



**RÉPUBLIQUE
FRANÇAISE**

*Liberté
Égalité
Fraternité*



*maîtriser le risque
pour un développement durable*

Existing regulations and standards

*B. Weinberger
R&D Manger
Ineris*

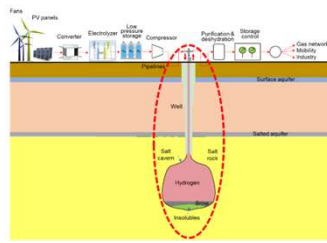
Appliances of hydrogen



PRODUCTION



STORAGE



UNDERGROUND STORAGE



COMPRESSION



CONVERSION



TRANSPORT



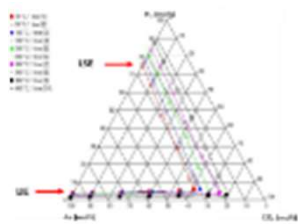
DISTRIBUTION



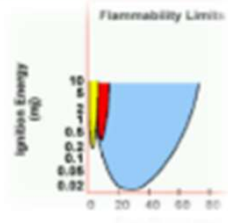
MOBILITY

Specificities of hydrogen, hazardous properties

	Explosive range	Minimum ignition energy	Burning rate	Characteristics of the flame	Embrittlement	Energy density volume at atmospheric pressure
Hydrogène	4 à 75 %	17 μJ	3,3 m/s	Flamme peu visible	Cracking/blistering/hydride formation with non-compatible steels	10,8 MJ/m³
Hydrocarbons	1 à 15 %	200 μJ	0,5 m/s	Flamme visible	-	Diesel 38680 MJ/m³ Methane 39,77 MJ/m³



↓
Explosive clouds larger



↓
Inflammation Easier



↓
Explosions more violent



↓
Hardware specific Intervention



↓
Steels Adapted



↓
High-pressure bulky tanks

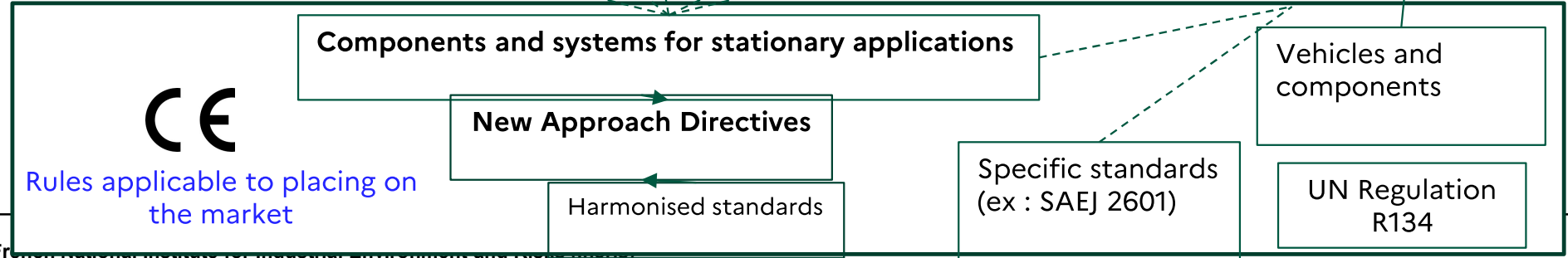
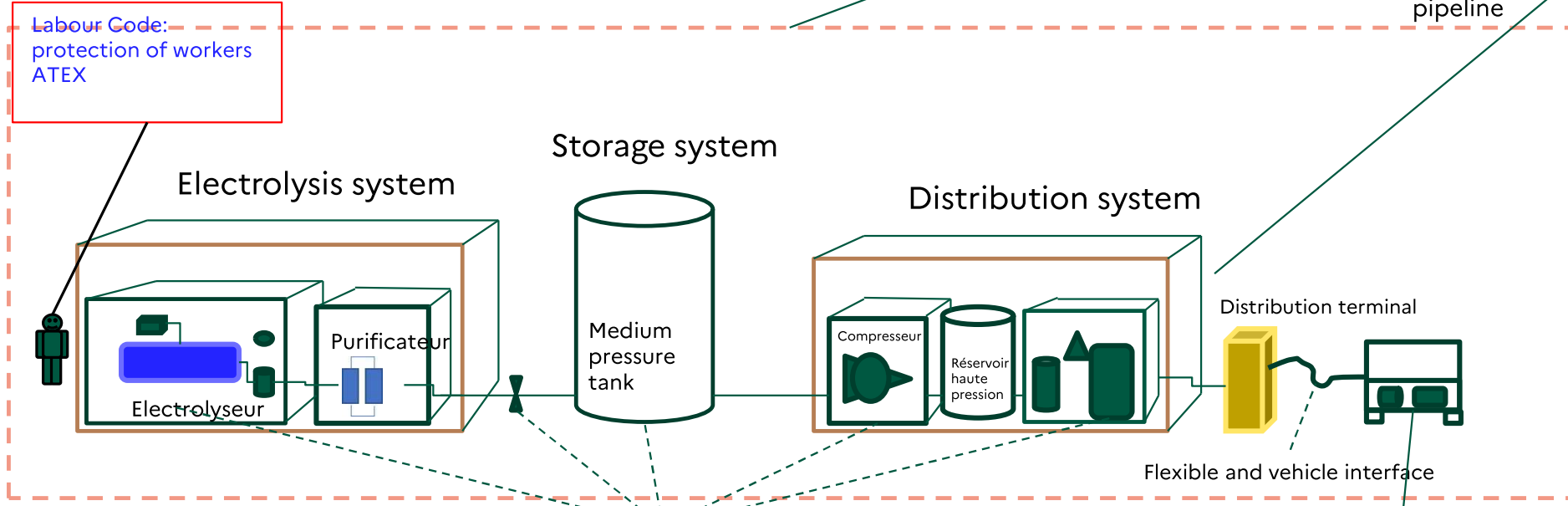
Regulatory scope

