



isrs⁷ PSM

for the health of your business



MANAGING RISK

isrs⁷ PSM: improving process safety, environmental and business performance

To meet the increasing expectations of multiple stakeholders, you need to continually improve and demonstrate the health of your business. isrs⁷ PSM is a system to help you manage major accident risks, achieve operational efficiency, provide assurance of management control and create confidence among stakeholders.

Built on isrs⁷: a world leading system

isrs⁷ is a world leading system for measuring, improving and demonstrating safety, environmental and business performance. isrs⁷ helps you manage your risks. It assures and improves the health of your business processes, provides management with advanced decision support and builds reputation. It also drives business results and helps you establish competitive advantage.

isrs⁷ has been developed as a Joint Industry Project between DNV and partners from the Nuclear, Chemical and Petrochemicals industries worldwide. It is based on the long established International Safety Rating System (ISRS), which over 30 years has been used by thousands of sites across the world.

isrs⁷ PSM: additional focus

In developing the Process Safety Management (PSM) version of isrs⁷, DNV has refocused the tool to consider the specific controls needed for managing process related events. This was based upon the currently evolving best practice and incorporates learning's from a range of authoritative sources.

isrs⁷ PSM includes the requirements and learnings from:

- OSHA 1910.119 – Process Safety Management
- Seveso II Directive – 96/82/EC
- MES 2 – Metatechnical Evaluation System

- Baker and CSB Reports into Texas City
- CPL 03-00-004 – Petroleum Refinery Process Safety Management National Emphasis Program
- UK Offshore Safety Case Regulations
- ISO 9001:2000 - Quality Management
- ISO 14001:2004 - Environmental Management
- OHSAS 18001:1999 - Health and Safety Management
- PAS 55:2004 - Asset Management
- Global Reporting Initiative 2002 - Corporate Social Responsibility

Benefits

DNV's isrs⁷ PSM helps you achieve:

- systematic and effective control of process risks
- advanced management decision support
- improved process safety, environmental and business performance
- the ability to meet and exceed regulatory requirements
- optimised work processes using industry best practice
- quantified goal setting
- internal and external benchmarking
- evaluation of the condition of plant and equipment
- improved behaviour and commitment of personnel
- continual improvement through a single integrated management system.



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isrs⁷ PSM brings these attributes into a process industry setting by focusing on the key performance areas required to safely operate a successful business in the major hazards industry. The existing isrs⁷ questions remain intact and are enhanced by additional PSM specific questions and guidance.

A structured approach

PSM Omega Processes

isrs⁷ PSM adopts a structure based on 15 processes, embedded in a continual improvement loop which is common to leading integrated management systems. The PSM Omega processes are designed to manage risk and drive continuous improvement.

Strategy	1. Leadership
Plan	2. Planning and Administration
	3. Risk Evaluation
	4. Human Resources
	5. Compliance Assurance
Implement	6. Project Management
	7. Training and Competence
	8. Communication and Promotion
	9. Risk Control
	10. Asset Management
	11. Contractor Management and Purchasing
Monitor	12. Emergency Preparedness
	13. Learning from Events
	14. Risk Monitoring
Review	15. Results and Review

PSM Omega Assessment

The effective implementation of PSM depends on the implementation of a robust management system. The PSM Omega Assessment is a comprehensive evaluation of your management processes against best practice.

It involves a thorough assessment of all 15 processes and typically takes one to two weeks depending on the size of the site. The assessment includes interviews with management process owners where questions are answered and scored. Detailed verification is conducted and organisations must be prepared to offer evidence to support their answers.

The Physical Conditions Assessment

A key feature of the PSM Omega Assessment is the Physical Conditions Assessment which assesses the effectiveness of your PSM system in the workplace. The Physical Conditions Assessment looks in detail at the technical condition and operability of risk control equipment on site. It assesses the awareness and understanding of front line managers and workforce with regard to risk control barriers and PSM. Regulatory compliance can also be reviewed through the Physical Conditions Assessment.

Scoring and Results

The results from interviews, document checks, and the Physical Conditions Assessment are combined to determine an overall level of PSM Omega performance between one and ten. The results provide you with a detailed measure of performance and a gap analysis against your desired level of performance. This becomes the planning basis for improvement during the next period.

