TLM Level 2 Award in Introduction to Hydrogen Safety Practises

The Introduction to Hydrogen Safety Practises qualification aims to assist individuals in the Gas and Hydrogen infrastructure industry, whether already working or aspiring to do so, by demonstrating their comprehension of maintaining safety standards and recognising the importance of safety in hydrogen-related work. This qualification encompasses the necessary knowledge to ensure a secure working environment in the presence of hydrogen.

The Regulated Qualifications Framework (RQF) was designed by the UK government's Qualifications and Curriculum Development Agency now replaced by Ofqual. The RQF is referenced to the European Qualifications Framework devised by the European Union

The assessment model for the qualifications presented in this publication was designed by TLM in consultation with Andy Lord founder and CEO of WAWWA

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1. For those in a hurry!

Please read the rest of the book later as the details are important!

1.1	TLM's assessment model is common to most of its qualifications. It is based on competence-based assessment of coursework using a portfolio of evidence and supported by a free optional cloud-based evidence management system.
1.2	Learners must demonstrate competence against the assessment criteria from their day-to-day work and the tutor assessor must verify that they are competent in relation to the general level descriptor using indicative assessment criteria. TLM's external moderator will check the judgements and the quality of the evidence and provide feedback. This process is not graded, the intention is that it is a flexible way of checking basic practical competence in the subject at the qualification's framework level.
Procedures	
1.3	The first thing to do is to arrange assessor training with TLM. TLM trains at least one assessor as Principal Assessor who must accept responsibility for standards within the Centre. The Principal Assessor can train and appoint assessors within the Centre as long as they are competent to take on the work and are willing to sign an agreement on the web site to uphold standards.
1.4	TLM will provide initial training in the pedagogical model, and using the supporting technologies to provide the evidence needed. The purpose is to get you started and then we provide on-going support to ensure you are confident and we can work as a professional partnership. We advise new Centres to do some coursework assessment early so that they can receive feedback and quickly become confident in doing routine coursework assessment. Our aim is to make this no more onerous than normal routine assessment that anyone would do as a normal part of the teaching job. This gives more time to focus on teaching and therefore to support raising attainment.

2. Introduction

The Level 2 Award in Introduction to Hydrogen Safety Practises is designed to support professionals in, or striving to work within the Gas and Hydrogen infrastructure industry in demonstrating their understanding in how to maintain standards and understand the needs to be safe when working with hydrogen. Covering the knowledge needed to work safely within this dangerous environment.

They give learners the opportunity to:

- engage in learning that is relevant to them and that will provide opportunities to develop a range of skills and techniques, personal skills and attributes essential for safe working practises
- achieve a nationally-recognised Level 2 qualification
- develop their own personal growth and engagement in learning.

2.1 Level 2 Award in Introduction to Hydrogen Safety Practises

The objective of the qualification is to prepare learners with the knowledge and confidence to develop their own skills.

Mandatory
Unit 1 – Hydrogen Fundamentals (2 credits).
Unit 2 – Introduction to Hydrogen Safety (3 credits)

3. Summary of Qualification Specification

3.1 Level 2 Award (Annexe A)

The Level 2 Award is a qualification designed to support professionals in, or striving to work within the Gas and Hydrogen infrastructure industry in demonstrating their understanding in how to maintain standards and understand the needs to be safe when working with hydrogen. Covering the knowledge needed to work safely within this dangerous environment.

