INAIL

INSPECTIONS ANC CONTROLS IN SEVESO AND IED ESTABLISHMENTS: POSSIBLE INTEGRATIONS FOR SIMPLIFICATION PURPOSES

Exchanges of multilateral experience Italy/Europe

Roma, March 20th - 2026

Inspections, control and maintenance activities of critical technical elements of environmental relevance based on operational experience

Annalisa Pirone
Maria Rosaria Vallerotonda

Contents

- INAIL: Organization and role in Seveso context
- Framework: Safety Management System (MAH)
- Operational Control - Critical technical systems
- Maintenance, inspection and control activities
- Conclusions

Inail: Organization

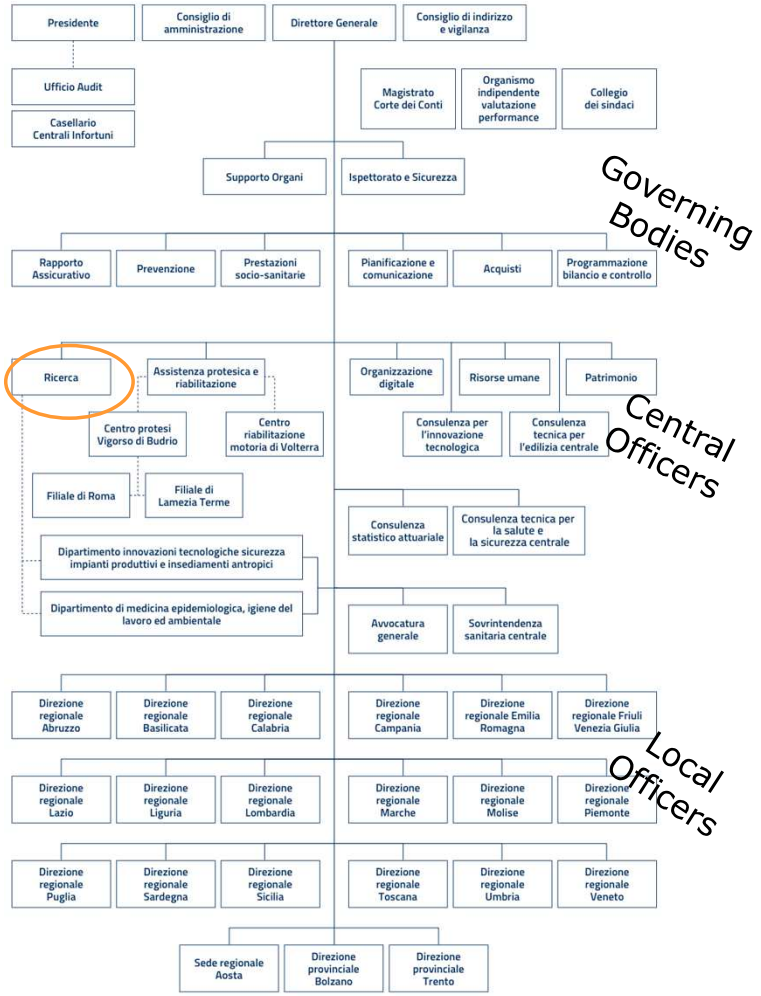
Inail is a public non-profit entity safeguarding workers against physical injuries and occupational diseases.

Its objectives are:

- reducing injuries
- protecting workers performing hazardous jobs
- facilitating the return to work of people injured at workplace

Directorate of Research → Department of technological innovations and safety of plants, products and anthropic settlements (Dit)

In relation to the technological evolution of the safety work systems, it promotes and carries out study, research and experimentation activities aimed at the development and validation of best practices, methods, risk management and assessment procedures in the field of safety of workers' living and working environments
It is composed of 10 laboratories and 6 technical-scientific sections.



Organizational structure (www.inail.it)

Inail – Dit Lab. V

Dit - Laboratory
SAFETY AND ENVIRONMENTAL PROTECTION OF PROCESS PLANTS

Areas of application and expertise – Research activities

- Lifecycle safety in the process industry (risk analysis, consequence assessment, protection from malicious acts, resilience engineering, safety culture, maintenance);
- Major accident prevention (risk analysis, safety management systems, plant aging, post-accident investigations, near misses, territorial compatibility);
- National coordination and monitoring of inspections for the Institute's internal activities;
- Process plant safety (safety devices, compliance with sizing and materials, considering damage mechanisms, inspection outcomes, etc.);
- Environmental protection is linked to the implementation of new plant technologies and the treatment of hazardous substances, and analysis for the safe assessment and management of natural events and NaTech risks in plants.

Inail & Seveso Directive

Inail is one of the Technical Bodies for the ministries responsible for implementing Legislative Decree 105/2015

- Coordination for uniform application throughout the country (Article 11);
- Inspection commissions to review the compliance of the Safety Management System for the Prevention of Major Accidents and the implementation of the Major Accident Prevention Policy (Article 27);
- Regional technical committees (Article 10, paragraph 1, letter h), established within each Region by the Ministry of the Interior;
- Working groups, established within the CTRs, to conduct the investigation of Safety Reports prepared by the operators of upper-tier establishments (Article 17);
- Inspection commissions in the event of a major accident (Article 26).

