U-3ARC Webinar No. 45 Introduction to electrical qualification in LV

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CONTEXT

Electricity is everywhere. Underground, in overhead lines, in our homes, in our workplaces, in our vehicles .

When we know how dangerous it is , we say to ourselves that it is a miracle that it does not claim more victims.

Humankind has been able to protect itself and develop appropriate protections throughout its development, as well as appropriate behaviors.

But electricity still causes too much damage. Too many broken families.

Whether you are an "electrician" or a "non-electrician," the "electrical certification" training aims to inform you about electrical risks.

RISKS ASSOCIATED WITH ELECTRICITY

Different situations can lead to electrical accidents :

- ✓ **During electrical**
- ✓ **During an operation installation**
- ✓ **During the replacement of equipment.**
- ✓ **When not respecting safety distances or contact .**

The lack of training of professionals and non-compliance with prevention rules are the main risk factors.

Security

is our first

Priority

GOALS OF THERE TRAINING FOR AUTHORIZATION

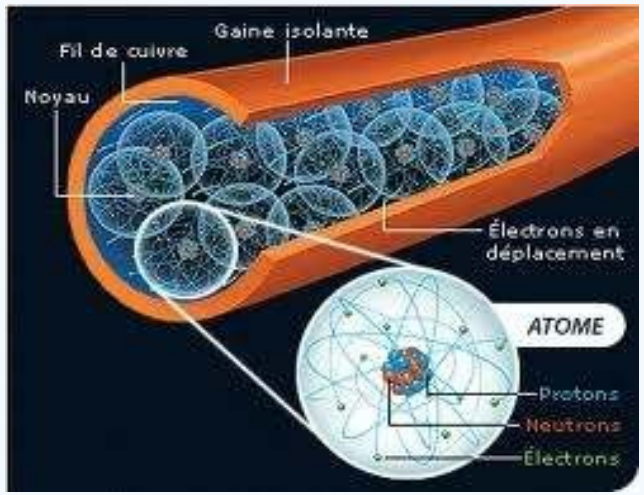
qualification is recognition of a person's ability to safely carry out an electrical or non-electrical task , on or near an electrical installation.

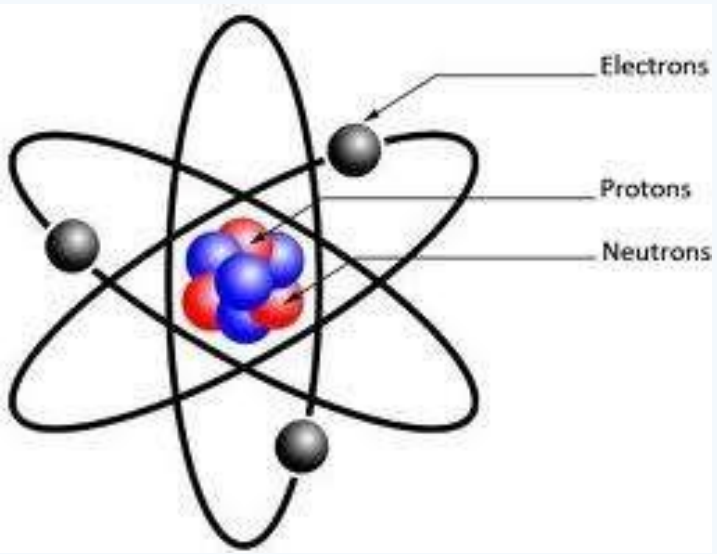
Electrical certification can only be issued to persons previously trained in electrical risks . The capacity and knowledge of an authorized person must be regularly assessed .

“ Recycling is recommended ”

ELECTRICITY

ELECTRICITY





It is THE shift of the electrons free In THE materials driver Or there matter.

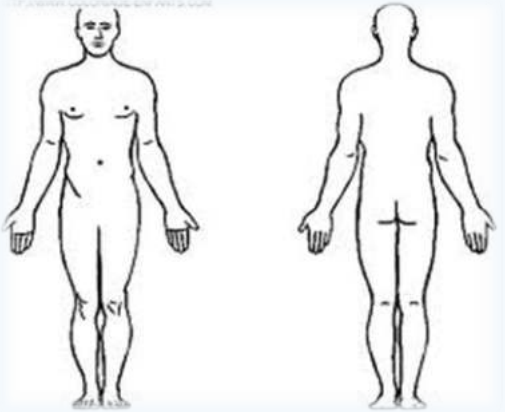
CONDUCTIVE MATERIALS

ELECTRICITY

There matter solid **DRIVER** of electricity East constituted of ions positive between which ones circulate of the electrons free.

THE METALS

WATE
R



THE MAN

INSULATING MATERIALS

ELECTRICITY

THE electrons of the atoms Who constitute THE body **INSULATORS** , are prisoners of the cores.

THE RUBBER

THE GLASS

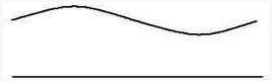
THE DRINK

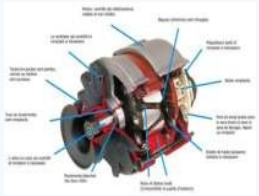
THERE PORCELAIN

TYPES OF CURRENT

ELECTRICITY

- ALTERNATIVE





- CONTINUOUS

2 TYPES OF CIRCUIT PHASE:

- **Single phase : 220/240 V AC** (phase + neutral + Earth)
- **Three-phase : 380/ 4 0 0 V AC** (3 Phases + Neutral + Earth)

UNITS OF MEASUREMENT

ELECTRICITY

THERE TENSION — **Letter U And itself measure in Volt (V)**

It is there strength of fluent either there size of the electrons.

THE INTENSITY — **Letter I And itself measure in Ampere (HAS)**

It is THE Speed of fluent either there quantity of electrons Who pass in 1 second.

THERE RESISTANCE — **Letter R And itself measure in Ohm (Ω)**

It is the opposition created by THE driver At passage of fluent.

THERE POWER — **Letter P And itself measure in Watt (W)**

It is energy transported by THE fluent in 1 second. $P\,(w) = U\,(v) \times I\,(a) \cos \Phi$