Qualification Title: TLM Level 2 Award in Introduction to Hydrogen Safety Practises
Qualification Number: 610/3052/1
Qualification Level: Level 2
Total Credits: 5
Guided Learning Hours: 30
Total Qualification Time:50
Assessment Methods: Coursework, E-assessment, Portfolio of Evidence

Assessment
Learners must demonstrate competence against the assessment criteria from their communication and involvement with the training materials and the trainer assessor must verify that they are competent in relation to the general level descriptor using indicative assessment criteria. TLM's external moderator will check the judgements and the quality of the evidence and provide feedback. This process is not graded, the intention is that it is a flexible way of checking basic practical competence in the subject at the qualification's framework level.
Mandatory Unit: Unit 1 – Hydrogen Fundamentals (2 credits).
Mandatory Unit: Unit 2 - Introduction to Hydrogen Safety (3 credits)

3.5 Assessment

The internally assessed, externally moderated coursework for all qualifications is pass/fail but by submitting the evidence for external moderation, feedback can be given to the tutor on areas to improve for resubmission.

Evidence must be provided against the unit assessment criteria from practical tasks related to the learners' everyday work supported by tutor observations, portfolio completed, and or activities inline with the learning materials

The way evidence is gathered is up to the assessor, the only requirement is that it clearly supports the judgements against the assessment criteria and the relevant learning outcomes.

If on formative assessment the account manager finds gaps in evidence relating to a particular candidate, they will request more evidence before approving the award or the unit certificate. Assessors must then adjust their work to ensure all their learners are providing the appropriate level and breadth of evidence.

We encourage early submission of at least some evidence so that assessors are confident from the feedback that what they are providing is sufficient. In this way we can maintain standards while supporting improved efficiency.

Centres will be subject to the TLM Centre Assessment Standards Scrutiny (CASS) and further details of this, including our centre guidance, is freely available on the TLM website in our Policy Download Centre. https://tlm.org.uk/policy-download-centre/

4. Qualification Content

Mandatory	Optional (for reference)
5 CREDITS	**Samples Shown**
Unit 1 Hydrogen Fundamentals (2 credits). **Unit 2** Introduction to Hydrogen Safety (3 credits)	None

5. Support

	Guidance and Assistance
6.1	There is further guidance for coursework assessment on the TLM web site. All centres have an assigned Account Manager who will be pleased to help at any time. Our aim is to give professional assessors, most of whom are qualified tutors, the confidence to make judgements with a minimum of bureaucracy so that they can focus their time on maintaining their professional knowledge, skills and supporting learning through effective teaching rather than "chasing paper". There is often a confusion between bureaucracy and rigour, since unnecessarily complex bureaucracy can actually detract from rigour by obscuring the importance of the outcomes.
6.2	**Web sites** - TLM provides support through cloud-based systems. Providing assessment grades and the management of certification through the Markbook Site is mandatory and all assessors are provided with training in its use. It is simply a matter of recording learner competence against the unit criteria as the evidence is collected and claiming a certificate on behalf of the learner when a unit has been fully assessed.
6.3	The **community learning site** provides free optional facilities for learners to submit their evidence online, linking it to the assessment criteria across single or multiple units. The assessor can accept or reject this evidence and comment on it providing a full audit trail for evidence. Moderator/verifiers can get immediate access to this evidence and so it is potentially a lot more efficient than alternative methods. No paper, no e-mails with file attachments necessary. There are facilities for progress tracking that can be based on criteria and/or units. The system can be linked as an extension to any standards compliant VLE/e-portfolio system for centres that are already committed to a specific VLE product. Training can be provided, and free support is available from your Account Manager. The aim is to eliminate all paper-based bureaucracy, all screen-shots and referencing that draws time away from teaching.
6.4	**Telephone** and e-mail support are available to all Centres. There is a general convention of first-name.secondname@tlm.org.uk for e-mail addresses. It is usually best to e-mail your account manager in the first instance. Google hangouts can be arranged for video conferencing support.

