Clean Hydrogen Partnership

Co-funded by the European Union

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Project development assistance for regions (PDA II)

Title: EU Regulations for Hydrogen Projects

Date: March 2024

An initiative delivered by

SPILETT new technologies

With support from the subcontracting consultancies

Disclaimer

This paper presents the rules and regulations that regulate hydrogen production, storage, transportation, and dispensing.

This paper covers EU regulations in place up to March 2024. Hydrogen projects can be subject to strict regulations and long permit application timelines. The information provided in this paper will support hydrogen project developers and help to minimise delays with permitting by providing developers with a better understanding the EU regulations for hydrogen projects. This information was prepared as part of the activities in the „PDA II – Project development assistance for regions“ initiative to facilitate the development of local or regional hydrogen projects.

Author DeltaH CHANGING ENERGY

Contracting autority Clean Hydrogen Partnership

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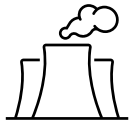
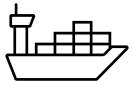
Content

Introduction

This paper covers rules and regulations for the development of new hydrogen projects, including:


Hydrogen production


Hydrogen transportation


Hydrogen refuelling


Hydrogen mobility

The aim of the Project Development Assistance for Cities and Regions II (PDA II) Programme is to develop projects which will contribute towards national and EU climate targets and the goals of the EU Hydrogen Strategy. The development of hydrogen projects in European regions is an important step towards those goals.

Projects involving hydrogen must be developed according to regulations and standards to ensure safety-by-design.

H2 PROJECT DEVELOPMENT ASSISTANCE FOR REGIONS

Clean Hydrogen Partnership

This report can inform the project teams on the processes for permitting their projects, allowing early engagement with national and regional regulatory bodies.
As the process for permitting hydrogen projects may be new to the relevant regulatory bodies, early engagement can help prevent delays by ensuring these bodies are prepared to engage with hydrogen projects once permits are required.

Content

Seveso III

Major accident hazards involving dangerous substances

The Seveso III regulations must be considered for the **storing, producing, or combustion of hydrogen**. It lays down the rules for prevention of major industrial accidents involving hazardous substances. There are two categories that a facility can be classed as: lower tier and upper tier.

Tier level	Lower tier	Upper tier
Quantity of hydrogen stored on site*	From 5 to 49 tonnes	In excess or equal to 50 tonnes
Documents required by the establishment to hand in to the competent authorities	A notification including relevant information about the establishment and identifying the dangerous substance. A major accident prevention policy (MAPP) to ensure a high level of protection of human health and the environment. This should be reviewed every 5 years.	
	N/a	A safety report which: ○ Shows a MAPP and safety management system have been put into effect. ○ Demonstrates that major accident hazards and possible accident scenarios have been identified. ○ Shows adequate safety and reliability have been considered in the design, construction, operation and maintenance of the establishment. ○ Demonstrates internal emergency plans have been drawn up.
Documents to be drawn up by the competent authorities	N/a	External emergency plans for the measures to be taken outside the facility in the case of a major accident.

The list of competent authorities under the European Chemicals Agency can be found here.

