



Installation Instructions Trace Heaters ELSR-Ramp in Concrete (Application 1c of EN 62395-1)

1. Receipt of Goods:

After receipt of the goods check the heater and the accessories and compare with the data on the delivery note to ensure that the correct material was supplied.

Ensure that only components listed in this manual are used.

It is recommended that the insulation resistance be checked (see "8. Test and Commissioning").

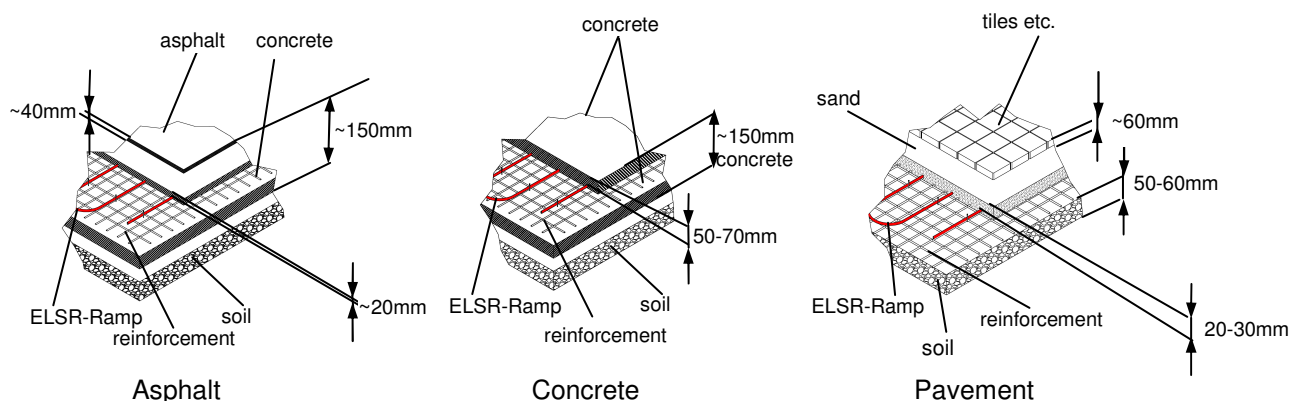
Attention: Make sure that the trace heater data sheet is available. Information given in the data sheet is required for safe installation. Do not install trace heaters without having access to the data sheet.

2. Storage:

The goods have to be stored in a dry place at an ambient temperature of $-20 \dots +60^{\circ}\text{C}$. If a dry storage is not possible, the trace heater ends have to be sealed with an end termination set. This is also necessary if a heating circuit cannot be finished at the end of a shift.

3. Applications:

The trace heater ELSR-Ramp is suitable for embedded applications in concrete. Suitable power supply lead is type NYY 3G6 or NI2XY-J 3G6 with fine strands.



4. Heating Circuit Length:

The max. allowable length of a heating circuit is to be designed according to the relevant data sheet of the trace heater. It depends on the maximum allowable voltage drop (max. recommended 10%) and the utilisation of the circuit breaker (recommended: 16A CB with "C" characteristic (slow), max. 80%)

5. Protective Measures:

- the use of a ground fault protection device (30mA, or 30mA above the inherent fault current level of the installation) for each heating circuit is mandatory
- when using the trace heaters on metal surfaces, they also have to be protected against indirect contact acc. to DIN VDE 100, part 410 (or equivalent standards) before operation of the system
- the metallic braid or screen of the trace heater has to be connected to the potential earth
- de-energise all circuits prior to installation or maintenance of heating components

6. Mounting Instructions:

- de-energise all electric circuits prior to any installation work
- remove any sharp objects, burrs etc. from the surface to be heated or from the areas over which the heaters are being pulled.
- the installation of a heating circuit has to be carried out based on the included sketches using original eltherm accessories acc. to the eltherm installation instructions.

Attention: Do not use adhesive tape with emollients (i.e. PVC)!

Attention: Observe the minimum bend radius and installation temperature given in the data sheet.

When binding wires are used, make sure not to damage heater jacket while fastening

An overlapping or contacting installation of the trace heater does not cause overheating due to the self-regulating characteristic.

- the connection and end termination of the free trace heater ends has to be carried out using eltherm power and end termination kits with associated termination instructions. Failure in doing so will void the warranty.

