MEMORANDUM

TO: NFPA Technical Committee on Solvent Extraction Plants

FROM: Joanne Goyette, Administrator, Technical Projects

DATE: June 21, 2011

SUBJECT: NFPA 36 ROP TC Letter Ballot (F2012)

The ROP letter ballot for NFPA 36 is attached. The ballot is for formally voting on whether or not you concur with the committee’s actions on the proposals. Reasons must accompany all negative and abstention ballots.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for action.

Please complete and return your ballot as soon as possible but no later than July 6, 2011. As noted on the ballot form, please return the ballot to Joanne Goyette either via e-mail to jgoyette@nfpa.org or via fax to 617-984-7110. You may also mail your ballot to the attention of Joanne Goyette at NFPA, 1 Batterymarch Park, Quincy, MA 02169.

The return of ballots is required by the Regulations Governing Committee Projects.

Attachments:

Proposals
Letter Ballot
Technical Committee on Solvent Extraction Plants,

Recommendation: Review entire document to: 1) Update any extracted material by preparing separate proposals to do so, and 2) review and update references to other organizations documents, by preparing proposal(s) as required.

Substantiation: To conform to the NFPA Regulations Governing Committee Projects.

Committee Meeting Action: Accept

Revise Chapter 2 to read as follows:

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

2.3 Other Publications.
   2.3.1 ASME Publications. American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.
   2.3.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

2.4 References for Extracts in Mandatory Sections.

Committee Statement: The amendments made in this proposal bring all referenced publications up to their current edition dates.
Friction sparks range from 10 mJ to 100 mJ. If steel is rubbed against steel for a longer duration, impact sparks, however, are created by a ferrous or steel object being struck or dropped on another hard surface. Martin Sheldon reported in his study, Frictional Sparking, that “It is well known that the sharpening of steel tools on a grindstone is accompanied by showers of sparks.” Sheldon went on to say “frictional heating and spark occurs when two solid bodies come into contact with each other, because of microscopic surface irregularities, they do not touch over the whole of their surfaces but only at a relative few spots. At the actual contact spots adhesion occurs between the two bodies and if they are moved relative to each other the work necessary to overcome this adhesion is converted into heat, raising the temperature of the bodies...As the contact spots are forced apart fragments of the materials may be broken off and projected into the surroundings...These small particles of material have arisen from the areas where work was expended. If these particles are heated sufficiently the glowing particles will appear as frictional sparks.”

NFPA 36, Annex B, paragraph B.2 states that “The primary solvents used for the extraction of vegetable oils are the petroleum hydrocarbon fractions sold commercially as “hexane” and “isohexane.” NFPA 53 Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres, 2011 edition, Table F.2.1 Ignition and Flammability Properties of Combustible Liquids and Gases in Air and Oxygen at Atmospheric Pressure lists properties for various flammable liquids. Hexane’s synonyms is n-Hexane, minimum ignition temperature (MIT) for n-Hexane is 437°F (225°C) and minimum ignition energy (MIE) for n-Hexane is 4.288 milli joules (mJ).

