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**Designing guideline for the elderly
and people with disabilities—
Windows and doors application in
housing design**

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Foreword

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Designing guideline for the elderly and people with disabilities—Windows and doors application in housing design

Introduction

Physical functions such as action abilities generally decline with ageing. The elderly with declined physical function and people with disabilities sometimes feel inconvenienced in using doors and windows for housing.

This Japanese Industrial Standard has been established, based on **TS A 0027** published in 2010, as a guideline intended for the elderly and people with disabilities on the selection of the suitable doors and windows in designing safe and comfortable houses.

1 Scope

This Standard specifies the guidelines for the elderly and people with disabilities (hereafter referred to as the intended users) when the housing designers, users and the like select the manual doors and windows, and the hardware to be attached thereto in the houses where the intended users reside.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS A 1541-1 *Building hardware—Locks and latches—Part 1: Test methods for locks and latches*

JIS A 4702 *Doorsets*

JIS A 4706 *Windows*

JIS Z 8071 *Guide for addressing accessibility in standards*

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS A 1541-1**, **JIS A 4702**, **JIS A 4706** and **JIS Z 8071**, and the following apply.

3.1

swinging door

door that opens/closes around the vertical axis located at the panel end, the panel of which is supported by hinges, etc.

NOTE Swinging doors include the single-swinging doors, double-swinging doors and master-slave doors. They are classified into the entrance doors, back doors and interior doors according to the place where they are used.

3.2

folding door

door that opens by folding two or more panels connected to each other by hinges, etc.

NOTE The folding doors are often used for the interior doors, bath room doors, walk-in closet doors, etc., where the space available for the door open/close is small. The folding doors usually open/close along the area smaller than that necessary for the swinging doors.

3.3

sliding door

door the panel of which slides horizontally on the rail or in the groove for open/close

NOTE Sliding doors include the double-sliding doors, single-sliding doors, one-groove sliding doors and retractable sliding doors. They are classified into the entrance sliding doors, sliding back doors and interior sliding doors according to the place where they are used.

3.4

fixed window

window which cannot be opened/closed because the glass or the like is directly fixed to the window frame

3.5

sliding window

window the panel of which slides horizontally on the rail or in the groove for open/close

NOTE Sliding windows include the double-sliding windows, single-sliding windows, centre-panel sliding windows, both sides-panel sliding windows, one-groove sliding windows and retractable sliding windows.

3.6

casement window

window that opens/closes around the vertical axis located at the window panel end, the panel of which is supported by hinges, etc.

NOTE Casement windows include the single-casement windows and the double-casement windows. Also, they are classified into the outward-opening windows and the inward-opening windows according to the direction to which the window opens.

3.7

vertical slideout window

window that opens in such a way that the panel moves from the suspension side of vertical window frame to the other vertical window frame

NOTE Vertical slideout windows include the single-vertical slideout windows and the double-vertical slide-out windows.

3.8

double-hung window

window consisting of two panels which move up/down

NOTE Double-hung windows include the single-motion double-hung windows in which the upper panel is fixed and the lower panel only moves, and the double-motion double-hung windows in which both panels move.

3.9

projected window

window that opens outward by using the upper frame as the rotation axis

3.10

in-swinging window

window that opens inward by using the lower frame as the rotation axis

3.11

slideout window

window that opens in such a way that the upper end of panel moves along the vertical window frame when the lower end of panel is pushed outward

NOTE Slideout windows are sometimes called the lateral slideout windows to distinguish them from the vertical slideout windows.

3.12

awning window

window having two or more panels, the ends of which are linked by interlocking hardware inside the window frame

All the panels open/close together by the handle operation, etc. of window operator.

3.13

glass louver window

window having two or more glasses, the ends of which are linked by interlocking hardware

All the glasses open/close together by the handle operation, etc. of window operator.

3.14

Dreh Kipp window

window the opening direction of which is selectable between the in-swinging opening and the inward opening, by switching the handle mechanism for open/close of the window

3.15

sweeping-out window

window through which the intended users can access the balcony, etc. from the room in a house, or vice versa

NOTE Sweeping-out windows include the casement windows and the sliding windows. Sweeping-out windows do not belong to doors because they cannot be locked/unlocked from outside.

