

## **Prototype Specification for Hydraulic Sabbath Elevator**

This prototype specification lists the type of requirements usually specified for Sabbath and holiday operation of a hydraulic elevator. Because there are differences among elevators in the details of their operation and control, this specification is not necessarily completely applicable to all hydraulic elevators or to a specific elevator. Only when all details of operation are made known to the Institute for Science and Halakha can a final specification be written for a particular elevator.

### **1. Automatic service**

a. When operating on the Sabbath or holiday in the "Shabbat" mode, the elevator shall operate completely automatically according to a preset program without the possibility of affecting the program by operating the pushbuttons in the car or at the stations. The car shall stop at the entrance floor and at the other desired floors, remain at each for a preset time interval, and then proceed to the next station in accordance with the preset program without being influenced by any external factor.

The car may stop at desired intermediate stations during ascent or descent or in both directions of travel. The times at each floor need not be equal. It may be desirable that the car park a longer time at the entrance floor. This allows more time for entrance and exit of passengers and also lowers the motor and oil pump duty cycle.

The requirement for automatic service does not cancel or take precedence over existing safety requirements for alarm buttons, door open buttons and door safety buffer which shall remain operative as described below.

b. A time switch operated by a clock mechanism shall be provided to allow setting of the hours during which operation in the Shabbat mode is desired. The clock may have a 24-hour or seven-day cycle. Where appropriate, the clock may be replaced by computer software which takes into account the different hours of the onset and end of the Jewish Sabbath and holidays at different seasons of the year and the occurrence of Jewish holidays at different Gregorian dates each year.

c. If a 24-hour clock is used, a manual switch shall be provided to enable changing from normal to Shabbat mode (key operated, if desired). The clock settings are made before the onset of the Sabbath or holiday. The switch is turned on before the onset of the Sabbath or holiday and turned off after it has ended. Setting the clock switching times and operation of the changeover switch shall be the only operations required to put the elevator into Shabbat mode. Where a seven-day clock is used, the manual switch is not required.

The time settings of a seven-day clock must be changed both before and after the occurrence of holidays, an operation that may sometimes be complicated for untrained personnel. It has often been found preferable to use a 24-hour clock with the manual switch operated before and after each holiday in the same manner as before and after the Sabbath.

If the clock switch connects the Shabbat mode when the car has previous calls registered, the car shall accept no further calls and finish all existing calls before going over to the Shabbat mode. If Shabbat mode service is ended when the car is in motion or at an intermediate station, the car shall

proceed to the entrance floor, open its doors and allow time for exit of passengers before ending the service.

d. It is preferred that the car be completely out of service on the Sabbath during those hours when the Shabbat mode is not connected. If it is required that the car revert to normal service during the hours when the Shabbat mode is not connected, there shall be clear indication during Shabbat service that the car is operating in the Shabbat mode, as detailed below in paragraph 2c.

## **2. Lights and Indicating Lamps.**

a. The lighting in the elevator car shall remain on continuously during operation in the Shabbat mode and shall be controlled only by the clock-operated time switch or circuits operated directly by it.

b. If the car is out of service at some time during the Sabbath, it shall be parked at the entrance floor with the lights out and the doors open. In elevators equipped with manually operated shaft doors, opening the shaft door shall not cause the car lighting to turn on.

c. If the car returns to normal weekday service on disconnection of the Shabbat mode, it is required that there be clearly visible indication of Sabbath service at each landing during the time that the service is operative. It is recommended that there be such indication in the car as well, located in a position where it can be seen clearly by an entering passenger. An explanatory notice shall be posted at the entrance floor or other appropriate place or places to warn against accidental entrance by a Sabbath observer into a car not operating in Shabbat mode. All means must be employed to avoid or make improbable that a passenger who desires Sabbath service should enter the car on the Sabbath while it is in normal service.

