Annex 2a – Common Process for HW, CW and 'Wet' Heating Systems (Domestic)

Annex 2a – Common Minimum Technical Competency Requirements for Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Domestic)				
Routes to demonstrating required competence				
Route	**Qualifications/Certification**	**Experience / Evidence**	Inspection / Assessment	
			On –Site	Off-Site
1a	Level 2 NVQ Diploma in Domestic Plumbing and Heating (QCF); **or** QCF Level 2 NVQ Diploma in Domestic Heating(QCF); **or** SVQ Level 3 in Plumbing	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No
1b	QCF unit achievement of unit(s): D/602/2682 - Understand and carry out site preparation, and pipework fabrication techniques for domestic plumbing and heating systems **and** D/602/2939 - Install and Maintain domestic plumbing and heating systems, **or** R/602/2971 - Install and Maintain domestic heating systems; **or** SCQF unit achievement of unit(s): F9H5 04 **-** Install and Commission Hot and Cold Water Systems **and** F9H5 06 **-** Install and Commission Central Heating Systems		*Yes*	*No*
1c	NVQ Level 2 in Plumbing or domestic heating or Full craft Certificate in Plumbing or domestic heating		Yes	No
2	Alternative certification that has been mapped to the competence requirements within this Annex and agreed by SummitSkills as aligning with the competence requirements within this annex and aligning with the related requirements for acceptance as alternative certification		Yes	No
3	Registered with a Building Regulations Competent Person Scheme or certificated by another a UKAS Accredited Certification Body for the type of work covered in this annex	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No

4	Qualifications other than above or no formal Qualification	Minimum of 3 years verifiable relevant experience covering the competence requirements stated in this annex and successful completion of the Experienced Worker Assessment*	Yes	Yes

NOTES

Route 4: Experienced Worker Assessments will be conducted by the registering Scheme Operator or Certification Body who shall assess the Enterprise's evidence of meeting the underpinning knowledge and practical competence requirements as stated in this annex. Note: Experienced worker assessment enables the competences within this annex to be assessed and demonstrated but do not lead to the award of a qualification.

Area of Competence		Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Domestic)		Annex 2a
Competence requirement *The installer must:*		**Context/Scope**	**NOS Ref.**	**Further Guidance**
1	Know the health and safety risks and safe systems of work associated with common processes for hot water, cold water and 'wet' heating systems installation work	Health and safety risks and safe systems of work associated with: • electrocution/electric shock • burns • toxic poisoning • personal injury though component/equipment handling	SUMMES1 K1, K6	Possible associated additional risks: • Working in excavations • Working in confined spaces • Refrigerants Asbestos (retrofit installations)
2	Know the types of domestic plumbing and heating pipework and their jointing and bending principles	Know the pipework materials used in domestic plumbing and heating work: • Copper – R220 soft coils – R250 half hard lengths – R290 hard lengths • Low Carbon steel (LCS) – Medium grade • Plastic pipework (hot, cold and heating) – Polyethylene (MDPE) – Polybutylene	SUMMES10 K2	
		Know the range of typical pipe material sizes available for use in dwellings: • Copper • Low carbon steel • MDPE • Polybutylene • PVC-u • Polypropylene • MUPVC • ABS	SUMMES10 K2	

Area of Competence		Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Domestic)		Annex 2a
Competence requirement *The installer must:*		**Context/Scope**	**NOS Ref.**	**Further Guidance**
3	Know the types of domestic plumbing and heating pipework and their jointing and bending principles (continued)	Know the acceptable methods of jointing new hot and cold water pipe to existing lead pipework	SUMMES10 K2	
		Know the general fitting types used in dwellings: • couplers • elbows and bends • equal tees • reducing tees • reducers • tap connectors • flexible connectors • manifolds • specialist fittings such as tank connectors	SUMMES10 K2	

		Know the methods of jointing pipework and be able to joint pipework used in dwellings:
		
		• copper pipe
		  – solder ring
		  – end feed
		  – compression (type A and B)
		  – push-fit
		  – press-fit
		
		• low carbon steel (LCS) pipe
		  – threaded
		  – compression e.g. Viking
		
		• plastic pipe (hot, cold and heating)
		  – push-fit
		  – compression
		  – proprietary (between lead and MDPE)
			SUMMES10 K2
			
			SUMMES10 P3, P6	

Area of Competence		Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Domestic)		Annex 2a
Competence requirement *The installer must:*		**Context/Scope**	**NOS Ref.**	**Further Guidance**

4	Know the types of domestic plumbing and heating pipework and their jointing and bending principles (continued)	Know the methods of bending pipework and be able to bend pipework used in dwellings:
		
		• Copper spring bending
		  – 90^{o} bends
		  – sets and offsets bends
		
		• Copper machine bending
		  – 90^{o} bends
		  – sets and offset bends
		  – passover bends
		
		• LCS hydraulic machine bending
		  – 90^{o} bends
		  – sets and offset bends
		  – passover bends
		
		• Plastic (hot, cold and heating)
		  – cabling technique
			SUMMES10 K2
			
			SUMMES10 P2	

Area of Competence	Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Domestic)		Annex 2a
Competence requirement *The installer must:*		**Context/Scope**	**NOS Ref.**	**Further Guidance**
5	Know how to use clips and brackets to support domestic plumbing and heating pipework and components	Know how to measure and mark out for fixings to pipework and plumbing and heating components	SUMMES7 P10 SUMMES10 K1	

		Know the range of general fixing devices used for making fixings for pipework and plumbing and heating components
		
		• nails
		  – for timber
		  – for masonry
		
		• screws
		  – slotted head
		  – phillips head
		  – pozidrive
		  – plastic plugs
		
		• heavy duty fixings
		  – coach bolts
		  – rawlbolts
			SUMMES10 K2	

6	Know how to use clips and brackets to support domestic plumbing and heating pipework and components (continued)	Know the range of specialist fixing devices: • cavity fixings • drive in fixings	SUMMES10 K2	
		Know how to identify appropriate clip and bracket types for domestic plumbing and heating work: • copper pipework – hot, cold and central heating • LCS pipework – central heating • plastic pipework – hot, cold, central heating	SUMMES10 K2	

Area of Competence	Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Domestic)		Annex 2a
Competence requirement *The installer must:*		**Context/Scope**	**NOS Ref.**	**Further Guidance**
7	Know the installation requirements of domestic plumbing and heating pipework	Know the methods of installing domestic plumbing and heating pipework: • prefabrication of pipework • installing pipework in-situ • use of sleeves • fire-stopping to pipework	SUMMES10 K1	
		Know how to identify how to select pipework materials and fittings from instructions including plans and drawings: • copper pipework – hot, cold and central heating • LCS pipework – central heating • plastic pipework – hot, cold, central heating	SUMMES10 K2	
8	Be able to apply fixings and brackets to domestic plumbing and heating pipework and components	Be able to measure, mark out and fix pipework clips and brackets at recommended spacing intervals: • copper pipework • LCS pipework • plastic pipework	SUMMES7 P10 SUMMES10 K4	

Area of Competence	Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Domestic)		Annex 2a
Competence requirement *The installer must:*	**Context/Scope**	**NOS Ref.**	**Further Guidance**
9 Be able to install domestic plumbing and heating pipework	Be able to accurately measure, mark and cut pipework materials for bending and jointing: • copper pipework – hot, cold and central heating • LCS pipework – central heating • plastic pipework – hot, cold, central heating pipework	SUMMES10 P2	

	Be able to bend domestic pipework to clear obstacles:
	• copper machine bending
	  – 90° bends
	  – sets and offset bends
	  – passover bends
	• LCS Hydraulic machine bending
	  – 90° bends
	  – sets and offset bends
	  – passover bends
	• plastic (hot, cold and heating)
	  – cabling technique
		SUMMES10 P2	

	Be able to position and fix domestic pipework to specifications: • copper pipework – hot, cold and central heating • LCS pipework – central heating • plastic pipework – hot, cold, central heating	SUMMES10 P3, P5, P6	

Area of Competence	Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Domestic)		Annex 2a
Competence requirement *The installer must:*		**Context/Scope**	**NOS Ref.**	**Further Guidance**

10	Be able to install domestic plumbing and heating pipework (continued)	Be able to joint domestic pipework systems to specifications:
		• copper pipe
		  – solder ring
		  – end feed
		  – compression (type A and B)
		  – push-fit
		  – press-fit
		• low carbon steel (LCS) pipe
		  – threaded
		  – compression e.g. Viking
		• plastic pipe (hot, cold and heating)
		  – push-fit
		  – compression
		  – proprietary (between lead and MDPE)
			SUMMES10 P3, P6	