6. Registration & Procedures

	Registration
7.1	TLM's registration model allows centres to enter learners at times convenient to them. There are no late entry fees and no additional fees should a learner fail to produce evidence at a level but can meet the criteria at a lower level. This can reduce costs to the centres when compared to other qualifications There are no fees for replacement certificates or verification of certificates because all certificates can be directly authenticated against TLM's secure database. For details of current subscription costs please contact us or refer to the web site.
	Internal standardisation
7.2	The Principal Assessor has the ultimate responsibility for consistency in assessment standards within a centre. All assessors have signed a contract agreeing to uphold standards and should therefore co-operate with the Principal Assessor and Account Manager at TLM to ensure that standards across the centre are consistent. It is advisable to send work samples to TLM early to check that evidence is at the right standard so that there is time to make any adjustments necessary to the course and learner expectations. TLM will generally check a higher quantity of work from new assessors and feedback to ensure that they are confident to make appropriate judgements over time. This reduces risk and improves efficiency in the longer term.
	Authentication
7.3	All assessors must take reasonable steps to ensure that any coursework evidence submitted by candidates is a true reflection of the candidates' competence. This is in keeping with the assessor undertaking to uphold and maintain standards in the contract with TLM.
7.4	Certificates can be authenticated directly on-line using the certificate number or by scanning the QR code on the certificate. There is no charge and it makes it more likely that certificates will be checked and that in turn improves security. Certificate forgeries are a significant problem when authentication is not simple and straightforward because convincing forgeries are easy to achieve with recent technologies and will get easier as time goes on.

7. Other Considerations

	Access arrangements and special requirements
8.1	All TLM's qualifications are intended to be accessible, as widely as possible. There is an extensive policy documented on the web site at https://tlm.org.uk/policy-download-centre/ Centres should contact TLM if they have any questions related to accessibility issues.
	Language
8.2	The language for provision of this qualification is English only. This will only change if we have a significant demand in another language that is sufficient to cover the additional costs involved.
	Malpractice
8.3	TLM has comprehensive policies and procedures for dealing with malpractice. These are documented with links on the web site at https://tlm.org.uk/policy-download-centre/ Assessors should be familiar with these policies and make them clear to candidates. Assessors should inform their account manager if they suspect any instance of malpractice that could have a material effect on the outcome of any assessments, either for themselves or colleagues. This is part of the upholding of standards that is part of the contract with TLM.
	Equality of opportunity
8.4	TLM promotes equality of opportunity through policies and procedures. These are again documented in detail on the web site at https://tlm.org.uk/policy-download-centre/
	Resources, Support and Training
8.5	A clear goal is to enable learners to support all their IT user needs using resources freely and legally available from the internet. This is related directly to national policies for inclusion and equality of opportunity. The reality is that there is so much user dependence on proprietary applications that we can only support the transition to free and open resources through education and common sense.
8.6	TLM does not require centres to use Free and Open Source applications but it certainly encourages them to do so. Most of the key software applications needed to support any of the assessed units are available freely from the web including office suites, graphics and sound editing. As a nation we could save hundreds of millions if not billions of pounds in software licensing fees by providing users with the skills, knowledge and confidence to migrate to free and open source applications. You Tube, OpenClipart.org, Wikipedia and many other sites provide free content that supports learning and the number and range of such sites is increasing.

Annexe A

Level 2 Award in Introduction to Hydrogen Safety Practises - Unit assessment - coursework guidance

The **Level 2 learner** reflects the ability to select and use relevant knowledge, ideas, skills and procedures to complete well-defined tasks and address straight-forward problems. It includes taking responsibility for completing tasks and procedures and exercising autonomy and judgment subject to overall direction or guidance. AND/OR Holder can select and use relevant cognitive and practical skills to complete well-defined, generally routine tasks and address straightforward problems. Holder can identify how effective actions have been. Holder can identify, gather and use relevant information to inform actions.	**Moderation/verification:** The assessor should keep a record of assessment judgements made for each candidate and make notes of any significant issues for any candidate. They must be prepared to enter into dialogue with their Account Manager and provide their assessment records to the Account Manager through the on-line mark book. They should be prepared to provide evidence as a basis for their judgements should it be required by the Principal Assessor or their Account Manager/external moderator. Before authorising certification, the Account Manager must be satisfied that the assessor's judgements are sound.

