2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

# 080500-H: BASIC DOORS AND WINDOW MATERIALS AND METHODS

## RELATED SECTIONS

010000H: Architectural General Design Guidelines (especially “Building Entrance Design”)
All Division 8 sections
5.5.1: UMHHC – Custodial Closets
5.13: UMHHC Healthcare Procedure Room Infection Control Types and Requirements
5.14: UMHHC Patient Care and Support Spaces Room Type Requirements
5.15: UMHHC Patient and Staff Protection: Falls, Bariatrics, Low Vision, Ergonomics
5.16: UMHHC Requirements for Critical Pressure Sensitive Rooms
Architectural Preferred Manufacturers List

## GENERAL

In general, follow the guidelines below when designing and specifying doors, hardware, glazing and frames for Michigan Medicine facilities. Unless specifically indicated otherwise, these guidelines are not intended to restrict or replace professional judgment and compliance will all applicable codes.

In-wall non-combustible wood blocking must be installed at all door stop, door bumper and door holder locations. Mount door stops and door holders on a stud if possible.

In renovation projects, care should be taken to match the adjacent doors, hardware and frames and/or the building standard, if it is appropriate for the door function.

All material properties, including finish, appearance, finish, species, grain, etc. shall be fully described in the Construction Documents. “Match Existing” is not acceptable.

Doors and frames must be factory prepped and reinforced for finish hardware, including armor plating, door closers, etc.

The bottom 12” of all doors must be flat (flush).

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

## EXTERIOR DOORS

Entrance doors for patients and the public should typically be insulated glass and aluminum assemblies. They should have automatic operators.

Exterior emergency exit doors, such as at the bottom of stairs to the exterior, must be weatherproof. If hollow metal doors and frames are to be used, they must be galvanized. Flashing over the doorway, landscape and pavement drainage away from the door, and ideally a covered door opening should be provided.

See below for examples of water infiltration at an exterior door, and a 12-year-old door and frame nearly rusted away where the door has no covering, improper drainage and non-galvanized steel.








## ACOUSTICS

Door, frame, gasketting, door bottoms and hardware assembly shall be designed to an STC rating to match the adjacent wall as close as possible. Refer to state of Michigan code for requirements and national guidelines for best practice.

Sound gaskets and perimeter seals are required on doors where speech privacy is essential.

Automatic door bottoms should be surface mounted for durability and ability to maintain.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

## CROSS CORRIDOR PAIRS OF SWINGING DUAL-EGRESS DOORS

Cross corridor pairs doors that swing in opposite directions (dual egress) must always be designed to have the right-hand door swing away; that is, the right hand door should always be the door which swings in the direction of egress from the right side of the corridor. This is critical at automated opening doors, and also required at all dual egress doors. The only possible exception might be made where the doors are always intended held in the open position, for example Healthcare Smoke Barrier cross-corridor doors, and the right-hand egress would interfere with the optimal floor plan.

Note cross corridor smoke barrier doors typically do not require latching hardware or more than “solid construction”, unless there is another reason for the latching or fire rating.

Minimum code-required glazing is required in all cross-corridor swinging doors.

Where doors are to be typically held in the open position in high cart traffic areas, flush door hardware, hinges, and wall pockets for the door to be as flush against the wall as possible should be considered.

## SWINGING DOOR WIDTH

New swinging doors used primarily by in and outpatients and the public, for example entrances, waiting rooms, patient and public toilet rooms, exam rooms, should be a minimum of 3’-2” to accommodate the Michigan Medicine standard oversized wheelchairs used at all clinical sites. Where space permits, such as restrooms, 3’-4” should be providedconsidered. For renovations where existing frames are to remain, and offsite outpatient facilities, offset hinges on a 3’-0” wide door frame may be considered. Note that oversized wheelchairs are standard at all MM sites.

New swinging doors subject to bed movement (primarily inpatient, ambulatory surgery, and emergency department) should typically have a 48” minimum leaf. Frequently a second, smaller leaf is also provided. If the doors are held open, both leaves should be included. Use automatic flush bolts; manual flush bolts should not be used. The corridor outside the room should be 8’-0” wide.

