SAFETY REQUIREMENT VV 17 **Possible contact with electricity** **Carrying out work at or in the vicinity of electrical installations**	nyrstar Bales/Pelt

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1 PURPOSE

The safe execution of work on or in the vicinity of electrical installations to prevent electrification/electrocution and the risk of combustion by electricity.

2 SCOPE

Anyone who performs operations on or in the vicinity of electrical installations.

3 CREDENTIALS

- AREI : General Regulations on Electrical Installations.
- Nyrstar standard : TS202 : Electrical Safety.
- Safety regulation : VV01 : Choice of PPE.
- Safety regulation : VV32 : Use of arc protective PPE/clothing.
- Safety regulation : VV22 : Individually employed.

4 STANDARD EQUIPMENT

Protection	
Body	Standard work suit (see safety regulation VV01)
	long sleeve undershirt (100% cotton)
Head	Electrically insulating helmet (EN397, EN166, EN50365)
Face	Safety glasses (see safety instruction VV01)
Feet	Leather " electrical" safety shoe EN ISO 20345, CAN/CSA Z195-02

Additional PPE based on the electrical risks see Chapter 14

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5 DEFINITIONS/ABBREVIATIONS

Electrical installation : This is a whole consisting of electrical machines, appliances and pipes (Boek1 Hst.2.2.1.1.)

LS: Low voltage (≤1000 VAC, ≤1500 VDC)

HS: High voltage (>1000 VAC, >1500 VDC)

BA4 (warned) : basic

Persons authorised to carry out control work and non-electrical work in the vicinity of live parts. The electrical installation is not being worked on.

BA4 (warned) : with access / base + / EM

Basic + = extra privileges (= depending on the function and department)
EM = Electro-Mechanic

Persons who:

- or have been adequately trained on the electrical risks associated with the work entrusted to them.
- or be permanently monitored by a competent person (BA5) during the work entrusted to them in order to minimise the risks associated with electricity.

BA5 (skilled) : Basic / WV LS / HS1 / HS2 / WV HS

Basic = standard electrical works
WV LS = Work manager Low voltage
HS1 = + all standard high voltage circuits (consumers)
HS2 = + all high-voltage circuits that change operation
WV HS = Work manager High voltage

Persons who, through knowledge acquired through training and/or experience, can themselves assess the dangers associated with the work to be carried out and determine the measures that eliminate the specific risks or reduce them to a minimum.

Installation manager (IV) : the member of staff responsible for the operation of the electrical installation.

Work manager (WV): the staff member appointed to take charge of the work. Only BA5 authorised persons are eligible for this and are appointed by the installation manager.

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Navigable active parts: Conductors or conductive parts of electrical equipment which may be live in ordinary use and which are not shielded (not insulated).

HS : High Voltage

LS : Low voltage

ZLS : Very Low Voltage

ZLVS : Very low Safety Voltage

6 ACTIVITIES/POWERS

Standard competence : Regardless of the prior training of the staff member, each employee is authorised to use the electrical installation. For example, plugging a device into the socket, operating a light switch and operating an installation.

Electrical work : Work on or in the vicinity of an electrical installation that directly relates to that electrical installation.

Non-electrical work : Work in the vicinity of an electrical installation that does not directly relate to that installation itself, such as painting work.

Inspection work : visual checks, tests and measurements.

Live work: Activities in which a person comes into contact with navigable live active parts or enters the live zone, either with a part of the body or with work equipment or equipment.

Work in the vicinity of live parts : Activities in which a person enters the proximity zone, either with a part of the body or with work equipment or equipment, without, however, entering the live zone.

Activities outside voltage : work on electrical installations in which all precautions have been taken to prevent electrical risks, as described in article 266.05 of the AREI (physical separation of the electrical installation, prevention of reconnection, control of voltage absence, grounding, discharging and short-circuiting).

Electrical service area : a room of the electrical service is a room or a fenced area which serves mainly or exclusively for the operation of electrical installations.