General Information

The Level 2 qualification has the following characteristics for learners:

- Achievement at RQF level 2 (EQF Level 3) reflects the ability to select and use relevant knowledge, ideas, skills and procedures to complete well-defined tasks It includes taking responsibility for completing tasks and procedures and exercising autonomy and judgement subject to overall direction or guidance.
- Use understanding of facts, procedures and ideas to complete well-defined tasks and address straightforward problems. Interpret relevant information and ideas. Be aware of the types of information that are relevant to the area of study or work.
- Complete well-defined routine tasks. Use relevant skills and procedures.
- Select and use relevant information. Identify whether actions have been effective. Take responsibility for completing tasks and procedures subject to direction or guidance as needed.

- The specification for the Level 2 award provides an outcome framework for assessment and is not intended to dictate any particular context for learning and so can be used with any age range of adults.

Requirements

- Standards must be confirmed by a trained Level 3 Assessor
- Assessors must as a minimum record assessment judgement as entries in the on-line mark book on the TLM certification site.
- It is expected that there will be routine evidence of work used for judging assessment outcomes in the candidates' records of their day to day work. Samples, including related plans and schemes of work should be available at the annual visit and/or by video conference.
- Different approaches to learning will be required in order to match differing needs, for example, the needs of learners will be different from the needs of those with learning disabilities.
- When the candidate demonstrates secure capability against each of the criteria in the unit, they are entitled to a certificate for passing the unit and the overall award.
- We expect at least 7 hours of guided study to be under-taken for the certificate for complete beginners generally new to formal education, but discretion can be used to take account of prior learning where this is sensible in individual cases. In terms of making the certificate, what matters is outcomes. Can the candidate securely meet the criteria?

Mandatory Unit 1 – Level 2, Unit 1 – Hydrogen Fundamentals

1. Understand the production and properties of hydrogen	**2. Understand the requirement for safe storage and transportation of hydrogen**	**3.Understand current hydrogen policies and the benefits of hydrogen adoption**
1.1 I can describe the characteristics and behaviour of hydrogen.	2.1 I can identify the safety concerns in transporting hydrogen.	3.1 I can describe the key climate and energy targets and how they relate to hydrogen.
1.2 I can describe what an energy carrier is.	2.2 I can describe the challenges for hydrogen storage and transportation.	3.2 I can identify any relevant regulations and legislation that relate to hydrogen as an energy carrier.
1.3 I can identify hydrogen as an energy carrier.	2.3 I can identify regulatory requirements for storing or transporting hydrogen.	3.3 I can describe the potential of including hydrogen as part of an energy infrastructure.
1.4 I can compare hydrogen to other energy carriers and identify the benefits of its use.	2.4 I can describe the safety protocols needed when transporting or storing hydrogen.	3.4 I can describe the opportunities and challenges for the use of hydrogen.
1.5 I can describe the processes for hydrogen production.		