130 technicians of:

- **Department of innovation technology**
- **36 Territorial Operational Unit of Certification, Verification and Research**

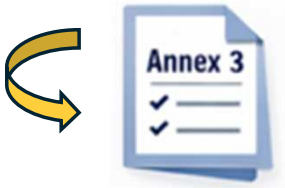
Reference framework

Safety Management System - Major Accident Hazard

European Directive 2012/18/EU
on the control of major-accident hazards involving dangerous substances

D.lgs. June 26th 2015, n. 105
Attuazione della direttiva 2012/18/UE relativa al controllo del pericolo di incidenti rilevanti connessi con sostanze pericolose.

Information referred to **in Article 8(5) and Article 10** on the safety management system and the organization of the establishment with a view to the prevention of major accidents



… Article 14 (5) and Article 15 (2), ….

Major accident prevention policy	The MAPP shall be *implemented by appropriate means, structures and by a safety management system,* in accordance with Annex III, proportionate to the major-accident hazards, and the complexity of the organization or the activities of the establishment (…) *Art. 8(5)*
Safety report	Member States shall require the operator of an upper-tier establishment to produce a safety report for the purposes: a) demonstrating that a MAPP and a safety management system for implementing it have been put into effect in accordance with the information set out in Annex III; (…) *Art. 10*

Reference Framework

SMS – MAH: Italian criteria, procedures and tools

Guidelines for the implementation of a safety management system for the prevention of major accidents

Art. 14(5), 15(2) d.lgs. 105/2015

- Major-accident prevention policy
- General requirements and SMS structure,
- Technical contents of SMS (key elements – Annex 3)
- Information, training and equipment for personnel working in the plant activities

Criteria for planning, scheduling and conducting inspections

APPENDIX 2 - PART II - Criteria, procedures, and support tools for conducting inspections

Section 2 - Analysis of Operational Experience

Section 3 - Feedback on the Elements of the SMS

Section 4 - Planned Examination of Technical Systems

APPENDIX 3 – Inspection check-list

Reference Framework

SMS – MAH: Italian legislative format

Eventi incidentali: analisi dei fattori gestionali e tecnici

Azienda .....

Rif. n.	Data	Titolo .....

Descrizione tecnica sintetica dell'evento **(con particolare riferimento alle cause tecniche e gestionali)**

Rottura di una guarnizione su corpo flangiato. Attivato il PEI per forte odore di ammoniaca in reparto

Sistemi tecnici critici (2)***: Corpi flangiati della linea ammoniaca-guarnizioni***

Fattore gestionale (3)	Descrizione	Azioni intraprese	Azioni previste / programmate
Es. 3.iii: adeguamenti impiantistici per la riduzione dei rischi	*Rottura di una guarnizione su corpo flangiato-materiale non idoneo*	*Attivazione PEI* *Intercettata la perdita* *Sostituzione della guarnizione* *Inserita protezione paraspruzzi*	*Controllo/verifica delle guarnizioni sulle linee dei corrosivi. Avviato programma di sostituzione delle guarnizioni presenti sulle linee degli ammoniacali con altre di materiale idoneo (PTFE)*

Incidents: Analysis of management and technical factors (Section 2)

Eventi incidentali ipotizzati nel Rapporto di Sicurezza (*)	**Misure adottate**			
	per prevenire l'evento ipotizzato		per mitigare l'evento ipotizzato	per seguire l'evoluzione dell'evento ipotizzato
	Sistemi tecnici	Sistemi organizzativi e gestionali	Mezzi di intervento dedicati in caso di emergenza	Sistemi finalizzati alla raccolta di elementi / dati utili per la ricostruzione dell'evento(**)
Es:Rottura manichetta travaso				

Table of incidents - measures adopted (Section 4)

Lista di riscontro 3.a

LISTA DI RISCONTRO PER LE ISPEZIONI DEL SGS-PIR

	A cura del gestore		A cura del verificatore ispettivo
	Rif. Docum. SGS-PIR	NOTE	Riscontro[1]
1. Documento sulla politica di prevenzione, struttura del SGS-PIR e sua integrazione con la gestione aziendale			
i Definizione della Politica di prevenzione - Verificare che sia stato redatto il Documento di Politica di prevenzione e che sia stato diffuso in azienda come documento di stabilimento, o integrazione delle politiche emesse a livello più alto dell'organizzazione aziendale. - Verificare che nella sua definizione e nel riesame del Documento sia stato consultato il Rappresentante dei Lavoratori per la Sicurezza (RLS).			
ii Verifica della struttura del SGS-PIR adottato e integrazione con la gestione aziendale - Verificare che il SGS-PIR adottato, preveda come componenti della sua struttura complessiva: ▪ la definizione della politica; ▪ l'organizzazione tecnica e delle risorse umane; ▪ la pianificazione delle attività; ▪ la misura delle prestazioni; ▪ la verifica e il riesame delle prestazioni.			

