PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

In an effort to minimize the cost of process industry facilities, this Practice has been prepared from the technical requirements in the existing standards of major industrial users, contractors, or standards organizations. By harmonizing these technical requirements into a single set of Practices, administrative, application, and engineering costs to both the purchaser and the manufacturer should be reduced. While this Practice is expected to incorporate the majority of requirements of most users, individual applications may involve requirements that will be appended to and take precedence over this Practice. Determinations concerning fitness for purpose and particular matters or application of the Practice to particular project or engineering situations should not be made solely on information contained in these materials. The use of trade names from time to time should not be viewed as an expression of preference but rather recognized as normal usage in the trade. Other brands having the same specifications are equally correct and may be substituted for those named. All Practices or guidelines are intended to be consistent with applicable laws and regulations including OSHA requirements. To the extent these Practices or guidelines should conflict with OSHA or other applicable laws or regulations, such laws or regulations must be followed. Consult an appropriate professional before applying or acting on any material contained in or suggested by the Practice.

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PUBLISHING HISTORY

August 2002 Issued
April 2011 Complete Revision
June 2016 Reaffirmation with Editorial Revision
September 2016 Editorial Revision

Not printed with State funds
# PIP ELEHA01
## Engineering Guide for Determining Electrical Area Classification

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## Data Forms

- ELEHA01-F1 – Flammable/Combustible Materials Form
- ELEHA01-F2 – Sources of Release Division Method Form
- ELEHA01-F3 – Sources of Release Zone Method Form
1. Scope

This Practice describes an engineering work process for gathering the necessary information and applying the applicable codes and standards to develop a documented area classification. This Practice addresses the classification of areas containing flammable liquids, gases, or vapors and combustible dust, but does not address ignitable fibers and flyings.

This Practice applies to petroleum and chemical process facilities and other related industries that fall within the scope of the standards being used for the assessment of the area classification. This Practice is applicable for new and existing facilities.

This Practice should be used with petroleum and chemical industry codes and standards that define the basis for area classification.

2. References

Applicable parts of the following Practices and industry codes and standards shall be considered an integral part of this Practice. The edition in effect on the date of contract award shall be used, except as otherwise noted. Short titles are used herein where appropriate.

2.1 Process Industry Practices (PIP)

- PIP PCEA001 – Fixed Gas Detection Guidelines

2.2 Industry Codes and Standards

- American Petroleum Institute (API)
  - API RP 500 – Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2
  - API RP 505 – Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2

- The Instrumentation, Systems, and Automation Society (ISA)
  - ISA-12.10 – Area Classification in Hazardous (Classified) Dust Locations
  - ANSI/ISA-12.01.01 – Definitions and Information Pertaining to Electrical Equipment in Hazardous (Classified) Locations
  - ANSI/ISA-TR12.24.01 – (IEC 60079-10 Mod) Recommended Practice for Classification of Locations for Electrical Installations Classified as Class I, Zone 0, Zone 1, or Zone 2

- National Fire Protection Association (NFPA)
  - NFPA 30 – Flammable and Combustible Liquids Code
  - NFPA 45 – Standard on Fire Protection for Laboratories Using Chemicals
  - NFPA 70 – National Electrical Code (NEC)
  - NFPA 496 – Standard for Purged and Pressurized Enclosures for Electrical Equipment
  - NFPA 497 – Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
3. Definitions

For definitions of terms used in this Practice, see *API RP 500*, Section 3; *API RP 505*, Section 3; *NFPA 497*, Chapter 3; *NFPA 499*, Chapter 3; *ISA-TR12.24.01*, Section 2; and *ISA- 12.01.01*, Section 3.

*Class I materials:* Flammable or combustible liquids or gases

*Class II materials:* Combustible dusts

4. General

4.1 Area classification for electrical installations should be performed by a team of people (e.g., principally process engineer and electrical engineer, and may include others such as Health, Environmental and Safety Specialists) who are knowledgeable of governing codes and standards. The team should also be familiar with applicable process equipment, operations and maintenance; electrical safety procedures; and electrical installation requirements for classified areas.