On the entrance is this sign : 

LS Spaces = cabins
HS Spaces = onderstations

Admitted persons : only warned (BA4) and skilled (BA5) persons have access to a room of the electrical service.

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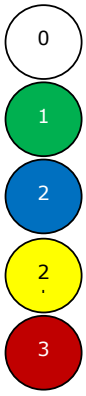
7 PRESCRIPTION

If work (electrical or non-electrical) on electrical installations must be carried out other than those described under standard authority, the **provider of the work permit** must at least have the certificate BA4 basis.

If work (electrical or non-electric) must be carried out in electrical rooms, the **provider of the work permit** must at least have the certificate BA5 basis.

Indication of powers: see Chapter 9

Identification of electrical rooms/signs is done cfr. other color-number encoding.



production facilities

LS classrooms/signs without nappable active parts

LS rooms/signs with nappable active parts

HS rooms/signs: Electrofilter

HS rooms/signs or LS rooms/signs with extremely high risk

8 GENERAL REQUIREMENTS

On the Nyrstar Balen/Pelt sites, electrical installations are always worked on in accordance with the provisions of the AREI.

Work on or in the vicinity of electrical installations is prohibited except for persons designated in writing (see Chapter 9).

The general rule is: **We always work without tension**.

Exceptions to this rule and the conditions attached to it are described in Chapter 12.

9 DESIGNATION OF POWERS

The Management Board of Nyrstar Balen/Pelt appoints someone as the installation manager (IV) for all electrical installations.

The IV then appoints the other competent persons (interns) in writing via the BA4/BA5 certificate (XR-101-CERT-T-00002) on the basis of their competence.

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BA4/BA5 privileges are only granted after following the appropriate education and training, see education matrix BA4-BA5 (XR-561-LST-T-00001).

External parties hired to carry out work (electrical or non-electrical) on electrical installations other than those described under standard authority must be declared temporarily authorised via the document 'TEMPORARY AUTHORITY CLEARANCE NYRSTAR BALEN – PELT / BA4 – BA5 (XF-101-FCH-6-00006). The maximum period of validity of this temporary power is 1 year and is given by the IV.

In the case of one-off and/or short-term interventions, this temporary power may also be given by:

- BA5 WV LS for the low-voltage installations
- BA5 WV HS for the low and high voltage installations.

The authorization to use an electrical space can be given:

- via the checklist 'access electric cabins' (XF-101-FCH-6-00001)
- via certificate BA4/BA5 (XR-101-CERT-T-00002)
- via the temporary declaration of competence BA4/5 (XF-101-FCH-6-00006)
- through oral instructions and under continuous guidance BA5

The provision of keys that provide access to electric rooms (LS and HS) is done by the IV. Keys are made available on a private basis and may not be transferred or further lent.

10 SAFE BUSINESS OPERATIONS

For each electrical work, a task risk analysis is performed, which can be made using the Flowchart "Electrical Works" (XW-101-WI-6-00002-000-00) and the standard TRA (XF-101-FCH-6-00007-000-00).

The exception to this are the electrical tasks of BA4 Basis, BA4 Basis+, BA4 EM.

- In principle, we always work without tension. See Chapter 12 for the exceptions to this.
- The preparation of complicated work must take place in writing.m a work preparation file and specific task risk analysis (TRA).
- Before the start of the work, the BA5 WV gives specific and detailed instructions to the person who performs the work.

11 WORK OUTSIDE TENSION

This chapter deals with the conditions that ensure that the electrical installation is voltage-free and safe during the duration of the work.

The text below describes the actions that must be carried out to enable safe work on electrical installations. The principle of the Vitale 8 is used.