Studies & data referencing Mechanical Sparks and their Hazards:
- Mechanical sparks include impact sparks and friction sparks. Friction sparks are generated from rubbing or surface contact between ferrous or steel and other materials. Hand tools such as pliers, screwdrivers wrenches, and sockets are used in a torque application, i.e. tools will make contact in a rubbing action. This occurs when the metal parts of the ferrous tool rub against another hard surface such as metal parts of machinery in extraction and meal processing. Impact sparks, however, are created by a ferrous or steel object being struck or dropped on another hard surface.
- Working with Modern Hydrocarbon and Oxygenated Solvents: A Guide to Flammability by American Chemistry Council, Section 2.1.4 Minimum Ignition Energy states that “Whatever the potential source of ignition, it must deliver a certain minimum amount of energy to initiate a flame front in the fuel/air mixture. However, very low energy levels can be sufficient to ignite solvent vapor/air mixtures (~0.01 – 2.0 milli joules). A spark from a metal tool falling on the floor...may have sufficient energy to ignite a fire if the solvent vapors in air are within the flammable range.”
- NFPA 36, Annex B, paragraph B.2 states that “The primary solvents used for the extraction of vegetable oils are the petroleum hydrocarbon fractions sold commercially as “hexane” and “isohexane.”
- NFPA 921, Guide for Fire and Explosion Investigations 2011 Edition, Chapter 5 Basic Fire Science Table 5.7.1.1 Reported Burning and Sparking Temperature of Selected Ignition Sources under Mechanical Sparks lists a Steel tool spark temperature at 2550°F (1400°C).
- Therefore, the temperature of ferrous or steel tool sparks far exceeds the minimum ignition temperature of hexane solvent which means that when the atmosphere is flammable, a ferrous or steel tool spark is capable of igniting solvents.
- A test conducted by W. Bartknecht, Ignition Capability of Hot Surfaces and Mechanically Generated Sparks in Flammable Gas and Dust/Air Mixtures showed that if steel is rubbed against steel for a longer duration, (0.5-2.0 seconds) then friction sparks are generated. At ignition temperature 400°C, the electrical equivalent energy by steel friction sparks range from 10 mJ to 100 mJ.
- Friction from continuous or intermittent contact between ferrous and other materials giving a rubbing action can produce sparks that are capable of igniting hexane solvents in flammable atmospheres.
- Martin Sheldon further stated that “A one kilogram hammer falling one meter onto the ground releases about 10 joules (10000 mJ) of thermal energy”. This far exceeds MIE of hexane or n-Hexane cited above.
- Kinetic energy can be calculated as Ek=½MV², m is the mass in kilograms, V is velocity in meter per second (m/s), Ek is the kinetic energy in joules. Hand tools use is frequently a high velocity application. In Eckhoff’s test study, Initiation of Grain Dust Explosions by Heat Generated during Single Impact between Solid Bodies, he used a range of 10m/s to 25m/s. Based on assumptions of a 3 pound hammer with an impact velocity of 18m/s, calculated kinetic energy is 220 joules (220000 mJ). Another example, a 5 pound hammer with an impact velocity of 14m/s, calculated kinetic...
OSHA inspection #124728437, employee #1 and a coworker, both maintenance
OSHA inspection #15050487, a piece of tramp metal was accidently dumped into
OSHA inspection #300965795, employee #1 was in the process of cleaning loose
OSHA inspection #2272953, two employees were assigned the job of tending
Listed as accident #82 on dust incident data compiled by the Chemical Safety Board
OSHA inspection #119775823, employee #1 was working on a solvent recovery
OSHA inspection #126764497, employee #1 was performing maintenance work