LAW D'OHM

ELECTRICITY

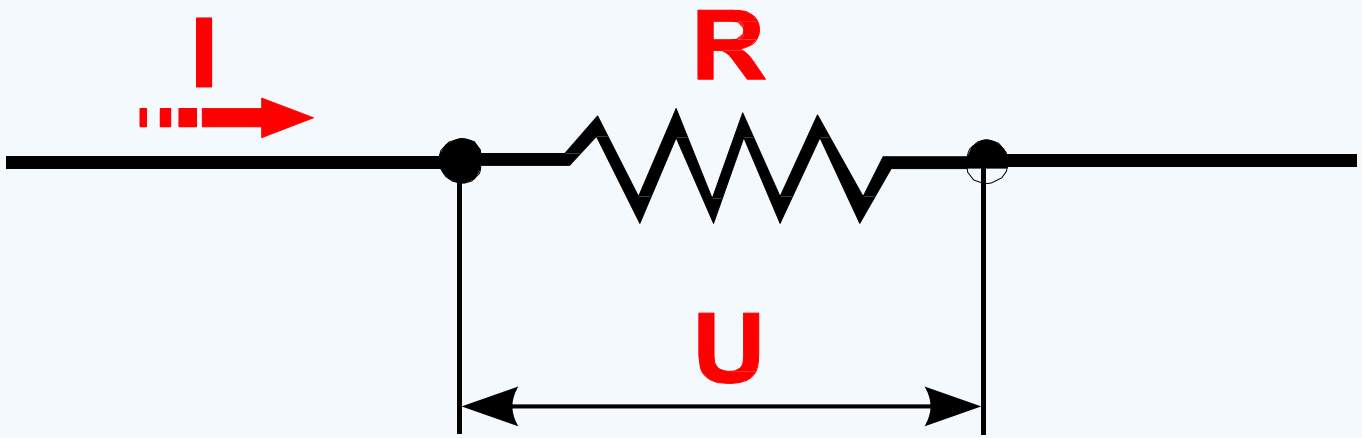
U : TENSION en VOLTS

R : RESISTANCE en OHMS

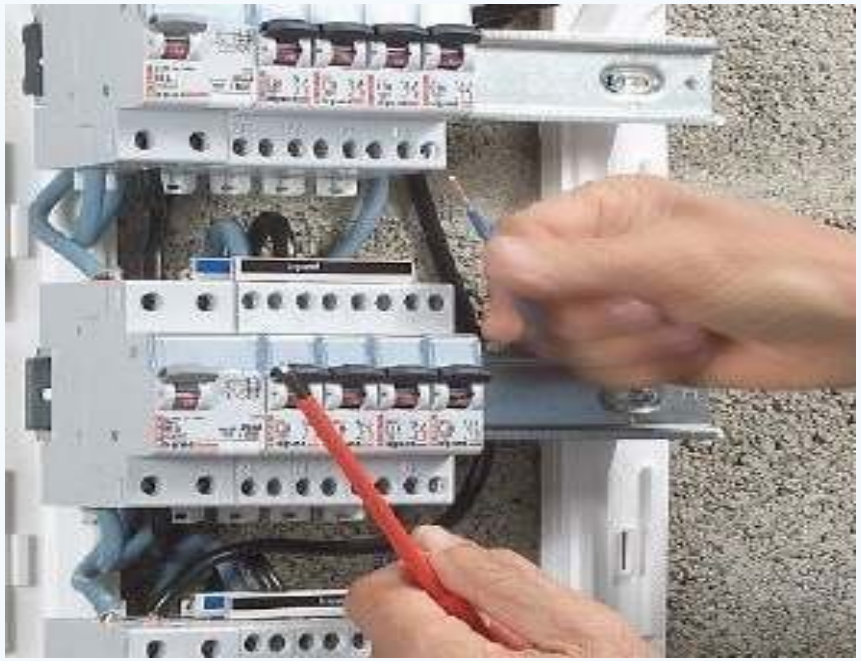
I : INTENSITE en AMPERES

THERE FORMULA MATHEMATICAL

U = R x I

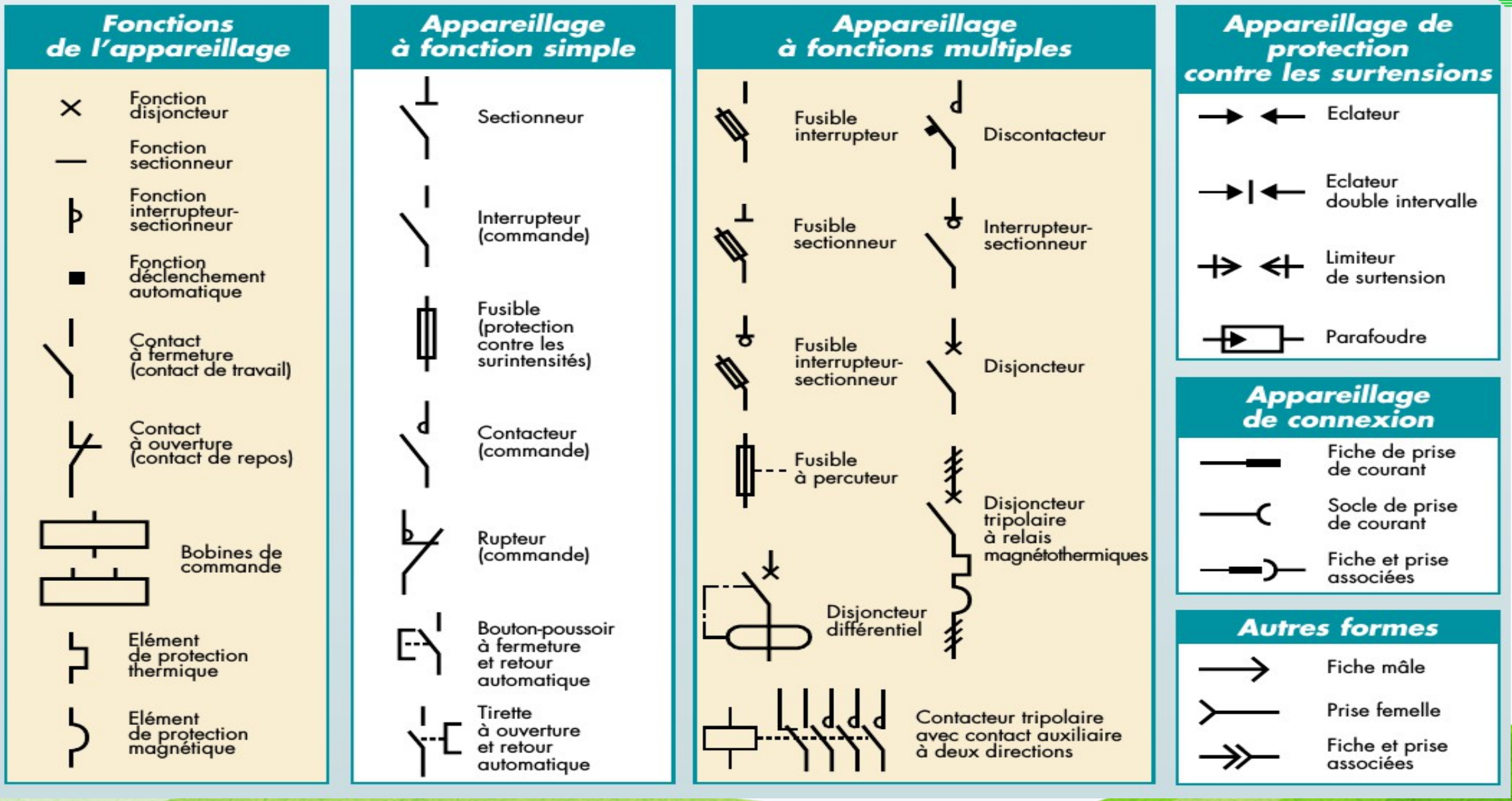


THE FACILITIES ELECTRIC



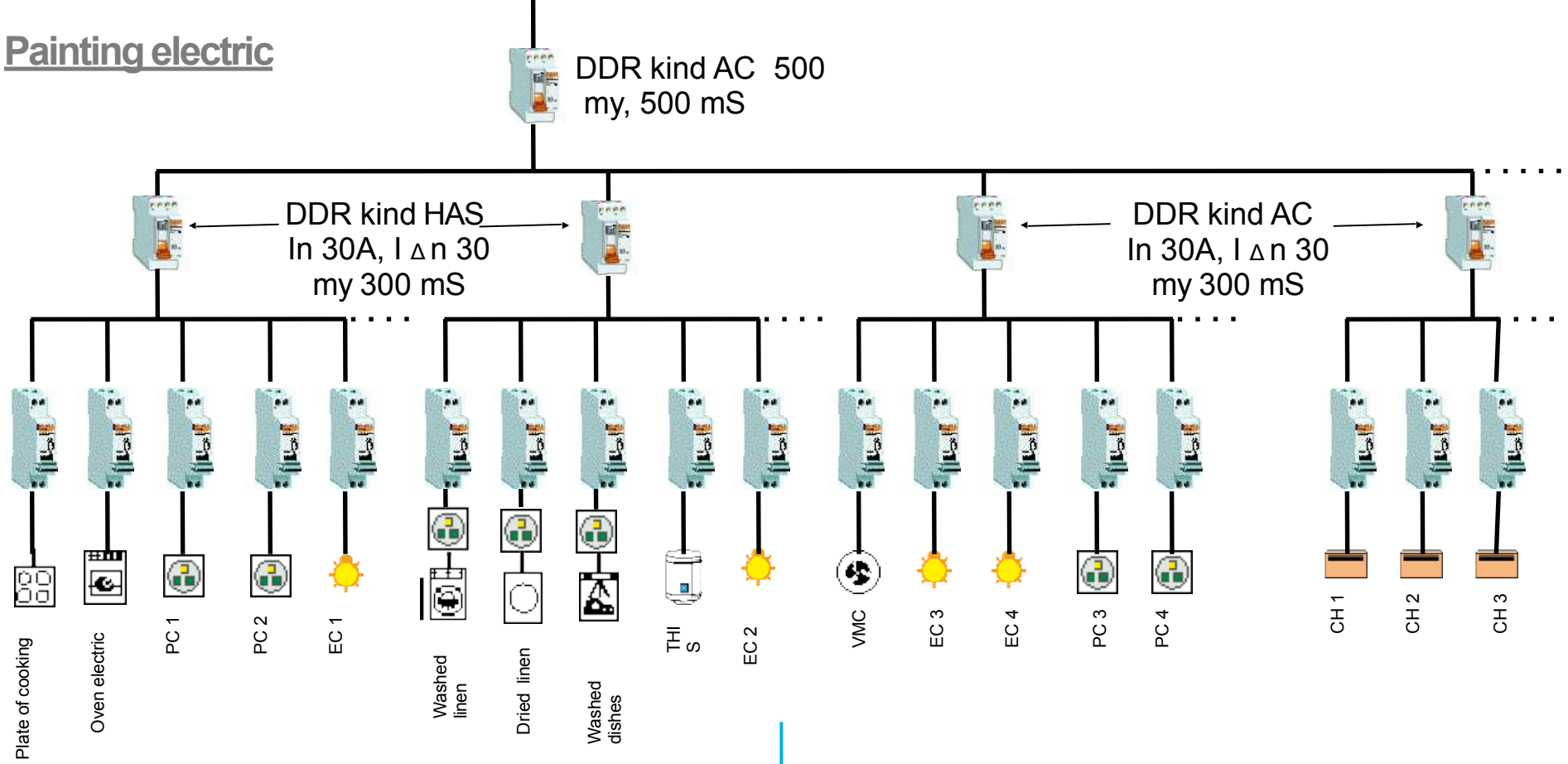
THE plan electric

THE FACILITIES ELECTRIC



Painting electric

THE FACILITIES ELECTRIC



PC: section 2.5mm2, protection 16 Or 20A (For 8 points)
Lighting: section 1.5mm 2 , protection 10A (For 8 points)