11	Know the general site preparation techniques for plumbing and heating work	Know the typical range of activities to be carried out when working on plumbing and heating systems: • preparing work sites • designing and selecting materials and equipment • installing systems and components • maintaining and dealing with faults on systems and components • decommissioning systems and components – temporary and permanent • soundness testing systems and components • commissioning systems and components	SUMMES7 K2	
		Know what information should be passed on to the customer when carrying out work on domestic pipework systems	SUMMES7 K2	
		Know how to check for pre-existing damage to the building fabric or customer property before the work commences	SUMMES7 K8	

Area of Competence	Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Domestic)		Annex 2a
Competence requirement *The installer must:*	**Context/Scope**	**NOS Ref.**	**Further Guidance**
12 Know the general site preparation techniques for plumbing and heating work (continued)	Know how to protect the building fabric or customer property before the work commences: • use of dust sheets • protection from flame damage • use of walking boards – lawns/flower beds • application of packaging to protect components during partially completed works • circumstances in which furniture, breakable items and carpets need to be removed from the work area • circumstances in which damage to vehicles may occur	SUMMES7 K8	M7, Kn h
	Know the method of storing tools, equipment and materials when working in new buildings and existing dwellings: • prevention of theft • avoiding loss and wastage • minimising damage	SUMMES7 K10	M7, Kn k
	Know the checks to be carried out on tools and equipment to ensure that they work correctly and are correctly calibrated	SUMMES7 K9	M7, Kn i
	Know the work methods for preparing building construction features for installation work: • holes in masonry surfaces – hammer and chisel, large power drill • making good to masonry surfaces • lifting and replacing timber flooring materials • notching timber floor joists • drilling holes – timber floor joists • cutting chases – wall and floor surfaces	SUMMES7 K7	M7, Kn g

Annex 2b – Common Processes for HW, CW and 'Wet' Heating Systems (Non-domestic)

Annex 2b – Common Minimum Technical Competency Requirements for Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Non-Domestic)

Routes to demonstrating required competence

Route	Qualifications/Certification	Experience / Evidence	Inspection / Assessment	
			On –Site	Off-Site
1a	Level 2 NVQ Diploma in Heating and Ventilating Industrial and Commercial Installation (QCF); or Level 3 SVQ Heating and Ventilating Industrial and Commercial Installation	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No
1b	QCF unit achievement of unit(s): **A/602/2768** -Understand and carry out site preparation and pipework fabrication techniques for industrial and commercial systems; or SCQF unit achievement of unit(s): **F9NH 04** - Install, Test and Commission Hot and Cold Water Systems		Yes	No
1c	NVQ Level 2 in Heating and Ventilating Industrial and Commercial Installation or Full craft Certificate in Heating and Ventilating Industrial and Commercial Installation		Yes	No
2	Alternative certification that has been mapped to the competence requirements within this Annex and agreed by SummitSkills as aligning with the competence requirements within this annex and aligning with the related requirements for acceptance as alternative certification		Yes	No
3	Registered with a Building Regulations Competent Person Scheme or certificated by another a UKAS Accredited Certification Body for the type of work covered in this annex		Yes	No
4	Qualifications other than above or no formal Qualification	Minimum of 3 years verifiable relevant experience covering the competence requirements stated in this annex and successful completion of the Experienced Worker Assessment*	Yes	Yes

NOTES

Route 4: Experienced Worker Assessments will be conducted by the registering Scheme Operator or Certification Body who shall assess the Enterprise's evidence of meeting the underpinning knowledge and practical competence requirements as stated in this annex. Note: Experienced worker assessment enables the competences within this annex to be assessed and demonstrated but do not lead to the award of a qualification.

Area of Competence	Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Non-Domestic)		Annex 2b
Competence requirement *The installer must:*	**Context/Scope**	**NOS Ref.**	**Further Guidance**
1 Know the health and safety risks and safe systems of work associated with common processes for fabricating installing and testing industrial and commercial MES systems	Health and safety risks and safe systems of work associated with: • electrocution/electric shock • burns • toxic poisoning • personal injury though component/equipment handling	SUMMES1, K3	Possible associated additional risks: • Working in excavations • Working in confined spaces • Refrigerants Asbestos (retrofit installations)
2 Know how to and be able to prepare for fabricating installing and testing industrial and commercial MES systems	Know the materials and fittings required to complete work and how check them for damage, including materials for MES systems: • Pipe – Low carbon steel – Stainless steel – Galvanised steel – Copper – ABS plastic – PEX plastic – Polypropylene – Polyethylene – Insulation • Fittings – Capillary soldered fittings – Compression fittings – Threaded fittings – Push fit fittings – Fusion welded fittings – Weld-on fittings – Mechanical controls (e.g. valves) – Crimped fittings		

Area of Competence		Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Non-Domestic)		Annex 2b
Competence requirement *The installer must:*		**Context/Scope**	**NOS Ref.**	**Further Guidance**
1	Know how to and be able to prepare for fabricating installing and testing industrial and commercial MES systems (continued)	Know the hand and power tools required to complete work and be able to use the hand and power tools required to complete work, including: • General hand and power tools • Specialist tools used in the MES sector and their maintenance requirements • Power threading machines • Hand threading tools • Crimping power tools • Grinders • Welding equipment • Electric drills (110v and cordless) • Pipe bending machines • Pipe wrenches • Pipe cutters • Reamers • Chain wrenches • Levels (including Laser) • Core drills • Joint forming tools (mechanical groove) • Testing equipment		
		Know how to Identify Personal Protective Equipment relevant to the work activity		
		Be able to select Personal Protective Equipment relevant to the work activity		

Area of Competence	Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Non-Domestic)		Annex 2b
Competence requirement *The installer must:*	**Context/Scope**	**NOS Ref.**	**Further Guidance**
2 Know how to and be able to fabricate and install industrial and commercial MES systems	Know the methods and techniques for fabricating MES systems to industry standards and specifications including: • Measuring and marking out • Cutting • Bending, hydraulic and machine – 90° – Offset – Passover – In copper and LCS • Drilling and fixing		
	Know the material jointing techniques on pipework and be able to undertake jointing techniques on pipework using: • Mechanical methods • Bolting • Compression pipe joints • Crimped pipe joints • Threaded pipe joints • Heat methods • Soft soldering • Hard soldering • Solvent methods • Adhesives • Solvent • Specialist jointing techniques • Push fit • Press fit • Crimping • Fusion welding		

Area of Competence	Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Non-Domestic)		Annex 2b
Competence requirement *The installer must:*	**Context/Scope**	**NOS Ref.**	**Further Guidance**
2 Know how to and be able to fabricate and install industrial and commercial MES systems (continued)	Know the methods and techniques for using hand tools, power tools, drills and fixing devices for fixing to: • Materials – Wood – Masonry – Metal • Fixing devices – Nails – Screws – Heavy duty fixing devices		
	Know the methods and techniques for fixing pipework using clips and brackets for the following materials: • Low carbon steel • Stainless steel • Galvanised steel • Copper • ABS plastic • PEX plastic • Polypropylene • Polyethylene • Insulation		

Area of Competence		Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Non-Domestic)		Annex 2b
Competence requirement *The installer must:*		**Context/Scope**	**NOS Ref.**	**Further Guidance**
2	Know how to and be able to fabricate and install industrial and commercial MES systems (continued)	Know the appropriate bracket spacing intervals in accordance with pipe diameter requirements for: • Horizontally mounted pipework in: – Copper – Plastic – Stainless steel – LCS • Vertically mounted pipework in: – Copper – Plastic – Stainless steel – LCS		
3	Know how to and be able to test MES systems	Know how to and be able to dentify appropriate equipment for applying soundness tests to rigid and plastic pipework		
		Know the procedure and be able to undertake the procedure for completing a soundness test on rigid or plastic pipework systems in accordance with appropriate industry standards and record the soundness test procedure		
		Know the required action and be able to take the required action when inspection and testing reveals defects in MES systems, including: • Remedial work associated with leakage from systems		

Annex 2b - Reference Document Requirements

The Enterprise shall hold or have access to current editions, including all amendments, of the documents (or recognised equivalent documents) listed in the following table

Reference Documents for Common Processes for Hot Water, Cold Water and 'Wet' Heating System Installation Work (Non-Domestic)
Insert details or state that no specific documents are required if this applies.