- Therefore, power density of mechanical sparks and hot surfaces from ferrous hand tools can have enough energy to
  ignite hexane solvents in flammable atmospheres.
- NFPA 30, Flammable and Combustible Liquids, Chapter 6, section 6.5.1 lists frictional heat or sparks as sources of
  ignition of flammable vapors and precaution shall be taken to control ignition sources.
- OSHA Flammable and Combustible Liquids regulation, 29 CFR Parts 1910.106(b)(6) states that precaution shall be
taken to eliminate or control sources of ignitions including frictional heat and mechanical sparks to prevent the ignition of
flammable vapors.
- Emergency Response Guidebook (ERG) requires the use of "non-sparking" tools to handle spills or leaks for
flammable liquids – Guide 128 Flammable Liquids (Non-Polar/Water-Immiscible) for hexanes.
- Manufacturers of solvents regularly require the use of "non-sparking" tools under Accidental Release Measures and/
or Handling and Storage sections in the MSDS's for their products. A few examples: ExxonMobil Chemical, CITGO,
Airgas, J.T. Baker, and Mallinckrodt Baker,
- Example of accidents caused by mechanical sparks from ferrous tools:
  - Friction spark from steel on steel: OSHA inspection #124728437, employee #1 and a coworker, both maintenance
    mechanics, were working in a 30 in. by 36 in. manhole at a Space Age Fuel gas station in Gresham, OR. Employee #1
    was trying to change a fuel pump, while the coworker watched from outside the manhole. Employee #1 was using an
    Allen wrench to loosen the bolts on the fuel pump lead when he apparently created a spark that ignited the gas fumes in
    the manhole, causing an explosion. Employee #1 suffered burns to his face, hands, arms, and legs. He was transported
to hospital for treatment.
  - Friction spark from steel on steel: OSHA inspection #15050487, a piece of tramp metal was accidently dumped into
    the south side hopper along with a load of wood chips and plywood trimmings. The movement of the screens caused a
    spark to occur. This spark ignited the dust in the confined area of the large and open-spaced dump house.
  - Friction spark from steel on steel: OSHA inspection #126764497, employee #1 was performing maintenance work
    on equipment used to make ignition caps for automotive air bags. He ran into some problems and called maintenance,
    but instead of waiting for them to arrive, he dismantled and attempted to reassemble the parts. In the process, he put in
    a part upside down. The part had four screws, and while two of them were still able to be installed, the other two no
    longer matched with their holes. Unaware that the part was upside down, Employee #1 tried to force one of the screws
    in at an angle. The friction resulting from this effort ignited the cap's residual explosive material. Flames flashed up the
    sleeve of Employee #1's smock and he sustained third-degree burns to his arm.
  - Friction spark from a hand tool: Listed as accident #82 on dust incident data compiled by the Chemical Safety Board
    (CSB), an explosion resulted as a spark created by a worker with an Allen wrench who was turning a screw to adjust a
    machine. The spark ignited some propellant dust and a vacuum system carried the fire another room where a barrel of
dust exploded.
  - Impact spark from metal on metal: OSHA inspection #119775823, employee #1 was working on a solvent recovery
    system to recycle solvent generated from a Flexographic printing process. As the spent solvent was poured into the
    system, sludge started to rise and a cloud of white smoke began to form. In closing the machine, the lid hit against the
    metal surface and generated a spark that ignited the solvent vapors. Employee #1's sustained second-degree burns to
    his upper right arm.
  - Impact spark from metal on metal: OSHA inspection #300965795, employee #1 was in the process of cleaning loose
    material from drill piping with a metal hammer. While striking the pipe with a hammer, an explosion occurred. Employee
    #1 was killed.
  - Impact spark from a metal hand tool: OSHA inspection #2272953, two employees were assigned the job of tending
    a 100 gallon (water jacket) reactor kettle of methyl methacrylate in the mixing room. Employee #1 used a metal wrench
    (visegrips) to pry open the cover of a kettle. The wrench handle struck the angle iron support for the agitator motor,
    producing a spark. Employee #2 noticed the spark, which was immediately followed by a massive "fire ball". Both
    employees were engulfed in the fireball. Employee #3 came to the area to assist the other employees. The
    investigation states that non-sparking tools were not provided for the employees. All three employees received first and
    second degree burns on their face, arms and abdomen. Employee #2 also received some third degree burns. All three
    employees were hospitalized.

These examples of OSHA documented accidents illustrates that accidents do happen when proper safety measures
are not taken against mechanical sparks from ferrous tools as a possible ignition source.

Safe operating practices should include protective tools. As such, mechanical sparks from ferrous tools should not be
overlooked as an ignition source in restricted and controlled areas where plant is operating or not purged. Without
added text, ferrous tools are likely to be used which can be an ignition source in flammable environments expose
employees to an explosion and fire hazard. However, if upon further consideration, the Committee still does not see the
need for restricting ferrous tools in flammable environments, we ask the Committee to at least include the proposed text

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in Annex text to raise the awareness of ignition hazard associated with ferrous tools in flammable environments.

This is not original material; its reference/source is as follows:

http://www.osha.gov/pls/imis/establishment.inspection_detail?id=15050497; OSHA inspection #126764497, Employee's Arm Burned in Explosion, available:
http://www.osha.gov/pls/imis/establishment.inspection_detail?id=126764497; OSHA inspection #119775823, Employee's Arm Burned in Solvent Vapor Flash Fire, available:
http://www.osha.gov/pls/imis/accidentsearch.accident_detail?id=170903140; OSHA inspection #300965795, Employee Killed in Explosion On Site, available:
http://www.osha.gov/pls/imis/accidentsearch.accident_detail?id=201270550; OSHA inspection #2272953, Flammable Vapors Ignited by Spark, Employee Burned, available:
http://www.osha.gov/pls/imis/accidentsearch.accident_detail?id=14491245; U.S. Chemical Safety and Hazard Investigation Board, Dust Incident Data File, incident #82, data file available:

Committee Meeting Action: Accept in Principle

See action on Proposal 36-3 (Log #3).

