INVESTIGATIONS INTO POSSIBLE AMENDMENTS TO IS 5216 THE INDIAN STANDARD FOR ELECTRICAL SAFETY IN WORKPLACE

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ABSTRACT:

Now a day, electricity has become a biggest need of human life. Per capita consumption of electricity is an indicator of development of that country. Electricity is like blessings to human being. But it is not use safely it can converted into curse. Electricity which can be consumed by Indian industries is near about 36.5% of total power consumption in India according to 2010-2011 data from ministry of power. Accordingly, Indian industries utilize huge electrical power of total consumption of electrical power in India. Electrical accident's numbers has shown Occupational as well as non-occupational electrical safety in India is an inattention issue. Almost 12 peoples die due to electrocution (National Crime Records Bureau), 42 % of total fire accidents occur due to electrical sources (Oil India Safety Directorates), and 8% deaths that occur in factories due to electricity in India (National Crime Records Bureau). IS 5216 (recommendations on safety procedures and practices in electrical work) has not yet been updated once from 1982. So, this is also one kind of drawback of electrical safety issues in India. This Paper is focuses on analysis into possible amendments to IS 5216.

INTRODUCTION:

The Indian standard IS 5216 (recommendations on safety procedures and practices in electrical work) was originally published in 1969 [I]. The first revision was effected in 1982 and later it was adopted by the Indian standard institution. This standard is documented by bureau of Indian standards (the national standards body of India). This revision was divided into four parts i.e. I) General, II) Life savings techniques, III) Safety posters, and IV) Specific guidance for safety in electrical work in hazardous area. First two parts were published in 1982 but remaining two parts have not been published till date [I]. Electrical technology has undergone a dramatic change since 1980s. Safety concerns are involved right from design, manufacture, and installation to operation of the electrical equipment. Thus it is imperative that as the technology changes, the safety norms and practices need to change accordingly. While standards and codes for electrical safety at workplace have been adaptively revised by the developed nations, ironically IS5216 has not changed at all since 1982. Sooner the better, urgent attention to this issue and necessary revision of the standard IS5216 commensurate with prevailing trends and technologies is the call of the day. It is in this spirit, this paper seeks to explore the possibilities of amendments to IS5216.

Health and safety in the workplace is about measures designed to protect the health and safety of employees, visitors and general public who may be affected by workplace activities. Safety measures are concerned with controlling and reducing risks to anyone who might be affected by these activities. Equipment malfunction and human factors both are likely contributors in unexpected release of explosive electrical energy in the workplace which is known as arc flash.

REVISION PROCESS OF THE STANDARD:

Developed countries have been revising their safety standard periodically and as many as 11 editions of NFPA 70E (standard for electrical work safety in workplace) have been brought out by USA, the latest being in 2015 [II]. How laborious and long thought process is needed before the release of a newer edition of the standard is evident from following excerpts of the initial pages from NFPA 70E 2012.

The Standards Council of the National Fire Protection Association announced on January 7, 1976, the formal appointment of a new electrical standards development committee. Entitled the Committee on Electrical Safety Requirements for Employee Workplaces, *NFPA 70E*, this new committee reported to

the Association through the Technical Correlating Committee on National Electrical Code®. This committee was formed to assist OSHA in preparing electrical safety standards that would serve OSHA's needs and that could be expeditiously promulgated through the provisions of Section 6(b) of the Occupational Safety and Health Act. OSHA found that in attempting to utilize the latest edition of *NFPA 70*®, *National Electrical Code® (NEC®)*, it was confronted with the following problems:

(1) Updating to a new edition of the *NEC* would have to be accomplished through the OSHA 6(b) procedures. OSHA adopted the 1968 and then the 1971 *NEC* under Section 6(a) procedures of the Occupational Safety and Health Act of 1970. Today, however, OSHA can only adopt or modify a standard by the procedures of Section 6(b) of the OSHA Act, which provide for public notice, opportunity for public comment, and public hearings. The adoption of a new edition of the *NEC* by these procedures would require extensive effort and application of resources by OSHA and others. Even so, going through the Section 6(b) procedures might result in requirements substantially different from those of the *NEC*, thereby creating the problem of conflict between the OSHA standard and other national and local standards.

(2) The *NEC* is intended for use primarily by those who design, install, and inspect electrical installations. OSHA's electrical regulations address employers and employees in their workplaces. The technical content and complexity of the *NEC* is extremely difficult for the average employer and employee to understand.

(3) Some of the detailed provisions within the *NEC* are not directly related to employee safety and, therefore, are of little value for OSHA's needs.

Serious and deep thought has been given to several such aspects while revising the 2012 edition of NFPA 70E. This signifies the importance and magnitude of the revision task of any standard.

POSSIBLE AMENDMENTS:

The above discussion underlines the need for revision of IS 5216 through joint efforts and brainstorming among concerned government and private bodies as well as individuals. Following points may be some of the possible subjects for amendments.

