

Safety Regulations Electrical Work

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SRP

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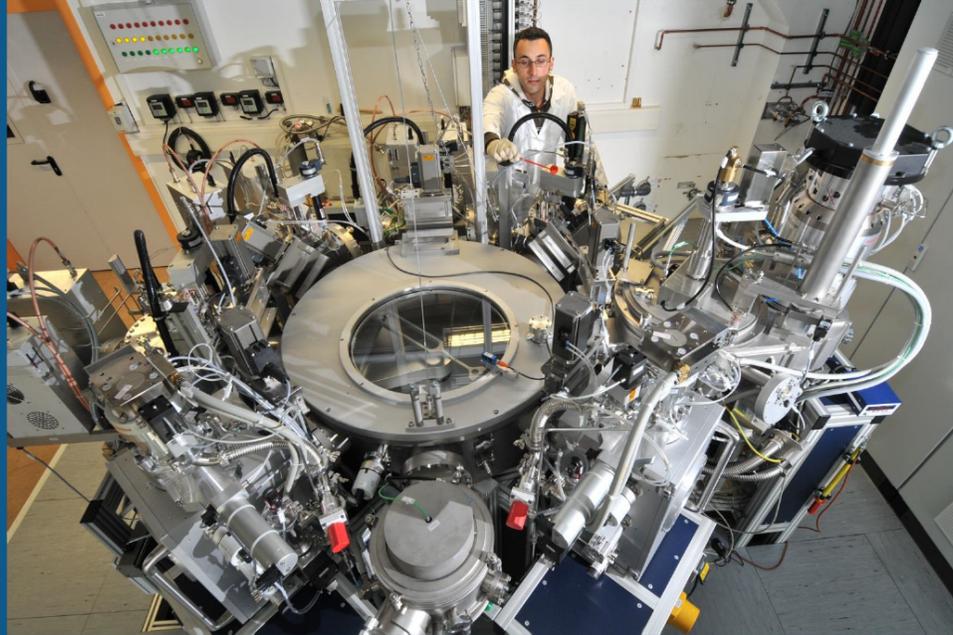


Necessity for Safety Regulations Electrical Work

- Electricity poses particularly high risks due to its ubiquitous nature in our working environment and in everyday life
- Differently from other work-related accidents, the frequency of those involving electricity is not going down
- Almost all electricity-related accidents result from human error and hence are avoidable
- Accidents involving electricity have a significant probability of ending fatally
- Accidents in our environment do happen:
 - Fatal electrical accident during construction of CSSB at DESY in 2017
 - Electrical accident involving a technician from HZDR in the HED laser room

Legal framework for electrical work

- Association of German Work Accident Insurers (DGUV) imposes Regulations for different types of work
- These regulations are binding for any company/organisation that is subject to one of the Work Accident insurers (XFEL's Insurer is "Unfallkasse Nord")
- For electrical work "Vorschrift 3: Elektrische Anlagen und Betriebsmittel" is pertinent
 - This covers both work with electrical equipment as well as work in the vicinity of electrical equipment
- There are no exemptions from these rules for doing research or the like!!!
- XFEL is an organisation with very high electrical risks according to DGUV
 - Therefore the small voltage (Schutzkleinspannung) is one half of that for other organisations



Leitfaden Sicherheit bei Errichtung, Betrieb und Prüfung elektrischer Anlagen im Forschungsbetrieb

Dieser Leitfaden entstand in Zusammenarbeit der Helmholtz-Arbeitskreise:

- Arbeitskreis Gesundheit, Arbeitssicherheit und Umwelt
- Arbeitskreis Facility Management und Bau
- Arbeitskreis Wissenschaftlicher Gerätebau

Working Group “Electrical Safety”

■ Members:

- T. Schön (Responsible Electrical Expert)
- U. Brüggmann (Electrical Expert)
- F. Dietrich, T. Korsch, A. Schmidt (Representatives from Instruments and Science Support Groups)
- T. Haas (SRP)

