



Electrical Hazard Assessments: OSHA & The NFPA 70E?

AWEA Health & Safety

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Key Learning Objectives

- Statistical Electrical Incidents & Injuries
- What Does OSHA Want?
- A quick Glimpse into The NFPA 70E, OSHA 1910.269 & Subpart S
- Challenges for the Wind Industry



Key Learning's



Annual Electrical Injury Facts

- Annually in the workplace, there are:
 - Approximately 400 electrical fatalities
 - 3600 disabling electrical contact injuries
 - 4000 non-disabling injuries
 - Defined as injury requiring hospitalization and time away from work
- Additionally, 2000 workers are sent to burn centers for electrical burns

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Primary Protective Strategy

The primary protective strategy must be to establish an **electrically safe work condition!**

- No PPE is necessary
- Unqualified workers can perform tasks



Key Learning's

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What Does OSHA Want From Us?

- Bunches
 - Safety must be proactive, not reactive
 - It takes a lot of time, effort and manpower
 - Documentation will help
 - If you didn't document it, you didn't do it

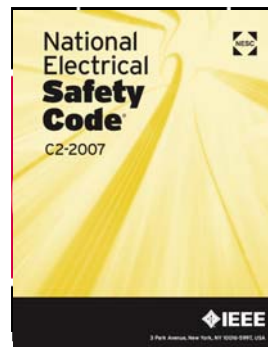


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What Electrical Safety Standards Apply?

- Several!
 - OSHA 29 CFR 1910 (covers maintenance)
 - OSHA 29 CFR 1926 (covers new construction)
 - NFPA 70E
 - National Electrical Safety Code (for utilities)
 - State and local laws and ordinances



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OSHA and The NFPA

- OSHA tells us what to do
 - Federal law
 - 29 CFR (Code of Federal Regulations)
- NFPA 70E tells us how to do it
 - Recognized industry practice
 - Consensus standard
- OSHA requires employers:
 - Assess the hazards
 - Select PPE
 - Train employees on PPE use



Employers Must Assess the Hazards

“The employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE).”

29 CFR 1910.132(d)(1)





OSHA and FR Clothing

“The employer shall ensure that each employee who is exposed to the hazards of flames or electric arcs does not wear clothing, that when exposed to flames or arcs, could increase the extent of injury that would be sustained by the employee.”

29 CFR 1910.269(l)(6)(iii)



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Workers Must Use PPE

“Employees working in areas where there are potential electrical hazards shall be provided with, and shall use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed”.

29 CFR 1910.335(a)(1)(i)



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Flash Hazard Analysis

- 70E Article 130.3 Flash Hazard Analysis
 - Shall be done to protect against arc flash
 - Shall determine:
 - Flash Protection Boundary
 - PPE required
 - Must look at:
 - Voltage
 - Short-circuit current
 - Maximum total clearing time
 - Working distance from exposed part



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Flash Hazard Analysis

- 130.3(A) Flash Protection Boundary
 - Distance from exposed, energized conductor that would cause incident energy of 1.2 cal/cm^2 (on-set of a second-degree burn)
 - 1.0 cal/cm^2 is amount of heat produce by a match on finger tip for 1 second
 - If Boundary is crossed, must wear flash protective equipment
- For $<600\text{V}$ the FPB can be 4'
 - $50\text{kA} \times 0.1 \text{ sec}$, not exceeding 300kA cycles or $5000 \text{ ampere seconds}$ ($50\text{kA} \times 6 \text{ cycles}$)



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Flash Hazard Analysis

- 130.3(B) Flame-resistant (FR) clothing and PPE shall be used by the employee based upon the incident energy exposure associated with the specific task.
- Additional PPE to be used to protect parts of body that are closer than torso.
- As an alternative, PPE requirements of NFPA 70E 130.7 may be used in lieu of a detailed flash hazard analysis



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Normal Conditions



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Abnormal Conditions



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Normal Condition



Transformer
(Doors Closed)

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Abnormal Condition

1.5 MW Wind Converter:
Exposed Electrical
Components
(Door Open)



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Abnormal Condition

1.5 MW Wind Converter:
Inverter Components
(Door Open)



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Abnormal Condition

1.5 MW Wind Converter:
Output Breaker
(Door Open)



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Train Your Workers!



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Challenges for Wind Energy

- Wind energy equipment and systems presents unique hazards for electrical work:
 - Extreme heat/cold
 - Mechanical hazards
 - Multiple power sources
 - Worker fatigue
 - Personnel challenges
 - Elevated Working
 - High incident energy at many locations in the collector



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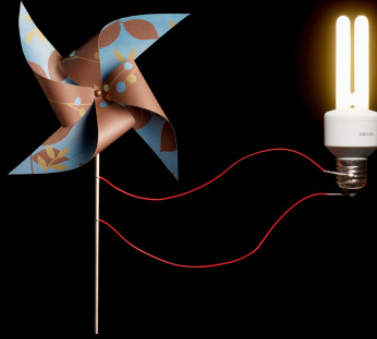
Summary

- Turn it off to work on it
- Arc Flash Assessment is required by law
- Using sound engineering practice, you must quantify the hazard to the employee
- You must train the employee on the hazard
- Recent changes to codes and standards emphasize these points
- When you do it – document it!
- And oh yea.....turn it off!



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Questions?



Thank You

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