LIFE SAVING TECHNIQUES:

Life saving techniques against electrocution from electrical hazards in IS 5216 appear out of step with current technology trends.

EXPLANATIONS AND ILLUSTRATIONS:

Explanations and illustrations may be improvised to be clearer and user friendly.

Permit to work procedures are important for safety records of industries. Permit to work is a kind of sanction from person in-charge of operations to the person in-charge of men selected to carry out any particular work. Section 3.1 of IS 5216 states that, after completion of work, the person in-charge of the maintenance staff should return permit to the issuing authority [I]. According to IS 5216 this procedure shall be recorded in special register provided for that purpose, and should be treated as important record. However due to large scale computerization of the processes, requirements of maintaining hand written records may need amendment.

EXTRA LOW VOLTAGE (I.E. <50V):

Daniel Roberts [IV] suggests that extra low voltage (<50 Volts) may even cause death. IS 5216 does not consider this extra low voltage while classifying voltage levels to be dealt with in safety procedures.

APPROACH BOUNDARY:

Limited, restricted, prohibited approach boundaries for qualified and nonqualified persons need to be specifically defined in terms of exact distances and voltage limits for these boundaries [II].

MODERN SAFETY INSTRUMENTS AND EQUIPMENT:

Section 6 of IS 5216 standard provides "safety instructions for working on high voltage mains and apparatus" [I]. Under this section two types of instrument are recommended for safe operation on high voltage 1) Isolating devices, 2) High voltage neon lamp contact indicator rods. These instruments are no longer in use and have undergone major transformation. Latest instruments need to be mentioned in the standard.

The images of devices are shown side below.

Fig. No.1. Disconnecting switch

Fig. No.2. Isolating Link

Fig. No.3 Old High Voltage Indicator

Fig. No. 4 New High Voltage Indicator

ARC FLASH HAZARD:

Good safety standard is incomplete without mention about arc flash analysis and hazards. IEEE standard SA - 1584-2002 (IEEE Guide for Performing Arc Flash Hazard calculation) provides guidelines for calculating the incident energy levels of arc flash at different points in the electrical power system [V]. IS 5216 does not give any information and recommendations on arc flash hazard analysis.

PERSONAL PROTECTIVE EQUIPMENT:

Although IS 5216 provides recommendations on personal protective equipment and apparel, but they are of 1980s and hence need to be updated commensurate with changed technologies and changed hazards perspective.

Fig.No.5. Arc flash coverall kit, for 40cal/cm^2 as per the recommendations of NFPA 70E.

SAFETY PRACTICES:

Article no. 8 of IS 5216 provides recommended safety practices for workers safety [I]. However they need to be updated in the light of following aspects

- Planning every job and document first time procedure.
- Predicting unexpected events.
- Identifying the electrical hazards and reduce the associated risk.
- Assessing peoples abilities.
- Examine the principles.
- Qualifications and number of employees to be involved.
- Personal protective equipment (PPE) involved.
- Electrical single line diagrams, etc.

METHODS OF DEALING WITH ELECTRICAL ACCIDENTS:

IS 5216 was introduced part II, especially for life saving techniques from electrical accidents. This part provides number of methods for immediate treatment of electric shock, like immediate action to recover patient, artificial respiration's method, etc.

ACCIDENTS:

Under this article standard present some instruction like do's and don'ts. All technical staff is required to be familiar with first aid and artificial respiration system, firefighting techniques. All accidents whether they are fatal or nonfatal shall be immediately reported, thoroughly investigated and recorded [I].

TREATMENT FOR ELECTRIC SHOCK:

In accordance with IS 5216, "in most cases of electric shocks and collapse, it is the lung and the diaphragm (the thin sheet of muscles which lies below the lungs) that stop working" [I]. However vast scope remains to incorporate insights obtained by the

advancement of medical science. Ventricular fibrillation has been identified as the consequence of a severe electric shock. In respect of this, use of external defibrillators needs to be a part of the standard document.

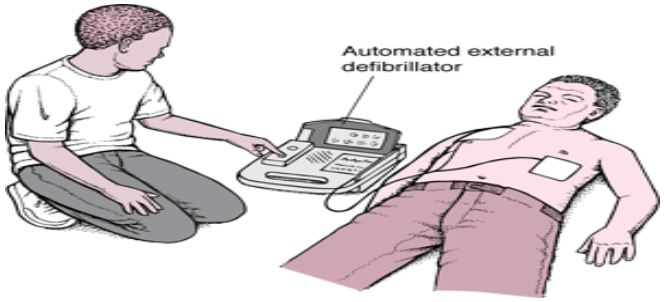

Fig.No.6 Automated external defibrillators.

CONCLUSION:

This paper tried to bring out salient possibilities of amendments in Indian Standard IS 5216 for Electrical Safety at Workplace. Reference benchmark used is the world-wide acknowledged American standard NFPA 70E: 2015. In all ten aspects have been highlighted where in amendments are possible and necessary. There still remains a scope to carry out further study and find out new possibilities for revision of the Indian standard IS 5216.

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