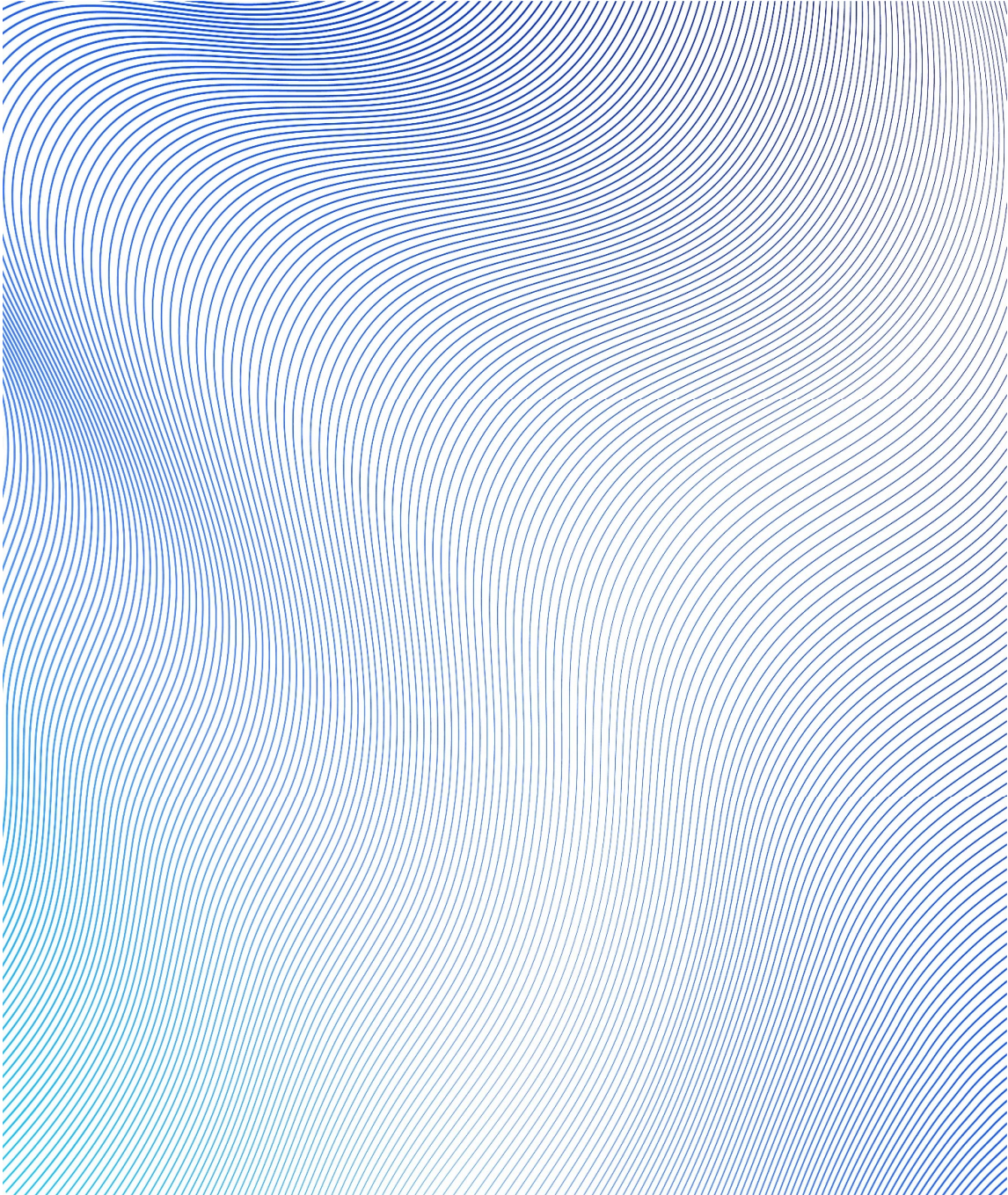


LMETB – RSTC Dundalk

MECHANICAL PARTICULAR SPECIFICATIONS



August 2026

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Ss_55_70_38_42 Indirect hot water storage supply systems

Systems

Ss_55_70_38_42 Indirect hot water storage supply systems

1. Description: Supply, install, test, commission, demonstrate and set to work the entire system as set out within this specification and as described on the drawings/equipment schedules.
2. System performance: Reference to missing clause Centralized hot water storage system
3. Capacity: Refer to project specific design requirements
4. Primary heat source: Air source heat pump
Refer to project specific design requirements
5. Primary: Sealed
6. Storage unit: [Pr_60_50_20_42 Indirectly heated unvented hot water storage cylinders.](#)
7. Electric immersion heater: [Pr_60_60_96_42 Immersion heaters.](#)
8. Pumps
 - 8.1. Primary hot water supply: Integral pump in heat pump unit
 - 8.2. Secondary hot water supply: Existing DHW recirculation pump
9. Pipelines: [Pr_65_52_63_17 Copper pipelines](#)
10. Pipeline accessories
 - 10.1. Expansion devices: Not applicable. Expansion to be accommodated through pipeline system design and installation practice
 - 10.2. Gauges: [Pr_65_52_34_65 Pressure and altitude gauges Type A](#) and [Pr_65_52_34_88 Temperature gauges Type A.](#)
 - 10.3. Accessories: [Pr_65_52_61_63 Pipe sleeves Type A](#)
 - 10.4. Pipeline supports: [Pr_80_77_27_15 Channel supports](#)
11. Valves
 - 11.1. Isolating valves: [Pr_65_54_95_06 Ball valves.](#)
 - 11.2. Check valves: [Pr_65_54_95_14 Copper alloy check valves.](#)
 - 11.3. Draining devices: [Pr_65_54_95_27 Draining taps Type A.](#)
 - 11.4. Accessories: [Pr_65_54_93_87 Test points Type A.](#)
12. Fire-stopping: Individual services penetrations fire-stopping system
13. Thermal insulation
 - 13.1. Pipelines: [Pr_80_77_76_62 Phenolic foam insulation Type A](#) and [Pr_80_77_76_54 Mineral wool pipe section insulation Type A.](#)
 - 13.2. Cylinders: [Pr_80_77_76_62 Phenolic foam insulation Type A](#) - to be factory applied
14. Vibration isolation: Not applicable
15. Controls: Refer to controls specification
16. Plant and equipment identification: [Pr_40_10_57_78 Self-adhesive colour pipe bands Type A;](#)
[90-90-55/480 Mechanical plant and equipment identification labels Type A;](#)
[90-90-55/490 Valve charts and schematics Type A;](#)
and [90-90-55/495 Valve identification labels.](#)
17. Execution: [Ss_55_70_38/620 Installing hot and cold water systems generally;](#)
[Ss_55_70_38/650 Hydraulic pressure testing of hot and cold water supply systems;](#)
[Ss_55_70_38/660 Flushing hot and cold water systems;](#)
and [Ss_55_70_38/670 Disinfection of hot and cold water systems.](#)

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18. System completion: [Ss_55_70_38/810 Commissioning of hot and cold water supply systems](#);
[Ss_55_70_38/820 Inspection and test records](#);
[Ss_55_70_38/830 Demonstrations](#);
[Ss_55_70_38/850 Water quality tests](#);
[Ss_55_70_38/860 Spares](#);
[Ss_55_70_38/870 Operating tools](#);
[Ss_55_70_38/880 Maintenance](#);
and [Ss_55_70_38/840 Documentation](#).