Heating: section 2.5mm2, protection 20A (For 4500 w)

Plates of cooking: section 6mm2, protection 32A (line direct)

VMC: section 1.5mm2, protection 2A

Oven electric: section 2.5mm2, protection 20A (line direct)

Dried linen: section 2.5mm2, protection 20A (line direct)

Washed dishes: section 2.5mm2, protection 20A (line direct)

Heated water: section 2.5mm2, protection 20A (line direct)

ELECTRICAL EQUIPMENT

THE FACILITIES ELECTRIC

THE RELAY THERMAL

THE CONTACTOR

THE TRANSFORMER BT

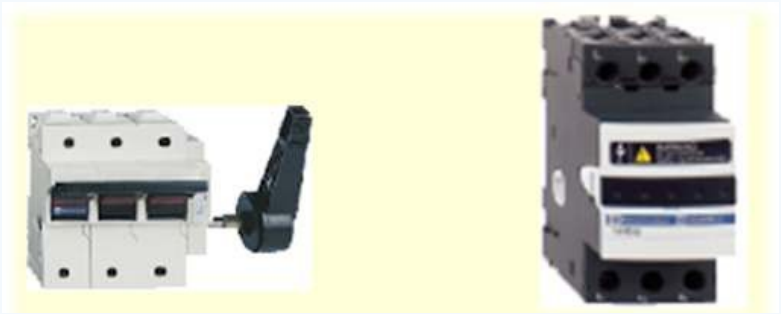
INVERTER

THERE PLIERS AMPERMETRIC

THE SOLENOID VALVE

ELECTRICAL EQUIPMENT

THE DISCONNECTOR



THE DISCONNECTOR DOOR FUSE

THE SWITCH DISCONNECTOR

THE SWITCH

CALCULATOR

AC AND DC VOLTAGE DOMAINS

ELECTRICITY

High Tension	HTB	U n > 50 000V U n > 75000V	Ex: 100Kv 50Kv		PRODUCTION
	HTA	AC 1000V < U n ≤ 50 000V DC 1500V < U n ≤ 75 000V			TRANSPORT ATION
Low Tension	BT	AC 50V < U n ≤ 1000V DC 120V < U n ≤ 1500V	Ex: 750v 600v		TRANSFO BT
			Ex: 410v 240v		USE
Very Low Tension	TBT	AC U n ≤ 50V DC U n ≤ 120V	Ex: 48v 24v 12V		TRANSFO TBT

THE NEUTRAL REGIME

1ère lettre : neutre du transfo		2ème lettre : masses des appareils (côté utilisateur)	
raccordé à la terre	T	T	raccordées à la terre
isolé de la terre	I	T	raccordées à la terre
raccordé à la terre	T	N	raccordées au neutre

ELECTRICAL ACCIDENTS

Falls

Fires

Electrifications

Electrocutions

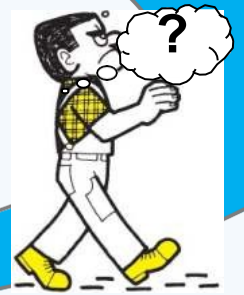
Explosions

CONSEQUENCES OF ELECTRICAL ACCIDENTS

Burns **Ejection**

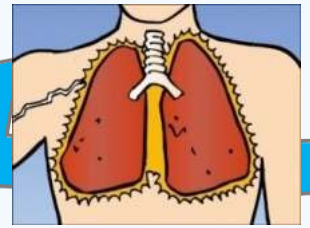
Phenomenon of No coward

Unconscious

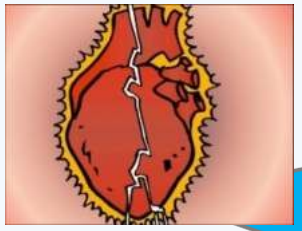


Losses of memory

Paralysis



Stop respiratory



Fibrillation Or stop of heart

THE EFFECT OF INTENSITY AND TENSION

EFFECT OF THE INTENSITY

1 HAS — Stop of heart irreversible

75/500 my — Threshold of fibrillation

30 my — Threshold of cardiac paralysis

10 my — Threshold of respiratory

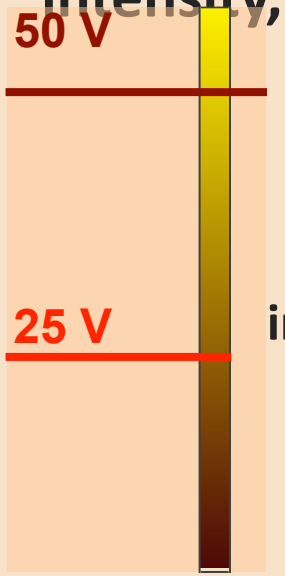
Threshold of No let go Contraction muscular

1 my — Threshold of perception

Sensation very

EFFECT OF THERE TENSION

Hazard of dead, according to the intensity, has leave of:

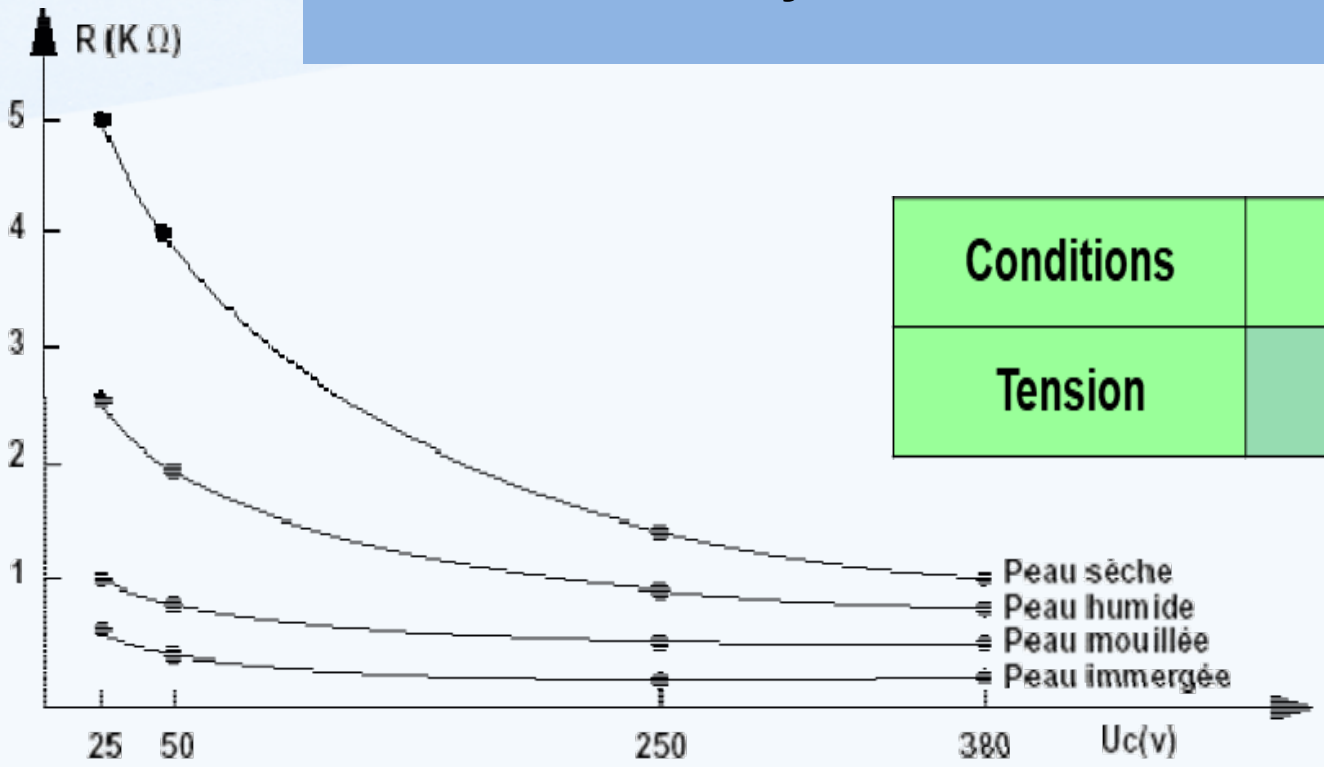


50 V — in medium dry

25 V — in medium humid

Each electrical accident has varying degrees of severity depending on the circumstances. It can range from a simple electric shock (electrification) upon the death of the person who is the victim. (electrocution)

Resistance of body human in function of there tension of contact



Conditions	Sèches	Humides	Mouillées
Tension	50V (48)	25V (24)	12V

It is observed that the body's resistance decreases significantly depending on the contact voltage and the degree of humidity of the skin .

