# Awareness Programme on
# IS 5216 –Part 1(1982)
# RECOMMENDATIONS ON SAFETY PROCEDURES AND PRACTICES IN ELECTRICAL WORK
# PART I GENERAL
# (First Revision)

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# IS 5216 –Part 1

- Part I General
- Part II Life saving techniques
- Part III Safety posters
- Part IV Special guidance for safety in electrical work in hazardous areas.
- All parts shall be read in conjunction with one another.

# Introduction to this specifications

- It is essential that safety should be ,preached and practiced at all times by all concerned in installation, operation and maintenance of electric lines and apparatus
- Why the safety practices are gathering importance ? The reason behind this? It is ignorance and innocence about the safety norms.
- Guide lines given in this Indian specification is a legal requirement and mandatorily to be followed by all institutions.

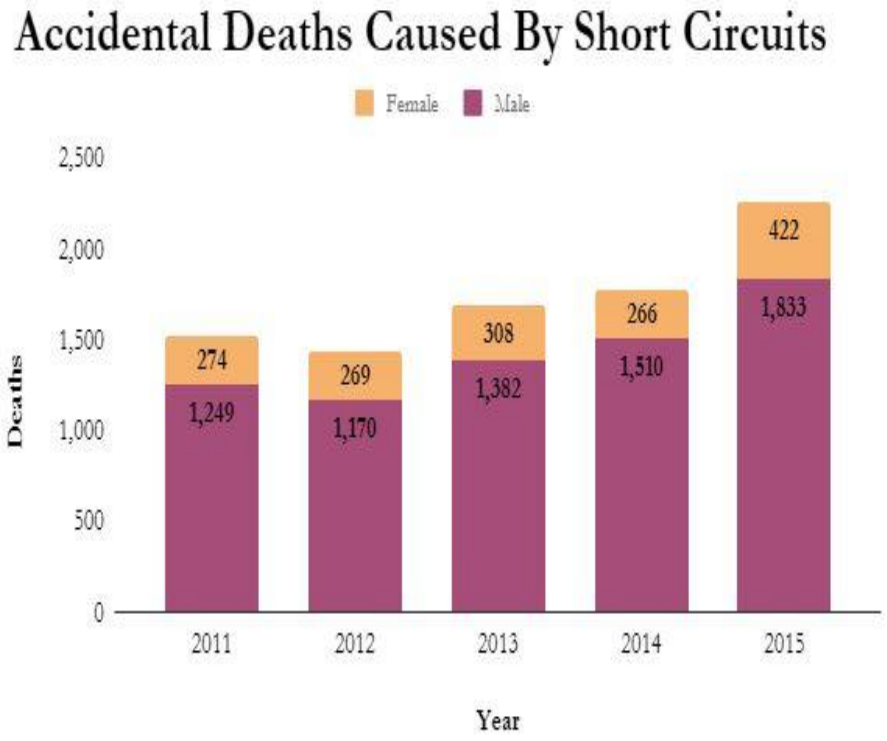
# Work related electric accidents

- Many work related electric accidents occurred in electrical energy industries are due to ignorance and not following safe practices resulting fatal very often.
- 80% Accidents are due to ignorance of safety measures
- 20% Accidents are due to innocence of the safety rules
- **Example**: In most of the distribution utilities ,the operation workmen cadre are engaging personnel on their own. They are mostly unqualified ,or semiskilled personnel without adequate competency to perform the maintenance works.Ex: Recent punishment by high court on June 29$^{th}$ to the LM concerned in Narasa rao peta for the work done a private electrician engaged by LM who was electrocuted in Electrical work in a house.
- For that matter there are not authorised by the management, but every one knows about their existence and under what safety conditions they are working.

# Accident statistics

- Over 7,600 people die each day from work-related accidents or diseases - that's over 2.78 million every year* across the world.
- Latest estimates from the International Labour Organization (ILO) show that, each day,
- Every 15 seconds, a worker dies from a work-related accident or disease, and 153 people experience a work-related injury.
- These represent an enormous burden for organizations and society as a whole, costing over 2.3 million deaths a year, not to mention the more than 300 million non-fatal accidents resulting work related injuries.

