum 5 feet from drains.
- g. Utilize round / pipe supports for screens, equipment support frames, curbs, etc. in order to utilize roofing “boots” for watertight conditions.
- h. Two sided curbs are prohibited. Either support on frame above roof (at min. 24” above roof) or provide four sided curb, fully flashed.
- i. Piping supports on roofing shall be a compatible composite material, min. 1” wider than the pipe x 4” long with piping securely fastened to the support. Support may not be secured to the roof and shall be allowed to “free float”.
- j. All equipment on roofing shall be accessible by roof walking pads compatible with the roofing system. Provide min. 18” x 18” pads in a path of travel that allows for access to panels, electrical disconnects, filters, etc. as necessary to service equipment.
- k. Wherever possible, roof hatches and equipment shall be a minimum of 10’-0” or further from roof edges to prevent the need for safety rails.
- l. When adjacent roof areas sheet drain to lower roof areas, provide gutter collection system of the upper roof, downspouts, and splash blocks. Splash blocks shall be compatible plastic or composite material glued to roof membrane.
- m. Roof drains shall be located strategically with building structure, roof obstructions, and secondary overflows to maximize drainage capacity and minimize interference by obstructions. When obstructions are unavoidable, utilize cants, saddles, crickets, or manufacturer recommended methods to provide positive drainage away from obstructions. Refer to Division 22 Plumbing for Roof Drain information.
- n. Secondary Roof Drainage shall be via through wall roof scuppers or similar design. Through wall penetrations shall be seamless or soldered joint metal box over watertight membrane, fully flashed. Provide collection boxes, gutters, and splash blocks where appropriate.

2. New roof systems shall provide a minimum twenty (20) year manufacturer's warranty. The manufacturer's warranty certificate shall be preceded by a "roof walk" and inspection by the manufacturer's representative. In addition, the installer shall provide a five (5) year maintenance warranty
3. The University reserves the right to witness the installation of roofing system, including preparation, removal of existing (if required), installation, and punch list. Contractor shall coordinate schedule of installation with Owner.
4. The University reserves the right to perform test cuts of new roofing to verify that the installation has met the minimum requirements. The roofer shall be responsible for the repair of these test cut locations, at no expense to the Owner.
5. Repairs to "flat" roofing shall be specified to match the existing manufacturers roofing materials.
 - a. Test cuts shall be performed by the EMU Physical Plant, or under the supervision of the Physical Plant. All contractor performed test cuts shall be scheduled with the Physical Plant prior to work being performed.
6. For Re-Roofing or Roofing Repair projects, coordination of preparation and installation shall be required:
 - a. Verify that appropriate weather precautions have been made.
 - b. That the work schedule has been coordinated to minimize noise, especially in concrete structures more likely to transmit sound.
 - c. That appropriate dust protection has been utilized, especially in concrete structures more likely to transmit vibrations.
 - d. That any ceiling and lighting systems, specifically tiles, damaged by roofing work, or temporary "leaks" are corrected at no cost to the University, and shall be the responsibility of the Roofing Installer.

Section 07 60 00 Flashing and Sheet Metal

1. Use of sealants or caulk is not an acceptable "waterproofing" agent. Roofing designs shall promote proper drainage, and where necessary shall include appropriate flashing and counter flashing to prevent water infiltration.
2. Flashing Guarantee requirements apply to this work. Note that curb heights must comply with manufacturer's requirements for warranty of roofing systems. Refer to paragraph 07 50 10.2.
3. Plug anchorage by use of wood or plastic is prohibited.
4. Metal Flashing shall have the following characteristics:
 - a. Appropriate metal for the application
 - i. Asphalt Shingles: Aluminum, galvanized, or stainless steel.
 - ii. Slate Shingles: Copper, soft temper stainless steel, terne coated or stainless steel.
 - iii. Standing Seam Metal: To match metal roofing.
 - iv. Single Ply Membrane: Aluminum, galvanized, or stainless steel.
 - b. Bonded to roofing where necessary for watertight condition.

5. Pitch Pan or Pitch Pockets: Use of pitch pans or pockets only with prior approval of the EMU Physical Plant. Items penetrating roofing must be flashed with sheet metal secured with clamps or with box curbs welded, or otherwise secured, to the penetrating items. See flashing materials above for acceptable metals.
6. Fabrication and installation of flashing and sheet metals shall conform to the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Architectural Sheet Metal Manual recommendations. Copper, when used, to conform to SMACNA and Revere Copper Products Copper & Common Sense recommendations.