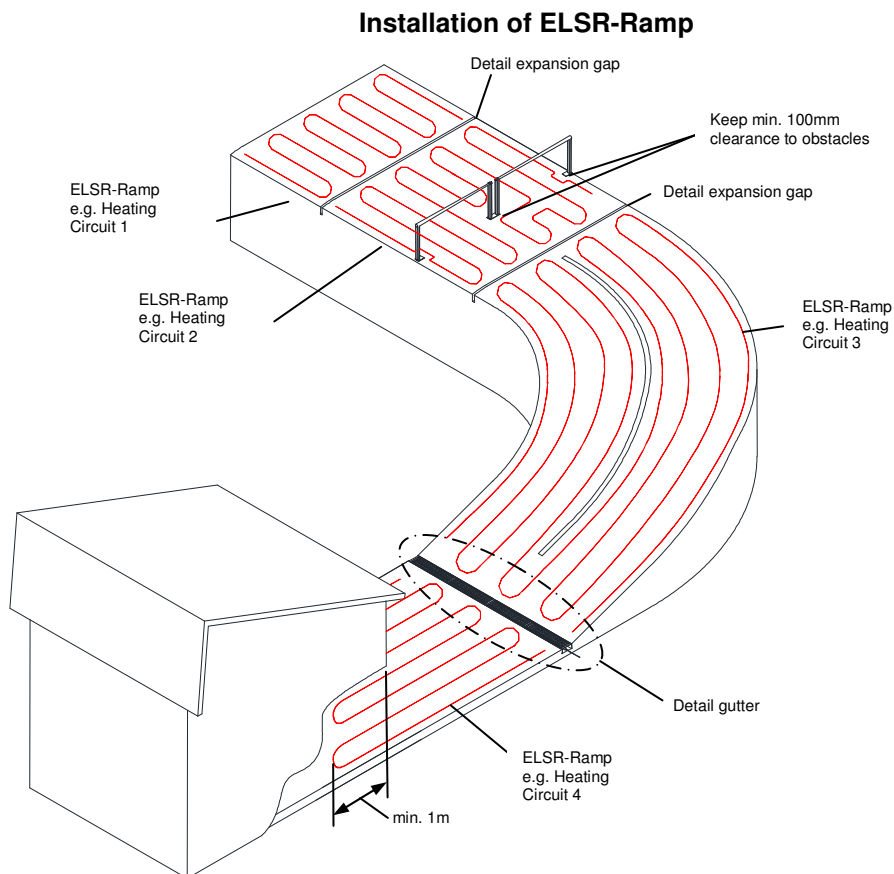
Attention: To avoid short circuit, do not connect the two bus wires of the trace heater to each other. Under all circumstances observe the termination and maintenance instructions for the connection and termination of the trace heaters.

- make sure to attach the trace heater - especially the area next to the electrical connection to its surroundings - in a proper way to avoid pulling stress or torsion on the electrical connection.
- In order to save energy the use of temperature controls can be worthwhile. Please contact the eltherm project department when in doubt.

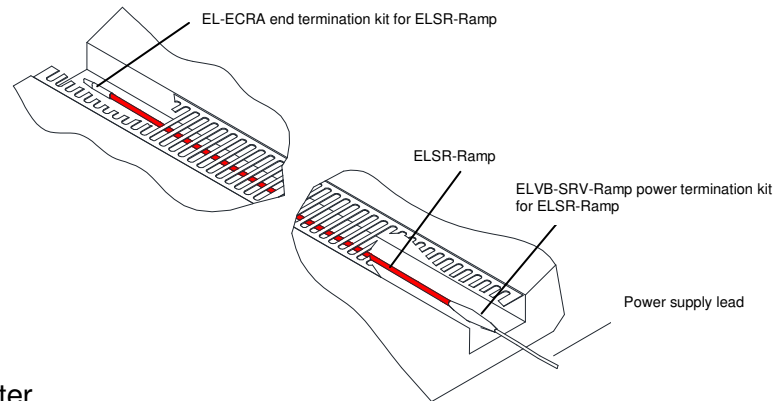
Attention: Make sure that the maximum operating temperature of the heater is not exceeded



- when trace heaters ELSR are used in industrial applications, all requirements of the DIN VDE 0100 series of standards need to be observed as well as DIN VDE 0721 part 1, DIN VDE 0721 part 2A3 and all effective local codes and regulations.
- electrically heated areas have to be identified by warning signs “Electrical Heating“ in reasonable intervals (approx. every five metres or at least with one sign per distinctive area).

