
USACE / NAVFAC / AFCEA UFGS-08 71 00 (October 2007)

Preparing Activity: NAVFAC Superseding
UFGS-08 71 00 (April 2007)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated March 2008

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10/07

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SECTION 08 71 00

DOOR HARDWARE 10/07

NOTE: This guide specification covers the requirements for finish hardware for permanent structures. All items of finish hardware necessary for completion of the project and not specified in other sections should be included in this section.

Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

NOTE: On the drawings, show:

1. Location, class, and hourly rating of fire doors;
2. Location and installation details for blocking behind door stops (wall bumpers) mounted on wallboard partitions; and
3. Either hardware set numbers (HW-2, etc.) in the door schedule, or list doors by number in each hardware set.

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

- | | |
|------------|--|
| ASTM E 283 | (2004) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen |
| ASTM F 883 | (2004) Padlocks |

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

- | | |
|--------------|---|
| BHMA A156.1 | (2006) Butts and Hinges |
| BHMA A156.12 | (2005) Interconnected Locks & Latches |
| BHMA A156.13 | (2005) Mortise Locks & Latches, Series 1000 |
| BHMA A156.15 | (2006) Closer Holder Release Devices |
| BHMA A156.16 | (2002) Auxiliary Hardware |
| BHMA A156.17 | (2004) Self Closing Hinges & Pivots |
| BHMA A156.18 | (2006) Materials and Finishes |
| BHMA A156.2 | (2003) Bored and Preassembled Locks and Latches |
| BHMA A156.21 | (2006) Thresholds |
| BHMA A156.22 | (2005) Door Gasketing and Edge Seal Systems |
| BHMA A156.3 | (2001) Exit Devices |
| BHMA A156.4 | (2000) Door Controls - Closers |
| BHMA A156.5 | (2001) Auxiliary Locks & Associated Products |
| BHMA A156.6 | (2005) Architectural Door Trim |
| BHMA A156.7 | (2003) Template Hinge Dimensions |
| BHMA A156.8 | (2005) Door Controls - Overhead Stops and Holders |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- | | |
|----------|---|
| NFPA 101 | (2005; Errata 2006; TIA 2006; TIA 2006)
Life Safety Code, 2006 Edition |
|----------|---|

NFPA 80 (2007) Standard for Fire Doors and Other
Opening Protectives

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI/DOOR A250.8 (2003) Recommended Specification for
Standard Steel Doors and Frames

UNDERWRITERS LABORATORIES (UL)

UL 14C (2006) Swinging Hardware for Standard
Tin-Clad Fire Doors Mounted Singly and in
Pairs

UL Bld Mat Dir (2007) Building Materials Directory

1.2 SUBMITTALS

NOTE: Where a "G" in submittal tags follows a
submittal item, it indicates Government approval for
that item. Add "G" in submittal tags following any
added or existing submittal items deemed
sufficiently critical, complex, or aesthetically
significantly to merit approval by the Government.
Submittal items not designated with a "G" will be
approved by the QC organization.

Submit the following in accordance with Section 01 33 00 SUBMITTAL
PROCEDURES.

SD-02 Shop Drawings

Hardware schedule[; G][; G, [_____]]

Keying system

SD-03 Product Data

Hardware items[; G][; G, [_____]]

NOTE: For special hardware items requiring shop
drawings, add submittal requirement for SD-04,
Drawings. Do not require shop drawings for standard
commercial hardware.

SD-08 Manufacturer's Instructions

Installation

SD-10 Operation and Maintenance Data

Hardware Schedule items, Data Package 1[; G][; G, [_____]]

Submit data package in accordance with Section 01 78 23 OPERATION
AND MAINTENANCE DATA.

SD-11 Closeout Submittals

Key Bitting

1.3 HARDWARE SCHEDULE

Prepare and submit hardware schedule in the following form:

Hard- ware Item	Quan- tity	Size	Reference		Mfr. Name and Catalog No.	Key Con- trol Symbols	UL Mark	
			Publi- cation Type	Finish			(If fire rated and listed)	BHMA Finish Designa- tion
-----	-----	-----	-----	-----	-----	-----	-----	-----

1.4 KEY BITTING CHART REQUIREMENTS

Submit **key bitting** charts to the Contracting Officer prior to completion of the work. Include:

- Complete listing of all keys (AA1, AA2, etc.).
- Complete listing of all key cuts (AA1-123456, AA2-123458).
- Tabulation showing which key fits which door.
- Copy of floor plan showing doors and door numbers.
- Listing of 20 percent more key cuts than are presently required in each master system.