4.2 The work process described in this Practice, along with the associated worksheets, should be used to define the basis for area classification, determine the electrical area classification, and create the documentation.

4.3 Figure 1 in this Practice is a process flowchart that displays the major activities associated with the assessment of locations with Class I or Class II materials for area classification.

5. Preparation

5.1 Selection of Project-Specific Reference Materials

5.1.1 In accordance with Figure 1, Item 1, “Assemble Data References and Government Regulations,” the first step in performing an area classification is to determine whether zones or divisions should be used for classification and to select the appropriate reference standards for the project.

5.1.2 NFPA 70 prohibits the overlap of the two classification methods in a facility. For existing facilities that were classified using the Division Method, there is little incentive for reclassifying unless major revisions are planned.

5.1.3 Table 1 lists the suggested industry standards for assessing area classification.
Table 1 – Suggested Industry Standards for Assessing Area Classification

<table>
<thead>
<tr>
<th>Type of Installation (Note 1)</th>
<th>Method of Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum Facilities (including Refineries)</td>
<td>Class I, Division</td>
</tr>
<tr>
<td></td>
<td>API RP 500</td>
</tr>
<tr>
<td>Chemical Process Areas</td>
<td>NFPA 497 (Note 2)</td>
</tr>
</tbody>
</table>

Notes:
1. Additionally, the classification of laboratories using chemicals may fall under the guidance of NFPA 45.
2. For large, high-pressure plants, the API recommendations are more suitable (see NFPA 497-2012, Para. 5.7.4).

ISA-TR12.24.01 provides additional guidance on using the Zone Method.

5.2 Data Gathering

5.2.1 In accordance with Figure 1, Item 1, “Assemble Data References and Government Regulations,” the next task in the work process is to obtain pertinent information (e.g., process descriptions, process flow diagrams (PFDs), material balance sheets (MBSs), piping and instrumentation diagrams (P&IDs), Safety Data Sheets (SDSs), equipment lists) and an up-to-date plot plan for all locations to be considered for area classification.

5.2.2 The plot plan should indicate the location of major process equipment, roads, and all below-grade locations.

5.2.3 Any existing electrical area classification drawings and supporting documentation should be obtained.

5.2.4 The areas adjacent to the project should be reviewed to determine possible sources of leaks that could impact the area classification within the scope-of-work area.

5.2.5 An actual walk-through of the area is highly recommended.

5.2.6 Review housekeeping/maintenance procedures and schedules with plant personnel for Class II areas.

5.3 Materials and Properties

5.3.1 In accordance with Figure 1, Item 2, “List all Material Properties Class I and II Materials,” and Item 3, “Determine Class and Group,” using process data, Class I and Class II materials should be listed for the area under study on PIP ELEHA01-F1 Flammable/Combustible Materials Form.

5.3.2 For Class I materials, material properties, such as flash point, ignition temperature, T-Codes, lower flammable limit (LFL), and vapor density should be provided.
5.3.3 For Class II materials, material properties, such as layered or cloud ignition temperature and particle density should be provided.

5.3.4 If there are variations in the properties of flammable materials, the reference source should be noted on PIP ELEHA01-F1 Flammable/Combustible Materials Form.

5.3.5 For one example for dealing with mixtures of materials, see NFPA 497-2012, Annex B.

5.3.6 For gas mixtures containing hydrogen sulfide, see API RP 500 or API RP 505, as appropriate. NFPA 30-2015, Chapter 4 provides definitions of flammable and combustible liquids.

5.3.7 Using the appropriate references and standards, the class and group of the materials should be determined and entered on PIP ELEHA01-F1 Flammable/Combustible Materials Form. For hydrogen sulfide and hydrogen, see API RP 500-2012 (ER2014), Sections 5.4 and 5.5 or API RP 505-1997 (R2013), Sections 5.4 and 5.5.