# Accidents due to mishandling of Electricity.


NCRB : National Crime Records Bureau

# Electrical Accidents-Statistics

- 25% of all fires occur due to electricity (NFPA)
- 411 deaths from job related electrical accidents per year (NIOSH)
- Electrocution - the fifth leading cause of death (1982 - 1990) NIOSH
- About 12 deaths due to electrocution NCRB, (India)
- 42 % of total fires occur due to electrical sources (Source -OISD)
- 8% deaths that occur in Indian factories are due to electricity

Sec : 1. SCOPE of IS 5216 Part-1

- 1.1 This standard ( Part I ) gives recommendations regarding safety procedures and practices which should, be followed to the extent applicable in all major electrical installations, such as generating stations, sub-stations, industrial establishments, transmission and distribution net work lines, and cable networks whether it is private or public organisations.
- Sec 2 . STATUTORY REGULATIONS
- 2.1 It is the duty of all related persons with the installation, operation and maintenance of electric lines and apparatus of all voltages to understand thoroughly, conversant with the regulations and safety rules governing the work they may have to undertake on these lines and apparatus.

- Sec 2.4 Electric supply undertakings usually lay down **safety instructions in the form of safety rules or standard operating procedures** for the guidance of the staff employed for the execution of work on or near the electric lines and apparatus and for their operation and-maintenance **which should be strictly complied and implemented with at all times**.
- Sec 2.5 **It shall be the responsibility of the person-in-charge to interpret and explain correctly the rules and regulations to all staff concerned and to ensure that the staff thoroughly understands the same for implementation in a letter and spirit.**
- Ex: Conducting  effective safety trainings at all levels

# 3. PERMIT-TO-WORK SYSTEM

- 3.1 All work on major electrical installations shall be carried out under permit-to-work system which is now well established in all most all the organisations.
- 3.2 No work shall be commenced on live mains unless it is specifically intended to be so done by specially trained staff.
- All such works to formulate Job safety analysis before taking up the jobs by identifying potential hazards or accidents that may occur and preventive methods to be followed including supplying of necessary PPE kits.

# 3. PERMIT-TO-WORK SYSTEM

- Such work shall only be carried out with proper equipment provided for the purpose and, after taking necessary precautions, by specially trained and experienced persons who are aware of the danger that exists when working on or near live mains or apparatus.
- 3.3 On completion of the work for which the permit-to-work is issued, the person-in-charge of the maintenance staff should return the permit duly discharged to the issuing authority.
- 3.4 In all cases, the issue and return of permits shall be recorded in a special register provided for that purpose.
- 3.5 The permits shall be issued not only to the staff of the supply undertakings, but also to the staff of other departments, contractors, engineers, etc, who might be required to work adjacent to live electrical mains or apparatus.

# Sec 3.6

- NOTE 1 -The permit is to be prepared in duplicate by the person-in-charge of operation.
- NOTE 2 -The original permit will be issued to the person-in-charge of work and the duplicate will be retained in the permit book.
- NOTE 3 - On completion of the work, the original shall be returned to the issuing officer duly discharged for cancellation.
- Permit to work is a legal document. To be maintained properly

APPENDIX A (Clause 3.6)
MODEL FORM OF PERMIT-TO-WORK

Explanation on Permit to work

# Maintenance of Work Permit book

- 3.7 Permit books should be treated as important records. All sheets in the permit books and the books themselves should be serially numbered.
- No page should be detached or used for any other except bonafide work.
- 3.8 Permit books shall be kept only by the person-in-charge of operation who shall maintain a record of the receipts and issues made by him.
- 5.2 Work on Live Low and Medium Voltage Mains and Apparatus - Only competent, experienced and authorized persons shall work on live mains and apparatus, and such persons should take all safety measures as may be required under the Indian Electricity Rules, 1956.

# 4. REGISTER OF MESSAGES

- 4.1 **Registering of site instruction** : All messages and instructions relating to the operation of switches and other important communications concerning the work shall be recorded in the register of messages, preferably by an independent person not directly connected with the work.
- 4.2 The return of permit shall be entered in the log book or log sheet either in red ink or should be underlined.
- When change of shift occurs during the pendency of a permit, the outgoing permit issuing officer shall inform his relief by entering in the logbook or log sheet, before handing over, the existence of all permits.
- 4.3 All the permit issuing officers and persons-in-charge concerned with the permit shall adopt similar logging procedure.