Rolle	Rechtliche Beschreibung	Besondere Qualifikation	Aufgaben
Anlagenbetreiber	Trägt die Unternehmerverantwortung für den sicheren Betrieb und ordnungsgemäßen Zustand der elektrischen Anlage	keine	<ul style="list-style-type: none"> • Verantwortlich für den sicheren Betrieb der gesamten elektrischen Anlage • Legt die Regeln und Randbedingungen der Organisation fest
Verantwortliche Elektrofachkraft	Nimmt die Aufsichtsverantwortung wahr bei allen Tätigkeiten, die für die elektrische Sicherheit von Bedeutung sind.	Elektrofachkraft	<ul style="list-style-type: none"> • Beurteilung der Auswirkungen der vorgesehenen Arbeiten auf den sicheren Betrieb der Anlage • Erkennen der besonderen Gefahren, die mit den durchzuführenden Arbeiten an oder in der Nähe der elektrischen Anlage verbunden sind • Festlegen der Sicherheitsmaßnahmen • Überwachung der einzuhaltenden Sicherheitsfestlegungen • Erlaubnis für die vorgesehenen Arbeiten erteilen
Anlagenverantwortlicher	Benannte Person, die die unmittelbare Verantwortung für den Betrieb der elektrischen Anlagen trägt	Elektrofachkraft	<ul style="list-style-type: none"> • Handelt im Auftrag und anstelle des Anlagenbetreibers in Hinsicht auf elektrische Installationen und Arbeiten • Trägt die unmittelbare Verantwortung während der Arbeiten für den sicheren Betrieb der Anlage • Legt die Arbeitsbereiche fest
Arbeitsverantwortlicher	Beauftragte Person, die die unmittelbare Verantwortung für die Durchführung der Arbeit an der Arbeitsstelle trägt	Elektrofachkraft	<ul style="list-style-type: none"> • Führt elektrische Arbeiten aus
Entsprechend unterwiesene Person	Person, die für die ihr übertragenen Aufgaben und möglichen Gefahren bei unsachgemäßem Verhalten unterrichtet und erforderlichenfalls angelernt sowie über die notwendigen Schutzeinrichtungen und Schutzmaßnahmen belehrt wurde.	Elektrotechnisch unterwiesene Person	<ul style="list-style-type: none"> • Übernimmt einfache Wartungs- und Prüfungsarbeiten, die von der EFK übertragen werden und die unter deren Leitung und Aufsicht erfolgen.
Weitere Personen	Elektrischer Laie	keine	<ul style="list-style-type: none"> • keine

Elektrischer Laie (Electrical Idiot)

- Anybody who is not specially educated/trained = Most of us including scientists!
- Permitted activities, e. g.
 - Connect/disconnect 230V plugs, network cables
 - Switch on/off: lights, standard electrical equipment
- No permission:
 - Check for no voltage
 - Repair switches or plugs
 - Work on any electrical equipment

Elektrofachkraft (Electrical Expert)

- A person with appropriate education, knowledge and experience to be able to recognise and avoid risks arising from electricity (Defined in European Norm EN 50110-1:2008-09-1)
- In Germany this means that the person has vocational training or a bachelor/master's degree in a profession in the field of electrical engineering
- The Electrical Expert has to also have recent practical experience and needs to keep him/herself continuously educated on recent legal and technical developments (Yearly training!)
- The Electrical Expert needs a first aid training every 2 years
- Permitted activities:
 - Independently carry out electrical work or work in the vicinity of electrical installations

Elektrisch Unterwiesene Person – EUP (Electrically Trained Person)

- A person trained by an Electrical Expert for specific tasks and the risks arising from wrong behaviour and instructed about necessary protective equipment and measures (DIN VDE 0105-100)
- The EUP always works under the immediate supervision of an Electrical Expert
- Permitted Activities (depending on the training)
 - Measure continuity/resistance with a multimeter
 - Open electrical equipment that is without voltage
 - replace fuses/switch breakers
 - Work inside XFEL racks (only from the front in the instrument rack rooms)
 - Connect/Disconnect signal, motor, sensor, patch cables
 - Work on components with galvanically separated voltage < 25V

Responsible Electrical Expert (Verantwortliche Elektrofachkraft)

- Person who has the technical and supervisory responsibility for electrical work in a company
- Needs to be competent and responsible and explicitly nominated by the employer
- Currently XFEL has only one such person: T. Schön. A second person will be nominated
- Tasks and responsibilities:
 - Evaluate the consequences of any electrical work on the entire electrical installation
 - Recognise special risks arising from specific electrical work
 - Define any special safety measures
 - Authorise specific electrical work
 - Recognise the qualifications of any person in XFEL who should work as electrical expert