5.4 Release Sources

5.4.1 In accordance with Figure 1, Item 4, “Locate All Hazardous Material Release Sources,” all potential flammable and combustible material release sources should be reviewed.

5.4.2 The release sources that the team agrees need to be considered for area classification purposes should be marked on the PFD, P&ID, and/or plot plan. Tabulate these sources on either PIP ELEHA01-F2 Sources of Release – Division Method Form or PIP ELEHA01-F3 Sources of Release – Zone Method Form.

5.4.3 The API and NFPA standards provide guidance on the selection of appropriate “sources” for the purpose of area classification.

5.4.4 With today’s environmental regulations and restrictions and the impact that it has had on process equipment design, criteria used in the past for selecting potential sources may need to be reviewed and updated for each facility. Additional factors such as maintenance practices, monitoring, response facilities, and past experience with similar process facilities may influence the selection of potential release sources.

API RP 505-1997(R2013) provides additional guidance on the relationship between the grade of release and the zone classification in Section 6.5.8 and Table 2. Table 2 indicates that a continuous grade of release has a flammable mixture present 1,000 or more hours per year, a primary release has a flammable mixture present between 10 hours and 1,000 hours per year, and a secondary release has a flammable mixture present less than 10 hours per year.

API RP 505-1997(R2013) goes on to indicate that while “there are no firm relationships relating the time that flammable mixture occurs in zones, many use the rule-of-thumb shown in Table 3.” Table 3 in API RP 505 shows the typical relationship between zone classification and the presence of flammable material and indicates Zone 0 as having flammable mixtures present 1,000 hours or more per year (> 10%), Zone 1 as having flammable mixtures present 10 hours to 1,000 hours per year (0.1% to 10%), Zone 2 as having flammable mixtures
present 1 hour to 10 hours per year (0.01% to 0.1%), and unclassified as having flammable mixtures present less than 1 hour per year (0.01%).

6. **Class I Materials**

6.1 The standards listed in Table 1 provide guidance in the classification of Class I Materials where they are produced, processed, or handled, and where released into the atmosphere could be ignited by electrical systems or equipment.

6.2 From the information on either *PIP ELEHA01-F2* for the Division method or *PIP ELEHA01-F3* for the Zone method and the reference codes and standards, the extent of the divisions or zones, as applicable, should be determined and shown on the appropriate physical plan drawings.

6.3 The following should be considered for determining the extent of the classified areas:

a. Minimizing the extent of the classified area may lower the initial electrical equipment and installation costs, but certainly safety should not be reduced.

b. The grouping of overlapping or near-by areas into a single, readily defined classified area should be evaluated.

c. Lumping multiple-point sources within close proximity into one classified area may be cost-effective if conduit versus cable is used to reduce the number of sealing fittings required at area classification boundary crossings.

d. The area classification of future project additions and modifications in adjacent areas may require the upgrade of the electrical equipment and installations.

e. Extending the classified area to coincide with other easily identified boundaries or equipment should be considered (e.g., clarifying the extent of the classified area for a particular facility by extending the area to the edge of unit paving or adjacent roadway boundaries).

6.4 The plan drawings should be reviewed to determine if physical items (e.g., barriers, dikes, sumps, and elevation changes) may influence the extent of the division or zone.

6.5 Appendixes A and B provide a process for evaluating individual point sources for Class I hazardous area assessment. This process, in general, is based on a process shown in *ISA-TR12.24.01*, Figure C.2. The process has been modified to address both divisions and zones and the requirement for transition zones in accordance with *API RP 500* and *API RP 505*.

7. **Class II Materials**

7.1 The standard listed in Table 1 provides guidance in the classification of areas where combustible dusts are produced, processed, or handled, and where dust released into the atmosphere or accumulated on surfaces could be ignited by electrical systems or equipment.

7.2 The extent of the boundaries should be shown on the appropriate physical plan drawings in accordance with *NFPA 499* guidelines.

