Report EC type-examination

Report belonging to EC type-examination certificate nr.	:	NL 03-400-1002-004-30
Date of issue of original certificate	:	November 27th, 2003
Nr. and date of revision of certificate	:	Rev. 1, January 18th 2007
Nr. and date of revision of report	:	Rev. 1, January 18th 2007
Concerns	:	Safety component Printed Circuit Board
Revision 1 concerns	:	See Annex 2
Requirements	:	Lifts Directive 95/16/EC, Standards: EN 81-1 / EN 81-2 article 14.1.1, 14.1.2.1.3, Annex H / F6
Project nr.	:	P070017-01

1. General specifications

Name and address manufacturer	:	Schindler Elettronica S.A. Via della Pace 22 CH-6600 Locarno, Switzerland
Description safety component	:	SUET 3.Q safety circuit used for bridging of door and door locking contacts during levelling
Type	:	SUET 3.Q
Laboratory	:	Liftinstituut, Amsterdam, Netherlands
Date / data of examination	:	October 2003
Examination performed by	:	D. Lantsink

2. Description safety component

Technical details	:	Safety circuit used for bridging of door and door locking contacts during levelling
Usage	:	Safety circuit used for bridging of door and door locking contacts during levelling
Limits of use for Safety component	:	Safety-line circuit voltage maximum 125 Volt AC/DC, current max. 1000mA Voltage safety relays 20,5 Volt DC

The printed circuit board SUET 3.Q is used when door pre-opening is required.

LIFTINSTITUUT B.V. - VEILIGHEIDS- EN KWALITEITSMANAGEMENT

Buikslotermeerplein 381 | Postbus 36027 | Tel. 020 - 435 06 06 | www.liftinstituut.nl | BTW-nummer:
1025 XE Amsterdam | 1020 MA Amsterdam | Fax 020 - 435 06 26 | info@liftinstituut.nl | NL 812392991

The car- and landing-door already open before the car reaches the destination floor.
In order to enable this operation it is necessary to bypass the door contacts/door locking contacts.
The PCB contains four safety relays RUET, RUET1, RKUET and RFUET.
These four relays together form a safety circuit for bridging the door safety contacts during levelling of the car.
The door zone signals KUET/KUET1 (magnetic sensors) or PHEUT/PHS (optical sensors) are used for activation of the safety relays RUET and RUET1.
The levelling speed is checked by the microprocessor, safety relay RFUET is activated in case the levelling speed has been reached.

Change of state of the door zone signals KUET/KUET1, PHS/PHUET has to be established within a certain delay time (between 130 and 180 msec.).
The purpose of this delay time is to be able to activate both relays RUET and RUET1, in case the door zone signals are not activated at exactly the same time.
Control relay RKUET is connected to the "electronic time delay circuit" and will be de-energized with a delay (may vary between 130 and 180 msec.).

3. Examinations and tests

The purpose of failure analysis according EN 81 is to verify that one or more faults can lead to a dangerous situation, this means uncontrolled bridging of door contacts/door locking contacts.

Any single fault listed in par. 14.1.1 of EN-81 in the electric equipment of an elevator, if it can not be excluded under conditions described in par. 14.1.1.2 and/or Annex H shall not, on its own, be the cause of a dangerous malfunction of the elevator.
For some (electronic) components short circuit or open circuit, change of value or change of function can not be excluded according Annex H of EN-81.
It is necessary that the fuse in the safety circuit is correctly rated and constructed according to the applicable IEC-standards to prevent a dangerous situation in case of short circuit.

The required creepage and clearance distances are mentioned in Annex H and therefore part of the failure analysis.
All the relevant distances between the connections to the safety chain and the tracks behind these connections and to other connections and their associated tracks are measured.

In Annex H there are some requirements about the used materials and (electronic) components, the manufacturer has to make an official declaration about these materials and components.

NOTE:
When the requirements of Annex H are fulfilled, there is a possibility for the manufacturer to make his own risk analysis on the subject.
The replacing technical solution has to be of equivalent safety.
It is for the Notified Body whether or not to accept this.

LIFTINSTITUUT B.V. - VEILIGHEIDS- EN KWALITEITSMANAGEMENT

Buikslotermeerplein 381 | Postbus 36027 | Tel. 020 - 435 06 06 | www.liftinstituut.nl | BTW-nummer:
1025 XE Amsterdam | 1020 MA Amsterdam | Fax 020 - 435 06 26 | info@liftinstituut.nl | NL 812392991

For technical information and explanation of this circuit we refer to the accessory report of the PCB SUET 3.Q (EC type-examination number NL00-400-1002-004-30 October 2003).