If the car is completely inoperable when not in the Shabbat mode, the aforementioned floor indications are recommended but not mandatory.

d. Where some elevators of a group are in normal service and others are in Sabbath service, there shall be clear indication which are in Sabbath service.

e. No indicating lamps of the incandescent or fluorescent types shall be activated or extinguished during service in the Shabbat mode. There shall be no flashing, intermittent operation or other visible changes in light intensity in any such lamps that are illuminated continuously during service in the Shabbat mode. The above requirements apply to lamps in the car, at the landings and in the control room.

"Cold" light sources, such as LED (light emitting diodes) or LCD (liquid crystal displays) lamps in the car, at the landings or in the control room, may be illuminated and extinguished during Sabbath service. Except as described below in paragraph 3d, if these "cold" lights form numerals, letters or symbols, they shall be disconnected or display a fixed unchanging symbol during service in Shabbat mode.

## **3. Car Direction and Position Indicators.**

a. Indicators of car position and of the direction of subsequent travel that turn on as the car reaches a landing shall not operate during Sabbath service. To identify floors, it is recommended that there be

clear indication of the floor number painted or posted at the landings and so positioned as to be visible to the car passengers as the doors open.

b. If the elevator serves only a small number of floors or if it stops at stations only when traveling in one direction and travels non-stop between end floors in the other direction, travel-direction indicating arrows shall be disconnected during Sabbath service.

c. If the absence of travel-direction indication will seriously interfere with proper passenger service, the indicators shall operate as described below.

All UP arrows shall be turned on at the initiation of door closure before the car leaves the bottom floor and shall remain on as the car ascends. All UP arrows shall be extinguished and all DOWN arrows shall be turned on at any time between arrival at the top floor and the initiation of door closure before descent. The DOWN arrows shall remain lighted during descent and shall be extinguished at the moment the UP arrows are activated at the end of the parking time at the bottom floor.

d. Directional arrows used as in subparagraph c, above, shall be of the LED or LCD types. If it is desired to use other lamp types, send technical details to the Institute with a request for instructions.

#### **4. Pushbuttons.**

a. All call pushbuttons at the stations and dispatch buttons in the car shall be disconnected from voltage when the car is in the Shabbat mode. This requirement does not apply to call buttons common to a multiplexed group of elevators where some elevators of the group are operating in Sabbath service and others in normal weekday service.

b. The Alarm button shall operate in Shabbat mode as in normal weekday service.

c. The Door Open button shall operate as described in paragraph 7c.

d. If local codes require a STOP button, inform the Institute of the requirements and request further data.

#### **5. Speed variations.**

Four categories are defined below for the differences in velocity and total travel time, during descent, between that of an empty car and that of a fully loaded car.

a. Category A: The total elapsed time of descent from floor-to-floor of the fully-loaded car is less than 90 percent of the total elapsed time of descent of the empty car.

b. Category B: The total elapsed time of descent from floor-to-floor of the fully-loaded car is equal to or longer than 90 percent, but shorter than 96.7 percent of the total elapsed time of descent of the empty car.

c. Category C: The total elapsed time of descent from floor-to-floor of the fully-loaded car is equal to or longer than 96.7 percent but less than 100 percent of the total elapsed time of descent of an empty car.

d. Category D: The total elapsed time of descent from floor-to-floor of the fully-loaded car is longer than the total elapsed time of descent of an empty car by at least 100 milliseconds. Category D is the preferred category for hydraulic Sabbath lifts

e. Total elapsed descent time is measured from the instant the car starts to move downward until the instant it halts.

f. Load compensation on descent by hydraulic means is permitted. If variation in oil pressure or flow caused by differences in load is detected by electronic means and used in electronic feedback loops for speed or load compensation, the Institute must be informed of the technical details to enable determination of permissibility. In most cases, the use of electronic pressure detector and amplifier is not permitted.

Note: If the hydraulic valve is equipped with mechanical/hydraulic load compensation and means to adjust it, it is often possible to meet the requirements of Category C or even Category D. In the case of fixed compensation, adjustment can sometimes be made by choice of a spring with appropriate characteristics to increase the compensation or achieve over-compensation.

