

# EPSC on Seveso Legislation

## For Catalan Chemical Engineers

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# EPSC - Website

**EUROPEAN CONFERENCE 2022**  
**ON PLANT & PROCESS SAFETY**  
 SEPTEMBER 13 & 14  
 ANTWERP  
 FLANDERS CONVENTION CENTRE

*Hands work in 2022*  
*Networking Forwards*

**Practical learnings on Processes with Hazardous Chemicals**

Organized by: **EPSC**

In cooperation with:

For more info: [www.safetyongreen.eu](http://www.safetyongreen.eu)

EPSC Conference

## EPSC Process Safety Fundamentals

			
Double Isolation	First Line Break	Flexible Hoses	Plugged Equipment
			
Open Drain	Operating Limits	Overrides	Reporting
			
Run Away Reaction	Splash Loading	Line of Fire	Utility Connections
			
Furnace Burners	Leak Tightness	Unloading	Critical Equipment
			
Walk the Line		Working behind a Single Valve	

EPSC PS Fundamentals  
Other languages

# Run Away in a storage tank

EPSC Learning Sheet, June 2018



## What Happened:

At a pharma production location a storage tank with 45% chloro-acetaldehyde (CAA) released an HCl cloud after the CAA polymerised in an exothermic reaction. The pressure increase ruptured piping.



## Aspects:

- A failing tank tracing caused an initial temperature rise
- 45% CAA in water can polymerise exothermic as of 60 °C
- The reaction plugged the line and continued in the tank
- The PSV was not sized for this scenario, high pressure damaged gaskets and caused a hole in the piping (picture)
- It is essential to understand the chemistry under normal and all foreseeable abnormal conditions (quote from CS8)
- Contaminants sometimes act as catalyst and start a reaction
- The SDS did not mention the exothermic polymerisation specifically. Indicated storage conditions can be important.
- Determine thermal stability and safe storage conditions using lab tests, DTA (Thermal Analysis) and modelling

### Avoid reactions in stored chemicals

EPSC Learning Sheets are meant to stimulate awareness and discussion on Process Safety  
EPSC can not be held liable for the use of this sheet. Questions or Contact via [www.epsc.be](http://www.epsc.be)

EPSC Learning Sheets

**Promoted by:**



**EPSC**

**EPSC  
Webinar**

*Fri 23<sup>rd</sup> October 2020*  
**14.00 – 15.30 (EST)**  
**13.00 – 14.30 (GMT)**

**Facilitated by:**



**Royal  
HaskoningDHV**  
*Enhancing Society Together*

*EPSC webinars facilitated by knowledgeable solution providers offer the opportunity to learn and discuss on a specific safety topic.*

**Register by sending an email to [office@EPSC.be](mailto:office@EPSC.be)** (You will receive a link to join)

## Seveso versus Reach:

### Largely independent or two faces of one coin ?

*Seveso legislation focuses on preventing major incidents that may have acute adverse effects on health and safety of both workers and the community in engineering terms: preventing loss of containment by ensuring asset integrity.*

*Reach legislation addresses all chemicals, but focuses on limiting the use of substances with long term toxic effects on humans or the environment.*

*In permitting terms: a SAN on specific substances, unless ....*

*The bottom line is the same: if managed properly, business continuity is at stake.*

**Aspects to be discussed in an interactive setting**

- The objectives of Reach and Seveso
- Main results achieved in the past decade
- Focus areas as experienced by RHOHV in permitting due to REACH data
- How will the EU strategy for sustainability impact chemical industry the next decade?
- Securing supply chain continuity in the EU
- Business continuity & stakeholders
- Process safety is a paradigm shift needed to accommodate the above trends?
- Case studies TNO






For more information, contact RHOHV: [info@rhohv.com](mailto:info@rhohv.com) or +31 20 540 0100

EPSC Webinars

# What Legislation on Chemicals do you know?

- Seveso III → NTA-8620
- ATEX → NPR 7910
- PED → WBDA
- Pipelines
- ADR & ADN Transport
- REACH



OXIDISING



CHRONIC HEALTH HAZARD



FLAMMABLE



CORROSIVE



HEALTH HAZARD



EXPLOSIVES



COMPRESSED GAS



ENVIRONMENTAL HAZARD



ACUTE TOXICITY

# Law or Guideline / Best Practice

“ you have to....”



