RH2INE

Rhine Hydrogen Integration Network of Excellence

# RH2INE

## Green deal binnenvaart

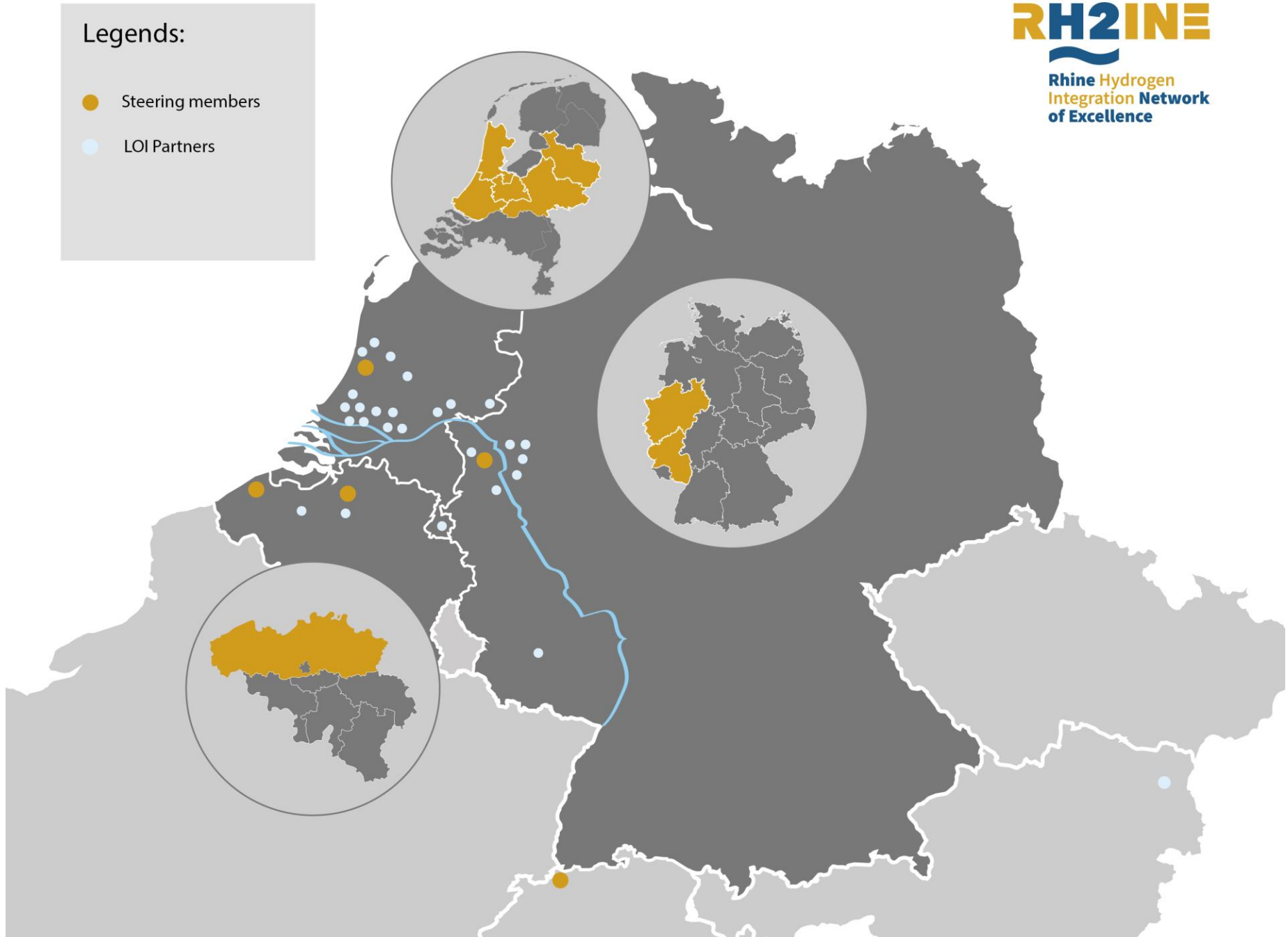
Niel

December 3, 2024

# Mission and vision

RH2INE
Rhine Hydrogen Integration Network of Excellence

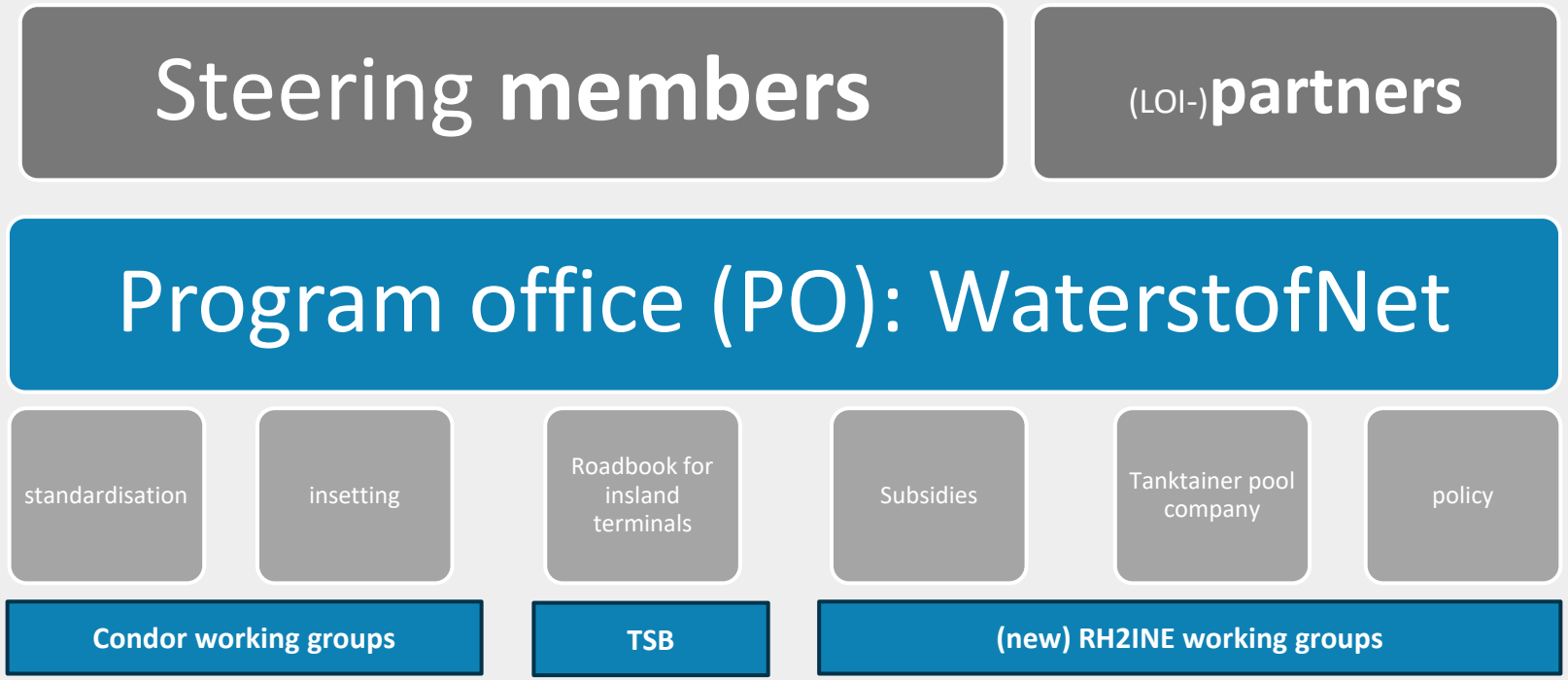
The main aim of RH2INE is to **develop the use of hydrogen in inland shipping** and to **coordinate the activities** along the Rhine for the development of the use of hydrogen in inland shipping. The goal is to **establish a market ready hydrogen system** for inland shipping. This means that both the **shipping side** as well as the necessary **infrastructure** needs to be developed, including the value chain of the **supply** of hydrogen.


Legends:
Steering members
LOI Partners
RH2INE
Rhine Hydrogen Integration Network of Excellence