Inpatient egress doors, for example into exit stairs, treatment rooms, sleeping rooms, are typically required to be 41 ½” clear width, such as 44” wide door.

New swinging doors subject to cart movement, including soiled utility, clean utility, equipment storage, janitors closets, etc. should be 42” to 48” wide. Janitors closet doors should swing out. Typically, doors to Janitors Closets are required to have closers. , and in some cases be fire rated. Where door swings out, the closer should permit 180 degree opening to limit the encroachment upon the corridor to the maximum permitted, typically 7” in the fully open position and no more than 50% of the required corridor width in the course of the swing. Janitors closets in corridors less than 8’-0” wide will need to be carefully designed to meet code.

## SWINGING DOORS WITH CLOSERS, WITH CART, BED, STRETCHER OR WHEELCHAIR TRAFFIC

If the swinging door, subject to bed or wheelchair movement, is fire rated or otherwise requires a closer, one of the following should be provided:

- Automatic operators
- Hold opens tied into the fire alarm system
- Holder activated hold open (HAS)

If the swinging door, subject to cart movement, is fire rated or otherwise requires a closer (such as Janitors closets), one of the following should be installed:

- Automatic operators
- Hold opens tied into the fire alarm system
- Holder activated hold open (HAS)

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

- Delayed closers

## SLIDING DOORS

Pocket doors are not permitted. All doors must be surface mounted or frame mounted to allow for maintenance.

Non-latching: Areas where sliding doors are desired should be designed as "suites" to eliminate the need to latch a sliding door. Note a sliding door can be locked without latching.

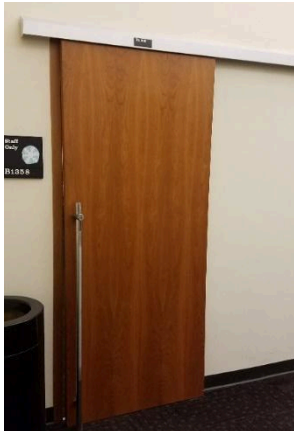
Self latching: Sliding doors which are required to positively self-latch in a corridor situation frequently present ongoing maintenance issues. Every effort should be made to limit the use of sliding doors in a room type or an inpatient Healthcare corridor which would require a positive latch.

Sliding doors with breakaway swinging doors features may be desired at Operating Rooms, Patient rooms such as intensive care units, procedure rooms, isolation rooms and other locations. The amount of glass contained can vary due to privacy. Electrified privacy glass in the door is preferred over cubicle curtains. If auto operators are used in an Operating Room or similar procedure room, there should be a shut off so there are not accidental door openings during a procedure.

Without "breakaway" feature
Are permitted for rooms with fewer than 10 occupants, or as permitted by the most stringent code. (ORs and similar spaces should be presumed to have more than 10 occupants)

- Exam rooms: They are frequently desired at outpatient exam rooms, where acoustics are a concern. Typically, they would include 1" diameter "C" shaped pulls on both sides, no privacy lock, and acoustical seals and door bottom. Clear width of 40" minimum unless wider required for stretcher.
- Staff workspaces such as check in/check out., where moderate security and privacy are desired. Hardware that locks into the floor can be provided, and acoustical seals are typically not required. Clear width of 33" min unless they will be used by MM patients in wheelchairs.

