



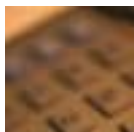
KnowH₂OSM

Hydrogen safety training for handling, design and operation

At Air Products, we are focused on human and product safety and respect for the environment. Nothing is more important than safety—not sales, not production, not profits. It's a commitment we all share.



Our team of hydrogen safety experts gives you access to decades of design and operating experience in virtually every application for hydrogen, including fuel cells.



Course Information

Presenters

Specially trained Air Products' industry engineers who are highly knowledgeable experts in the safe use of hydrogen in a variety of industrial applications.

Customization

We can customize this course to meet your needs by focusing on safety aspects specific to your operation. Examples include hands-on equipment training, operational safety and hazards review, operational readiness inspection, etc.

The full course takes two days. A condensed, one-day version is also offered. Schedules are arranged to suit your needs.

Experience and Capabilities

You may already know us as the world's leading supplier of merchant hydrogen and as the sole provider of liquid hydrogen to America's Space Shuttle missions. We are a leader in all aspects of the worldwide hydrogen market and have built hundreds of hydrogen installations for customers worldwide. Here is a summary of our capabilities:

- Industry leader in hydrogen safety engineering
- Global leader in hydrogen production and distribution
 - Initiated supply in mid-1950s
 - Largest merchant hydrogen producer worldwide
 - Over 1,200 hydrogen installations worldwide
 - More than 340 miles of hydrogen pipeline systems worldwide
- Over 3,000 tons per day of hydrogen production
- Industry leader in hydrogen fueling stations for clean transportation applications
- Commercial developer, supplier, and operator of turnkey hydrogen on-site plants
- Developer of new technologies and systems for hydrogen purification, generation, and handling.
- Provider of hydrogen purification equipment
- Leading transporter of cryogenic liquid hydrogen in tankers and containers

Air Products has been twice honored with the prestigious Lammot duPont Safety Award for demonstrating exceptional safety improvement over a five year-period.



Safety is Paramount

At Air Products, we are focused on human and product safety and respect for the environment. Nothing is more important than safety—not sales, not production, not profits. It's a commitment we all share.

We design and operate gas facilities worldwide to the highest safety standards. We have earned more safety-related awards than any other industrial gas company. Year after year, we stand among the top performers of the American Chemistry Council (ACC). As a member of the ACC's Responsible Care® program, we take pride in being the first industrial gas company in the U.S. to have successfully completed a third-party Management Systems Verification of its environmental, health, and safety processes.

Throughout Europe, we have won several EIGA (European Industrial Gas Association) Awards for outstanding performance in health and safety.

Working with the UK Chemical Industry Association, Air Products played a key role in establishing certification for safety, health and environmental management systems.

an industry leader

hydrogen safety KnowH₂ow

Course Description

With the rapid commercial advancement of fuel cell systems, most companies involved in this revolutionary development are being introduced to a new potential fuel—hydrogen. It is critical to the safe, global introduction of hydrogen for fuel cell applications that all participants know and understand the special properties of hydrogen. This will help ensure the safe handling, design, and operation of hydrogen-based systems.

Our team of hydrogen safety experts, led by Dr. James Hansel, reflects decades of design and operating experience in hydrogen production and handling, have prepared this two-day course. To focus on hydrogen safety concerns, we'll use interactive education techniques such as:

- Discussions augmented by slides
- Videos highlighting hazards, procedures, and actual incidents
- Awareness checks reinforcing key concepts

We strongly encourage questions and discussion regarding site-specific issues. Each attendee receives a KnowH₂ow™ course book.

How You Benefit

- Learn properties and hazards associated with hydrogen.
- Recognize potentially unsafe design elements
- Identify sources of contamination, leakage, and ignition
- Discover critical system inspection methods
- Understand key commissioning activities

- Learn personal protective equipment uses & safe practices
- Learn about standards & codes
- Understand emergency response training needs
- Explore comparisons with other fuels

Who Should Attend

- Design and consulting engineers
- Operation and maintenance personnel
- Plant and corporate safety staff
- Laboratory and R&D technicians
- Supervisory and other related personnel
- Outside safety support services

Our diverse team of instructors will customize KnowH₂ow™ Safety Training to match your operation's specific requirements.



H₂

fuel cell systems



Registration

To register/inquire:

Telephone: 1 800 704-8343 (USA)

Email: KnowH2ow@apci.com

Fax: 1 610 481-5036

registration





KnowH₂ow

Course Content

1. Hydrogen Properties

Key hydrogen properties and their link to safety concerns

2. Hydrogen Production and Applications

Plant production, distribution, and industrial applications

3. Approach to Hydrogen Safety

Outstanding safety record of hydrogen industry, quantified risk analysis, modern safety approach in hydrogen and other industries

4. Hydrogen Safety Hazards

Elements of fire, fire triangle, flammability properties & flammability envelope of hydrogen and other fuels

5. Leaks and Releases of Hydrogen

Comparison of leakage properties, indoor/outdoor releases, continuous leaks, and combustion factors

6. Hydrogen System Design Considerations

Piping design, material selection, valve design, designing for leak prevention and control of releases

7. Operating Practices

New approaches to handling leak detection, sweep airflow, new integrated hydrogen sensors & electrical classification

8. Awareness Checks

Design, protective equipment, operating procedures, PPE

9. System Piping Design

Prevention of hydrogen leaks, material compatibility, positive shut off, leak impingement, codes, electrical grounding

10. Leak Detection Equipment

New generation rapid response leak detectors, diverse operating environments, low ppm hydrogen detection

11. Laboratory Systems*

Hoods and ceiling leak detection, alarm settings, convective flows, walk-in hoods, hydrogen inventory levels

12. Liquid Hydrogen*

Cryogenic liquid hazards, volumetric expansion, valve and control system design, materials of construction

13. Vehicle and Refueling System Safety*

Differences in hydrogen plant and refuel station safety, zero leak tolerance, electrical requirements, component wear and tear

14. Hydrogen vs. Natural Gas*

Significant differences between hydrogen and other fuel properties, highlights of the differences in system design and operation

15. Emergency Response

Training needs, first aid, SCBA, evacuations, gas release vs. liquid release, response to fire

16. Personal Protection

Permits, purging systems, operating procedures, personal protection equipment & Nomex® clothing requirements

17. Standards and Codes

NFPA, CGA, ASME, ASTM and company-established standards

18. Literature

MSDS, Safetygrams, Air Products Fact Book, NFPA & CGA safety guidelines, Air Products product safety website



We believe there is no substitute for using interactive education techniques to best focus on hydrogen and other safety concerns.

*Optional Modules

About Air Products

We started small and we started nearly 60 years ago. Our company was the vision of Leonard Pool, who grew the business by really understanding what his customers wanted from hydrogen and other industrial gases. Our growth has been fueled by an ongoing dedication to technical innovation and strong business management

Today we're a \$5 billion company with 17,000 employees in 30 countries, making chemicals, gases and related equipment, but the same principles apply—we've grown by building lasting relationships with our customers. We pride ourselves on being able to help our customers reduce costs, increase productivity, and improve product quality through innovative industrial gas supply and applications technology.

We will be happy to assist you in meeting your hydrogen and other industrial gas needs.

tell me more
www.airproducts.com

Find Out More

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hydrogen safety