**PED**  
97/23/EC



**ATEX** 

The ATEX symbol, which is a black hexagon containing the white text "Ex".

# SEVESO III criteria

## Production, Treatment, Storage of Dangerous Substances

Toxic 2 classes

Oxidative

Flammability K0 – K4

Nr	Stof	Drempelwaarden [ton]	
		PBZO	VR
1	Zeer giftig	5	20
2	Giftig	50	200
3	Oxiderend	50	200
4	Ontploffbaar ADR 1.4	50	200
5	Ontploffbaar ADR-overig	10	50
6	Ontvlambaar VP 21-55 °C	5000	50000
7	Licht ontvlambaar VP < 21 °C	50	200
8	Zeer licht ontvlambaar Gas VP < 0 °C	10	50



# Seveso legislation

- Lower tier “Prevention Policy”
- Higher Tier Safety Report
  - Management System (VMS) & Organization
  - Description: Site, Process & Surrounding
  - LOC Scenario's
  - Measures (organizational & technical)
  - QRA
  - MRA
  - Emergency Response: Fire protection

**Checklist Safety Report**

# Examples of management systems

## 21 Elements of GE - HSF



DNV IRIS



Seveso Legislation

## CCPS

1. Process Safety Culture
2. Compliance
3. Competence
4. Workforce Involvement
5. Stakeholder Outreach
6. Knowledge Management
7. Hazard Identification and Risk Management
8. Operating Procedures
9. Safe Work Practices
10. Asset Integrity / Reliability
11. Contractor Management
12. Training / Performance
13. Management of Change
14. Operational Readiness
15. Conduct of Operations
16. Emergency Management
17. Incident Investigation
18. Measurement and Metrics
19. Auditing
20. Management Review

1. Site Health & Safety Plan
2. Health & Safety Expectations and Performance Appraisals
3. Hazard Analysis and Regulatory Compliance
4. Employee Involvement
5. Health & Safety Specialist
6. Accident Reporting, Investigation and Follow-up
7. Health & Safety Training
8. Health, Safety and Housekeeping Inspections
9. Personal Protective Equipment
10. Contractor Health & Safety
11. Emergency Preparedness and Fire Protection
12. Job Safety Analysis
13. High Risk Operations
14. Health & Safety Reviews of New and Modified Facilities and Equipment
15. Industrial Hygiene
16. Chemical Management
17. Ergonomics
18. Motor Vehicle Safety
19. Medical Services
20. Program Evaluation
21. LOTO

- Structured Elements
- That fit the organization

# Process Safety essential elements

- Process Hazard Analysis & Regulatory Compliance
- MOC Management of Change
- Mechanical Integrity
- Emergency Response
- Incident Investigation
- Process safety Information
- Auditing

Other elements of the integrated SHEQ MS:

- Management commitment
- People engagement
- Training / competency management
- Contractor management