Mandatory Unit 2 – Level 2, Unit 2 – Introduction to Hydrogen Safety

1. Know the principles of risk assessment in the context of safe storage and transportation of hydrogen.	**2. Know the importance of safe manual handling in the workplace, specifically in relation to the storage and transportation of hydrogen**	**3. Understand the risks to health associated with working with hydrogen**	**4. Know the importance of working around hydrogen safely.**
1.1 I can describe the objective of conducting risk assessments and method statements specifically for hydrogen storage and transportation.	2.1 I can explain the reasons for prioritizing safe manual handling in the workplace, particularly when dealing with hydrogen storage and transportation	3.1 I can identify the primary categories of substances classified as hazardous to health according to current regulations.	4.1 I describe the potential ways in which injuries can occur due to the movement and storage of hydrogen
1.2 I can identify the legal obligations regarding risk assessments and method statements related to hydrogen storage and transportation.	2.2 I can identify the potential injuries and health issues that can arise from improper manual handling techniques in the context of hydrogen-related activities.	3.2 I can list the common health risks that can arise when working with hydrogen	4.2 I can explain the significance of having safeguards in place near areas where plant, machinery, and equipment are being used for hydrogen-related activities.
1.3 I can explain the consequences of failing to prevent accidents and illnesses in the workplace during hydrogen storage and transportation activities.	2.3 I can identify the responsibilities of employees as stipulated by current legislation and official guidance	3.3 I can explain the significance of proper storage practices for combustibles and chemicals.	4.3 I can describe the various methods to eliminate or control risks associated with working around plant, machinery, or equipment used for storage and transportation of hydrogen
1.4 I can identify typical hazards and potential risks associated with hydrogen storage and transportation	2.4 I can identify the importance of utilising site safety equipment while handling materials and equipment associated with hydrogen storage and transportation	3.4 I can identify the various types of personal protective equipment (PPE) that should be used when handling hazardous materials in order to mitigate risks to health.	4.4 I can identify the hazard warning signs and symbols commonly used when operating, working with, or in close proximity to hydrogen-related activities.

Teacher Guidance Notes

Level 2, Unit 1 – Hydrogen Fundamentals

1.1 I can describe the characteristics and behaviour of hydrogen.

Introduce the concept of hydrogen as an element. Explain its atomic structure, consisting of one proton and one electron. Discuss its position on the periodic table and its unique properties, such as being the lightest and most abundant element in the universe. Emphasize its combustible nature and how it reacts with oxygen to produce water. You can conduct demonstrations or experiments to showcase these characteristics, such as the classic hydrogen gas-filled balloon experiment.

1.2 I can describe what an energy carrier is.

Explain the concept of energy carriers, which are substances or systems that store and transport energy from one location to another. Examples of energy carriers include fossil fuels, electricity, and hydrogen. Discuss how energy carriers enable the conversion and utilization of energy in various forms. Use real-world examples to illustrate the role of energy carriers in everyday life, such as gasoline transporting energy for vehicles or electricity powering electronic devices.

1.3 I can identify hydrogen as an energy carrier.

Introduce hydrogen as a potential energy carrier by explaining how it can be used to store and release energy. Discuss its application in various sectors, such as transportation, industry, and energy storage. Highlight the advantages of hydrogen, such as its high energy content, clean combustion, and potential for producing zero-emission energy. You can provide case studies or examples of existing hydrogen projects and technologies to demonstrate its role as an energy carrier.

1.4 I can compare hydrogen to other energy carriers and identify the benefits of its use.

Compare hydrogen with other common energy carriers, such as fossil fuels, batteries, and biofuels. Discuss the advantages and disadvantages of each energy carrier, considering factors like energy density, availability, environmental impact, and efficiency. Facilitate discussions or debates where students can analyse and present their findings on the benefits of hydrogen as an energy carrier, such as its potential to reduce greenhouse gas emissions and dependence on fossil fuels.

1.5 I can describe the processes for hydrogen production.

Explain the various methods of hydrogen production, including steam methane reforming, electrolysis, and biomass gasification. Discuss the chemical reactions involved in each process and their energy requirements. Explore the different sources of hydrogen, such as fossil fuels, water, and renewable energy sources. Emphasize the importance of sustainable hydrogen production and its potential for integration with renewable energy systems. Provide visual aids, diagrams, or videos to help students visualize the production processes.

2.1 I can identify the safety concerns in transporting hydrogen.

Discuss the safety concerns associated with transporting hydrogen. Explain that hydrogen is a highly flammable gas and can form explosive mixtures when combined with air. Discuss the characteristics of hydrogen that make it challenging to handle, such as its low ignition energy and wide flammability range. Address potential risks, such as leaks, ignition sources, and the need for proper ventilation. Explore case studies or incidents related to hydrogen transportation to highlight the importance of safety measures.

