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**General requirements relative
to hoists for the transfer of
disabled persons**

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law.

In establishing the standard, **ISO 10535 : 1998** *Hoists for the transfer of disabled persons—Requirements and test methods* was used as a basis with a view to making easy the comparison between **JIS** and the International Standard, the development of **JIS** conforming with the International Standard and the submission of draft proposal of International Standard prepared based on **JIS**.

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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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General requirements relative to hoists for the transfer of disabled persons

Introduction This Japanese Industrial Standard has been made on the basis of **ISO 10535** *Hoists for the transfer of disabled persons—Requirements and test methods* published in 1998 as the first edition with modifying some parts of the technical contents and, as a result specifying the clauses corresponding to the general requirements and test methods out of the clauses described in the corresponding International Standard.

The portions underlined with dots in this Standard are the matters not included in the original International Standard.

1 Scope This Standard specifies the general requirements for hoists used for the persons unable to easily transfer or move by their own help (hereafter referred to as “hoist”). This Standard does not apply to the apparatus for transferring to other floors.

Remarks : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relative International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

ISO 10535 : 1998 *Hoists for the transfer of disabled persons—Requirements and test methods* (MOD)

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of coming into effect is given to these referred standards, only the edition of indicated year constitutes the provision of this Standard but the revision and amendment made thereafter are not applied. The normative references without the indication of the year of coming into effect apply limiting only to the most recent edition (including amendments).

JIS T 0601-1 *Medical electrical equipment—Part 1 : General requirements for safety*

JIS T 1005 *Style manual for instruction manuals*

JIS T 1006 *Graphical symbols for medical electrical equipment*

JIS B 8361 *Hydraulic fluid power—General rules relating to systems*

JIS B 8360 *Wire reinforced rubber hose assemblies for hydraulic use*

JIS B 8364 *Textile reinforced rubber hose assemblies for hydraulic use*

JIS B 8370 *Pneumatic fluid power—General rules relating to systems*

JIS Z 8731 *Acoustics—Description and measurement of environmental noise*

ISO/TR 12100-1 : 1992 *Safety of machinery—Basic concepts, general principles for design—Part 1 : Basic terminology, methodology*

ISO/TR 12100-2 : 1992 *Safety of machinery—Basic concepts, general principles for design—Part 2 : Technical principles and specifications*

IEC 812 : 1985 *Analysis techniques for system reliability—Procedure for failure mode and effects analysis (FMEA)*

IEC 1025 : 1990 *Fault tree analysis (FTA)*

IEC 60601-1-2 : 1993 *Medical electrical equipment—Part 1 : General requirement for safety. 2. Collateral standard : Electromagnetic compatibility—Requirements and tests*

3 Definitions For the purposes of this Standard the following definitions apply:

- a) **adverse condition** The condition in which failure is most likely to occur and which is based on continual trial and error.
- b) **attendant** The person who operates the hoist if not the lifted person.
- c) **backrest** The part of the body support unit that supports the back of the person being lifted, moved or transferred (e.g. sling, seat, stretcher etc.) along with the associated attachment structure.
- d) **backwards** 180° to the forwards direction of travel.
- e) **body support unit** The part of the hoist that supports the person being lifted, moved or transferred (e.g. sling, seat, stretcher etc.) along with its associated attachment structure.
- f) **ceiling hoist** An overhead mounted hoist system fixed to the ceiling or wall(s), including the tracking system.
- g) **central suspension point (CSP)** A reference point on the hoist to be used for measurements (this point may be a connecting point).
- h) **connecting point** The part to which the body support unit attaches.
- i) **control devices** The part or parts of the hoist which operates the lifting and lowering mechanisms of the CSP as well as other functions, e.g. leg opening of the mobile base.
- j) **end limiting device** A device that stops any movement at a predetermined end position.
- k) **flexible device** A component along with any associated joining components that functions as a lifting device (e.g. chain, tape, rope).
- l) **footrest** The part of the body support unit that supports the feet.
- m) **forwards** The intended direction of travel, as stated by the manufacturer, in relation to the person who is moving the hoist.
- n) **free-wheeling** The reverse rotation stop for transmitting a force in one way direction only by the working between ratchet wheel and the ratchet.
- o) **functional test** The test to confirm that the corresponding mechanism and structure are in a required condition by means of operating, for example.