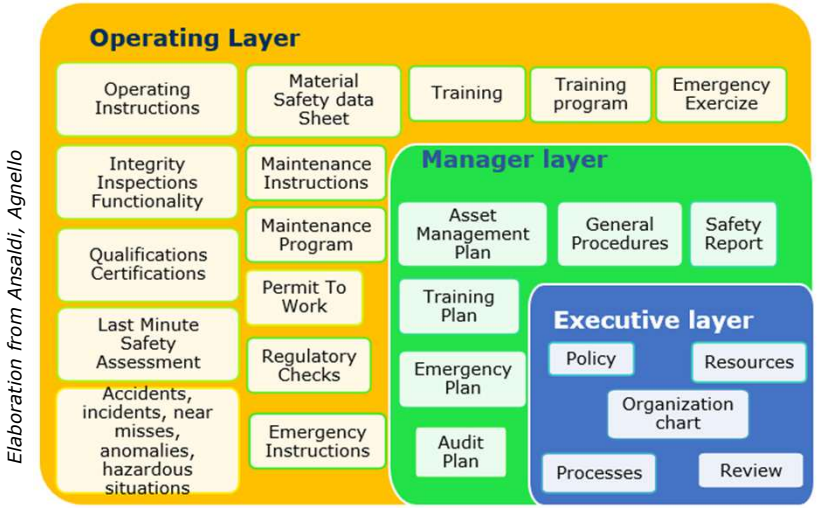
[1] Si tengano presenti le seguenti definizioni:
riscontro: descrizione delle verifiche specifiche effettuate in merito;
rilievo: constatazione di fatti rilevati durante il riscontro supportata da evidenze oggettive;
non-conformità:
- non conformità maggiore: rientrano in questa definizione le evidenze di sostanziali mancanze del rispetto di requisiti di legge, di norme tecniche prese a riferimento per il Sistema di Gestione della Sicurezza, di standard aziendali (ad esempio, mancato o non completo rispetto delle disposizioni contenute nell'allegato B del decreto di recepimento della Direttiva 2012/18/UE, mancato coinvolgimento degli RLS nella definizione del Documento di Politica, mancata consultazione del personale che lavora nello stabilimento, compreso il personale di imprese subappaltatrici a lungo termine nella stesura del Piano di Emergenza Interna, ecc.....). Possono divenire, a giudizio della commissione, non conformità maggiori tutte le non conformità minori che si perpetuano nel tempo (ad esempio la mancata attuazione delle raccomandazioni formulate al gestore nel corso di precedenti ispezioni). Le carenze così evidenziate devono essere comunicate al gestore al momento della loro rilevazione.
- non conformità minore: rientrano in questa definizione le evidenze di aspetti formali non adeguatamente soddisfatti (ad esempio, requisito di una norma adottata volontariamente non completamente soddisfatto per mancanza di adeguata documentazione a supporto, elemento del sistema di gestione adottato ma mancante di una adeguata componente documentale a supporto, ecc.)

SMS - MAH inspection checklists (Section 3)

Operational control

European Annex III & Italian Annex 3

AI elaboration of authors



Elaboration from Ansaldi, Agnello

- "adoption and implementation of procedures and instructions **for safe operation,** including **maintenance**, of plant, processes and equipment, and for **alarm management and temporary stoppages**; taking into account available information on **best practices** for monitoring and control, with a view to reducing the risk of system failure; **management and control of the risks associated with ageing equipment installed in the establishment and corrosion**; inventory of the establishment's equipment, strategy and methodology for monitoring and control of the **condition of the equipment**; appropriate follow-up actions and any necessary countermeasures"

Operational control

Italian Annex B

Procedures and instructions

Prepare, adopt, and update **procedures and instructions to control processes and plant activities affecting safety**. These must cover documentation management, operating and maintenance procedures, inspections, procurement, and pre-commissioning checks.

3.4.1

3.4.2

Documentation management

It should enable the sharing, updating, and preservation of **information essential for understanding processes, systems, operations, and maintenance**. It must address system changes, operational experience, regulatory requirements for document retention, and support performance monitoring and management review

3.4.3

Operating procedures

OP must cover **normal, abnormal, and emergency plant operations**, considering human factors to ensure effective operator, process, and plant interaction. Procedures should be updated throughout the plant lifecycle from pre-commissioning to decommissioning

3.4.4

Maintenance, inspection, and testing criteria and procedures

They must ensure **reliability and availability of each safety-relevant part of the plant**, as required by assessment assumptions. Plans **must include monitoring and control of risks related to of equipment and plants, with corrective and preventive actions.** All activities must be properly authorized and documented, using specific work and access permit systems.

3.4.5

Approval equipment, materials and service

It must carry out using **criteria and procedures that ensure compliance with legal requirements** and consistency with risk assessments, including through the performance of pre-commissioning checks.

