# Process safety management fundamentals

A six-step approach to address process safety management

worldsteel ASSOCIATION

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Definitions and calculations related to this publication are available in the Safety and health section of worldsteel.org.

Photos: NLMK Belgium (cover), Nucor, and Tenaris



## Introduction

Process safety management (PSM) is a blend of engineering, operations and management skills focused on preventing catastrophic accidents, particularly structural collapse, explosions, fires and toxic releases associated with loss of containment of energy or dangerous substances such as toxic gases, molten metal, chemicals and petroleum products.

The manufacturing of steel involves processes with intrinsic hazards that need careful management. The measures needed to control these hazards are often complex. The focus of process safety management is not limited to protecting the people within the company but also includes the environment, assets and surrounding community.

Our PSM fundamentals encourage steelmakers to take a risk-based, rather than compliance-based strategy to the prevention of PSM incidents and focus resources on high-risk activities.

## Six safety and health principles for the steel industry

1. All injuries and work-related illness can and must be prevented.
2. Management is responsible and accountable for safety and health performance.
3. Worker engagement and training is essential.
4. Working safely is a condition of employment.
5. Excellence in safety and health drives excellent business results.
6. Safety and health must be integrated into all business management practices.

## Four focus areas

**Safety culture and leadership**

**Occupational safety management**

**Occupational health management**

**Process safety management**

## Six process safety management fundamentals

01
Ensure there is a commitment to process safety management.

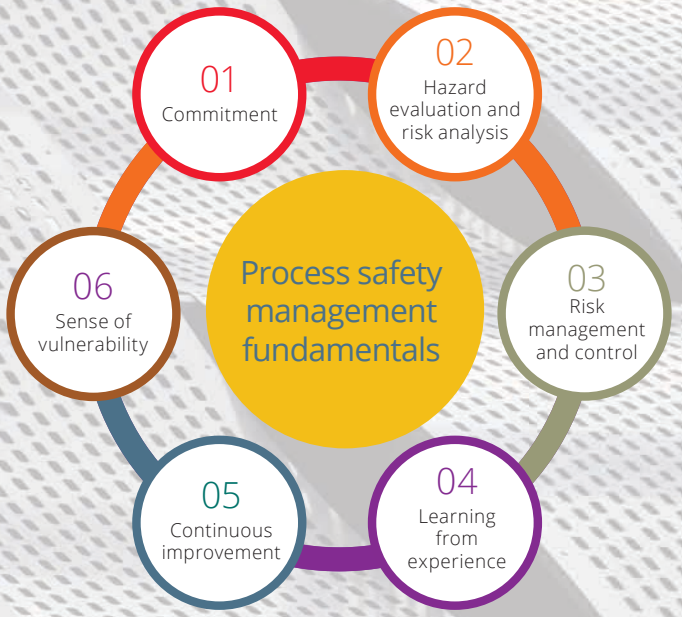
02
Establish a hazard evaluation and risk analysis programme

03
Implement and maintain a risk management and control system.

04
Strive to excellence in learning from experience.

05
Maintain a sense of vulnerability in process safety management.

06
Ensure medical and psychological support is available.








## 01 Ensure there is a commitment to process safety management.

The commitment to process safety management is the foundation of process safety excellence and requires five elements:

1. Process safety culture in the workplace
2. Workforce involvement and participation
3. Stakeholder involvement
4. Workforce competencies
5. Performance based on standards

Is Process Safety Management a core value in your organisation?

## 02 Establish a hazard evaluation and risk analysis programme.

The understanding of process safety hazards and risks helps organisations to allocate resources effectively. This process comprises two elements:

1. Process and equipment knowledge
2. Hazard identification and risk analysis

Do you understand your hazards and risks?



## 03 Implement and maintain a process safety risk management and control system.

Risk management and control helps organisations to operate and maintain processes with excellence, ensuring risk mitigation, management of change and keeping the risk tolerable. It also ensures that the workplace is prepared in the event of an emergency. This process requires six elements:

1. Good operational practices
2. Asset integrity and reliability
3. Management of contractors
4. Training and performance
5. Management of change
6. Emergency preparedness

Do you manage your risks to keep them on a tolerable level?

