

UNIT V - ELECTRICITY

Lesson 2: Electrical Terminology

Competency/Objective: Identify the terms associated with electrical work.

Study Questions

1. What are the terms and definitions of electricity?
2. What is the NEC?
3. How are NEC guidelines enforced?
4. What does a UL listing mean?

References

1. *Agricultural Structures (Student Reference)*. University of Missouri-Columbia: Instructional Materials Laboratory, 1999, Unit V.
2. Activity Sheet
 - a) AS 2.1: Electrical Terms

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TEACHING PROCEDURES

B. *Review*

Lesson 1 addressed electrical safety, electrical defects, and types of circuit protection. To work with electricity safely, a knowledge of the basic terminology is important in order to understand it properly. The NEC and Underwriters Laboratories play an important role in electrical work as well.

C. *Motivation*

Point out to the class that electricity has its own set of terms and definitions. Ask students if they know what volts, ohm, amps, and watts are. Discuss why it is important to understand this terminology.

D. *Assignment*

E. *Supervised Study*

F. *Discussion*

1. To become proficient in working with electricity, an individual needs to become familiar with the terminology used. Have students list electrical terms they have heard and discuss their definitions.

What are electrical terms and definitions?

- a) Conductor - wire through which electrical current is carried through a circuit; typically made from copper, aluminum, or copper-clad aluminum
- b) Circuit - complete, uninterrupted path of electricity
- c) Positive, or hot, wire - wire that acts as a conductor of electrical power; typically color-coded red or black
- d) Neutral wire - wire that conducts electricity from the appliance back to the source, completing the circuit; color-coded white or gray
- e) Insulation - protective covering on the wires; usually made of plastic or rubber
- f) Grounding - electrical connection from the piece of equipment or appliance to the earth
- g) Fuse - safety device that prevents the overload of an electrical circuit by “burning out” and interrupting the electrical flow
- h) Circuit breaker - automatic flip switch located on an electrical circuit that breaks, or shuts off, the current when overloaded

- i) Alternating current (AC) - electrical current that alternates, or changes its direction of flow at regular intervals, usually 60 times per second
 - j) Direct current (DC) - electrical current that flows steadily in the one direction through a conductor; produced by a generator or battery
 - k) Amperage - measurement of the flow of current through an electrical system; measured in amperes, or amps (A)
 - l) Voltage - measurement of the pressure created by electricity moving through a conductor; measured in volts (V)
 - m) Wattage - measurement of the total electrical power within a system; calculated by multiplying amperage and voltage and measured in watts (W)
 - n) Kilowatt (kW) - 1,000 watts
 - o) Resistance - opposition to the flow of current as it moves through a conductor; measured in ohms
 - p) Voltage drop - loss of electrical pressure from the source to the point of use
 - q) Short circuit - wires in the same circuit come into contact, causing the flow of electrical current to move from its desired path
2. Ask students what the acronym NEC stands for. Discuss the purposes of the NEC.

What is the NEC?

- a) In 1911, the National Fire Protection Association sponsored the development of the National Electrical Code (NEC).
 - b) The goal of the NEC is to address four issues.
 - 1) Changing power needs in the United States
 - 2) Safe user practices of new technology
 - 3) Minimum standards for electric wiring practices and materials used nationwide
 - 4) Increased energy use in the home, workplace, and community
 - c) Printed periodically in book form.
 - d) Topics covered in the 1996 edition
 - 1) Wiring and protection
 - 2) Wiring methods and materials
 - 3) Equipment for general use
 - 4) Special occupancies (buildings for particular purposes)
 - 5) Special equipment
 - 6) Special conditions
 - 7) Communication systems
3. Ask students if they think that they are required to follow NEC guidelines in every structure they build. Why might it be a good idea to do so?

How are NEC guidelines enforced?

- a) The NEC is basically a reference and resource for state and local governments and for insurance companies.

- b) Government agencies utilizing the NEC include the Occupational Safety and Health Administration (OSHA) and state and local building inspectors.
 - c) Insurance companies may require the use of NEC guidelines in buildings they insure, primarily for those structures being built for rental or resale.
4. Show students the UL listing on some type of electrical equipment. Ask them if they know what it means. Discuss the purpose of a UL listing. Have students complete AS 2.1.

What does a UL listing mean?

- a) Underwriters Laboratories, Inc. (UL) - independent, not-for-profit testing and certification organization that evaluates products, materials, and systems in the interest of public safety
- b) UL listing
 - 1) Means that representative samples of the product have been tested and evaluated with reference to nationally recognized safety standards for electric shock, fire, and related safety hazards
 - 2) Important because it provides a degree of product quality assurance

G. *Other Activities*

Have students work in groups to list everyday items (for example, a 40-watt light bulb) or situations in which many of the terms discussed in this lesson are used.