The following section provides a brief overview of the isrs⁷ PSM Management processes.

isrs⁷ PSM Management Processes

1. Leadership

Good leadership is essential for the effective operation of any organisation. Good leadership begins with defining the organisation's expectations (purpose, vision, values, goals and policies), aligning these with the expectations of other stakeholders and developing a strategy for achieving these expectations. Leaders are responsible for defining the core business of the organisation and identifying the major business risks. Leaders must also demonstrate commitment to improvement through practical leadership by "walking the talk". This is particularly emphasised in terms of the focus on PSM within the leadership, and the encouragement of a suitable PSM culture within the organisation.

The Leadership process tests the business purpose, vision, values, goals and policies of your organisation. It examines strategy and the actions of executives to demonstrate their commitment to PSM. It reviews stakeholder engagement, and the clarity and communication of accountabilities and business processes. It also highlights business risks and improvement opportunities. The PSM version includes additional activities related to Process Safety Leadership and Process Safety Culture.

2. Planning and Administration

Effective planning and follow-up ensures that business goals are achieved on time to the desired quality and on budget. Strategic plans and shorter term business plans detail the individual responsibilities and resources to deliver leadership expectations. Efficient documentation and record systems help ensure excellent business processes and capture organisational knowledge.

The Planning process tests business planning, work planning and the effectiveness of action tracking. It also tests the robustness of the management system documentation and the effectiveness of the record management system.

3. Risk Evaluation

The first duty of managers is to effectively manage risk. Risk management begins with the identification and evaluation of health, safety, environmental and process safety related risks. Employees must have a good awareness of risk at all times. A team approach to process and task risk evaluation will drive a strong risk culture in the organisation.

The Risk Evaluation process reviews the identification process for health, safety and environmental hazards. It focuses on the application of effective Process Hazard Analysis techniques supported by well maintained Process Safety Information to inform decision making and resource allocation. It also reviews the system to identify and evaluate customer expectations as well as the identification and control of management system exposures.

4. Human Resources

People and the knowledge they possess are the most important assets in many organisations. Good Human Resource systems ensure these assets are managed effectively from recruitment through to leaving the organisation. Systems for recognition, discipline and regular performance reviews guide the development of individuals. Organisational change is a constant in the modern workplace which should be controlled with an effective change management process.

The Human Resources process tests the robustness of the HR system including recruitment, individual performance, recognition and discipline. It also considers how organisational change is managed.

5. Compliance Assurance

Society expects ever higher standards of health, safety and environmental performance, which is reflected in a growing body of regulations that must be complied with. Every organisation needs a system to identify relevant regulations, codes and standards, and assess their impact on the business. Societal expectations also demand high standards of stewardship throughout the product lifecycle from design to disposal.

The Compliance Assurance process tests the identification and use of regulations, external authorisations to operate, codes and standards. It reviews the reporting system to authorities as well as the system to ensure compliance with chosen requirements. It also reviews the robustness of the product stewardship systems.

6. Project Management

Projects are unique activities with a beginning and an end. Their unique character introduces risks into the workplace and requires careful planning to ensure risks are controlled and that projects are completed on time, on budget and to the desired quality. Formal accountabilities should be defined for each project. Project plans define the goals, responsibilities, resources and risks throughout the project lifecycle. Effective execution and control ensures changes are managed, work is completed correctly and stakeholder expectations are met. Post project review ensures lessons are learned for future projects.

The Project Management process reviews the project co-ordination system to ensure projects are aligned to business needs. It tests the robustness of project planning, project execution, project control and close out, and looks at how Process Safety is built into plant, equipment and systems through the application of suitable studies and Process Safety Project Reviews.

7. Training and Competence

Personnel must have the necessary competence to execute their jobs effectively. An effective training system is important in order to identify and deliver the training necessary to ensure individual competence.

Training should only be performed to fill an identified need, based on an analysis of existing competence, role requirements, training objectives and employee aspirations. Training should be delivered by competent instructors using appropriate communication techniques and resources. Effective orientation/inductions are important for leaders and employees to ensure they are not at risk when they start in a new position and understand their part in the effective control of processes.

The Training and Competency process reviews the system used for training including identification of training needs, instructor management and training delivery. It reviews the orientation and induction process for leaders and general personnel as well as for specific jobs; and considers the evaluation of training systems to foster continual improvement. The PSM version specifically addresses Process Safety Knowledge and Competence

8. Communication and Promotion

Good communication is essential for effective management of change. In an ever changing workplace, effective communication is critical both to inform and motivate personnel. Good communication is more than telling – it should be an interactive process of “giving and getting understanding”. Promotion campaigns and varied communication channels should be used to promote performance improvement in a fresh and interesting way. Management and group meetings should be focused on key risk issues and co-ordinated to ensure important information is filtered up and cascaded down effectively. Exceptional group and individual performance should be identified and widely communicated to reinforce correct behaviours.