Office style sliding door



## STAFF ENTRANCES INTO OPERATING ROOMS AND SIMILAR PROCEDURE ROOMS

In order to maintain the air pressure and avoid disrupting the laminar flow of air over the sterile field, doors should be opened to as small an angle as possible and the use of the main, wide patient door should not be necessary. It should be possible to enter the OR without the use of hands or elbows from the scrub sink area during the procedure. Automated doors will likely disrupt the air flow and stand open too long. A double swinging doorA push-pull action is desirable if the door is not required to latch and if positive air pressure relationships can be maintained. If latching is required, consider an oversized "hip" type hospital latch.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

Designing the OR area as a “suite” may eliminate the need for door latching.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

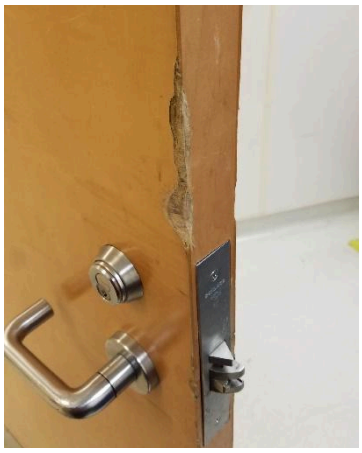
## DOOR MATERIALS

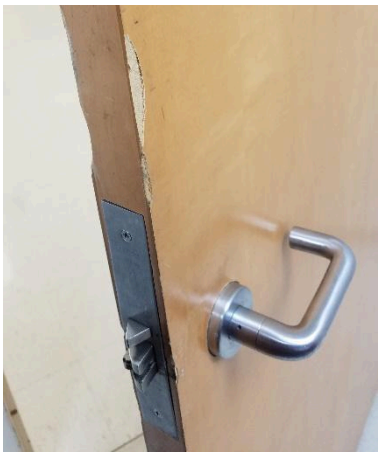
Design: All doors should be flush, rather than paneled, for ease of cleaning. Door should be factory prepped for all hardware, including solid blocking for closers, door operators and the like. Fire rated labels must be positioned so they are visible after hardware, such as continuous hinges or door protection is installed.

Natural solid core wood doors: For low-traffic rooms not subject to cart traffic, such as staff offices, solid core wood doors with a natural finish are the standard, and shall be AWI “custom grade”. For renovations, if another type of door is standard in the building it may be considered. All surfaces should be factory sealed. If door bottoms are field cut, the bottom shall be re-sealed. Transparent finishes should be specified. Hinge side stiles should be a minimum of 2” in depth.

Do not use natural solid core wood doors on supply rooms, service elevator lobbies, storage rooms, or cross corridor doors.

Natural solid core fire rated doors should particularly be avoided due to damage that destroys their fire rating, as seen below:





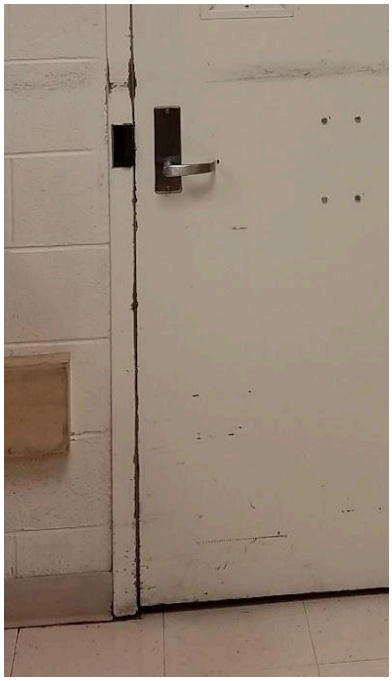
Plastic laminated doors should not be specified due to delamination problems (below)

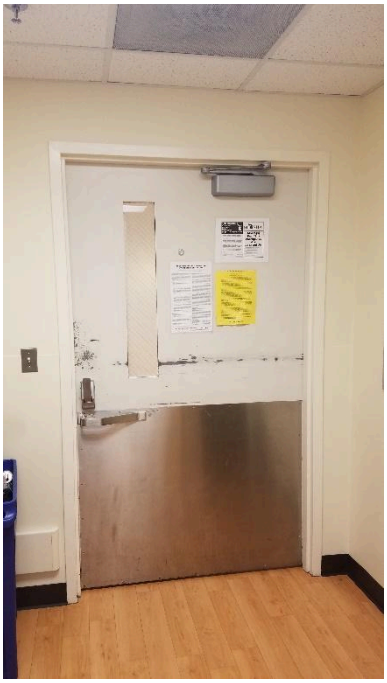


2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

Painted hollow metal doors should be avoided at high traffic areas and areas with a great deal of cart traffic. If they must be used, stainless steel armor plate and door hardware protection should be included, fire rated as required. Shop paint all doors with manufacturer's standard baked-on rust inhibitive primer.

