

HVL Electric Safety

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- Basics** Any high voltage test circuit or device that is not visibly grounded must be considered as being on potential.
Direct contact, even proximity, can be lethal.
- Inspection Duty** Any electric circuit ($U_{AC} > 25 \text{ V}$, $U_{DC} > 60 \text{ V}$ or $E > 0.3 \text{ J}$) has to be cross-checked by the responsible internal control person, before putting into operation.
A strict dual control principle applies (**4-eye principle**, see “*HVL General Safety*”, Chapter 4.3)
- Technical Safety** The electric circuit has to be confined such that no contact with parts on potential is possible. A breach of the confinement or a power loss has to lead to an automatic interruption of all electric power sources and to an automatic discharge of all electric energy storages.
For high voltage experiments, the confinement is typically a fenced area. One (or two) door(s) with integrated interlock is (are) the only point of entrance to the test bay. At least one warning light (green/red) must be visibly mounted on the fence surrounding the test bay. A manual earthing rod is placed next to the door on a monitored hook, which is also included in the interlock circuit of the test bay.
For each independent test bay, a local emergency stop must be provided. Activating this switch immediately de-energizes the test equipment of this – and only this – particular test bay.

Any work on electric circuits ($U_{AC} > 25 \text{ V}$, $U_{DC} > 60 \text{ V}$ or $E > 0.3 \text{ J}$) has to comply with the Technical Safety Guidelines (“*HVL General Safety*”, Chapter 3).
- Organizational Safety** Always comply with the vital five rules for work with electric equipment:
- 1.) Turn off
 - 2.) Secure against turning on again
 - 3.) Check for absence of voltage
 - 4.) Earth and short-circuit
 - 5.) Cover adjacent, live parts
- Emergency** The central emergency stop (red buttons on yellow plates, marked with "löst Alarm aus") are positioned on the laboratory walls may only be activated in an emergency.
When a central emergency stop is pressed, the power in the lab is immediately disconnected (except the emergency lighting). Simultaneously, a loud acoustic alarm signal will be set off in the corridors of the ETL and ETZ buildings and the place of origin of this alarm is displayed on control units located in these corridors. This will alert all colleagues of the HVL to provide assistance rapidly (“*HVL General Safety*”, Chapter 6).

In case of electric shock, it is mandatory to perform an ECG at a doctor or hospital to check for hidden cardiac/electrolytic damage¹.

¹ SUVA Article «Achtung Stromschlag» <https://www.suva.ch/de-ch/news/2019/stromschlag>