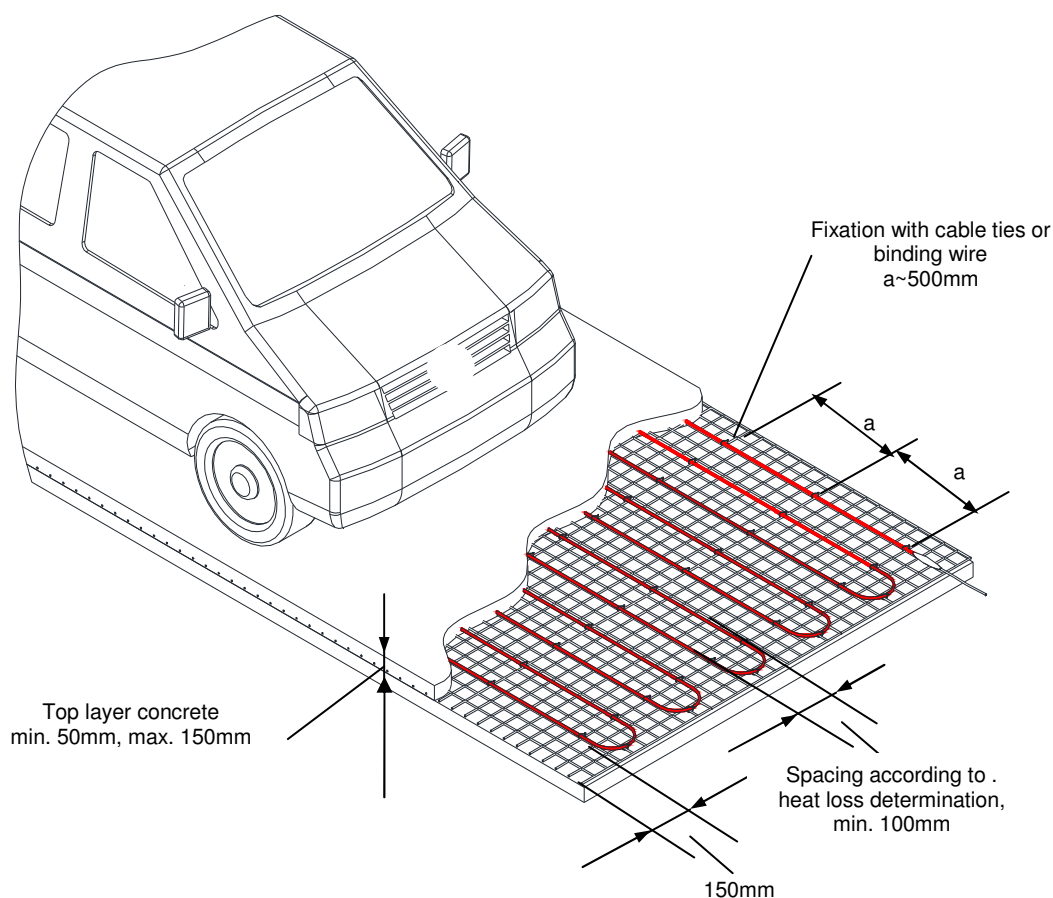


- expansion gaps: trace heaters must not cross expansion gaps..Separate heating circuits need to be arranged on either side of an expansion groove.
- spacing: spacing between trace heater runs should be approx. 0.3 m. Clearance to obstacles should be approx 0.1 m, clearance to the borders of the heated area approx. 0.15 m.
- keep areas clear in which gutters, curbstones, foundations for barriers, card readers etc. will be placed prior to the pouring of concrete. Clarify these points with all involved crafts!
- heat gutters independently with a separate trace heater.



Detail gutter

- heat roofed areas which are likely to be contaminated with snow by entering vehicles at least to a depth of 1.0m. Generally heat deceleration zones in front of barriers or card readers.
- installation pattern: use longest possible cable runs to minimise number of bends!. In curves: route cable runs parallel to the shape of the curve (hence the required spacing can be realised)
- stability of the area to be heated: the reinforcement must be supported in a way sufficient for safe access of installation personnel and for prevention of deformation of the reinforcement.
- required tools and equipment: cable dispenser, folding rule, pliers, needle nose pliers, pipe wrench, utility knife, hot air gun, crimp tool, screw driver, high voltage tester 2500V DC, cable ties in suitable numbers and lengths, test protocol insulation resistance test.