The safety circuit for bridging the door safety contacts is built up of two independent channels (relays RUET and RUET1 and door zone signals KUET/KUET1 or PHUET/PHS) and a control circuit (relay RKUET), which monitors the equal status of two independent channels.
The door bridging is not possible in case of different status between the two channels.

The functioning of the control circuit (relay RKUET) itself will be checked each time the lift reaches a door zone after activation of the relay RFUET.

The safety relays RUET, RUET1 and RKUET together form a safety circuit according to par. 14.1.2.3 of EN-81.

The speed of the lift in case of levelling has to be in accordance with par. 14.2.1.2 (point B).

The movement of the lifts, in case the door contacts/door locking contacts are bridged, is limited to the unlocking zone by the door zone signals KUET/KUET1 or PHUET/PHS.
The length of the door zone has to be in accordance with par. 7.7.1 of EN-81.

The functional operation of the safety circuit is described by Schindler in the technical description Q 42 106 535.

According to the requirements of EN-81, the following faults/defects have to be considered:

Fault A:

Non-separation of relay RUET as a result of a failure (e.g. welding of NO-contacts). This fault leads to non-attraction of control relay RKUET and relay RUET1, during the next levelling operation.
The door safety switch bridging is blocked.
This fault scenario also takes place in case door zone signal KUET or PHS stays activated outside the door zone.

Fault B:

Non-separation of relay RUET1 as a result of a failure (e.g. welding of NO-contacts). This fault leads to non-attraction of control relay RKUET and relay RUET, during the next levelling operation.
The door safety switch bridging is blocked.
This fault scenario also takes place in case door zone signal KUET1 or PHUET stays activated outside the door zone.

LIFTINSTITUUT B.V. - VEILIGHEIDS- EN KWALITEITSMANAGEMENT

Buikslotermeerplein 381 | Postbus 36027 | Tel. 020 - 435 06 06 | www.liftinstituut.nl | BTW-nummer:
1025 XE Amsterdam | 1020 MA Amsterdam | Fax 020 - 435 06 26 | info@liftinstituut.nl | NL 812392991

Fault C:

Non-attraction of control relay RKUET as a result of a failure (e.g. open circuit in supply to coil).
This fault leads to non-attraction of both relays RUET and RUET1.
The door safety switch bridging is blocked.

Fault D:

Non-attraction of relay RUET as a result of a failure.
This fault leads to not closing of the NO-contact in the safety chain during levelling operation, the door safety switch bridging is blocked.

Fault E:

Non-attraction of relay RUET1 as a result of a failure.
This fault leads to not closing of the NO-contact in the safety chain during levelling operation, the door safety switch bridging is blocked.

Fault F:

Non-separation of control relay RKUET as a result of a failure.
This fault leads to not closing of the NC-contact in the safety chain during levelling operation, the door safety switch bridging is blocked.

Fault G:

Open circuit of transistor T1 in neutral line of control relay RKUET as a result of a failure.
This fault leads to non-attraction of control relay RKUET.
Door zone relays RUET and RUET1 can not be activated, the door safety switch bridging is blocked.

Fault H:

Short circuit of transistor T1 in neutral line of control relay RKUET as a result of a failure.
This fault leads to a longer time delay (> 180 msec.) for control relay RKUET.
Capacitor C12 discharges totally over the coil of control relay RKUET and this leads to the possibility that the door safety switch bridging is not activated, in case delay time of C12 is much to long.
After each levelling sequence capacitor C12 will be discharged totally and therefore a dangerous situation can not take place.

Fault I:

Short circuit between the two door zone signals KUET and KUET1 (magnetic sensors) can be excluded because the required creepage and clearance distances are in accordance with Annex H of EN-81.
Loss of redundancy is not possible.

LIFTINSTITUUT B.V. - VEILIGHEIDS- EN KWALITEITSMANAGEMENT

Buikslotermeerplein 381 | Postbus 36027 | Tel. 020 - 435 06 06 | www.liftinstituut.nl | BTW-nummer:
1025 XE Amsterdam | 1020 MA Amsterdam | Fax 020 - 435 06 26 | info@liftinstituut.nl | NL 812392991

Fault j:

Short circuit between the two door zone signals PHS and PHUET (optical sensors) can be excluded because the required creepage and clearance distances are in accordance with Annex H of EN-81.
Loss of redundancy is not possible.

Fault K:

Loss of redundancy between two door zone signals for two car door entrances is possible, because short circuit of diodes can not be excluded. See par. 7.2.6 for the fault analysis.

