



Property Risk Consulting Guidelines

A Publication of AXA XL Risk Consulting

PRC.9.2.3.3

DIPPING AND COATING PROCESSES USING FLAMMABLE OR COMBUSTIBLE LIQUIDS

INTRODUCTION

National Fire Protection Association (NFPA) documents describe a level of fire protection agreed on by persons representing a variety of interests. The guidance in these documents does not reflect unique conditions or special considerations, such as system performance under adverse conditions. Nor does NFPA guidance reflect the increased system reliability that AXA XL Risk Consulting recommends for high valued properties.

This AXA XL Risk Consulting Guideline takes a position on provisions of NFPA 34 that AXA XL Risk Consulting believes require clarification or changes. To understand the position, this AXA XL Risk Consulting Guideline must be read with a copy of NFPA 34. The provisions of the NFPA document are not repeated.

POSITION

The most common use NFPA 34 is for paint dipping or flow coating operations, but it also applies to dipping and coating with other materials, such as adhesives, cleaners, coatings, inks, lubricants and sealants. It also applies for printing operations that utilize dipping or coating processes.

General

The requirements of this standard apply for these materials if their formulation includes flammable or combustible liquids or if their application produces combustible deposits or residues.

This standard recommends protection appropriate for “average” dipping and coating operations. Large batch coating operations or continuous coating operations which are vital to production may require a sprinkler design with a higher density, an automatic deluge system in addition to an automatic wet pipe sprinkler system, an additional special extinguishing system or a combination of these fire protection systems.

Separate dipping and coating processes from all other operations, including drying areas with a minimum 2 h fire wall. Protect all openings with a 1½ h automatic fire door or shutter. Higher fire rated fire wall may be necessary depending on the quantity of flammable or combustible liquids or criticality of adjacent equipment or occupancy.

Drying areas require adequate ventilation that meets the requirements of NFPA 34 and NFPA 86, if applicable.

Do not use aluminum for panel frames due to the low melting point and probable early failure in a fire situation. Do not use heat-treated glass for light panels or observation panels since they can shatter.

The other types of glass listed have a less catastrophic failure mode. Design the structural integrity of the frame and method of securing the panel in the frame so they do not fail before the vision panel.

AXA XL Risk Consulting does not recommend using plastic ducts. Follow the guidance in PRC.2.3.2 if these ducts are used.

Fire Extinguishing Systems

Provide an automatic fire protection system for dipping and coating operations covering all parts of the operation and its ventilation system, including:

- The dipping or coating process (for example: tanks, enclosures, drying areas, enclosures, and drain boards)
- Inside the ventilation system exhaust ductwork and recirculation ductwork.
- Over all areas containing pumps and piping for the dipping or coating process.

Sprinkler System

Provide an automatic sprinkler systems density for a density of 0.35 gpm/ft² (14.3 lpm/m²) for 4000 ft² (372 m²) remote area.

Provide sprinkler protection in exhaust ducts and stacks at a design of 20 gpm (76 L/min) over 100 linear ft (30.5 linear meter) of ductwork. For open head deluge systems, calculate the flow from all of the sprinklers that are controlled by the deluge valve.

Carbon Dioxide, Dry Chemical, And Clean Agent Systems

Special extinguishing systems should be installed with a connected reserve, and should be capable of manual operation. At a minimum, an unconnected supply of extinguishing agent should be maintained at the facility.

Electrical

Both intrinsically safe and nonincendive equipment should be listed by a nationally recognized testing laboratory. Information about nonincendive electrical equipment is contained in UL 1604. Information about intrinsically safe electrical equipment is contained in UL/ANSI 913. Intrinsically safe equipment and systems are listed in the UL *Online Certification Directory* under category OERX. Equipment suitable for connection to intrinsically safe systems is listed under category NRAW.

Intrinsically safe equipment and associated wiring are incapable of igniting hazardous vapors in their most easily ignited concentration under either of the following conditions:

- At 1.5 times the energy of the worst single electrical fault.
- With the most unfavorable combination of two electrical faults.

Nonincendive equipment and associated wiring is incapable of igniting hazardous vapors in their most easily ignited concentration with the worst single electrical fault.

Flammable Liquids Handling

Transfer liquids through piping systems with either compressed inert gases or positive displacement pumps. Do not use centrifugal pumps because of the possibility of siphoning. Do not use gravity dispensing systems because a piping leak upstream of dispensing valves, including dead man valves, could empty the storage tank. Also, follow the requirements in NFPA 30 and PRC.8.1.0.

Properly designed and installed bonding connectors and grounding connectors are crucial fire prevention systems.

Do not use plastic buckets or other non-metallic containers for dispensing flammable liquids. These containers do not properly ground to dissipate static electricity. There is a history of fire occurrence where non-metallic containers were used for flammable liquids transfer.

Store cleaning solvents in a separate room complying with NFPA 30 and PRC.8.1.0. Do not permit solvents in the dipping or coating area except during cleaning operations. Take the following precautions when cleaning with solvents:

- Leave all extinguishing systems in service.
- Keep the ventilation system running.
- Remove all combustible materials from the area.
- Shut down all power to the operation except for ventilation equipment.
- Remove or disable all other potential sources of ignition.
- Confirm acceptable housekeeping.
- Prohibit smoking.
- Make sure all solvents and rags are removed from the area before restoring normal operations.
- Inspect the area upon completion of cleaning operations.

Electrostatic Detearing Apparatus

Carefully design and install the high voltage grid of electrostatic detearing apparatus. Set up a program to, kept it cleaned and well maintained. It is very important that the exhaust ventilation system is functional and working properly. Management programs for process hazards evaluation, preventive maintenance and housekeeping must specifically address this equipment.

Management Programs

Maintenance

Establish and follow preventive maintenance programs covering the following areas:

- Replacement of ventilation system filters
- Cleanliness and condition of fan blades
- Condition and tightness of pumps
- Insulation resistance and infrared testing of fan and pump motors
- Vibration monitoring of bearings and shafts
- Condition and tightness of valves
- Condition of hoses and tightness of connections to piping
- Resistance to ground of all parts of electrostatic systems
- Condition of classified electrical equipment
- Operability of controls, interlocks and alarms
- Condition of protective systems

Empty waste containers at least once per shift. Waste containers should be covered and safely arranged. If interim waste storage is necessary onsite, the storage area should be located as far from the process as possible.

Use a lockout/tagout system for conducting maintenance. This system should ensure that all operations remain shut down until the work is completed and the area restored to normal. Keep records of all maintenance activities.

Hot Work

Conduct a thorough review of the process hazard to see if alternative methods can be used instead of using hot work. After the review, if it is concluded that hot work is necessary, thoroughly clean the dip tank and associated equipment/areas prior to authorization of this work.

Training

Operator training is only one of many important management programs for loss prevention and control. In addition to the training elements described in this chapter, follow all the applicable sections of *OVERVIEW*. Pay particular attention to the following areas, as described throughout this AXA XL Risk Consulting Guideline:

- Hazardous Material Analysis
- Process Hazards Evaluation
- Loss Prevention Inspection
- Preventive Maintenance
- Housekeeping

DISCUSSION

Static electricity is an ignition source when transferring flammable liquids, but the hazard is often not recognized or understood by the operator. This also applies to metallic containers.

Hot work in these hazardous areas is strongly discouraged, and should be considered the method of last resort. There is a long history of serious fire incidents caused by hot work in dipping and coating operations. In most cases, it is possible to utilize less hazardous methods for the repairs and installations in dipping and coating areas. Examples include saws, bolt cutters, tube cutters, screws and bolts.