2.2 I can describe the challenges for hydrogen storage and transportation.

Explain the challenges involved in storing and transporting hydrogen. Discuss the properties of hydrogen that make it difficult to handle, such as its low density and high diffusivity. Address the need for specialized storage and transportation infrastructure to ensure safety and efficiency. Discuss different storage methods, including compressed gas cylinders, liquid hydrogen, and solid-state storage technologies. Highlight the advantages and limitations of each method and their implications for transportation.

2.3 I can identify regulatory requirements for storing or transporting hydrogen.

Introduce students to the regulatory requirements and standards associated with storing and transporting hydrogen. Discuss international, national, and regional regulations that govern the handling, storage, and transportation of hydrogen. Explain the importance of regulatory compliance in ensuring safety and mitigating risks. Provide examples of regulatory bodies and standards that oversee hydrogen-related activities, such as the International Fire Code (IFC) or the National Fire Protection Association (NFPA) standards.

2.4 I can describe the safety protocols needed when transporting or storing hydrogen.

Teach students about the safety protocols and practices necessary for transporting and storing hydrogen. Discuss the importance of risk assessment, hazard identification, and mitigation strategies. Address topics such as leak detection, emergency response procedures, and the use of safety equipment. Explain the role of proper ventilation, grounding, and bonding in preventing static electricity-related incidents. Emphasize the need for training and certification of personnel involved in hydrogen transportation and storage.

3.1 I can describe the key climate and energy targets and how they relate to hydrogen.

Introduce students to key climate and energy targets, such as the Paris Agreement, Sustainable Development Goals (SDGs), or national renewable energy targets. Discuss the objectives of these targets, including reducing greenhouse gas emissions, promoting renewable energy, and achieving energy efficiency. Explain how hydrogen can contribute to these targets by serving as a clean and sustainable energy carrier. Explore case studies or examples where hydrogen has been integrated into strategies to meet climate and energy goals.

3.2 I can identify any relevant regulations and legislation that relate to hydrogen as an energy carrier

Teach students about the regulations and legislation that pertain to hydrogen as an energy carrier. Discuss policies and standards at the international, national, and regional levels that support or govern hydrogen production, distribution, and utilization. Examples may include government incentives, emissions regulations, safety standards, or renewable energy mandates. Encourage students to research and identify specific regulations or initiatives in their own country or region and discuss their implications for hydrogen adoption.

3.3 I can describe the potential of including hydrogen as part of an energy infrastructure.

Explain the potential of integrating hydrogen into existing energy infrastructures. Discuss how hydrogen can complement and diversify energy systems, including electricity grids and transportation networks. Explain the concept of a hydrogen economy, where hydrogen plays a significant role in meeting energy demands across multiple sectors. Address the potential for hydrogen to act as an energy storage medium, balancing intermittent renewable energy sources. Explore case studies or future scenarios where hydrogen infrastructure is being developed or piloted.

3.4 I can describe the opportunities and challenges for the use of hydrogen.

Engage students in a discussion about the opportunities and challenges associated with using hydrogen as an energy carrier. Address the opportunities, such as decarbonizing transportation, providing grid stability, and enabling renewable energy integration. Discuss the potential for job creation and economic growth in the hydrogen sector. Simultaneously, explore challenges like the high costs of production and infrastructure development, safety concerns, and the need for technological advancements. Encourage students to critically analyse the feasibility and potential trade-offs of hydrogen adoption.

Level 2, Unit 2 – Introduction to Hydrogen Safety

1.1 I can describe the objective of conducting risk assessments and method statements specifically for hydrogen storage and transportation.

Explain to students the importance of conducting risk assessments and method statements for hydrogen storage and transportation activities. Discuss how risk assessments help identify potential hazards, evaluate their severity, and implement appropriate control measures to mitigate risks. Emphasize the objective of ensuring the safety of personnel, facilities, and the environment during hydrogen-related operations. Discuss the role of method statements in providing step-by-step guidelines for safe procedures and ensuring consistency in working practices.