Example H2 station

French environmental code:
Classified facilities, Transmission pipelines
European directives:
Seveso Directive, IED

Labour Code:
protection of workers
ATEX

(Site External)
ADR
TPED
TMD order



INTERNATIONAL



EUROPEAN



National Standardization Bodies







 ...

National Standardization Bodies

Mechanical engineering
 Building / civil engineering
 Services
 Information technology
 Aerospace
 Medical technology
 Precision engineering
 +63 other fields of activity...

Electrotechnical Standardization Bodies

Electrotechnology
 Telecommunications
 ...

Other standardization bodies/
institutions working on H2







 ...

Standardisation groups

ISO/TC 197 Hydrogen technologies

ISO/TC 192 Gas turbines

ISO/TC 22/SC 37 Electrically propelled vehicles

ISO/TC 22/SC 41 Specific aspects for gaseous fuels

IEC/TC 105 Fuel cell technologies

EUROCAE WG-80 Hydrogen Fuel Cell Systems

CEN/TC 399 Gas Turbines application

CEN/TC 268 Cryogenic Vessels and Hydrogen Technologies

CEN/TC 234 Gas infrastructure

CEN-CENELEC/TC 6 Hydrogen

CLC/SR 105 Fuel cell technologies

Examples of H2 standards

ISO TR 15916 Basic considerations for the safety of hydrogen systems

ISO 19880-1:2020 Gaseous hydrogen — Fuelling stations — Part 1: General requirements

SAE J 2601 mai 2020 Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles

ISO 23273:2013 Fuel cell road vehicles-Safety specifications - Protection against hydrogen hazards for vehicles fuelled with compressed hydrogen

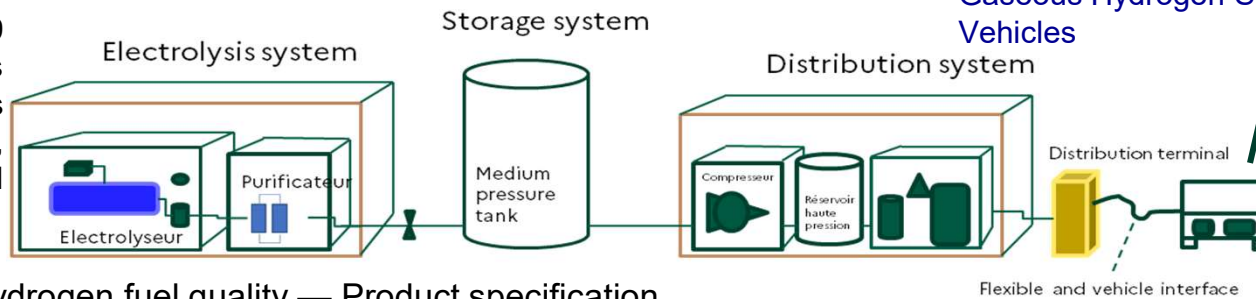
ISO 12619-serie: Road vehicles (16 standard)

ISO 19881:2018 Gaseous hydrogen — Land vehicle fuel containers

ISO 19882:2018 Gaseous hydrogen — Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers

ISO Hydrogen using water Industrial, and applications

22734:2019 generators electrolysis commercial, residential



ISO 14687:2019 Hydrogen fuel quality — Product specification

ISO 16111:2018 Gaseous hydrogen land vehicle refuelling connection devices

ISO 19880-3:2018 Gaseous hydrogen — Fuelling stations — Part 3: Valves

ISO 19880-5:2019 Gaseous hydrogen — Fuelling stations — Part 5: Dispenser hoses and hose assemblies

ISO 19880-8:2019 Gaseous hydrogen — Fuelling stations — Part 8: Fuel quality control

ISO 26142:2010 Hydrogen detection apparatus — Stationary applications

CEN EN 17124:2022 Hydrogen fuel - Product specification and quality assurance for hydrogen refuelling points dispensing gaseous hydrogen - Proton exchange membrane (PEM) fuel cell applications for vehicles

CEN EN 17127:2020 Outdoor hydrogen refuelling points dispensing gaseous hydrogen and incorporating filling protocols

CEN EN ISO 17268:2020 Gaseous hydrogen land vehicle refuelling connection devices (ISO/FDIS 17268:2019)

Thank you for your attention



INTERNATIONAL CONFERENCE ON HYDROGEN SAFETY
September 19-21, 2023



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