Committee Statement: The action taken on Proposal 36-3 (Log #3) addresses the issues raised in this proposal.
4.11.1 Power and Hand Tools. Maintenance operations involving the use of power and ferrous hand tools that can produce sources of ignition shall be prohibited except as provided for in Sections 6.7 and 6.8.

Substantiation: Ignition Hazard of Mechanical Spark from Ferrous Hand Tools:

- Mechanical sparks include impact sparks and friction sparks. Friction sparks are generated from rubbing or surface contact between ferrous or steel and other materials. Hand tools such as pliers, screwdrivers, wrenches, and sockets are used in a torque application, i.e., tools will make contact in a rubbing action. This occurs when the metal parts of the ferrous tool rub against another hard surface such as metal parts of machinery in extraction and meal processing. Impact sparks, however, are created by a ferrous or steel object being struck or dropped on another hard surface.
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- Non-ferrous tools are used to guard against mechanical sparks.

Studies & data referencing Mechanical Sparks and their Hazards:

- Martin Sheldon reported in his study, Frictional Sparking, that “It is well known that the sharpening of steel tools on a grindstone is accompanied by showers of sparks.” Sheldon went on to say “frictional heating and spark occurs when two solid bodies come into contact with each other, because of microscopic surface irregularities, they do not touch over the whole of their surfaces but only at a relative few spots. At the actual contact spots adhesion occurs between the two bodies and if they are moved relative to each other the work necessary to overcome this adhesion is converted into heat, raising the temperature of the bodies…..As the contact spots are forced apart fragments of the materials may be broken off and projected into the surroundings…These small particles of material have arisen from the areas where work was expended. If these particles are heated sufficiently the glowing particles will appear as frictional sparks.”
- Martin Sheldon reported that steel friction sparks are incandescent particles at temperatures around 2732°F (1500°C).
- NFPA 921, Guide for Fire and Explosion Investigations 2011 Edition, Chapter 5 Basic Fire Science Table 5.7.1.1 Reported Burning and Sparking Temperature of Selected Ignition Sources under Mechanical Sparks lists a Steel tool spark temperature at 2550°F (1400°C).
- Therefore, the temperature of ferrous or steel tool sparks far exceeds the minimum ignition temperature of hexane solvent which means that when the atmosphere is flammable, a ferrous or steel tool spark is capable of igniting solvents.
- A test conducted by W. Bartknecht, Ignition Capability of Hot Surfaces and Mechanically Generated Sparks in Flammable Gas and Dust/Air Mixtures showed that if steel is rubbed against steel for a longer duration, (0.5-2.0 seconds) then friction sparks are generated. At ignition temperature 400°C, the electrical equivalent energy by steel friction sparks range from 10 mJ to 100 mJ.
- Friction from continuous or intermittent contact between ferrous and other materials giving a rubbing action can produce sparks that are capable of igniting hexane solvents in flammable atmospheres.
- Martin Sheldon further stated that “A one kilogram hammer falling one meter onto the ground releases about 10 joules (10000 mJ) of thermal energy”. This far exceeds MIE of hexane or n-Hexane cited above.
- Kinetic energy can be calculated as $E_k = \frac{1}{2}mV^2$, m is the mass in kilograms, V is velocity in meter per second (m/s), $E_k$ is the kinetic energy in joules. Hand tools use is frequently a high velocity application. In Eckhoff’s test study, Initiation of Grain Dust Explosions by Heat Generated during Single Impact between Solid Bodies, he used a range of 10m/s to 25m/s. Based on assumptions of a 3 pound hammer with an impact velocity of 18m/s, calculated kinetic energy is 220 joules (220000 mJ). Another example, a 5 pound hammer with an impact velocity of 14m/s, calculated kinetic energy
**Example of accidents caused by mechanical sparks from ferrous tools:**