## 6. Switches

a. If the elevator is in category A, above, all switches actuated by car movement in its normal travel during descent, e.g., to operate solenoid valves, or to supply information on car position or floor identification, shall be of the vane-operated photoelectric, or of the electronic proximity types as described below.

1) All photoelectric switches in which an opaque vane or partition interrupts a light beam, preventing it from reaching a photodetector, and thus performs the desired control operation are acceptable. Switches in which the vane reflects light back to the photodetector and, thereby, the appearance of light at the detector performs the operation are not acceptable. The desired action must always take place as a direct consequence of blocking the light from the detector.

2) Acceptable electronic proximity switches are those in which the proximity of metal causes a lowering in amplitude of an oscillation or stops the oscillator completely, thus causing the switching action. Such switches may be approved if technical details of their method of operation are made available to the Institute. Switches of this type approved to date include those manufactured by Turck, Scan, Balluf, Pepperl + Fuchs, and Telemecanique. (These are European and Asian companies. To date, the Institute has no data on American manufacturers of such switches.) Approval may be granted to other manufacturers after technical details of their sensors are made available to the Institute.

b. If the elevator is in category B, in addition to the switches described in subparagraph a, above, magnetic switches as described below are also permitted.

Acceptable magnetic switches are those that have a magnet and a switch on opposite sides of a fixed gap. The entrance of an iron vane into the gap operates the switch. The desired action performed by the switch, such as, for example, operation of solenoid valves to slow or stop the car or to indicate car location, shall be initiated by entrance of the vane into the gap and not by its exit from the gap.

Magnetic switches in which the approach of the pole of a magnet to the switch causes the desired action are not acceptable. (E.g., reed relays, bistable switches, and Hall detectors)

c. If the elevator is in category C or category D, there is no limitation on the types of switches actuated by car descent.

d. The approved switches may replace the usual switches completely and be used both in normal and Shabbat mode. Alternatively, the regular switches may be disconnected and the approved switches replace them only when the car is in the Shabbat mode.

e. If, for elevators of categories A and B, safety codes require an electromechanical switch to be actuated during descent, the Institute must receive circuit diagrams showing the circuits of such switches. After examination of the circuit diagram, the Institute will supply instructions concerning such electromechanical switches. In many cases, sometimes with slight circuit modifications, such switches may remain in normal use.

Where building safety codes require an electromechanical switch to be actuated on descent but this specification does not permit it to perform its function, the electromechanical switch shall be preceded by an approved switch that shall perform the required operation. The electromechanical switch remains connected as a backup to perform the operation in the event of malfunction of the approved switch. For example, if the mechanical switch, as is common, performs a disconnect, place the contacts of the approved switch in series with those of the mechanical switch and adjust its operating vane to actuate the approved switch when the car is a short distance above the actuation point of the mechanical one. It is preferred that the contacts of the approved switch be located on the voltage side of the supply and the mechanical switch nearer to the common ground side. Means shall be provided to enable verification, visually or by electrical measurement, that the permitted switch is the actual operative one and precedes the backup.

f. All the specified limitations on switches apply only where the actuation and resultant action occurs on car descent. There is no limitation on switches actuated operatively only during ascent. Switches not normally actuated in Sabbath service need not be modified or replaced. Thus, switches actuated only in the event that the car descends below the bottom floor or below the lowest floor served in Sabbath service may remain unchanged.

g. If preopening uses switches not permitted in the Shabbat mode, it is recommended that there be no preopening in Shabbat mode.