1.5 QUALITY ASSURANCE

1.5.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, [pivots,] and closers of one lock, hinge, [pivot,] or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

1.6 DELIVERY, STORAGE, AND HANDLING

**NOTE: Whenever construction master keying is
required, permanent keys (and removable cores)
should be sent directly to the Contracting Officer.**

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule. [Deliver permanent keys [and removable cores] to the Contracting Officer, either directly or by certified mail. Deliver construction master keys with the locks.]

PART 2 PRODUCTS

2.1 TEMPLATE HARDWARE

Provide hardware to be applied to metal [or to prefinished doors] manufactured to template. Promptly furnish template information or templates to door and frame manufacturers. Conform to BHMA A156.7 for template hinges. Coordinate hardware items to prevent interference with other hardware.

2.2 HARDWARE FOR FIRE DOORS AND EXIT DOORS

Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for exit doors, as well as to other requirements indicated, even if such hardware is not specifically mentioned under paragraph entitled "Hardware Schedule." [Conform to UL 14C for swinging hardware for the tin-clad fire doors.] Provide the label of Underwriters Laboratories, Inc. for such hardware listed in UL Bld Mat Dir or labeled and listed by another testing laboratory acceptable to the Contracting Officer.

2.3 HARDWARE ITEMS

NOTE: It is essential for the specifier to have current editions of the BHMA standards, available from Builders Hardware Manufacturers Association, 355 Lexington Avenue, 17th Floor, New York, New York, 10017. The specifier should also have publications of the BHMA Standards, for guidance in selecting and scheduling finish hardware.

NOTE: For projects at Camp Lejeune:

1. Specify Series 4000, Grade 1, locks and latches with 70 mm 2-3/4 inch backset.
2. Specify interchangeable cores with seven pin tumblers.
3. Specify "All locks shall have interchangeable cores by Best Lock Corp., Arrow Lock Corp., Falcon Lock, or Eagle."
4. For offices, entrances, classrooms, and maintenance shops, specify lock function F81, unless F82 or F84 is more appropriate.
5. For mechanical rooms and pipe chases, specify lock function F86 (storeroom lock, outside knob always rigid).
6. For sleeping room doors, specify one deadbolt, E2151, with concealed mounting screws, and one latchset, F75.
7. For BEQs, require a separate master keying

system for each floor of each building.

Clearly and permanently mark with the manufacturer's name or trademark, hinges, pivots, locks, latches, exit devices, bolts and closers where the identifying mark will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

2.3.1 Hinges

NOTE: Use full-mortise (butt) hinges except where special types are required. Use swing-clear hinges where necessary to keep door opening completely clear when door is opened 90 to 95 degrees. Use wide-throw hinges where necessary to keep door leaf clear of wall, casings, jambs, or reveals. Use antifriction-bearing hinges on high-frequency or extra-heavy doors, and on doors equipped with closers. Use plain-bearing hinges on low-frequency doors up to 900 mm 3 feet wide and without closers. Use hospital tips in neuropsychiatric areas of medical facilities. In general, full-mortise hinges for interior doors should be steel with BHMA 600 finish (primed for painting). Hinges on natural wood or plastic surfaced interior doors should be steel with BHMA 652 finish (satin chromium plated) or BHMA 639 finish (satin bronze plated) to match finish of other door hardware. Hinges for exterior doors should be stainless steel with BHMA 630 finish or solid brass or bronze with BHMA 626 finish. Plated steel hinges may rust if used on exterior doors. Use two hinges for doors [1500 mm] [60 inch] or less in height and one additional hinge for each additional 750 mm 30 inch (or fraction thereof) of door height.