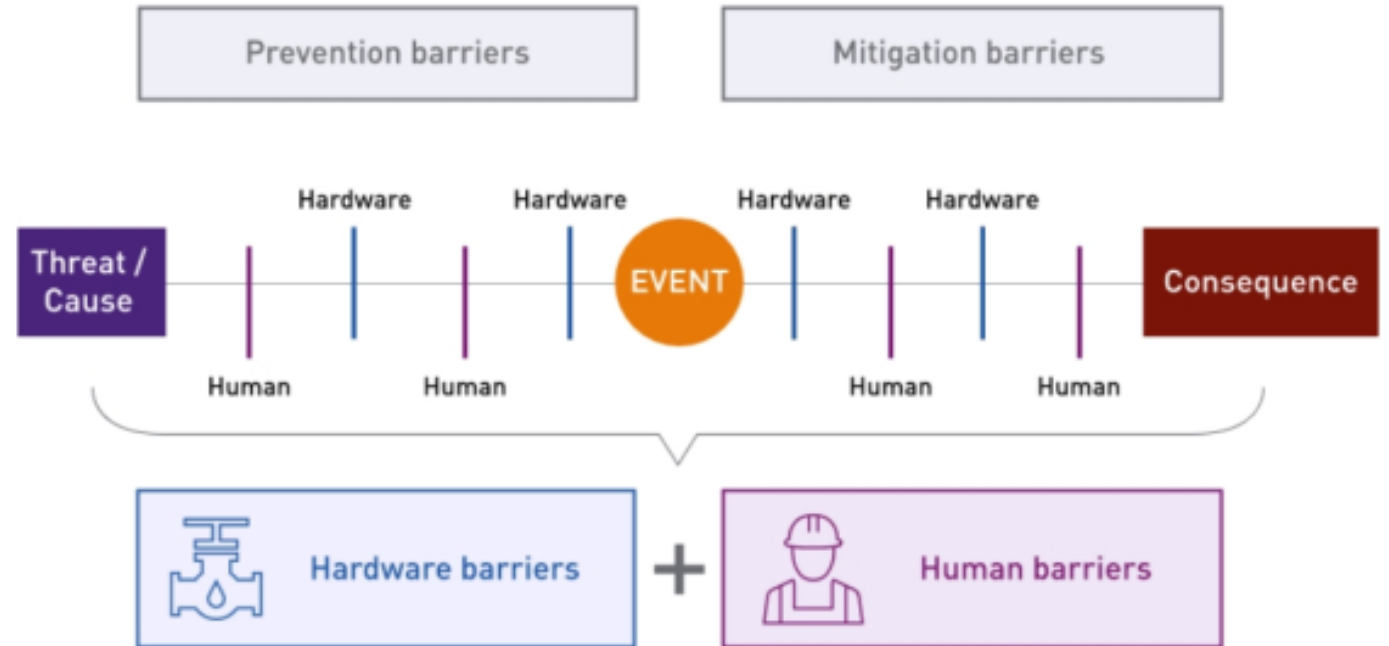
# LOC Scenario's / Safety cases

- Criteria for LOC Scenarios
  - high probable and severe cases
  - Different causes

- Scenario

- Cause & Consequence
- Mitigation (barriers)
- Residual risk

- Develop scenario's with a team
- Review scenario's regularly (3-5 years)
- Use scenario's for training
- Projects or significant changes: update the scenario