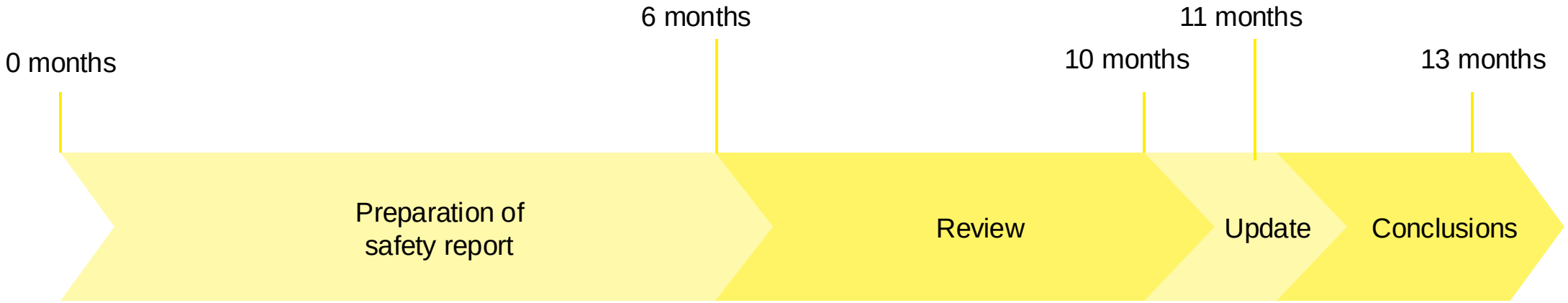
*For sites storing multiple kinds of dangerous substances, please see note 4 of Annex 1 of the Seveso Directive for quantities permitted to be stored onsite.

Seveso III

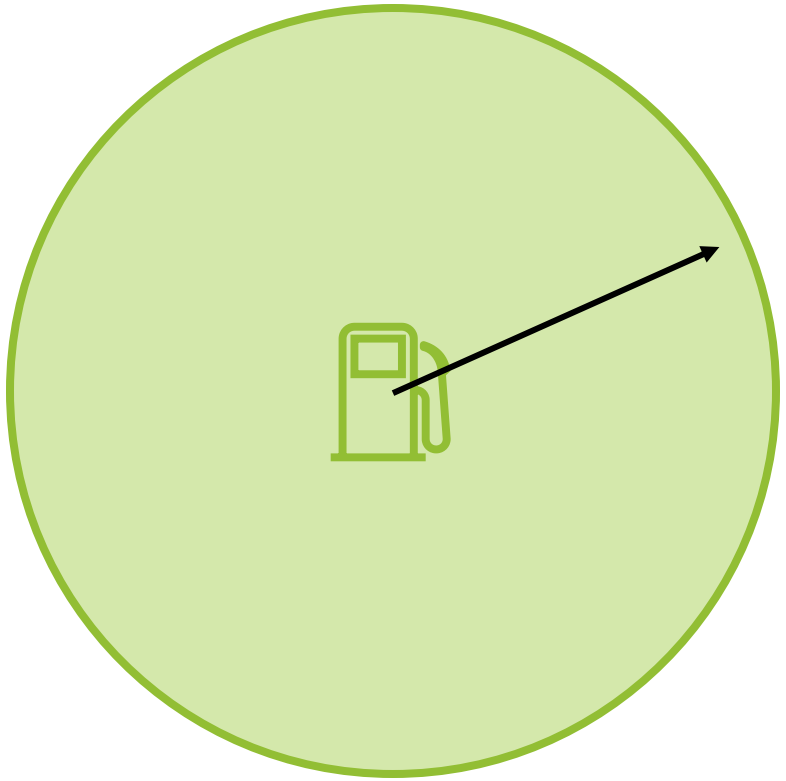
Major accident hazards involving dangeours substances

Advice for PDA teams

Permitting under Serveso III can take up to 13 months - PDA teams must first understand whether their project includes any lower tier/upper tier Serveso sites and engage with the relevant authorities early to expedite the process. These timelines should be built into the project plan.



Safety distances and siting requirements



Seveso III directive does not provide strict requirements for safety distances for hydrogen projects. However, it is extremely important to consider the separation distances for risk assessment and land-use planning for any hydrogen projects.

The criteria to fulfil Seveso land-use planning obligations in different Member States are diverse, but all aim to evaluate the potential consequences of possible major accidents for use in making land-use planning decisions.

If the quantity of hydrogen is below 5 tonnes, the Seveso III directive does not regulate the safety distance required for storage. The local fire brigade will issue requirements for the safety distances.