7.3 The plan drawings should be reviewed to determine if physical items such as barriers may influence the extent of the Division classification.
7.4 Appendix C provides a process for evaluating individual point sources for Class II hazardous area assessment. This process is based on the criteria for evaluating areas described in NFPA 499.

8. Classification Alternatives

8.1 General
In accordance with Figure 1, Item 25, “Evaluate Class I Classification Alternatives,” alternatives for reducing classified areas to improve safety, operability, and maintainability should be considered.

8.2 Pressurization
8.2.1 Pressurization is a method for reducing area classification within enclosures, rooms, or buildings in Class I and Class II locations. See NFPA 496 for details.

8.2.2 The requirements for pressurization are stringent, and some types require automatic de-energization of electrical equipment. However, in some instances, pressurization may be the only practical method for installing some types of electrical equipment in classified locations, particularly Group A or Group B locations.

8.2.3 The volume to be pressurized and to the operating costs (e.g., utilities and maintenance) should be considered.

8.2.4 For locations with high humidity, the air used for pressurization may require conditioning or an alternative purging gas such as nitrogen may be required to avoid damage to enclosed electrical equipment.

8.3 Equipment Location
8.3.1 When possible, locate electrical equipment in a reduced or unclassified area.

8.3.2 For areas containing heavier-than-air gases, locating electrical equipment at least 24 inches (610 mm) above grade should be considered to reduce the risk of ignition.

8.4 Walls and Barriers
For Class I locations, vapor tight walls or barriers that cover the full extent of the classified area boundary can be used to limit the extent of classified areas. For Class II locations, wall or barriers which limit the passage of dust in suspension or layer form, as described in NFPA 499, can be used to limit the extent of classified areas.

8.5 Ventilation
8.5.1 Natural or mechanical ventilation can be used to reduce the classification in Class I locations.

8.5.2 Ventilation is often applied to indoor applications.

8.5.3 See API RP 500-2012 (ER2014), Section 6.3; API RP 505-1997 (R2013), Section 6.6; NFPA 30-2015, Sections 17.11 and 18.6; and ISA 12.24.01-1998, Section 5 for additional guidance.

8.5.4 For Class II locations, ventilation can increase the risk of ignition by causing combustible dust to be placed in suspension in the air.
8.6 Gas Detection

8.6.1 For the application of gas detection as a method of protection for Class I sources, see API RP 500–2012 (ER2014), Section 6.5; API RP 505–1997 (R2013), Section 6.8; and ISA-TR12.24.01–1998, Annex D.

8.6.2 If applied in accordance with NEC, Article 500 and Article 505, gas detection is an NEC-recognized method of protection for industrial locations.

8.6.3 For selection, design, and application of fixed gas monitoring detectors see PIP PCEA001 Fixed Gas Detection Guidelines.

8.7 Dust Source Control

For Class II locations, consider the following options to control dust:

a. Housekeeping
b. Sealing of sources to minimize leaks
c. Dust removal systems
d. Sloped surfaces to prevent accumulation

9. Unclassified Locations

9.1 Those locations that have not been classified as Division 1 or Division 2; or Zone 0, Zone 1, or Zone 2 are unclassified locations.

Under certain specific conditions, a location may contain flammable or combustible materials and still be unclassified. Certain locations can be both Class I and Class II locations, requiring special considerations.

9.2 See API RP 505-1997 (R2013), Section 6.5.9; API RP 500-2012 (ER2014), Section 6.2.4; NFPA 497-2012, Section 5-4; and ISA-TR12.24.10–1998, Section 4.2 for additional criteria for the evaluation of unclassified locations.

