

6.10 Electrical Equipment and Grounding

Introduction

The purpose of this section is to provide information about electrical equipment and grounding. The information provided in this section should not be considered as a directive or as an industry standard that readers must adopt or follow. Instead, the information is intended to provide helpful ideas and guidance that users may wish to consider in a general sense (See Section 1.1 *Preface and Legal Notice*). Also included is a reference list of useful resources.

Contents

6.10.1	Electrical Equipment	1
6.10.2	Grounding	2
6.10.2.1	System Grounding.....	2
6.10.2.2	Equipment Grounding and Bonding	2
6.10.2.3	Static Grounding	2
6.10.2.4	Lightning Protection.....	2
	References	3

6.10.1 Electrical Equipment

Phosgene is not flammable and special consideration is not typical for electrical equipment to account for the possible presence of phosgene. However, where other chemicals that have flammable or combustible properties are used with phosgene, the electrical equipment requirements for those other chemicals should be evaluated. The National Fire Protection Agency (NFPA) 497¹ provides information on the classification of flammable liquids, gases, or vapors and of hazardous (classified) locations for electrical installations in chemical process areas. NFPA 70 (National Electrical Code)² Articles 500 and 501 are sources of information on electrical installations in hazardous (classified) areas with flammable liquids, gases, or vapors.

6.10.2 Grounding

6.10.2.1 System Grounding

Electrical power system grounding helps ensure that severe transient overvoltages do not occur during normal operation of electrical loads as well as during power system disturbances such as arcing ground faults. System grounding is the intentional connection of the neutral or one phase to earth ground, either solidly or through a resistor. Ungrounded power systems may be more prone to equipment malfunction related to transient over-voltage-induced damage than grounded systems. NFPA 70 (National Electrical Code)² Article 250 provides information on system grounding.

6.10.2.2 Equipment Grounding and Bonding

Grounding and bonding the non-current-carrying parts of electrical equipment and raceways helps ensure that touch voltage remains at a low level under both normal and abnormal power system conditions and that an effective path for electrical fault current exists. Consideration should be given to the design of the grounding electrode system to earth to ensure its effectiveness under local soil conditions. NFPA 70 (National Electrical Code)² Article 250 provides information on system grounding.

6.10.2.3 Static Grounding

Static electricity has not been shown to create hazards in pure phosgene areas. However, the common practice of grounding to a common point (usually earth potential) and bonding all process piping and vessels containing these materials may prevent static discharge from becoming an ignition source in other parts of the unit where a hazardous atmosphere may be present. NFPA 77³ and the American Petroleum Institute (API) 2003⁴ provide information on static grounding and other techniques for the control of static electricity. ANSI/ESD S20.20⁵ provides information on protecting electronics from electrostatic discharge.

6.10.2.4 Lightning Protection

Lightning can disrupt electrical power and control systems, cause injury or loss of life, damage to plant equipment, and serve as an ignition source if a hazardous atmosphere is present. If there is a concern regarding lightning protection, a risk assessment analysis may be completed. If indicated by the risk assessment, the addition of lightning protection systems to equipment and structures not inherently protected needs to be evaluated. NFPA 780⁶ and Underwriters Laboratories Inc. (UL) Standards UL 96/96A⁷ provide further information on lightning protection.

References

¹National Fire Protection Agency (NFPA) 497, *Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*

²NFPA 70, *National Electrical Code*

³NFPA 77, *Recommended Practice on Static Electricity*

⁴American Petroleum Institute (API) *Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents*

⁵ANSI/ESD S20.20-2021, *Protection of Electrical and Electronic Parts*

⁶NFPA 780: *Standard for the Installation of Lightning Protection Systems*

⁷Underwriters Laboratories Inc. (UL) Standards UL 96/96A, *Standard for Lightning Protection Components and Standard for Installation Requirements for Lightning Protection Systems*