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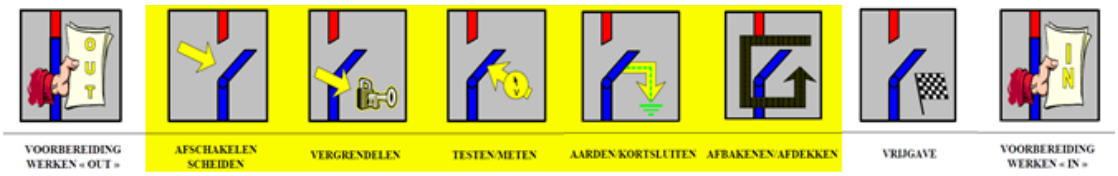

Stap 1 : Preparing the work 'OUT'
Work preparation, Task instruction, Risk Analysis

Step 2 : Separating the electrical installation
Installation voltage-free setting.

Step 3: Prevent re-enable Lock→
Locking the installation against re-activation.

Step 4 : Checking voltage absence Testing→
Testing, measuring voltage.

Step 5 : Grounding, discharging and short-circuiting
High voltage: Grounding and discharging.
Low voltage: Only for emergency power supplies, magnetic fields, induction voltages, capacitors, ...

Step 6 : Demarcation and/or shielding of the electrical installation
Demarcate and/or shield work zone.

Step 7 : Release the electrical installation
If the above measures have been taken: release via work permit.

Step 8 : Bring back under tension 'IN'
After execution work and unlocking, bring the installation back under tension.

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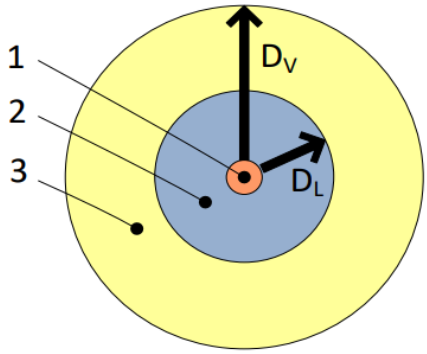
12 LIVE OR LIVE-IN-SERVICE WORK

Live work: Work in which a person comes into contact with navigable active parts under tension or enters the area under tension, either with a body part or with work equipment or equipment.

Working in the vicinity of live parts: Activities in which a person enters the vicinity zone, either with a body part or with work equipment and equipment, without, however, entering the tension zone.

	Spanningsniveau AC	**Spanningsniveau DC**	**DL waarde (mm) Zone onder spanning**		**DV waarde (mm) Nabijheidszone**	
HS (Hoogspanning)	>1000V	>1500V	6000 V 15000 V 26500 V	120 mm 160 mm 285 mm	6000 V 15000 V 26500 V	1120 mm 1160 mm 1285 mm
LS 2de categorie (Laagspanning)	>500V en ≤1000V	>750V en ≤1500V	0 mm geen aanraking		500 mm	
LS 1ste categorie (Laagspanning)	>50V en ≤500V	>120V en ≤750V	0 mm geen aanraking		500 mm	
ZLS (Zeer Lage Spanning)	≤50V	≤120V	0 mm geen aanraking		500 mm	
ZLVS (Zeer Lage Veiligheidsspanning)	≤25V	≤60V	0 mm geen aanraking		500 mm	



1. blank actief deel onder spanning
2. zone onder spanning
3. nabijheidszone

D_L: afstand die de buitengrens van de zone onder spanning aangeeft
D_V: afstand die de buitengrens van de nabijheidszone aangeeft

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12.1 Working under Voltage: HS

Working under tension or in the vicinity of live parts is **always** prohibited. Schakel activities are allowed.

The qualified persons (BA5 HS1, BA5 HS2 and BA5 WV HS) must use additional PPE and insulating shale material when switching, see Chapter 14.