## **7. Doors.**

a. A warning buzzer shall be installed which, in Sabbath service, shall buzz for approximately two to three seconds at the end of the predetermined parking time at the landing before the doors start to close. The buzzer serves as a warning to the passengers that the doors are about to close. If the elevator is equipped with automatic doors, the buzzing sound may end when the doors start to close. The buzzer should be sufficiently loud to be heard in the car and just outside the open doors. It should not be that loud or harsh sounding that it disturbs persons in rooms adjacent to the elevator.

b. If there is interference with door closure detected by a photoelectric device or by contact with a safety buffer, the door shall stop. It may stay in that position or reopen either partly or completely. After stopping or after reopening, the door shall not attempt reclosure for a preset time of at least five seconds. Before reclosure, the buzzer shall sound repeating the cycle described in subparagraph a, above. Interference with reclosure shall cause repetition of the above-described delay and warning

buzz cycle. Under no circumstances shall release of the door or removal of the interfering object cause immediate continuation of the closure. Nudging is not permitted.

c. The Door Open pushbutton shall open the door completely and then operate in the same manner as the safety buffer switch, i.e., it shall initiate the delay and warning-buzz cycle and subsequent attempt at reclosure described in subparagraph b, above.

d. If the door is equipped with a photoelectric safety device in addition to a safety buffer, the photoelectric device shall be made inoperable in the Shabbat mode except as described in subparagraph e, below. The photodetectors themselves must be inactive, i.e. they shall not react to the presence or absence of light (e.g., by disconnect of supply voltage). The door safety buffer shall remain operative.

e. If disconnection of the photoelectric device will cause hardship, as in the case of elevators used often by passengers who are aged or have disabilities, the photoelectric device shall be operated as specified below.

If a photo-safety device is the only door protection with which the elevator is equipped or where passengers are aged or have disabilities, the photoelectric device shall be disconnected from supply voltage immediately upon arrival of the car at the landing before the doors are opened. The device shall be reconnected at the moment that the doors begin to close at the end of the buzz.

f. In elevators with manually operated hall door and automatic car door, the buzz shall be two to three seconds longer than the time required for the manually operated door to close from a 90-degree open position. If the hall door is found to be closed at the conclusion of the buzz, the car doors shall begin to close. The buzz before travel shall continue until the shaft door is locked.

If the shaft door locks at the onset of car door closure, the buzz may end immediately. If the shaft door locks only upon complete closure of the car door, the buzz shall continue until locking of the shaft door.

If a door is open at the end of the buzz, the car shall remain at the station for an additional interval of at least five seconds. At the end of the interval, the warning buzzer shall sound again to warn passengers to close the manual doors. The interval - buzz cycle shall be repeated until the door is found to be closed at the end of a cycle.

g. If the elevator is equipped with a manually operated shaft or car doors, all voltage shall be disconnected from door operated switches from the moment the car stops at a station until the end of the buzz before starting travel to the next station. If the interval-buzz cycle is to be repeated, voltage shall be disconnected immediately until the end of the next cycle

h. The parking time at the landings shall be sufficiently long to allow, under average conditions, entry and exit of the passengers before the warning buzzer sounds.

## **8. Weighing Mechanisms.**

Hydraulic passenger elevators do not usually have weighing mechanisms other than load compensation in the hydraulic valve. In the event that there are other load weighing devices, supply details to the Institute to enable permissibility to be determined. (For specification requirements on load compensation see paragraph 5f.)

### **9. Speed and position control.**

Should there be any equipment for measurement and control of car speed and position such as tachometers or optical encoders, inform the Institute and request instructions.

### **10. Releveling.**

If the car arrives inaccurately at the landing, releveling is permitted before the doors are opened, subject to the limitations imposed by the requirements of paragraph 6, above. There shall be no releveling caused by passenger entrance or exit. If the sag with load causes a safety hazard, contact the Institute to receive data on possible alternative solutions.

Releveling caused by sag after the car stands at a station for a long time at a station is permitted. Such releveling will not usually occur during the short time that doors are open immediately after arrival at a floor.

### **11. Approval.**

The Institute will give final approval of the elevator for Sabbath use for Science and Halakha when it has been verified that the elevator meets all of the specified requirements.