- p) **hoisting range** The vertical difference between the maximum and minimum heights of the CSP (see Attached Figs. 6 and 7).
- q) **hoisting reach** The unimpeded horizontal distance between the structure and a vertical line through the CSP at a given height within the hoisting range (see Attached Fig. 6).
- r) **hold to run control device** Control device(s) which initiates and maintains operation of the hoist elements only as long as the manual control is actuated. The manual control automatically returns to the 'Stop' or 'Off' position when released.
- s) **legrest** The part of the body support unit that supports the legs.
- t) **lifted person** The person who is transferred by the hoist.
- u) **lifting cycle** The raising and lowering of the lifting machinery for the same distance in both directions.
- v) **lifting device** Means of lifting and lowering the body support unit.
- w) **lifting machinery** Device that performs the lifting function, e.g. the hydraulic, mechanical or electrical apparatus.
- x) **locking gate** A device that ensures a hoist cannot move from one track to another unless both tracks are in the correct position.
- y) **locking system** The means by which the rigid body support unit is secured to the hoist.
- z) **maximum load** The greatest permissible load, excluding the body support unit, that can be applied to the hoist.
- aa) **mobile hoist** A hoist fitted with a device or devices (e.g. wheels) that is freely movable and propellable along the floor, and with which a disabled person is lifted, transferred or moved.
- bb) **multi-purpose hoist** A hoist that can be assembled, possibly with the use of different parts, to provide a variety of operations.
- cc) **non-rigid body support unit** A device that is manufactured from flexible materials which adapts to the body shape, with the associated connecting means of attaching to the lifting device of the hoist.
- dd) **rail guided hoists** A hoist transferring along the rail fixed above the head, for example, to the ceiling, wall or support. There are running on ceiling type and stationary type.
- ee) **rigid body support unit** A preformed seat or recumbent device, manufactured from rigid materials (if necessary padded), or flexible materials encased by a frame, with associated connecting means for attaching to the lifting device of the hoist.
- ff) **single fault condition** Condition in which a single means for protection against a safety hazard in equipment is defective or a single external abnormal condition is present.

- gg) **sitting part** Part of the body support unit that is available for sitting on.
- hh) **sling** The body support unit manufactured from soft cloth, for example, fitting the body and to be attached to the lifting device of the hoist.
- ii) **spreader bar** A rigid construction with more than one connection point, onto which the body support unit is attached (for example see Attached Figs. 6 and 7).
- jj) **stationary hoists** A hoist with which a person is lifted, transferred or moved within a pre-defined area and which is fixed to a wall, ceiling or floor or is mounted in or on other allied devices.
- kk) **turning radius** The radius of the narrowest circle encompassing the extreme points of the hoist, when it is turned 360° without being reversed.
- ll) **wheeled hoists** A kind of the mobile type hoist with casters that is freely movable and propellable along the floor and with which a disabled person is lifted, transferred or moved.

4 Classification and division

4.1 Classification and symbols The classification and symbols shall be as given in Table 1.

Table 1 Classification and symbols

Classification		Symbols
Mobile type	Wheeled hoists with sling seats (Non-rigid body support units)	WHN
	Wheeled hoists with solid seats (Rigid body support units)	WHR
	Hoists trolleys (Stretcher type)	HTS
Stationary type	Stationary hoists fixed to the wall/walls, floor and/or ceiling (House)	SHH
	Stationary hoists fixed to, mounted in or on another product	SHP
Rail-guided type	Ceiling hoist (Stationary hoists fixed to ceiling)	SHC
	Stationary free standing hoists (Free standing type)	SHF
Other type hoist	Rest of hoists	ROH
Body support unit	Body-support units for hoists (Non-rigid body support units)	BSN
	Body-support units for hoists (Rigid body support units)	BSR

4.2 Division according to maximum load The division according to the maximum load shall be as given in Table 2 which is generated by the corresponding maximum mass.

Table 2 Division according to maximum load

Symbol for division	Maximum load N	Maximum mass kg
W60	588	60
W80	784	80
W100	980	100
W120	1 176	120
WX	Over 1 176	Over 120

5 Requirements

5.1 General requirements

5.1.1 Risk analysis The requirements of **IEC 812**, **IEC 1025**, etc. apply to the risk analysis. The procedure and result of the risk analysis shall be maintained by the manufacturer in a written form.

5.1.2 Ergonomics factors The ergonomics condition of hoists shall be considered at the time of design. For securing the safety, the human ability, skill, limit and want shall be taken into account in addition to the mutual relation between human beings, technology and working circumstance. The gists to be considered are as follows:

- a) Body dimensions, posture, body action and biological dynamics shall be taken into account in designing the hoist. The design of the handle and pedal shall meet with the following requirements:
 - the distance between any handle (part intended to be grabbed) requiring an operating force of more than 10 N and any construction part of the hoist shall not be less than 35 mm;
 - the distance between any upper surface of a pedal (in its operating position) and any other part of the hoist shall have a vertical toe clearance of not less than 75 mm;
 - the diameter of any operating handles and or knobs requiring an operating force of more than 10 N shall be between 19 mm and 43 mm;
 - pedals shall be placed not more than 300 mm above the surface of the floor;
 - hand operated controls shall be placed at a height of 800 mm to 1 200 mm above the floor;
 - handles for pushing and/or pulling shall be placed at a minimum height of 900 mm.