Products

90-10-65/320 Copper pipeline jointing materials

1. Manufacturer: Submit proposals .
2. Standards:
 - 2.1. Lead free solder for capillary fittings: To IS EN ISO 9453.
 - 2.2. Brazing filling: To IS EN ISO 17672.
 - 2.3. Flange jointing rings: To IS EN 1514-4.

90-90-40/390 Protection Type A

1. Manufacturer: Contractor's choice .
2. Material: Self adhesive cladding and jacketing. Venture Clad or equal as agreed with the Engineer unless stated elsewhere within this specification
3. Colour: Self finish.
4. Execution: Reference to missing clause Installing self adhesive cladding and jacketing and Reference to missing clause Installing polyisobutylene (PIB) protection.

90-90-55/480 Mechanical plant and equipment identification labels Type A

1. General: All mechanical plant and equipment shall, in addition to manufacturer's labels, be permanently, clearly and uniquely labelled with identification name, reference number and function in the particular installation.
2. Manufacturer: Contractor's choice .
3. Material: Face engraved rigid plastic laminate.
4. Label size: Contractor's choice .
5. Colour:
 - 5.1. Background: Black
 - 5.2. Lettering: White
6. Typography:
 - 6.1. Font: Helvetica
 - 6.2. Size: 10mm high lettering
7. Information to be included: Equipment name;
Equipment reference number;
and Service.
8. Execution: [Pr_40_10_57/611 Installing mechanical plant and equipment identification](#).

90-90-55/490 Valve charts and schematics Type A

1. Manufacturer: Contractor's choice .
2. Material: Engraved plastics laminate.

3. Information to be included: 'Schematic layout chart' of the mechanical installation - a fully detailed drawing with each pipeline and system clearly identified;
'Valve charts' giving the pipeline, function and position of all labelled valves;
'Safety Procedures' wall chart with method of operation for all control panels;
and 'Identification chart', with key to colour codes set out in BS1710, Appendix D, table 3.
4. Size: A0 and A1.
5. Execution: Reference to missing clause Installing valve charts and schematics.

90-90-55/495 Valve identification labels

1. Manufacturer: Contractor's choice .
2. Material: Face engraved rigid plastic laminate.
3. Label size: Manufacturer's standard .
4. Colour:
 - 4.1. Background: Basic and safety colour identification of associated system.
 - 4.2. Lettering: Contractor's choice .
5. Typography:
 - 5.1. Font: Contractor's choice .
 - 5.2. Size: Contractor's choice .
6. Information: Purpose and reference number.
7. Execution: Reference to missing clause Installing valve identification labels.

Pr_40_10_57_78 Self-adhesive colour pipe bands Type A

1. Manufacturer: Contractor's choice .
2. Standards: To BS 1710.
3. Identification type: Adhesive colour bands.
4. Execution: Reference to missing clause Installing identification on pipework.

Pr_60_50_20_42 Indirectly heated unvented hot water storage cylinders

1. Description: New hot water calorifier
2. Manufacturer: Refer to equipment schedules
3. Standard: To IS EN 12897.
4. Capacity: Refer to equipment schedules
5. Pressure: Refer to equipment schedules
6. Safety equipment: Provide energy cut-out device, temperature relief valve, pressure-reducing valve and backflow prevention in accordance with IS EN 12897.
7. Accessories: Immersion heater

Pr_60_60_96_42 Immersion heaters

1. Description: Back up immersion heater in tank
2. Manufacturer: Refer to equipment schedules
3. Standards: To IS EN 60335-1 and IS EN 60335-2-73.
4. Arrangement: Single element, alloy sheathed;
5. Rating: 6kW
6. Size: To suit cylinder size and location.
7. Mounting: Horizontal
8. Thermostat: Manufacturer's standard .

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Indirect hot water storage supply systems

Pr_65_52_34_65 Pressure and altitude gauges Type A

1. Manufacturer: Contractor's choice .
2. Standard
 - 2.1. Bourdon: To IS EN 837-1.
 - 2.2. Diaphragm: To IS EN 837-3.
3. Diameter: 100 mm.
4. Case: Stainless steel.
5. Connections: 'Ring' pattern siphon and gauge cock.
6. Execution: Reference to missing clause Installing pressure gauges.

Pr_65_52_34_88 Temperature gauges Type A

1. Manufacturer: Submit proposals .
2. Standard: To IS EN 13190.
3. Format: Manufacturer's standard .
4. Diameter: 100.
5. Case: Manufacturer's standard .
6. Connections: Contractor's choice .
7. Integral accessories: 100 mm immersion length pocket.

Pr_65_52_61_63 Pipe sleeves Type A

1. Sleeves: Pipework passing through walls, floors, ceilings and partitions shall be fitted with sleeves of internal diameter at least 10 mm larger than the external diameter of the pipework insulation passing through the sleeve to allow clearance. Pipework insulation shall always pass through walls uninterrupted and suitably fire stopped where passing through fire rated walls.
2. Manufacturer: Contractor's choice .
3. Material: Sleeves shall be of a material similar to that of the pipe, steel or copper and for plastic pipes, rigid plastic or copper, with lugs to locate in floors and ceiling and treated against corrosion.
4. Finish: Install sleeves flush with the finished face(s) of walls, floors, ceilings and partitions. In areas where floors are washed down, in wet working areas or ablutions install protruding 100 mm above floor finish, with the clearance around the pipe sealed with waterproof mastic or screwed plastic thimbles.
5. Masking Plates: Fit at visible penetrations (or sleeves in wet areas), including through false ceilings of occupied rooms.
6. Form: Submit proposals .

Pr_65_52_63_17 Copper pipelines

1. Description: To connect new cylinder to existing piping (DCW, DHW, DHWR)
2. General requirements: [90-10-65/320 Copper pipeline jointing materials](#) and [Pr_65_52_63_18 Copper pipeline fittings](#).
3. Manufacturer: Contractor's choice .
4. Standard: To IS EN 1057.
5. Grade: R250.
6. Finish: Plain.
7. Execution: [Pr_65_52_63/630 Installing copper pipelines](#) and [Pr_65_52_63/635 Brazed joints in copper and copper alloy pipes](#).

Pr_65_52_63_18 Copper pipeline fittings

1. Manufacturer: Contractor's choice .
2. Standards
 - 2.1. Capillary: To IS EN 1254-1, solder ring.
 - 2.2. Compression: To IS EN 1254-2, type B.
 - 2.3. Flanges: To IS EN 1092-3
 - 2.4. Press fittings: To IS 8537

Pr_65_54_93_87 Test points Type A

1. Manufacturer: Contractor's choice .
2. Third-party certification: Required
3. Arrangement: Self sealing.
4. Material: Manufacturer's standard .
5. Connections: 6 mm (¼ inch) extended length.

Pr_65_54_95_06 Ball valves

1. Manufacturer: Submit proposals . Manufacture to be from the approved list as appended within this specification.
2. Material: Brass copper alloy.
Provide 1/4 turn hand lever
3. Connections: Compression;
Threaded to suit pipeline application
4. Finish: Chrome plated when exposed and Natural.
5. Execution: Reference to missing clause Installation of valves generally and [90-10-90/670 Valve tests](#).