3.16

door lock

lock used for locking swinging doors and sliding doors

3.17**flush bolt**

hardware designed to protrude a rod upward or downward in order to lock a posterior opening door panel (a slave door) of double-swinging door, master-slave door, etc.

3.18**door guard**

hardware designed to hook a loop on an arm-shaped receiver so as to clamp a swinging door from inside

NOTE Door guards are designed, for checking a visitor, to allow the door to be opened a little but not fully opened from outside.

3.19**door chain**

hardware with a chain used for clamping a swinging door from inside

NOTE Door chains are designed, for checking a visitor, to allow the door to be opened a little but not fully opened from outside.

3.20**pulling handle**

hardware attached to an upright stile of a sliding door or a sliding window for its opening/closing operation

3.21**door pull stile**

part of a sliding door on which a hand is laid for its open/close operation

Normally, an edge stile is used for this purpose.

3.22**crescent**

fastener attached to the meeting stile of double-sliding windows, single-sliding windows, double-hung windows, etc., in which the lever is rotated to latch the mating component

NOTE The latch has a crescent shape and is capable of pulling and thrusting laterally the mating component.

3.23**auxiliary lock**

second lock used mainly for the security and attached to the lower stile of the double-sliding window

When it is installed, the protrusion of the lock collides with the meeting stile of inner panel, and prevents the door from being opened.

NOTE Also called sub-locks.

3.24**cam latch**

handgrip equipped with a flanged fastening mechanism

NOTE Used for casement windows, slideout windows, etc.

3.25

cremorne fastener

lock in which a lever handle and a connecting rod are combined and worked for locking

NOTE Normally, the cremorne fastener means a type which protrudes the dead bolts into the upper and lower frames for locking, but sometimes means a type which couples two or more roller pins attached to a connecting rod with the receiver in the vertical frame side for locking.

3.26

window operator

hardware for opening/closing a window by rotating a handle

NOTE The window operator is used for vertical slideout windows, glass louver windows, awning windows, etc.

3.27

up/down lock

fastener for locking the panel of double-hung window to the vertical frame

3.28

projection rod

hardware of rod used for opening/closing the projected window

NOTE The rod is capable of adjusting the opening angle stepwise and has a function of fastening the window when the window is closed.

3.29

projection fastener

fastener having an arm function, which is used for the projected window

NOTE It has a function to keep the panel at a specified angle when the window is opened.

3.30

top latch

fastener used for in-swinging windows, out-swinging windows, etc.

NOTE The window is automatically fastened, when it is closed, by the protrusion of a spring-actuated latch.

3.31

hook bar

bar with a hook at its tip used for opening/closing an in-swinging window, etc. located at a height beyond the reach

3.32

operation chain

chain fixed to the window, which is used in conjunction with a window operator in order to open/close an awning window, etc. located at a height beyond the reach

3.33**pivot hinge**

hardware for supporting the panel of swinging door at the top and bottom by means of pivots

3.34**door closer**

hardware fixed to a door panel and the door frame, having a mechanism to close the panel automatically and slowly by means of a metal spring and hydraulic pressure

3.35**arm stopper**

hardware having a function to keep the panel of swinging door or casement window at a specified angle when the window is opened

3.36**door stop**

hardware fixed to a floor, etc. to prevent the panel or handgrip of swinging door from colliding with a wall, etc. when the door is opened

3.37**suspending wheel**

wheel used for the sliding doors suspended at the top

3.38**friction stay**

hinge used for vertical slideout windows and lateral slideout windows, having a mechanism such that the centre of hinge slides from the panel trail side to the edge side

3.39**supporting hardware for double-hung window**

hardware equipped so as to open/close a double-hung window smoothly

NOTE The hardware includes balancers, suspending wheels and rack-and-pinions.

3.40**hinge**

general term for the axial rotation type hardware used for swinging doors, casement windows, projected windows, in-swinging windows, etc.

NOTE Hinges include pivot hinges.

3.41**effective opening width**

width, ignoring the extruding parts of hardware, through which a person can pass when a door is fully opened

4 Common matters to be considered for selection of doors and windows used by intended users

4.1 General

In consideration of the impairments and activity limitations of the intended users as shown in 4.2, the common matters addressing the easy use and the safe opening/closing of doors and windows shall be in accordance with 4.3.