Most important Consequences from the proposed Organisation Electrical Work

- “Responsible Electrical Expert” maintains a list of qualified personnel for electrical work
 - This applies also to personnel from collaborating institutes, e. g. HZDR
- Access to instrument rack rooms will be limited to EUPs
- All personnel in Instruments and science support groups receive yearly electrical training to become EUP (Elektrisch Unterwiesene Person)
 - 1 Day for having access to the Instrument Rack Rooms
 - One additional 1/2 day to be allowed to work on tunnel racks
 - Training will be carried out in-house by U. Brüggmann starting in January

EUP Training

- 4 blocks, 90 minutes each (= 1 day)

- 8 participants/training

- Block 1 (Structure, Overview, Legal)

- Electrical Organisation at XFEL

- Definitions

- 5 Golden rules

- Block 2 (Technical)

- Concepts of shielding

- International Protection Marking IPXX

- Typical risks at XFEL

- Using a multimeter

- Block 3 (On-site in the instruments and rack rooms)

- XFEL rack design

- Concept of emergency off

- Redundant power concept

- Grounding concept

- Block 4 (Review, Photo Examples)

- XFEL Electrical Hall of Shame

- Block 5 (1/2 day for work in the tunnels)

Additional Measures

- Work on fixed electrical installations is not being carried out by XFEL personnel
- We shall have to start a process of CE-certifying all equipment that “Users” will have contact with
 - EU Machine Directive
 - EU Low voltage Directive
 - EU EMC Directive
- Other large science infrastructure (ESRF, ESO) have already started on this path

Plan for Implementation

- Safety Regulations Electrical Work (Needs translation into English)
 - Approved by WoCo
 - Still pending in MB
- Start with EUP trainings early next year (To be done by U. Brüggmann)
 - Start with Instruments SASE1, SASE3, SASE2
 - Implement access restrictions by March
- Start with a systematic self-certification as soon as our new machine safety specialist arrives
- T. Schön and U. Brüggmann already started identifying the Electrical Experts per group at XFEL
 - A formal request will be sent to the group leaders in the next days
 - There should be at least one per group

Group Leader Nominations as Responsible Persons for Health and Safety

- A number of iterations were done with the respective group leaders
 - The contents of the nomination letters was fine tuned
 - A legal opinion about the responsibility of the group leaders was added
- The letters (together with the legal opinion) are now with the Directors and should be arriving for signature shortly.

Access Regulations: Changes and Clarifications

- Visitor cards for the Experiment Hall are now with the gatekeepers
 - Reserve them 1 day in advance by mailing gatekeepers@xfel.eu
 - Note that visitors are NOT allowed to work. This also applies to commissioning work at the beam lines
- Groups may request up to 5 visitor cards for their area of responsibility
 - For instruments this should also include access to the hall but this regulation still needs approval
- Groups may also request Temporary Service Access cards
 - Intended for maintenance in well defined areas
- Group specific cards may be requested using SRP form 1

Overview

Name of DARF-DACHS access right (max. 30 characters)

Description of DARF-DACHS access right (max. 60 characters)

Responsible group leader * Responsible room managers *

* Group leader and room managers will be granted the right to enter the access rights to this area and all requirements besides synchrotron protection training—unless they are radiation protection officers—to every card holder. Only group leaders can delegate.

Requirements (continued on next page)

- Allgemeine Sicherheit Onsite safety training required (valid for 12 months)
- XFEL.EU Experimental Safety Additional person responsible for entering *onsite training* into database
- XFEL.EU General Laser Additional person responsible for entering *access rights* into database
- Allgemeine Strahlenschutzunterweisung
- Strahlenschutz XFEL Beschleuniger Additional training required (to be filled out by hand)
- Sicherheit XFEL Beschleuniger
- XFEL.EU General Chemistry
- XFEL.EU General Biology (A2 and S2)
- XFEL.EU Selbstretter

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						Install?	Fire door?	Esc. door?	Rad. area	UPS?
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Key: Esc. door = Escape door, Rad. area = Radiation prevention area, UPS = uninterrupted power supply More info: dachs.desy.de

Requirements (continued from previous page)

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