Pr_65_54_95_14 Copper alloy check valves

1. Manufacturer: Contractor's choice .
2. Standard: To IS 5154.
3. Third-party certification: Required
4. Lift type
 - 4.1. Design: Disk.
 - 4.2. Body pattern: Straight.
5. Swing type: Vertical.
6. Material: Copper alloy.

Pr_65_54_95_27 Draining taps Type A

1. Manufacturer: Contractor's choice .
2. Standard: To IS 2879.
3. Size: ½ inch.
4. Arrangement: Type 2.
5. Material: Copper alloy.
6. Connections: Threaded joints to IS EN 10226-1.
7. Accessories: Lever pattern key and Spare hose union.
8. Execution: Reference to missing clause Installation of valves generally.

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Indirect hot water storage supply systems

Pr_80_77_27_15 Channel supports

1. Manufacturer: Contractor's choice .
2. Third party certification: To be certified in accordance with EAD 330008-02-0601.
3. Channels
 - 3.1. Load capacity: As required - contractor design
 - 3.2. Format: Slotted.
 - 3.3. Dimensions: As required - contractor design
 - 3.4. Type: Single.
 - 3.5. Material: Carbon steel.
 - 3.6. Finish: Hot dip galvanized or Zinc plated.
 - 3.7. Accessories: 90° brackets;
Base plates;
Channel type cantilever arms;
End caps;
Internal connectors;
6 mm threaded rod;
8 mm threaded rod;
10 mm threaded rod;
and Trapeze hangers.

Pr_80_77_76_47 Loadbearing pipeline support insulation Type A

1. Pipelines carrying fluids at temperature up to 120°C: 300 mm length of high density phenolic foam.
2. Pipelines carrying fluids at temperatures above 120°C: 300 mm length of calcium silicate.
3. Pipelines carrying cold fluids: 300 mm length of high density phenolic foam.
4. Execution: Reference to missing clause Installing at loadbearing pipelines supports.

Pr_80_77_76_54 Mineral wool pipe section insulation Type A

1. Manufacturer: Submit proposals .
2. Standard: To IS 3958-4 and To IS EN 14303.
3. Recycled content: 50% (minimum) to IS EN ISO 14021.
4. Thermal conductivity: 0.032 W/m·K at 0°C.
0.034 W/m·K at 10°C.
0.037 W/m·K at 50°C.
0.040 W/m·K at 75°C.
0.044 W/m·K at 100°C.
5. Finish: Aluminium foil faced.
6. Fire performance: Reaction to fire classification of A2L-s1, d0, as defined in BS EN 13501-1
7. Insulation thickness (minimum): To IS 5422 and TIMSA guide in accordance with Approved Document L
8. Vapour barrier
 - 8.1. Material: Aluminium Foil face
 - 8.2. Vapour permeability: To IS 5422, clause 5.6.
9. Protection: [90-90-40/390 Protection Type A](#).
10. Accessories: [Pr_80_77_76_94 Valve and flange insulation Type A](#) and [Pr_80_77_76_47 Loadbearing pipeline support insulation Type A](#).
11. Execution: Reference to missing clause Installing at non-loadbearing pipelines supports.

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Pr_80_77_76_62 Phenolic foam insulation Type A

1. Manufacturer: Submit proposals .
2. Standard: To IS EN 13166.
3. Form: Pipe section.
4. Thermal conductivity: 0.018 W/m·K at 0°C.
0.018 W/m·K at 10°C.
0.023 W/m·K at 50°C.
0.025 W/m·K at 75°C.
5. Finish: Aluminium.
6. Fire performance: Reaction to fire classification of A2L-s1, d0, as defined in BS EN 13501-1
7. Insulation thickness (minimum): To IS 5422 and TIMSA guide in accordance with Approved Document L
8. Vapour barrier
 - 8.1. Material: Aluminium Foil faced
 - 8.2. Vapour permeability: To IS 5422, clause 5.6.
9. Protection: [90-90-40/390 Protection Type A](#).
10. Accessories: [Pr_80_77_76_94 Valve and flange insulation Type A](#) and [Pr_80_77_76_47 Loadbearing pipeline support insulation Type A](#).
11. Items to be insulated: Cover plates and Removable access covers.
12. Execution: Reference to missing clause Installing at non-loadbearing pipelines supports;
[Pr_80_77_76/690 Installing phenolic foam insulation on vessels Type A](#);
and [Pr_80_77_76/640 Installing phenolic foam insulation on pipelines Type A](#).

Pr_80_77_76_94 Valve and flange insulation Type A

1. Material: match pipework insulation material
2. Form: Removable and reusable preformed rigid covers.
3. Finish: Grey unless otherwise stated
4. Execution: Reference to missing clause Installing at valves and flanges.

Execution

90-10-90/670 Valve tests

1. Standard: To IS EN 12266-1.

Pr_40_10_57/611 Installing mechanical plant and equipment identification

1. Fixing: Fix with adhesive to equipment.
2. Position: On equipment.

Pr_65_52_63/610 Pipelines installation generally type A

1. Standard:

BESATechnical Report TR/20/4 Hot water service;
BESATechnical Report TR/20/5 Cold water service;
2. Appearance: Install exposed pipe runs parallel with other pipe or service runs and building structure, taking account of gradients for drain or venting. Set vertical pipes plumb, or follow building line
3. Pipeline Clearance: Adequate clearance should be allowed between pipes and from surfaces for valve access.

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Indirect hot water storage supply systems

4. **Gradients:** Pipework shall be securely supported, singly or in groups, graded to level required for venting and draining.
5. **Air Venting:** Provide vents at high points
6. **Draining:** Provide drains at low points
7. **Pipeline expansion and contraction:** Supports and fittings should be arranged to accommodate pipeline movement due to thermal expansion. Movement at branch connections should be allowed for.
8. **Pipeline support:** Arrange supports and accessories for equipment, appliances and ancillary fittings in pipelines, so that no undue strain is imposed upon pipes.
9. **Joint location:** No joints shall be located within the thickness of the building structure or be so close to the surface that access is difficult.
10. **General Practise:** Pipe ends shall be machine cut, prepared for jointing, deburred, be free from rust scale and any other foreign matter, be thoroughly cleaned before installation, complete with approved type screwed plugs, caps or flanges provided to seal open ends during construction.
11. **Dirt Insects and Rodents:** Prevent ingress
12. **Dissimilar metals:** Prevent electrolytic corrosion.