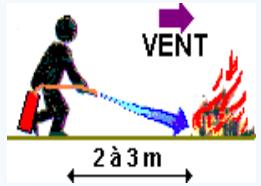
ELECTRICAL FIRES

An electrical fire can occur due to worn electrical outlets, overloading, failure to comply with safety standards or faulty equipment.

ATTACK DISTANCES

Extinguisher has CO^2 :
Scope effective: **1 meter**

Extinguisher has **WATER** sprayed with Or without additive :
Scope effective: **2 meters**

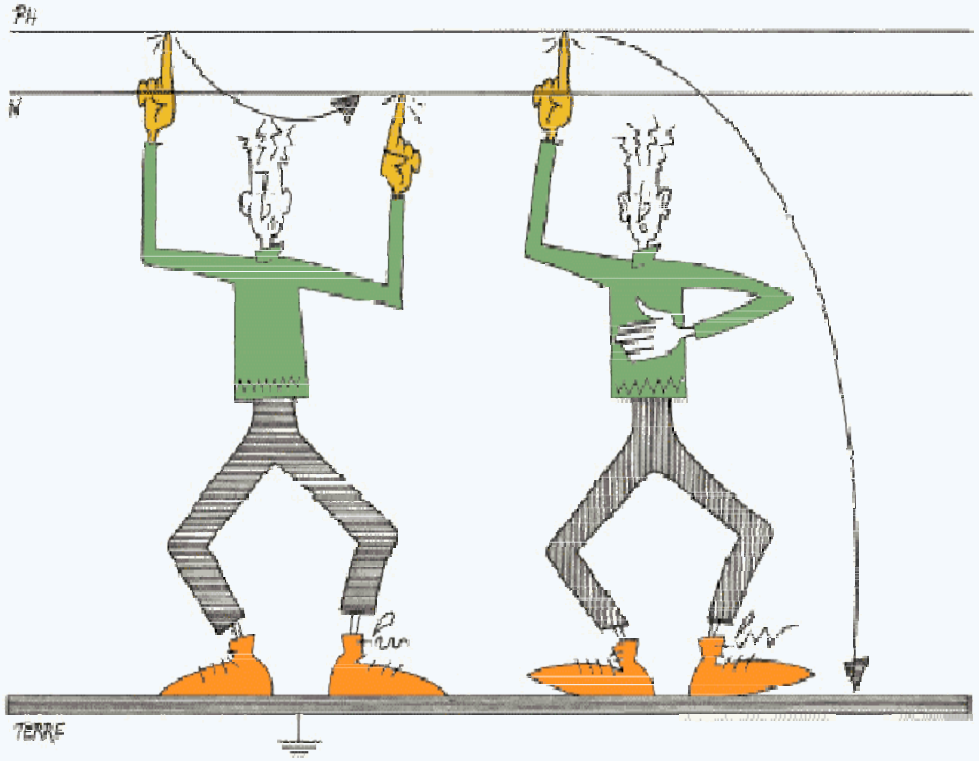


Extinguisher has **POWDER** : Scope effective: **3 meters**

THE DIFFERENT CONTACTS AND PREVENTION

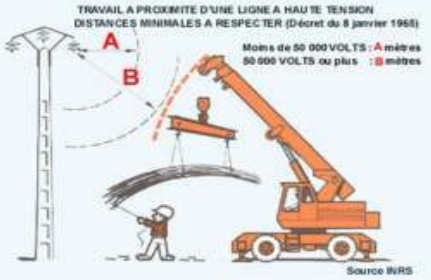
DIRECT CONTACT:

Contacts of a person with an active part of a circuit.



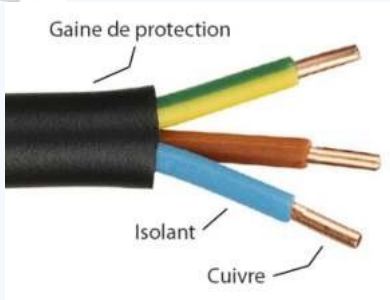
A contact direct East generally due has a imprudence Or At non- compliance with rules of security electric

➢ ***DISTANCE***



➢ ***OBSTACLES***

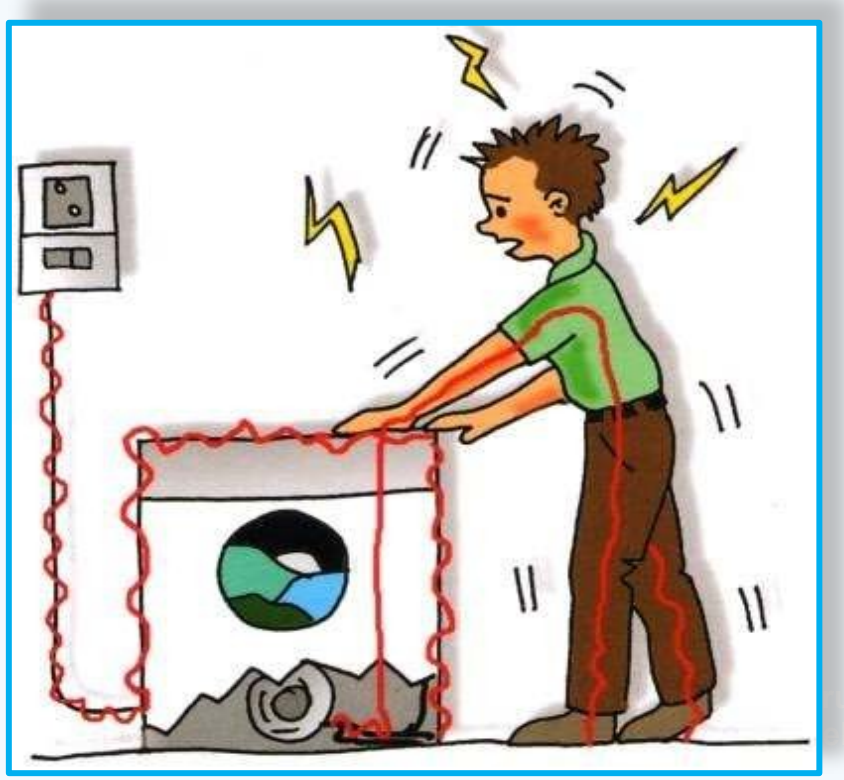
➢ ***INSULATIO N***



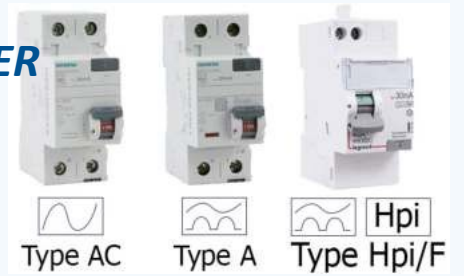
THE DIFFERENT CONTACTS AND PREVENTION

CONTACT INDIRECT :

He it is about of a contact with a mass bet accidentally below tension following has A default isolation.



➢ ***BET HAS THERE EARTH PARTNER HAS CIRCUIT BREAKER DIFFERENTIAL***



➢ ***DOUBLE INSULATION***

➢ ***VERY LOW TENSION OF SECURITY (50V,25V,12V)***

PREVENTION AGAINST SHORT CIRCUITS AND OVERCHARGE

- CIRCUIT BREAKER MAGNETO-THERMAL OR FUSE

- PROTECTIONS COLLECTIVES

- PROTECTIONS INDIVIDUAL

COLLECTIVE OR INDIVIDUAL

Helmet + visor

Gloves insulators

Shoes insulating

Stool Or Carpet insulating

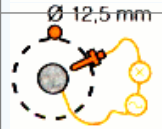
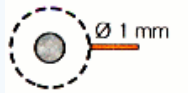
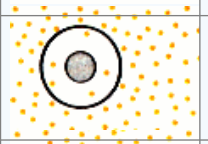
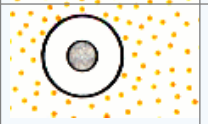
OR

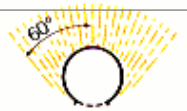
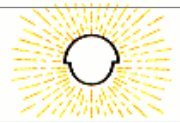
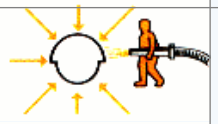
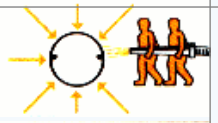
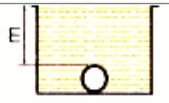
Combination HT And Pole insula..