The Communication and Promotion process tests the effectiveness of the communication system, the co-ordination of management, operational and maintenance meetings. It examines the quality of group meetings, the Joint Committee/Council and Promotion Campaigns. The system of coaching is tested, as is the method of recognition for individuals and teams.



isrs⁷ has been developed as a Joint Industry Project between DNV and partners from the Nuclear, Chemical and Petrochemicals industries worldwide. The PSM version builds on this to create a best practice standard for the management of process safety.

9. Risk Control

Once health, safety, security, environmental and process related risks have been identified, a hierarchy of controls should be in place to manage those risks. Engineering/design controls are the first choice to eliminate risks where possible. Administrative controls including procedures, rules, work permits and warning signs are the next choice to mitigate risk. Personal and environmental protective equipment are the last line of defence. Materials and products should be effectively identified, labelled, stored and inspected to ensure quality is controlled. Controls should be in place to ensure processes perform within critical parameters.

The Risk Control process evaluates the controls for identified hazards. It assesses the effectiveness of demonstrating the control of process related hazards to stakeholders through the use of Major Hazard Reports. It tests the systems for identification and traceability of products and the preservation of materials, including the control of non conforming product and final inspection/delivery. It ensures that the creation, use and review of operating practices and procedures is done robustly. It also assesses the effective control of hazardous work and the development, deployment and review of rules, work permit and provision of personal protective equipment.

10. Asset Management

Asset Management is the maintenance of physical assets in the workplace to ensure acceptably low risk for optimum operability and cost. The maintenance programme describes the integrity management (maintenance, inspection and testing) regime for each asset in the asset register. Maintenance and operations personnel must co-ordinate activities to plan and execute the programme. Inspections of appropriate areas ensure the general condition of assets is maintained. An effective engineering change management process is essential to ensure risks are managed when new assets are introduced. Risk assessments must also be conducted when assets are acquired or sold or their use is changed.

The Asset Management process assesses the comprehensiveness of the asset register and the quality of the description of the control of each asset. It tests the effectiveness of maintenance planning and scheduling as well as the systems to control, review and improve the execution of maintenance within the Asset Integrity Programme. It verifies the effective use of collected data to identify deterioration and revise integrity management programmes accordingly. This includes the management of defects and investigation of failures. It also tests the quality of systems for planned conditions, special equipment and pre-use inspections. This process also reviews the comprehensiveness, quality and application of the engineering change management system and the system for inspection, measurement and

testing of equipment. In addition, this process considers how risk assessments are applied to acquisition, change of use and sale of assets.

11. Contractor Management and Purchasing

In their drive for efficiency, organisations are increasingly making use of contractors, outsourcing and temporary employees. A major challenge associated with this trend is how to ensure contractors comply with the organisation's safety and environmental standards when contractor personnel are managed by others. Effective contractor management requires a rigorous selection process, clear definition of responsibilities, competence checks, adequate supervision and careful monitoring of performance. Excellent communication is required to ensure effective co-ordination with company personnel and processes. Effective purchasing and supply chain management are required to ensure materials and equipment are sourced on time, of the desired quality and at the optimum cost.

The Contractor Management and Purchasing process tests the pre-qualification, tendering and acceptance system for different contractor types. It tests the robustness of operational control of contractors, the frequency and quality of the meetings between client and contractor, the training of contractor employees as well as their performance. It reviews the purchasing system and the control of the supply chain. It also considers the management of risks around planning and execution of logistics systems.

12. Emergency Preparedness

Managing risk means that occasionally some hazards may be realised. Effective emergency preparedness means planning and practising in advance so that, in the event of an emergency, the harm to people, the environment and to the business is minimised. Firstly, potential emergencies should be identified and categorised. Plans should then be developed to respond to these emergencies. Systems for emergency communication should be established and technical systems, for example, for fire protection and emergency power, should be put in place. Emergency teams of experienced personnel should be established to execute the emergency plans and their competence should be assured through regular drills and exercises. Finally, adequate first aid and medical support should be available if required.