Pr_65_52_63/620 Installing anchors generally

1. **Purpose:** To resist axial stress transmitted by flexure of horizontal and vertical pipe runs, and loading on vertical pipes.
2. **Fixings:** Provide associated backing plates, nuts, washers and bolts for attachment to, or building into building structure.
3. **Main Anchor Location:** Install main anchors at each end of the pipe run
4. **Changes of direction:** Install main anchors at locations where pipelines change direction
5. **Location with regard to expansion joints:** Anchors are to be provided upstream and downstream of the expansion joints at both ends of the thermally expanding or contracting pipe length
6. **Intermediate anchors:** Intermediate anchor points should be used in long pipe runs to separate expansion joints with no more than one expansion joint located between two anchor points
7. **Fixing to building structure:** Bolted.
8. **Building structure:** suitable for transmitted stresses

Pr_65_52_63/625 Installing slide guides

1. **Expansion and contraction:** Direct movement from pipe anchor points towards loops, bellows or flexible inserts.
2. **Thrust:** Linear relative to the axis of pipe.
3. **Friction:** Apply a friction reducing material between metal faces subjected to movement

Pr_65_52_63/630 Installing copper pipelines

1. **General requirements:** [Pr_65_52_63/610 Pipelines installation generally type A](#);
[Pr_65_52_63/620 Installing anchors generally](#);
[Pr_65_52_63/625 Installing slide guides](#);
[Pr_65_52_63/690 Spacing of pipelines](#);
and [Pr_65_52_63/710 General inspection and testing type A](#).
2. **Standard:** In accordance with CDA publications 88 Copper tube in buildings and 149 Large diameter copper tubes.
3. **Jointing method**
 - 3.1. **Permanently concealed joints:** Brazed
 - 3.2. **Accessible joints:** Brazed;
Capillary, up to 67 mm for pressure up to 600 kPa and 110°C;
Capillary, 67–108 mm for pressure up to 400 kPa and 110°C;

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Indirect hot water storage supply systems

Compression, up to 54 mm;
and Press fit.

4. Expansion loops: Formed bends from single pipe length.
5. Anchor
 - 5.1. Method: Contractor's choice .
 - 5.2. Pipe restraints: Saddle clamps

Pr_65_52_63/635 Brazed joints in copper and copper alloy pipes

1. Preparation, marking and sealing: In accordance with IS EN 14324.

Pr_65_52_63/690 Spacing of pipelines

1. Minimum clearance between insulated pipelines and
 - 1.1. Wall finish: 10mm
 - 1.2. Ceiling finish or soffit: 10mm
 - 1.3. Floor: 25mm
 - 1.4. Electrical services: 150mm
 - 1.5. Adjacent services: 100mm
 - 1.6. Uninsulated pipeline: 75mm
 - 1.7. Another insulated pipeline: 25mm
2. Minimum clearance between uninsulated pipelines and
 - 2.1. Wall finish: 15mm
 - 2.2. Ceiling finish or soffit: 15mm
 - 2.3. Floor: 100mm
 - 2.4. Electrical services: 150mm
 - 2.5. Adjacent services: 150mm
 - 2.6. Another uninsulated pipeline: 100mm

Pr_65_52_63/710 General inspection and testing type A

1. Inspection of joints
 - 1.1. Joints: Required
 - 1.2. Number of joints: Three.
2. Safety precautions: In accordance with HSEGuidance Notes: General Series (GS) GS 4.

Pr_80_77_76/610 Installing insulation and protection products generally

1. Standard: In accordance with IS 5970.
2. Timing: Insulate after installed system has been fully tested and joints proved sound.
3. Insulation: Do not enclose adjacent units together.
4. Clearance: Maintain between pipes.
5. Finish: Neatly finish joints, corners, edges and overlaps.

Pr_80_77_76/640 Installing phenolic foam insulation on pipelines Type A

1. General requirements: [Pr_80_77_76/610 Installing insulation and protection products generally](#).
2. Joints: Close butt, seal with 50 mm wide class 0 foil tape on both longitudinal and circumferential joints.
3. At fittings: Mitre. Secure with tape.

4. Vapour seal: Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 foil tape.

Pr_80_77_76/690 Installing phenolic foam insulation on vessels Type A

1. General requirements: [Pr_80_77_76/610 Installing insulation and protection products generally](#).
2. Application: Install pre-formed segments or pre-slotted foil faced insulation around the diameter of the vessel. Lay with staggered joints.
3. Joints: Seal joints and gaps around protrusions with jointing compound.
4. Finish: Secure with aluminium banding.
5. Access: Allow for removal of access covers.

Ss_55_70_38/620 Installing hot and cold water systems generally

1. Standard: To IS 8558 and IS EN 806-4.
2. Performance: Free from leaks and the audible effects of expansion, vibration and water hammer.
3. Fixing of equipment, components and accessories: Fix securely, parallel or perpendicular to the structure of the building.
4. Preparation: Immediately before installing tanks and cisterns on a floor or platform, clear the surface completely of debris and projections.
5. Corrosion resistance: In locations where moisture is present or may occur, avoid contact between dissimilar metals by use of suitable washers, gaskets, and the like.

Ss_55_70_38/650 Hydraulic pressure testing of hot and cold water supply systems

1. Standard: To IS 8558 and IS EN 806-4.
2. Notice (minimum): 1 week.
3. Pressure: 1.5 times working pressure.
4. Duration of test: 1 hour

Ss_55_70_38/660 Flushing hot and cold water systems

1. Standard: To IS EN 806-4.
2. Water analysis: Analyse water samples before treatment.
3. Preliminary checks: Thoroughly inspect pipework. Complete pressure tests before cleaning or chemical treatment.
4. Waste products : Neutralize, and dispose of to drain. Preferably direct to manhole.

Ss_55_70_38/670 Disinfection of hot and cold water systems

1. Standard: To IS EN 806-4.
2. Samples for analysis: Provide after disinfection and flushing.

System completion

Ss_55_70_38/810 Commissioning of hot and cold water supply systems

1. Pre-commissioning: In accordance with BSRIABG 2/2010 and CIBSE Commissioning Code W.
2. Commissioning: In accordance with IS EN 806-4, BSRIABG 2/2010 and CIBSE Commissioning Code W.
3. Notice (minimum): One week.
4. Equipment: Check and adjust operation of equipment, controls and safety devices.
5. Outlets: Check operation of outlets for satisfactory rate of flow and temperature.

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Indirect hot water storage supply systems

Ss_55_70_38/820 Inspection and test records

1. Construction phase reports: System design is commissionable and System cleanliness.
2. Records for water systems: In accordance with BSRIABG 2/2010.
3. Record sheets
 - 3.1. Submission: On completion.
 - 3.2. Number of copies: 1 paper and 2 electronic copies

Ss_55_70_38/830 Demonstrations

1. Running of plant
 - 1.1. Operation: Run, maintain and supervise the installations under normal working conditions.
 - 1.2. Duration: Two weeks.
2. Instruction: Instruct and demonstrate the purpose, function and operation of the installations.

Ss_55_70_38/840 Documentation

1. Operating and maintenance instructions
 - 1.1. Scope: Submit for the system giving optimum settings for controls.
 - 1.2. Product information: Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
 - 1.3. Format: Paper copy and Electronic.
 - 1.4. Number of copies: Two.
2. Record drawings
 - 2.1. Content: Location and arrangement of plant in plant rooms;
Location, size and route of hot and cold water services;
Location and identification of regulating, isolation and control valves
 - 2.2. Format: A1 paper print and Electronic.
 - 2.3. Number of copies: Two.
3. Submittal date: 2 weeks prior to the date of practical completion
4. Wholesome water consumption notice: Submit within 5 days.