1.2 I can identify the legal obligations regarding risk assessments and method statements related to hydrogen storage and transportation.

Introduce students to the legal obligations associated with risk assessments and method statements for hydrogen storage and transportation. Discuss relevant health and safety legislation, regulations, or standards that govern these activities. Examples may include occupational health and safety laws, transportation regulations, or specific industry guidelines. Discuss the responsibility of employers and employees to comply with these legal requirements to ensure a safe working environment and prevent accidents.

1.3 I can explain the consequences of failing to prevent accidents and illnesses in the workplace during hydrogen storage and transportation activities.

Discuss the potential consequences of failing to prevent accidents and illnesses during hydrogen storage and transportation activities. Highlight the immediate and long-term impacts on individuals, the environment, and the organization. Discuss the potential for injuries, fires, explosions, or environmental damage resulting from improper handling or inadequate safety measures. Explore case studies or real-world examples to illustrate the seriousness of such incidents and their implications for human health, the environment, and organizational reputation.

1.4 I can identify typical hazards and potential risks associated with hydrogen storage and transportation.

Teach students about the typical hazards and potential risks associated with hydrogen storage and transportation. Discuss hazards such as flammability, high-pressure systems, cryogenic temperatures, and the release of hydrogen gas. Address risks related to leaks, ignition sources, inadequate ventilation, and incompatible materials. Encourage students to identify specific hazards and risks in different stages of hydrogen storage and transportation, including production, distribution, and end-use. Discuss control measures and best practices for mitigating these hazards and risks.

2.1 I can explain the reasons for prioritizing safe manual handling in the workplace, particularly when dealing with hydrogen storage and transportation.

Discuss the importance of safe manual handling in the workplace, with a specific focus on hydrogen storage and transportation. Explain that manual handling involves any activity where a person lifts, carries, pushes, pulls, or moves an object by hand or bodily force. Highlight the risks associated with improper manual handling, such as strains, sprains, musculoskeletal injuries, and accidents caused by dropped objects. Emphasize that safe manual handling practices reduce the risk of injuries, increase efficiency, and promote a safer working environment.

2.2 I can identify the potential injuries and health issues that can arise from improper manual handling techniques in the context of hydrogen-related activities.

Teach students about the potential injuries and health issues that can arise from improper manual handling techniques in the context of hydrogen-related activities. Discuss common injuries, such as back strains, hernias, sprained muscles, and repetitive strain injuries. Explain how lifting heavy hydrogen cylinders or equipment without proper technique can put excessive strain on the body. Discuss the long-term impact of musculoskeletal disorders and the importance of proper ergonomics and body mechanics to prevent such issues.

2.3 I can identify the responsibilities of employees as stipulated by current legislation and official guidance.

Introduce students to the responsibilities of employees as stipulated by current legislation and official guidance regarding manual handling in the workplace. Discuss relevant health and safety regulations and guidelines that outline employees' responsibilities, such as the Health and Safety at Work Act, local occupational health and safety legislation, or official guidance from regulatory bodies. Explain that employees have a duty to take reasonable care of their own health and safety and that of others affected by their actions or omissions.

2.4 I can identify the importance of utilizing site safety equipment while handling materials and equipment associated with hydrogen storage and transportation.

Discuss the importance of utilizing site safety equipment when handling materials and equipment associated with hydrogen storage and transportation. Explain that safety equipment, such as personal protective equipment (PPE), lifting aids, or mechanical handling equipment, is designed to reduce the risk of injuries and ensure a safe working environment. Discuss specific safety equipment relevant to hydrogen-related activities, such as gloves, goggles, harnesses, lifting straps, or equipment designed for handling hydrogen cylinders. Emphasize the need for proper training, maintenance, and use of safety equipment.

3.1 I can identify the primary categories of substances classified as hazardous to health according to current regulations.