Annex 9a – Hot Water Systems (Domestic)

Annex 9a – Common Minimum Technical Competency Requirements for Hot Water Systems Installation Work (Domestic)				
Routes to demonstrating required competence				
Route	**Qualifications/Certification**	**Experience / Evidence**	Inspection / Assessment	
			On –Site	Off-Site
1a	Level 3 NVQ Diploma in Domestic Plumbing and Heating (QCF); **or** Level 3 NVQ Diploma in Domestic Heating; or (QCF): **or** SVQ Level 3 in Plumbing	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No
1b	QCF unit achievement of unit(s): K/502/9155 **-** Understand and apply domestic hot water system installation, commissioning, service and maintenance techniques **and** D/602/2939 - Install and Maintain domestic plumbing and heating systems, **or** SCQF unit achievement of unit(s): **F9H5 04 -** Install and Commission Hot and Cold Water Systems		Yes	No
1c	NVQ Level 3 in Plumbing or Advanced Craft Certificate in Plumbing		Yes	No
2	Registered with a Building Regulations Competent Person Scheme or certificated by another a UKAS Accredited Certification Body for the type of work covered in this annex	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No
3	Qualifications other than above or no formal Qualification	Minimum of 3 years verifiable relevant experience covering the competence requirements stated in this annex and successful completion of the Experienced Worker Assessment*	Yes	Yes

NOTES

Route 3: Experienced Worker Assessments will be conducted by the registering Scheme Operator or Certification Body who shall assess the Enterprise's evidence of meeting the underpinning knowledge and practical competence requirements as stated in this annex. Note: Experienced worker assessment enables the competences within this annex to be assessed and demonstrated but do not lead to the award of a qualification.

Area of Competence	Hot Water Systems Installation Work (Domestic)		Annex 9a
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
1 Know the legislation and sources of information relating to undertaking work on hot water systems	Know the sources of information required when undertaking work on hot water systems: • statutory regulations • industry standards • manufacturer technical instructions		
	Know the notification requirements for work on hot water systems: • water undertaker • building control or self-certification		
	Know installer responsibilities and user responsibilities under water legislation		

2 Know the types of hot water system and their layout requirements	Identify the type of hot water system from layout diagrams:
	
	• centralised systems
	  - unvented hot water systems
	  - open vented hot water systems
	• Localised systems
	  - unvented point of use heaters
	  - instantaneous heaters
	• direct system
	  - conventional boiler (small hot water only boiler)
	  - immersion heater including low energy tariff types
	• indirect system
	  - fed by combined hot water and heating boiler
	• single point of use vented heaters
	• instantaneous hot water heaters
	  - multipoint heaters
	  - combination boilers		

Area of Competence	Hot Water Systems Installation Work (Domestic)		Annex 9a
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
3 Know the types of hot water system and their layout requirements (continued)	Know the factors that need to be considered when the type of hot water system is selected for use in a building: • quantity and usage of hot water required • distance of outlet from hot water source • need for a secondary recirculation system		
	Know hot water system pipework layout features for dwellings: • larger systems requiring a secondary circulation system		
	Know the recommended design temperatures within hot water systems: • hot water storage vessel • hot water outflow • secondary return • at point of use - instantaneous heaters - storage system - thermostatic mixing valve installations		
	Know the layout features for pipework systems incorporating secondary circulation: • pump type and location • timing devices • prevention of reverse circulation • methods of balancing circuits		
	Know how trace heating can be used as an alternative to a secondary circulation system		

Area of Competence	Hot Water Systems Installation Work (Domestic)		Annex 9a
Competence requirement The installer must:		**Context/Scope**	**NOS Ref.**	**Further Guidance**

4	Know the types of hot water system and their layout requirements (continued)	Know the working principles of hot water system components :
		• stop valves
		• fullway gate valves
		• servicing valves
		• drain valves
		• float operated valves
		• terminal fittings
		  - bib taps
		  - pillar taps
		  - mixer taps
		  - ceramic disc taps
		• showers
		  - gravity mixer
		  - mains fed mixer
		  - electric instantaneous
		• thermostatic mixing valves
		• backflow prevention devices
		  - simple air gaps
		  - single check valves
		• feed and expansion cisterns
		• cold water feed cisterns
		• directly heated storage cylinders
		• indirectly heated storage cylinders
		  - single feed
		  - double feed
		  - combination
		• instantaneous water heaters
		  - mains fed multipoint heaters
		  - mains fed combination boilers
		  - single point of use vented heaters
		• infra-red operated taps
		• concussive taps
		• combination bath tap and shower head
		• flow limiting valves
		• spray taps
		• shower pumps – single and twin impellor
		• pressure reducing valves
		• shock arrestors/mini expansion vessels		

Area of Competence	Hot Water Systems Installation Work (Domestic)		Annex 9a
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
5 Know the types of hot water system and their layout requirements (continued)	Know the use of components in hot water systems to overcome temperature and pressure effects caused by the installation of backflow prevention devices		
	Know the typical pipe sizes used in centralised open vented hot water systems in dwellings : • primary circuit • secondary circuit		
	Know the system layout features for the open vent and cold feed pipes of primary and secondary open vented hot water circuits		
	Know the connection requirements for feed and expansion cisterns into open vented primary hot water circuits		
	Know the system layout features for plastic feed and expansion cisterns: typical cistern sizes for small dwellings • warning pipe (overflow) arrangements • inlet/ outlet position • position of float operated valve • position of cistern vent • service valve requirements • cistern base support requirements		
	Know the types and typical sizes of open vented storage cylinder used in hot water systems in dwellings: • direct • single feed indirect • double feed indirect • double feed indirect super duty recovery • combination Know the system layout features for hot water heaters: • mains fed Instantaneous multipoint water heaters including combination boilers • localised (point of use) open vented hot water heaters		

Area of Competence	Hot Water Systems Installation Work (Domestic)			Annex 9a
Competence requirement The installer must:		**Context/Scope**	**NOS Ref.**	**Further Guidance**
6	Know the types of hot water system and their layout requirements (continued)	Know the typical pipe sizes used with mains fed instantaneous hot water heaters and open vented point of use water heaters in dwellings		
		Know the need for temperature control of hot water systems: • thermostats • overheat thermostats • temperature relief valves		
		Know the factors that can lead to backflow from hot water outlets and equipment in dwellings		
		Know the system layout features for the installation of hot water components: • gravity fed showers • mains fed showers • instantaneous electric showers • thermostatic mixing valves		
7	Know the pipework materials and fittings required and be able to select the pipework materials and fittings required to complete work on hot water systems :	• pipework materials • pipework fitting and fixings	SUMMES7, K10 SUMMES7, P2,P9	

Area of Competence	Hot Water Systems Installation Work (Domestic)		Annex 9a
Competence requirement The installer must:		**Context/Scope**	**NOS Ref.**	**Further Guidance**
8	Know the requirements to install and be able to install hot water systems and components	Know the positioning requirements of components in hot water systems and be able to position and fix components in hot water systems: • heaters/storage cylinders • cisterns – hot water feed cisterns and feed and expansion cisterns • drain valves • service valves • thermostatic mixing valves • showers – gravity fed mixer, mains fed mixer and instantaneous electric	SUMMES10, K4 SUMMES10 P3,P4,P6	
		Know how to make pipework connections and be able to make pipework connections to open vented hot water storage cylinders	SUMMES10, K1, K3 SUMMES10 P5	
		Know the positioning and fixing requirements of components of secondary circulation systems: • system pipework • pump • control valves • timing devices • reverse circulation control valves • pipework insulation	SUMMES10, K1, K2,K3,K4	
		Be able to demonstrate that hot water components and pipework systems cannot be brought into operation by the end user before the work has been fully completed	SUMMES10 P9	

Area of Competence	Hot Water Systems Installation Work (Domestic)		Annex 9a
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
9 Know the inspection and soundness testing requirements of hot water systems and components and be able to inspect and soundness test hot water systems and components (continued)	Know the checks to be carried out during a visual inspection of a hot water system to confirm that it is ready to be filled with water and be able to carry out a visual inspection of a hot water system to confirm that it is ready to be filled with water	SUMMES25, K1 SUMMES25 P12	
	Know how to fill hot water pipework with water at normal operating pressure and check for leakage and be able to fill hot water pipework with water at normal operating pressure and check for leakage	SUMMES25, K2 SUMMES25 P2,P4	
	Know how to carry out a soundness test to industry requirements on hot water systems pipework and components and be able to perform a soundness test to industry requirements on hot water systems pipework and components • metallic pipework systems • plastic pipework systems	SUMMES25, K1 SUMMES25 P3,P4	
	Know the flushing procedure for hot water systems and components and be able to flush for hot water systems with wholesome water on completion of soundness testing	SUMMES25, K1 SUMMES25 P5	
	Know the actions that must be taken when inspection and testing reveals defects in hot water systems: • dealing with systems that do not meet correct installation requirements • remedial work associated with defective pipework bracketing • remedial work associated with leakage from pipework systems	SUMMES25, K4	