Technical Systems
Overview

Primary containment and storage equipment

- *Storage tanks and pressure vessels*
- *Piping systems and pipelines*
- *Loading/unloading areas*
- *Process vessels and reactors*

Secondary and tertiary containment (mitigation)

- *Bunds/drainage systems and catchment basins/sorbent materials*

Control and safety instrumented systems

- *Emergency shutdown systems (ESD)*
- *Process monitoring equipment: (sensors)*
- *Alarm systems*
- *Pressure relief devices: valves*

Fire protection and extinguishment management

- *Firefighting water retention systems*
- *Fire detection and fire suppression systems*

Utility infrastructure

- *Electrical power and air systems*
- *Mutual utilities: interconnecting utilities in industrial parks that, if failed, could cause domino effects*

Management of aging and integrity

- *Corrosion protection systems: cathodic protection systems and coating systems*
- *Ageing equipment management: specific inspections and procedures for older equipment to manage increased risk of failure*

Critical technical systems
Seveso Definition

Equipment, tanks, components and control, protection and safety devices **involved in accident scenarios** that may occur in the plant **or derived from the analysis of operational experience**
(Legislative Decree 105/15 - Annex H, paragraph 1, letter i)

PRIMARY CONTAINMENT SYSTEMS

Static systems

Tanks, reactors, exchangers, agitators, columns (distillation, scrubbers, etc.), piping and related safety devices.

Rotating systems

Pumps
Compressors

PROTECTIVE DEVICES

Safety accessories

Valves
Rupture discs
Pressure switches
Thermostats
Level switches

Control devices

Pressure gauges, thermometers, level indicators, pressure sensors, temperature transmitters

Alarms, accessories for controlling pressure, temperature or other parameters

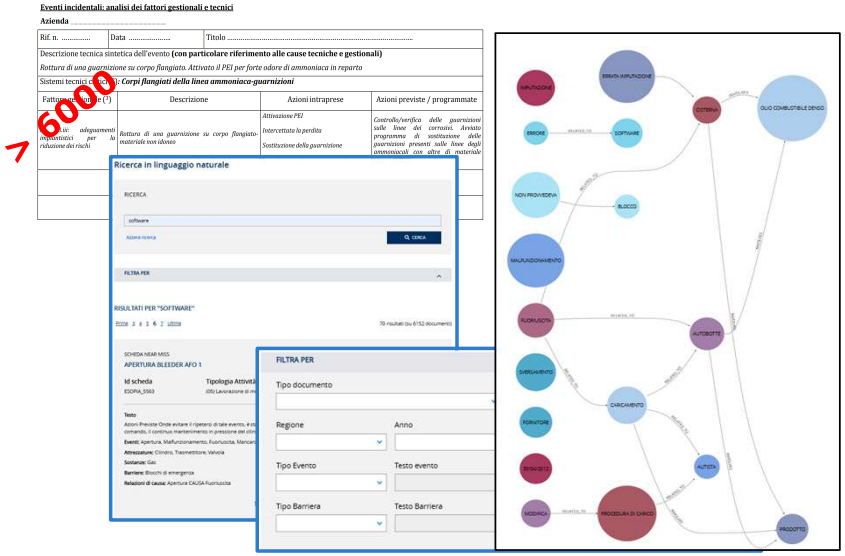
Operational experience

Tanks and Pipelines in research's activities

EsOpIA

Operational Experiences and Artificial Intelligence

A cognitive research platform consisting of a document repository for collecting industrial plant safety documentation (OE) and an entity-relationship ontological model that uses AI algorithms to extract information from documents.



https://www.inail.it/app/rcqi-fe/

902 2464

Pipelines

Deterioration	Failure	Loss
Corrosion (102)	Damage (56)	Leak (314)
Wear (29)	Break (198)	Release (316)
Thinning (72)	Drilling (70)	Spill/spreading (134,33)

Tanks

Deterioration	Failure	Loss
Corrosion (81)	Damage (138)	Leak (596)
Wear (79)	Collapse (70)	Release (241)
Thinning (43)	Drilling (67)	Spill/spreading (342,98)
Obstruction (25)	Increase P, T (41,43)	Drawing (122)

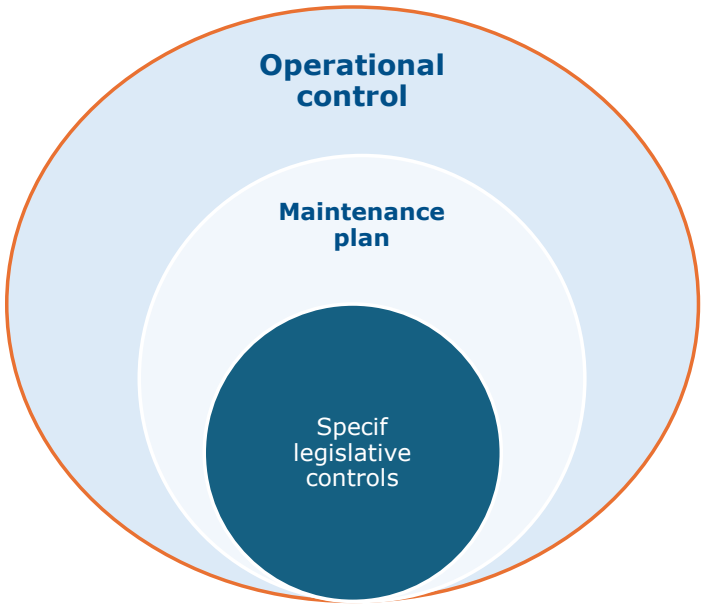
Maintenance, inspection and control activities