Tablecloth Insulating

Marking collectives

THE CLUE OF PROTECTION IP2X

1st Figure : Protection against THE body solid		
	Tests	
0		Not of protection
1		Protected against THE upper solid bodies at 50mm (ex : Involuntary contact of there hand)
2		Protected against THE upper solid bodies at 12.5mm (ex : finger of there hand)
3		Protected against THE upper solid bodies has 2.5mm (ex : Tools, screw.)
4		Protected against THE upper solid bodies at 1mm (ex : tools ends, son.)
5		Protected against the dust (no harmful deposit.)
6		Totally protected against dust
	29	

2nd Figure : Protection against THE liquids		
	Tests	
0		Not of protection
1		Protected against the falls vertical drops of water (condensation.)
2		Protected against the falls of drops of water up to 15th of the vertical.
3		Protected against water in rain until 60° from the vertical.
4		Protected against the projections of water of all directions.
5		Protected against THE water jets of all directions has there spear.
6		Totally protected against THE water splashes assimilable to the packages of sea.
7		Protected against THE effects of immersion.
8		Protected against THE effects of prolonged immersion In conditions specific.

THE envelopes of protection must to have At minimum A hint of protection **IP2x to prevent a person from accessing active parts with their finger**

THE AUTHORIZATIONS ELECTRIC

THE CHARACTERS OF THE TITLE

- **1 ER Character; THE domain of tension:**

  B : THE FACILITIES of the areas BT And TBT

  H : INSTALLATIONS in the HT domain

- **2ND Character; there letter of there stain has accomplish :**

  C , CONSIGNMENT

  R , INTERVENTIONS BT GENERAL

  S , INTERVENTIONS BT ELEMENTARY

  E , OPERATIONS SPECIFIC. THE holder can perform of the OPERATIONS TRIAL Or of VERIFICATION Or of MEASUREMENT Or of the MANEUVERS

  P , OPERATIONS on THE FACILITIES chain photovoltaic

  F , OPERATIONS OF SEARCH In Area Approach Careful between 0.5m And 1.5m

Or THE Figure Who designates THE Status of technician :

0 , NO ELECTRICIAN

1 , EXECUTING ELECTRICIAN

2 , CHARGE OF WORKS responsible of the organization of construction site **.**

- **3RD Character** *(with THE figure)* **:**

V : in HT, WORKS in AREA OF NEIGHBORHOOD REINFORCES HT (area 2) in BT, WORKS in AREA OF NEIGHBORHOOD REINFORCES BT (area 4)

T : WORKS BELOW TENSION

N : WORKS OF CLEANING BELOW TENSION

X : OPERATIONS " specials» not entering not In THE designations previous. This AUTHORIZATION must to have A character exceptional

The nature of the authorization is symbolized by capital letters and a numerical index

TITRE D'HABILITATION

Nom:
Prénom:
Fonction:

Employeur:
Affectation:

Personnel	Symbole d'habilitation	Champ d'application		
		Domaine de tension	Ouvrages concernés	Indications supplémentaires
Non électricien habilité				
Exécutant électricien				
Chargé de travaux ou d'interventions				
Chargé de consignation				
Habilités spéciaux				

Le Titulaire
Signature:

Pour l'Employeur
Nom et prénom:
Fonction:
Signature:

Date:
Validité:

AVIS

- Le présent titre d'habilitation est établi et signé par l'employeur ou son représentant et remis à l'intéressé qui doit également le signer.
- Ce titre est strictement personnel et ne peut être remis à des tiers.
- Le titulaire doit être porteur de ce titre pendant les heures de travail ou le conserver à sa portée.
- La perte éventuelle de ce titre doit être signalée immédiatement au supérieur hiérarchique.
- Ce titre doit comporter les indications suivantes:
  - l'une des majuscules B ou H, distinctive du domaine de tension dans lequel le titulaire peut être amené à exercer son activité.
  - l'un des indices 0, 1, 2 ou 2ª lettre R ou C, fixant les attributions qui peuvent lui être confiées.
  - l'aptitude à travailler sous tension (lettre T ajoutée à B ou H),
  - l'aptitude à nettoyer sous tension (lettre N ajoutée à B ou H),
  - l'autorisation à travailler au voisinage de pièces nues sous tension (éventuellement lettre V ou indication, en toutes lettres, dans la colonne *INDICATIONS SUPPLEMENTAIRES*),
  - L'absence d'une indication a valeur d'interdiction.
  - L'habilitation d'indice 2 implique celles des indices 0 et 1.
  - L'habilitation d'indice 1 implique celle d'indice 0.
  - L'habilitation BR implique l'habilitation B1.
  - Les habilitations d'indices 0, 1, 2 ou de 2ª lettre R permettent d'être désigné comme surveillant de sécurité électrique dans le même champ d'application que celui fixé par le titre d'habilitation.

Cette habilitation n'autorise pas à elle seule son titulaire à effectuer de son propre chef les opérations pour lesquelles il est habilité. Il doit, en outre, être désigné par son chef hiérarchique pour l'exécution de ces opérations.