Hinge Sizes Chart

Thickness of Doors in Millimeters	Width of Doors in Millimeters	Height of Hinges (Length of Joint) in Millimeters
22 to 29 screen	To 915	76
35	To 815	89
35	Over 815 to 940	102
44	To 915	114
44	Over 915 to 1220	127 Heavy Weight
44	Over 1220	152 Heavy Weight
51, 57, and 64	To 1065	127 Heavy Weight
51, 57, and 64	Over 1065	152 Heavy Weight

Hinge Sizes Chart

Thickness of Doors in Inch	Width of Doors in Inches	Height of Hinges (Length of Joint) in Inch
7/8 to 1-1/8 screen	To 36	3
1-3/8	To 32	3-1/2

Hinge Sizes Chart

Thickness of Doors in Inch	Width of Doors in Inches	Height of Hinges (Length of Joint) in Inch
1-3/8	Over 32 to 37	4
1-3/4	To 36	4-1/2
1-3/4	Over 36 to 48	5 Heavy Weight
1-3/4	Over 48	6 Heavy Weight
2, 2-1/4 and 2-1/2	To 42	5 Heavy Weight
2, 2-1/4 and 2-1/2	Over 42	6 Heavy Weight

1. Select and size hinges for lead-lined, unusually heavy, and high-frequency doors on an individual basis.

2. The 114 by 114 mm 4-1/2 by 4-1/2 inch listed is for 44 mm 1-3/4 inch doors up to 915 mm 3 feet wide and with up to 20 mm 3/4 inch trim projection, and covers the majority of openings. For other doors, determine hinge width in accordance with:

Twice the door thickness plus trim projection, minus 13 mm 1/2 inch, or 2(t+p)-1/2. If answer falls between regular hinge sizes, use nearest larger size. Formula is for hinges set back 6 mm 1/4 inch from edge of door.

BHMA A156.1, 114 by 114 mm 4-1/2 by 4-1/2 inch unless otherwise indicated. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed. Other antifriction bearing hinges may be provided in lieu of ball-bearing hinges.

2.3.2 Pivots

NOTE: For extra heavy doors, pivots are sometimes preferable to hinges, particularly on entrance doors and lead-lined doors. See BHMA A156.4 and manufacturers' literature for types available.

BHMA A156.4.

2.3.3 Spring Hinges

NOTE: Use spring hinges only where closers are not practicable and for gates at counters. Ensure that specified spring hinges are large enough and strong enough to serve their purpose adequately. See BHMA A156.17 for types available. See manufacturers catalogs for recommendations on sizes, quantities, and styles of spring hinges.

BHMA A156.17.

2.3.4 Locks and Latches

NOTE: Specify Series 1000, in paragraph entitled "Mortise Locks and Latches," for hollow metal doors where security is a major factor. See BHMA A156.13, Appendix A, Users' Guide, for guidance on Security Grades.

For Bachelor Enlisted Quarters (BEQ) sleeping room doors, use heavy-duty pushbutton combination locks with keyed cylinder bypass (such as Simplex Securities Systems, Inc., Unican 1000 series); Grade 1 mortise locks (Series 1000), function F13, with removable-core cylinders; or a deadbolt, E2151, with interchangeable core and a latchset, F75. Check with activity housing managers to determine preference.

For doors between sleeping room and shared bath, use a privacy lock, F76, Grade 1, and a deadlock, E0151 (key x thumbturn) keyed like the sleeping room entrance door and with the key on the bathroom side.

NOTE: Choose the applicable paragraph(s) from the following.

2.3.4.1 Mortise Locks and Latches

BHMA A156.13, Series 1000, Operational Grade 1, Security Grade 2.

[Provide factory-installed lead lining in locks for lead-shielded doors.]

[Provide mortise locks with escutcheons not less than 178 by 57 mm 7 by 2-1/4 inch with a bushing at least 6 mm 1/4 inch long. Cut escutcheons to suit cylinders and provide trim items with straight, beveled, or smoothly rounded sides, corners, and edges.] Install knobs and roses of mortise locks with screwless shanks and no exposed screws.

2.3.4.2 Bored Locks and Latches

BHMA A156.2, Series 4000, Grade 1. [Provide factory-installed lead lining in locks for lead-shielded doors.]

2.3.4.3 Residential Bored Locks and Latches

NOTE: For temporary buildings and family housing only. Delete if not applicable. See BHMA A156.2 for types available.

BHMA A156.2, Series 4000, Grade 2. Install locks for exterior doors with threaded roses or concealed machine screws.

2.3.4.4 [Interconnected Locks and Latches

NOTE: For exterior doors in family housing units
only. See BHMA A156.12 and manufacturers'
literature for types available.