Operational control

SMS - MAH inspection checklists

Critical equipment aging management

Critical technical systems



Maintenance plan

- Directive 97/23/EC (PED) for design and manufacture of pressure equipment and assemblies
- M.D. 329/04
- D.ve Decree 81/08 and M.D. 11 April 11th 2011
- Standards UNI/CTI – Structural integrity

Operational control

Inspections checklist

Identification of systems and equipment subject to audit plans

Rif. 3.4.1 Annex B

- criteria adopted **to identify critical elements** according the hazard assessment and the plant and its application
- inclusion of critical elements in **periodic maintenance, inspection, and control programs**, considering their reliability, as assumed in the risk assessment, or their lifetime or failure rates, based on operating experience and the results of previous inspections
- **consistency with the assumptions made in the Safety Report** (for upper-tier plants) **or other relevant documentation** (for lower-tier plants) and the frequency of inspections and maintenance
- a plan to monitor and control the **risks associated with the aging** of equipment and systems
- developed programs are based on clearly identified and updated **technical specifications and standards**
- **tests for the safety systems** in place to prevent and/or mitigate accident scenarios
- critical components and systems for which periodic inspection **is required by law are identified as such and included in the inspection program**
- timing, methods, and scope of inspections correspond to those established in the programs

Operational control

Inspections checklist

Maintenance, inspection and testing criteria and procedures

Rif. 3.4.4 Annex B

What to check?

- maintenance operations are governed by the **principles and objectives** defined in the SGS-PIR
- **criteria** for determining the maintenance regimes adopted (preventive, predictive, remedial, other)
- operations are carried out based on a specific **schedule**, based on timely and statistical assessments of previous activity
- **safety function** is involved in the maintenance and periodicity of checks on critical components
- **procedures and responsibilities** for establishing, correctly compiling, updating, and maintaining maintenance records for systems, equipment, appliances, and other items are defined and implemented
- verify that maintenance is subject to **work permit systems**.

Critical equipment aging management

The operator **must ensure the correct application of the technical measures for risk reduction** while maintaining their effectiveness over time through:

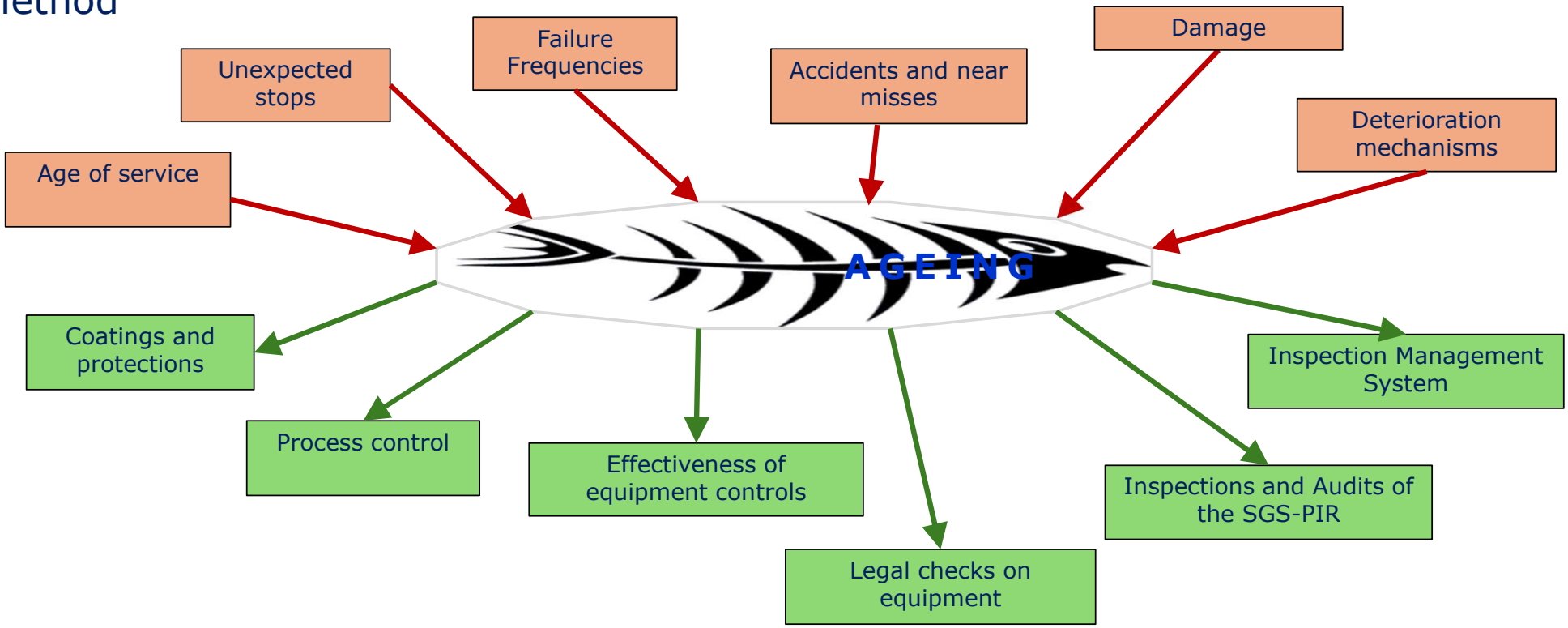
a **maintenance, inspection and control plan** (combination of several intervention policies) subject to the identification:

- the degree of criticality of the condition of the equipment
- predictability of the failure

a plan for monitoring and controlling the risks related to aging (corrosion, erosion, fatigue, viscous flow) of equipment and systems that can lead to the loss of containment of hazardous substances

Guidelines for a synthetic assessment of the adequacy of the equipment aging management program in Seveso plants

Aging guidelines
Method



Accelerating factors (*A*) ⇨ **Penalties**

Slowing factors (*F*) ⇨ **Offsets**

FINAL OVERALL INDEX
I = A – F – C*

***C corrective factor**

Periodic checks of critical equipment

Pressure equipment and systems

Product Directive 2014/68/EC
(L.ve Decree no. 26/2016)

Product Directive
97/23/EC

Social Directive 89/391/EEC

L.ve Decree 93/2000

L.ve Decree 81/2008 Art. 71

Art. 19 L.ve D. 93/2000 - **Provisions for putting into service and use of P.E. and assemblies**

.. In particular, the pressure equipment and assemblies for which the **verification of the first or new system is mandatory are identified** and requirements are adopted regarding **installation, commissioning, maintenance, repair**, as well as the procedures of:

a) declaration of commissioning;
b) commissioning control;
c) periodic retraining;
d) check after repair.

MD 329/2004

MD 04/11/2011

Periodic checks on Annex VII equipment of D.ve D. 81/08.

The procedures for carrying out the periodic checks referred to in Annex VII are defined as well as the criteria for the authorization of public or private entities.

New rules for the operation and use of pressure equipment and assemblies

Maintenance, inspection and periodic control activities

Obligations of the employer/operator

Classify all pressure equipment and assemblies according to the PED directive

Record which pressure equipment and assemblies fall under the Ministerial Decree 329/04 regime

Make the declaration of commissioning

Identify the check regime (commissioning and/or periodic) to which the equipment or assemblies must be subjected

Identify the inspection regime (commissioning and/or periodic) to which the equipment must report the pipes and containers for liquids built before 12/05/2002. Request the commissioning inspection at the same time

Subject the work equipment to the checks indicated in the use and maintenance manual

Subject the equipment to the periodic checks required by Ministerial Decree 329/04 or by Legislative Decree 81/08 and subsequent amendments

All pressure equipment and assemblies are registered in the INAIL-CIVA Portal (Certification and Verification of Equipment and Systems) and assigned an INAIL registration number.

Directive PED - Pressure Equipment Directive

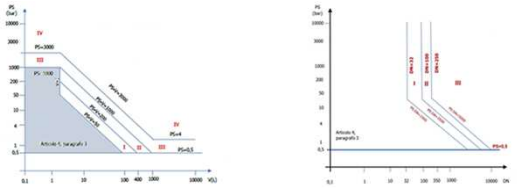
Typology

- Pressure equipment (vessels, pipes, pressure accessories, safety accessories)
- Pressure assemblies (various pressure equipment assembled by a manufacturer to form an integrated and functional whole)

which have a maximum allowable pressure PS greater than 0.5 bar

Classification

- Fluid group (hazardous or non-hazardous fluid) and physical state (gas, liquid)
- Risk category (I, II, III, IV) determined by the type of fluid stored according to specific tables



PS x V for vessels and PS x DN for pipes

Documentation

- CE marking
- CE Declaration of Conformity
- Use and maintenance manual

MD 329/04

Provisions for putting into service and use of P.E. and assemblies referred to in Article 19 L.ve D. 93/2000

Mandatory initial installation or commissioning inspection (articles 4-6)

- This involves verifying their **correct installation on the system**. At the end of the **inspection**, the person in charge of the inspection provides the company with a **certificate of the results of the checks** performed. If the inspection is negative, the document expressly prohibits the commissioning of the pressure equipment. For the sole purpose of the initial inspection, temporary commissioning of the equipment or assembly is permitted.
- **Commissioning declaration**.

Periodic checks or periodic requalification (articles 8-10)

They are **designed to verify compliance with the installation methods specified by the manufacturer in the instructions for use, the state of maintenance and conservation, the maintenance of the safety conditions** originally intended by the manufacturer, and the efficiency of the safety and control devices.
They include:
- functional checks (every 2 to 5 years);
- integrity checks (every ten years).

Repair and modification checks (art. 14)

Repair consists of replacing part of a pressure equipment or repairing it, with or without welding, without changing the original design, while **modification** consists of a technical intervention that changes the original characteristics, purpose and type, or simply the type, after it has been put into service.

Inail carries out the commissioning and the initial inspection, while Arpa or ASL or the authorized public or private bodies carry out the subsequent inspections.