AUTORISATIONS (OU INTERDICTIONS) SPÉCIALES

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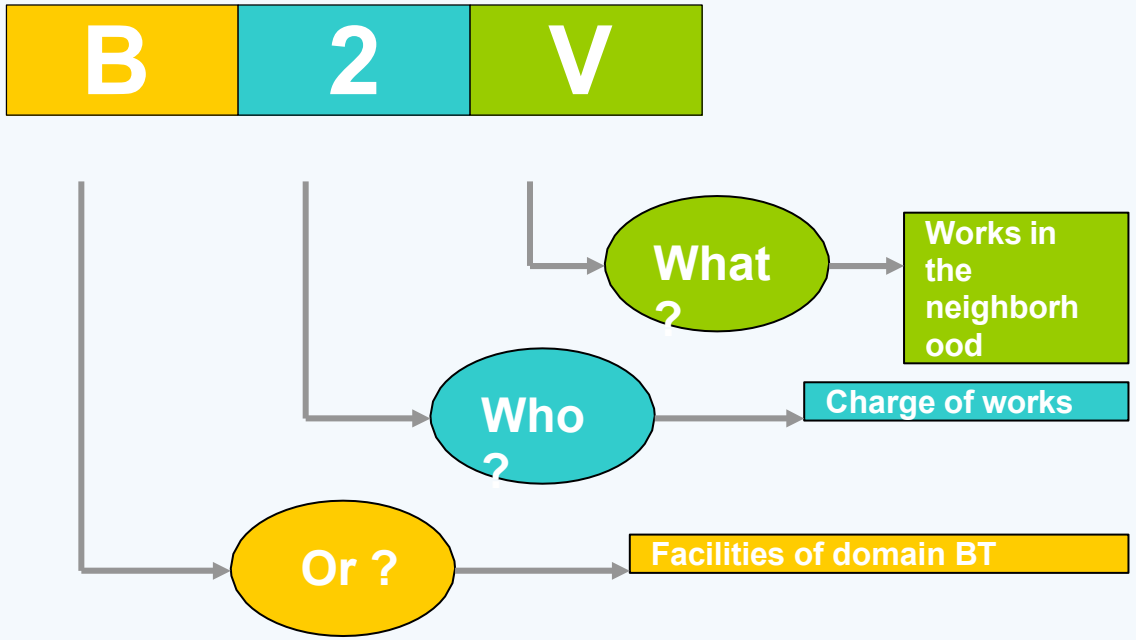
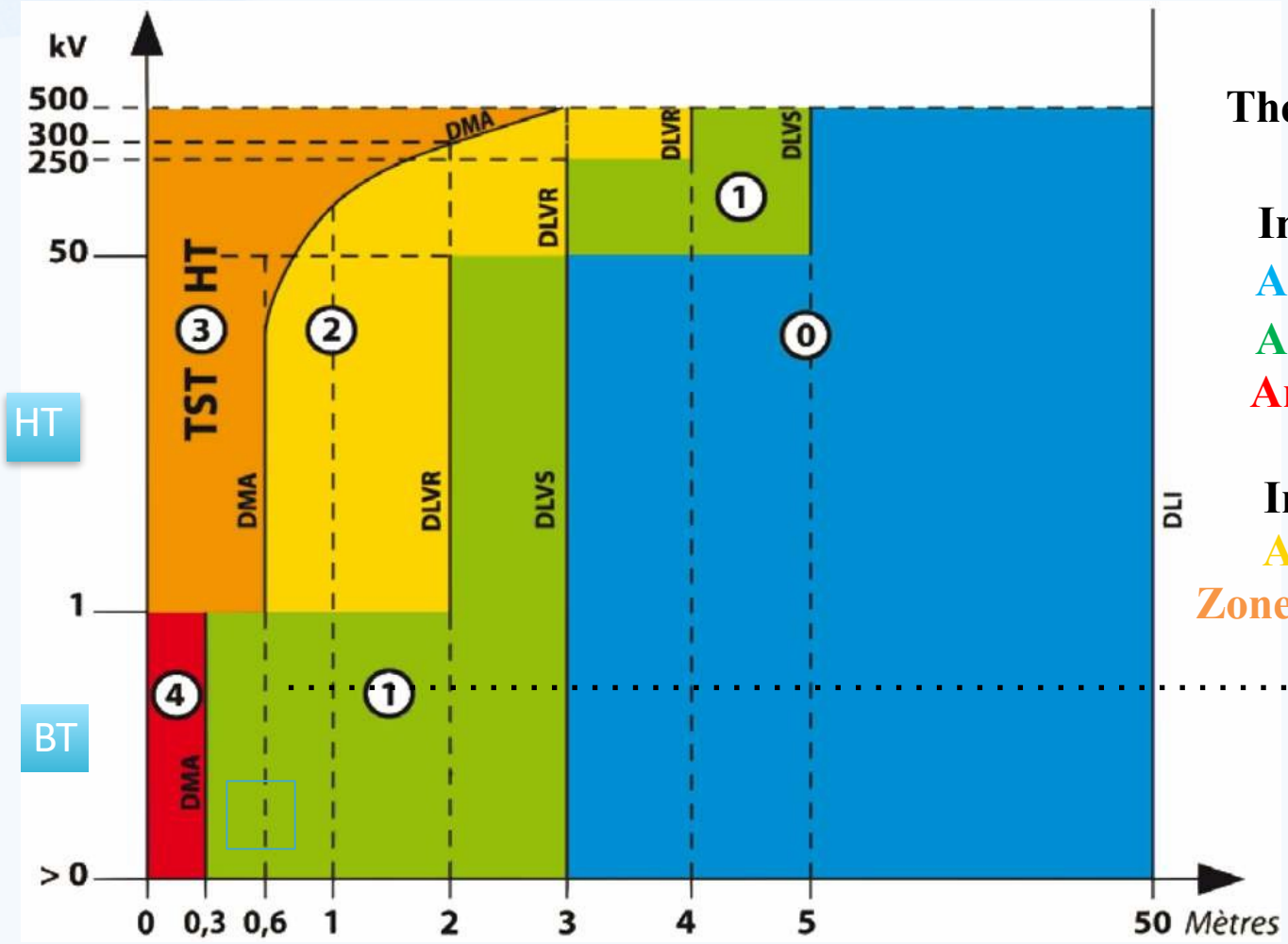


	Opération d'ordre non électrique	Opération d'ordre électrique				
	Exécutant ou chargé de chantier	Exécutant	Chargé de travaux	Chargé de consignation	Chargé d'intervention	Chargé d'opération
						
Basse Tension	B0	B1 - B1V	B2 - B2V B2V ESSAIS	BC	BS - BR	BE+ ATTRIBUT
Haute Tension	H0 - H0V	H1 - H1V	H2 - H2V H2V ESSAIS	HC	-	HE+ ATTRIBUT

LIMIT DISTANCES AND ZONES DEFINED IN OPEN FIELD



The environment electric itself compound in 5 areas.

In Low Tension:

Area 0 investigation

Area 1 of neighborhood simple

Area 4 Distance Minimal Approach

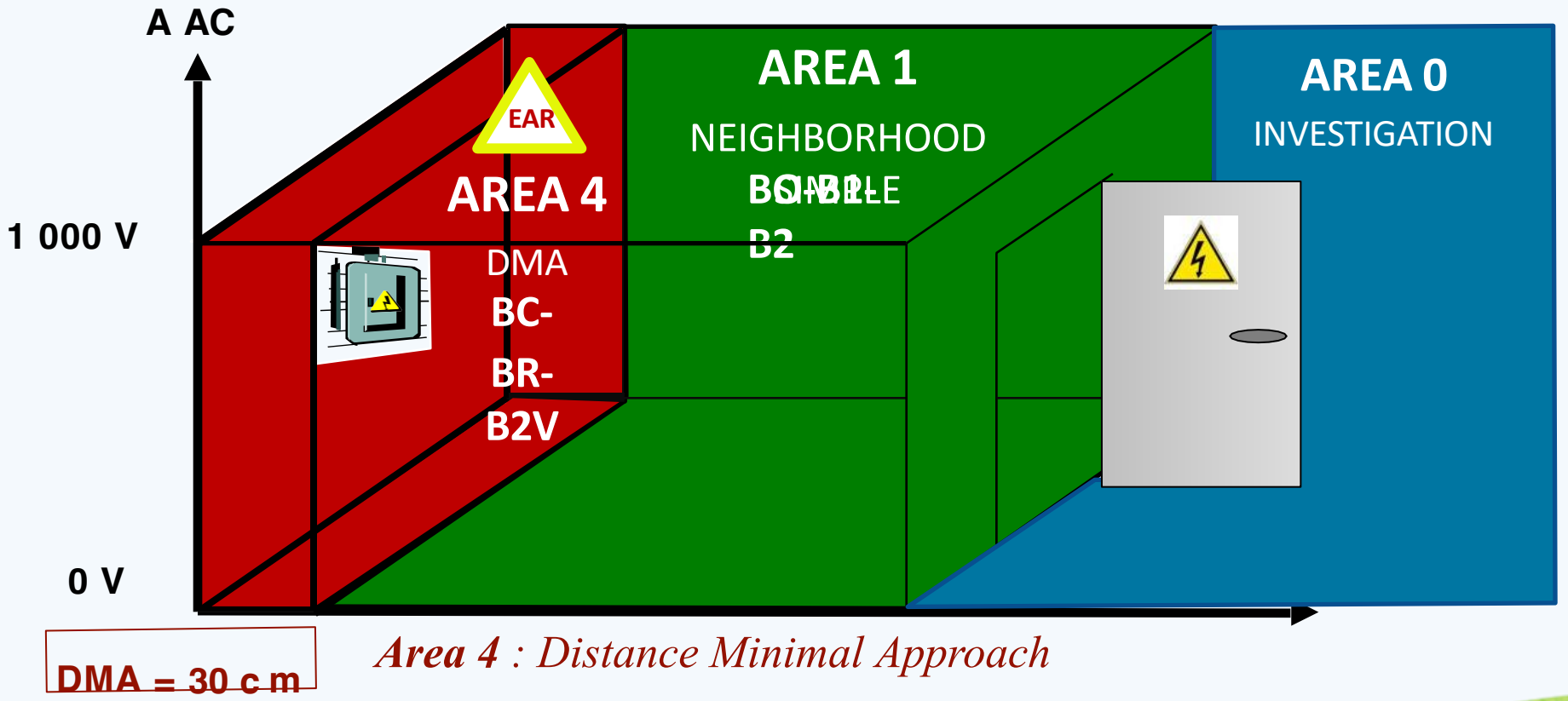
In High tension :