- installation procedure: (Remark: the power connection can be done off site if suitable)

Test trace heater for integrity by measuring the insulation resistance (both bus wires versus braid). The insulation resistance must be 20MΩ at least. Note the result in the test protocol.

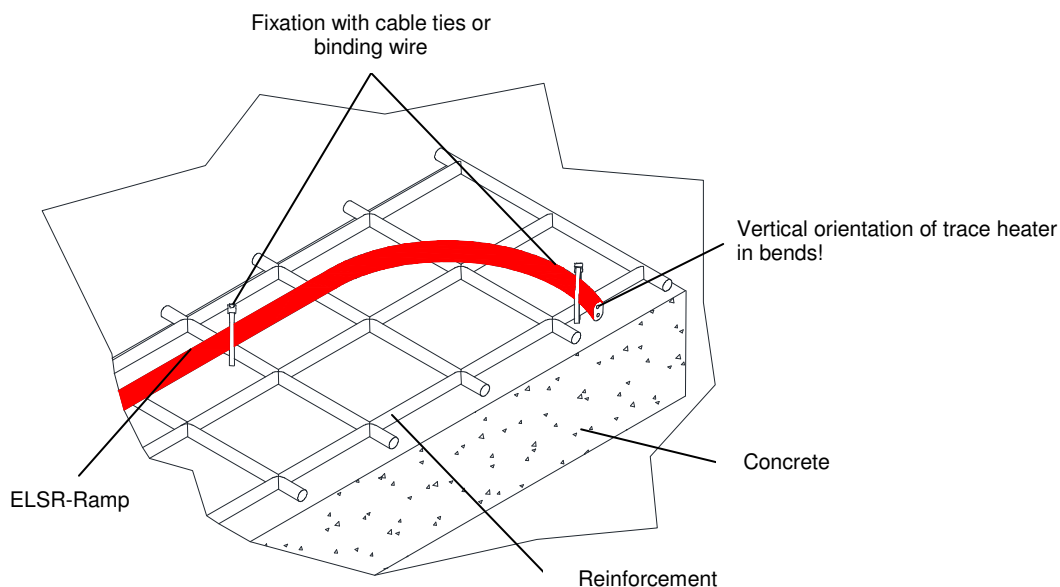
Place heater drum on cable dispenser, fix power termination to reinforcement via cable ties.

Route power supply lead to power distribution panel / point. Protect end of power supply lead against ingress of water / moisture

Do not pull power supply lead; avoid mechanical stress at the joint between trace heater and power supply lead!

Fix the trace heater to the reinforcement by means of cable ties, starting from the joint between trace heater and power supply lead. Observe spacing and clearances to obstacles and to the border of the heated area while doing so.

Horizontal or vertical orientation of the trace heater has no influence on the heater performance! Completely install and fix the heater, then cut to length as applicable.



The maximum allowed heating circuit length must not be exceeded! Instead, add another heating circuit if required!

Install the end termination kit as soon as possible; Under all circumstances avoid ingress of water or moisture in the trace heater.

Fix end termination to reinforcement via cable ties.

Trim cable ties along the entire trace heater.

Repeat the above listed steps for all heating circuits.

7. As built documentation:

All heaters need to be documented in the heating circuit plan. Based on the existing floor plans, the routing of each heater and the placement of power and end terminations as well as of sensors needs to be drawn including dimensioning. The routing of the power supply leads needs to be documented including dimensioning as well.

8. Test and Commissioning:

After installation of the heater and before pouring of the top layer the following steps are to be taken:

- a visual check of the trace heater regarding possible mechanical damages and/or incorrect installation (proper bend radius, proper spacing, no crossing of expansion gaps, cable ties trimmed, power and end termination undamaged, proper depth seating of heater).
- insulation resistance test
 - the insulation resistance of each heating circuit is to be measured between each single bus wire and the protective braid or screen. The measured values are to be noted.
 - test voltage: min 500 VDC, preferably 2500 VDC; duration 1 min
 - independent of the heating circuit length, the insulation resistance must not be lower than 20 MOhm. In case of a lower insulation resistance, the source of defect has to be determined and eliminated.

