

# Arc Flash Hazards and Electrical Safety

## Introduction to the 2018 Edition of IEEE Std. 1584-2018: Guide for Performing Arc-Flash Hazard Calculations

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**Abstract:** Though electrical incidents represent a relatively small percentage of all work-related incidents; they are disproportionately fatal. In the case of burn injury, it may result in extended hospitalization and rehabilitation. According to NFPA 70E, approximately 5 to 10 arc flash explosions occur on the job every day in the United States. Proper protection is the key to reduce casualties during these incidents. IEEE 1584 and NFPA 70E are developed to protect the safety of the workers. With the better understanding of the arc flash phenomena, several areas in the IEEE Std. 1584-2002 need further research, testing validation, and revision.

The IEEE and the NFPA (National Fire Protection Association) have joined forces on an initiative to fund and support research and testing to improve the understanding of arc flashes. The results of this collaborative project will provide information that will be used to improve electrical safety standards, predict the hazards associated with arcing faults and accompanying arc blasts, and provide practical safeguards for employees in the workplace. The identified areas include but are not limited to: 1) Heat and Thermal Effects, 2) Blast Pressure, 3) Sound, and 4) Light intensity.

The following topics will be covered in this tutorial:

1. Basic understanding of the arc flash
2. History of the development
3. From IEEE Std. 1584-2002 to IEEE Std. 1584-2018
4. New features in IEEE Std. 1584-2018
5. Available ranges and configurations of IEEE Std. 1584-2018
6. Performing the arcing current, incident energy, and protection boundary estimation
7. Non thermal related hazards (Light, pressure, and Sound).



**Biography:** Professor Lee received the B.S. and M.S. degrees from National Taiwan University, Taipei, Taiwan, R.O.C., and the Ph.D. degree from the University of Texas, Arlington, in 1978, 1980, and 1985, respectively, all in Electrical Engineering.

In 1986, he joined the University of Texas at Arlington, where he is currently a professor of the Electrical Engineering Department and the director of the Energy Systems Research Center.

He has been involved in the revision of IEEE Std. 141, 339, 551, 739, 1584, and dot 3000 series development. He is the President Elect of the IEEE Industry Application Society (IAS). He is an editor of IEEE Transactions on Industry Applications and IAS Magazine and editorial board member of Journal of Modern Power Systems and Clean Energy (MPCE) and CSEE Journal of Power and Energy Systems. He is the project manager of IEEE/NFPA Collaboration on Arc Flash Phenomena Research Project.

Prof. Lee has been involved in research on utility deregulation, renewable energy, smart grid, microgrid, energy internet and virtual power plants (VPP), arc flash hazards and electrical safety, load and wind capacity forecasting, power quality, distribution automation and demand side management, power systems analysis, online real-time equipment diagnostic and prognostic system, and microcomputer based instrument for power systems monitoring, measurement, control, and protection. He has served as the primary investigator (PI) or Co-PI of over one hundred funded research projects with the total amount exceed US\$16 million dollars. He has published more than one hundred and seventy journal papers and two hundred eighty conference proceedings. He has provided on-site training courses for power engineers in Panama, China, Taiwan, Korea, Saudi Arabia, Thailand, and Singapore. He has refereed numerous technical papers for IEEE, IET, and other professional organizations.

Prof. Lee is a Fellow of IEEE and registered Professional Engineer in the State of Texas.