


SAFETY REGULATION VV 32 Use of arc protection PPE/Clothing	 Balen/Pelt
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Use of arc protection PPE/Clothing



1 Objective

Protection of employees against the consequences of an electric arc by using arc protective PPE/clothing, in those places where an electric arc with a calorific value greater than 1.2 cal/cm² may occur during electrical work/operations.

By working without tension, the risk of a possible electric arc can be eliminated. If it is not possible to work without voltage (see safety regulation VV 17 "Carrying out work on and in the vicinity of electrical installations"), this safety regulation applies and the wearing of arc protective PPE / clothing is an obligation.

2 Scope

The requirements in this safety regulation apply to the premises of NYRSTAR Belgium.

Only the persons who have been declared BA5 (professional competence) competent can, after following a training course, receive permission to carry out work / actions in an environment where an electric arc can occur. They are therefore obliged to use the correct arc protective PPE /clothing.

3 References

- Nyrstar Standard : TS232 : Arc Flash Safety Protection
- Electric arc study Balen and Pelt : Vincotte Reference 60668743
- Safety regulation : VV17 : Carrying out work on and in the vicinity of electrical installations

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4 Definitions

Arc flash : can be caused by a short circuit between 2 or more live electrical conductors or can be caused by incorrect switching operations in which a current is interrupted inadvertently.

The features :

- Pressure rise (0.1 -1 Bar) Sound pressure (> 140 dB(A))
- Heat flow with temperatures (up to 18000°C)
- UV radiation
- Metal particles and toxic fumes (copper vapour)
- Current limitation (45 – 80 %)

Arc boundary : Arc flash Boundary :

the area around an electric arc where the energy exceeds 1.2 cal/cm²

ATPV : Arc Thermal Performance Value = Arc flash resistance expressed in cal/cm²

VRC : Arc flash Risk Categories

5 Activities, actions and causes that may lead to electric arc :

- Switching on or off circuit breakers under voltage.
- Live opening or closing of rail separators or line separators low-voltage installations
- Live opening or closing of rail separators, line separators or wagon separators high-voltage installations
- Opening or closing earth switches.
- Application of loose groundings.
- Working under tension or working in the vicinity of tension.
- Remove under tension or install fuses.
- Opening live electrical boards with exposed parts.
- Repair work in which parts or tools may fall between live parts.

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- Use of wrong tools (e.g. not isolated).
- Manipulation of insulated cables under electric tension.
- ...

6 Subdivision of electrical installations / electrical boards


For each electrical installation/distribution and/or distribution board, an arc flash study will be carried out. Based on this study, an Arc Flash Risk Category (PRC) will be determined for each board. The arc risk category is clearly indicated, by means of stickers, on each electrical installation/distribution and/or distribution board.

If there is a difference in arc flash energy between the arrival zone of a sign and the global sign, an additional sticker with the respective PRC is affixed to this arrival zone.

Vlamboog Risico Categorie	Vlamboog energie
VRC 0	energie < 1,2 cal/cm ²
VRC 1	energie ≥ 1,2 - < 9,9 cal/cm ²
VRC 2	energie ≥ 9,9 cal - < 40 cal/cm ²
VRC 3	energie ≥ 40 cal/cm ²

* If this "VRC" stickering has not yet been carried out, VRC 2 (< 40 cal/cm²) is used for each electrical installation/distribution board.

* The electric signs with only steering voltage will not be stickered. For these plates, VRC 0 (< 1.2 cal/cm²) is used.

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7 Select Arc protective PPE / Clothing

The choice of the arc protected PPE/clothing is determined by the PRC of the electric installation.

Bescherming	Omschrijving Vlamboog beschermende PBM	Type (Nyrstar)	Keuze PBM's ifv de ernstgraad elektrische bord			
			VRC 0 (< 1,2 cal/cm ²)	VRC 1 (≤ 9,9 cal/cm ²)	VRC 2 (< 40 cal/cm ²)	VRC 3 (≥ 40 cal/cm ²)
Lichaam	Standaard werkpak Minimum ATPV 9,9 cal/cm ²	TECASAFE XA9001	x	x		
	Arc flash pak (jas en broek) Minimum ATPV 40 cal/cm ²	FR			x	
Hoofd, gezicht en nek	Elektrisch isolerende Helm Isolerend tot 1000 V	IDRA2	x			
	Elektrisch isolerende helm met gelaatsscherm Minimum ATPV 9,9 cal/cm ²	Paulson		x		
	Bivaksmuts Minimum ATPV 9,9 cal/cm ²	FR		x		
	Vlamboogkap Minimum ATPV 40 cal/cm ²	FR			x	
Gehoor	Oorpluggen	Bilsom 303L		x	x	
Handen	"Heavy Duty" Lederen handschoenen	Honeywell		x	x	
Voeten	Lederen "electrical" veiligheidsschoen	Cofra	x	x	x	