L.ve Decree 81/08 and subsequent amendments
Work equipment

Title III: Use of work equipment and personal protective equipment	**Chapter I**: Use of work equipment	**Annex V**: Safety requirements for work equipment built in the absence of laws and regulations transposing the community product directives or made available to workers before the date of their issue
		Annex VI: Provisions concerning the use of work equipment
	Chapter II: Use of personal protective equipment	**Annex VII**: Equipment inspections
		Annex VIII: General information on special protections

Work equipment: any machine, apparatus, tool or plant (a set of machines), equipment and components necessary for the implementation of a production process to be used during work (art. 69 of Legislative Decree 81/08 and subsequent amendments)

They can be critical Seveso elements

Work equipment – Employer Duties

Article 71 of L.ve Decree 81/08

- ***Paragraph 4*** → the work equipment must: be installed and used in accordance with the instructions for use, be subject to suitable maintenance ensuring that safety requirements are met; be subject to measures to update the minimum-security requirements; be accompanied by an updated audit log.
- ***Paragraph 8*** → the work equipment must be subjected to the necessary **controls** to maintain the good state of conservation and efficiency of the work equipment over time.
- ***Paragraph 11*** → the employer shall subject the work equipment listed in ANNEX VII to **periodic checks** aimed at assessing its actual state of conservation and efficiency for safety purposes, with the frequency indicated in the same ANNEX.

M.D. April 11th2011

Functional checks during periodic checks

Integrity checks during periodic checks

It regulates the **procedures for carrying out the periodic checks** to which the work equipment referred to in Annex VII of Legislative Decree no. 81/2008 is subjected, as well as **the criteria for the qualification of public or private entities** and identifies the conditions under which INAIL and the ASL can make use of the support of public or private entities, pursuant to Article 71, paragraph 12, of Legislative Decree no. 81/2008, for the performance of the periodic checks referred to in Article 71, paragraph 11.

Controls by employers

INITIAL CHECK

after installation and before commissioning to ensure correct installation and proper operation

PERIODIC CHECKS

according to frequencies established based on the **indications** provided by the **manufacturers**, rules of good technique or good practice

EXTRAORDINARY CHECKS

in order to ensure that good safety conditions are maintained, whenever **exceptional events** such as repairs, transformations, accidents, natural phenomena or prolonged periods of inactivity occur

- bottom and double bottom
- inner and outer wall of mantle ferrules
- floating roof drain pipe joints
- extraction valve and introduction valve
- support feet for floating roof tanks
- sheet thickness
- valves (tank inlet/outlet, bottom drainage, gunwale, shell, drain drainage of floating roof)
- grounding connections
- containment basins

(Rif. API STANDARD 653 "Tank Inspection, repair, alteration, and reconstruction" or EEMUA n. 159 "Users guide to the inspection, maintenance and repair of aboveground vertical cylindrical steel storage tanks")

Functional checks

They consist of:

- **the ascertainment** of the **compliance** of the **conditions of actual use with** the provisions of the **declaration of putting into service**, in the manufacturer's instructions for use and, where required, in the certificate, referred to in Article 4, paragraph 3, contained in the declaration of commissioning;
- the **verification of the functionality of the safety accessories**.

It is carried out by:

a) documentary examination;

b) control of the functionality of the protective devices;

c) control of the operating parameters (for safety valves, verification of calibration);

d) ascertaining that the operating parameters fall within the established operating limits.

Integrity checks

They consist of:

- in the inspection of the various elements by **visual inspection** carried out from the outside and from the inside, where possible, in **thickness checks** and **any other checks** that may be necessary in the face of obvious situations of damage;
- **if defects are found** in the visual and instrumental or only instrumental survey that may in some way affect the further usability of the equipment, **appropriate additional investigations are undertaken**, with possible authorization by the person in charge, to establish not only the extent of the defect **but also its possible origin**.

Aim: **to take the most appropriate actions to restore the structural integrity of the component**, or to assess the degree of safety commensurate with the time of further exercisability with the permanence of the defects found.

- Identify potential mechanisms of damage
- Perform the appropriate Non-Destructive Testing (NDT) on the equipment
- Evaluate structural stability in relation to the various damage mechanisms
- Calculate the remaining life of the equipment (safe exercisability)
- Define the recontrol plan

The UNI/CTI standard – Structural integrity

Checks during the life cycle of a pressure equipment – legislative and regulatory references

It is necessary to plan specific checks during life and identify the most suitable NDTs according to the mechanisms of damage acting

Design and Construction
2014/68/UE (PED)

National Standards
VSR, VSG, M, S

Harmonised standards

Commissioning
(DM 329/04
UNI TS 11325-6)

Stesura piano controlli
(CREEP UNI TS 11325-2/4
FATICA UNI TS 11325-10
CORROSIONE UNI TS 11325-9
RBI UNI TS 11325-8)

NO

Periodic checks
(DM 329/04
DM 11.4.11
UNI TS 11325-12)
RBI
(UNI TS 11325-8)

INSPECTION

Defects?

SI

Was the repair successful?