BHMA A156.12. Provide F96 or F97, unless otherwise specified.]

2.3.4.5 Hospital Latches

Push-pull latchset similar and equal to Glynn-Johnson HL6, 13 mm 1/2 inch
throw, [70 mm 2-3/4 inch] [127 mm 5 inch] backset, to fit 161 cutout.
Cover approximately 64 by 140 mm 2-1/2 by 5-1/2 inch, handle approximately
38 by 114 mm 1-1/2 by 4-1/2 inch, projection approximately 64 mm 2-1/2 inch,
covers and handles of stainless steel, BHMA 630 finish, engraved "PUSH" and
"PULL" on handles, push handle pointing up, pull handle pointing down.

2.3.4.6 Auxiliary Locks

NOTE: Delete if not applicable. See BHMA A156.5
for types available.

BHMA A156.5, Grade 1.

2.3.4.7 Combination Locks

NOTE: For medical projects only, include the first
bracketed option.

[Pharmacy door locks shall be keyed separately from building master key
system.]Heavy-duty, mechanical combination lockset with five pushbuttons,
standard-sized knobs, 20 mm 3/4 inch deadlocking latch, 70 mm 2-3/4 inch
backset. Operate the locks by pressing two or more of the buttons in
unison or individually in the proper sequence. Inside knob will operate the
latch. Provide a keyed cylinder on the interior to permit setting the
combination. [Provide a keyed [removable-core] cylinder on the exterior to
permit bypassing the combination.] [Provide a thumb turn on the interior
to activate passage set function, so that outside knob operates latch
without using the combination.]

2.3.5 Exit Devices

NOTE: Due to the difficulty in securing exit
devices against unauthorized use, they should only
be specified where required by NFPA 101. Use single
exit doors with locksets in preference to pairs of
doors. When pairs are required, specify removable
mullions and rim type devices. Vertical rod devices
require use of an overlapping astragal and door
coordinator for security and fire protection. They
should be used only where mullions are unfeasible.

BHMA A156.3, Grade 1. Provide adjustable strikes for rim type and vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Provide [touch bars in lieu of conventional crossbars and arms.] [Provide escutcheons, not less than 178 by 57 mm 7 by 2-1/4 inch.]

2.3.6 Exit Locks With Alarm

BHMA A156.5, Type E0431 (with full-width horizontal actuating bar) for single doors; Type E0431 (with actuating bar) or E0471 (with actuating bar and top and bottom bolts, both leaves active) for pairs of doors, unless otherwise specified. [Provide terminals for connection to remote indicating panel.] [Provide outside control key.]

2.3.7 Cylinders and Cores

NOTE: When an extension of an existing system is required, the manufacturer's name and type of locks should be indicated.

Arrow, Best and Falcon make interchangeable cores which are fully compatible with each other. Corbin, Russwin, Sargent, Schlage, and Yale make locksets which can receive the interchangeable cores made by Arrow, Best, or Falcon. Corbin, Russwin, Sargent, Schlage, and Yale each make their own interchangeable core system which are not compatible with any other manufacturer's system. Specify the system which will best meet the activity's needs without restricting competition.

For projects at Lajes Field, Azores, delete first paragraph; use second paragraph.

For projects in Bermuda, delete first paragraph; use third paragraph.

[Provide cylinders and cores for new locks, including locks provided under other sections of this specification.] Provide cylinders and cores with [six] [seven] pin tumblers. Provide cylinders from products of one manufacturer, and provide cores from the products of one manufacturer. [Rim cylinders, mortise cylinders, and knobs of bored locksets have interchangeable cores which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core.]

[Provide cylinders for new locks, including locks provided under other sections of this specification. Provide fully compatible cylinders with products of the Best Lock Corporation with interchangeable cores which are removable by a special control key. Factory set the cores with [six] [seven] pin tumblers using the A4 system and F keyway. Submit a core code sheet with the cores. Provide master keyed cores in one system for this project. Provide construction interchangeable cores.]

[Provide cylinders and cores for new locks, including locks provided under other sections of this specification. Provide cylinders and cores with

[six] [seven] pin tumblers. Provide cylinders with interchangeable and fully compatible with products from Best Lock Corp., Arrow Lock Corp., or Falcon Lock which are removable by special control keys. Stamp each interchangeable core with a key control symbol in a concealed place on the core.]