ADDITIONAL OBLIGATIONS :

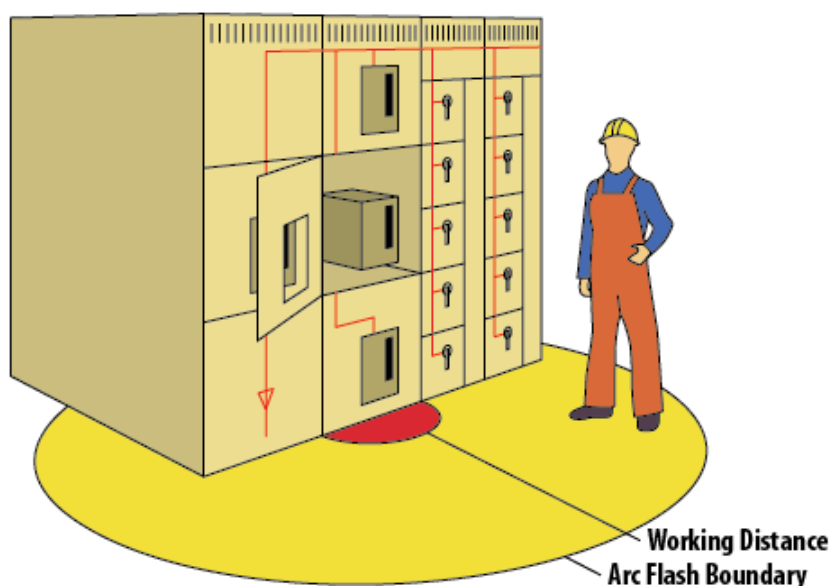
- * No work/operations may be carried out on live electrical installations/signs marked with VRC 3!
- * The standard safety glasses will always be operated under a full face shield or electric arc cap
- * "Heavy Duty" leather gloves are made entirely of leather and have a minimum thickness of 0.7 mm, are not lined or are lined with non-flammable or fusing fabrics.
- * If there is an additional risk of direct contact, the leather gloves will have to be worn above the insulating gloves.

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8 Flambow limits

The ARC flash boundary is the zone around the arc where the energy is greater or equal to 1.2 cal/cm².

If work has to be carried out within the arc limits and there is a chance that an electric arc may occur, everyone within this zone is obliged to wear PPE/clothing protective of electric arc. All body parts within the arc arc limit must be protected with the appropriate degree of protection and these have been determined by the PRC of the electrical installation that is being worked on.



Vlambooggrenzen (Arc Flash Boundary)	Laagspanning (werkafstand = 455 mm) (< 1000 Volt)	Hoogspanning (werkafstand = 910 mm)
VRC 0 (< 1,2 cal/cm ²)	nvt	nvt
VRC 1 (≤ 9,9 cal/cm ²)	2 m	nvt
VRC 2 (≤ 40 cal/cm ²)	5 m	6 m

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9 Care and maintenance of arc protective PPE/clothing

* Arc protective PPE/clothing must be inspected before the start of each work.

- Clothing whose arc protective properties have been reduced, by pollution or by damage, may not be used.
- PPE that is damaged or contaminated with grease, oil, flammable liquids or flammable products may not be used.
- Expiration dates of PPE should always be respected. If the date is exceeded, it will be replaced.

* Arc protective PPE/clothing must be stored in such a way that they cannot be damaged or contaminated.

- They must be protected against contamination or damage caused by: moisture, dust, aggressive products, flammable or flammable products, pests.

* The cleaning/repair of arc protective PPE/clothing must be done in accordance with the manufacturer's instructions, in order to prevent them from losing their protective properties.