# Steering members

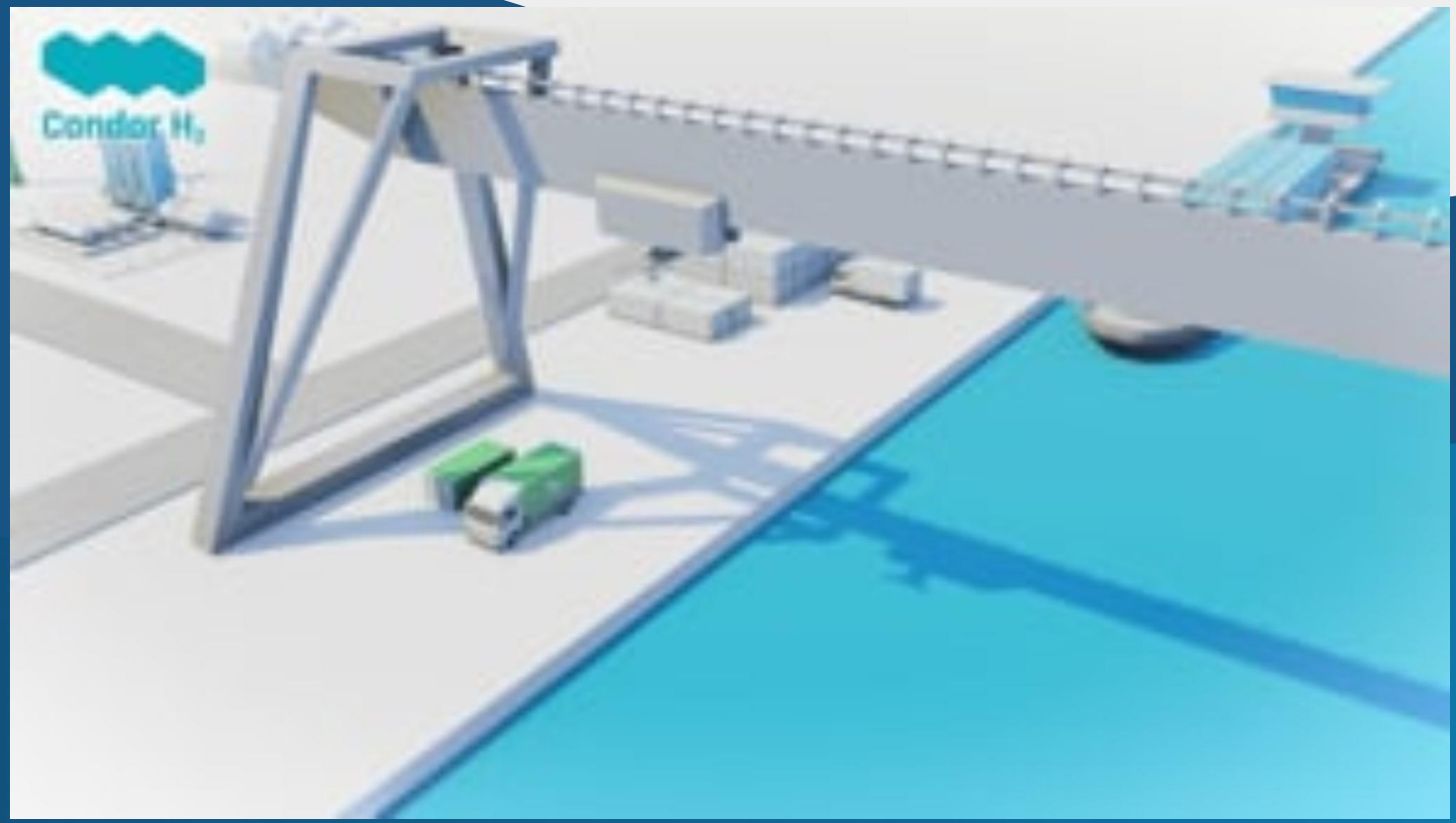
- Province of South Holland
- Province of North Holland
- Province of Utrecht
- Province of Gelderland
- Province of Overijssel
- Rhineland-Palatinate
- North Rhine Westfalia
- De Vlaamse Waterweg
- Port of Rotterdam
- Duisport
- Port of Basel
- Port of Antwerp-Bruges