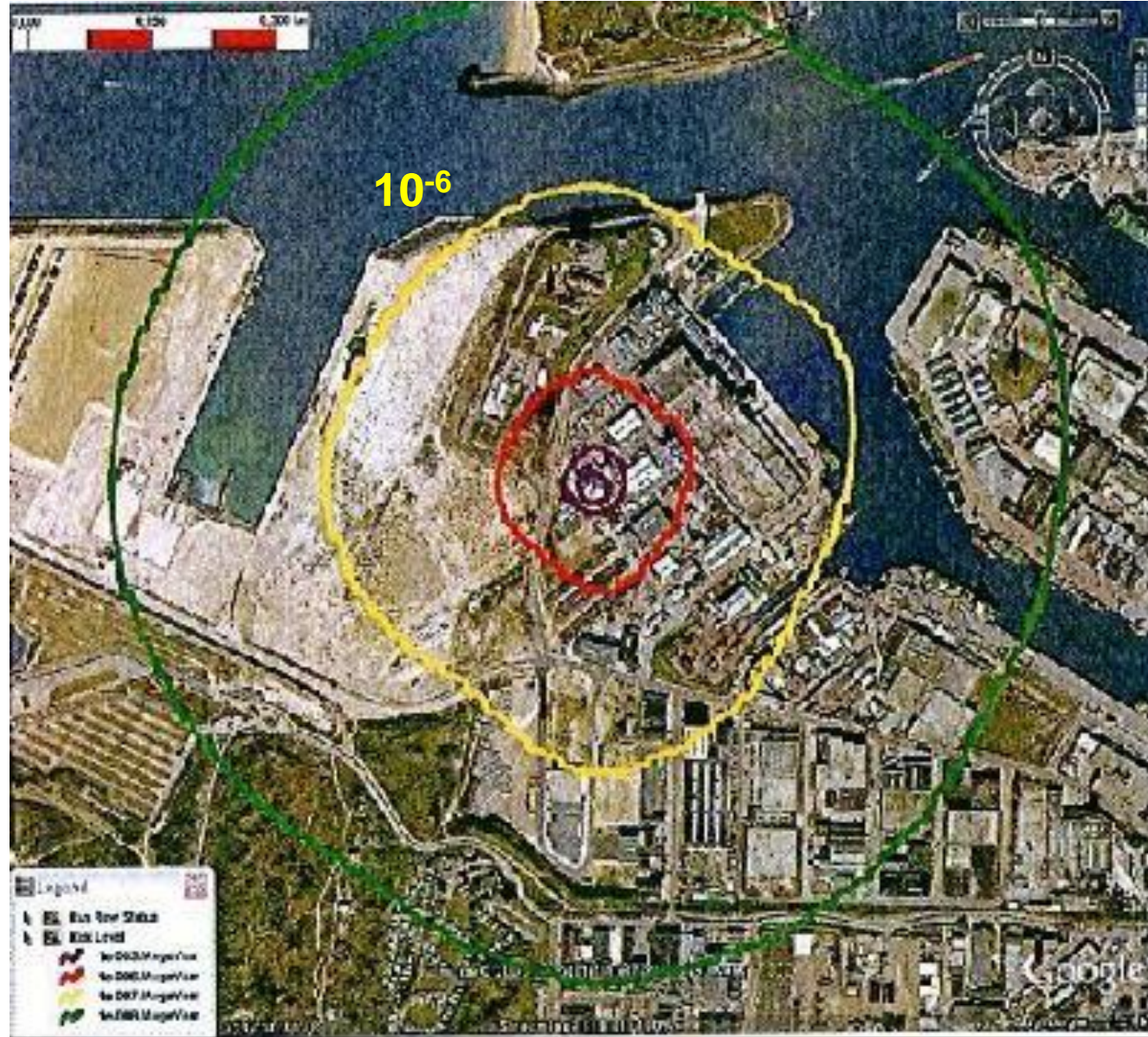


# QRA quantitative risk analysis

- Consider leakages from process equipment:  $10^{-4}$  leak for 10 mm leak
- Use PHAST 6.54 for calculations for contour plots
- Calculate PR
- Criteria: No “harmful objects” in  $10^{-6}$  PR contour