Do you have emergency plans in all your units?

## 04 Strive to excellence in learning from experience.

The learning from experience programme must maintain vigilance, utilise internal and external sources of information, take action and ensure effectiveness. This process comprises two elements:

1. Incident investigations
2. Measures and metrics

Are you monitoring and acting on internal and external sources of information?

## 05 Utilise continuous improvement to ensure process safety management effectiveness.

Routinely reviewing the Process Safety Management system to stimulate continuous improvement will ensure effectiveness in the fundamentals of Process Safety Management. This process comprises two elements:

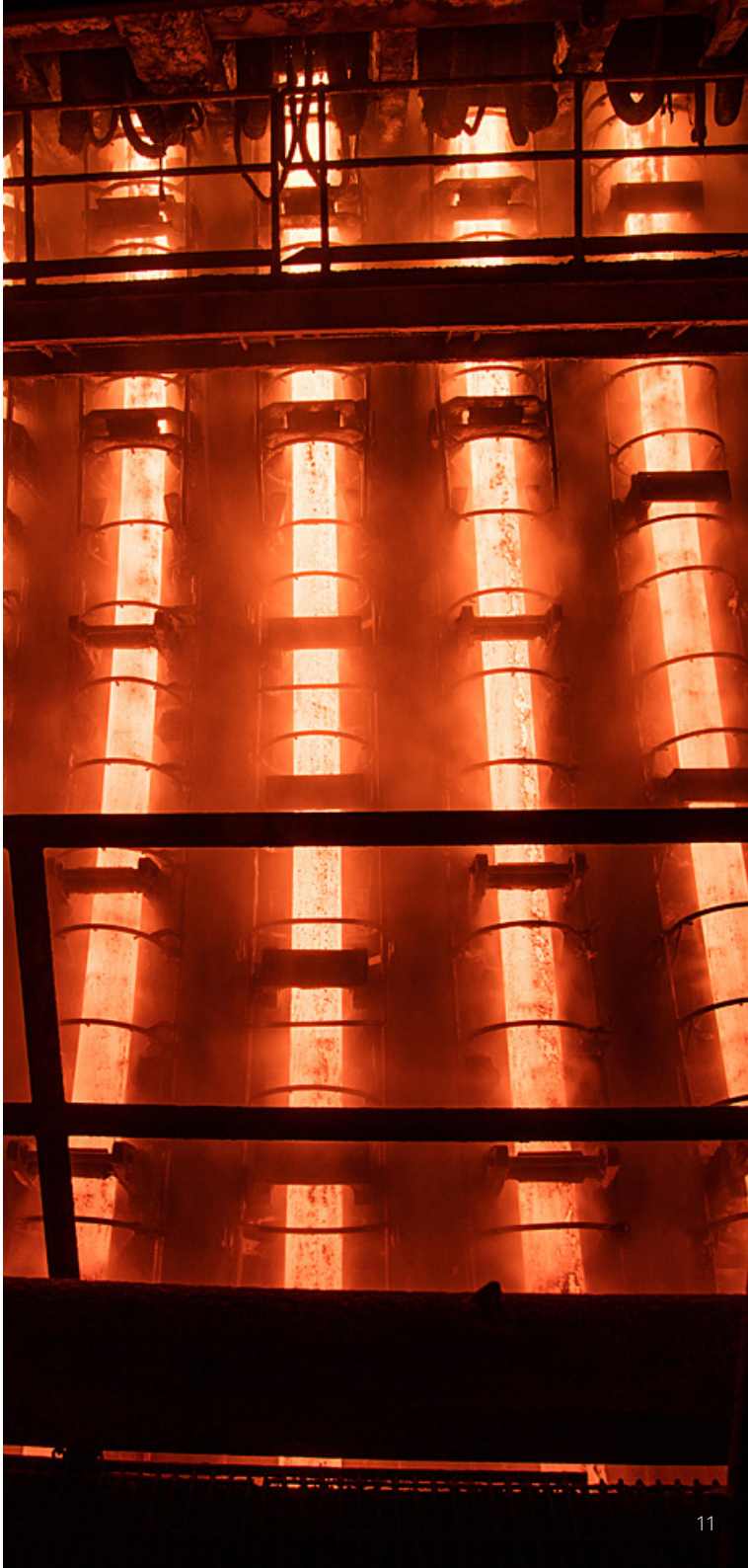
1. Auditing
2. Management review and governance

> Are you performing reviews and auditing your process safety management system?

