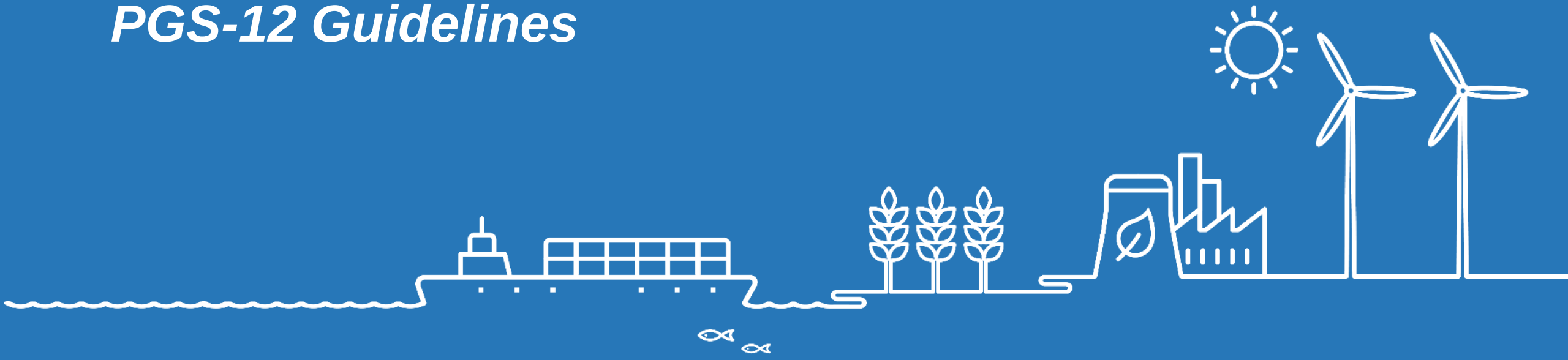
Yara Clean Ammonia

PGS-12 Guidelines



November 2023

PGS-12 Guidelines

What is PGS

PGS stands for Publication Series on Hazardous Substances. A PGS guideline is a document about specific activities involving hazardous substances

What is PGS-12

PGS – 12 “Ammonia - Storage and Offloading” Dutch guideline for the safe storage and handling of ammonia

Scope Includes

- The storage, loading and unloading of ammonia;
- Pressurized storage in both cylinders and spheres and in refrigerated atmospheric tanks where there is no lower or upper limit on the volume of ammonia storage

Latest Version

Interim PGS Version 1.0 (August 2021)

NEW VERSION PGS-12

Current Status

✓ The current interim version of PGS-12 is being updated to align properly with the current state of the art.

Work Group

✓ Delegates from:
Vopak, OCI, Yara International & Proton Ventures

Timeline

✓ The estimation is that the final version of PGS12 will be released in February 2024.

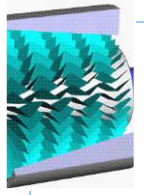
Phase-1 Scope

✓ New tanks to be built in future

TOPICS DISCUSSED IN NEW PGS-12

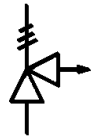
Pump configurations

Risk of out of service inspection (generic)



Boil Off Compressors

Flare/Torch



Safety valves

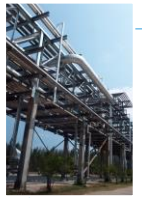
Storage tank foundations

Material of construction

Storage tank insulation

Tank configurations

Minimum SIL requirements



minimum requirements for loading/unloading installations

STORAGE TANK AND PUMP CONFIGERATIONS ADVANTAGES / DIS-ADVANTAGES

Different tank configurations evaluated in following areas:
Intrinsically safe design
Insulation
Maintenance (In-service/ Out-of-service)
Inspection (In-service/ Out-of-service)
Material
Occupational Safety aspects
Failure rate scenarios frequencies
Past Incidents
Examples of in-service tanks

Different pump configurations were evaluated in following areas:
Intrinsically safe design
Maintenance (In-service/ Out-of-service)
Inspection
Availability
Operational aspects
Occupational Safety Aspects
Examples

KEY TAKEAWAYS

Best available technique for tank configuration

Full containment with concrete outer wall to protect against external impact.

Best available technique for pump configuration

Internal pump where all penetrations go through the roof.

Safety Instrumented System

Minimum SIL requirements for overfill and overpressure protection

Ongoing Discussions

- Inspection methods. Techniques are available where inspection can be completed for in-service tank
- Installation of deluge system / water monitors to mitigate small ammonia leak.

NEXT STEPS

- Phase-2 Scope:
  - Existing tanks and cryogenic storage tanks to be converted to store ammonia
  - Ongoing discussion whether there is added value to have a separate PGS should be drawn up for existing tanks
  - GAP Assessment for existing installations compared to requirements specified in new PGS-12 guidance document


Thank you for your attention!
Any questions?
YARA
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