See below for cart damage to hollow metal doors and frames.





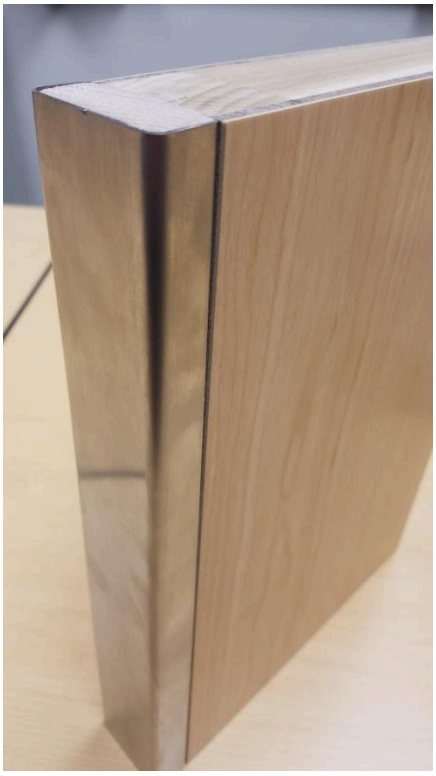




If hollow metal painted frames are to be specified at exterior locations, bathrooms with showers, dishwashing rooms and other very wet locations, galvanized steel should be used.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

Impact resistant doors with stainless steel edges: Pre-manufactured solid core wood doors with high impact covering and stainless steel edges are preferred for patient rooms, restrooms and public areas. Please refer to the Preferred Manufacturers list and the wood door guideline for information on building-standard finishes. High impact edges are not preferred. The bottom edge of the impact resistant door shall be factory sealed and not field cut. The bottom and top should be factory sealed. If field cutting is necessary, the bottom must be re-sealed. See below.





High abuse FRP doors: In kitchen, food service and very high abuse “back of the house” areas, the use of solid core heavy duty FRP doors with aluminum or stainless steel edges is standard. These are frequently textured FRP. Textured FRP to be minimum of 0.09” thick min., and smooth a min. of 0.07” thick.

.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/



Clean room FRP doors: In some procedure rooms, pharmacies, and other clean rooms, smooth solid core FRP doors may be required. In rooms with very stringent cleaning requirements, any door glazing kit frame should be flush with the surface of the door, without joints or cracks that need to be cleaned. White is preferred. Material to be corrosion resistant resin system. Provide seamless construction on all four sides with internal steel and/or fiberglass reinforcement at door and all hardware locations.

Stainless Steel doors: Flush stainless steel doors can be a durable alternative in operating rooms, high cart traffic rooms, and clean rooms. The use of lasers must be reviewed with clinical staff to avoid reflection.

Wood grained steel doors: may be a good choice for security doors, high abuse corridor doors and other locations where the look of wood is desired but the room use indicates the use of a more durable door.

## FIRE RATED DOORS

Provide fire rated assemblies that are labeled and listed for the fire rating indicated, by Underwriters' Laboratories or Warnock-Hersey.

Existing hollow metal frames can frequently be field labeled by an approved agency. This can save significant dust and disruption, and may be cost effective for multiple frame projects.

Fire rated doors shall be pre-fitted and pre-machined. Provide solid wood blocking at hardware locations; particularly closers and exit devices, to avoid the use of through bolts on light and medium duty doors. Through bolts can be specified on doors with heavy traffic or security issues.

Fire rated doors shall be labeled such that the label is visible after the hardware is installed, for example at continuous hinges.

Fire rated doors should be factory glazed.