- **Impact spark from metal on metal:** OSHA inspection #124728437, employee #1 and a coworker, both maintenance mechanics, were working in a 30 in. by 36 in. manhole at a Space Age Fuel gas station in Gresham, OR. Employee #1 was trying to change a fuel pump, while the coworker watched from outside the manhole. Employee #1 was using an Allen wrench to loosen the bolts on the fuel pump lead when he apparently created a spark that ignited the gas fumes in the manhole, causing an explosion. Employee #1 suffered burns to his face, hands, arms, and legs. He was transported to hospital for treatment.

- **Impact spark from metal on metal:** OSHA inspection #15050487, a piece of tramp metal was accidently dumped into a 100 gallon (water jacket) reactor kettle of methyl methacrylate in the mixing room. Employee #1 used a metal wrench (visegrips) to pry open the cover of a kettle. The wrench handle struck the angle iron support for the agitator motor, producing a spark. Employee #2 noticed the spark, which was immediately followed by a massive “fire ball”. Both employees were engulfed in the fireball. Employee #3 came to the area to assist the other employees. The investigation states that non-sparking tools were not provided for the employees. All three employees received first and second degree burns on their face, arms and abdomen. Employee #2 also received some third degree burns. All three employees were hospitalized.

- **Impact spark from metal on metal:** OSHA inspection #300965795, employee #1 was in the process of cleaning loose material from drill piping with a metal hammer. While striking the pipe with a hammer, an explosion occurred. Employee #1 was killed.

- **Impact spark from a metal hand tool:** OSHA inspection #2272953, two employees were assigned the job of tending a 100 gallon (water jacket) reactor kettle of methyl methacrylate in the mixing room. Employee #1 used a metal wrench (visegrips) to pry open the cover of a kettle. The wrench handle struck the angle iron support for the agitator motor, producing a spark. Employee #2 noticed the spark, which was immediately followed by a massive “fire ball”. Both employees were engulfed in the fireball. Employee #3 came to the area to assist the other employees. The investigation states that non-sparking tools were not provided for the employees. All three employees received first and second degree burns on their face, arms and abdomen. Employee #2 also received some third degree burns. All three employees were hospitalized.

These examples of OSHA documented accidents illustrate that accidents do happen when proper safety measures are not taken against mechanical sparks from ferrous tools as a possible ignition source.

Safe operating practices should include protective tools. As such, mechanical sparks from ferrous tools should not be overlooked as an ignition source in restricted and controlled areas where plant is operating or not purged. Without added text, ferrous tools are likely to be used which can be an ignition source in flammable environments expose employees to an explosion and fire hazard. However, if upon further consideration, the Committee still does not see the need for restricting ferrous tools in flammable environments, we ask the Committee to at least include the proposed text in Annex text to raise the awareness of ignition hazard associated with ferrous tools in flammable environments.

**This is not original material; its reference/source is as follows:**
Revise 4.11.1 to read:

4.11.1* Power and Hand Tools. Maintenance operations involving the use of power and hand tools that can produce sources of ignition shall be prohibited except as provided for in Sections 6.7 and 6.8.

A 4.11.1 Maintenance or cleanup operations require analyses, such as job safety analyses or activity hazard analyses, of the hazards and risk of a given task and the application of appropriate protective measures to prevent or mitigate the hazards and risk. This includes identification and mitigation of ignition risk from multiple sources, including hand tools. Due to the complexity of the numerous operations involving flammable liquids, the Code cannot address all conditions in which spark-resistant tools should be made mandatory, might be advisable, or are unnecessary to help control the ignition risk of the given operation.

Committee Statement: The Technical Committee agrees with the submitter's intent to add hand tools to this provision of the standard, but has deleted the word "ferrous", thus broadening the application to tools made of other materials (e.g., aluminum). Other tools might be capable of causing a problem.