RH2INE
Rhine Hydrogen Integration Network of Excellence



# Value chain approach

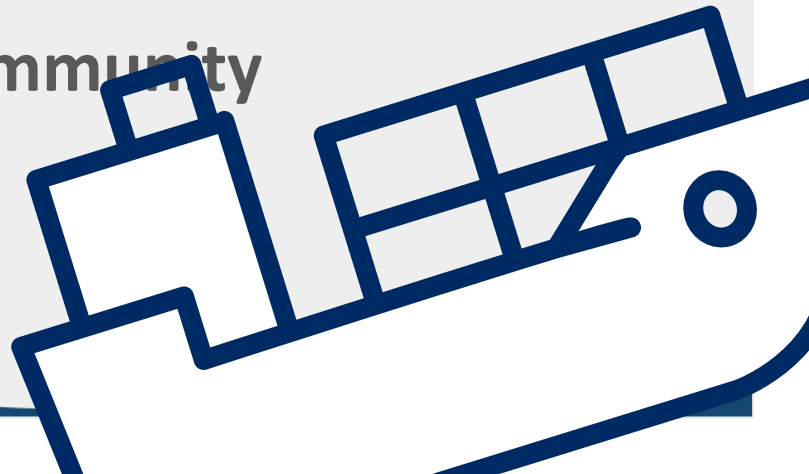
RH2INE
Rhine Hydrogen Integration Network of Excellence



# Objectives 2025

RH2INE
Rhine Hydrogen Integration Network of Excellence

1. Establishing structural cooperation and knowledge exchange with existing initiatives
2. Initialising tanktainer pool
3. One voice towards European and national authorities
4. Creating visibility towards barge community



# Overview

**Objective 1**

1. Standardisation
2. Insetting
3. Roadbook for inland terminals

**Objective 2**

4. T*anktainer* pool company
5. Subsidies

**Objective 3**

6. Policy

# Standard / Format / Design specification / Type

## AA battery
## &
## Dedicated location in appliance

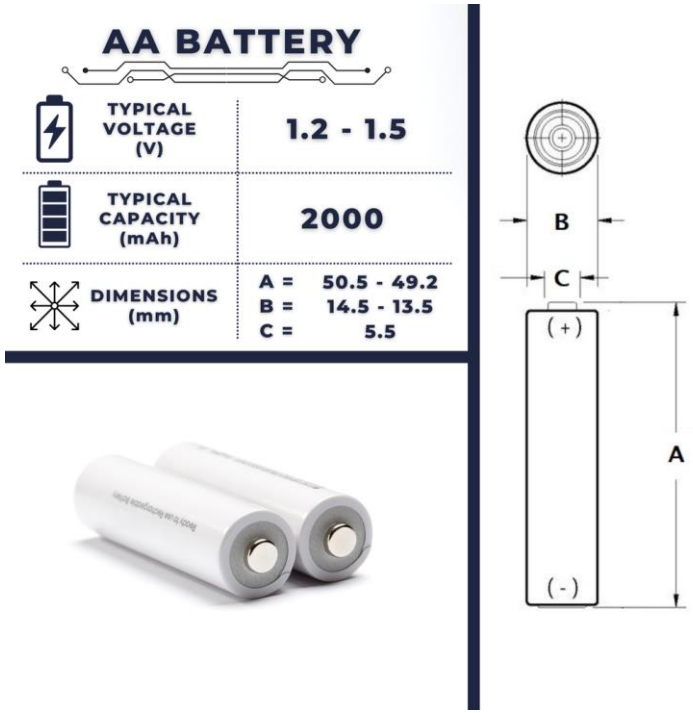
Types of AA Batteries:

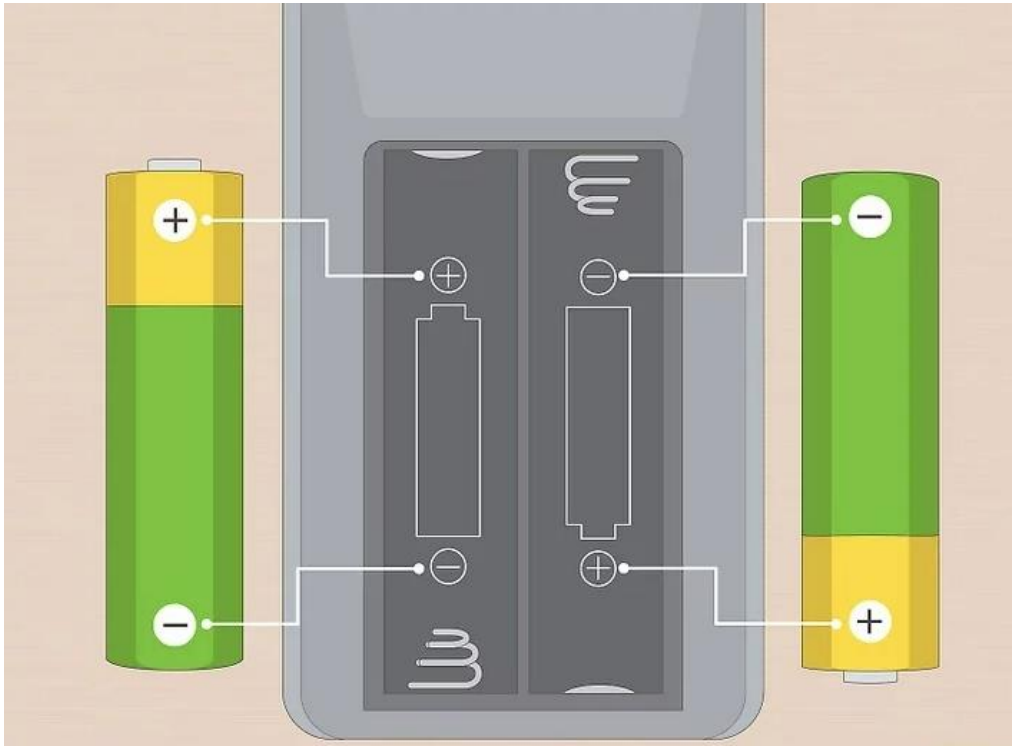
**Primary Battery**

- alkaline battery
- lithium metal battery
- zinc-carbon battery
- zinc-chloride battery

**Secondary Battery**

- NiMH battery
- NiCd battery



# Certification Process

Tanktainer ‘category’ certified
&
Ship certified for ‘category’ of tanktainers

# Standardisation document : content

1. Pressure levels
2. Container sizes
3. Transport modes
4. Location of pressure regulation
5. Physical interface
6. Data communication
7. Communication protocol

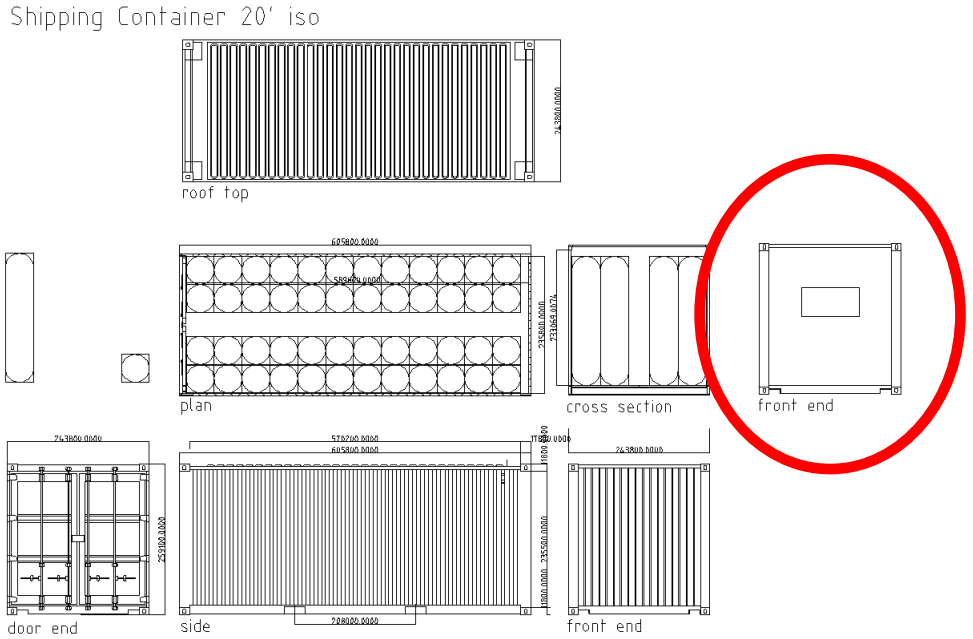
# Standardisation document : pressure levels

- 300 bar
- 500 bar
- 700 bar

= maximum pressure level

# Standardisation document : container sizes

- All standard container sizes possible :
  - 10”, 20”, 30” and 40” (+high cube)
- Standard fixing system : ISO blocks (twist locks on board)
- Connections on front side



# Standardisation document : transport modes

- Suitable for all transport modes
  - Truck
  - Barge
  - Train

- As a result it has to comply to with the existing transport mode rules :