10. Documentation

10.1 Electrical area classification documentation should include the following information:

a. Material data with Class, Group, ignition temperature and T-Code recorded on PIP ELEHA01-F1 Flammable/Combustible Materials Form
b. Source data with Division or Zone classification and extent recorded on PIP ELEHA01-F2 for the Division method or PIP ELEHA01-F3 for the Zone Method
c. Class II assignment of Division classification and extent (if appropriate)
d. Ventilation, pressurization, and gas detection considerations (may be a drawing note)

10.2 Typically, a classification drawing(s) should be prepared. However, a drawing may not be necessary if the other assembled documentation is sufficient to adequately define and support the area classification.
10.3 If electrical area classification drawings are prepared, the drawings should include the following information:

a. Equipment plot plan that details major process equipment, roads, and below-grade locations

b. A reference that indicates the standard(s) (number and year) on which the area classification drawing is based

c. A legend with different markings for each classification. Preferred symbols that denote classified areas are shown in *API RP500–2012 (ER2014)*, Annex F for Divisions and in *API RP 505–1997 (R2013)*, Appendix C for Zones. It is recommended that, at a minimum, the following material and source data from *PIP ELEHA01-F1 Flammable/Combustible Materials Form* and either *PIP ELEHA01-F2* or *PIP ELEHA01-F3* be recorded on the area classification drawings:

   1) Class, Division or Zone, Group

   2) Temperature Class (T-code) of applicable flammable gases and vapors

d. Elevations of equipment to completely define the extent of the classified areas

e. The applicable classification figure(s) from the industry standards can be referenced on the drawings to enhance clarity.

f. Special notes pertaining to the area classification (e.g., notes on ventilation, pressurization, and gas detection)

10.4 Retain the documentation necessary to support the area classification decisions. The documentation should include references, worksheets, drawings, and special considerations or calculations used in determining the classification.
Figure 1 – Work Process for Developing Electrical Area Classifications
Appendix A – Class I Division Method Hazardous Area Assessment Process

Note: The following process can be used in conjunction with PIP ELEHA01-F2 when classifying using the Division method.

Step 1 – Are there any potential release sources of flammable or combustible material capable of producing a dangerous volume of explosive gas atmosphere?

- If No, the area is unclassified and the assessment is complete.
- If Yes, continue to Step 2.

Step 2 – Can the source be eliminated?

- If the source is eliminated, the area is unclassified and the assessment is complete.
- If No, continue to Step 3.

Step 3 – Determine if ventilation is adequate.
(Reference Column 7)

- If No, the area Division classification without ventilation remains and the recommendations for inadequately ventilated areas in API 500 should be followed.
- If Yes, the area Division classification may be reduced from Division 1 to Division 2 and the recommendations for adequately ventilated areas in API 500 should be followed.

Adequate ventilation is defined in API RP 500-2012 (ER2014), Section 6.3.2.

Step 4 – Determine the classification Division.

Division classifications for Class I materials are defined in NFPA 70-2014, Article 500.5 (B)(1) and (2).

Step 5 – Evaluate whether one or more of the following can make the area less hazardous: modifying the source type, improving ventilation.

- If Yes, return to Step 4.
- If No, continue to Step 6.

Step 6 – Use an appropriate area classification standard to determine the extent of the classification. End of evaluation process.
Appendix B – Class I Zone Method Hazardous Area Assessment Process

Note: The following process can be used in conjunction with PIP ELEHA01-F3 when classifying using the Zone method. If classifying using the Division method, the process may be followed and the results translated. To classify using the Division method directly, the user must recognize that columns 4 and 8 do not apply as shown in this appendix. See Appendix A. Refer to API RP 500 for ventilation and rates of release.

Step 1 – Are there any potential release sources of flammable or combustible material capable of producing a dangerous volume of explosive gas atmosphere?

- If No, the area is unclassified and the assessment is complete.
- If Yes, continue to Step 2.

Step 2 – Can the source be eliminated?

- If the source is eliminated, the area is unclassified and the assessment is complete.
- If No, continue to Step 3.

Step 3 – Determine whether the grade of release is continuous, primary, or secondary.
(Reference Column 4)

- **Continuous grade of release:** A release that is continuous or is expected to occur for long periods.
- **Primary grade of release:** A release that can be expected to occur periodically or occasionally during normal operation.
- **Secondary grade of release:** A release that is not expected to occur in normal operation and if it does occur, is likely to do so only infrequently and for short periods.

