Unit 317HV: Understand cold water systems for industrial and commercial buildings

# Delivery guide

Unit information

This unit covers the knowledge and understanding of the installation and operating principles of industrial and commercial cold water systems. Learners will have an understanding of the purpose of Water Regulations and the impact this has on their work.

Learners will understand how to work in accordance with the current versions of the appropriate industry standards and regulations; the specification; industry recognised working practices; the working environment and the natural environment.

Learners may be introduced to this unit by asking themselves questions such as:

* How is cold water supplied to industrial and commercial buildings?
* What are the advantages and limitations of cold water systems?
* What are the different types of cold water system components and how are they applied?
* What are the industry standards and regulations relevant to cold water systems in industrial and commercial buildings?

Learning outcomes

1. Understand the requirements for cold water supplies to industrial and commercial buildings
2. Understand the operation, applications, advantages, and limitations of cold water systems
3. Understand the applications, advantages and limitations of system equipment, components, and accessories in relation to the working environment
4. Understand the appropriate industry standards and regulations relevant to installing cold water systems

Suggested resources

Textbooks

* Brown, R. (2014) BSRIA Illustrated Guide to Hot and Cold Water Services (BG 33/2014). Berkshire: BSRIA.  
  ISBN 978-0-8602-2736-6
* CIBSE (2014) *Guide G Public health and plumbing engineering*. CIBSE. ISBN 978-1-9068-4641-1
* Lloyd, S. (1998) BSRIA Illustrated Guide Cold Water Storage Tanks (TN 13/98). Berkshire: BSRIA. ISBN 978-0-8602-2504-1
* World Health Organization (2017) *Guidelines for Drinking-water Quality*. WHO. ISBN 978-92-4-154995-0
* Young, L. and Graham, M. (2000) *Water Regulations Guide. Water Regulations Advisory Scheme.* Stockport: WRAS.

ISBN 978-0-9539-7080-3

Websites

* [APHC | Support for Heating Contractors](https://www.aphc.co.uk/)
* [GOV.UK | The Water Supply (Water Fittings) Regulations 1999](https://www.legislation.gov.uk/uksi/1999/1148/contents/made)
* [Water Regs UK Limited | Water Regulations Guide](https://www.waterregsuk.co.uk/guidance/publications/water-regulations-guide/)

British Standards

* BS EN 805:2000. *Water supply. Requirements for systems and components outside buildings.*
* BS EN 806:2012. *Specification for installations inside buildings conveying water for human consumption (Parts 1–5).*
* BS 8558:2015. *Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages. Complementary guidance to BS EN 80*.
* BS 1710:2014. *Specification for identification of pipelines and services, including colour bandings.*