Area of Competence	Hot Water Systems Installation Work (Domestic)			Annex 9a
Competence requirement The installer must:		**Context/Scope**	**NOS Ref.**	**Further Guidance**
10	Know the commissioning requirements of hot water systems and components	Know the information sources required to complete commissioning work on hot water systems	SUMMES27, K1	
		Know the how to take flow rate and pressure readings from new and existing hot water outlets	SUMMES25, K2	
		Be able to adjust and set system controls to achieve system design requirements/specification: • pressure at outlets • flow rate at outlets • temperature at outlets	SUMMES27 P4	
		Be able to operate the system and take performance readings in order to compare them to the design specifications: • mechanical component readings • electrical component readings	SUMMES27 P3	
		Know the how to balance a secondary circulation system during commissioning activities	SUMMES25, K2	
		Know the actions that must be taken when commissioning reveals defects in hot water systems: • dealing with systems that do not meet correct installation requirements • remedial work associated with defective components	SUMMES25, K4	
		Know the procedure for notifying works carried out to the relevant authority	SUMMES25, K6	
		Know the range of information that would be detailed on a commissioning record for a hot water system	SUMMES27, K6	
		Know the points to be covered when handing over a completed system to the end-user	SUMMES27, K7	

Area of Competence	Hot Water Systems Installation Work (Domestic)		Annex 9a
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
11 Know the decommissioning requirements of hot water systems and components and be able to decommission hot water systems and components	Know the working methods that reduce the time periods during which hot water systems need to be isolated	SUMMES13, K1, K3	
	Know the information that needs to be provided to other persons before decommissioning work takes place	SUMMES13, K2	
	Be able to advise appropriate persons before hot water system components or pipework are isolated in order to undertake work	SUMMES13 P1	
	Know how to temporarily decommission and able to temporarily decommission hot water system components and connecting pipework systems	SUMMES13, K4 SUMMES13 P3	
	Know the work sequences for permanently decommissioning hot water system components	SUMMES13, K4	
	Know the methods used during the decommissioning process to prevent the end-user from operating hot water system components : • isolation of stop/ servicing valves • temporary capping of pipework sections • use of warning notices and signs	SUMMES13, K4	
	Be able to drain and safely dispose of the system contents	SUMMES13 P3	
	Be able to take precautions to ensure that the system cannot be brought back into operation before the decommissioning work is complete	SUMMES13 P4	
	Be able to advise other persons that the system has been successfully decommissioned	SUMMES13 P3	
	Be able to check to ensure that the decommissioning procedures carried out prevent the end-user from operating cold water system components	SUMMES13 P4	

Area of Competence	Hot Water Systems Installation Work (Domestic)		Annex 9a
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
12 Know the design techniques and be able to apply the design techniques for hot water systems	Know the information sources and be able to interpret the information sources when undertaking design work on cold water systems: • statutory regulations • industry standards • manufacturer technical instructions • verbal and written feedback from the customer	SUMMES8, K3	
	Know how to and be able to take measurements of building features in order to carry out design calculations: • from plans, drawings and specifications • from site	SUMMES8, K3	
	Know the factors which affect the selection of hot water systems for single occupancy dwellings	SUMMES8, K4	
	Know the criteria used when selecting hot water system and component types: • customers needs • building layout and features • suitability of system • energy efficiency • environmental impact	SUMMES8, K1,K2,K3.	
	Know how to and be able to calculate the size of hot water system components used in single occupancy dwellings: • cistern • hot water storage vessel • pipework • secondary circulation pump • booster pump (shower and full system)	SUMMES7, K9 SUMMES8 P7	
	Know how to and be able to present design calculations in an acceptable format: • using basic not to scale line drawings • details for insertion into a quotation or tender for work in a small-scale dwelling	SUMMES8, K10 SUMMES8 P8	

Annex 9a - Technical Reference Document Requirements

The Enterprise shall hold or have access to current editions, including all amendments, of the documents (or recognised equivalent documents) listed in the following table

Technical Reference Documents for Hot Water Systems Installation Work (Domestic)
WRAS Water Regulations Guide
Building Regulations Approved Document to support Regulation 7 (1999 Edition incorporating 2000 amendments or subsequent edition)
Building Regulations Approved Document G (2010 Edition or subsequent edition)
Domestic Building Services Compliance Guide (2010 Edition or subsequent edition)
BS 6700: 2006+A1:2009 - Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages or subsequent edition
BS 8000-15:1990 Workmanship on building sites. Code of practice for hot and cold water services (domestic scale) or subsequent edition

Annex 9b – Unvented Hot Water Storage Systems

Annex 9b – Common Minimum Technical Competency for Unvented Hot Water Storage Systems Installation Work (Systems up to 500 litres capacity and 45kW power input)				
Routes to demonstrating required competence				
Route	**Qualifications/Certification**	**Experience / Evidence**	Inspection / Assessment	
			On –Site	Off-Site
1a	QCF Level 3 NVQ Diploma in Domestic Plumbing and Heating; or QCF Level 3 NVQ Diploma in Domestic Heating; or Level 3 SVQ in Plumbing	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No
1b	QCF unit achievement of unit(s): K/502/915**5 -** Understand and apply domestic hot water system installation, commissioning, service and maintenance techniques **and** D/602/2939 - Install and Maintain domestic plumbing and heating systems, **or** SCQF unit achievement of unit(s) F9H5 04 **-** Install and Commission Hot and Cold Water Systems		Yes	No
2	Alternative certification that has been mapped to the competence requirements within this Annex and agreed by SummitSkills as aligning with the competence requirements within this annex and aligning with the related requirements for acceptance as alternative certification		Yes	No
3	Registered with a Building Regulations Competent Person Scheme or certificated by another a UKAS Accredited Certification Body for the type of work		Yes	No

	covered in this annex			
4	Qualifications other than above or no formal Qualification	Minimum of 3 years verifiable relevant experience covering the competence requirements stated in this annex and successful completion of the Experienced Worker Assessment*	Yes	Yes
In addition – all applicants will require the following recognised certificates				

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Route 4: Experienced Worker Assessments will be conducted by the registering Scheme Operator or Certification Body who shall assess the Enterprise's evidence of meeting the underpinning knowledge and practical competence requirements as stated in this annex. Note: Experienced worker assessment enables the competences within this annex to be assessed and demonstrated but do not lead to the award of a qualification.

Area of Competence		Unvented Hot Water Storage Systems Installation Work (systems up to 500 litres storage capacity and 45kW power input)		Annex 9a
Competence requirement The installer must:		**Context/Scope**	**NOS Ref.**	**Further Guidance**
1	Know the legislation and sources of information relating to undertaking work on unvented hot water storage systems	Know the sources of information required when undertaking work on unvented hot water storage systems: • statutory regulations • industry standards • manufacturer technical instructions		
		Know the notification requirements for work on unvented hot water storage systems: • water undertaker • building control or self-certification		
2	Know the types of unvented hot water storage system and their layout requirements	Know unvented hot water storage system pipework layout features for dwellings : • centralised systems • localised systems		

		Know the various types of unvented hot water system:
		
		• indirect storage systems
		• direct storage systems
		  - electrically heated
		  - gas or oil fired
		• small point of use (under sink)		

		Know the use of cold water accumulators in unvented hot water systems		

Area of Competence		Unvented Hot Water Storage Systems Installation Work (systems up to 500 litres storage capacity and 45kW power input)		Annex 9a
Competence requirement The installer must:		**Context/Scope**	**NOS Ref.**	**Further Guidance**
3	Know the types of unvented hot water storage system and their layout requirements (continued)	Know the function of components in unvented hot water systems: • safety devices - control thermostat - overheat thermostat (thermal cut-out) - temperature relief valve • functional devices - line strainer - pressure reducing valve - single check valve - expansion device (vessel or integral to cylinder) - expansion relief valve - tundish arrangements - application of composite valves		
		Know the layout features for temperature and expansion relief pipework in unvented hot water systems		
4	Know the installation requirements of unvented hot water storage system and components	Know the meaning of the terms balanced and unbalanced supply pressures in unvented hot water storage systems	SUMMES10 K1	
		Know the positioning and fixing requirements of components in unvented hot water systems: • safety devices - control thermostat - overheat thermostat (thermal cut-out) - temperature relief valve • functional devices - line strainer - pressure reducing valve - single check valve - expansion device (vessel or integral to cylinder) - expansion relief valve - tundish arrangements - application of composite valves	SUMMES10 K1,K2,K3,K4	