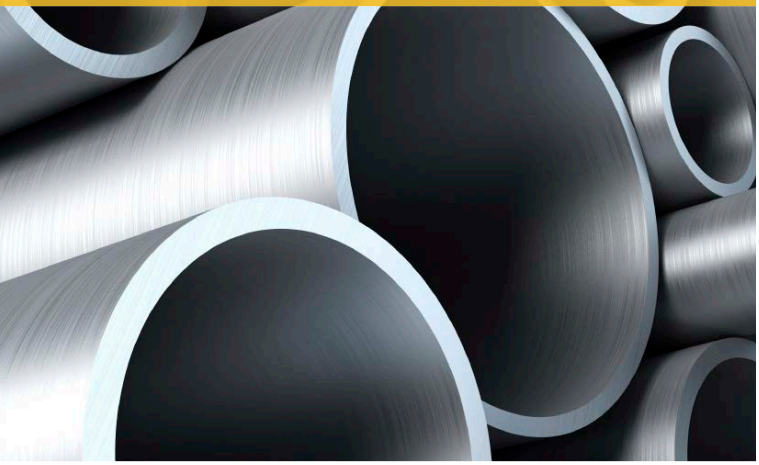
## 06 Maintain a sense of vulnerability in process safety management.

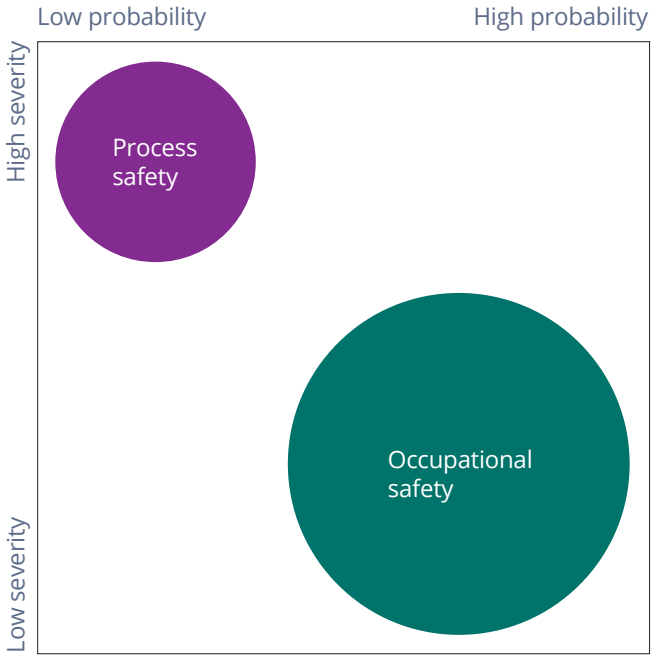
Developing a sense of vulnerability drives organisations to seek and maintain a clear understanding of risk and the means to control it.

> Are you promoting the sense of vulnerability in your organisation?



# Tier framework for process safety









**Tier 1**
Is a loss of primary containment (LOPC) with the greatest consequences, e.g. fires and explosions causing lost time injuries, one or multiple fatalities or significant financial impact (greater than organisational tolerance levels) or serious environmental impact or harm to the community or substantial reputation impact.




**Tier 2**
LOPC with the lesser consequences, e.g. fires and explosions causing a recordable injury or financial impact (within organisational tolerance levels) or environmental impact or low harm to the community or reputation impact.




**Tier 3**
Typically represents a challenge to the barrier system and near misses, e.g. deviations in safety operational limits, potential LOPC.




**Tier 4**
Typically represents performance of individual components of the barrier system and are comprised of operating discipline and management system performance (e.g. KPI of PSM).

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