BG ETEM
Energie Textil Elektro
Medienerzeugnisse

Electrical Hazards in the Textile and Garment Industry

Practical Solutions for avoiding danger

Introduction

Hazards arising from current flowing through the human body

Examples of “unacceptable” and “acceptable” situations

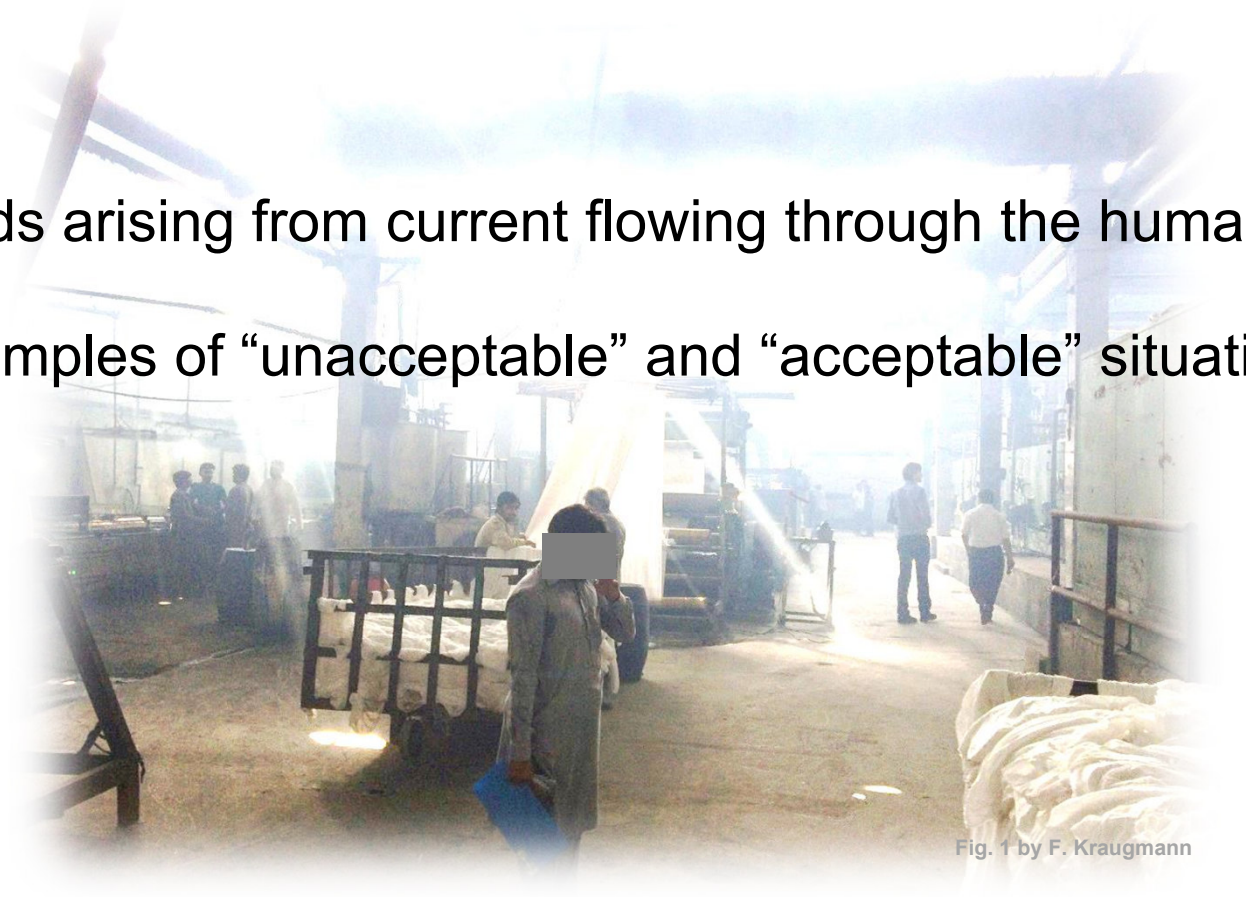
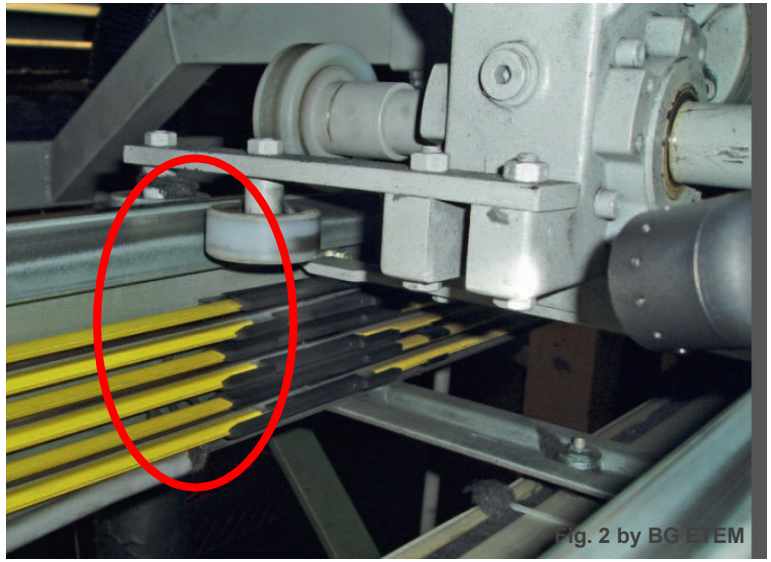