[For medical projects, pharmacy door locks shall be keyed separately from building master key system.]

2.3.8 Keying System

NOTE: Do not require higher levels of master keying than necessary because each level decreases the security of the locks. Specify a construction system where necessary to ensure security after construction is complete.

Provide [a [great] [grand] master keying system] [an extension of the existing keying system. Existing locks were manufactured by [_____] and [do not] have interchangeable cores.] [Provide [a construction master keying system] [construction interchangeable cores].] [Provide key cabinet as specified.]

NOTE: Add the following for Naval Training Center, Orlando, Florida. Coordinate with the lead paragraph.

Provide [sub-master keying system for [the] [each] building, and keyed to the existing Best removable-core master and grand master keying systems. Key equipment spaces and mechanical rooms separately from the building systems, and keyed alike to the existing Best master and grand master systems for these doors.]

NOTE: Add the following for Naval Submarine Base, Kings Bay, Georgia. Coordinate with the lead paragraph.

[The Government will provide permanent cylinders with cores and keys for mortise locksets, auxiliary locks, and exit devices. Furnish cylinders as manufactured by Best Lock Corp., Arrow Lock Corp., or Falcon Lock. Notify the Contracting Officer 90 days prior to the required delivery of the cylinders. Provide temporary cores and keys for the Contractor's use during construction, and for testing the locksets.]

2.3.9 Lock Trim

NOTE: For facilities which have not been certified as accessible only to able-bodied personnel, specify lever handles for doors which will be accessible to handicapped persons and knurled or abrasive coated knobs and lever handles for doors which are accessible to blind persons and which lead to

dangerous areas.

Cast, forged, or heavy wrought construction and commercial plain design.

2.3.9.1 Knobs and Roses

Conform to the minimum test requirements of BHMA A156.2 and BHMA A156.13 for knobs, roses, and escutcheons. For unreinforced knobs, roses, and escutcheons, provide 1.25 mm 0.050 inch thickness. For reinforced knobs, roses, and escutcheons, provide outer shell of 0.89 mm 0.035 inch thickness, and combined thickness of 1.78 mm 0.070 inch, except for knob shanks, which are 1.52 mm 0.060 inch thick.

2.3.9.2 Lever Handles

Provide lever handles in lieu of knobs [where indicated in paragraph entitled "Hardware Schedule"]. Conform to the minimum requirements of BHMA A156.13 for mortise locks of lever handles for exit devices. Provide lever handle locks with a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when force in excess of that specified in BHMA A156.13 is applied to the lever handle. Provide lever handles return to within 13mm 1/2 inch of the door face.

2.3.9.3 Texture

Provide knurled or abrasive coated knobs or lever handles[where specified in paragraph entitled "Hardware Schedule"] [for doors which are accessible to blind persons and which lead to dangerous areas].

2.3.10 Keys

NOTE: For projects at Lejes Field, Azores, delete first paragraph; use second paragraph.

Furnish one file key, one duplicate key, and one working key for each key change [and for each master [and grand master] keying system]. Furnish one additional working key for each lock of each keyed-alike group. [Furnish two additional keys for each sleeping room.] [Furnish [] great grand master keys,] [] construction master keys,] [and [] control keys for removable cores].] [Furnish a quantity of key blanks equal to 20 percent of the total number of file keys.] Stamp each key with appropriate key control symbol and "U.S. property - Do not duplicate." Do not place room number on keys.

[Furnish seven change keys for each interchangeable core, furnish two control keys, six masters keys, and six construction master keys. [Furnish a quantity of key blanks equal to 20 percent of the total number of change keys.] Stamp each key with appropriate key control symbol and "U.S. property - Do not duplicate." Do not place room numbers on keys.]

2.3.11 Door Bolts

NOTE: Use chain and foot bolts for exceptionally high doors and where use of flush bolts is impracticable.

BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Automatic latching flush bolts: BHMA A156.3, Type 25.

2.3.12 Closers

NOTE: Use closers Type C02011 with o.f. PT 4C for surface applications, except use parallel arm closers, C02021, on outswinging exterior doors. Specify holder arms, C02051 and C02061, where doors must be held open from 90 degrees to 135 degrees, or to 180 degrees where desired. Do not use holder arms for fire-rated doors. Use overhead concealed closers on main entrance doors of monumental buildings, double-acting doors, and for other openings where concealment is necessary. Avoid overhead concealed closers with wood doors. Where they can not be avoided, modify section on wood doors to require a 125 mm 5 inch headrail. Avoid use of floor-concealed closers, but where required, ascertain that floor slab design will not interfere with closer case.