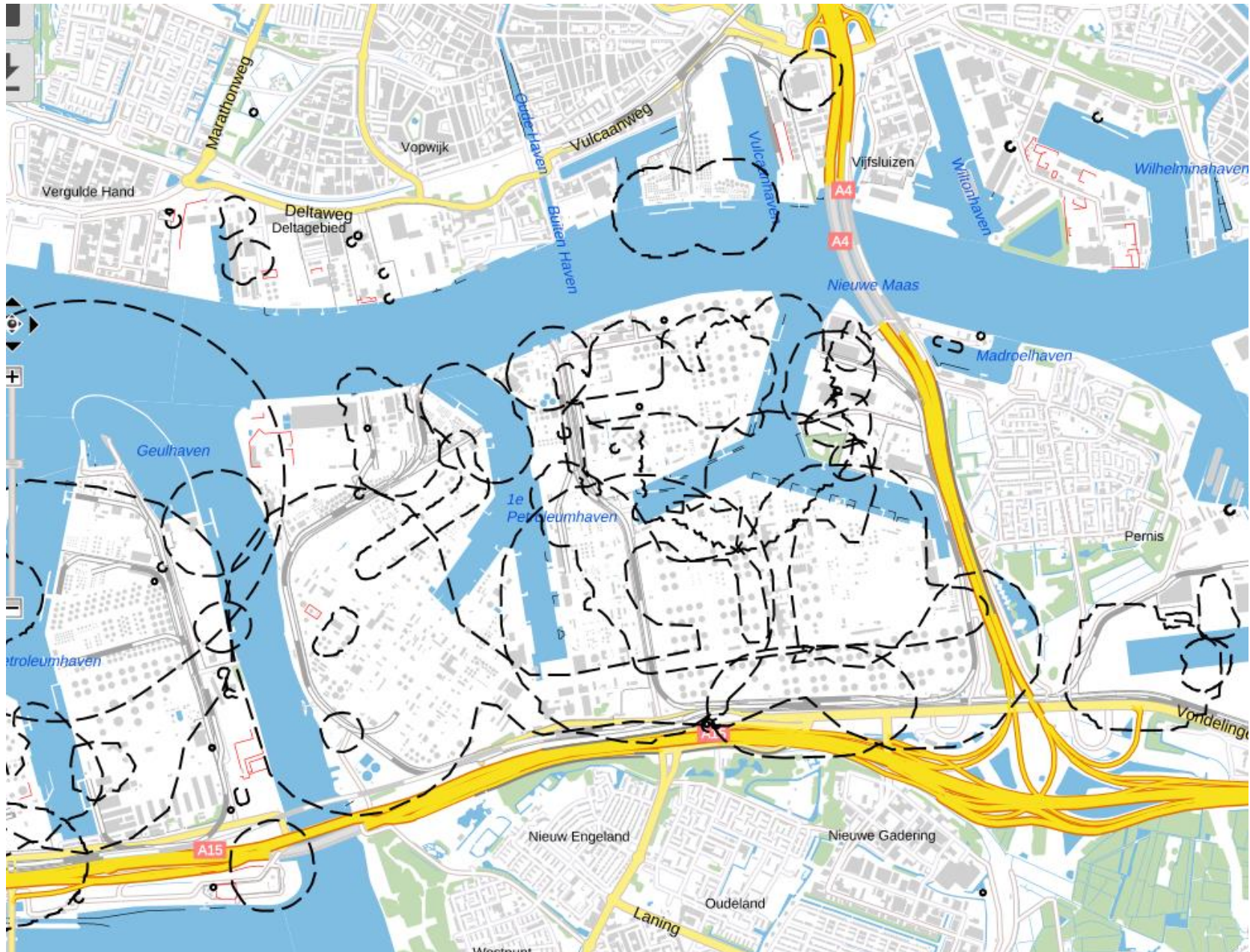


# QRA Contour





# Risk Map --- $10^{-6}$





# External Hazards

## Earthquakes and Flooding

- Prediction (Hazard)
- Potential Consequences
- Measures



Figuur 1 - Overstromingskans van de Botlek voor 2015 1/1000 jaar en voor 2050 1/300 jaar





# Emergency Response Planning



- Determine relevant Fire-scenario's
- Calculate heat radiation contours

# ATEX

- Equipment suppliers (ATEX 114)

(formerly ATEX 95)



ATEX: zone classification,  
electrical & mechanical:  
Standards IEC61508 & IEC61511

**Electronic systems**

**SIS Industry**

- Companies with explosive materials, part of Arbo legislation: (ATEX 153)

(formerly ATEX 137)

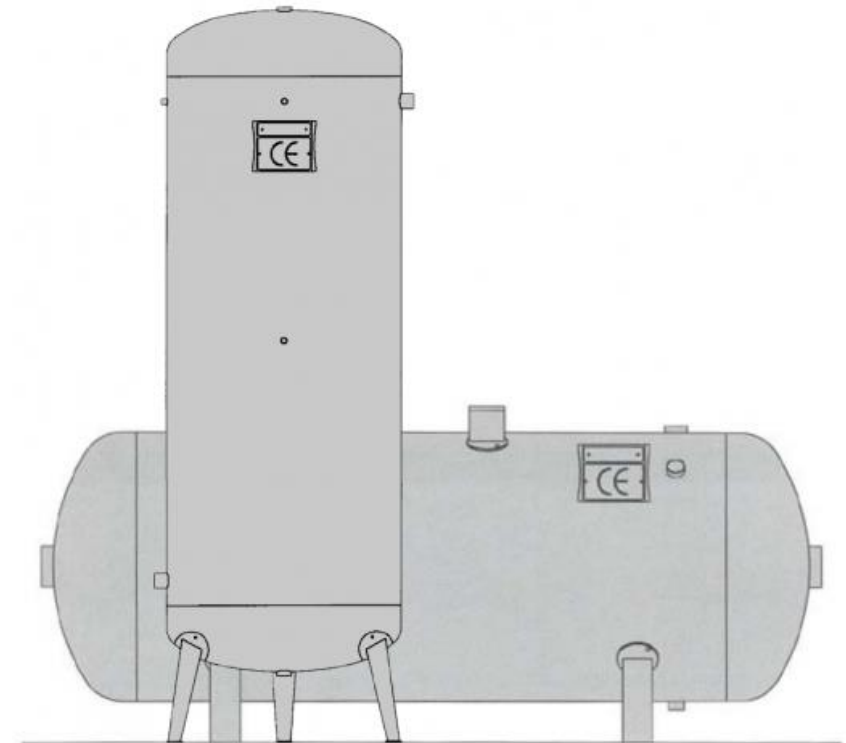


**Dutch implementation: NPR 7910-1 & 2**

# Equipment Directive Pressure (PED)

## Pressure Equipment Directive (2014/68/EU)

- European legislation
- Avoiding ruptures: integrity of vessels & equipment
- Previous Steam Vessel Control → WBDA
- Pressure above 0.5 barg
- Notified Body
- CE



# Thank you for your attention

## Questions?