The Technical Committee has added an annex explanation that is based on similar language in Annex A of NFPA 30, Flammable and Combustible Liquids Code, to provide the user with information about determining the need for special tools.

The Technical Committee notes that it cannot agree with all the statements made in the submitter's substantiation, without considerable review and study of the cases cited.
6.4.2 Where fabric filters are used for the collection of dust they shall be located (either) outside of the building (or along an outside wall in a fire resistive room inside the building) (or shall comply with one of the exceptions listed below.)

Exception No. 1:
Dust collectors shall be permitted inside of buildings if located as close as practical to an exterior wall, vented to the outside through straight ducts not exceeding 6 m (20 ft) in length, and designed so that the explosion pressures will not rupture the ductwork or the collector.

Exception No. 2:
Dust collectors shall be permitted to be located inside of buildings if equipped with an explosion suppression system designed according to NFPA 69, Standard on Explosion Prevention Systems.

Exception No. 3:
Centrifugal separators, without bags, used for removing moisture from coolers that handle pelleted, extruded, or flaked grain and feed products shall be permitted inside or outside of buildings without explosion protection.

Exception No. 4:
Bin vent dust collectors directly mounted without a hopper on a tank or bin, whose primary function is to filter air displaced during filling or blending operations and return dust directly to the bin, shall be permitted inside or outside of buildings without explosion protection. Filters that return air to inside of buildings shall be capable of a minimum efficiency of 99.9 percent at 10 microns.

Exception No. 5:
Filters used for classifying food products with air (product purifiers) shall be permitted to be located inside or outside of buildings without explosion protection.

Substantiation: The current NFPA 36 Standard is not aligned with the NFPA 61 Standard. The exceptions added by this proposal are directly from NFPA 61 10.4.3 2008. Since Grain Elevators are located at the same site as Solvent Extraction Plants lack of alignment of NFPA 36 and NFPA 61 causes confusion for installation and protection of dust collection equipment.

Acceptance of this proposal aligns NFPA 36 with NFPA 61 and offer practical options for installation and protection of filter collectors.

Committee Meeting Action: Accept
6.4.2.2 The outside walls of roof of an inside room shall have explosion relief in the ratio of 1 m² of relief area for each 9 m² to 15 m³ of room volume (1 ft² of relief area for each 30 ft³ to 50 ft³).

Substantiation: The current NFPA 36 Standard is not aligned with the NFPA 61 Standard. Inclusion of my proposal to modify 6.4.2 is inclusive of NFPA 61 Exceptions and eliminates the need for this requirement. Since Grain Elevators are located at the same site as Solvent Extraction Plants lack of alignment of NFPA 36 and NFPA 61 causes confusion for installation and protection of dust collection equipment.

Acceptance of this proposal aligns NFPA 36 with NFPA 61 and offers practical options for installation and protection of filter collectors.

Committee Meeting Action: Accept

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6.4.3 (Automatic sprinklers shall be installed within fabric-type dust collector housings.) Equipment requiring explosion prevention shall be protected by containment, suppression, inerting, or explosion venting.

6.4.3.1 Suppression, containment, or inerting systems shall be designed according to NFPA 69, Standard on Explosion Prevention Systems.

6.4.3.2 Venting shall be directed to a safe, outside location away from platforms, means of egress, or other potentially occupied areas or directed through a listed flame arresting and particulate retention device.

Substantiation: The current NFPA 36 Standard is not aligned with the NFPA 61 Standard. My proposal to modify 6.4.3 which is inclusive of NFPA 61 protection requirements found in NFPA 61 6.3 2008. Since Grain Elevators are located at the same site as Solvent Extraction Plants lack of alignment of NFPA 36 and NFPA 61 causes confusion for installation and protection of dust collection equipment.

Acceptance of this proposal aligns NFPA 36 with NFPA 61 and offers practical options for installation and protection of filter collectors.

Committee Meeting Action: Accept in Principle

Revise 6.4.3 to read:

Automatic sprinklers shall be installed within fabric-type dust collector housings: Filter media-type dust collectors shall be protected with an automatic sprinkler system and, if a dust explosion hazard exists within the enclosure, shall be protected by containment, suppression, inerting, or explosion venting.