# 5. SAFETY INSTRUCTIONS FOR WORKING ON LOW AND MRDIUM VOLTAGE MAINS AND APPARATUS

- Procedures
- 5.1 Work on Dead Low and Medium Voltage Mains and Apparatus
- All mains and apparatus to be worked upon shall be isolated from all sources of supply before starting the work, proved dead, earthed and short-circuited.
- For earthing and short-circuiting, only recognized methods should be used.
- Measures shall be taken against the inadvertent energizing of the mains and apparatus.

# SAFETY INSTRUCTIONS FOR WORKING ON LOW AND MEDIUM VOLTAGE MAINS AND APPARATUS

- 5.2.1 Warning boards shall be attached on or adjacent to the live apparatus and at the-limits of the zone in which work may be carried lout.
- 5.2.2 Immediately before starting work, rubber gauntlets, if used, shall be thoroughly examined to see whether they are in sound condition.
- Under no circumstances shall a person work with unsound gauntlets(Hand gloves),protective mats, uninsulated platforms or other accessories and safety devices.

## 6. SAFETY INSTRUCI'IONS FOR WORKING ON HIGH VOLTAGE MAINS AND APPARATUS

- 6.1 General -All high voltage mains and apparatus shall be regarded as alive and a source of danger and treated accordingly unless it is positively known to be dead and earthed.
- 6.1.1 No person shall work or test on high voltage mains or apparatus unless covered by a permit-to-work from competent supervisor and after proving the mains dead except for the purpose of connecting the testing apparatus, etc,
- 6.1.2 The operations of proving dead, earthing and short-circuiting of any mains shall be carried out only by an authorized person under the instructions of the person-in-charge of maintenance.
- Preparation of job safety analysis before you take up the work.

# High Voltage Phasing Sticks

- High Voltage Phasing Sticks highly insulated FRP earth discharge rod, high voltage phasing
- They are supplied in a wide range of ratings 11 / 33 / 44 / 66 / 132 / 220 / 400KV.They are used to discharge Electrical Systems having limited fault levels.
- The length of the rods from

  15-18 feet for different voltages

Die cast alu. Grounding Clamp 2. ISI marked PVC insulated multi-stranded 440/1100V grade transparent copper cable 10 sq. mm as per IS-6943. ISI marked PVC insulated multi-stranded 440/1100V grade transparent copper cable 35 sq.mm as per IS-694

# 6. SAFETY INSTRUCI'IONS FOR WORKING ON HIGH VOLTAGE

- 6.1.1 No person shall work on high voltage mains or apparatus unless covered by a permit-to-work and after proving the mains dead except for the purpose of connecting the testing or maintain the apparatus, etc,

# 6.4.6 Earthing and Short-Circuiting High Voltage Main

- 6.4.6.1 High voltage mains shall not be worked unless they are discharged to -earth after making them dead and are earthed and short-circuited with earthing
- All earthing switches wherever, installed should be locked up with tag.
- 6.4.7 It should ensured to remove the Earth Connections - On completion of work removal of the earthing and short-circuiting devices shall be carried out in the reverse order.

# Sec 7. WORKMEN'S SAFETY DEVICES AND APPLIANCES

- 7.1 General
- 7.1.1 Rubber gauntlets, gloves, mats, boots and galoshes, insulated platforms and stools, safety belts, hand lamps, tower wagons and other special insulated devices shall be used, as required, for working on electrical equipment and apparatus as precaution against accidental electric shock.
- The PPE tools should be tested frequently for their healthiness.
- 7.1.2 If the insulation has been damaged, these tools shall not be used.
- 7.13 The person-in-charge of the work should ensure proper maintenance and use of the safety equipment.

- Maintenance of Rubber Gauntlets .
- 7.2 Care of Rubber Gauntlets, Gloves, Etc.,
- 7.2.1 No person should put his rubber gauntlets or gloves into his coat or trouser pocket along’ with other tools. Gauntlets carried in this way are liable to get damaged and consequently become of danger for the person.
- 7.3.2 After the rubber gauntlets and gloves have been in use, they should carefully cleaned at once and stored in a suitable chalk in a suitable container. No tool or other material shall be stored in this container.