Ss_55_70_38/850 Water quality tests

1. Standard: To IS EN 806-4.
2. Samples
 - 2.1. Sample points: Hot water storage cylinder;
 - 2.2. Samples for analysis: Submit samples for bacteriological analysis.
3. Water temperature: Record at each sampling point at the time of taking the sample.
4. Test results
 - 4.1. Record: Details of all analyses.
 - 4.2. Submit: On completion.
 - 4.3. Number of copies: One hardcopy and an electronic copy

Ss_55_70_38/860 Spares

1. Pipeline ancillaries
 - 1.1. Keys: Two of each type.
 - 1.2. Hose unions: Two of each type.
2. Belts and pulleys: Two of each type.

Ss_55_70_38_42

Indirect hot water storage supply systems

Ss_55_70_38/870 Operating tools

1. **Tools:** Supply tools for operation, maintenance and cleaning purposes.
2. **Keys:** Supply keys for valves and vents.

Ss_55_70_38/880 Maintenance

1. **Servicing and maintenance:** Undertake for 12 months after completion.

Ω End of System

Ss_60_40_36_05 Air source heat pump systems

Systems

Ss_60_40_36_05 Air source heat pump systems

1. Description: Supply, install, test, commission, demonstrate and set to work the entire system as set out within this specification and as described on the drawings/equipment schedules.
2. System manufacturer: Refer to equipment schedules.
3. Arrangement: Heating as described in equipment schedules
4. Heat pump type: [Pr_70_60_37_04 Air-to-water heat pumps](#).
5. Supporting frame: Big-foot steel support frame or equal and approved by manufacturer
6. Supplementary equipment: [Pr_60_50_20_10 Buffer vessels](#).
7. Pumps: Refer to LTHW system specification section
8. Thermal insulation:

[Pr_80_77_76_62 Phenolic foam insulation](#) - LTHW pipework
or [Pr_80_77_76_54 Mineral wool pipe section insulation](#) - LTHW pipework

9. Controls: Refer to specific controls specification.
10. Plant and equipment identification: [Pr_40_10_57_78 Self-adhesive colour pipe bands](#);
[90-90-55/490 Valve charts and schematics](#);
[90-90-55/495 Valve identification labels](#);
11. Execution: [Ss_60_40_36/620 Installing heat pump systems type A](#).
12. System completion: [Ss_60_40_36/810 Commissioning of heat pump systems](#);
[Ss_60_40_36/860 Servicing and maintenance](#);
[Ss_60_40_36/820 Performance testing](#);
[Ss_60_40_36/840 Demonstrations](#);
[Ss_60_40_36/850 Documentation](#);
and [Ss_60_40_36/830 Inspection and test records](#).

Products

90-90-40/390 Protection

1. Manufacturer: Contractor's choice .
2. Material: Self adhesive cladding and jacketing. Venture Clad or equal as agreed with the Engineer unless stated elsewhere within this specification
3. Colour: Self finish.
4. Execution: Reference to missing clause Installing self adhesive cladding and jacketing

90-90-55/490 Valve charts and schematics

1. Manufacturer: Contractor's choice .
2. Material: Engraved plastics laminate.
3. Information to be included: 'Schematic layout chart' of the mechanical installation - a fully detailed drawing with each pipeline and system clearly identified;
'Valve charts' giving the pipeline, function and position of all labelled valves;
'Safety Procedures' wall chart with method of operation for all control panels;
and 'Identification chart', with key to colour codes set out in BS1710, Appendix D, table 3.
4. Size: A0 and A1.
5. Execution: [Pr_40_10_57/620 Installing valve charts and schematics](#).

Ss_60_40_36_05
Air source heat pump systems

90-90-55/495 Valve identification labels

1. Manufacturer: Contractor's choice .
2. Material: Face engraved rigid plastic laminate.
3. Label size: Manufacturer's standard .
4. Colour:
 - 4.1. Background: Basic and safety colour identification of associated system.
 - 4.2. Lettering: Contractor's choice .
5. Typography:
 - 5.1. Font: Contractor's choice .
 - 5.2. Size: Contractor's choice .
6. Information: Purpose and reference number.
7. Execution: Reference to missing clause Installing valve identification labels.

Pr_40_10_57_78 Self-adhesive colour pipe bands

1. Description: For new LTHW piping systems
2. Manufacturer: Contractor's choice .
3. Standards: To IS 1710.
4. Identification type: Adhesive colour bands.
5. Identification label: Applied to the piping
6. Execution: [Pr_40_10_57/660 Installing identification on pipework.](#)

Pr_60_50_20_10 Buffer vessels

1. Description: New 1,000 L capacity buffer tank installed in space adjacent to existing boiler room
2. Manufacturer: Submit proposals .
3. Material: Stainless steel.
4. Arrangement: Vertical unless otherwise stated / indicated on drawings
5. Duty
 - 5.1. Capacity: In line with system requirements to ensure adequate system water content and prevent cycling of plant
 - 5.2. Working temperature: System maximum temperature
 - 5.3. Working pressure: System maximum operating pressure
6. Accessories: Drain cock and Insulation.

Pr_70_60_37_04 Air-to-water heat pumps

7. Description: New air source heat pumps
8. Manufacturer: Basis of Design: Master Therm (or approval equal)
9. Standards
 - 9.1. Safety and environmental: To IS EN 378-1 and IS EN 378-2.
 - 9.2. Test requirements: To EN 14825 and EN 16147.
 - 9.3. Electrical safety: To IS EN 60335-2-40.
10. Heat pump type: Monobloc. Each unit shall be factory assembled, factory tested, and delivered as a complete monoblock solution suitable for immediate commissioning. All units shall be capable of equal participation in the cascade, with no fixed duty or standby units. The system shall support continuous modulation and intelligent load sharing across all units.

Each heat pump unit shall be equipped with a fully inverter-driven compressor and variable-speed EC fan. The system shall be capable of continuously modulating heat output from approximately

Ss_60_40_36_05

Air source heat pump systems

20% to 100% of nominal capacity. Stable operation at low load without excessive cycling shall be demonstrated, allowing the unit cascade to operate efficiently for the majority of annual operating hours.

11. **Mode:** Heating and DHW production.
12. **Coefficient of performance (minimum):** The system shall achieve an energy efficiency class of A+++. Minimum performance values shall include a COP of not less than 5.02 at A7/W35 and a SCOP of not less than 4.89 in accordance with EN 14825. All efficiency values shall be based on tested and certified data, inclusive of defrost cycles and real operating conditions, and not on theoretical or compressor-only values.
13. **Integrated service fittings:** Heating circulating pump. Automatic air vent. Integral control valve for domestic hot water primary circuit.
14. **Output**
 - 14.1. **Heating:** As per schedules. Capable of delivering LTHW flow temperatures of up to 75degC without need for external temperature boosters.
 - 14.2. **Heating:** Heat pumps capable of
15. **Electrical supply type:** Three-phase.
16. **Refrigerant:** R290 – system shall utilize a natural refrigerant with a GWP of less than 150. The refrigerant solution shall be fully compliant with current and future EU F-Gas regulations. Refrigerant charge, safety design, and control philosophy shall be factory engineered, CE certified, and supplied as a complete tested system. Synthetic or blended refrigerants shall not be accepted.

As part of the cascade configuration, each individual heat pump unit shall contain a refrigerant charge not exceeding 2.9 kg per unit. As the refrigerant charge per circuit remains below applicable regulatory thresholds, the system shall not require mandatory annual refrigerant leak inspections by law.