Fire rated wood doors shall not be specified at high volume, high cart traffic locations. Carts easily damage wood fire rated doors, and they often cannot be repaired and retain the fire rating.

Recessed exit devices at fire rated doors are desirable but must be part of the overall assembly.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

## SHIELDED DOORS

All shielding shall be determined and specified by the MM Physicist.

Automatic operators should be provided. They should permit the door to remain open as long as desired by door holders. Door holders can be magnetic holders, tied into the fire alarm system if the door is required to close in the event of a fire alarm. Push buttons to release the door holders are preferred. Overhead friction holders are not acceptable at shielded doors. In rare cases, heavy duty wall holders, secured to a wall stud and through bolted at the door may be provided.

Lead shielded doors should have pivot hinges, additional hinges. Limit the use of continuous hinges to locations where they are the only alternative. The doors should match the building standard door as much as possible.

Sheet lead should be factory installed in doors and well secured. Doors should be constructed with a single continuous sheet of lead, and with offset and lapped shielding for mortised hardware. Shielding must continue at hardware and through-bolt locations as determined and specified by MM Physicist.

Bolt heads and nuts should be covered with equivalent lead shielding thicknesses and poured or tack welded in place, with perimeter edges of lead sheet secured with anchor clips.

Fire-rated lead-lined doors should be manufactured in accordance with the procedures of a certified testing laboratory, and bear the appropriate label.

Steel shielding may require to contain radiation scatter from mobile imaging equipment, such as (but not limited to) O-arms. Consider stainless steel armor plate covering the entire leaf, metal backing beneath the surface material, or a metal door solution. Consult with the Design Manager, Department, and the Radiation Physicist to confirm.

Linear accelerator doors are required to latch if they are corridor doors. For this reason, Radiation Oncology departments should be designed as suites. They should be designed with space and adequate support for additional shielding as possible. Doors are auto operated and integrated with the accelerator.

Radio Frequency (RF) Shielded doors shall provide full RF integrity while presenting the appearance of a conventional door. Door shall be provided as a complete assembly with frame and all required hardware.

- RF Performance of Door: Provide a proven RF pneumatic seal design that is easily maintained and serviced. The RF door leaf, frame and seal assembly shall maintain a shielding effectiveness equal to that of the shielded enclosure.
- Sound Performance of Door: Provide a door with a minimum STC rating of 29, preferably 34 STC if available.
- Door Construction: Decorative face over manufacturer's shielded RF core. Stainless steel finish may be used if desired and appropriate for the application.
- Door RF seal shall be of pneumatic design as standard with the manufacturer. Finger design is not acceptable. Pneumatic seal shall work off the building compressed air system, or if not available, a compressor may be provided by RF Door Contractor.
- Provide two (2) or three (3) push button actuators for the pneumatic door, one in the MRI Room, one in the Control Room and one on Corridor side (if applicable.)
- Hardware: Hardware items should match the MM standards if possible. Provide manufacturer's standard hinges, locks/latch, closer and threshold. Finish shall be US26D satin chrome or US32D satin stainless steel
- Threshold shall be flat
- Door shall be manual or automatic. If automatic, shall be able to be opened or closed within 3 seconds. If manual the door should have a holder.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

## FRAMES

Material: In virtually all instances, door frames are to be factory welded 14-gauge hollow metal, painted stainless steel. At high abuse locations, 12-gauge stainless steel with factory welds should be specified. 16-gauge welded doors are acceptable for offsite locations. Knock down frames should not be specified except in very light duty staff-only offsite locations, and wood frames should not be used. Shop paint all hollow metal frames with manufacturers standard baked-on rust inhibitive primer.

If hollow metal painted frames are to be specified at exterior locations, bathrooms with showers, dishwashing rooms and other very wet locations, galvanized steel should be used.

Reinforce door frames for finish hardware. Provide continuous reinforcement within the frame if continuous hinges are specified.

Structural members should be extended on each side of the frame to the structure above at new wall construction. This is mandatory at oversized doors, shielded doors, high cart and bed traffic locations.