The Emergency Preparedness process reviews the comprehensiveness and categorisation of credible emergency scenarios including those with very high consequences. It tests the quality of the site and off-site emergency plans as well as crisis and business continuity plans. It reviews the robustness of the emergency communication system, the protection systems and shutdown controls. Furthermore, it establishes the robustness of the emergency teams and the effective use of drills and exercises, and reviews the first aid, medical support and mutual aid systems.



isrs' PSM placed additional emphasis on:

- Process Safety Information
- Management of Change
- Asset Integrity Management
- Process Hazard Analysis
- Process Safety in Design
- Operating Procedures
- Pre-start-up Safety Reviews
- Managing Proprietary Technology

13. Learning from Events

Learning from events is critical to drive continual improvement in process safety, environmental and business performance. An effective Learning from Events system transforms undesired events into improvement opportunities. Managers should strive to create a “no blame” culture in the organisation to foster high levels of event reporting. Personnel should be particularly encouraged to report near misses, which offer the greatest number of learning opportunities. All events should be risk assessed and investigated appropriately involving both managers and front line personnel. Investigations must uncover the basic causes of events before determining the necessary corrective and preventative actions. Actions must be tracked to completion and the results communicated to all necessary stakeholders.

The Learning from Events process reviews the reporting of events, investigation, allocation of corrective actions and follow up. Reported events may include safety events, environmental lapses through to breaches of security. It tests the system to learn from success and to ensure adequate participation in investigations. It establishes that there is a robust near miss/substandard conditions system in place, that complaints are managed adequately and that events are communicated effectively. It tests the robustness of the action follow-up system and considers away from work accidents. Furthermore, it tests the analysis of accident data and the use of problem solving teams.

14. Risk Monitoring

Risk monitoring is essential to provide assurance to managers and other stakeholders that all risks are effectively controlled. Risk Monitoring builds on Risk Evaluation (Process 3) and Risk Control (Process 9) to complete the risk management continual improvement loop. Effective monitoring should identify where risk controls are inadequate, and initiate the necessary improvement actions. Employee perception surveys are often useful to monitor the perceptions of key stakeholders. Behavioural observation is important to reinforce desired safety, environmental and quality behaviours in the workforce.

Task observation is important to reinforce compliance with procedures and improve the quality of those procedures. Audits are the last line of defence to check that all necessary systems are in place and working.

The Risk Monitoring process reviews the performance and robustness of the hazard monitoring systems including the control arrangements in place. It tests the effectiveness and the use of perception surveys. Also, it considers the use of behavioural observation and task observation and reviews the use of system audits to assure that the management system meets its goals.

15. Results and Review

To survive and prosper, a business must achieve good results. Business results are measured simply by comparing actual performance against the safety, environmental and business goals set by the leadership team (Process 1). The challenge for business leaders is to direct business and work processes both to manage exposures and achieve good business results. Leaders should also understand the residual levels of risk that remain. Sustained or continually improving performance can be demonstrated by preparing trends of business results. Performance benchmarking may be undertaken by those organisations who wish to compare themselves with industry leaders or world class performance. The management system is the leadership team’s primary tool to manage risks and drive improvement. Formal management reviews are necessary to evaluate the performance of the management system, identify improvement actions and feedback into the strategy and planning process. Corporate Social Responsibility demands that businesses demonstrate good safety, environmental and business performance to all relevant stakeholders (identified in Process 1).

The Results and Review process considers the performance of the organisation versus its goals. It establishes the robustness of the management review system, the annual reporting process and the use of economic and environmental indicators. It considers the use of social performance indicators concerning labour practices, human rights and societal and product responsibility. It also tests the effectiveness of reporting to stakeholders.

Physical Conditions Assessment - Conditions Assessment

Industry specific checklists support the assessment of the condition of the process system on site. This is based on an inspection of a sample of key plant and equipment supported by review of documentation and records related to integrity management. Typical areas covered are:

- Pipe, Flanges and Vessels
- Small Bore Fittings (<2") & Conduit
- Control and Isolation Valves
- Relief and Depressurising Systems
- Culverts, Bunding & Drainage
- Monitoring & Control Systems
- Rotating Equipment
- Tanks & Materials Storage
- Emergency Response Facilities and Provisions
- Electrical controls

Physical Conditions Assessment - Workplace Verification Questions

These questions assess the understanding of front-line management and personnel of process safety related issues. They cover:

- Perception of Hazards – What potential exposures exist and how are they manifested?
- Understanding of Controls – What do we do to manage the hazards?
- Management of Controls – How do we make sure the controls are working properly?

Within these three areas are questions related to the management of changes, bypasses and overrides, contractors, coordination between functions and data analysis.



isrs⁷ PSM offers you a flexible approach to improve process safety, environmental and business performance.

DNV is a global provider of services for managing risk. Established in 1864, DNV is an independent foundation with the objective of safeguarding life, property and the environment. DNV comprises 300 offices in 100 countries, with 7,000 employees.

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