Area of Competence		Unvented Hot Water Storage Systems Installation Work (systems up to 500 litres storage capacity and 45kW power input)		Annex 9a
Competence requirement The installer must:		**Context/Scope**	**NOS Ref.**	**Further Guidance**
5	Know the installation requirements of unvented hot water storage system and components	Be able to connect pipework to an unvented hot water system • Incoming supply pipework - Line strainer - Pressure reducing valve • Expansion vessel • Storage cylinder • Check valve	SUMMES10 P3,P4,P5	
		Know the pipe size and positioning methods for safety relief pipework connected to unvented hot water storage system cylinder safety valves: • D1 section • tundish • D2 section	SUMMES10 K2,K3	
		Know how to position, fix and connect and be able to position, fix and connect new unvented hot water storage system safety relief pipework: • D1 pipework • tundish • D2 pipework • Correct termination	SUMMES10 K2,K3 SUMMES10 P3,P4,P5	
6	Be able to commission unvented hot water storage and components	Be able to carry out a visual inspection of an unvented hot water storage system to confirm that it is ready to be filled with water	SUMMES25 P1,P2	
		Be able to charge hot water pipework with water at normal operating pressure and check for leakage	SUMMES25 P2,P4	
		Be able to perform a soundness test to industry requirements on hot water systems pipework and components	SUMMES25 P3,P4	
		Be able to flush the system with wholesome water on completion of soundness testing Be able to use test instruments to take readings of the water supply pressure and flow rate	SUMMES25 P5 SUMMES27 Pf. 3	

Area of Competence		Unvented Hot Water Storage Systems Installation Work (systems up to 500 litres storage capacity and 45kW power input)		Annex 9a
Competence requirement The installer must:		**Context/Scope**	**NOS Ref.**	**Further Guidance**
7	Be able to commission unvented hot water storage and components (continued)	Be able to operate the system and take performance readings in order to compare them to the design specifications: • mechanical component readings • electrical component readings	SUMMES27 P3	
		Be able to adjust and set system controls to achieve system design requirements: • pressure at outlets • flow rate at outlets	SUMMES27 P4	
		Know the actions that must be taken when commissioning reveals defects in hot water systems: • dealing with systems that do not meet correct installation requirements • remedial work associated with defective components	SUMMES25 K4	
		Know the procedure for notifying works carried out to the relevant authority	SUMMES27 K6	
		Know the range of information that would be detailed on a commissioning record for a hot water system	SUMMES27 K6	
		Know the points to be covered when handing over a completed system to the end-user	SUMMES27 K7	

Annex 9b - Technical Reference Document Requirements

The Enterprise shall hold or have access to current editions, including all amendments, of the documents (or recognised equivalent documents) listed in the following table

Technical Reference Documents for Unvented Hot Water Storage Systems Installation Work (systems up to 500 litres storage capacity and 45kW power input)
WRAS Water Regulations Guide
Building Regulations Approved Document to support Regulation 7 (1999 Edition incorporating 2000 amendments or subsequent edition)
Building Regulations Approved Document G (2010 Edition or subsequent edition)
Domestic Building Services Compliance Guide (2010 Edition or subsequent edition)
BS 6700: 2006+A1:2009 - Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages or subsequent edition
BS 8000-15:1990 Workmanship on building sites. Code of practice for hot and cold water services (domestic scale) or subsequent edition

Annex 9c – Hot water systems (Non-domestic)

Annex 9c – Common Minimum Technical Competency Requirements for Hot Water Systems Installation Work (Non-Domestic)				
Routes to demonstrating required competence				
Route	**Qualifications/Certification**	**Experience / Evidence**	Inspection / Assessment	
			On –Site	Off-Site
1a	Level 3 NVQ Diploma in Heating and Ventilating Industrial and Commercial Installation (QCF); **or** Level 3 SVQ in Heating and Ventilating Industrial and Commercial Installation	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No
1b	Achievement of QCF unit(s): Y/602/4852 - Understand industrial and commercial hot water system installation and pre-commissioning techniques (Level 3); **and** Y/602/4897 - Install H&V industrial and commercial systems (Level 3); **or** Achievement of SCQF unit(s): F9NH 04 **-** Install, Test and Commission Hot and Cold Water Systems		Yes	No
1c	Level 3 NVQ in Heating and Ventilating Industrial and Commercial Installation			
2	Registered with a Building Regulations Competent Person Scheme or certificated by another a UKAS Accredited Certification Body for the type of work covered in this annex		Yes	Yes
3	Qualifications other than above or no formal Qualification	Minimum of 3 years verifiable relevant experience covering the competence requirements stated in this annex and successful completion of the Experienced Worker Assessment*	Yes	Yes

NOTES

Route 3: Experienced Worker Assessments will be conducted by the registering Scheme Operator or Certification Body who shall assess the Enterprise's evidence of meeting the underpinning knowledge and practical competence requirements as stated in this annex. Note: Experienced worker assessment enables the competences within this annex to be assessed and demonstrated but do not lead to the award of a qualification.

Area of Competence	Hot Water Systems Installation Work (Non-Domestic)		Annex 9C
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
1 Know the working principles and layouts of industrial and commercial hot water systems	Know the operating and working principles of hot water systems including: • Indirect • Unvented • Secondary circulation • Instantaneous (plate heat exchanger) • Factors to determine system selection • Key regulations relevant to the installation		
	Know the operating principles of different appliance types that are connected to hot water systems, including: • Sanitary appliances • Hospital appliances • Appliances specific industrial and commercial premises • Compliance with Building and Water Regulations		
	Know the working principles of all hot water system components including: • Indirect systems • Unvented systems • Secondary circulation systems • Instantaneous (plate heat exchanger) systems		
	Know how to determine pipe sizing requirements in relation to demand units for hot water systems, including: • Indirect • Unvented • Secondary circulation • Instantaneous (plate heat exchanger) Confirm the hot water system layout requirements for all hot water systems including: • Indirect • Unvented • Secondary circulation Instantaneous (plate heat exchanger)		

Area of Competence	Hot Water Systems Installation Work (Non-Domestic)			Annex 9C
Competence requirement The installer must:		**Context/Scope**	**NOS Ref.**	**Further Guidance**
1	Know the working principles and layouts of industrial and commercial hot water systems (continued)	Know the positioning of selected components in hot water systems.		
2	Know the legislative and organisational procedures related to all industrial and commercial hot water systems work activities	Know and apply appropriate sources of health and safety information as they relate to the: • Installation • Testing • Commissioning of hot water systems		
		Know how to interpret and apply regulations, codes of practice, and industry recommendations appropriate to the • Installation • Testing • Commissioning of hot water systems		
		Know the actions that should be taken to liaise with other persons during the: • Installation • Testing • Commissioning		
		Explain how to prevent the inadvertent operation of the installed system during work activities		
3	Know how to and be able to complete preparation work for industrial and commercial hot water system installation activities	Know how to and be able to undertake visual inspections and tests required in the work location to determine preparation requirements to: • Install • Test • Commission hot water systems		

Area of Competence	Hot Water Systems Installation Work (Non-Domestic)		Annex 9C
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
3 Know how to and be able to complete preparation work for industrial and commercial hot water system installation activities (continued)	Be able to confirm that job information and documentation for cold hot water system installation is available and appropriate including: • Statutory Regulations • Codes of Practice • Industry Standards • Industry Guides/Good Practice Guides • Verbal instructions		
	Be able to use job information and documentation to ensure that the following is fit for purpose: • Equipment • Tools • Labour resources		
	Be able to confirm that authorisation has been obtained from the relevant person(s) prior to commencement of the work.		
	Know how to evaluate the work location to determine planning requirements		
	Know how to and be able to select pipework materials and fittings required to complete work on hot water systems and check them for damage		
	Be able to complete preparatory work for the installation of hot water systems to include: • Use of material and equipment requisites where appropriate • Confirmation that the selection of material, equipment and components are compatible to the installation • Confirmation that the work location is ready for installation activities • Confirmation of secure site storage for tools, equipment, materials and components • Confirmation of suitable access equipment • Confirmation of suitable lifting equipment where required • Completion of risk assessments • Completion of method statements		

Area of Competence	Hot Water Systems Installation Work (Non-Domestic)		Annex 9C
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
4 Know the procedures and be able to apply the procedures for identifying industrial and commercial hot water systems, equipment and components	Know how to evaluate site drawings and plans and the work location to determine specific hot water installation requirements		
	Know how to interpret and apply appropriate sources of information when determining hot water installation requirements: - Statutory Regulations - Codes of Practice - Industry Standards - Industry Guides/Good Practice Guides		
	Be able to confirm that the proposed job specification for hot water system installation complies with: • Statutory Regulations • Codes of Practice • Industry Standards • Industry Guides/Good Practice Guides • Specifications		
	Know how to evaluate possible proposals to determine how well they meet: • Site structures and features • Industry requirements		
	Know how to critically compare the range of environmentally friendly materials, products, procedures and energy efficiency devices and make recommendations for their use		
	Know how to determine the size and specification of components to be used within hot water systems including: - Indirect systems - Unvented systems - Secondary circulation systems - Instantaneous (plate heat exchanger)		