4.2 Impairments and activity limitations of intended users

The body parts in which the intended users suffer from the declined physical functions, or the functions thereof are divided as shown in Table 1 based on the impairments, activity limitations and the like specified in **JIS Z 8071**. The conditions under which doors and windows are operated are also exemplified.

Table 1 Impairments and activity limitations of intended users, and examples of conditions under which intended users operate doors and windows

Body part or function	Impairments and activity limitations of intended users	Examples of conditions under which intended users operate doors and windows
Hand/finger	— Reduced ability to turn or bend objects and other impairments in range of motion of hands — Reduced ability to bring thumb and fingers close together or an inability to separate them very far — Reduced ability in complex operations, such as pushing while turning objects — Inadvertent or involuntary movement (e.g. tremor) that interferes with fine hand use — Reduced ability caused by use of non-dominant hand (left or right) — Reduced muscle power and endurance — Reduced gripping strength making it difficult or painful to operate a system^{a)} against resistance or torque	— Operation is not easy when a handle, handgrip, tab or the like is small. — Operation of a handle, handgrip, tab or the like is not easy when surrounding space is insufficient. — Operation of a handle, thumb turn or the like is not easy when it requires a large force. — Inserting a key into the key hole is not easy.
Arm	— Reduced ability to turn or bend objects and other impairments in range of motion of hands — Reduced ability to reach distant objects, or objects on the floor due to limited range of motion of shoulder joint and/or elbow joint — Reduced ability to manage heavy or bulky objects due to weakness or musculoskeletal temporal injury in the upper body — Reduced muscle power and endurance	— Opening/closing a door is not easy if large force is required for the operation. — In the case of a casement window, etc., the opening operation is difficult at times depending on the opening direction. — Opening/closing a large door panel or window panel is not easy because the moving range of arm is small.

Table 1 (concluded)

Body part or function	Impairments and activity limitations of intended users	Examples of conditions under which intended users operate doors and windows
Leg	— Reduced ability to walk, move around, climb stairs or ladders, and transfer from one place to another — Reduced ability to control the body when turning, bending or maintaining balance — Reduced ability to perform coordinated actions aimed at moving objects by using legs and feet — Reduced muscle power and endurance	— Walking without a cane or the like is impossible or inconvenient. — Moving is impossible or inconvenient without a wheelchair (but wheelchair operation is possible by oneself). — Easy to fall when passing over the level difference, etc. unless the body is supported. — Cannot firmly stand on the floor when opening/closing a heavy door panel or window panel.
Visual ability	— Reduced ability to see images distinctly — Reduced ability to change focus from near to distant objects and vice versa, and reduced ability to see contrast — Reduced sensitivity to light (higher-intensity light is necessary) — Very limited or no useful visual ability and relying on other sensory functions, such as hearing and touch, to obtain information	— Difficult in reading cautions and operation manuals written in small letters — Near object is recognisable but a little distant one dims. — Difficult to see in a place where light-intensity is low. — Recognition of level difference is difficult. — Distinction only by visual sense is difficult.
Sense of balance	— Reduced ability to control the body when turning, bending or maintaining balance — Increased potential for slipping, stumbling or other balance disturbances that can cause falling — Increased risk of falling due to balance impairment	— Easy to fall unless equipment for grasp is prepared — Easy to fall unless assistive device is prepared
Note ^{a)} Refers to opening/closing operations and locking/unlocking operations of doors and windows in this Standard.		

4.3 Common matters for selection of doors and windows

Common matters to be considered on the selection of doors and windows for housing used by the intended users shall be as follows.

- a) **Operability** The following factors are relevant to the physical functions and action abilities, which affect the operation of doors, windows and hardware thereof, of the intended users. Attention should be paid to the easiness of laying hands or fingers on, gripping or pinching them in consideration of the impairments and activity limitations of the intended users.
- 1) Body height, body shape and restrict/operation/motion/muscle power/endurance of hand/finger motion, and range of upper extremity movement
 - 2) Visual sense, sense of touch, sense of balance, etc.