  ADN, ADR, RID, Es-Trin, IMO

# Standardisation document : location of pressure regulation

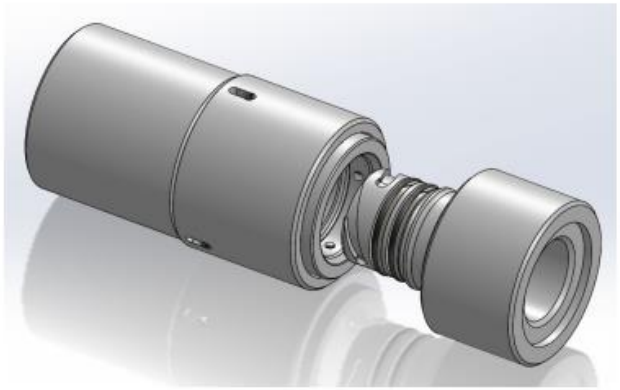
- The pressure regulator will be put **OUTSIDE** the tanktainer
  - Economical reasons
  - Technical reasons
  - Safety reasons

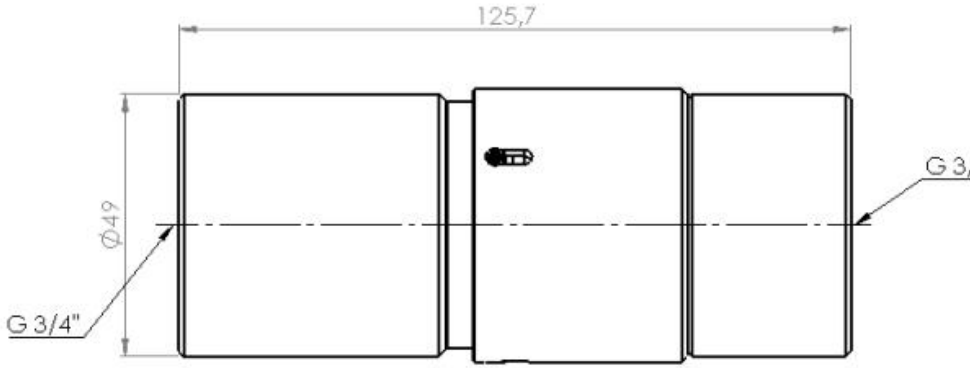
# Standardisation document : physical interface

Mechanical interfaces :

- Main H2 hose connection
- Vent hose connection
- Compressed air pressure hose connection(s)

# Quick Coupling






The H2-Quick-Coupling is a fitting designed for fast coupling of two pipe systems. Pipe systems that ended with one of them (male or female) could connect with each other system with same quick-coupling end (male or female). H2 will be vent during discoupling.

| | |
|---|---|
| $Q_{max}$: | 8 g/s [28 kg/h] @ 15 °C, P1= 35 |
| Inlet pressure P1: | bar, 16g/sec, or special |
| Inlet pressure min: | 0…630 bar |
| Nominal size: | 20 bar |
| Fluid temperature: | DN 10, DN 15, DN 25, DN 30 |
| Valve housing material: | -40 °C…+85 °C |
| Sealing material: | 1.4404 (X2CrNiMo17-12-2) |
| Internal leakage: | FKM |
| External leakage: | < 10 ppm |
| Weight: | < 10 ppm |
| Deadroom: | ~1,60 kg |
| Connection: | ~600 mm³ |
| | 2x G3/4" female / IG |

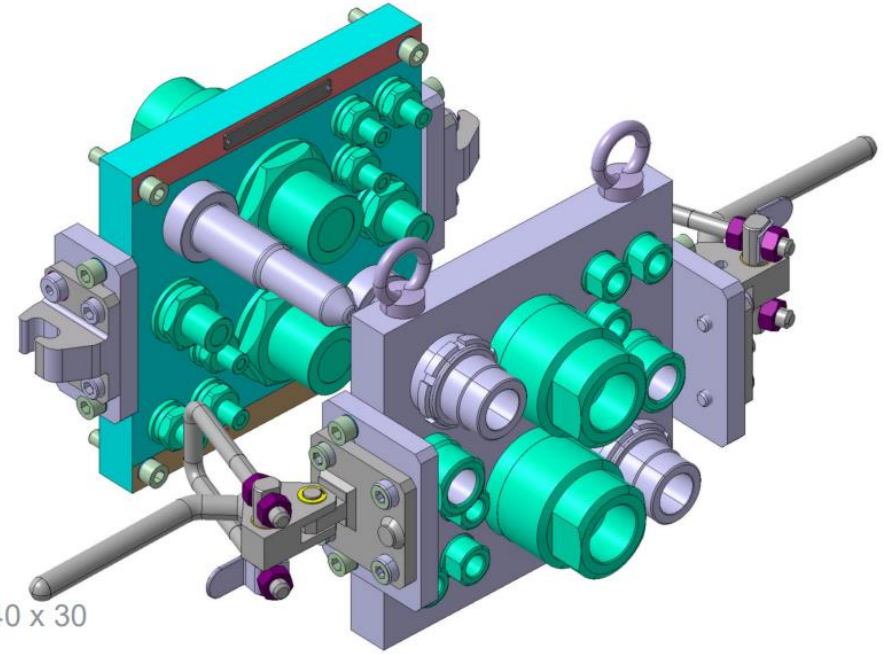
Options:

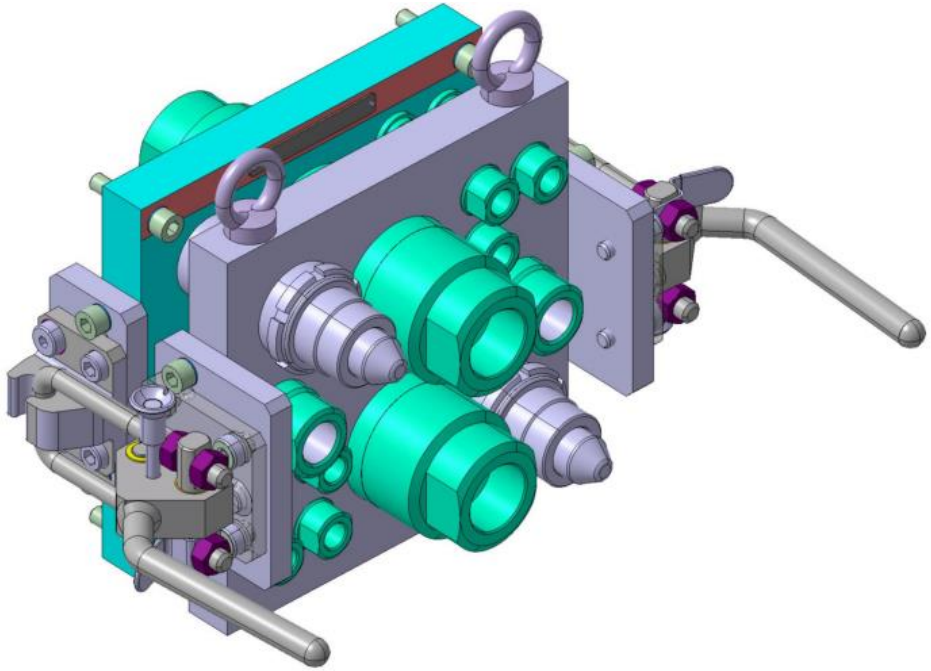
Venting Version with DN 30 with

3/2 way valve with needle valve

Customised solutions

# Multiconnector





***Dimensions :***

Mobile plate : 245 x 240 x 30
Weight : 27 Kg

Fixed plate : 245 x 240 x 30
Weight : 24 Kg

# Standardisation document : physical interface

## Multiconnector and 1 quick coupling combined on 1 tanktainer

- Multiconnector
  - Chosen as preferable option due to fool proof necessity
  - Backward compatibility should be possible
    - 300 bar : 2 conical pins
    - 500 bar : 3 conical pins
    - 700 bar : 4 conical pins
  - Weight should be lowered
- For inland navigation
  - Multiconnector with 4 connections = preferred option. (Main H2, Vent line, two air pressure lines)
- For land based applications
  - Only 1 connector needed (H2 supply)
  - Quick coupling = preferred option
- Multi-use should be possible !
  - Higher turnaround of tanktainers : will lower the cost
  - Use for inland navigation and land based applications should be combined

# Standardisation document : data communication

- Required data (available at all times, foreseen in a digital way) :
  - Pressure in each section
  - Temperature in each section
  - Identification of design pressure

Each section has an own Pressure Relief Valve and an own thermal pressure relief device.

- Optional data :
  - Number of filling cycles
  - Acceleration data (occurred G-forces)
  - GPS position
  - Safety check
  - …

# Standardisation document : communication protocol

Communication protocol J2799

# Let’s stay in touch!

RH2INE
Rhine Hydrogen Integration Network of Excellence

**Tom Verlinden** – project director
Tom.Verlinden@Waterstofnet.eu

**Sofie Van Overschelde** – strategic communication
Sofie.VanOverschelde@Waterstofnet.eu