Area of Competence	Hot Water Systems Installation Work (Non-Domestic)		Annex 9C
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
5 Know how to and be able to install industrial and commercial hot water systems	Know the methodologies to measure and record site details for installation purposes		
	Be able to verify that job information applicable to the installation process is available and conforms to: • Statutory Regulations • Codes of Practice • Industry Standards • Industry Guides/Good Practice Guides • Specifications		
	Know how to interpret and apply information for the installation of hot water systems from: • Statutory Regulations • Codes of Practice • Industry Standards • Industry Guides/Good Practice Guides • Specifications		
	Be able to verify that materials, tools, equipment and resources necessary for the installation of hot water systems are: • Available as required • Safely and securely stored • Meet industry requirements • Fit for intended purpose		
	Be able to position and fix control components for industrial and commercial hot water systems		
	Be able to Inspect and confirm that all aspects of the installation process conforms with industry requirements, including: • Statutory Regulations • Codes of Practice • Industry Standards • Industry Guides/Good Practice Guides • Verbal instructions Manufacturer's instructions		

Area of Competence	Hot Water Systems Installation Work (Non-Domestic)		Annex 9C
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
5 Know how to and be able to install industrial and commercial hot water systems (continued)	Be able to apply methods of working that ensures that any damage to customer/client property and building features is avoided during work activities		
6 Know the procedures and be able to complete the procedures for soundness testing industrial and commercial hot water systems	Know how to interpret and apply information for the soundness testing of hot water systems: • Statutory Regulations • Codes of Practice • Industry Standards • Industry Guides/Good Practice Guides • Specifications		
	Know how to Identify the requirements of hot water systems to confirm that they are ready to receive soundness tests to cover: • Pipework • Appliances • Components		
	Be able to confirm through visual inspections that the following systems conform with industry requirements and is ready to receive a soundness test: • Unvented • Secondary circulation • Instantaneous (plate heat exchanger)		
	Know how to specify procedures for flushing and charging all hot water systems.		
	Be able to verify that procedures for: • Cleaning • Flushing • Charging systems have been carried out in accordance with industry requirements		
	Know how to and be able to check and confirm that input services adequately meet hot water service system requirements		

Area of Competence	Hot Water Systems Installation Work (Non-Domestic)		Annex 9C
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
6 Know the procedures and be able to complete the procedures for soundness testing industrial and commercial hot water systems (continued)	Know the procedures for and be able to carry out a soundness test on hot water systems.		
	Know the information that would be required to complete pre-commissioning documentation in order to ensure the safe pre-commissioning of systems and components		
	Be able to implement pre-commissioning tests and checks in accordance with appropriate industry requirements, including: Statutory Regulations Codes of Practice Industry Standards Industry Guides/Good Practice Guides Verbal instructions		
	Be able to implement checks to confirm: • System cleanliness • Use of additives where appropriate • System is charged • Un-commissioned systems and components cannot be activated		

Area of Competence	Hot Water Systems Installation Work (Non-Domestic)		Annex 9C
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
7 Know the procedures and be able to complete the procedures for commissioning industrial and commercial hot water systems	Know how to interpret and apply appropriate sources of information on the performance of hot water systems including: • Indirect • Unvented • Secondary circulation • Instantaneous (plate heat exchanger)		
	Know the procedures for and be able to complete the procedures for establishing correct mechanical, electrical and control performance for the following: Systems – • Indirect • Unvented • Secondary circulation • Instantaneous (plate heat exchanger) Components – • Cold water storage cistern – secondary system • Feed and expansion cistern – primary system • Hot water storage vessels, including high temperature to low temperature calorifiers • Electric and gas water heaters • Appliance control valve or tap, terminal fittings • Stop valves • Float operated valves • Single and double check valves • Gate valves • Servicing valves • Drain taps • Pressure reducing valves • Shower mixing valves • Blending valves • Mixing valves • Circulating pumps (bronze) • Line strainers • Temperature and pressure relief valves • Expansion vessel • relief valves • Expansion vessel		

Area of Competence	Hot Water Systems Installation Work (Non-Domestic)		Annex 9C
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
7 Know the procedures and be able to complete the procedures for commissioning industrial and commercial hot water systems (continued)	Know procedures for commissioning hot water systems and components in accordance with project specifications		
	Know the points in the commissioning process where co-operation and liaison with other trades and clients/customers may be required		
	Know the information that would be required to complete commissioning documentation in order to ensure the safe commissioning of systems and components		
	Know the actions to take when components being commissioned do not meet performance requirements		

Annex 9C - Technical Reference Document Requirements

The Enterprise shall hold or have access to current editions, including all amendments, of the documents (or recognised equivalent documents) listed in the following table

Technical Reference Documents for Hot Water Systems Installation Work (Non-Domestic)
Building Regulations - Approved Documents G & L
The Non-domestic Building Services Compliance Guide
Water Regulations Guide (WRAS)
BS EN 806 Parts 1-4 – Installations inside buildings conveying water for human consumption
HVCA Installation and Testing of Pipework Systems Part 4 - Hot Water Service HWS [TR20/4]
BSRIA Model Commissioning Plan (BG 8/2009)

Annex 10b – Underfloor heating

Annex 10b – Common Minimum Technical Competency Requirements for 'Wet' Central Heating Systems Installation Work (Underfloor Heating)				
Routes to demonstrating required competence				
Route	**Qualifications/Certification**	**Experience / Evidence**	Inspection / Assessment	
			On –Site	Off-Site
1	QCF unit achievement of unit(s): L/503/6986; **and** F/503/6984	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No
2	Alternative certification that has been mapped to the competence requirements within this Annex and agreed by SummitSkills as aligning with the competence requirements within this annex and aligning with the related requirements for acceptance as alternative certification.	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No
3	Registered with a Building Regulations Competent Person Scheme or certificated by another a UKAS Accredited Certification Body for the type of work covered in this annex	Must have evidence of work carried out to be able to demonstrate their practical competence for the scope for which they have applied in accordance with the competence requirements stated in this annex.	Yes	No
4	Qualifications/certification other than above or no formal Qualification	Minimum of 3 years verifiable relevant experience covering the competence requirements stated in this annex and successful completion of the Experienced Worker Assessment	Yes	Yes

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* **Route 4** - Experienced Worker Assessments will be conducted by the registering Scheme Operator or Certification Body who shall assess the Enterprise's evidence of meeting the underpinning knowledge and practical competence requirements as stated in this annex. Note: Experienced worker assessment enable the competences within this annex to be assessed and demonstrated but do not lead to the award of a qualification.

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)	Annex 10B

Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
1	Know the types and layouts of underfloor warm water heating and cooling pipework system	Know the types system installation: • systems with pipes in the weight-bearing layer (screed) – Type A construction detail • systems with pipes under the weight-bearing layer (screed or timber) Type B construction detail • systems with pipes in an adjustment screed - Type C construction detail • systems including Raised Access Floors/modular wood and non-Type A,B & C	SUMMES8 K8	BSEN 1264-4:2009 4.1.2.8.2
		Know and recognise following system components: • system manifold/pump station • clip rails and staple clips • screed system plates • pocketed polystyrene products • heat emission/transfer plates • floating floor panels • reflective foil insulation • bend supports • polythene protection layer • pipe	SUMMES8, K9 SUMMES9, K3	
		Know and be able to identify suitable a location for the system manifold(s) in relation to: • heat source • primary pipework • underfloor circuits	SUMMES9, P6, K3, K4	
		Identify the typical layouts for pipework from the system manifold/ pump station: • series pattern constant spacing • series pattern modified spacing • spiral pattern constant spacing • spiral pattern modified spacing	SUMMES9, K3, K4	

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)	Annex 10B

Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
1	Know the types and layouts of underfloor warm water heating and cooling pipework system (continued)	State the typical minimum spacing requirement between the room perimeter and an underfloor circuit	SUMMES9, K3	
		State the typical pipe spacing requirements for UFH circuits in: • older buildings • buildings heated by a heat pump • small rooms with two or three outside walls • corner bathrooms • corridors with large glass areas • conservatories	SUMMES9, K3	Heat Emitter Guide (Relevant to heat pumps only)
2	Know the structural pre-condition requirements to enable warm water floor heating and cooling pipework installation	Know the structural pre-condition requirements in relation to the external building envelope	SUMMES7 K5, K12	BSEN 1264-4:2009 4.1.1
		Know the structural pre-condition requirements in relation to the internal building services installations: • the stage of completion of the internal building services installations • the method and standard of work to which the internal building services installations have been carried out	SUMMES7 K5, K12	Ref: BSEN 1264-4:2009 4.1.1 4.1.2.1
3	Know the requirements relating to the positioning and installation of peripheral insulating strips and protective layers	Know the requirements for positioning and installing of peripheral insulating strips in relation to: • parts of the structure that require a peripheral insulating strip • secure positioning/fixing requirements • the height of the peripheral insulating strip • allowance for screed movement • the final trimming of peripheral insulating strips	SUMMES9 K3	BSEN 1264-4:2009 4.1.2.2.2
		Know the requirements for positioning and installing of protective layers in relation to: • overlaps at joints and taping • the arrangement where the protective layer meets the peripheral insulating strip • the requirement when synthetic resin screeds or calcium sulphate screeds are specified.	SUMMES9 K3	BSEN 1264-4:2009 4.1.2.3