12.2 Working under voltage : LS + ZLS

Working under tension or in the vicinity of live parts is only permitted if **all** the following conditions are met:

- An urgent need has been demonstrated : for example, for safety reasons, the work cannot be postponed until the installation can be made voltage-free or , for example, switching off the voltage poses more risk (also of a non-electrical nature) than working under or in the vicinity of voltage.
- A demonstrable task risk analysis (TRA) must be done.
  (XF-101-FCH-6-00007-000-00)
- The installation must be suitable for live operation,
  Vb. all navigable active parts under tension can be shielded, there is sufficient space available to place shields.
- Sufficient control measures have been taken, such as guards, use of specific PPE, insulated tool pen. (The control measures that are not to be determined in a task risk analysis.
- The work manager appointed by the installation manager or the installation manager or the Asset Manager must give a written order to carry out the live work. This must always be stated on the work permit and standard TRA.
  (XF-101-FCH-6-00007-000-00)

Working under tension or in the vicinity of live parts in confined or narrow conductive spaces is never permitted !

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12.3 Working under voltage : ZLVS

The risk when working on a very low safety voltage and this with completely dry skin or moistened by perspiration (BB1) is limited. Therefore , no measures should be taken against direct contact, but short circuits can cause fire or arc flashes and therefore measures to prevent it must be taken on the basis of a TRA.

12.4 Control work (Measuring, Testing and Visual Inspections) : HS + LS + ZLS

Plates niv. 1 :
Live measurements and tests may be carried out without additional PPE.

Plates niv. 2 + High voltage :
Live measurements and tests may be carried out if additional PPE is used in relation to the electrical risks: see Chapter 14.

Measuring and testing devices must be checked for their proper functioning before and, if necessary, also after use.

Visual inspections :
May be performed under tension. When carrying out visual inspections, one should not enter the proximity zone.

13 WORKING UNDER "HAZARDOUS CONDITIONS"

According to the law (ARAB art 54), no work under "dangerous conditions" may be carried out by a secluded employee. The presence of another person, capable of quickly giving an alarm, is necessary. (see VV22)

Within the context of electrical safety, "hazardous conditions" that operate are those carried out when there is an increased risk of contact with live navigable active parts or when one has to use arc protective clothing ≥ 9.9 cal/cm² - < 40 cal/cm². In these cases, the presence of a 2nd person is necessary.

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14 ELECTRICAL RISKS AND THEIR CONTROL MEASURES

The control measures are determined in the TRA carried out and are taken in function of the highest risk, however, combinations are possible.

E.g. insulating gloves in combination with leather over gloves.

Collective protective equipment always takes precedence over personal protective equipment.

Risico	**Kenmerken/gevolg**	**Beheersmaatregelen**
Vlamboog/Kortsluiting	Drukstijging, Hittestroom, UV-straling, Projectie van (oa gesmolten) metalen deeltjes	Zie veiligheidsvoorschrift VV 32 "Gebruik van vlambooqbeschemende
Rechtstreekse aanraking	Elektrisering/Elektrocutie	**HS :** - Elektrisch isolerende handschoenen Class 2 : max 17 kV AC Class 3 : max 26,5 kV AC - Isolerend schakelmateriaal - Isolerende mat of bankje - Afschermen van genaakbare actieve delen d.m.v. isolerende matten/dekens/platen/... - Goedgekeurd isolerend gereedschap
	Elektrisering/Electrocutie	**LS + ZLS :** - Elektrisch isolerende handschoenen Class 0 : max 1000 V AC - Afschermen van genaakbare actieve delen d.m.v. isolerende matten/dekens/platen/... - Goedgekeurd isolerend gereedschap

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15 OTHER PROVISIONS

- It is forbidden for unauthorized persons to enter electrical rooms.
- It is forbidden to use electrical spaces such as storage space, office, schaftlokaal and the like.
- Fire in the vicinity of electrical equipment must be fought with CO2 extinguishers (small extinguishers), under no circumstances should water be used as an extinguishing agent.
- Measures must be taken to prevent your tools, keys and the like from falling out of your trouser, vest or chest pockets, in particular from your chest pockets.
- It is a recommendation not to wear jewelry, watches or other conductive metals while performing work on or in the vicinity of electrical installations.