Fig. 1 by F. Kraugmann

Hazards caused by electricity

Deadly failure at power rail

- During non electrical maintenance next to the power rail
- Even the power rail was “finger safe”
- Worker slipped off and the screwdriver touched the power rails



Measurements

- electrical hazards must be consider in risk assessment too
  - Switch off electrical power
  - Cover power rails

Hazards caused by electricity

Accidents caused by electricity can be divided into three main parts:

current flowing through human body

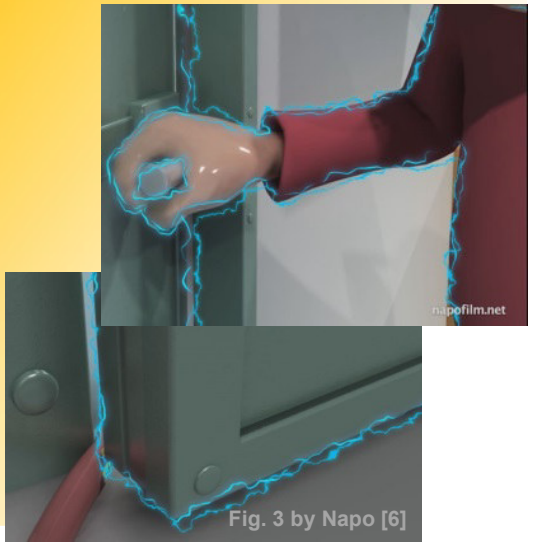


Fig. 3 by Napo [6]

Contact with **hot** and **harmful substances**

Fig. 4 by BG ETEM

Fig. 4 by BG ETEM

Secondary hazards

Fig. 5 by Napo [6]

current flowing through the human body

The extent of injury reflects the impact of a series of factors, such as:

- Amperage
- Path of current
- Frequency of current
- Ambient conditions
  (e.g. humidity, temperature)
- Length of contact time

Fig. 6 by F. Kraugmann

current flowing through the human body

- Can cause electric shock with a harmful effect on the internal organs and their proper function
- Most vulnerable are cardiac activities
- Weak current mostly causes functional disorders, while heavy current causes human tissue burn, especially if the current goes in and out of the body

The current that may cause an injury is about 1/10th of the current flowing through a light bulb!

current flowing through the human body

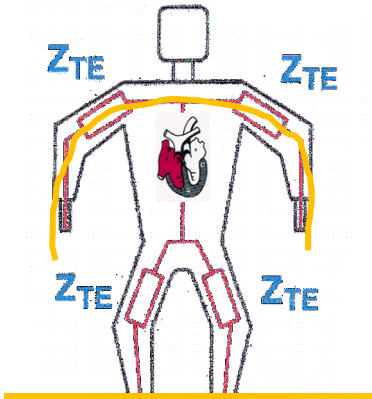
The extent of injury reflects the impact of a series of factors:

- Amperage

Injury:	Amperage:
The lower limit of noticeability:	0,5 mA to 3 mA
Pain threshold:	> 3,5 mA
Limit when you get stick on to it:	10 mA to 20mA
The lower limit of ventricular fibrillation:	> 30 mA
Burn:	> 2 A

current flowing through the human body

The resistor of a human body at 230 V in according to the current path



current path	resistor of human body
hand to hand	1000 Ω
foot to foot	1000 Ω
hands to feet	500 Ω
hand to feet	750 Ω
hand to chest	450 Ω
hands to backside	300 Ω

- current (hand to hand) = 230V / 1000Ω = **230mA**
- **The lower limit of ventricular fibrillation is about** **> 30mA**

Examples for “unacceptable” and “acceptable” conditions

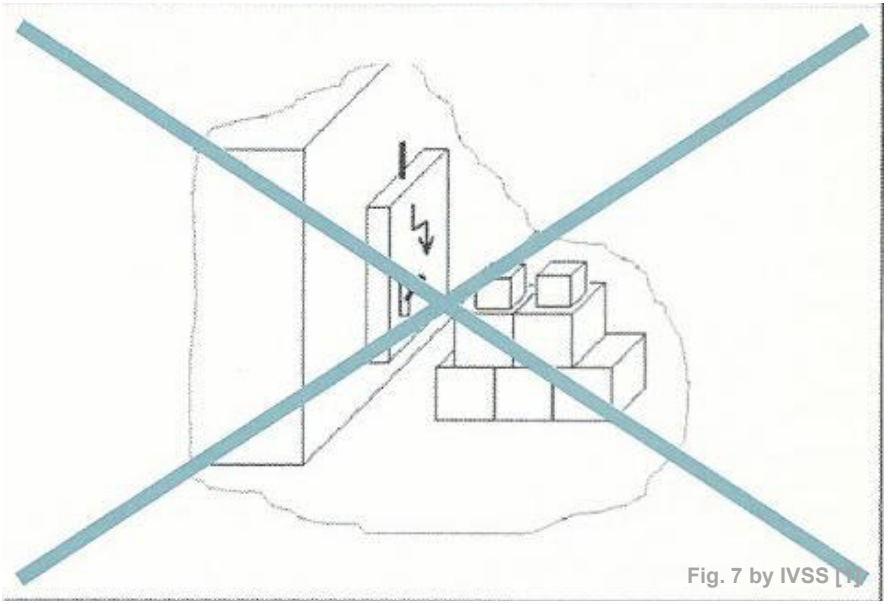


Fig. 7 by IVSS [1]

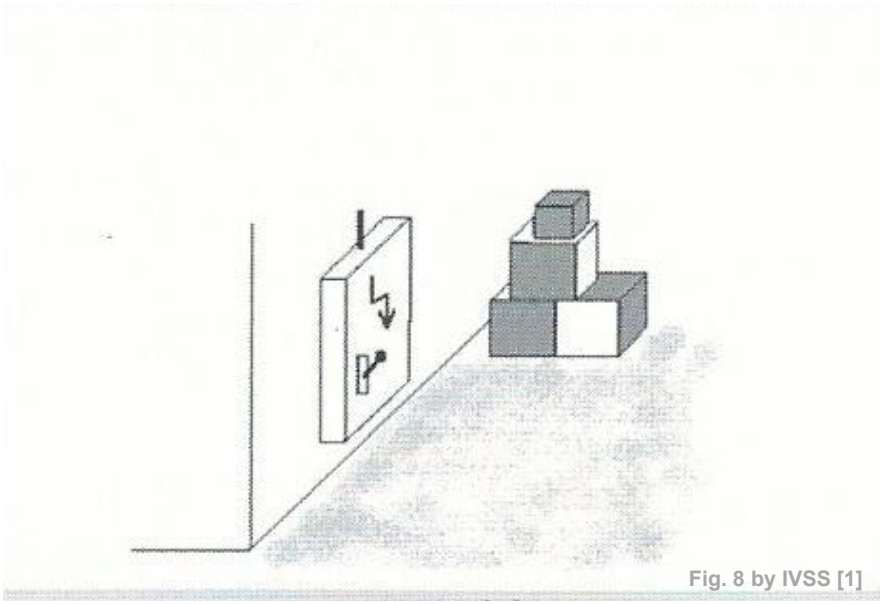


Fig. 8 by IVSS [1]