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)		Annex 10B
Competence requirement The installer must:		**Context/Scope**	**NOS Ref.**	**Further Guidance**
4	Know the types of piping material that are suitable for underfloor warm water heating and cooling pipework systems	Know suitable piping material types and grades: • plastic piping • composite piping	SUMMES8 K9	BSEN 1264-4:2009 4.1.2.2.2
		Know the recommended material types and grades in relation to the protection of the system against corrosion	SUMMES8 K9	BSEN 1264-4:2009 4.1.2.3
5	Know the preparatory requirements for underfloor warm water heating and cooling pipework installation work	Know the information that needs to be available to enable the work to proceed: • written information • diagrammatic information	SUMMES7 K2, K5	
		Know how to cross check, using the industry rule of thumb method that pipe circuit lengths are broadly appropriate	SUMMES7 K2, K5	
6	Know the requirements relating to the installation of piping in underfloor warm water heating and cooling systems	Know the handling requirements in relation to: • transportation of underfloor pipework • storage of underfloor pipework	SUMMES7 K11, K12	BSEN 1264-4:2009 4.1.2.6.1
		State the potential issues associated with installing plastic pipework when the ambient temperature is low	SUMMES9 K2	CIBSE Underfloor Heating Design and Installation Guide P.22
		Identify work methods that address the issues associated with installing plastic pipework when the ambient temperature is low	SUMMES9 K2	
		State the bending radius requirements for pipework: • minimum bend radius • other requirements	SUMMES9 K2, K3	BSEN 1264-4:2009 4.1.2.6.3
		State the clearance requirements in relation to minimum distances from: • vertical structures • smoke ducts and open fireplaces, open or walled shafts, lift wells. • External and internal walls to pipe	SUMMES9 K3	BSEN 1264-4:2009 4.1.2.6.1

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)	Annex 10B

Competence requirement The installer must:		Context/Scope	NOS Ref.	Further Guidance
6	Know the requirements relating to the installation of piping in underfloor warm water heating and cooling systems (continued)	Know the requirements where pipework couplings are used with the floor construction in relation to: • types of coupling • method of securing and sealing the coupling • record requirements/ pressure tests • record locations of repair joins	SUMMES9 K2, K3	BSEN 1264-4:2009 4.1.2.6.4
		Know the requirements for sleeving of pipework • adjacent to manifolds • at floor expansion joints • other locations	SUMMES9 K2, K3	
		Know acceptable pipe support and fixing methods for: • solid floor/screed finished structures • solid floor/floating floor structures • Suspended timber floor structures	SUMMES9 K2, K3	
		Know the requirements for the attachment of piping in relation to: • vertical deviation limits • horizontal deviation limits • attachment spacing	SUMMES9 K2, K3	BSEN 1264-4:2009 4.1.2.7
		Know the requirements where underfloor heating pipework crosses thermal movement joints in Type A and Type C floor screeds in relation to: • the purpose of the pipework crossing the joint • the levels of the pipework crossing the joint • the requirements for insulation sleeving	SUMMES9 K2, K3	BSEN 1264-4:2009 4.1.2.8.5
		Know the typical requirements for installing temperature control probe conduit in relation to: • room perimeter • UFH circuit pipework • thermostat location	SUMMES9 K2, K3	

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)		Annex 10B
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
6 Know the requirements relating to the installation of piping in underfloor warm water heating and cooling systems (continued)	Know when there may potential requirement for pipework insulation where underfloor heating pipework passes through a room to supply a circuit in another room.	SUMMES9 K2, K3	CIBSE Underfloor Heating Design and Installation Guide P.24
7 Know the requirements relating to the leak testing of piping	Know the accepted methods of leak testing	SUMMES9 K8 SUMMES 27 K1	BSEN 1264-4:2009 4.1.3
	Know the test pressure requirements for standard s ystems: • minimum test pressure • maximum test pressure • test duration • pass criteria	SUMMES9 K8, K9 SUMMES27 K1	BSEN 1264-4:2009 4.1.3
	Know the requirements when water is being used for leak testing and there is a risk of freezing	SUMMES9 K8, K9 SUMMES27 K1	BSEN 1264-4:2009 4.1.3
8 Be able to install an underfloor warm water heating and cooling pipework system to a solid floor construction (screeded)	Be able to identify the tools, equipment and materials required for the installation	SUMMES9 P2, P5	
	Be able to undertake the necessary pre-installation checks and preparatory work	SUMMES9 P4	
	Be able to install the underfloor warm water heating and cooling pipework system and any associated components in accordance with regulatory requirements and recognised industry practice	SUMMES9 P6, P7, P8, P9, P10	
9 Be able to install an underfloor warm water heating and cooling pipework system to a suspended floor construction (timber)	Be able to identify the tools, equipment and materials required for the installation	SUMMES9 P2, P5	
	Be able to undertake the necessary pre-installation checks and preparatory work	SUMMES9 P4	
	Be able to install the underfloor warm water heating and cooling pipework system and any associated components in accordance with regulatory requirements and recognised industry practice	SUMMES9 P6, P7, P8, P9, P10	

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)		Annex 10B
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
10 Be able to inspect and test an underfloor warm water heating and cooling pipework system	Be able to inspect a completed underfloor warm water heating and cooling pipework system installation for compliance with the installation specification, regulatory requirements and recognised industry practice.	SUMMES9 P12 SUMMES27 P1, P2	
	Be able to identify and obtain the equipment required to perform a hydraulic soundness test and check that the equipment is in a safe, usable condition.	SUMMES9 P12	
	Be able to perform a hydraulic soundness test on a completed underfloor warm water heating and cooling pipework system installation in accordance with the installation specification, regulatory requirements and recognised industry practice.	SUMMES9 P12 SUMMES27 P3	BSEN 1264-4:2009 4.1.3
	Be able to obtain written acceptance from the authorised person that the completed underfloor warm water heating and cooling pipework system installation is installed and tested in accordance with the installation specification, regulatory requirements and recognised industry practice.	SUMMES9 P12 SUMMES27 P3	
11 Know the recommended minimum standards for compliance with the building regulations relating to warm water underfloor heating system installation work.	Knows how to interpret building regulation/building standards guidance documentation as relevant to warm water underfloor heating installation work to identify the recommended minimum standards in relation to: • system temperature control • room temperature control • time control • requirements for heating zones • heat source control • floor insulation • minimising distribution losses • system corrosion protection • system commissioning	SUMMES7 K2	Domestic Building Services Compliance Guide, Section 7

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)		Annex 10B
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
12 Know industry recognised sources of guidance relating to warm water underfloor heating system installation work.	Know industry recognised sources of guidance: • British/European Standards • other publications	SUMMES7 K2	BS EN 1264 CIBSE Underfloor Heating Design and Installation Guide BSRIA Underfloor Heating and Cooling Guide UHMA/TACMA Controls Guide Screeds with underfloor heating - Guidance for a defect-free interface (IEP 11/2003)
13 Know the purpose and features and/or operational characteristics of warm water underfloor heating control components	Know the purpose features and/or operational characteristics of the following components: • system manifold • thermostatic mixing valve (self-acting) • thermal actuator • zone controller • electronic water temperature control sets (with mixing valve) • master controller	SUMMES8 K9 SUMMES9 K3	CIBSE Underfloor Heating Design and Installation Guide P.26-28 BSRIA Underfloor Heating and Cooling Guide P. 50 -.52
14 Know the requirements of different types of warm water underfloor heating system arrangements between the heat source and the underfloor heating system manifold	Know the typical pipework layout, component requirements and component positions for: • systems with a hot water storage cylinder but without a radiator zone • systems with a hot water storage cylinder and a radiator zone • systems with a combination boiler but without a radiator zone • systems with a combination boiler and a radiator zone • systems with a heat pump • open vented systems • sealed systems	SUMMES8 K9 SUMMES9 K3	BSRIA Underfloor Heating and Cooling Guide P. 44 (partial coverage only)