This requirement is considered a critical operational and whole-life cost factor. Systems utilising larger individual refrigerant charges (typically exceeding 5 kg per circuit) are subject to mandatory periodic refrigerant inspections, often requiring two or more inspections per year, which can result in significant ongoing operational and maintenance costs. The proposed low-charge cascade arrangement shall therefore minimise statutory inspection requirements and long-term lifecycle cost exposure.

17. **Execution:** Comply with manufacturers' requirements. The heat pump system must be capable of managing space heating, domestic hot water (DHW) production, and auxiliary heat sources without reliance on third-party cascade controllers or external BMS logic for core system operation. Systems requiring add-on PLCs, third-party cascade managers, or BMS-based sequencing to achieve full functionality shall not be deemed compliant.
18. **Control system:** The heat pump system shall include a fully integrated, manufacturer-supplied PLC control system. The PLC shall be factory fitted, factory programmed and proven in live installations. All cascade logic, sequencing, optimisation, and plantroom management functions shall be provided as part of the heat pump system itself and not via any third-party controller.

The control system shall provide full cascade control of all units, including dynamic lead/lag rotation to equalise runtime and component wear. Unit staging and modulation shall be based on real system demand, outdoor air temperature, flow and return temperatures, and system delta-T. Partial-load optimisation shall be continuous and proportional and shall not rely on simple on/off or stepped staging logic.

Systems that rely on external BMS logic, third-party PLCs, or add-on cascade controllers to achieve cascade operation or plantroom management shall not be considered equivalent.

The system shall include integrated remote monitoring and control provided directly by the heat pump manufacturer. The monitoring platform shall allow real-time access to system temperatures, compressor speed, fan speed, electrical consumption, energy delivered, alarms, and fault history. Remote diagnostics and parameter adjustment shall be available.

Core monitoring and diagnostic functionality shall not be subject to annual licence fees. Systems offering only limited Modbus points or read-only BMS data shall not be considered equivalent.

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Air source heat pump systems

19. **Verification:** Comply with manufacturers' requirements. System to be supplied with minimum seven (7) year manufacturer's warranty. Single manufacturer shall retain responsibility for the heat pump units, control hardware, control software and cascade logic. Split responsibility between multiple suppliers, controls contractors or BMS integrators shall not be accepted.
- 19.1. **Submittals:** Test results, report and certification from an accredited testing facility. Technical information, calculations, and manufacturer's literature. Manufacturer's certification.

Pr_80_77_76_47 Loadbearing pipeline support insulation

1. Pipelines carrying fluids at temperature up to 120°C: 300 mm length of high density phenolic foam.
2. Pipelines carrying cold fluids: 300 mm length of high density phenolic foam.
3. Environmental rating: Submit Proposals
4. Volatile organic compounds (VOC) emissions level (maximum): Submit Proposals
5. Recycled content: IS EN ISO 14021, 30% (minimum)
6. Execution: Reference to missing clause Installing at loadbearing pipelines supports.

Pr_80_77_76_54 Mineral wool pipe section insulation

1. Manufacturer: Submit proposals .
2. Standard: To IS 3958-4 and To IS EN 14303.
3. Environmental rating: BRE GreenBookLive rating A
4. Recycled content: 50% (minimum) to IS EN ISO 14021.
5. Thermal conductivity: 0.032 W/m·K at 0°C.
0.034 W/m·K at 10°C.
0.037 W/m·K at 50°C.
0.040 W/m·K at 75°C.
0.044 W/m·K at 100°C.
6. Finish: Aluminium foil faced.
7. Fire performance: Reaction to fire classification of A2L-s1, d0, as defined in BS EN 13501-1
8. Insulation thickness (minimum): To BS 5422 and TIMSA guide in accordance with Approved Document L
9. Vapour barrier
 - 9.1. Material: Aluminium Foil face
 - 9.2. Vapour permeability: To BS 5422, clause 5.6.
10. Protection: [90-90-40/390 Protection](#).
11. Accessories: [Pr_80_77_76_94 Valve and flange insulation](#) and [Pr_80_77_76_47 Loadbearing pipeline support insulation](#).
12. Execution: Reference to missing clause Installing at non-loadbearing pipelines supports.

Pr_80_77_76_62 Phenolic foam insulation

1. Manufacturer: Submit proposals .
2. Standard: To IS EN 13166.
3. Form: Pipe section.
4. Thermal conductivity: 0.018 W/m·K at 0°C.
0.018 W/m·K at 10°C.
0.023 W/m·K at 50°C.
0.025 W/m·K at 75°C.
5. Finish: Aluminium.

6. Fire performance: Reaction to fire classification of A2L-s1, d0, as defined in BS EN 13501-1
7. Insulation thickness (minimum): To IS 5422 and TIMSA guide in accordance with Approved Document L
8. Vapour barrier
 - 8.1. Material: Aluminium Foil faced
 - 8.2. Vapour permeability: To IS 5422, clause 5.6.
9. Protection: [90-90-40/390 Protection](#).
10. Accessories: [Pr_80_77_76_94 Valve and flange insulation](#) and [Pr_80_77_76_47 Loadbearing pipeline support insulation](#).
11. Items to be insulated: Cover plates and Removable access covers.
12. Execution: Reference to missing clause Installing at non-loadbearing pipelines supports;
[Pr_80_77_76/690 Installing phenolic foam insulation on vessels](#);
and [Pr_80_77_76/640 Installing phenolic foam insulation on pipelines](#).

Pr_80_77_76_94 Valve and flange insulation

1. Material: Match pipework insulation material
2. Form: Removable and reusable preformed rigid covers.
3. Finish: To match pipelines finish.
4. Environmental rating: Submit Proposals
5. Volatile organic compounds (VOC) emissions level (maximum): Submit Proposals
6. Recycled content: Submit Proposals
7. Execution: Reference to missing clause Installing at valves and flanges.

Execution

Pr_40_10_57/620 Installing valve charts and schematics

1. Fixing: Plug and screw to wall.
2. Position: Boiler house

Pr_40_10_57/660 Installing identification on pipework

1. Application of basic identification colour: Coloured bands as IS 1710 clause 3.3.
2. Safety colour identification: On or next to the colour bands
3. Information: Abbreviation of name;
Colour bands as IS 1710 appendix D
4. Direction of flow: Indication arrow;
Indication arrow and the word FLOW or the letter F;
and Indication arrow and the word RETURN or the letter R.

Pr_80_77_76/610 Installing insulation and protection products generally type A

1. Standard: In accordance with IS 5970.
2. Timing: Insulate after installed system has been fully tested and joints proved sound.
3. Insulation: Do not enclose adjacent units together.
4. Clearance: Maintain between pipes.
5. Finish: Neatly finish joints, corners, edges and overlaps.

Pr_80_77_76/640 Installing phenolic foam insulation on pipelines

1. General requirements: [Pr_80_77_76/610 Installing insulation and protection products generally type A](#).
2. Joints: Close butt, seal with 50 mm wide class 0 foil tape on both longitudinal and circumferential joints.
3. At fittings: Mitre. Secure with tape.
4. Vapour seal: Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 foil tape.