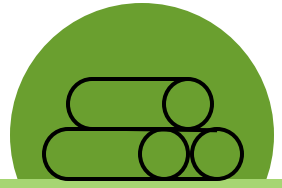
Content

Regulations for the transport of dangerous goods by rail, road, and inland waterways

The documents laying out the rules and regulations for the transport of dangerous goods by rail, road and inland waterways are the following: the Regulations concerning the International Carriage of Dangerous Goods by Rail (RID); the Agreement concerning the International Carriage of Dangerous Goods by Road, also known as the ADR; and the Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways, known as the ADN.

The RID is in effect from January 2023.The ADR and ADN agreements were drawn up on the 30th of September 1957 in Geneva by the United Nations Economic Commission for Europe and entered into force a year later.

The following sections are relevant to PDA teams wanting to transport hydrogen by road and inland waterways, and include:



Regulations and tests required for the use of Multiple Element Gas Containers (MEGCs) to transport hydrogen by rail, road and water.

Regulations and documents needed for the transportation of hydrogen by road.

Regulations and documents needed for the transportation of hydrogen by inland waterways.

Regulations and documents needed for the transportation of hydrogen by rail.

1. Regulations and tests required for the use of Multiple Element Gas Containers (MEGCs) to transport hydrogen by road and water

Multiple Element Gas Containers (MEGCs)

MEGCs are a method of containing gaseous hydrogen, allowing it to be transported. They consist of bundles of gas cylinders.

MEGCs can be used to transport hydrogen by waterways and by road. Regulations are in place to ensure these pressurised containers are safely handled.

Kecko (2008). *Hydrogen Tanker - No Smoking* [Photograph]. Flickr. https://flic.kr/p/4ZvQMi

From section 6.8.2.4 of the ADR

Multiple Element Gas Containers (MEGCs)

The regulations on Multiple Element Gas Containers apply to **transport by road, rail, and by water**.

Type approval

A **type approval certificate** must be issued by the competent authority*. The MEGC must meet:

- Construction ADR requirements
- Equipment ADR requirements
- Meet RID requirements
- Special conditions

The certificate must be attached to the tank record and is valid for a maximum of 10 years.

Markings

Certain **markings** should also be present on the packaging, these are detailed in the following slides.

*For the competent authorities designated by each EU member state for the transport of dangerous goods:

- By road
- By sea

Inspections

The MEGC must undergo

- **an initial inspection**
- **periodic inspections, every 5 years**
- **intermediate inspections, every 2.5 years**
- **exceptional inspections** when the MEGC shows evidence of damaged areas

These inspections must be carried out by an inspection body, approved by the competent authority. The inspection body must issue a certificate if the inspections are satisfactory.

Advice for PDA teams

Ensure your MEGC has a valid type approval certificate when purchased.

The inspections of the MEGCs require an inspection body, approved by the competent authority. Ensure your region has this in place to prevent delays. As an example, the UK and French government website have lists of appointed inspection bodies:

- UK appointed inspection bodies
- French appointed inspection bodies

Multiple Element Gas Containers (MEGCs)

Markings

The following should be marked onto the packaging:

- "1049" and "HYDROGEN, COMPRESSED"
- The maximum filling mass and tare of receptable **or** the gross mass
- The year of the next periodic inspection

The label shown on the right shall also be present on the packaging and on placards affixed to both sides and at both ends of the MEGC,

Configuration for labels

Configuration for placards

2. Regulations and documents needed for the transportation of hydrogen by road

Transport documents

Driver training

All drivers must have a certificate showing they have passed the examination required for their respective training course.

Drivers must attend a **basic training course** (18 teaching units). The drivers must attend an additional **specialisation training course** (12 teaching units) if:

- The vehicle contains fixed or demountable tanks with a total capacity exceeding 1m^3.
- The vehicle is a battery-vehicle with a total capacity exceeding 1m^3.
- The vehicle contains tank containers, portable tanks of MEGCs with a total capacity exceeding 3m^3.