Area 2 of reinforced neighborhood

Zone 3 minimum approach distance

LIMIT DISTANCES AND DEFINED ZONES INDOORS IN BT

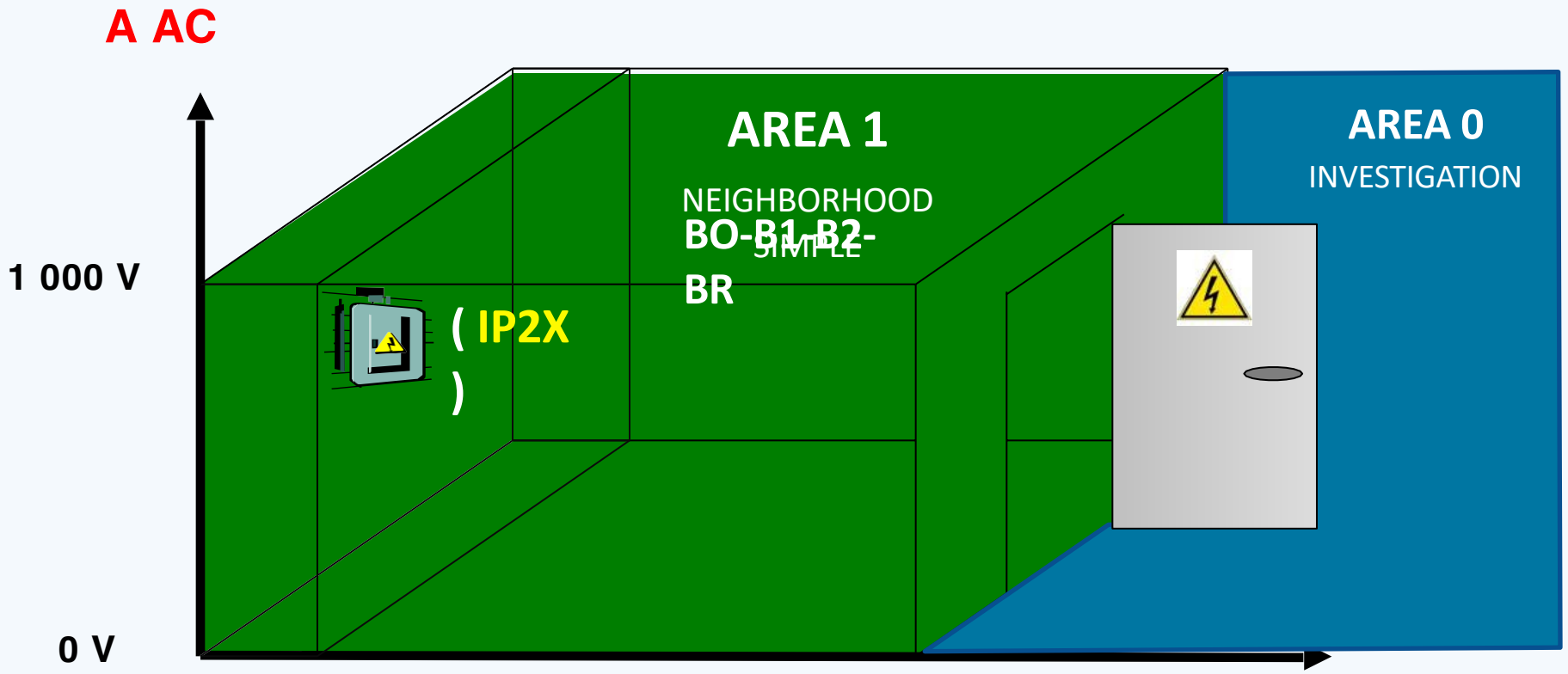
Local reserve to electricians with PNST



Area 4 : Distance Minimal Approach

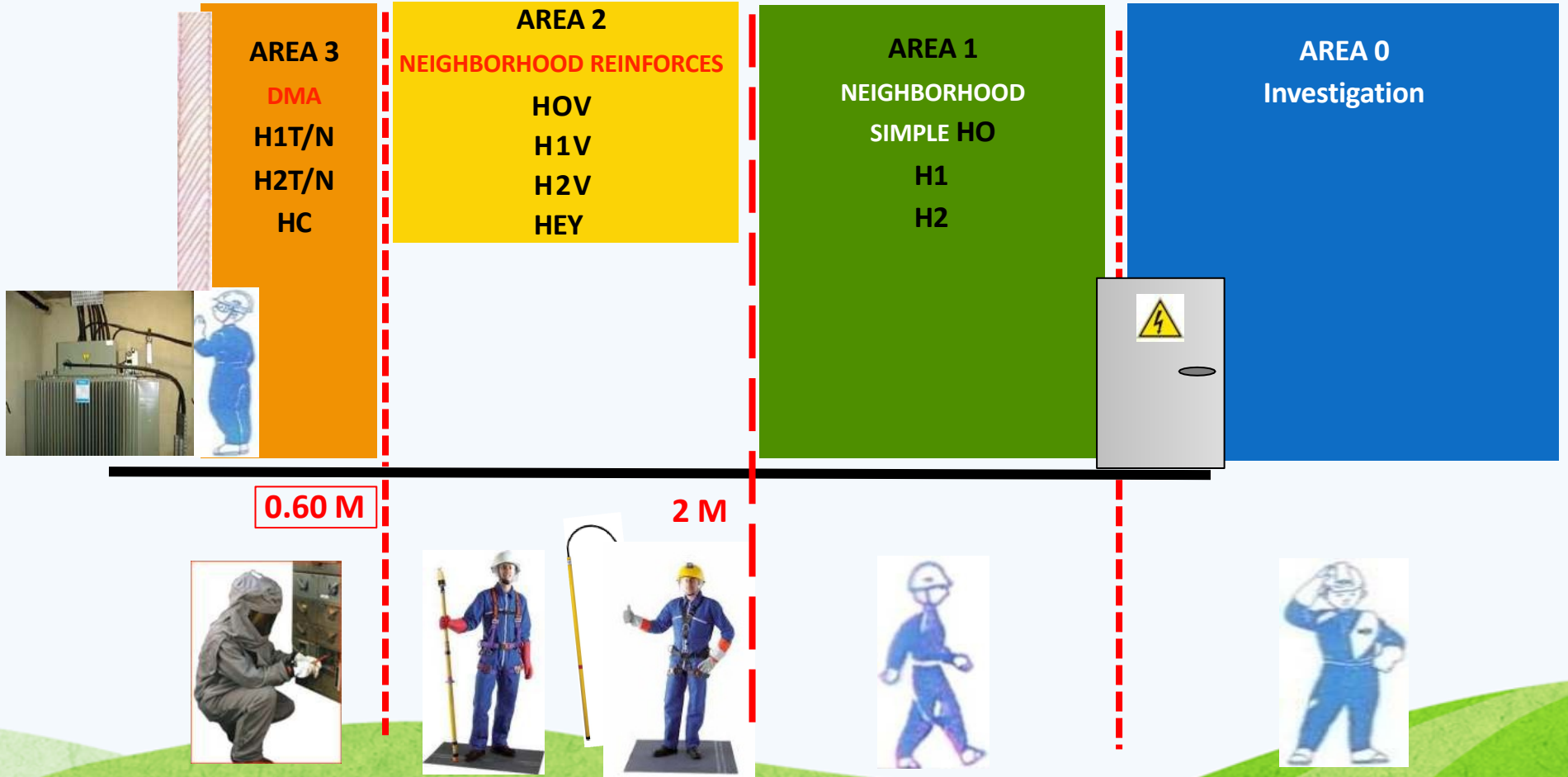
LIMIT DISTANCES AND DEFINED ZONES INDOORS IN BT

Local reserve to electricians **without PNST**



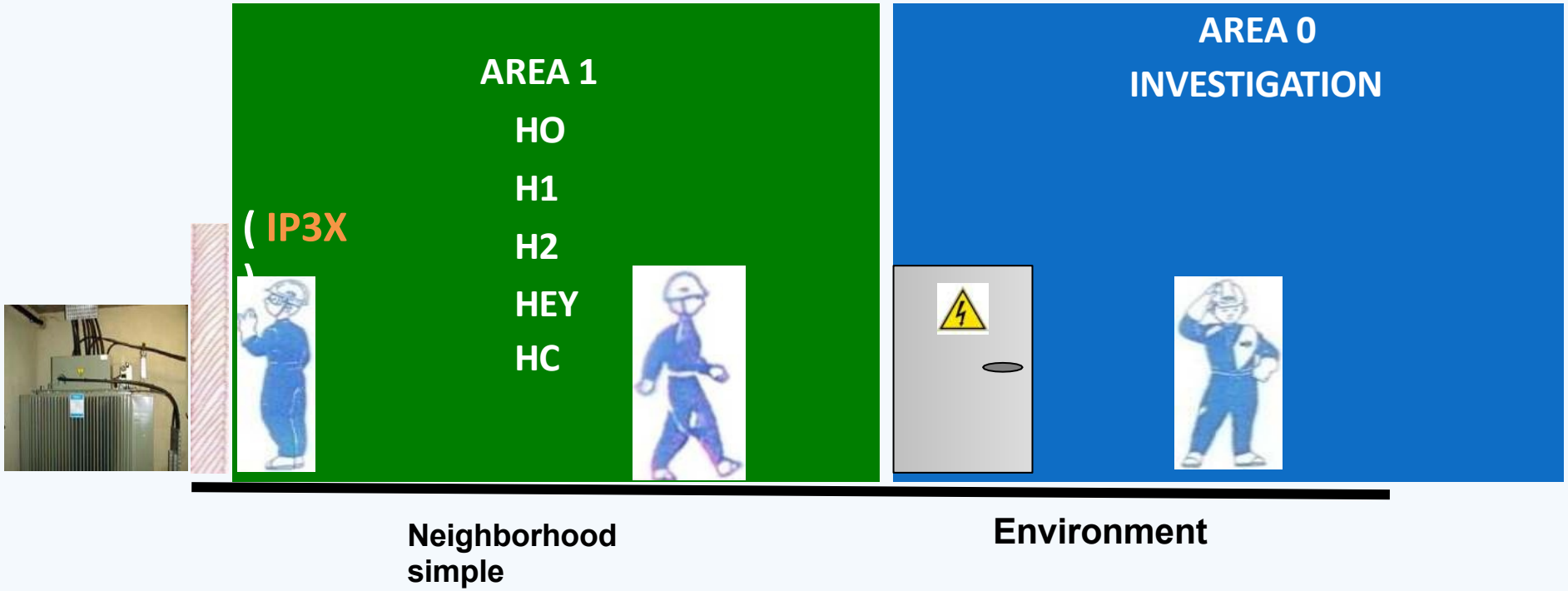
LIMIT DISTANCES AND DEFINED ZONES INDOORS IN HT

Local reserve to electricians **with PNST**



LIMIT DISTANCES AND DEFINED ZONES INDOORS IN HT

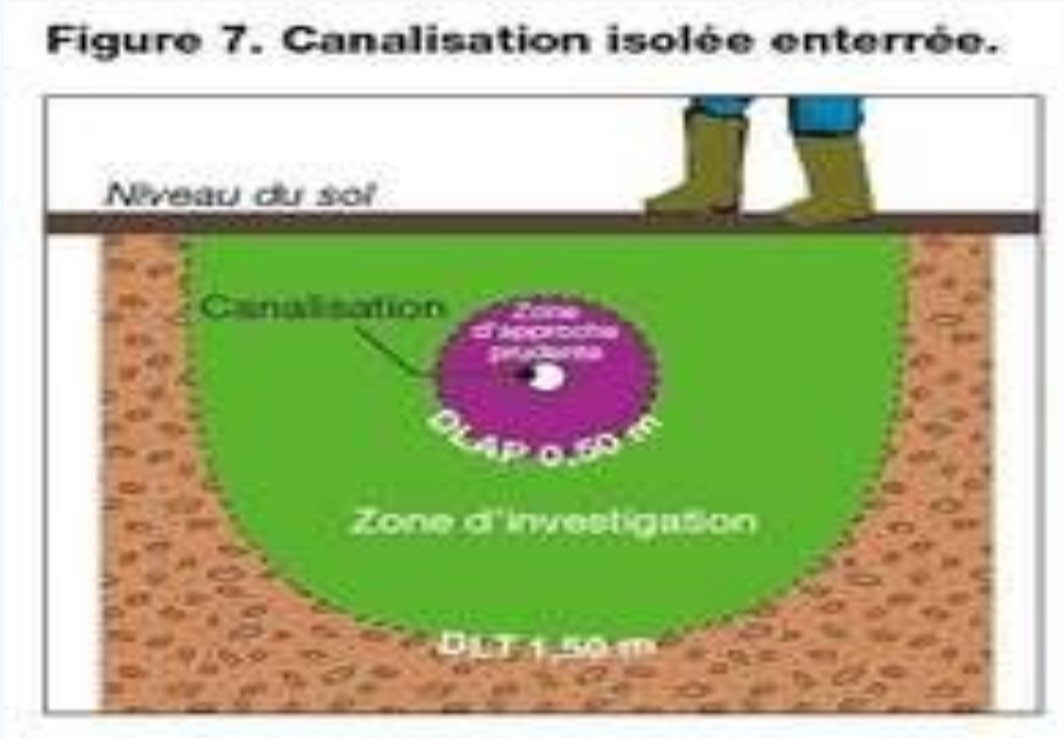
Local reserve to electricians **without PNST**

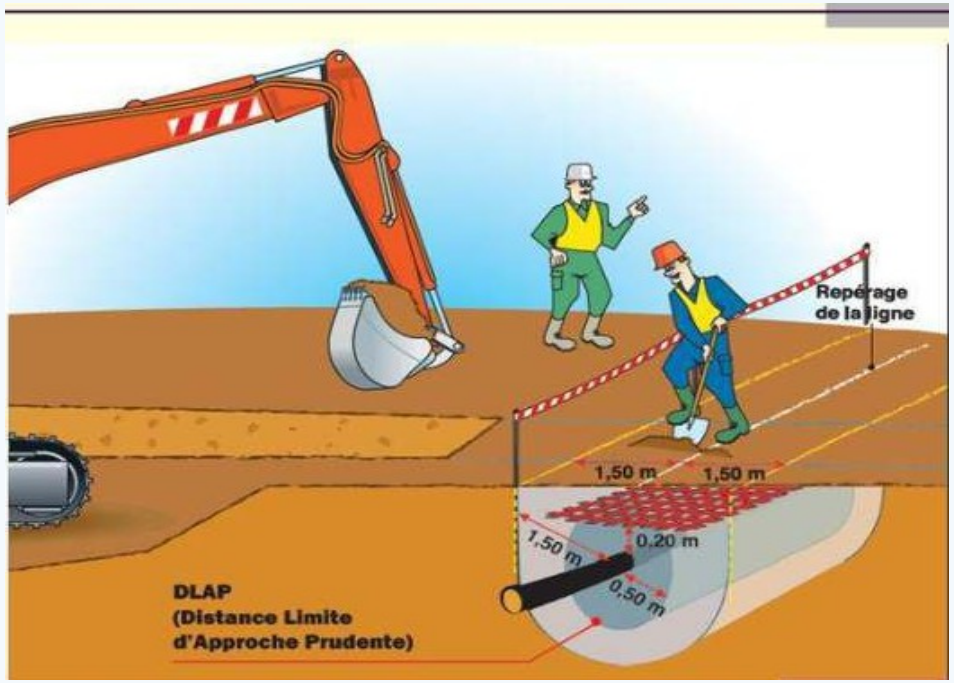


CAUTIONARY APPROACH DISTANCES LIMITS

DLAP = 0.50m

DLT (1.5m) = Distance Limit of Work





THERE CONSIGNMENT

THERE CONSIGNMENT IN 1 STAGE

B2V (Charged of Works) And BC (Charge of Consignment)

1/ SEPARATION

- ➢ Maneuver A disconnector (OUT CHARGE) or a circuit breaker
- ➢ Unplug A device, Withdraw A fuse

2/ CONVICTION

- ➢ Immobilization mechanical
- ➢ Signaling with A sign

3/ IDENTIFICATION

- ➢ To consult THE plans
- ➢ Follow materially THE circuit

4/ VAT

- ➢ Test of Phase And Neutral, Or Phase And Phase, At closer of there source of work

5/ MALT And CC

- ➢ Bet out service of a area of work on THE SNCF lines / TRAMWAY or some electrical installations submitted has the effect magnetic of capacitive coupling And inductive

THERE CONSIGNMENT IN 1 STAGE

BR (Charge intervention general)