See ISA-TR12.24.01 for additional information on assessing the grade of release.

Step 4 – Determine whether the degree of ventilation is high, medium, or low.

- **High ventilation (VH):** Can reduce the concentration at the source of release virtually instantaneously, resulting in a concentration below the lower explosive limit. A zone of small (even negligible) extent results.
- **Medium ventilation (VM):** Can control the concentration, resulting in a stable situation in which the concentration beyond the zone boundary is below the LEL while the release is in progress and where the explosive atmosphere does not persist unduly after release has stopped. The extent and type of zone are limited to the design parameters.
- **Low ventilation (VL):** Cannot control the concentration while the release is in progress and cannot prevent undue persistence of a flammable atmosphere after the release has stopped.
Step 5 – Determine whether the availability of the ventilation is good, fair, or poor.

- **Good** ventilation is present virtually continuously.
- **Fair** ventilation is expected to be present during normal operation. Discontinuities are permitted provided that they occur infrequently and for short periods.
- **Poor** ventilation that does not meet the standard of fair or good, but discontinuities are not expected to occur for long periods.

See *ISA-TR12.24.01* and *API RP 505* for additional information on the availability of ventilation.

Step 6 – Using the following table, determine the classification Zone or Division based on the grade of release, the degree of ventilation, and the availability of the ventilation.

<table>
<thead>
<tr>
<th>SOURCE TYPE</th>
<th>DEGREE OF VENTILATION</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous</td>
<td>Unclassified (See Note 1)</td>
<td>Zone 2 (See Note 1)</td>
<td>Zone 1 (See Note 1)</td>
<td>Zone 2 (See Note 1)</td>
</tr>
<tr>
<td>Primary</td>
<td>Unclassified (See Note 1)</td>
<td>Unclassified (See Note 1)</td>
<td>Zone 1</td>
<td>Zone 1 (Surrounded by Zone 2)</td>
</tr>
<tr>
<td>Secondary</td>
<td>Unclassified (See Note 1)</td>
<td>Zone 2 (See Note 3)</td>
<td>Zone 2</td>
<td>Zone 2 (See Note 3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AVAILABILITY OF VENTILATION</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
</table>

**NOTES:**

The table indicates the resulting zone for various combinations of sources and ventilation. When applying this table to Division classification, substitute Division 2 for Zone 2 and Division 1 for Zone 1. Division 1 can also be substituted for Zone 0, but the user should recognize that it is prudent to use either intrinsically safe systems or consider applying two or more methods of protection concurrently for applications.

The National Electrical Code (NEC) requires a transition zone between Division 1 and unclassified areas, between Zone 0 and Zone 2, and between Zone 1 and unclassified. This requirement is in addition to the guidance presented in this table.

1. These classifications actually have a small area around the point source with a higher level of classification, but the extent of this transition area is negligible. Care should be applied in assessing risk whenever ventilation is used as criteria for reducing the classification around Zone 1 and Zone 2 locations.
2. The area will be Zone 0 if the low ventilation is so weak and the release is such that in practice an explosive atmosphere exists virtually continuously (i.e., approaching a “no ventilation” condition).
3. The Zone 2 area created by the secondary grade of release may exceed that attributable to a primary or continuous grade or release, in which case, the greater distance should be taken.

See *ISA-TR12.24.01* and *API RP 505* for additional information on assessing the degree of ventilation.
Step 7 – Evaluate whether one or more of the following can make the area less hazardous: modifying the source type, improving the degree of ventilation, or increasing the availability of the ventilation.

- If Yes, return to Step 6.
- If No, continue to Step 8.

Step 8 – Use an appropriate area classification standard to determine the extent of the classification. End of evaluation process.
Appendix C – Class II Hazardous Area Assessment Process

Step 1 – Is Class II, Group E material present in hazardous quantities?