The certificate is only **valid within 5 years of the training course**; a refresher course must be taken after the 5-year period.

New training courses are approved by competent personnel and must be submitted with the following documents:

- A detailed training programme.
- Qualifications and fields of activities of the teaching personnel.
- Information of the premises and facilities.
- Conditions of participation in the courses

Inspections

In order to transport hydrogen, the transport vehicle must be inspected annually. A certificate of approval must then be issued by the competent authority if the vehicle is found to be compliant.

Advice for PDA teams

The annual inspections are ADR compliant and should be already implemented in your region for the transport of other dangerous goods.

A training course for drivers may not be set up in your country or region, we recommend that you check with the competent authority early, as the creation of a new course can delay your project timeline.
Some governments have documents detailing the necessary steps to create a new course, e.g. France.

Summary of documents required for the transport of hydrogen by roads

Needed by	Document	Validity period	Advice for regions
Containers	Type approval	10 years	Ensure your MEGC complies with type approval by your competent authority.
	Inspection certificates	Intermediate inspection: 2.5 years Periodic inspection: 5 years	The inspections require an inspection body, approved by the competent authority. Ensure your region has this in place to prevent delays.
Vessel	Certificate of approval	1 year	Ensure inspection bodies are set up in your region.
Crew	Driver training certificate	5 years	The training course may not be set up in the country/region - ensure these are set up early.

Find the competent authorities designated by each EU member state here: Country information (Competent Authorities, Notifications) | UNECE

3. Regulations and documents needed for the transportation of hydrogen by inland waterways or rail

Certificate of approval for transport by inland waterway

A certificate of approval is a required document to transport dangerous goods by sea. It is awarded by an inspection body after the vessel in question has been inspected and is found to be compliant with ADN. It is valid for no more than 5 years.

The following documents are required to apply for a certificate of approval:

- The vessel certificate
- The relevant inspection report

The certificate of approval must be complemented by an annex. If the certificate of approval could not be issued in time, but the vessel complies with the requirements laid out in the ADN, a provisional certificate of approval may be issued.
The model for the **certificate of approval**, the **provisional certificate of approval**, and the **annex to the certificate of approval** are provided in chapter 8.6.1 of the ADN.

Advice for PDA teams

Required inspections of the vessels must be carried out by inspection bodies. Check for these in your region.

Transport documents by inland waterway

An inspection of the insulation resistance of the fixed electrical installations and equipment and their earthing by **a person authorised by the competent authority** shall take place whenever the certificate of approval in renewed and within the third year from the date of issue of the certificate of approval.

Certificates concerning this should be carried on board.

Advice for PDA teams

Your regions should have people designated to carry out the required inspections. Lists of these inspection bodies can be found online.

The following should also be kept on board and stamped by the competent authority issuing the certificate of approval:

- A list or plan indicating the fixed installations and equipment suitable for use in zone 1.
- A list or plan indicating the fixed installations and equipment not authorized for use during loading and unloading, during a stay in the vicinity of, or within an onshore assigned zone
- A plan indicating the boundaries of the zones and the location of the electrical and non-electrical equipment installed in the relevant zones intended for use in explosion hazardous areas
- A list of these electrical and non-electrical equipment, along with their location and marking (explosion protection level, equipment category, or equivalent protection level)

Zone 0	Hydrogen exists permanently or during long periods
Zone 1	Hydrogen is likely to exist occasionally
Zone 2	Hydrogen is likely to exist rarely and only for short periods