Simultaneously closing of NO- and NC-contacts can be excluded if the safety relays for door safety switch bridging are in accordance with requirements of par. 13.2.1.3 of EN-81.

Short circuit between contacts and contacts and coil can be excluded if the relays fulfil the requirements of par. 13.2.2.3 (par. 14.1.2.2.3) of EN-81.

Relays RUET and RUET1:
Hengstler R718 T3
HDZ-468-1146
20,5 VDC (coil)
6A/230 Volt (contact)
safety relay according to EN-50205

Relays RKUET and RFUET:
Hengstler R721 T3
HDZ-468-1150
20,5 VDC (coil)
6A/230 Volt (contact)
safety relay according to EN-50205

The door zone relays RUET and RUET1 can only be activated in case control relay RKUET is attracted.
In case the door zone relays RUET/RUET1 are not activated at exactly the same time (difference in alignment of the door zone signals in the shaft), control relay RKUET must fall off with a time delay.
The function of the electronic time delay is to activate both door zon relays RUET/RUET1 within a certain time, by keeping attracted control relay RKUET after the first door zone relay is activated.

A failure analysis for the electronic time delay circuit is required.
After each levelling sequence the time delay circuit is discharged totally, so control relay RKUET can not be activated in case door zone relay RUET or RUET1 does not fall off as a result of a failure.
Even in case an electronic component in the time delay circuit fails, a dangerous situation in the safety circuit can not take place.

LIFTINSTITUUT B.V. - VEILIGHEIDS- EN KWALITEITSMANAGEMENT

Buikslotermeerplein 381 | Postbus 36027 | Tel. 020 - 435 06 06 | www.liftinstituut.nl | BTW-nummer:
1025 XE Amsterdam | 1020 MA Amsterdam | Fax 020 - 435 06 26 | info@liftinstituut.nl | NL 812392991

Schindler declares that the time delay lays between the following minimum and maximum value:

Minimum value = 130 msec.
Maximum value = 180 msec.

In case of two car door entrances, four different door zone signals are required.
For the first car door entrance the door zone signals PHUET and PHS are used, these are optical sensors.
For the second car door entrance the door zone signals 2PHUET and 2PHS are used, these are optical sensors.

After each door zone signal a diode is connected.
According to the requirements of Annex H short circuit of a diode can not be excluded. In case of short circuit of two diodes during a normal operation of the lift there is a possibility that both car door entrances are opened, even when there is only one landing door (passengers inside the car are looking against the wall of the shaft. This situation can only take place when the car door is not mechanically locked. When the car door is mechanically locked because the horizontal distance between the wall of the shaft and the sill exceeds 0,15 m, opening of the car door is not possible without the presence of a landing door.

The diodes are manufactured in such a way that short circuit of two different diodes is almost impossible.

Note:
Only two diodes D11 and D12 are mounted on the SUET 3.Q board. The other two diodes are connected on the SDIC board.

The optical sensors are not tested by the Liftinstituut as part of this EC type-examination according to par. 14.1.2.5 of EN-81.

The magnetic sensors KUET/KUET1 are in accordance with par. 14.1.2.5 of EN-81. These sensors are already in use for the safety circuits MXUET and SUET 1.Q.

The capacitors C14 and C15 on the printed circuit board SUET 3.Q are not allowed to be used/mounted.

4. Results

The highest voltage used on the door bridging related parts is 125 Volt AC/DC.
The highest voltage used on the safety relays is 20,5 Volt DC.

According to Annex H of the EN 81-1 / 2 (par 3.1 and 3.6) the creepage and clearance distances shall fulfil the requirements of the IEC 664-1 taking into account:

LIFTINSTITUUT B.V. - VEILIGHEIDS- EN KWALITEITSMANAGEMENT

Buikslotermeerplein 381 | Postbus 36027 | Tel. 020 - 435 06 06 | www.liftinstituut.nl | BTW-nummer:
1025 XE Amsterdam | 1020 MA Amsterdam | Fax 020 - 435 06 26 | info@liftinstituut.nl | NL 812392991

- pollution degree 3
- material group III
- inhomogeneous electrical field
- overvoltage category III
- printed wiring column not used

The creepage distances and clearances between terminals, connected to the door bridging circuit, safety-circuit and tracks behind these terminals to each other and to another voltage do fulfil the above mentioned distances.
The changes made on this new PCB didn't affect the safety-related parts on the PCB negatively.

The door bridging circuit (safety component) shall also fulfil the requirements of Annex F6 concerning:

- Vibration test
- Shock test
- Temperature test

The tests are performed at an independent test laboratory, on request of Schindler. After testing the printed circuit board SUET 3.Q the Liftinstituut received a copy of the test results from the test laboratory. These test results are satisfactory.
The PCB SUET 3.Q is in accordance with the requirements of Annex F.6 of EN-81.