Examples for “unacceptable” and “acceptable” conditions

Fig. 9 by F. Kraugmann

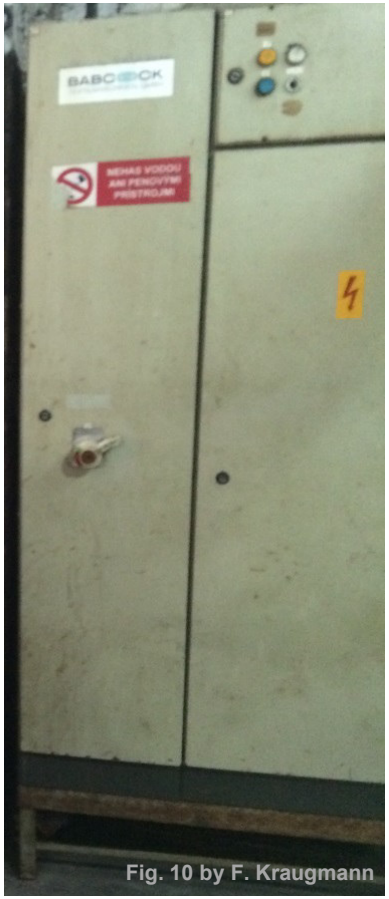


Fig. 10 by F. Kraugmann

Examples for “unacceptable” and “acceptable” conditions

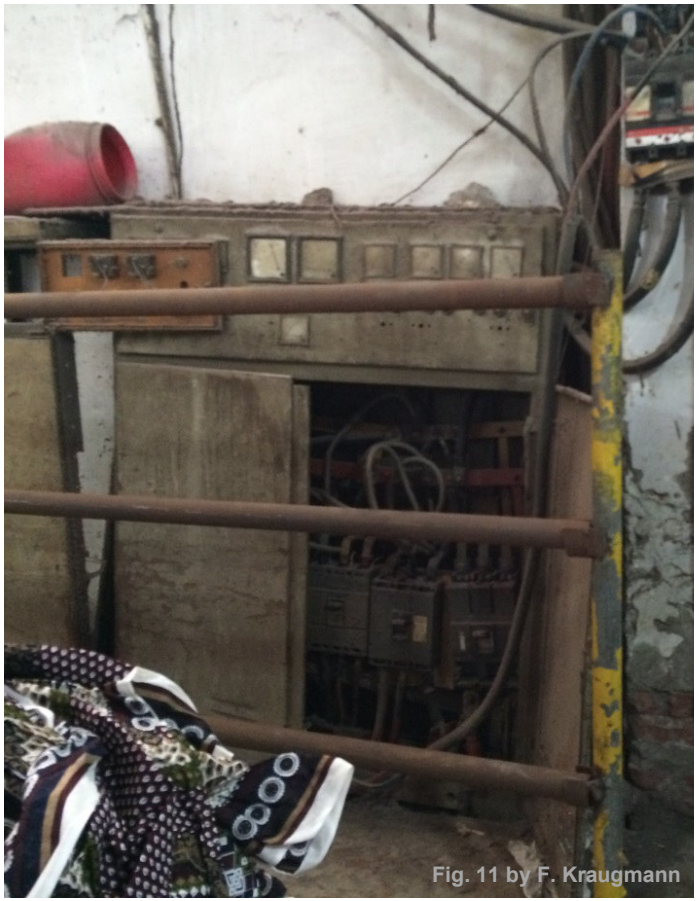


Fig. 11 by F. Kraugmann

12 by F. Kraugmann

Examples for “unacceptable” and “acceptable” conditions

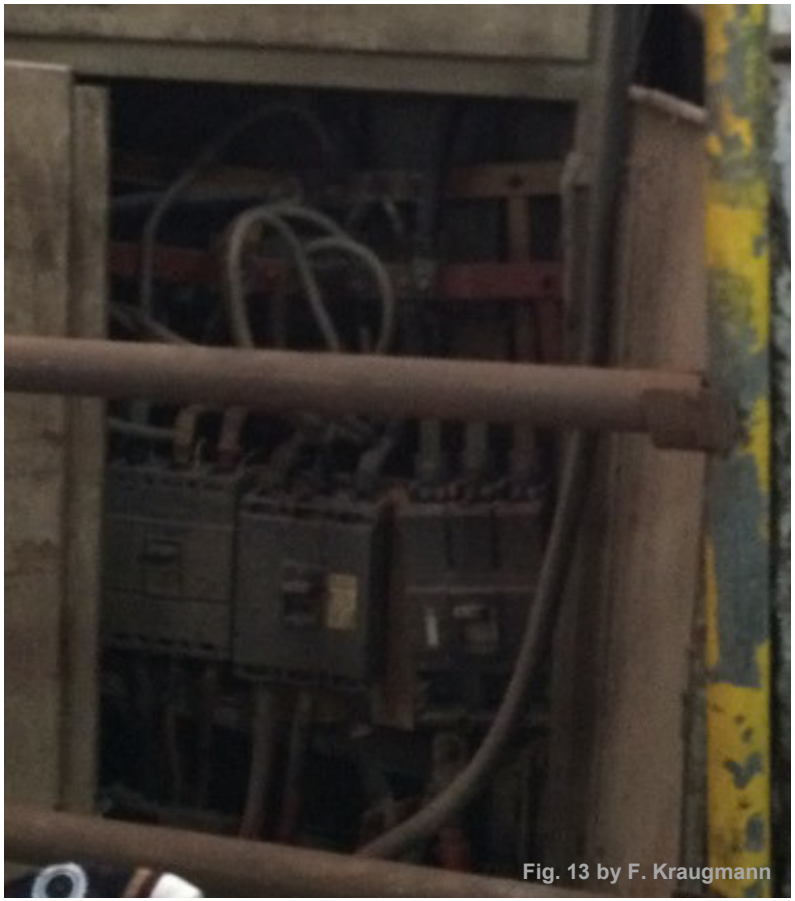