Expert training for transport by inland waterways

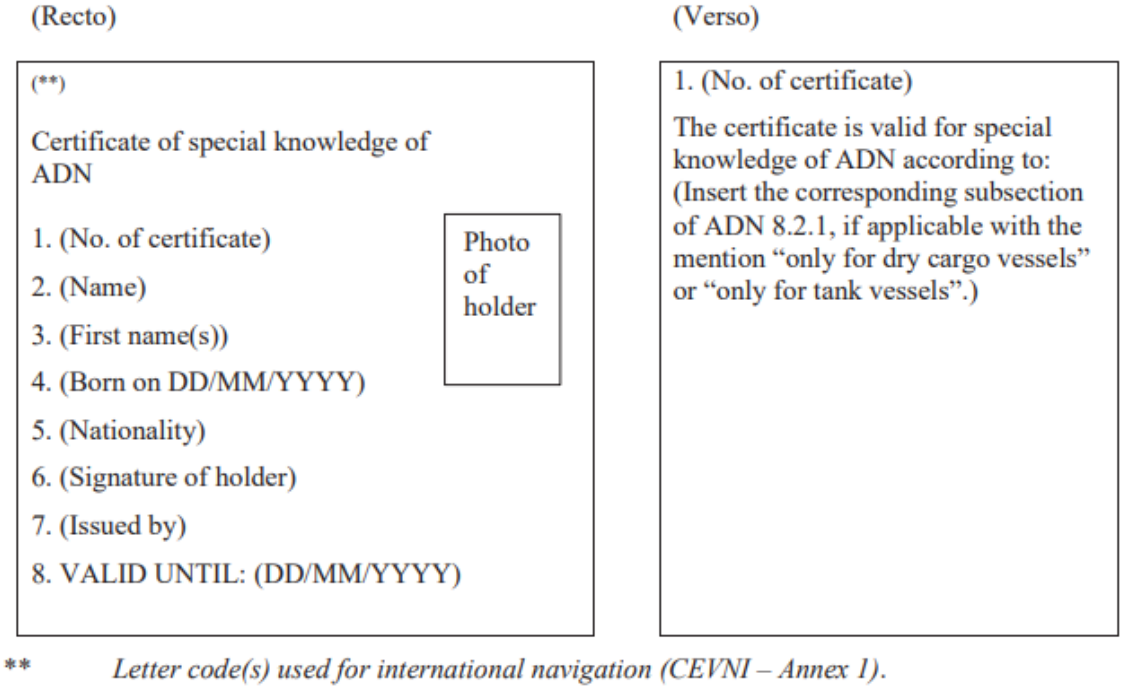
An expert must be present on board.

The expert must have obtained a certificate, shown right, certifying they have passed a qualifying ADN examination. For the carriage of gases, the expert shall also have attended a specialisation course.

The certificates are only **valid within 5 years of the training courses**, a refresher course must be taken after the 5-year period.

New training courses are approved by the competent authority and must be submitted with the following documents:

- The detailed course curriculum.
- Qualifications and fields of activities of the training instructors.
- Information of the classrooms, teaching materials and facilities.
- Conditions of participation in the courses (e.g. number of participants)
- A detailed plan for final tests



(Recto)

(**)

Certificate of special knowledge of ADN

1. (No. of certificate)
2. (Name)
3. (First name(s))
4. (Born on DD/MM/YYYY)
5. (Nationality)
6. (Signature of holder)
7. (Issued by)
8. VALID UNTIL: (DD/MM/YYYY)

Photo of holder

(Verso)

1. (No. of certificate)

The certificate is valid for special knowledge of ADN according to: (Insert the corresponding subsection of ADN 8.2.1, if applicable with the mention "only for dry cargo vessels" or "only for tank vessels".)

** *Letter code(s) used for international navigation (CEVNI – Annex 1).*

Certificate of special knowledge of ADN

Advice for PDA teams

Check for training courses in your region/country, these might have to be created, which should be done as early as possible in the project timeline. As previously, some governments provide documents detailing the necessary steps to create a new course, e.g. France.

Safety Advisor training for transport by rail

A safety advisor must be present on-board trains carrying dangerous substances.

An advisor shall hold a vocational training certificate, valid for transport by rail. That certificate shall be issued by the competent authority or the body designated for that purpose by each RID Contracting State.