- check of the function of the heating circuit (only in connection with the required temperature controller and/or limiter)
- eventual damages must be repaired/replaced immediately. With short heating circuits, the trace heater may be replaced completely. With longer heating circuits, the defect is to be eliminated by cutting out the damaged part and replacing it by a new piece of trace heater according to the termination instructions.
- during and after the pouring of the top layer the insulation resistance test needs to be repeated. Both bus wires vs. braid: at least 20 MOhm must be achieved! Note results in the test protocol. If the insulation resistance falls below 20 MOhm, the pouring needs to be stopped and the damage of the heater needs to be repaired.

All additional labour of other crafts needs to be supervised: gutter installation, placement of anchoring bolts, milling of grooves for crack prevention etc. Repeat insulation resistance test and note results. Document any identified damage and report to the site manager.

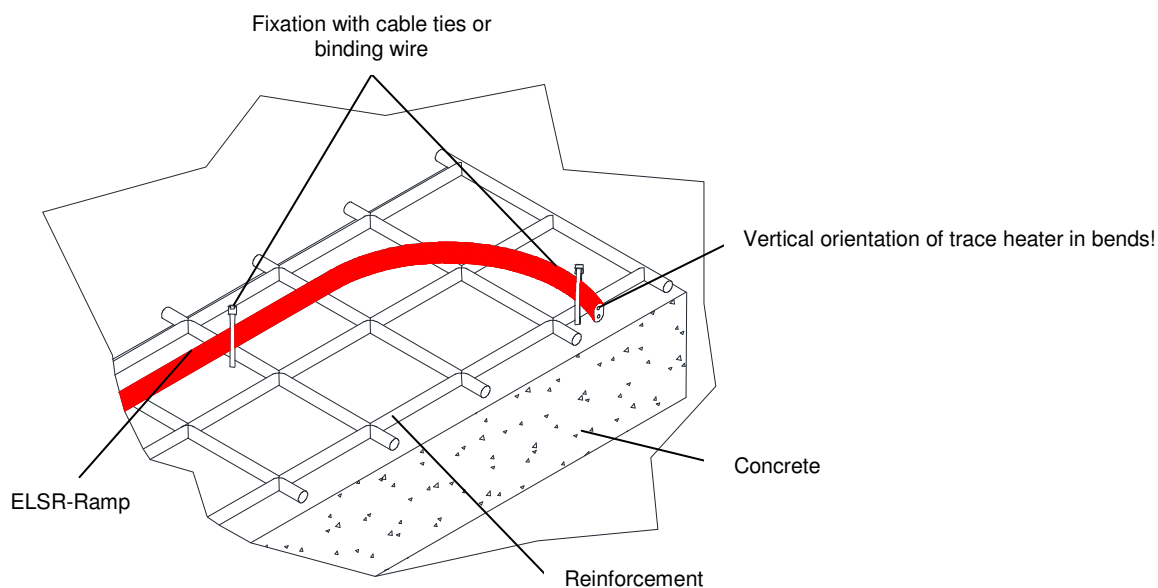
9. Operation and Maintenance:

During operation of the system, local laws and regulations for the use of electrical trace heaters are to be followed. The permissible operating conditions given in the trace heater data sheet (voltage, current, operating temperature, maximum ambient temperature, IP rating) are to be followed accordingly.

- trace heaters ELSR-Ramp generally operate maintenance free. However, it is recommended that the power supply leads be checked by qualified personnel in regular intervals for visual damages and the insulation resistance of the installed system be tested.
- installed trace heater has to be protected against damages that may occur during repair work on heated components
- after completion of the repair, the heating circuit will once again need to be tested as shown in paragraph 8 "Testing and Commissioning"
- damaged heating circuits shall not be operated.
- temperature control units and control devices are to be checked at least annually by trained workers or authorized persons



Installation of ELSR-Ramp on reinforcements of concrete slabs



Cover trace heater with concrete layer of 50 mm to 150 mm thickness.

Power terminations made with eltherm kits ELVB-SRV-Ramp and end terminations made with eltherm kits EL-ECRA can be placed inside the concrete slab.

