The application of the New Machinery Directive 2006/42/EC has resulted in the introduction of new safety requirements also in hydraulic elevators. The publication of the Amendment A3 81.2 incorporates these new. Compared to the previous edition have been excluded elevators having a speed less than or equal to 0.15 m/s. Were also included in various parts of the text and appendices, the requirements on fixing system of removable guards, precision leveling and stopping and on unintended movement of the car. Regarding the protection against unintended car movement, hydraulic lifts shall be provided with a means to stop unintended car movement away from the landing with the landing door not in the locked position and the car not in the closed position, as a result of failure in any single component of the hydraulic or drive system upon which the safe movement of the car depends, except failure of the suspension ropes, flexible hoses, steel piping and cylinder. The means shall detect unintended movement of the car, shall cause the car to stop, and shall keep the lift out of operation. The means shall be capable of performing as required without assistance from any lift component that, during normal operation, controls the speed or retardation, stops the car or keeps it stopped, unless there is built-in redundancy and correct operation is self-monitored. In the case using two electrically commanded hydraulic valves operating in series, self-monitoring implies separate verification of correct opening or closing of each valve under the empty car static pressure. If a failure is detected, next normal start of the lift shall be prevented.

Protection against upwards unintended movement is usually implemented through the monitoring of motor stop contactors by the control panel, whereas for the down direction, Start Elevator was expected to respond to new security requirements with following devices:

A. DS safety valve (various sizes available) to be added to pre-A3 amendment pump unit. Is expected that the DS valve can be used in two ways:
   A.1 as an emergency stopping element of the cabin
   else
   A.2 as an element of redundancy in the descent on the pump unit.

B. Valves assembly (Ex. 93/E-2DS, 11/M e LX) that already have redundancy in down commands.


The stopping devices shall be activated in conformity with the requirements of the standard rule and the interface instructions given by the Start Elevator.

In cases A.2 and B. it is provides a redundancy monitoring in conformity with 9.13.3 of standard EN 81-2:1998+A3:2009. The expected monitoring is a functional type by the control panel as indicated in the diagrams of the devices provided by the Start Elevator.

Redundancy monitoring is subject to type examination.

When the devices has been activated or the redundancy monitoring has indicated a failure of the stopping element, its release or the reset of the lift shall require the intervention of a competent person in conformity with 9.13.9 of standard EN 81-2:1998+A3:2009.

REDUNDANCY MONITORING FUNCTION

Start Elevator prepares on the pump unit two electrical devices (coils $E_2$ and $E_1$) that should be normally activated to allow the cabin to move downward. In the pump unit that are equipped with dawnward redundant valves group, the coils are that of normal downstroke solenoid valve and of $2°$ downstroke solenoid valve. If instead you use the DS safety valve, the coils interested in testing are that of valve DS and of normal descent of the pump unit. The monitoring should include a test of activation for each of the valves $E_2$ and $E_1$. If there are other devices that are normally used in downward, they must be activated, however in low speed, during both tests.

The parameters interesting the monitoring are:
- Frequency and operating conditions
- Opening times of descent devices
- Distance of the contact detecting abnormal lowering during monitoring.

The frequency of monitoring is not indicated in the technical standard, but should be adequate the execution of automated tests at least once in 24 hours, and certainly what happens if they are execute when the car is sent automatically to the lowest level within 15 min. the last normal travel. Alternatively you can execute the tests periodically in 24 hours, the lowest floor, in the absence of calls, for about 60 seconds after the closing doors.

The tests can be performed alternately on the two devices, or in sequence according to the instructions of specific use of the devices. The time ($t_1$) for the activation of each valve must be included between 5 and 10 s. The time ($t_2$) between the activation in sequence of a valve and the following must be between 5 and 10 s.

The contact detecting abnormal lowering coincides with upward releveling contact (ID) the lowest floor.

If, during the automating test, it detects an abnormal lowering, it shall stop the test, and shall keep the lift out of operation as expected by the standard rule.

It is advisable, after the releveling, to repeat the first test before putting the system out.
DOWNWORD DEVICES TO MAKE FUNCTIONAL TEST
Shows the devices and the execution sequence of tests, refer to the valve assemblies of our production.

1. **Safety valve DS used as redundancy element. (sheets 08183, 08184, 08185 and 08186)**
   - E2 Unblock solenoid valve of safety device DS
   - E1 Downstroke solenoid valve of the pump unit

2. **Valve assembly 11/M (sheet 02160)**
   - E2 Downstroke solenoid valve <16>
   - E1 2° Downstroke and Upward starting solenoid valve <20>

3. **Valve assembly 93/E-2DS (sheet 03132)**
   - E2 Downstroke solenoid valve <16>
   - E1 2° Downstroke and Upward starting solenoid valve <20>

4. **Valve assembly LX (sheet 02520)**
   - E2 2° Downstroke solenoid valve <22>
   - E1 Downstroke solenoid valve <16>

Does not exclude other sequence of monitoring by the control panel or specific device.
These different solutions, however, must be evaluated by the Start Elevator regarding their compliance with their devices.
The control panel or specific devices must have the ability to easily test and verification of the monitoring system and then of the valves redundancy.