The certificate shall be valid for five years. The period of the validity of a certificate shall be extended by examination after five years.

The certification must be made by a competent authority, listed by the Intergovernmental Organisation for International Carriage by Rail (known as OTIF). OTIF are responsible for the regulation of international railway transport.

The competent authority or an examining body designated by the competent authority shall invigilate every examination.

All examination documents shall be recorded and kept as a print-out or electronically as a file

1.8.3.18 Form of certificate

Certificate of training as safety adviser for the transport of dangerous goods

Certificate No: .....

Distinguishing sign of the State issuing the certificate: .....

Surname: .....

Forename(s): .....

Date and place of birth: .....

Nationality: .....

Signature of holder: .....

Valid until ..... for undertakings which transport dangerous goods and for undertakings which carry out related consigning, packing, filling, loading or unloading:

☐ by road

☐ by rail

☐ by inland waterway

Issued by: .....

Date: .....

Signature: .....

Certificate of special knowledge of ADN

Advice for PDA teams

Check for approval bodies from OTIF in your region/country.

Summary of requirements for transport of hydrogen by inland waterway or by rail

	Document	Validity period	Advice for regions
Containers	Type approval	10 years	To be issued by the competent authority, ensure your MEGC complies with this.
	Inspection certificates	Intermediate inspection: 2.5 years Periodic inspection: 5 years	The inspections require an inspection body, approved by the competent authority. Ensure your region has this in place to prevent delays
Vessel/Wagon	Certificate of approval	3 years	This requires an inspection body to inspect the vessel, ensure your region has these in place
	Inspection certificates	To be renewed when the certificate of approval is renewed	Inspectors should be already present in your region, check whether this is the case
Crew	Expert training certificate	5 years	The training course may not be set up in the region, ensure these are set up early

Find the competent authorities designated by each EU member state here: For inland waterway Country information (Competent Authorities, Notifications) | UNECE; for rail Competent Authorities of the Member States

Advice for PDA regions
European-level guidance on the transport of hydrogen by rail is limited – if your project involves transporting hydrogen by rail contact your competent authority for specific guidance

Content

Design standards for refuelling stations

The Alternative Fuels Infrastructure Directive (AFIR)

The 2014 Alternative Fuels Infrastructure Directive and the subsequent amendment, the Commission Delegated Regulation 2019/1745, specify the European standards for the building and renewing of refuelling stations, these are shown in the table below.

	Standard	Scope
Interoperability requirements for hydrogen refuelling points	EN 17127	This standard covers the interoperability of design, construction, operation, inspection and maintenance of stations for fuelling gaseous hydrogen to vehicles.
Quality of hydrogen dispensed by hydrogen refuelling points	EN 17124	This standard covers the quality characteristics of hydrogen fuel and the corresponding quality assurance in order to ensure uniformity of the hydrogen product. It sets a minimum hydrogen purity requirement for fuel cells, and maximum concentration of contaminants.
Fuelling algorithms employed by hydrogen refuelling points	EN 17127	This standard covers the interoperability requirements for hydrogen refuelling points.
Connectors used by motor vehicles for the refuelling of gaseous hydrogen	ISO 17268	

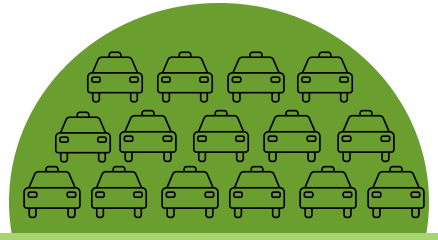
Advice for PDA teams

If using hydrogen for mobility you may need to use a **purification process** to achieve the required purity. This is particularly relevant to non-electrolysis hydrogen and hydrogen transported via gas grids. When designing project scope, consider whether purification equipment will be required.