Remarks : Operating controls used by the lifted person may require other positions.

- b) Mental ability (information recognition and processing) is considered in designing.
- c) Marking and signal are clearly recognized without ambiguity.
- d) Control actuator is designed so as to fit the physiological characteristics of the body part used for operating it.
- e) The design is made taking into account the influence given to the body by the environment (noise, vibration, heat radiation, lighting, hazardous material and radioactivity).

5.1.3 Sound level The maximum sound level of any hoist shall not exceed 65 dB (A) as measured in accordance with **JIS Z 8731** during one raising or lowering lifting cycle with the hoist loaded with the maximum load.

5.2 Safety requirements

5.2.1 Every hoist shall be capable of lifting a lifted person of the maximum load given in Table 2 (excluding body support unit).

5.2.2 Electrically operated hoist shall conform to **JIS T 0601-1** regarding electrical safety.

5.2.3 All load-bearing fasteners shall be either self-locking or fitted with a locking device to prevent inadvertent detachment.

5.2.4 Single use components (e.g. self-tapping screws), shall not be used to secure any component that can be deemed to be load-bearing. In addition they shall not be used for the assembly of any component(s) that is intended to be removed for the purpose of dismantling for transport or storage.

5.2.5 Unless required for a specific function of the hoist, all accessible edges, corners and surfaces shall be smooth and have no burrs or sharp edges. All projections shall be avoided or fitted with adequate protection to prevent damage or injury.

5.2.6 It shall not be possible to assemble the hoist in a manner which affects the overall safety of the unit. If the lifting device incorporates a mast, it shall be so located in relation to its base that it can only be assembled in the correct working position.

5.2.7 Protection against shearing, crushing, drawing in, trapping and abrading shall be provided and shall be in accordance with the requirements of **ISO/TR 12100**.

5.2.8 The hoist shall include in its design some means (e.g. limiting switches, the principal of free-wheeling etc.) that will ensure that, when lowering, should the body support unit, spreader bar or lifting arm come into contact with the lifted person, the total load imposed on the lifted person shall not be greater than the total mass of those parts.

5.2.9 When operated, the means provided in **5.2.8** shall not allow the hoist to become unsafe.

5.2.10 All controls, for lowering or raising the lifted person, shall be easily accessible and operable by the person operating the hoist.

5.2.11 Electrically operated hoists shall be provided with an emergency device which is readily accessible and is wired to isolate the power supply and to stop any electrically produced mechanical movement which could cause a safety hazard.

5.2.12 On all battery-powered hoists, to ensure that a full range lifting cycle with maximum load can be completed once started, a warning device shall be provided.

5.2.13 On all battery-powered hoists, a warning device(s) shall be provided that will indicate when the battery(ies) require charging.

When this device operates there shall be sufficient power available to complete one (1) full lifting cycle with maximum load.

5.2.14 All controls shall be of the 'hold to run' type.

5.2.15 Any hoist shall be designed in such a way so that it shall not lift more than 1.5 times the maximum load.

5.2.16 Hoists shall be provided with a safety device that shall ensure that the lifted person does not fall in the event of a single-fault condition of the lifting machinery.

5.2.17 After the static test, in accordance with **6.2.17**, any flexible lifting device and associated lifting joints shall show no sign of damage that will effect the function of the hoist as stated by the manufacturer.

5.2.18 A connection point shall be so designed that the body support unit shall not become inadvertently detached.

5.2.19 Where necessary, all precautions shall be taken [e.g. by the fitting of a safety device(s)] to protect the lifted person from inadvertently falling off/from the body support unit.

5.2.20 The electromagnetic wave compatibility of electrically operated hoists shall conform to **IEC 60601-1-2**.

5.2.21 The connection point(s) shall be smooth thus avoiding excessive wear of any connectors.

5.3 Requirements for performance

5.3.1 The hoist shall be designed for the purpose of transferring a disabled person according to the field of application, as stated by the manufacturer (see Annex B) and it shall be able to be operated by one person. If not, this shall be stated in the instructions for use.

Remarks : When being used in the designated manner the hoist should enable the disabled person to be positioned in such a way as to minimise the need for attendant repositioning.