| **Learning outcomes** | **Criteria** | **Delivery guidance** |
| --- | --- | --- |
| 1. Understand the requirements for cold water supplies to industrial and commercial buildings | * 1. The sources of water supply to industrial and commercial premises | * Learners to understand the processes involved within the supply of potable water to the building. * Learners to know the sources of cold water within Wales and England and how it is distributed from these sources to the consumer. * Sources should include the following: * surface source * underground source * private source. |
| * 1. The methods of water filtration and treatments | * Learners to know how water is filtered and treated as part of the distribution process before it reaches the consumer. * Learners to know different types of filtration including: * Ultraviolet (UV), water softeners, osmosis sand bed filters. |
| * 1. The requirements for pipework entry to buildings | * Learners to be able to explain how the water supply enters a commercial and industrial property, the depths involved, valve arrangements on entry and how it passes through the substructure. * Learners to know the methods used to protect supply pipework against frost damage. * Learners to be aware of: * depth * pressures * boundaries * protection * relation to other services. |
| * 1. The types of suitable supply pipework materials | * Learners to know the types of supply pipework materials and their advantages. * Learners to be able to explain how older lead pipework should be removed and the jointing processes used in modern Polyethylene (PE) supply pipework. * Learners to know the methods for protecting metallic pipework from corrosion underground. |
| * 1. The methods used to make connections to the mains supply | * Learners to know the connection, valve and meter arrangements at the mains supply. * Learners to be able to explain how ferrules are used and the methods of connecting to live supplies using tapping tools. |
| 1. Understand the operation, applications, advantages, and limitations of cold water systems | * 1. The working principles of cold water systems | * Learners to know the system layouts of common commercial and industrial cold water systems within the building. * Learners to be able to identify why different systems are used and their advantages including: * direct * indirect * boosted. |
| * 1. The application of cold water systems relevant to building layout and use | * Learners to know the various system layouts and why various system types are best suited to a range of building uses and types. * Learners to research how these systems vary dependant on the building type such as: * commercial * industrial * agricultural * horticultural * leisure and entertainment * residential medical and care facilities * public services establishments and * pre-1919 traditional/historic buildings. |
| * 1. The advantages and limitations of various cold water system types | * Learners to be able to state the individual advantages of various cold water system types. * Learners to know the limitations of these systems and to be able to relate this to the type of building layout. |
| * 1. The installation requirements specific to cold water pipework within the building | * Learners to know the specific installation requirements for the installation of industrial and commercial cold water systems. * Learners to know and explain the: * pipework types * clipping and bracketry * routes and positions * typical sizes relevant to the range of systems and buildings discussed. * Learners to describe the installation requirements to protect against damage, contamination and condensation. |
| * 1. The methods to protect, insulate and identify cold water pipework | * Learners to be able to explain the methods available to protect cold water pipework, such as suitable locations, placing in containment and purpose-made ducts/voids. * Learners to know how insulation is used to protect against heat gain and condensation and the purpose of vapour barriers and phenolic blocks. * Learners to know the types of pipe identification methods – including what lettering is used – and to be familiar with BS 1710:2014 (specification for identification of pipelines and services, including colour bandings). |
| * 1. The types and installation requirements for cold water storage cistern | * Learners to be able to list the requirements for the installation of cold water storage cisterns to enable potable water storage in line with the Water Regulations. * Learners to know the types of cistern construction, their controls and associated components and locations. * Learners to be aware of the construction of Glass-reinforced Polyester (GRP) sectional cisterns and their sectional installation. * Learners to know level controls and connection dimensions to the cisterns as well as access and support. * Learners to know about break cisterns and their particular controls for height and low water levels for: * storage cisterns * break tanks * sectional * plastic * GRP. |
| * 1. The operation of rainwater and grey water harvesting systems and their components | * Learners to be able to explain the different types of water re-use systems and the different uses of these systems within the building. * Learners to know the storage methods for these systems and the controls and components associated with them. * Learners to know how these systems are treated and the quality of water supplied from them. |
| * 1. The advantages and limitations of rainwater and greywater harvesting systems | * Learners to be able to list the advantages and disadvantages of rainwater and greywater systems, as well as have an awareness of blackwater systems. * Learners to know how these systems offset the use of mains water and how they can be used together within the building. |
| 1. Understand the applications, advantages and limitations of system equipment, components, and accessories in relation to the working environment | * 1. Types of valves and components used within industrial and commercial cold water systems | * Learners to know the types of valves and components used within industrial and commercial cold water systems. * Learners to be shown and know about the operation of a range of valves and components for: * stop valves * gate valves * servicing valves * check valves * float operating valves * Reduced Pressure Zone (RPZ) * lever valves * butterfly valves * solenoid valves * non-return valves * drain cocks/drain off valves * pressure reducing valves/pressure relief valves * mixing/blending valves, pumps * level switches * pipeline switches * accumulator * drinking water header. |
| * 1. The position of valves and components used within industrial and commercial cold water systems | * Learners to not only know what the various valves and components are used for, but also where they are located within the system and the effect they have on the system in that location. This includes: * stop valves * gate valves * servicing valves * check valves * float operating valves * Reduced Pressure Zone (RPZ) * lever valves * butterfly valves * solenoid valves * non-return valves * drain cocks/drain off valves * pressure reducing valves/pressure relief valves * mixing/blending valves, pumps * level switches * pipeline switches * accumulator * drinking water header. |
| * 1. The advantages, limitations and requirements of valves and components used within industrial and commercial cold water systems | * Learners to be able to explain the advantages and limitations of the valves and components including: * pressure * material type * strength * resistance to flow * safety etc. |
| 1. Understand the appropriate industry standards and regulations relevant to installing cold water systems | * 1. The regulations, standards and guidance documents relevant to cold water systems | * Learners to describe where to find legislative, standards and guidance documents relevant to the installation of cold water systems. * Learners to know how these documents are used and whether they are regulated. * This should include: * The Water Supply (Water Fittings) Regulations 1999 * BS EN 806:2012.Specification for installations inside buildings conveying water for human consumption (Parts 1–5) * BS 8558:2015. Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages * Water Regulation Advisory Scheme (WRAS) * HSE Legionnaires' disease. The control of legionella bacteria in water systems (L8). |
| * 1. The purpose of the Water Regulations | * Learners to know the purpose of the Water Regulations. * Learners to know the scope of the Regulations and the main aims including the meaning of: * contamination * undue consumption * waste * misuse * erroneous measurement. |
| * 1. Fluid categories | * Learners to be able to recognise the different fluid categories associated with the Water Regulations. * Learners to be able to give examples of each and the risks associated with each. * Learners to know the basic backflow protection requirements attached to each fluid category. |
| * 1. The principles of legionella and the conditions which promote its growth | * Learners to be able to explain the dangers associated with legionella and the conditions in which it thrives. * Learners to be aware of the environments in which Legionnaires disease can be contracted and how it affects the body. * Learners to know the temperatures attached to legionella within systems and the building and pipework/appliance arrangements that may encourage growth. |
| * 1. The practices for the prevention of legionella | * Learners to know how water systems are treated to prevent legionella including storage cisterns. * Learners to know how pipework arrangements are located beneath hotter system pipework, where pipework is to be insulated and the removal of 'dead legs'. * Learners to know how some components, such as flexes and fire hose reels are restricted in some situations, and the temperatures that should be maintained to prevent legionella growth. |
| * 1. Types of backflow prevention | * Learners to know mechanical and non-mechanical back flow prevention devices such as: * non return valves * check valves (double and single) * RPZ valves * air gaps. * Learners to be shown examples of these in live systems where possible. * Learners to know which type of backflow prevention is relevant to the fluid category, which it protects against. |