

COURSE OUTLINE

SAFETY IN ELECTRICAL SYSTEMS - NEC SAFETY CODE

- 1 OVERVIEW OF COURSE.
 - 1.1 Purpose of Course.

- 2 BASIC CONCEPTS OF ELECTRICITY.
 - 2.1 Current.
 - 2.2 Potential Difference.
 - 2.3 Resistance.
 - 2.4 Direct Current and Voltage.
 - 2.5 Alternating Currents and Voltages.
 - 2.6 Heating Effect Due to Resistance.
 - 2.7 Overview of Electric Conversion Devices.

- 3 ELECTRICAL HAZARDS.
 - 3.1 Electric Shock.
 - 3.1.1 Determine the Severity of an Electric Shock.

- 4 SAFETY AND ACCIDENTS.
 - 4.1 Safety.
 - 4.2 Unsafe Acts.
 - 4.3 Unsafe Conditions.
 - 4.4 Accident Reports.
 - 4.4.1 Writing up the Accident Report.
 - 4.4.2 Approach.
 - 4.4.3 Four Basic Principles.
 - 4.4.4 Communicating through the Report.
 - 4.4.5 The "Big Six": Questions a Report Must Answer.
 - 4.4.6 Basic Reasoning.

5 NATIONAL ELECTRICAL SAFETY CODE (C2-1997).

- 5.1 Purpose and Scope of Rules.
 - 5.1.1 Purpose.
 - 5.1.2 Scope.

- 5.2 Protective Arrangements in Electric Supply Stations.
 - 5.2.1 General Requirements.
 - 5.2.1.1 Enclosure of Equipment.
 - 5.2.1.2 Rooms and Spaces.
 - 5.2.1.3 Electric Equipment.
 - 5.2.2 Illumination
 - 5.2.2.1 Under Normal Conditions.
 - 5.2.2.2 Emergency Lighting.
 - 5.2.2.3 Fixtures.
 - 5.2.2.4 Attachment Plugs and Receptacles for General Use.
 - 5.2.2.5 Receptacles in Damp or Wet Locations.
 - 5.2.3 Floors, Floor Openings, Passageways, and Stairs.
 - 5.2.3.1 Floors.
 - 5.2.3.2 Passageways.
 - 5.2.3.3 Railings.
 - 5.2.3.4 Stair Guards.
 - 5.2.3.5 Top Rails
 - 5.2.4 Exits.
 - 5.2.4.1 Clear Exits.
 - 5.2.4.2 Double Exits.
 - 5.2.4.3 Exit Doors.
 - 5.2.5 Fire-Extinguishing Equipment.

- 5.3 Installation and Maintenance of Equipment.
 - 5.3.1 General Requirements.
 - 5.3.2 Inspections.
 - 5.3.2.1 In-Service Equipment.
 - 5.3.2.2 Idle Equipment.
 - 5.3.2.3 Emergency Equipment.
 - 5.3.2.4 New Equipment.
 - 5.3.3 Guarding Shaft Ends, Pulleys, Belts, and Suddenly Moving Parts.
 - 5.3.3.1 Mechanical Transmission Machinery.
 - 5.3.3.2 Suddenly Moving Parts.
 - 5.3.4 Protective Grounding.
 - 5.3.4.1 Protective Grounding or Physical Isolation of Non-current-Carrying Metal Parts.
 - 5.3.4.2 Grounding Metal.