## 7.4 Inspection of Safety Equipment

- 7.4.1 Rubber gauntlets, gloves, boots and galoshes shall be inspected periodically and records maintained.
- 7.4.2 All safety equipment should be inspected by frequent surprise checks by competent persons at intervals of not. more than six months and maintain the records.
- 7.4.3 Any safety device found defective on inspection shall be repaired immediately; if it is not possible to effect repairs satisfactorily, the defective ones shall be discarded at once.

# 8. SAFETY PRACTICES

- 8.1 In all electrical work, it is very necessary that certain elementary safety practices are observed.
- 8. 2 Fires and Fire Extinguishers
- 8.2.2 Fire extinguishers, which are not suitable for the purpose, should never be employed in fighting fires near exposed live conductors. Class C type FE to be used in case of Electrical fires.
- Only such fire extinguishers should be used as suitable for the purpose. When using fire hose, that the jet of - water does not come into contact with live conductors

# 8.3 Illumination

- 8.3 Lighting- Inadequate lighting of working areas is by itself a source of danger, Hence adequate lighting is to be provided as per IS : 3646( Part II ) - 1966*.
- 8.4 Safety Posters -



# 9. TRAINING OF EMPLOYEES

- 9.1 General-For maximum effectiveness, a sound safety procedure would include, thorough training of all employees who work on electrical installations and equipment.
- The employees should be trained in first aid, fire fighting, use of warning signs, guards and other protective devices and safe operational procedures.
- 9.2 Training Programme - The training programme should consist of, but should be specifically based upon demonstrations and training in the correct operation and maintenance of lines and apparatus.

# 9.3 Supervision by Competent authority/person

- 9.3.1 Supervising officers should maintain a close supervision over all operation and maintenance works and defective or careless handling of equipment should not be permitted.
- 9.3.2 Under no circumstances should deviation from safe practices be tolerated, as this could result in unnecessary hazards and danger to workmen or apparatus.

# APPENDIX C (Clause 8.1 )

## GENERAL SAFETY PRACTICES IN ELECTRICAL WORK

- C-l. EXERCISE CARE
- C.1 Place yourself in a safe and secure position to avoid slipping, stumbling or moving backward
- C-1.2 In the event of near approach of a lightning storm, all outdoor work should be suspended.
- C-1.3 Make a habit of being cautious. Be on the lookout for danger notice , danger flags, warning boards and signals, etc.

# C 2. PERSONAL APPAREL(Dresses)

- C-2.1 Don’t use clothing having metal buttons, metal watch straps and similar metal ornamental and other fittings on hands.
- C-2.2 While working on live conductors, do not roll up sleeves as dry cloth gives some protection against shocks.
- G2.3 Do not wear shoes with nailed soles preferably rubber soles.
- C-2.4 Do not wear metal arm bands with metal buckles or other metal parts. These might come in close proximity to live parts and cause serious, if not fatal, injury.
- Ex Copper rings. Gold chains, golden rings for fingers and metal strapped wrist watches.

# C-4. Think before you act- Clear your confusions or doubts before take up the job.

- Try to asses analyse  the potential danger that could happen before take up the job.
- C-4.1 Think carefully before you act. Make sure you are right. Watch out for the other man
- C-4.2 Never speak to any person working upon live mains or apparatus, unless the person doing the work is aware of your presence.
- Avoid Cutting jokes, and Chitchatting on  irrelevant issues during the work.
- C-7. WARNING BOARDS: Follow the warning signs

# C-8. VISITORS AND UNAUTHORIZED PERSONS

- C-8.1 Visitors and unauthorized persons shall not be allowed to proceed in the vicinity of live mains and apparatus, unless accompanied by an authorized person.
- C-9. WORKING IN DAMP SITUATIONS
- C-9.1 Extra precautions should be taken when working in abnormally damp area especially during rainy seasons.
- C-10. USE OF TONG OR CLIP-ON AMMETERS
- C1O.l These shall not be used on high voltage conductors,.

# C-12. PORTABLE ELECTRICAL APPARATUS

- C-12.1 All portable electrical apparatus shall be regularly examined, tested and maintained to ensure that the apparatus and leads are in good order.
- C-12.2 Ensure that all portable appliances are provided with 3-pin plug and socket connections and that the metal work of the apparatus is effectively earthed.
- C-12.3 All loose wiring, such as flexible cables for portable lamps, tools and trailing cables and other portable and transportable apparatus, shall be tested regularly at frequent intervals to ensure safety.


Thank You