Fig. 13 by F. Kraugmann

Fig. 14 by BG ETEM

Examples for “unacceptable” and “acceptable” conditions

Fig. 15 by F. Kraugmann

Fig. 16 by BG ETEM

Examples for “unacceptable” and “acceptable” conditions

Fig. 17 by F. Kraugmann

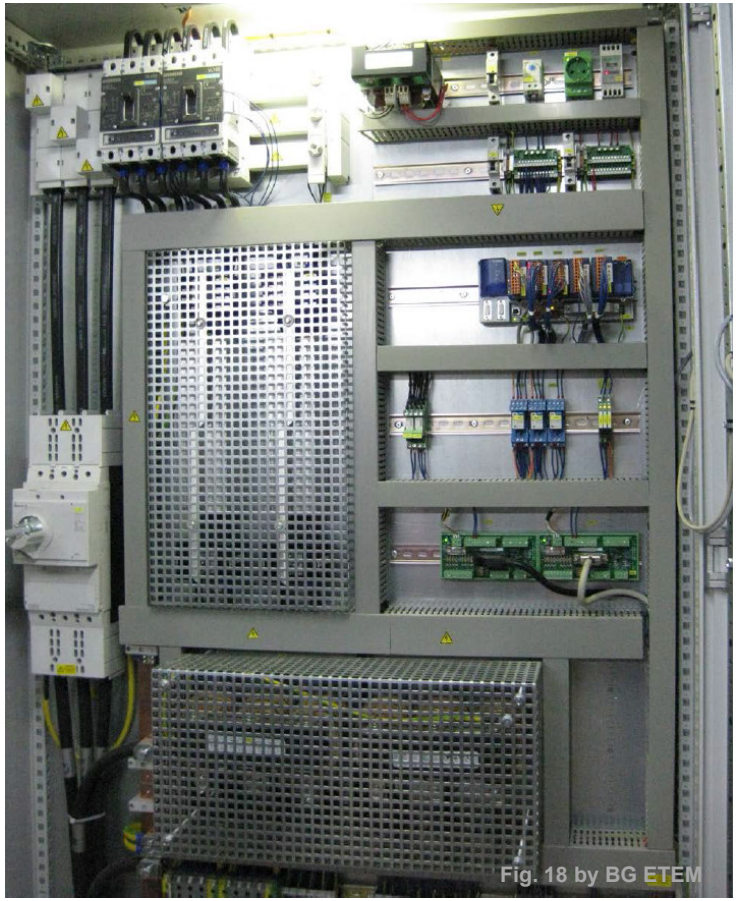


Fig. 18 by BG ETEM

Examples for “unacceptable” and “acceptable” conditions

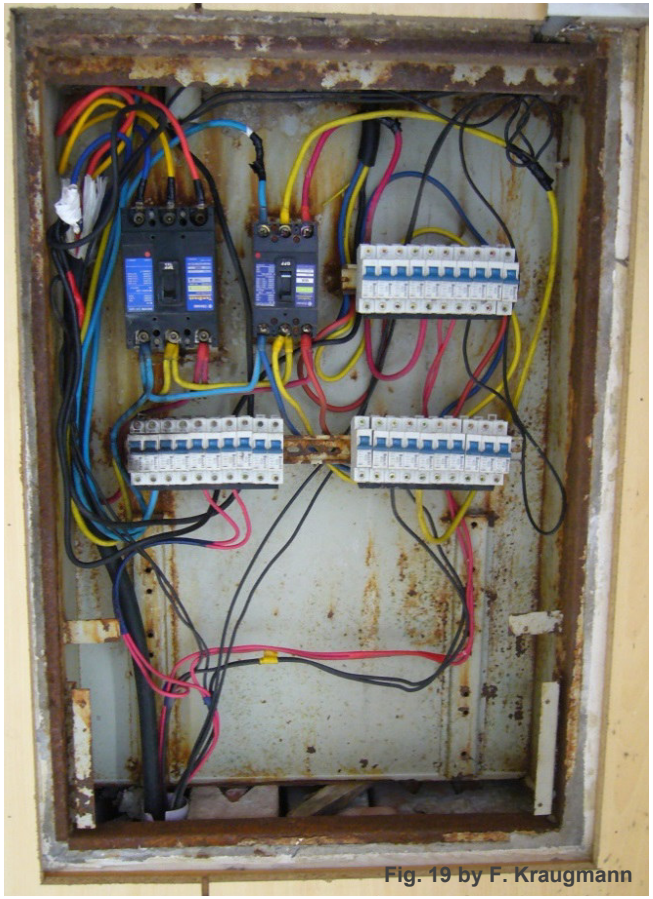


Fig. 19 by F. Kraugmann