Section 07 70 00 Roof and Wall Specialties and Accessories

1. Gutters and Downspouts shall have the following characteristics:
 - a. Metal type to match flashings as identified in Section 07 60 00 Flashing and Sheet Metal.
 - b. Sized by the professional to meet the storm water flow requirements per code. Provide a minimum 10% surcharge in sizing to allow for larger rain events. Submit drainage calculations as part of the Construction Documents.
 - c. Anchorage to the building shall be by mechanical fasteners, with straps or structural supports. Use of "gutter spikes" is prohibited.
2. Fascias, Copings, and Gravel Stops shall have the following characteristics:
 - a. Metal type to match flashings as identified in Section 07 60 00 Flashing and Sheet Metal.
 - b. Provide drip legs at bottom edge of all vertical surfaces to control water.
3. Roofing Walkways: Refer to Section 07 50 00 Membrane Roofing.

Section 07 80 00 Fire and Smoke Protection

1. Professional shall provide details for proper fire stopping of typical penetrations or applications.
2. Include the Manual of Practice of the Firestop Contractors International Association (F.C.I.A.) in the "References" article of the specifications.
3. At renovations or modifications to existing buildings, all fire stopping deficiencies shall be identified by the Professional with recommendations for remediation. The Professional shall work with the EMU Physical Plant to identify code requirements and define the work scope.
4. Applied Fireproofing shall have the following design and construction characteristics:
 - a. The Professional shall identify each item requiring fire proofing, the code required rating, and the proposed method of fire proofing. Provide a cut sheet and the UL or FM number, rating, and construction method to the EMU Physical Plant for review as part of the Construction Documents. Address fire rated elements during Design Development prior to commencing final Construction Documents.
 - b. Provide manufacturers data for any specialty fire stopping or fire blocking materials, including UL or FM classification, for review as part of the Construction Documents.

- c. Fire proofing for building structure / fire assemblies is preferred as follows:
 - i. Spray on Applied Fire Proofing shall be utilized for building structural elements only, and avoided when possible:
 - ii. All hangers and supports must be attached to the structural member prior to the application of the spray on.
 - iii. Cementitious spray on is preferred to the fibrous materials.
 - iv. Applications that allow for direct adherence, rather than the use of forms or wire mesh are preferred.
 - v. Hardboard applications shall be allowed, specifically at columns and vertical structural members. Use of fire rated gypsum, or encasement in UL Approved fire rated assemblies is preferred.
5. Inspection of the Fire Proofing and Fire Stopping may be required, on a per project basis, for an independent testing agency to verify proper installation of these systems. The University reserves the right to conduct additional field reviews and require corrective action.
6. Based on the Construction Type (code determined) the Professional shall identify a Fire Separation Plan indicating all fire rated assemblies and draft stopping locations.

Section 07 90 00 Joint Protection (including Sealants)

1. In no case shall sealants or caulking be considered an appropriate waterproofing agent. Sealants and caulk are to be utilized in support of other waterproofing systems. Construction tolerances for joint widths shall be specified per the Professional, however excessively wide gaps shall not be filled with sealant as a finish solution.
2. Guarantee: Provide written guarantee that the General Contractor and sealant installer jointly guarantee to replace, at no cost to the University, any or all joints which fail to establish and maintain airtight and watertight continuous sealed joints without staining or deteriorating joint substrates within 5 years after acceptance.
3. Sealants shall be applied by specialists in the application of sealants; minimum 5 years experience required, subject to review by the Professional and the University.
4. The Contractor shall inspect work of other trades prior to application of sealing material. If any joint or space cannot be put into proper condition to receive the material by specified methods, immediately notify the Contractor, Professional, and University in writing, or assume responsibility for and rectify unsatisfactory results from improper application.
5. Apply sealants as late as possible in the construction, preceding painting, and following cleaning operations. Do not apply sealants when air temperature is below 40 degrees F.
6. The University prefers that the words "caulk" or "caulking" not be used. The word "sealant" is appropriate and implies a product designed for a specific application.
7. Sealant types shall have the following characteristics:
 - a. Interior: Use acrylic type suitable for application of paint.
 - b. Exterior: Use two-part polyurethane. Prior to construction, require manufacturer's compatibility and adhesion test results for exterior elastomeric joint sealants on building materials which are subject to significant movement.

- c. Specialized Locations: Style, material, and application as required for the application shall be specified by the Professional.

End of Division 07 – Thermal and Moisture Protection