BHMA A156.4, Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, [full size covers, except at storefront mounting,] [pivots,] [cement cases,] and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Provide manufacturer's 10 year warranty.

2.3.12.1 Identification Marking

Engrave each closer with manufacturer's name or trademark, date of manufacture, and manufacturer's size designation located to be visible after installation.

2.3.13 Overhead Holders

NOTE: Use overhead holders for doors which will not swing 180 degrees and where there is no adjacent wall to accommodate wall type holder and stop. If holder must be on outside of doors, specify bronze (C12511) with satin chrome finish (626). Overhead holders can be specified as "Stop Only" where the hold-open feature is not desirable.

BHMA A156.8.

2.3.14 Closer Holder-Release Devices

NOTE: For fire doors which must be held open, use electromagnetic holder-release devices.

BHMA A156.15.

2.3.15 Door Protection Plates

NOTE: Use pulls attached to plates. Use 200 by 400 mm 8 by 16 inch push plates where door design permits. Use push bars or push and pull bars on all-glass doors. Use kick plates for push sides of doors equipped with closers. Use armor plates on heavy-duty doors where hand trucks or other heavy objects passing through the door could cause damage.

BHMA A156.6.

2.3.15.1 Sizes of [Armor] [Mop] [and] Kick Plates

NOTE: NFPA 80 requires that door plates be not more than 400 mm 16 inch high. Where wheelchair traffic is anticipated, kick plates should be 400 mm 16 inch high.

Fifty mm 2 inch less than door width for single doors; 25 mm one inch less than door width for pairs of doors. Provide [[200] [1200] mm [8] [10] inch kick plates for flush doors] [and] [125 mm one inch less than height of bottom rail for panel doors]. Provide a minimum [900] [1200] [_____] mm [36] [48] [_____] inch armor plates for flush doors [and] completely cover lower panels of panel doors, except 400 mm 16 inch high armor plates on fire doors. Provide [100] [150] mm [4] [6] inch mop plates.

2.3.16 Edge Guards

NOTE: Edge guards should be detailed on drawings; stipulate material, gauge, dimensions, etc. Use edge guards in addition to armor plates on heavy-duty doors where hand trucks or other heavy objects passing through could damage doors. They are not required at hinge stiles on doors equipped with "swing clear" hinges.

BHMA A156.6, stainless steel, of same height as armor plates. Apply to [hinge stile] [lock stile] [meeting stiles].

2.3.17 Door Stops and Silencers

NOTE: Specify wall bumpers Type L02251 wherever practical, except where they would be mounted on stud walls or partitions. Use floor stops only where necessary to prevent doors from hitting towel bars or similar items, as they create stumbling hazards and interfere with floor cleaning equipment.

BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

2.3.18 Padlocks

NOTE: See referenced specification for types, grades and options available.

ASTM F 883.

2.3.19 Thresholds

NOTE: Where vertical rod exit devices are used, and for other outswinging exterior doors, BHMA A156.21, type J35100, is recommended.

BHMA A156.21. Use J35100, with vinyl or silicone rubber insert in face of stop, for exterior doors opening out, unless specified otherwise.

2.3.20 Weather Stripping Gasketing

NOTE: Weather stripping is also specified in Section 08110 STEEL DOORS AND FRAMES Section 08120 ALUMINUM DOORS AND FRAMES and Section 08210 WOOD DOORS. Coordinate requirements to avoid conflict and duplication. Do not use interlocking type or spring tension type on metal doors and frames.

NOTE: Maximum air leakage rates are 2.19×10^{-5} cms per sq m 0.5 cfm per sq. ft. of door area for residential swinging doors and 5.48×10^{-5} cms per sq m 1.25 cfm per sq. ft. of door area for non-residential swinging doors.