H. *Conclusion*

To fully understand how to work with electricity, knowing the basic terms associated with it is vitally important. The terms addressed in this lesson are fundamental to the entire industry. Understanding each of them is imperative to learning how electricity works and how to wire circuits.

I. *Answers to Activity Sheet*

- 1. Conductor
- 2. Circuit breaker
- 3. Wire that acts as a conductor of electrical power; typically color-coded red or black
- 4. Voltage
- 5. Covering on the wires; usually made of plastic or rubber
- 6. Neutral wire
- 7. Fuse
- 8. Complete, uninterrupted path of electricity
- 9. Alternating current (AC)
- 10. National Electrical Code (NEC)
- 11. Measurement of the flow of current through an electrical system; measured in amperes, or amps
- 12. Electrical connection from the piece of equipment or appliance to the earth
- 13. Short circuit

14. Measurement of the total electrical power within a system; calculated by multiplying amperage and voltage and measured in watts
15. Underwriters Laboratories, Inc. (UL)
16. Loss of electrical pressure from the source to the point of use
17. 1,000 watts
18. Direct current (DC)
19. Opposition to the flow of current as it moves through a conductor; measured in ohms
20. UL listing

J. *Answers to Evaluation*

1. c
2. e
3. f
4. a
5. g
6. d
7. b

8. Answers may include any one of the following.

- Changing power needs in the United States
- Safe user practices of new technology
- Minimum standards for electric wiring practices and materials used nationwide
- Increased energy use in the home, workplace, and community

9. A UL listing means that representative samples of the product have been tested and evaluated with reference to nationally recognized safety standards for electric shock, fire, and related safety hazards.
10. Government agencies, including the Occupational Safety and Health Administration (OSHA) and state and local building inspectors, and insurance companies

EVALUATION

Match the term on the right with the description on the left.

- | | | |
|-------------|---|--------------------------|
| 1. _____ | Electrical current flowing steadily in the same direction through a conductor | a. Ampere |
| 2. _____ | The loss of electrical pressure from the source to the point of use | b. Wattage |
| 3. _____ | The opposition to flow of current as it moves through the conductor; measured in ohms | c. Direct current |
| 4. _____ | A unit of measurement for the flow of current through an electrical circuit | d. Alternating current |
| 5. _____ | The actual wire through which electricity is carried through a circuit | e. Voltage drop |
| 6. _____ | Electrical current that changes its direction of flow at regular intervals | f. Resistance |
| 7. _____ | Amperage multiplied by voltage | g. Conductor |

Complete the following short answer questions.

8. What is one of the four issues addressed by the National Electrical Code?
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-
-
-
-
-
-
-
-
-
9. What does a UL listing mean?

10. Who enforces NEC guidelines?

Electrical Terms

Objective: Define important terms used in the electrical industry.

Fill in the term or the definition for each of the blanks below.

- | <u>Term</u> | |
|------------------------------|---------------|
| 1. _____ | 12. Grounding |
| 2. _____ | 13. _____ |
| 3. Positive, or hot,
wire | 14. Wattage |
| 4. _____ | |
| 5. Insulation | |
| 6. _____ | |
| 7. _____ | |
| 8. Circuit | |
| 9. _____ | |
| 10. _____ | |
| 11. Amperage | |

Definition

Wire through which electrical current is carried through a circuit; typically made from copper, aluminum, or copper-clad aluminum

Wires in the same circuit come into contact, causing the flow of electrical current to move from its desired path

Automatic flip switch located on an electrical circuit that breaks, or shuts off, the current when overloaded

Measurement of the pressure created by electricity moving through a conductor

Wire that conducts electricity from the appliance back to the source, completing the circuit; color-coded white or gray

Safety device that prevents the overload of an electrical circuit by “burning out” and interrupting the electrical flow

Electrical current that changes its direction of flow at regular intervals, usually 60 times per second

Code sponsored by the National Fire Protection Association

16. _____ Independent, not-for-profit testing and certification organization that evaluates products, materials, and systems in the interest of public safety
17. Voltage drop
18. Kilowatt (kW)
19. _____ Electrical current that flows steadily in the one direction through a conductor; produced by a generator or battery
20. Resistance
21. _____ Mark indicating that representative samples of a product have been tested and evaluated with reference to nationally recognized safety standards