



Division of McNish Corporation

DISCUSSION OF BOILER ROOM CLASSIFICATION

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All fired boilers including Anaerobic Digestion Boilers cannot be placed in spaces designated as hazardous locations due to the spark or flame ignition and standing flame during operation. These spaces are designated 'Unclassified Locations' in accordance with NFPA codes, standards, and recommended practices.

The Walker Process Equipment HeatX™ boiler is a Scotch Marine fire tube boiler and is covered by National Fire Protection Association, NFPA, Codes, Standards, and Recommended Practices. The most important of these are:

- NFPA 85, Boiler and Combustion Systems Hazards Code, current edition 2007 and NFPA 8501 Single Burner Boiler Operation, current edition 1997
- NFPA 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities, current edition 2008
- NFPA 54, National Fuel Gas Code, current edition 2009
- NFPA 70, National Electric Code, current edition NEC 2008
- 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, current edition 2008.

Based on the above cited codes, standards, and recommended practices, a boiler room must be unclassified; further, anaerobic digester control building storage, handling, or burning of sludge gas, physically separated from gas-handling equipment is unclassified for NEC Electrical Classification and must be continuously ventilated by a minimum six air changes per hour.

Portions of the above codes, standards, and recommended practices supporting the Unclassified Location designation follows:

- **NFPA 85, Boiler and Combustion Systems Hazards Code, current edition 2007 and NFPA 8501 Single Burner Boiler Operation, current edition 1997**

This applies to boilers with fuel input rating of 12,500,000 BTU/hr (3663 kW) or greater. Paragraph A.5.3.8.1, states:

"Locations at which natural gas, propane, or fuel oil systems are installed in compliance with this code normally are not considered hazardous locations for electrical equipment as defined in NFPA 70, *National Electrical Code*."

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This applies to the Walker Process® HeatX™ boilers which are not specifically covered by NFPA based solely on sizes below fuel input rating of 12,500,000 BTU/hr (3663 kW).

Paragraph 8.6.4, states:

“Where an area is identified as a hazardous location defined by Article 500 of NFPA, National Electrical Code, the equipment design, the types of enclosures, and wiring methods shall be as specified by that code.”

Annex A, paragraph A.5.3.8.1 states:

“Locations at which natural gas, propane, or fuel oil systems are installed in compliance with this code normally are not considered hazardous locations for electrical equipment as defined in NFPA 70, National Electrical Code.”

- **NFPA 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities**

Chapter 2, Referenced Publications, NFPA 820 specifically references: NFPA 54, National Fuel Gas Code, 2006 edition; NFPA 70, National Electric Code, 2008 edition; NFPA 85, Boiler and Combustion Systems Hazards Code, 2007 edition; and 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, 2004 edition.

Section 1.1.1, Administration, General, states:

“This standard shall establish minimum requirements for protection against fire and explosion hazards in wastewater treatment plants and associated collection systems, including the hazard classification of specific areas and processes.”

Section 1.8, Administration, National Electric Code® Criteria, in 1.8.1 it is stated:

“NFPA 820 is based on the criteria established by Article 500 of NFPA 70 but shall not supersede or conflict with the requirements therein.” In 1.8.2 it is stated, “Once an area is classified, NFPA 70 shall be used to specify the types of equipment and the wiring methods that are required.”

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NFPA 820, Table 6.2(a), Solids Treatment Processes, Line 16, row c, describes the NEC Area Electrical Classification of Anaerobic Digester Control Building areas for storage, handling, or burning of sludge gas that are physically separated from gas handling equipment as Unclassified with a requirement to be continuously ventilated at six air changes per hour in accordance with chapter 9 and to include a combustible gas detection system, hydrant protection in accordance with section 6.2.4, and portable fire extinguishers.

Other areas in the Anaerobic Digester Control Building are specifically classed as either Class I Division 1 Group D or Class I Division 2 Group D. Table 9.1.1.4, Minimum Ventilation Rates, in row 3, line b, requires the ventilation of above grade spaces such as equipment rooms and galleries with gas piping classed as Unclassified to have six (6) air changes per hour.

NFPA 820, Annex A, Explanatory Material, paragraph A.1.8 states:

“For more information, see NFPA 497 and NFPA 499.” This annex also defines gas handling equipment in paragraph A.3.3.15.1 as “Gas-handling equipment does not include equipment or devices for the utilization of the gas, such as boilers, engines, and waste gas burners.”

NFPA 820, Annex D, Chemical and Fuel Fire/Explosive Hazards, paragraph D.3.1, Open Flames and Hot Surfaces, states:

“Open flames and hot surfaces might be encountered during normal operation, repair and maintenance operations, or with malfunctioning equipment and appliances within a wastewater treatment plant. Sources of ignition might include welding tasks, boilers, incinerators, kerosene-type lanterns, internal combustion engines, and smoking by personnel. Equipment producing open flames or hot surfaces capable of producing ignition should be properly installed, maintained, and isolated from potential hazards. For additional guidance see the following:

- (1) NFPA 31
- (2) NFPA 37
- (3) NFPA 82
- (4) NFPA 85

Smoking should be prohibited in all hazardous areas.”

- **NFPA 70, National Electrical Code[®], 2008 Edition, Article 500, Hazardous (Classified) Locations Class I, II, and III, Divisions 1 and 2**

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Section 500.2, Definitions, paragraph entitled, “Unclassified Locations”, states:

“Locations determined to be neither Class I, Division 1: Class I, Division 2; Class I, Zone 0; Class I, Zone 1; Class II, Division 1: Class II, Division 2; Class III, Division 1: Class III, Division 2; Zone 20; Zone 21; Zone 22; or any combination thereof.”

- **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**

Chapter 1, paragraph 1.1.1 states:

“This recommended practice applies to those locations where flammable gases or vapors, flammable liquids, or combustible liquids are processed or handled; and where their release into the atmosphere could result in their ignition by electrical systems or equipment.”

Chapter 1, paragraph 1.1.2, Purpose, states:

“The purpose of this recommended practice is to provide the user with basic understanding of the parameters that determine the degree and extent of the hazardous (classified) location. This recommended practice also provides the user with examples of the applications of these parameters.”

Chapter 3, section 3.3, definitions, paragraph 3.3.1 entitled, “Adequate Ventilation”, states:

“A ventilation rate that affords either 6 air changes per hour, or 1 cfm per square foot of floor area, or other similar criteria that prevent the accumulation of significant quantities of vapor-air concentrations from exceeding 25 percent of the lower flammable limit.”

Chapter 5, Classification of Class I (Combustible Material) Areas, Section 5.4, Unclassified Locations, paragraph 5.4.3 states:

“Open flames and hot surfaces associated with the operation of certain equipment, such as boilers and fired heaters, provide inherent thermal ignition sources. Electrical classification is not appropriate in the immediate vicinity of these facilities.”