Fire rated frames are to be provided as standard in Healthcare Occupancies, and as required by code. Label to be located so that it is not obscured by continuous hinge or other hardware. Labels must not be painted.

Stainless Steel frames: In high cart and bed traffic locations (such as utility rooms, janitors closets, radiology, treatment and procedure rooms, Cath Labs, Operating Rooms, storage and equipment rooms),

- New 12-gauge stainless steel frames should be specified instead of painted hollow metal.
- Where existing frames are to remain, fully adhered stainless steel frame protection wrap should be installed at doors with closers that lack electrified hold-open features and at frames narrower than listed above. Frame protection should be flared to hug the wall with no sharp corners. Edges should be silicone sealed, with no gaps between protection and frame or wall.
-

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/



Fiberglass may be appropriate in special environments.

Silencers: Prep frames and provide a minimum of three silencers per door.

Lead-lined door frames should have anchors adequate for the weight of the door, with structural members extended on both sides of the frame to the structure above. Steel clips should be shop-installed for retention of field installed lead lining, and have a minimum of 23 clips per door.

Lead lined window frames should have shop-installed clips for field installed lead at a maximum of 24" OC.

## GLAZING

1/4" thick tempered glass is a minimum standard for interior, non fire rated glazing.

Decorative resin products may be selected for aesthetic reasons by Interior Design. Specify thickness and material properties to meet requirements for deflection, breakability, fire rating and interior finish requirements.

Wired glass should not be used as it can be dangerous when broken, and should be removed and replaced in renovation projects, regardless of the location.

Fire rated glazing should be clear, specify as required by code. Reference http://www.med.umich.edu/facilities/plan/dg/policy.html "Healthcare walls and doors summary"; however reference all applicable current codes and comply with the most restrictive.

Electrified privacy glass is preferred for patient room interior glazing where large panes of glass are planned.

Integral blinds between glazing panels glass should only be specified in extraordinary circumstances, due to ongoing maintenance issues.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

Behavioral health facilities should reference the latest version of the "Design Guide for the Built Environment of Behavioral Health Facilities, available from the Facilities Guidelines Institute.

Laminated glass should be avoided, due to the lead time and expense for replacement if broken or cracked.

Films: The use of films for solar shading, privacy, security and in behavioral health facilities should be minimized, due to the tendency for the films to be damaged or delaminate over time. Where possible, install the film on the side of the glazing less likely to be vandalized or otherwise damaged.

## SUSTAINABLE DESIGN REQUIREMENTS

Steel doors and frames shall contain a minimum of 26% total recycled content. Total recycled content shall be based on post-consumer + 1/2 pre-consumer combined recycled content. Weight and cost factors are not required for projects not being submitted for LEED certification.

Acceptable products which meet these criteria include (but not limited to) the following:
-Curries Co., 747 Model
-Pioneer Industries/Division of CORE Industries –C-Series
-Steelcraft/Division of Ingersoll-Rand-L Series (specify LW for seamless full weld style)

Provide material data for products not included in the list above for review and approval by the MM Design Manager.

Flush wood doors shall contain a minimum of 55% total recycled content. Total recycled content shall be based on the sum of post-consumer + ½ pre-consumer combined recycled content. Weight and cost factors are not required for projects not being submitted for LEED certification.

Acceptable manufacturers that meet these criteria include (but are not limited to) the following:
Algoma Hardwoods Inc.
-PC NOVODOR FSC Door, Wood Veneer
Five Lakes
-PC-5: FSC Certified, NAUF, Wood Veneer
Construction Specialties Inc.
-Acrovyn Doors
Marshfield Door Systems
-Signature Series, Wood Veneer Doors
-Durable Series, Acrovyn Face Doors

Wood doors shall be manufactured within 500 miles of the construction site.

Specify wood door products certified in accordance with Forest Stewardship Council's principles and criteria when such products are available.

Wood doors shall contain no added urea-formaldehyde resin.

Alternative door products not listed above shall be reviewed and approved by MM FPD Design Manager.