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)		Annex 10B
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
15 Know the options, operating principles, component requirements and operating sequences of warm water underfloor heating time and temperature control arrangements	Know the following warm water underfloor heating electrical control system options: • low voltage • networked • 230v • wireless • dial / programmable options	SUMMES8 K9 SUMMES9 K3	
	Know the positioning requirements for warm water underfloor heating system electrical controls: • room temperature controls • flow temperature high limit thermostat	SUMMES9 K3	
	Know the operating principles of: • a weather compensation flow temperature control arrangement • a 'night' or 'unoccupied' set back control arrangement • an optimisation control arrangement	SUMMES8 K9 SUMMES9 K3	BSRIA Underfloor Heating and Cooling Guide P. 45 and P. 53-57 (partial coverage only) UHMA/TACMA Guide
	Know the typical component requirements for: • a weather compensation flow temperature control arrangement • a 'night' or 'unoccupied' set back control arrangement • an optimisation control arrangement	SUMMES8 K9 SUMMES9 K3	
	Know the typical control operating sequence for: • a weather compensation flow temperature control arrangement • a 'night' or 'unoccupied' set back control arrangement • an optimisation control arrangement	SUMMES8 K9 SUMMES9 K3	

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)		Annex 10B
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**

15 Know the options, operating principles, component requirements and operating sequences of warm water underfloor heating time and temperature control arrangements (continued)	Know the positioning requirements for:
	
	• weather compensation
	  - flow temperature sensor(s)
	  - external temperature sensor(s)
	  - internal temperature sensor(s)
	• optimisation
	  - external temperature sensor(s)
	  - internal temperature sensor(s)
		SUMMES9 K3	

	Know the suitability of night set-back and/or optimisation control arrangements in relation to: - thermal response requirements - temperature modulation arrangements	SUMMES8 K4	BSRIA Underfloor Heating and Cooling Guide P. 57
16 Know the fundamental principles of warm water underfloor heating system design to achieve optimal system operation	Know the features of the spatial temperature profile that is achieved through the use underfloor heating systems	SUMMES8 K4	BSRIA Underfloor Heating and Cooling Guide P. 5
	Know the minimum information requirements to enable system design to achieve optimal system operation	SUMMES8 K3, K7	
	Know the suitability of the following heat sources for use with warm water underfloor heating systems: • high efficiency gas and oil fired condensing boilers • non-condensing gas and oil fired boilers • micro-Combined Heat and Power (mCHP) units • biomass stoves and boilers • heat pumps • solar thermal collectors in support of one of the above • electric boilers	SUMMES8 K4	BSRIA Underfloor Heating and Cooling Guide P. 63 -76

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)		Annex 10B
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
16 Know the fundamental principles of warm water underfloor heating system design to achieve optimal system operation (continued)	Know the factors that affect the heat output from a warm water underfloor heating system	SUMMES8 K4	BSRIA Underfloor Heating and Cooling Guide P. 8
	Know the industry recommended design values for: • external air temperature • room temperatures • air change rates • allowance for high ceilings • allowance for intermittent heating	SUMMES8 K4	CIBSE Underfloor Heating Design and Installation Guide P.11, P12, P13
	Know the industry recommended maximum floor surface temperatures design guidance/values for: • occupied areas • peripheral areas • bathroom or similar areas • heat sensitive floor coverings	SUMMES8 K4	BSRIA Underfloor Heating and Cooling Guide P. 14
	Know the industry recommended maximum floor covering resistance value (m2K/W and TOG) for use with warm water underfloor heating systems	SUMMES8 K4	CIBSE Underfloor Heating Design and Installation Guide P.14
	Know typical floor covering resistance values (m^2K/W and TOG) for: • ceramics, stone slate • parquet blocks, synthetic fibre • carpets and heavy parquet blocks • deep pile carpets • timber flooring	SUMMES8 K4	CIBSE Underfloor Heating Design and Installation Guide P.9
	Know which building types and room types should be given special consideration when designing an underfloor heating system	SUMMES8 K4	CIBSE Underfloor Heating Design and Installation Guide P.10

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)		Annex 10B
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
16 Know the fundamental principles of warm water underfloor heating system design to achieve optimal system operation (continued)	Know how to establish the total heated floor area available in relation to: • permanent fixtures • other fixtures • provision for floor covering fixings at the perimeter of the room	SUMMES8 K4, K9	BSRIA Underfloor Heating and Cooling Guide P. 35
	Know the potential effect of heat build-up if areas of an underfloor heating circuit are covered with thermally insulating structures e.g. bath, kitchen units	SUMMES8 K4	BSRIA Underfloor Heating and Cooling Guide P. 35
	Know how the heat output requirement (W/m^2) is identified in relation to: • heat required in the space • total heated floor area available	SUMMES8 K4, K9	BSRIA Underfloor Heating and Cooling Guide P. 35
	Know how to establish the floor surface temperature requirement (o^C) in relation to: • the operative temperature (o^C) • the surface heat transfer coefficient (W/m^3K)	SUMMES8 K4, K9	BSRIA Underfloor Heating and Cooling Guide P. 36
	Know which factors determine the surface temperature and heat output achieved from an underfloor heating circuit: • constrained factors • variable factors	SUMMES8 K4	BSRIA Underfloor Heating and Cooling Guide P. 36
17 Know the fundamental principles of warm water underfloor heating component sizing and component selection and/or positioning	Know the factors that determine the system manifold (including pump/control group) requirements.	SUMMES8 K4, K9	
	Know how to determine optimum system manifold position requirements in relation to: • individual heating circuit pipework lengths • lengths of pipework that supply other circuits but do not form part of the heating for a room	SUMMES8 K4, K8	

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)		Annex 10B
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
18 Know the requirements to commission hot water underfloor heating system installations	State what information will or may need to be available to enable commissioning activities in relation to: • floor types • system set-up and adjustment	SUMMES27 K1	CIBSE Underfloor Heating Design and Installation Guide P.35
	Confirm the conditions that need to exist to commence commissioning activities in relation to: • pre-commissioning testing and cleaning of system pipework • system water treatment • curing of floor screeds • initial setting of valves and thermostats • safety checks • visual inspection requirements • installation of floor coverings	SUMMES27 K2	CIBSE Underfloor Heating Design and Installation Guide P.35 and P. 36
	Know what specialist equipment needs to be available to enable commissioning and filling activities	SUMMES7 K10	CIBSE Underfloor Heating Design and Installation Guide P.35
	Know the fundamental principles of each industry commissioning method: • water flow meter method • return temperature method • pre-setting valve method	SUMMES27 K2	CIBSE Underfloor Heating Design and Installation Guide P.35 and P. 36
	Know the requirements for the recording of the commissioning activities	SUMMES27 K6	

Area of Competence	'Wet' Central Heating Systems Installation Work (Underfloor Heating)		Annex 10B
Competence requirement The installer must:	**Context/Scope**	**NOS Ref.**	**Further Guidance**
19 Be able to commission a warm water underfloor heating system installation	Be able to obtain the information required to enable commissioning activities	SUMMES27 P1	
	Be able to confirm that the conditions required to commence commissioning activities exist	SUMMES27 P2	
	Be able to commission a warm water underfloor heating system installation in accordance with: • manufacturer's instructions • system design specification • industry recognised procedures	SUMMES27 P3, P4	
	Be able to correctly complete a record of commissioning activities	SUMMES27 P5	BSRIA Underfloor Heating and Cooling Guide, Appendix B, Final Inspection Checklist
20 Know the requirements to handover warm water underfloor heating system installations	Identify pre-handover check requirements	SUMMES27 K7	
	Confirm the industry handover procedures in relation to the: • provision of written information • provision of diagrammatic information • provision of verbal information/demonstration relating to system operation and use	SUMMES27 K7	<u>Written Information</u> • Guarantees/warranty • Testing and commissioning certificates • Water treatment records • User manuals/guides • Installer details – mechanical – electrical <u>Diagrammatic Information</u> • Hydraulic schematic • Wiring schematic <u>Verbal information/ demonstration</u> • Setting of controls • Awareness of the effect that changing to a different type of floor covering may have on system output • Awareness of which system components should only be adjusted by a competent engineer

Annex 10B - Technical Reference Document Requirements

The Enterprise shall hold or have access to current editions, including all amendments, of the documents (or recognised equivalent documents) listed in the following table

Technical Reference Documents for 'Wet' Central Heating Systems Installation Work (Underfloor Heating)
Building Regulations - Approved Document L
The Domestic Building Services Compliance Guide, 2010
Water Regulations Guide (WRAS)
BS EN 1264 Parts 1-5 – Water based surface embedded heating and cooling systems
CIBSE Underfloor Heating Design and Installation Guide
BSRIA Underfloor Heating and Cooling Guide
UHMA/TACMA Controls Guide
Screeds with underfloor heating - Guidance for a defect-free interface (IEP 11/2003)

- Water supply (Water fittings) Regulations 1999
- DEFRA – Water regulations guidance note
- BS6700 Design, installation, testing and maintenance of services supply water for domestic use within buildings
- HVCA Installation and Testing of Pipework Systems Part 4 – 'wet' Central Heating Service HWS

[TR20/4]