Fig. 20 by F. Tamberg

Examples for “unacceptable” and “acceptable” conditions

Fig. 21 by F. Kraugmann

Fig. 22 by F. Kraugmann

Examples for “unacceptable” and “acceptable” conditions

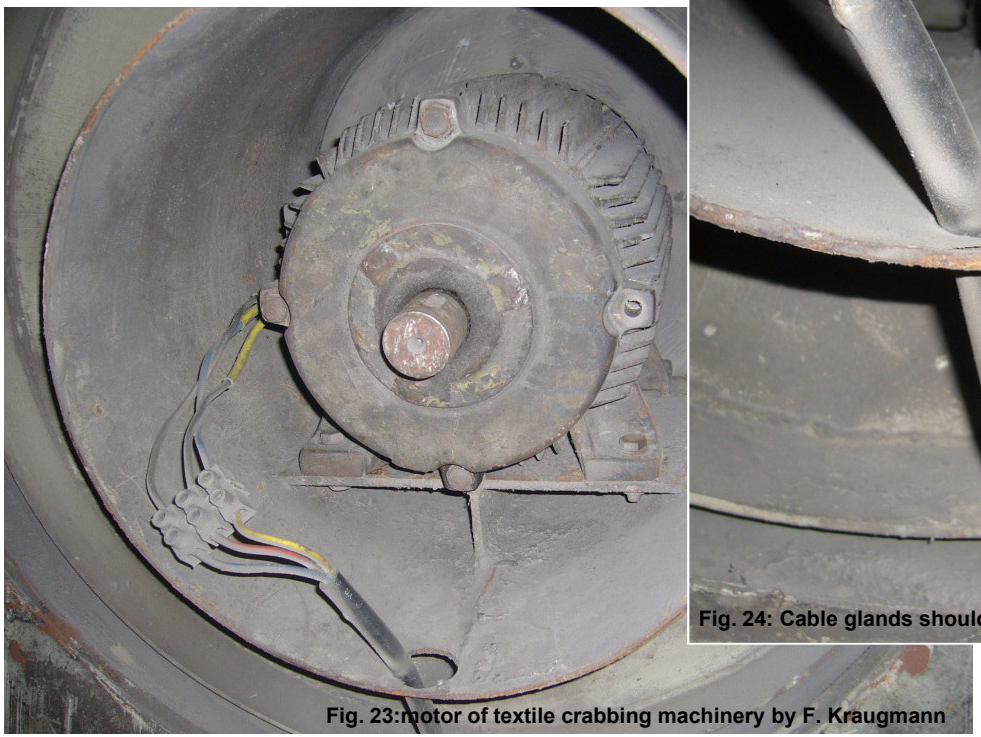


Fig. 23:motor of textile crabbing machinery by F. Kraugmann

Fig. 24: Cable glands should be used to insert the cable into the metallic case by F. Kraugmann