1/PRE-IDENTIFICATION

➢ Acknowledgement of the work during of there preparation of the work, read THE plan etc…

2/ SEPARATION

➢ Maneuver A disconnector (OUT CHARGE) or a circuit breaker
➢ Unplug A device, Withdraw A fuse

3/ CONVICTION

➢ Immobilization mechanical
➢ Signaling with A sign

4/ VAT

➢ Test of Phase And Neutral, Or Phase And Phase, At closer of there source of work

5/ MALT And CC

➢ Bet out service of a area of work on THE SNCF lines / TRAMWAY or some electrical installations submitted has the effect magnetic of capacitive coupling And inductive

2-STEP CONSIGNMENT
THE BC (BE M) AND THE B2V

THE BC Charge of Consignment must:

1/ SEPARATION

- Maneuver A disconnector (HC) Or A circuit breaker
- Unplug A device, Withdraw A fuse

2/ CONVICTION

- Immobilization mechanical
- Signaling with A sign

THE B2V Charge of Works must:

3/ IDENTIFICATION

- Observe THE indications on THE circuit breaker
- Read THE plan

4/ VAT

- Test of Phase And Neutral, Or Phase And Phase, At closer of there source of work

5/ MALT And C/C

- Bet out service of a area of work on THE SNCF lines / TRAMWAY or some electrical installations submitted has the effect magnetic of capacitive coupling And inductive

ELEMENTS OF CONSIGNMENT

TOOLS AND PROTECTIVE EQUIPMENT

Their features must be conforms has there standard "Example NFC 18-400 »

And to carry THE marking : And indicate there tension maximum of use.

ex : 1000V

THANK YOU

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