6.4.3.1 Suppression, containment, or inerting systems shall be designed according to NFPA 69, Standard on Explosion Prevention Systems.

6.4.3.2 Venting shall be directed to a safe, outside location away from platforms, means of egress, or other potentially occupied areas or directed through a listed flame arresting and particulate retention device.

Committee Statement: While the Technical Committee agrees with the submitter's intent, sprinklers are required in filter media-type dust collectors because of the presence of potentially ignitable solvent vapors. The Technical Committee has also broadened the scope of this provision because paper filter media is used in some canister filters and these are subject to the same fire hazard as fabric media.
7.7.6 Zone 1 Locations. Electrical wiring and electrical utilization equipment of the extraction process shall be installed in accordance with the requirements for Zone 1 locations as specified by NFPA 70, National Electrical Code. The Zone 1 location shall extend outward from the extraction process and into the restricted area for a horizontal distance of not less than 4.5 m (15 ft) and a vertical distance of not less than 1.5 m (5 ft) above the highest vent, vessel, or equipment containing solvent, as shown in Figure 7.7.2.

***Insert Figure 7.7.2 Here***

7.7.7 Electrical wiring and electrical utilization equipment within the restricted area beyond the 4.5 m (15 ft) distance specified in 7.7.2 and to a height of 2.4 m (8 ft) above the extraction process grade level shall be installed in accordance with the requirements of Zone 1 locations, as specified in NFPA 70, National Electrical Code, and as shown in Figure 7.7.2.

7.7.8 Electrical wiring and electrical utilization equipment within the controlled area and to within a height of 1.2 m (4 ft) above grade level shall be installed in accordance with the requirements of Zone 1 locations, as shown in 7.7.2.

7.7.9 Permanent luminaires (lighting fixtures) shall be installed where needed.

7.7.10 Flashlights approved for Zone 1, Group IIA locations shall be provided.

7.9.6 Power transmission belts shall not be used in any area that is classified as a Zone 1 or Zone 2 location as shown in Figure 7.7.2.

7.9.7 Process vent fans, purge fans, and building ventilation fans that might handle solvent vapors, including any fans that have air intakes located in Zone 1 or Zone 2 locations, as shown in Figure 7.7.2, shall be of AMCA Type B spark-resistant construction or better.

Substantiation: 1. This would align NFPA 36 with last couple of NFPA 70 updates which include Zone ratings for hazardous areas.

2. This standard is used internationally by US based corporations and many of those countries do not use the Class and Division format typically used in the US. Therefore, in order to compliment the other countries' use of the Zone system, an alternate method of area classification is offered to harmonize international systems. This is intended to be in addition to the Class and Division systems, NOT a replacement.

Committee Meeting Action: Accept in Principle

Revise 7.7.1, 7.7.2, and 7.7.3 as follows:
1. Replacing "Class I, Division 1" with "Class I, Division 1 or Zone 1, whichever is applicable" 
2. Replacing "Class I, Division 2" with "Class I, Division 2 or Zone 2, whichever is applicable"

3. In Figure 7.7.1, replace the existing legend with the following:
I-CD-1: Class I, Division 1, Group C or D; or Zone 1, Group IIA
I-CD-1: Class I, Division 2, Group C or D; or Zone 2, Group IIA

Also, add a new 7.7.1.1 to read:
In instances of areas within the same facility classified separately, Zone 2 locations shall be permitted to abut, but not overlap, Class I, Division 2 locations. Zone 1 locations shall not abut Class I, Division 1 or Division 2 locations.

Committee Statement: The Technical Committee agrees with the submitter's intent to provide guidance where the Zone system of electrical area classification is used and has implemented the proposal in a cleaner fashion. The Technical Committee has also added a new Paragraph 7.7.1.1 to provide the user with pertinent information based on NFPA 70, National Electrical Code.
ZONE-1: ZONE 1, GROUP IIA
ZONE-2: ZONE 1, GROUP IIA

FIGURE 7.7.2 TYPE AND EXTENT OF HAZARDOUS AREAS

NFPA 36 Log #1
ROP F2012