- If Yes, go to Step 2.
- If No, go to Step 3.

Step 2 – The Area is Class II Division 1. End of assessment.

Step 3 – Is the material Class II, Group F, or Group G?

- If Yes, go to Step 4.
- If No, this document does not address any Class II materials other than Group E, Group F, and Group G. Refer to NFPA 499 for additional guidance. End of assessment.

Step 4 – Under normal conditions, is a dust likely to be suspended in air (continuously, periodically, or intermittently) in quantities that are sufficient to produce explosive or ignitable mixtures?

- If Yes, go to Step 2.
- If No, go to Step 5.

Step 5 – Will mechanical failure or abnormal operation of machinery or equipment result in an explosive or ignitable mixture, and will it also provide a source of ignition through simultaneous failure of electrical equipment, operation of protective devices, or from other causes?

- If Yes, go to Step 2.
- If No, go to Step 6.

Step 6 – Are dust layers or accumulations on surfaces deeper than 1/8 inch?

- If Yes, go to Step 2.
- If No, go to Step 7.

Step 7 – Can the dust, not normally in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures, be thrown into suspension by infrequent malfunctioning of handling or processing equipment?

- If Yes, go to Step 8.
- If No, go to Step 9.

Step 8 – The area is Class II, Division 2. End of evaluation.
Step 9 – Could dust accumulations, which are insufficient to interfere with the normal operation of electrical equipment, be ignited by the abnormal operation or failure of electrical equipment?

- If Yes, go to Step 8.
- If No, go to Step 10.

Step 10 – Is there a dust layer that makes the colors of the surfaces indiscernible?

- If Yes, go to Step 8.
- If No, go to Step 11.

Step 11 – Would the failure of the mechanical dust collection system allow an ignitable suspension of dust or a layer deeper than 1/8 inch to build up?

- If Yes, go to Step 8.
- If No, the area is unclassified. End of evaluation.
### Material Properties

<table>
<thead>
<tr>
<th>Material</th>
<th>Applicable for Class I Only</th>
<th>Class II Only</th>
<th>Applicable for Class I or Class II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vapor Density (Air=1)</td>
<td>Flash Point</td>
<td>Lower Flammable Limit (LFL)</td>
</tr>
<tr>
<td></td>
<td>°C (°F)</td>
<td>Vol. %</td>
<td>kg/m³ (lb/ft³)</td>
</tr>
</tbody>
</table>

**Note:** National Electrical Code (NEC) Temperature Class (T-Code). See NFPA-70-2014 Article 500.8(C).
### SOURCES OF RELEASE

**DIVISION METHOD FORM**

**ELEHA01-F2**

**ENGINEERING GUIDE FOR DETERMINING ELECTRICAL AREA CLASSIFICATION**

**NOTES:**
1. Quote the number of list in *PIP ELEHA01-F1*.
2. G=Gas; L=Liquid; LG=Liquefied Gas; S=Solid
3. N=Natural; A=Artificial

### Facility Information

<table>
<thead>
<tr>
<th>FACILITY NAME:</th>
<th>PROJECT NO.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION:</td>
<td>UNIT OR BUILDING NO.:</td>
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### Revision History

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<th>NO.</th>
<th>DATE</th>
<th>REVISION DESCRIPTION</th>
<th>BY</th>
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### Notes

1. Quote the number of list in *PIP ELEHA01-F1*.
2. G=Gas; L=Liquid; LG=Liquefied Gas; S=Solid
3. N=Natural; A=Artificial

### Source of Release

<table>
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<tr>
<th>No.</th>
<th>Description</th>
<th>Location</th>
<th>Reference (Note 1)</th>
<th>Operating Temperature and Pressure</th>
<th>Flammable Material</th>
<th>Ventilation</th>
<th>Hazardous Area</th>
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<td>°C (°F) kPa</td>
<td>G/L/LG/S</td>
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<th>Operating Temperature and Pressure</th>
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<th>Degree (Note 5)</th>
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