NO

YES

Decommissioning

Repairs
DM 329/04
Temporary repairs
UNI TS 11325-5

Repair

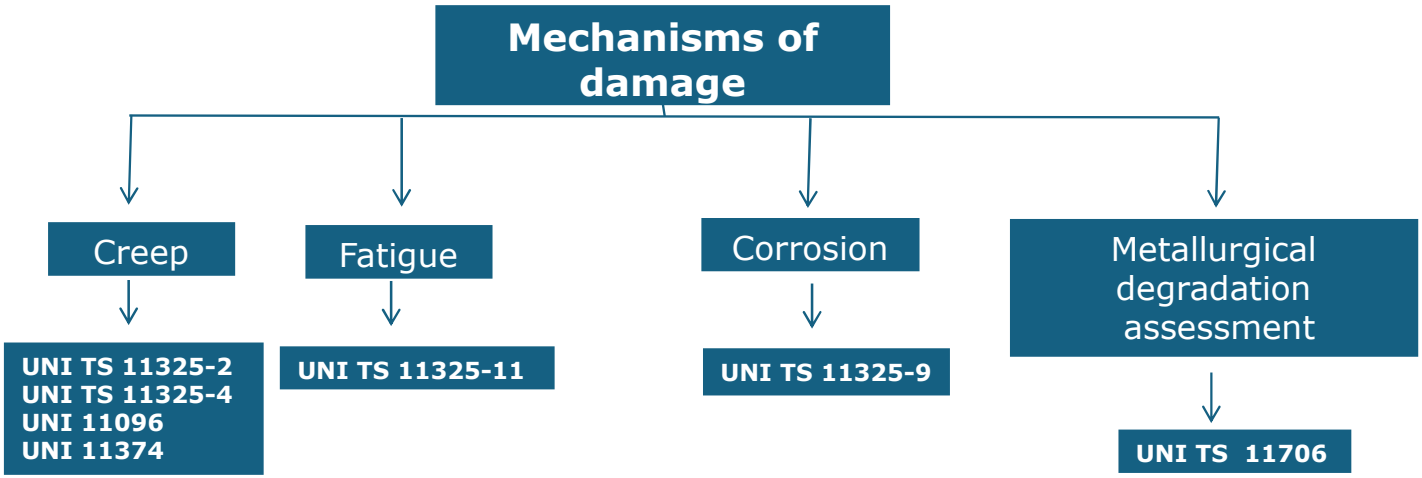
NO

YES

Fitness for Service
UNI TS 11325-9

The UNI/CTI standard – Structural integrity

It is necessary to plan **specific checks** during life and identify the most suitable NDTs **according to the mechanisms of damage acting**



Risk based inspection (UNI TS 11325-8): methodology to **optimize inspection planning** based on risk-based assessment; it can be used to plan exceptions to the inspection periodicity of pressure equipment in accordance with Ministerial Decree 329/04 and if the damage to an item is reasonably foreseeable at an estimated speed.

Fitness for service (UNI TS 11325-9): to assess the **appropriateness for operation of defective components**. It provides the basic principles for assessing the stability of a defect and calculating the life consumed.

Damage to pressure equipment

Factors affecting damage to pressure vessels:

- working fluid (metal leakage, hydrogen damage, chemical attacks, etc.)
- environmental conditions (metal loss, brittle fracture, etc.)
- operating conditions (fatigue, creep, etc.)
- mechanical actions (grooves, dents, misalignments, etc.)
- accidents and anomalies (fire damage, etc.)

Tank damage
Macro-types and overview

Mechanisms of damage

Structural failures

Loss of accessory functionality

Control instrumentation anomalies

- Roof, mantle and bottom damage due to cracking or corrosion
- product infiltration on the roof due to corrosion or inside the flotation caissons
- wear of the sealing gasket
- roof inclination
- drainage pipe rupture
- deformation of the walls due to internal depression

- breaking joints of the inner arm for drainage
- failure of high and very high level systems
- overfill due to high level block failure
- overpressure
- malfunctions in control instrumentation (e.g. level meters)
- procedural aspects
- natural causes

(images from the Web)

Pipe damage
Macro-types and overview

Mechanisms of damage

Terms of use

Media design and status

- Overpressure
- freezing valves/lines with connecting devices with tanks
- damage to the protection (painting, galvanizing, insulation, etc.)
- natural causes
- valve defect
- removal of flanges and lines
- stresses
- condition of flanged couplings (bolt tightening, sealing gaskets, etc.)
- state of the basin crossings (presence and condition of the bandage, jacketed lines, etc.)
- collision with vehicles

Final reflections

- The analysis of Seveso Operational control represents one of the main link between Seveso and Industrial Emissions (IED) Directives.
- The harmonization and coordination of inspection activities and controls in establishments subject to both Directives offers strategic benefits: not only related to reduction and optimization of costs and resources, but also to a greater operational efficiency and speed (simplification), transparency and comparability, an "integrated" legislative compliance with all company requirements, better relationships with Companies.
- A possible integration, however, requires attention on specific aspects:

  ---the definition of administrative procedures and operational methodologies shared between the Public parties involved

  ---the assessment of different legal competences of the Seveso Technical Bodies in the context of the EID procedure during the SMS MAH inspection

Thank you for attention!

a.pirone@inail.it
m.vallerotonda@inail.it
dit@inail.it
dit.impiantiprocesso@inail.it