Pr_80_77_76/690 Installing phenolic foam insulation on vessels

1. General requirements: [Pr_80_77_76/610 Installing insulation and protection products generally type A](#).
2. Application: Install pre-formed segments or pre-slotted foil faced insulation around the diameter of the vessel. Lay with staggered joints.
3. Joints: Seal joints and gaps around protrusions with jointing compound.
4. Finish: Secure with aluminium banding.
5. Access: Allow for removal of access covers.

Ss_60_40_36/620 Installing heat pump systems type A

1. Standards: To BS EN 378-2, BS EN 378-3 and BS EN 378-4.
2. Fixing of equipment, components and accessories: Fix securely on purpose-made bases or supports.
3. External units: Away from windows and adjacent buildings. Protect from high winds. Prevent snow, leaves and debris from blocking air flow.
4. Access: Provide for inspection and servicing of heat pumps and ancillary equipment.
5. Refrigerant lines: Short and straight.
6. Condensate: To drain away rapidly, without risk of freezing.

System completion

Ss_60_40_36/810 Commissioning of heat pump systems

1. Pre-commissioning: In accordance with CIBSE Commissioning Code B.
2. Commissioning: In accordance with CIBSE Commissioning Code B.
3. Additional testing: Allowance shall be made for return visits to commission system during heating season, if original commissioning does not occur during winter.
4. Notice (minimum): 1 week.

Ss_60_40_36/820 Performance testing

1. General: Demonstrate the performance of the installations.
2. Guaranteed efficiency: Tolerances defined in this specification.
3. Environmental tests: Carry out environmental testing. If necessary, use artificial loads to simulate operating conditions.
4. Recorders
 - 4.1. Type: Supply and maintain portable seven day space temperature and relative humidity recorders, complete with charts.
 - 4.2. Number: Two.
 - 4.3. Duration of loan: One week.
5. Reports: Submit on completion.

Ss_60_40_36/830 Inspection and test records

1. Construction phase reports: System design is commissionable;
Post-installation;
System cleanliness;
and System commissionable.
2. Records for water systems: In accordance with BSRIA BG 2/2010.
3. Records for air systems: In accordance with BSRIA BG 49/2015.
4. Record sheets
 - 4.1. Submission: On completion.
 - 4.2. Number of copies: 1 paper and 2 electronic copies

Ss_60_40_36/840 Demonstrations

1. Running of plant
 - 1.1. Operation: Run, maintain and supervise the installations under normal working conditions.
 - 1.2. Duration: One week.
2. Instruction: Instruct and demonstrate the purpose, function and operation of the installations.

Ss_60_40_36/850 Documentation

1. Operating and maintenance instructions
 - 1.1. Scope: Submit for the system giving optimum settings for controls.
 - 1.2. Product information: Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
 - 1.3. Format: Paper copy and Electronic.
 - 1.4. Number of copies: Two.
2. Record drawings
 - 2.1. Content: Location and arrangement of plant in plant rooms;
Location, size and route of Mechanical services;
Location, route and depth of underground services;
Location and identification of pipework regulating, isolation and control valves;
and Location of outlets.
 - 2.2. Format: A1 paper print drawing and Electronic drawing.
 - 2.3. Number of copies: Two.
3. Submittal date: 2 weeks prior to the date of practical completion

Ss_60_40_36/860 Servicing and maintenance

1. Requirement: Undertake for 12 months after completion.

Ω End of System

Ss_60_40_37_48 Low-temperature hot water heating systems

Systems

Ss_60_40_37_48 Low-temperature hot water heating systems

1. Description: Supply, install, test, commission, demonstrate and set to work the entire bivalent heat pump system as set out within this specification and as described on the drawings/equipment schedules.
2. System performance:
[Ss_60_40_37/280 Chemical treatment for heating systems](#);
[Ss_60_40_37/250 System operating parameters for water-based heating systems](#);
[Ss_60_40_37/220 Basic design temperatures for heating systems](#);
3. Arrangement: Refer to the relevant schematics and system descriptions
4. Distribution: Variable flow between heat pumps and buffer tank.
5. Heat source:
New air source heat pumps and existing gas boilers.
Refer to equipment schedules and detailed design requirements.
6. Feed and expansion: Pressurization units.
7. Corrosion monitoring:
8. Water treatment plant
 - 8.1. Equipment: [90-15-95/350 Dosing pots](#) and Filtration units.
 - 8.2. Chemicals: [Pr_60_55_96_06 Bacteria and biofouling inhibitors](#) and [Pr_60_55_96_16 Corrosion inhibitor chemicals for closed circuits](#).
9. Pipework:
[Pr_65_52_63_82 Steel pipelines](#).
10. Pipework ancillaries
 - 10.1. Jointing materials:
 - 10.2. Couplings:
 - 10.3. Venting devices: [Pr_65_54_93_05 Automatic air vents](#) and [Pr_65_54_93/610 Air bottles](#).
 - 10.4. Deaerators: Pressure differential de-aerators
 - 10.5. Separators:
[Pr_65_55_76_15 Combined air and dirt separators](#)
 - 10.6. Gauges: [Pr_65_52_34_65 Pressure and altitude gauges](#) and [Pr_65_52_34_88 Temperature gauges](#).
 - 10.7. Accessories: [Pr_65_52_61_63 Pipe sleeves](#);
[Pr_65_52_61_91 Tundishes](#);
[90-10-60/400 Pipeline strainers](#);
and Masking plates.
 - 10.8. Pipe supports: Pipe clips and Channel supports.
11. Fire-stopping: Individual services penetrations fire stopping system;
12. Valves
 - 12.1. Isolating valves: [90-10-90/332 Butterfly valves](#) and [90-10-90/334 Cast iron or steel ball valves](#).
 - 12.2. Check valves: [Pr_65_54_95_83 Steel globe stop and check valves](#).
 - 12.3. Regulating valves: Flow measuring devices and Double regulating valves.

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Low-temperature hot water heating systems

- 12.4. Balancing valves: Differential pressure control valves (DPCV) and [Pr_65_54_95_63 Pressure-independent control valves](#).
- 12.5. Mixing valves: Low-pressure thermostatic mixing valves.
- 12.6. Radiator valves: Thermostatic radiator valves.
- 12.7. Draining devices: Three-way vent cocks and [Pr_65_54_95_27 Draining taps](#).
- 12.8. Accessories: [Pr_65_54_93_87 Test points](#).
- 13. Thermal insulation: [Pr_80_77_76_62 Phenolic foam insulation](#) and [Pr_80_77_76_54 Mineral wool pipe section insulation](#).
- 14. Vibration isolation: Pad mountings;
[Pr_80_77_94_84 Spring isolators](#)
- 15. Controls: Refer to controls section of this document
- 16. Plant and equipment identification: [90-90-55/480 Mechanical plant and equipment identification labels](#);
Equipment labels and warning notices;
[Pr_40_10_57_78 Self-adhesive colour pipe bands](#);
[90-90-55/495 Valve identification labels](#);
and [90-90-55/490 Valve charts and schematics](#).
- 17. Verification:
- 18. Execution: [Ss_60_40_37/650 Filling and pressure testing of water based heating systems](#);
[Ss_60_40_37/620 Installing water based heating systems](#);
[Ss_60_40_37/660 Flushing and pre-commission cleaning of heating systems](#);
and [Ss_60_40_37/670 Installing water treatment for heating systems](#).
- 19. System completion: [Ss_60_40_37/870 Operating tools](#);
[Ss_60_40_37/880 Servicing and maintenance](#);
[Ss_60_40_37/845 Demonstrations](#);
[Ss_60_40_37/810 Commissioning water heating systems](#);
[Ss_60_40_37/860 Documentation](#);
and Performance testing.

