



## FOCUS ARTICLE

# Developing a Process Safety Hazard Checklist

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A hazard is traditionally defined as a condition, event, or circumstances that could lead to or contribute to an unplanned or undesirable event which in turn could result in injury or property damage or loss of life both for your company and/or the community, or damage to the environment. Hazards are inherent in materials, equipment and activities. Hazards can be of an occupational or process safety nature. Typically, occupational safety hazards could lead to slips, trips, and falls or employees being injured by tools or machinery or exposure to noise, heat or electrical shock hazards. **Process safety hazards** are hazards that are inherent to materials, equipment or technology of a process that – if not controlled or contained – can cause or lead to a catastrophic event causing damage to people, property and/or the environment. OSHA has a process safety management standard (29 CFR Part 1910.119) that contains requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. Industrial plants that contain flammable gases or liquids on-site in one location in quantity of 10,000 pounds or more with certain exceptions, and chemicals appearing in Appendix A of the standard in excess of a listed threshold quantity are required to comply with the standard. This standard contains 14 different management elements that include employee participation, process safety and hazard information,

hazard identification and assessment, training, hot work permitting, emergency planning and response, incident investigations and management of change.

A key component of any **process safety management (PSM) program** is the development of a checklist that can be used by management or other individuals responsible for safety and health in the industrial setting. This checklist can serve as a useful tool to identify areas where process safety hazards may exist. The checklist includes boxes for answers to questions with regard to whether or not the hazard exists and, in cases where these hazards are identified; recommendations are offered in terms of follow-up measures that can be undertaken to mitigate the hazards identified. Use of a checklist is an important part of any PSM program, even in instances where formal adherence to the OSHA standard is not required.

The checklist can serve several purposes including raising of awareness in terms of what a process safety hazard is, increasing the employees' ability to recognize and differentiate between process hazards, providing employees with the tools which can be used to address process safety concerns, and providing a mechanism for maintaining the safety and health of personnel, property and business.

## Why Should You Develop a Process Safety Checklist

As process safety specialists, we often hear statements such as, “But these things don’t impact us”, “We don’t have those chemicals here”, “That might happen at other places, but not here” and “We have never had an incident like that”. Experience has shown that this mindset can lead to trouble, and a culture that embodies this mentality can lend itself to experiencing incidents that ultimately could result in injuries or loss of life and significant property damage. Ultimately, the incidents could have been prevented by having a PSM program in place. Development of the checklist is a good starting point in developing a sound PSM program.

## Development of a Process Safety Hazard Checklist

Development of a Process Safety Hazard Checklist

1. Identification of the hazards within the facility
2. Assessment of the hazards
3. Managing the risk to a tolerable level

The checklist should be customized to address the process safety hazards that have been identified in your facility. The checklist should be divided into sections, each section identifying a particular area where a process safety hazard may exist. For example, a typical process safety audit checklist includes at least four important areas:

1. **Flammable gases, vapors, liquids** and combustible dusts
2. Toxic and/or corrosive materials
3. Equipment operating under pressure or vacuum
4. Reactive chemicals

In each section, there should be questions that enable the user to determine whether or not a particular process safety hazard exists. The question should be phrased in such a manner that a “yes” answer means that the hazard does not exist and results in a recommendation that “no further action is needed for this question”. A reference column can be inserted in instances where a particular code, standard, or requirement exists regarding the process safety hazard. A “Response” column should include three check boxes to indicate either a “yes”, “no”, or a “N/A” (not applicable) answer to the question. The final column would be a “Recommendations” column where a follow-up “action item” is provided to manage the risk. An example of a portion of a typical checklist is shown below.

## Example Checklist Structure

Question	Reference Y,N,N/A	Response	Descriptions
4.0 Process Equipment			
Is equipment maintained and operated in a manner that minimizes the escape of dust? Example-leaking augers, bins, enclosed conveyor belts.	(NFPA 654 - 7.1.1)	Yes - No further actions needed for this question.	No - Controls need to be put in place to comply. For example, gaskets replaced, covers replaced or re-machined, leaks fixed, etc.
Are dust collectors that have dirty side volumes of 8 ft.3 or more protected against explosion?	(NFPA 654 - 7.13)	Yes - No further actions needed for this question	No - Solicit the services of a competent contractor to design and install a suitable dust collection system.
Where dust collectors are located inside the building and deflagration (explosion) vents are used to protect them, are the vents ducted outside the building to a safe location?	(NFPA 68 - 6.8)	Yes - No further actions needed for this question.	No - Venting of a dust collector inside the building is not permitted by the Standard. Solicit the services of a competent contractor to re-design a suitable explosion protection system.

## Reference

OSHA Safety Regulation. 29 CFR Part 1910.119 Process safety management of highly hazardous chemicals, US Superintendent of Documents, Washington D. C. 20402-0001

## Summary

A key component in any successful process safety management (PSM) program is self-auditing to identify gaps in “recognized and generally-accepted good engineering practices”, such as the OSHA PSM standard. A useful tool for self-auditing is a checklist that can be used by management or other individuals responsible for safety

and health. This checklist can serve to initiate follow-up actions in areas where either administrative or engineering controls are not in place to manage the risks.

We have a team of highly skilled process safety professionals that provide independent consulting advice and assistance in the development and implementation of PSM plans, including the training and auditing requirements associated with these programs. We have worked with many clients in regard to these issues and can assist you in PSM related areas. In addition, we have extensive experience in the management of flammable gases and vapors and combustible dust fire and **explosion hazards**. Operating at an acceptable level of risk requires understanding of the specific hazards involved with these materials.

## DEKRA Process Safety

The breadth and depth of expertise in process safety makes us globally recognized specialists and trusted advisors. We help our clients to understand and evaluate their risks, and work together to develop pragmatic solutions. Our value-adding and practical approach integrates specialist process safety management, engineering and testing. We seek to educate and grow client competence to provide sustainable performance improvement. Partnering with our clients we combine technical expertise with a passion for life preservation, harm reduction and asset protection. As a part of the world's leading expert organization DEKRA, we are the global partner for a safe world.

### Process Safety Management (PSM) Programs

- > Design and creation of relevant PSM programs
- > Support the implementation, monitoring, and sustainability of PSM programs
- > Audit existing PSM programs, comparing with best practices around the world
- > Correct and improve deficient programs

### Process Safety Information/Data (Laboratory Testing)

- > Flammability/combustibility properties of dusts, gases, vapors, mists, and hybrid atmospheres
- > Chemical reaction hazards and chemical process optimization (reaction and adiabatic calorimetry RC1, ARC, VSP, Dewar)
- > Thermal instability (DSC, DTA, and powder specific tests)
- > Energetic materials, explosives, propellants, pyrotechnics to DOT, UN, etc. protocols
- > Regulatory testing: REACH, UN, CLP, ADR, OSHA, DOT
- > Electrostatic testing for powders, liquids, process equipment, liners, shoes, FIBCs

### Specialist Consulting (Technical/Engineering)

- > Dust, gas, and vapor flash fire and explosion hazards
- > Electrostatic hazards, problems, and applications
- > Reactive chemical, self-heating, and thermal instability hazards
- > Hazardous area classification
- > Mechanical equipment ignition risk assessment
- > Transport & classification of dangerous goods

We have offices throughout North America, Europe, and Asia.

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