- 3) With/without the welfare equipment such as wheelchair, caster walker, cane and wearing brace
- b) **Space configuration** Attention should be paid so that the positional relation between the door panel/window panel and the intended user or the wheelchair is sound, the approach to the operation parts is easy, and the open/close operation is made without the hindrance.
- c) **Safety considerations**
 - 1) Is the operation easy to learn and unlikely to make a mistake? In the case where a series of operations are required, is the operational sequence easy to understand? In the case of doors and windows of which the open/close procedure or movement is complex, is it possible to explain to the intended users clearly regarding the selection, then obtain their confirmation?
 - 2) When opening/closing a door or window or operating the hardware, is the space sufficient to avoid the collision of hand/finger or arm with the door or window frame, wall nearby, etc.?
 - 3) When a door panel is in open or close state and when it is operated for open/close, are the intended users unlikely injured due to protrusions, sharp edges, etc. of the door body or the hardware, or is any measures taken for the protrusion which may cause the intended users to stumble and fall?
 - 4) Is it unlikely occurring that the hand/finger is caught by any component of the door such as panel end, suspension and hardware during the operation?
 - 5) Is the operation easy in case of an emergency evacuation?
 - 6) Is the level difference designed to be small so that the intended users do not stumble at the opening of door or sweeping-out window used for moving in/out?
 - 7) Are the fittings clearly seen and considered so that the intended users do not collide with them? Especially when doors and windows of which the glass area is large are installed, such products should be selected that they have crosspieces inside or the panels and glasses of which are easily recognizable by sticking labels, films or the like on them.
 - 8) In the case where the glass bottom of a door, sweeping-out window, fixed window, etc. is close to the floor, is any measures taken, such as a large front dimension of width of the lower stile, so that the glass is not broken by a contact with the foot support of a wheelchair?
- d) **Consideration on in-house environment** The following matters shall be taken into consideration regarding the living environment related to doors and windows.
 - 1) Securing thermal insulation and airtightness for healthy and comfortable life
 - 2) Suppression of generation of diseases and allergies
 - 3) Location and size of opening width enabling appropriate lighting, ventilation and airing in consideration of the house location, arrangement of the rooms, etc.

5 Selection of doors and hardware

5.1 General

Housing designers shall understand the decline conditions of physical functions of the intended users according to **4.2**, and select the suitable doors and hardware (hereafter referred to as door products collectively). Procedures shall be determined for the door products selection and the evaluation method when the dwelling house is newly built or renovated, in which the intended users are going to reside.

The selection and evaluation shall be carried out following the procedures specified in **5.5** based on the guideline for determination specified in **5.3** and **5.4**, taking each matter given in **4.3** and **5.2** into consideration.

Examples of doors for housing and hardware are shown in Annex A.

5.2 Matters to be considered in selecting doors

5.2.1 Open/close of door panels

On the selection of doors, matters to be considered on the opening/closing of panels shall be as follows.

- a) Is the door open/close method easy for the intended users to operate? Are the direction and the force required for open/close of a panel appropriate? Is the panel width within the appropriate reach from the intended users when opening/closing the panel? When the intended users close the panel of the swinging door from the opposite side of the panel opening direction, the handle or knob on the panel edge side moves away beyond the reach. Especially, since the wheelchair users sometimes feel difficult to close the panel by stretching their hand, the usage of a panel equipped with a door closer capable of adjusting the closing speed is preferable.
- b) Is the height of the panel open/close operation part appropriate for the wheelchair users, and for the body height, posture, etc. of the intended users?
- c) Can the intended users open/close the panel easily by one hand even if their hand/finger, arm and leg functions are declined?

5.2.2 Operation of hardware

In selecting hardware such as a handle, door lock, etc., the matters to be considered on the operation shall be as follows.

- a) Is the hardware attached at the position appropriate and easy for operation for the wheelchair users, and for the body height, posture, etc. of the intended users?
- b) Can the intended users operate the hardware by a small force even if their hand/finger and arm functions are declined?
- c) Is the shape of operation parts designed to be easy to lay a hand/finger on or easy to grip them? The hardware should be designed so that the users suffering from the declined hand/finger function can operate it using other part of the body.
- d) Is the space secured around the operation part sufficient for the operation?
- e) Is it possible to complete the operation by a single motion or a series of motions?