Fig. 24 by BG ETEM

Examples for “unacceptable” and “acceptable” conditions

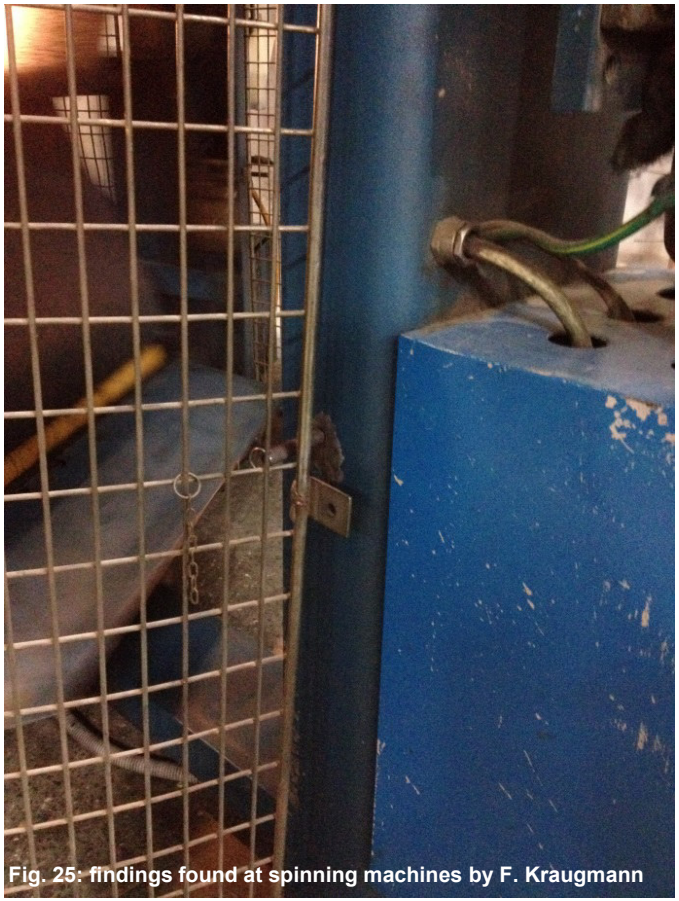


Fig. 25: findings found at spinning machines by F. Kraugmann

Fig. 26: Cable glands are missing by F. Kraugmann

Fig. 27: by F. Kraugmann

Examples for “unacceptable” and “acceptable” conditions

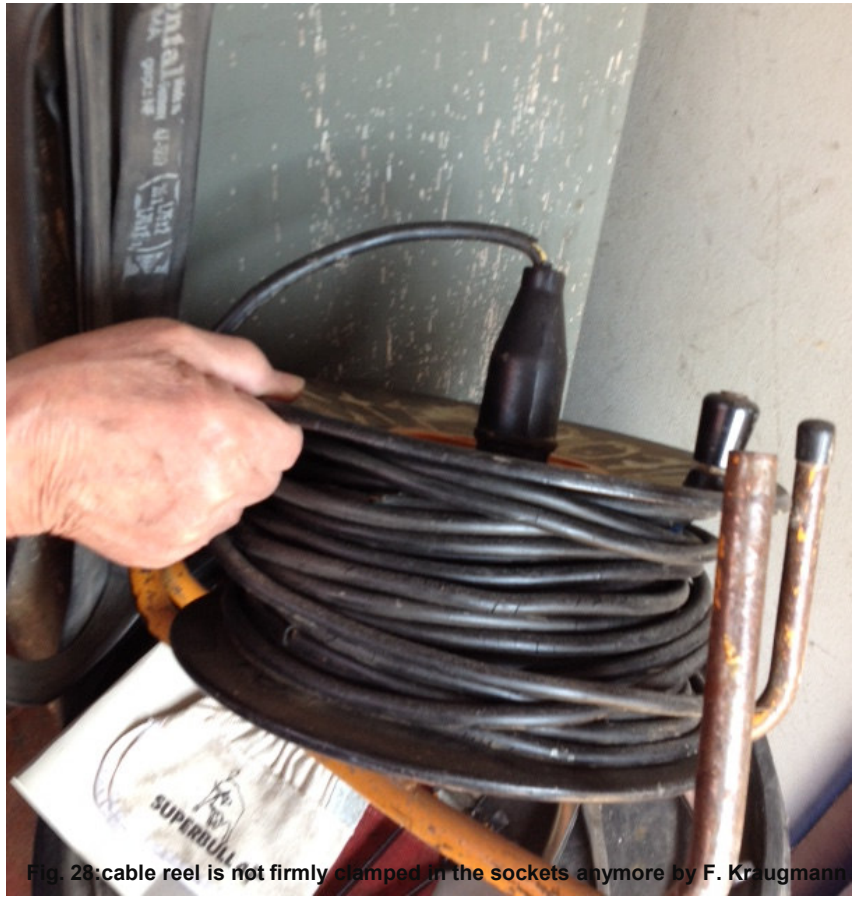


Fig. 28:cable reel is not firmly clamped in the sockets anymore by F. Kraugmann

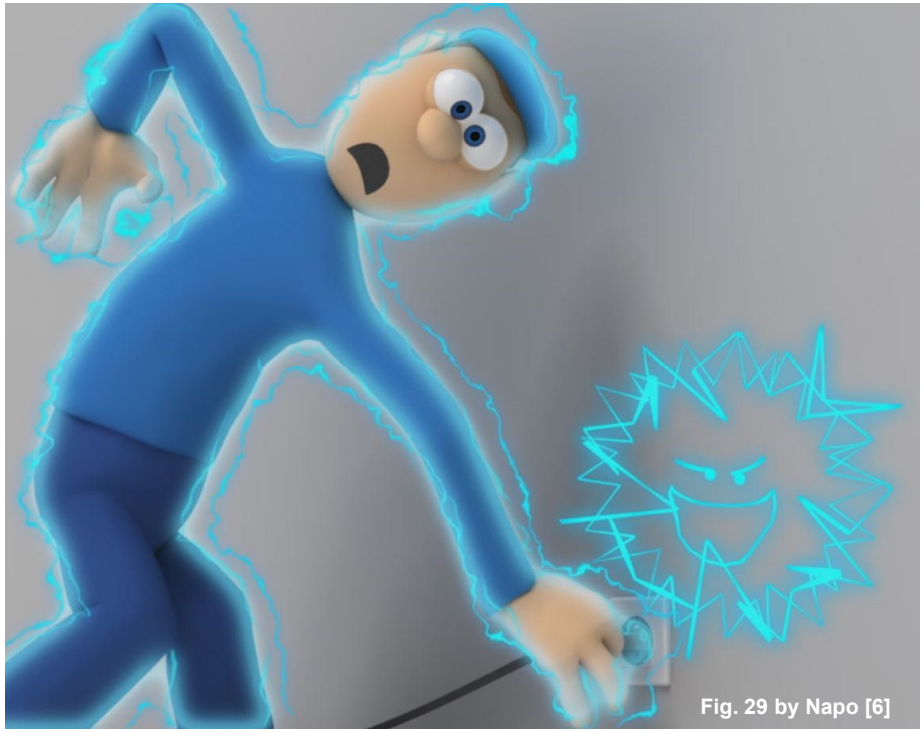


Fig. 29 by Napo [6]

Summary

Basic rules for safe use of electrical equipment and tools:

- It shall be designed and installed for safe operation
- Periodic checks are definitely required
- It shall be repaired safely and for safe further operation
- Never by-pass the protective device

List of references

[1] „Hazards arising from Electricity“, ISSA Section for Electricity

[2] “Golden Rules for Electrical Safety for the Layman”, ISSA Section for Electricity

[3] “Safety Rules for the Electrical Expert”, ISSA Section for Electricity

[4] „Sicherheit bei Arbeiten an elektrischen Anlagen“, BGI 519, BG ETEM

[5] „ Thermal hazards from electric fault arc“, DGUV Information 203-078, BG ETEM

[6] Pictures, Napo is co-produced by a European Consortium:

Further Information

www.bgetem.de
www.dguv.de
www.issa.com
www.suva.ch
www.napo.net
http://bangladeshaccord.org