5. Conditions

The EC type-examination certificate is only valid for products which are in conformity with the same specifications as the type certified product. Products deviating of these specifications need additional examination by Liftinstituut in order to determine whether a new type-examination certificate is necessary. Additional examination shall be requested by the certificate holder.

The revision has no influences on the safety parts of the SUET 3.Q PCB.

The general specifications of the PCB are in accordance with EN 62326-1 (3.6 of Annex H).

The base material and the solder resist of the PCB are of higher quality than the specifications of EN 60249-2-2 and/or EN 60249-2-3 (3.6 of Annex H).

6. Conclusions

The creepage distances and clearances are according to the requirements of Annex H of the harmonised standard EN 81-1/2.

LIFTINSTITUUT B.V. - VEILIGHEIDS- EN KWALITEITSMANAGEMENT

Buikslotermeerplein 381
1025 XE Amsterdam

Postbus 36027
1020 MA Amsterdam

Tel. 020 - 435 06 06
Fax 020 - 435 06 26

www.liftinstituut.nl
info@liftinstituut.nl

BTW-nummer:
NL 812392991

The door bridging circuit (safety component) is in accordance with the requirements of the harmonized standard EN 81-1 / 2.

The safety-relays RUET, RUET1, RKUET and RFUET, used for bridging the door contacts, are according the requirements of the harmonised standard EN-81-1 / 2.

The testing of this PCB with regard to vibration, shock and temperature was concluded to be sufficiently covering the tests required by EN 81-1 Annex F.6.

The PCB including the Door bridging safety-circuit has not been tested in relation to the requirements of the EMC-directive. Therefore this report does not contain any information about EMC.

Based upon the results Liftinstituut B.V. issues an EC type-examination certificate.

This EC type-examination certificate is only valid for products which are in conformity with the same specifications as the EC type certified product. Products deviating of these specifications need additional examination by Liftinstituut in order to determine whether a new EC type-examination certificate is necessary. Additional examination shall be requested by the certificate holder.

7. CE marking and EC Declaration of conformity

Every safety component placed on the market by Schindler, type designation SUET 3.Q, that is in complete conformity with the examined type must be provided with a CE marking according to Annex III of the Lifts Directive under consideration that conformity with the EMC Directive and eventually other applicable Directives is proven (CE 0400). Also every safety component must be accompanied by an EC declaration of conformity according to Annex II of the Lifts Directive in which the name, address and identification number of the Notified Body that carried out the EC type-examination (Liftinstituut, 0400) must be included as well as the number of the EC type-examination certificate NL 05-400-1002-004-30.

Liftinstituut B.V.

p.o.

Ir. A. Barendregt
Senior Officer Certification and Technology

LIFTINSTITUUT B.V. - VEILIGHEIDS- EN KWALITEITSMANAGEMENT

Buikslotermeerplein 381
1025 XE Amsterdam

Postbus 36027
1020 MA Amsterdam

Tel. 020 - 435 06 06
Fax 020 - 435 06 26

www.liftinstituut.nl
info@liftinstituut.nl

BTW-nummer:
NL 812392991

Annexes

Annex 1 : Printed Circuit Board SUET 3.Q

No picture available.

LIFTINSTITUUT B.V. - VEILIGHEIDS- EN KWALITEITSMANAGEMENT

Buikslotermeerplein 381 | Postbus 36027 | Tel. 020 - 435 06 06 | www.liftinstituut.nl | BTW-nummer:
1025 XE Amsterdam | 1020 MA Amsterdam | Fax 020 - 435 06 26 | info@liftinstituut.nl | NL 812392991

Annex 2 : Overview of previous revisions of EC type-examination certificate and report

REVISIONS OF CERTIFICATE

Rev.:	Date	Summary of revision
1	Jan. 18th, 2007	No safety issues, some types of components has been chanced

REVISIONS OF REPORT, BELONGING TO THE CERTIFICATE

Rev.:	Date	Summary of revision
1	Jan. 18th, 2007	No safety issues, some types of components has been chanced

LIFTINSTITUUT B.V. - VEILIGHEIDS- EN KWALITEITSMANAGEMENT

Buikslotermeerplein 381
1025 XE Amsterdam

Postbus 36027
1020 MA Amsterdam

Tel. 020 - 435 06 06
Fax 020 - 435 06 26

www.liftinstituut.nl
info@liftinstituut.nl

BTW-nummer:
NL 812392991