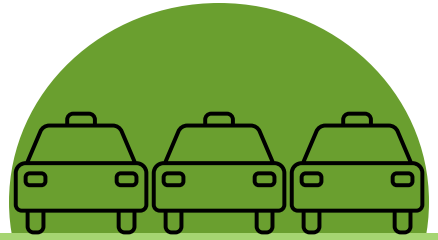
Content

Type approval for hydrogen fuelled vehicles

To use a hydrogen fuelled vehicle on the road, it must be type approved. Type approval is to ensure that vehicles meet EU standards for safety, environmental and conformity of production. The EU Type Approval Regulations can be found here.



European Community Whole Vehicle Type Approval (ECWVTA)
Any mass-manufactured vehicles from Europe, should have the required European type approval. Manufacturers should have a certificate of conformity which shows that the vehicle conforms to EU type approval requirements.



EU or National Small-series type approval
For vehicles manufactured in smaller quantities, a limited number can have standards approved at a lower cost. This is important for vehicles with new technologies such as hydrogen vehicles. Numbers must not exceed the quantitative annual limits.

Individual type approval
Member States will grant an EU individual vehicle approval for a vehicle that complies with the requirements. This is particularly relevant in the case of retrofitting of existing vehicles. National individual type approvals will only be valid within the Member State of approval.

Each Member State has an approval authority. Consult this document to identify the approval authority if the vehicles used in your project will require small-series or individual type approval.

Content

Training for local emergency services and first responders

Currently in Europe, there is no formalised hydrogen safety training for emergency response personnel.

However, following a collaboration between the European Union and the Clean Hydrogen Partnership, a guide for European Emergency Response was published, which is publicly available on HyResponder website. The International Curriculum on hydrogen safety training for responders can also be a basis for understanding and approval.

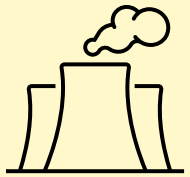
The guide can be used by emergency responders as a guide for action between the initial call until resolution of the incident. It can support decision-making personnel who have previous knowledge of emergency response operations and procedures.

PDA regions should inform their local fire brigade of the planned project and the resources available to support their understanding of how to respond to hydrogen incidents

Content

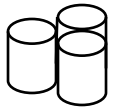
Conclusion

The novelty of hydrogen projects can make it hard for small national and regional regulatory bodies to provide quick approval. Engaging early and providing information on the project and relevant regulation will help minimise delays when the projects are ready to be submitted for permitting.



For the production, storage, or combustion of hydrogen

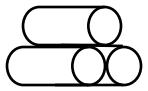
> 5 tonnes:
- Notification
- MAPP



≥ 50 tonnes:
- Safety report
- External & internal emergency plans

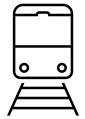
Approval can take 13 months – plan project timelines around this

For the transport of hydrogen by rail, road, or waterways



MEGCs
- Type approval
- Inspections

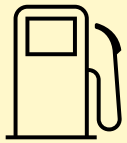
Road
- Approval certificate
- Training certificate



Rail

Sea
- Approval certificate
- Inspection certificate
- Training certificate

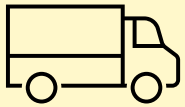
Ensure all inspection bodies and training courses are set up to prevent delays



For the building of refuelling stations

Standards ensure the interoperability of refuelling stations

For non-electrolysis hydrogen and hydrogen transported using gas grids, a purification stage may be necessary for hydrogen used in mobility.



For the use of hydrogen fuelled vehicles

Mass manufactured

Ensure vehicles are type approved

Smaller scale or retrofitted

Ensure regulatory body prepared to provide small series / individual vehicle type approval

Clean Hydrogen Partnership

Co-funded by the European Union

Useful Links:

HyLAW Online Database
Contains legislation and regulation relevant to fuel cell and hydrogen applications.

European Hydrogen Observatory
Provides data and up-to-date information about the European hydrogen sector, including public funding for low-carbon hydrogen projects.