- f) For the users suffering from the declined visual ability, are the operation parts clearly seen in such a way as enlarged size and well-devised colours and contrast?
- g) Is the key hole designed to be a mortar-shape or the like so that the key enters easily?

5.2.3 Doorway passage

In selecting doors, matters to be considered on the easy pass through the doorway shall be as follows.

- a) Is the effective opening width secured for enabling the wheelchair to pass through, for the wheelchair users?
- b) Is the level difference of the lower frame small enough for a wheelchair to pass through smoothly?
- c) Are the protruding parts of a handgrip, door guard, etc. designed so that they do not touch or easily catch the clothes or body of the intended users, taking it into consideration that they do not result in fall or body damage of the intended users?
- d) In the case of a door equipped with an automatic closing mechanism, is the mechanism capable of appropriate slowdown the closing speed? Also, is the mechanism provided with a closure delaying function to keep the door in open state for a certain period of time?
- e) In the case where the door is not equipped with an automatic closing mechanism, is safety taken into consideration in such a way as installing a braking device?

5.3 Guideline for door selection

5.3.1 Entrance doors

The guideline for the selection of entrance doors shall be as follows.

- a) Swinging doors or sliding doors are suitable for the users suffering from the declined hand/finger or arm function, and/or for the users suffering from the declined leg function but being able to walk by oneself.
- b) Sliding doors are suitable for the intended users whose sense of balance or visual ability is declined, because the swinging doors are likely to cause them to fall.
- c) Sliding doors are suitable for wheelchair users. In the case where the swinging door is used, the easy reach and the handling of the wheelchair shall be considered regarding the panel open/close direction and the space around the door in the designing stage of the house.

5.3.2 Back doors

In many cases, the intended users feel difficult to use the back doors due to such reasons as difficulty in securing sufficient space around the door and removing the level difference. However, if such issues are solvable, the guideline to the entrance doors should apply.

5.3.3 Interior doors

The guideline for the selection of interior doors shall be in accordance with **5.3.1**.

Folding doors are suitable for the users suffering from the declined leg function such as the wheelchair use, because the folding doors allow the larger opening width even in a small space, making them convenient for wheelchair users. However, attention should be paid to the users suffering from the declined hand/finger, arm or leg function, or the users suffering from the declined visual ability or sense of balance, because the movement of the folding doors differs from that of the swinging doors.

5.4 Guideline for hardware selection

5.4.1 Hardware operated by direct contact for door opening/closing and lock/unlock

The hardware operated by direct contact for door opening/closing and lock/unlock is relevant to the users suffering from the declined hand/finger and/or arm functions. The guideline shall be as follows.

The size and shape of operation parts should be adequate to fit to a hand, and its operation should be as simple as possible.

- a) **Knob** A knob requires to be gripped and turned; therefore, it is not suitable for the users suffering from the declined hand/finger and/or arm functions.
- b) **Lever handle** A lever handle is operable by simply laying a hand on and moving its handle in one direction; therefore, it is suitable even for the users suffering from the declined hand/finger and/or arm functions.
- c) **Push-pull handle** A push-pull handle is operable by a simple push-pull movement of the handgrip; therefore, it is suitable, in the push operation, for the users suffering from the declined hand/finger and/or arm functions. However, in the pull operation, the size and shape of handgrip should be taken into consideration, and it should be checked whether or not the users suffering from the declined hand/finger function can operate the handle smoothly.
- d) **Thumb latch handle** A thumb latch handle requires an operation that the operation part is pressed by the thumb; therefore, it is not suitable for the users suffering from the declined hand/finger function.
- e) **Door lock** The suitable key insertion part of the cylinder shall be so that it has a mortar-shape to lead the key easily and the key insertion part emits a light. Also, a reversible type key in which its orientation is not constrained is preferable.

The electric lock is suitable for the users suffering from the declined hand/finger function.

- f) **Thumb turn** A thumb turn of large and good in visibility is suitable because it is operated by being pinched between fingers. An electric lock which can be locked/unlocked by operation buttons, remote control device or the like is suitable for the users suffering from the declined hand/finger function. If a security thumb turn of which the operation part is detachable or the like, the operability should be checked.