BHMA A156.22. Provide the type and function designation where specified in paragraph entitled "Hardware Schedule". Provide a set to include head and jamb seals[, sweep strips,] [and, for pairs of doors, astragals]. Air leakage of weather stripped doors not to exceed $[2.19 \times 10^{-5}] [5.48 \times 10^{-5}]$ cms $[0.5] [1.25]$ cubic feet per minute of air per square meterfoot of door area when tested in accordance with ASTM E 283. Provide weather stripping with one of the following:

2.3.20.1 Extruded Aluminum Retainers

Extruded aluminum retainers not less than 1.25 mm 0.050 inch wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Provide [clear (natural)] [bronze] anodized aluminum.

2.3.20.2 Interlocking Type

Zinc or bronze not less than 0.45 mm 0.018 inch thick.

2.3.20.3 Spring Tension Type

Spring bronze or stainless steel not less than 0.20 mm 0.008 inch thick.

2.3.21 [Lightproofing] [and] [Soundproofing] Gasketing

BHMA A156.22. Include adjustable doorstops at head and jambs and an automatic door bottom per set, both of extruded aluminum, [clear (natural)] [bronze] anodized, surface applied, with vinyl fin seals between plunger and housing. Provide doorstops with solid neoprene tube, silicone rubber, or closed-cell sponge gasket. Furnish door bottoms with adjustable operating rod and silicone rubber or closed-cell sponge neoprene gasket. Doorstops mitered at corners. Provide the type and function designation where specified in paragraph entitled "Hardware Sets".

2.3.22 Rain Drips

NOTE: These items are not covered by federal specifications or BHMA standards. For types available, see manufacturers' catalogs.

Extruded aluminum, not less than 2.03 mm 0.08 inch thick, [clear] [bronze] anodized. Set drips in sealant and fasten with stainless steel screws.

2.3.22.1 Door Rain Drips

Approximately 38 mm high by 16 mm 1-1/2 inch high by 5/8 inch projection. Align bottom with bottom edge of door.

2.3.22.2 Overhead Rain Drips

Approximately 38 mm high by 64 mm 1-1/2 inch high by 2-1/2 inch projection, with length equal to overall width of door frame. Align bottom with door frame rabbet.

2.3.23 Special Tools

Provide special tools, such as spanner and socket wrenches and dogging keys, required to service and adjust hardware items.

2.4 FASTENERS

Provide fasteners of proper type, quality, size, quantity, and finish with hardware. Provide stainless steel or nonferrous metal fasteners that are exposed to weather. Provide fasteners of type necessary to accomplish a permanent installation.

2.5 FINISHES

NOTE: Choose one of the following options. Choose the first option for new buildings. Choose the second option only where necessary to match the

finish on existing hardware.

[BHMA A156.18. Provide hardware in BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except [aluminum paint] [prime coat] finish for surface door closers, and except [BHMA 652 finish (satin chromium plated)] [BHMA 600 finish (primed for painting)] for steel hinges. Provide hinges for exterior doors in stainless steel with BHMA 630 finish or chromium plated brass or bronze with BHMA 626 finish. Furnish exit devices in BHMA 626 finish in lieu of BHMA 630 finish [except where BHMA 630 is specified under paragraph entitled "Hardware Sets"]. Match exposed parts of concealed closers to lock and door trim. Match hardware finish for aluminum doors to the doors.]

[BHMA A156.18. Provide hardware in BHMA 612 finish (satin bronze), unless specified otherwise. Finish surface door closers [bronze paint] [prime coat] finish. Provide steel hinges in [BHMA 639 finish (satin bronze plated)] [BHMA 600 finish (primed for painting)]. Provide exposed parts of concealed closers finish to match lock and door trim. Match hardware finish for aluminum doors to match the doors. Provide hardware showing on interior of [bathrooms] [shower rooms] [toilet rooms] [washrooms] [laundry rooms] [and kitchens] in BHMA 629 finish (bright stainless steel) or BHMA 625 finish (bright chromium plated).]

2.6 KEY CABINET AND CONTROL SYSTEM

NOTE: Key cabinets hold keys on panels. Systems include materials and devices for recording and cross-referencing data on use and location of locks and keys. See BHMA A156.5 for description of cabinets and control systems.

BHMA A156.5, [Type [E8331 (25 hooks)] [E8341 (125 hooks)] [E8351 (150 hooks)] [E8311 (600 hooks)] [E8321 (700 hooks)].] [Type required to yield a capacity (number of hooks) 50 percent greater than the number of key changes used for door locks.]