- 5.3.4.3 Provision for Grounding Equipment during Maintenance.
 - 5.3.4.4 Grounding Methods for Direct-Current Systems over 750 V.
 - 5.3.5 Guarding Live Parts.
 - 5.3.5.1 Where Required.
 - 5.3.5.2 Strength of Guards.
 - 5.3.5.3 Types of Guards.
 - 5.3.5.3.1 Location or Physical Isolation.
 - 5.3.5.3.2 Shields or Enclosures.
 - 5.3.5.3.3 Railings.
 - 5.3.5.3.4 Mats.
 - 5.3.5.3.5 Live Parts Below Supporting Surfaces for Persons.
 - 5.3.5.3.6 Insulating Covering on Conductors or Parts.
 - 5.3.6 Working Space about Electric Equipment.
 - 5.3.6.1 Working Space (600 V or Less).
 - 5.3.6.1.1 Clear Spaces.
 - 5.3.6.1.2 Access and Entrance to Working Space.
 - 5.3.6.1.3 Working Space.
 - 5.3.6.1.4 Headroom Working Space.
 - 5.3.6.1.5 Front Working Space.
 - 5.3.6.2 Working Space Over 600 V.
 - 5.3.7 Equipment for Work on Energized Parts.
 - 5.3.8 Classified Locations.
 - 5.3.8.1 Coal-Handling Areas.
 - 5.3.8.2 Flammable and Combustible Liquids.
 - 5.3.8.3 Flammable Liquid Storage Area.
 - 5.3.8.4 Loading and Unloading Facilities for Flammable and Combustible Liquids.
 - 5.3.8.5 Gasoline-Dispensing Stations.
 - 5.3.8.6 Boilers.
 - 5.3.8.7 Gaseous Hydrogen Systems for Supply Equipment.
 - 5.3.8.8 Liquid Hydrogen Systems.
 - 5.3.8.9 Sulphur.
 - 5.3.8.10 Oxygen.
 - 5.3.8.11 Liquefied Petroleum Gas (LPG).
 - 5.3.8.12 Natural Gas (Methane).
 - 5.3.9 Identification.
 - 5.3.10 Mobile Hydrogen Equipment.
- 5.4 Rotating Equipment.
- 5.4.1 Speed Control and Stopping Devices.
 - 5.4.1.1 Automatic Overspeed Trip Device for Prime Movers.

- 5.4.1.2 Manual Stopping Devices.
 - 5.4.1.3 Speed Limit for Motors.
 - 5.4.1.4 Adjustable-Speed Motors.
 - 5.4.1.5 Protection of Control Circuits.
 - 5.4.2 Motor Control.
 - 5.4.3 Short-Circuit Protection.
 - 5.5 Transformers and Regulators.
 - 5.5.1 Current-Transformer Secondary Circuits Protection When Exceeding 600 V.
 - 5.5.2 Grounding Secondary Circuits of Instrument Transformers.
 - 5.5.3 Location and Arrangement of Power Transformers and Regulators.
 - 5.5.3.1 Outdoor Installations.
 - 5.5.3.2 Indoor Installations.
 - 5.5.4 Short-Circuit Protection of Power Transformers.
 - 5.6 Conductors.
 - 5.6.1 Application.
 - 5.6.2 Electrical Protection.
 - 5.6.2.1 Overcurrent Protection Required.
 - 5.6.2.2 Grounded Conductors.
 - 5.6.2.3 Insulated Power Cables.
 - 5.6.3 Mechanical Protection and Support.
 - 5.6.4 Isolation.
 - 5.6.5 Conductor Terminations.
 - 5.6.5.1 Insulation.
 - 5.6.5.2 Metal-Sheathed or Shielded Cable.
 - 5.7 Switchgear and Metal-Enclosed Bus.
 - 5.7.1 Switchgear Assemblies.
 - 5.7.1.1 General Requirements for All Switchgear.
 - 5.7.1.2 Metal-Enclosed Power Switchgear.
 - 5.7.1.3 Dead-Front Power Switchboards.
 - 5.7.1.4 Motor Control Centers.
 - 5.7.1.5 Control Switchboards.
 - 5.7.2 Metal-Enclosed Bus.
 - 5.7.2.1 General Requirements for All Types of Bus.
 - 5.7.2.2 Isolated-Phase Bus.
- 6 SAFETY AUDITS.
- 6.1 Introduction.
 - 6.2 Objectives.

- 6.3 Audit Items.
 - 6.3.1 One-Line.
 - 6.3.2 Trained People.
 - 6.3.3 Clearing Procedures.
 - 6.3.4 Energized Work Procedures.
 - 6.3.5 Grounding.
 - 6.3.6 Corrosion.
 - 6.3.7 Fault-Clearing Equipment.
 - 6.3.8 System Grounding.
 - 6.3.9 Switching Procedures.
 - 6.3.10 Protective Equipment.

- 6.4 Summary.