Introduce students to the primary categories of substances classified as hazardous to health according to current regulations. Discuss common classification systems, such as the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) or relevant local regulations. Explain the different hazard classes, such as flammable substances, corrosive substances, toxic substances, carcinogens, mutagens, and substances harmful to the environment. Provide examples and discuss the potential health effects associated with each category.

3.2 I can list the common health risks that can arise when working with hydrogen.

Discuss the common health risks that can arise when working with hydrogen. Explain that hydrogen itself is not typically considered hazardous to health. However, when working with hydrogen, there may be associated risks due to factors such as its flammability, potential as an asphyxiant in high concentrations, or the presence of other hazardous substances used in conjunction with hydrogen (e.g., chemicals used in hydrogen production or storage). Address specific risks and potential health effects associated with hydrogen-related activities, such as fire and explosion hazards or exposure to hazardous chemicals.

3.3 I can explain the significance of proper storage practices for combustibles and chemicals.

Explain the significance of proper storage practices for combustibles and chemicals in the context of workplace safety. Discuss the importance of appropriate storage conditions, such as adequate ventilation, separation of incompatible substances, and proper labelling and signage. Emphasize the need to follow manufacturer instructions, regulatory requirements, and industry best practices when storing combustible materials and hazardous chemicals. Address the potential consequences of improper storage, such as increased fire risks, chemical reactions, or exposure hazards.

3.4 I can identify the various types of personal protective equipment (PPE) that should be used when handling hazardous materials in order to mitigate risks to health.

Introduce students to the various types of personal protective equipment (PPE) that should be used when handling hazardous materials to mitigate risks to health. Discuss the importance of PPE in providing a physical barrier between workers and hazardous substances. Address specific types of PPE relevant to the handling of hazardous materials, such as gloves, protective clothing, eye protection, respiratory protection, and footwear. Explain that the selection of appropriate PPE should be based on the specific hazards involved and consider compatibility with the substances being handled.

4.1 I describe the potential ways in which injuries can occur due to the movement and storage of hydrogen.

Discuss potential ways in which injuries can occur due to the movement and storage of hydrogen. Address hazards related to handling hydrogen cylinders, such as improper lifting techniques leading to strains or dropped cylinders causing impact injuries. Discuss risks associated with hydrogen leaks, fires, or explosions during transportation or storage. Explain the importance of proper training, safe handling practices, and adherence to safety protocols to mitigate these risks.

4.2 I can explain the significance of having safeguards in place near areas where plant, machinery, and equipment are being used for hydrogen-related activities.

Explain the significance of having safeguards in place near areas where plant, machinery, and equipment are being used for hydrogen-related activities. Discuss the importance of physical barriers, safety guards, and warning systems to prevent unauthorized access and protect personnel from moving parts or potential hazards. Emphasize the need for proper maintenance, regular inspections, and operator training to ensure the effectiveness of safeguards. Discuss the role of risk assessments and safe systems of work in determining the appropriate safeguards.

4.3 I can describe the various methods to eliminate or control risks associated with working around plant, machinery, or equipment used for storage and transportation of hydrogen.

Teach students about the various methods to eliminate or control risks associated with working around plant, machinery, or equipment used for the storage and transportation of hydrogen. Discuss engineering controls, such as ventilation systems, pressure relief devices, or automated safety features that reduce the likelihood of accidents. Explain administrative controls, including proper training, clear procedures, and effective communication. Discuss the importance of personal protective equipment (PPE) and its role in further mitigating risks.

4.4 I can identify the hazard warning signs and symbols commonly used when operating, working with, or in close proximity to hydrogen-related activities.

Introduce students to the hazard warning signs and symbols commonly used when operating, working with, or in close proximity to hydrogen-related activities. Discuss internationally recognized symbols, such as those outlined by the GHS, as well as any specific local or industry-specific symbols. Explain the meaning of various signs and symbols related to flammable materials, high-pressure systems, or hazardous chemicals. Encourage students to become familiar with these signs and symbols to promote safety awareness and effective communication in the workplace.