PART 3 EXECUTION

3.1 INSTALLATION

Install hardware in accordance with manufacturers' printed installation instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

3.1.1 Weather Stripping Installation

Handle and install weather stripping to prevent damage. Provide full contact, weather-tight seals. Operate doors without binding.

3.1.1.1 Stop-Applied Weather Stripping

Fasten in place with color-matched sheet metal screws not more than 225 mm 9 inch on center after doors and frames have been finish painted.

3.1.1.2 Interlocking Type Weather Stripping

Provide interlocking, self-adjusting type on heads and jambs and flexible hook type at sills. Nail weather stripping to door 25 mm one inch on center and to heads and jambs at 100 mm 4 inch on center

3.1.1.3 Spring Tension Type Weather Stripping

Provide spring tension type on heads and jambs. Provide bronze nails with bronze, stainless steel nails with stainless steel. Space nails not more than 38 mm 1-1/2 inch on center.

3.1.2 [Lightproofing] [and] [Soundproofing] Installation

Install as specified for stop-applied weather stripping.

3.1.3 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set thresholds in a full bed of sealant and anchor to floor with cadmium-plated, countersunk, steel screws [in expansion sleeves].

3.2 FIRE DOORS AND EXIT DOORS

Install hardware in accordance with NFPA 80 for fire doors, NFPA 101 for exit doors [, and UL 14C for swinging tin-clad fire doors].

3.3 HARDWARE LOCATIONS

SDI/DOOR A250.8, unless indicated or specified otherwise.

- a. Kick and Armor Plates: Push side of single-acting doors. Both sides of double-acting doors.
- b. Mop Plates: Bottom flush with bottom of door.

3.4 KEY CABINET AND CONTROL SYSTEM

Locate where [directed] [indicated]. Tag one set of file keys and one set of duplicate keys. Place other keys in appropriately marked envelopes, or tag each key. Furnish complete instructions for setup and use of key control system. On tags and envelopes, indicate door and room numbers or master or grand master key.

3.5 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, as directed, errors in cutting and fitting and damage to adjoining work.

3.6 HARDWARE SETS

NOTE: Coordinate this section with Section 08120
ALUMINUM DOORS AND FRAMES.

Either list hardware set numbers on the drawings or
list doors by number in each hardware set. List
hardware sets in the following format:

SAMPLE LIST OF HARDWARE SETS

HW-1 (Doors 1 and 2, each pair)

3 Pair Hinges	A2111 x 623 x NRP
1 Three-Point Lock	E8271
2 Closers	C02021
2 Wall Bumpers	L02251
2 Pulls	Extruded aluminum with decorative panels
2 Push Bars	Extruded aluminum with decorative panels
1 Threshold	Type 26

HW-2 (Doors 3 and 4, each pair)

3 Pair Hinges	A2112 x 626 x NRP
2 Exit Devices	Type 1-05 x 630
1 Removable Mullion	Type 22
2 Closers	C02021
2 Kick Plates	J102 x 630
2 Wall Bumpers	L02251
1 Threshold	Type 26 x insert
1 Set Weatherstripping	R0D165

HW-3 (Doors 5, 7, 9, each leaf)

1-1/2 Pair Hinges	A2112 x 626 x NRP
1 Lockset	F04 x 630
1 Closer	C02021
1 Kick Plate	J102 x 630
1 Wall Bumper	L02251
1 Threshold	Type 26 x insert
1 Set Weatherstripping	R0D165

HW-101 (Doors 6, 8, 10, each leaf)

1-1/2 Pair Hinges	A8112 x 652
1 Lockset	F82
1 Closer	C02011
1 Kick Plate	J102 x 630
1 Wall Bumper	L02251

HW-102 (Doors 11 and 12, each leaf)

1-1/2 Pair Hinges	A8112 x 652
1 Pull Plate	J405 x 630
1 Push Plate	J301 x 630

1 Closer	C02011
1 Kick Plate	J102 x 630
1 Wall Bumper	L02101

HW-103 (Doors 13 and 14, each leaf)

1-1/2 Pair Hinges	A8133 x 652
1 Latchset	F75
1 Wall Bumper	L02251

Provide [hardware for aluminum doors under this section. Deliver Hardware templates and hardware, except field-applied hardware to the aluminum door and frame manufacturer for use in fabricating the doors and frames.]

-- End of Section --