System performance

Ss_60_40_37/220 Basic design temperatures for heating systems

- 1. Design temperatures: As per existing system
- 2. External air temperature: -3 Deg C unless stated elsewhere

Ss_60_40_37/250 System operating parameters for water-based heating systems

- 1. Design flow temperature: Maximum 70°C.
- 2. Temperature difference across primary heating circuit: 10°C across heat pump system; existing system delta t applies.
- 3. Water velocity: Maximum 1.5 m/s.
- 4. Working pressure: To allow 1 bar head at top of system for venting
- 5. Verification: System design calculations.

Ss_60_40_37/280 Chemical treatment for heating systems

- 1. Treatment: In accordance with BSRIA BG 50/2013.
- 2. Fill water pre-treatment
 - 2.1. Water conditioning: Fill system with inhibitor and biocide treated and softened water.
Dosing pot to be provided for subsequent top up of water treatment - sized by specialist.
 - 2.2. Microbiological control: Biocide dosing unless stated elsewhere

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Low-temperature hot water heating systems

3. Chemical treatment
 - 3.1. Corrosion inhibition: Organic film-forming.
 - 3.2. Bacteria and biofouling inhibition: Treatment for sulfate reducing bacteria; Treatment for nitrite reducing bacteria; and Pseudomonads.
 - 3.3. Scale inhibition: Yes
4. Non-chemical treatment
 - 4.1. Filtration: Strainers; Dirt separators; and Magnetic filtration.
 - 4.2. Deaeration: Passive deaeration.
5. Verification: Provide water analysis

Products

90-10-60/400 Pipeline strainers

1. Manufacturer: Contractor's choice .
2. Pattern: Y pattern.
3. Baskets:
 - 3.1. Perforation size: Manufacturer's standard .
 - 3.2. Mesh size: Manufacturer's standard .
4. Material: To suit pipeline material
5. Connections: Manufacturer's standard . To suit pipework installation
6. Integral accessories: Plugged connections for drain, air vent and differential pressure monitoring.
7. Execution: [Pr_65_57_96/650 Installing strainers.](#)

90-10-65/425 Steel pipeline jointing materials

1. Manufacturer: Contractor's choice .
2. Standards:
 - 2.1. Jointing compound: To IS6956-5.
 - 2.2. PTFE tape: To ISEN 751-3.
 - 2.3. Flange jointing rings: To ISEN 1514-4.
 - 2.4. Elastomeric gaskets: To ISEN 681-1.
 - 2.5. Welding rods:
 - 2.5.1. Gas welding: To ISEN ISO 20378.
 - 2.5.2. Arc welding: To ISEN ISO 636.

90-10-90/332 Butterfly valves

1. Manufacturer: Submit proposals
2. Standard: To ISEN 593 and IS EN 16668.
3. Design: Manufacturer's standard .
4. Arrangement: Double flanged; Downstream dismantling; End of line service; and Wafer.
5. DN rating: Manufacturer's standard .
6. PN rating: To suit the pressure regime to which the valve is being installed

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Low-temperature hot water heating systems

7. Working conditions:
 - 7.1. Type of fluid: To suit the system to which the valve is to be installed
 - 7.2. Maximum working pressure: To suit the pressure regime to which the valve is being installed
 - 7.3. Fluid temperature: To suit the system to which the valve is to be installed
 - 7.4. Flow velocity: Submit proposals .
 - 7.5. Differential pressure (valve closed): Submit proposals .
 - 7.6. Frequency of operation: Manufacturer's standard .
 - 7.7. Opening time: Manufacturer's standard .
 - 7.8. Closing time: Manufacturer's standard .
 - 7.9. Operating pressure difference: Submit proposals .
8. Materials:
 - 8.1. Body: Cast iron or Ductile iron.
 - 8.2. Shaft: Manufacturer's standard .
 - 8.3. Disc: Aluminium bronze or Stainless steel.
 - 8.4. Seat: Ethylene propylene diene monomer (EPDM).
9. Operation:
 - 9.1. Manual: Lever c/w trigger
 - 9.2. Fail safe: Single acting open and Single acting closed. Depending on system installation
 - 9.3. Automatic: Electric.
10. Options: Emergency hand control.
11. Execution: [Pr_65_54_95/610 Installation of valves generally](#)

90-10-90/334 Cast iron or steel ball valves

1. Manufacturer: Submit proposals .
2. Standard: To ISISO 7121.
3. Arrangement: Full bore.
4. Material: Carbon steel.
5. Connections: Manufacturers standard either:
Flanged to ISEN 1092-2;
Pressure-tight joints threaded to ISEN 10226-1;
and Threaded joints to ISEN ISO 228-1.
6. Options: Hand lever
7. Execution: [Pr_65_54_95/610 Installation of valves generally](#).

90-15-95/350 Dosing pots

1. Manufacturer: Contractor's choice .
2. Standard: To PD 5500.
3. Material: Mild steel.
4. Working pressure (maximum): 14 bar.
5. Execution: [Pr_60_55_97/610 Installing dosing equipment](#).

90-90-40/390 Protection

1. Manufacturer: Contractor's choice .
2. Material: Self adhesive cladding and jacketing. Venture Clad or equal as agreed with the Engineer unless stated elsewhere within this specification

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Low-temperature hot water heating systems

3. Colour: Self finish.
4. Execution: Reference to missing clause Installing self adhesive cladding and jacketing

90-90-55/480 Mechanical plant and equipment identification labels

1. General: All mechanical plant and equipment shall, in addition to manufacturer's labels, be permanently, clearly and uniquely labelled with identification name, reference number and function in the particular installation.
2. Manufacturer: Contractor's choice .
3. Material: Face engraved rigid plastic laminate.
4. Label size: Contractor's choice .
5. Colour:
 - 5.1. Background: Black
 - 5.2. Lettering: White
6. Typography:
 - 6.1. Font: Helvetica
 - 6.2. Size: 10mm high lettering
7. Information to be included: Equipment name;
Equipment reference number;
and Service.
8. Execution: [Pr_40_10_57/611 Installing mechanical plant and equipment identification.](#)

90-90-55/490 Valve charts and schematics

1. Manufacturer: Contractor's choice .
2. Material: Engraved plastics laminate.
3. Information to be included: 'Schematic layout chart' of the mechanical installation - a fully detailed drawing with each pipeline and system clearly identified;
'Valve charts' giving the pipeline, function and position of all labelled valves;
'Safety Procedures' wall chart with method of operation for all control panels;
and 'Identification chart', with key to colour codes set out in BS1710, Appendix D, table 3.
4. Size: A0 and A1.
5. Execution: [Pr_40_10_57/620 Installing valve charts and schematics.](#)

90-90-55/495 Valve identification labels

1. Manufacturer: Contractor's choice .
2. Material: Face engraved rigid plastic laminate.
3. Label size: Manufacturer's standard .
4. Colour:
 - 4.1. Background: Basic and safety colour identification of associated system.
 - 4.2. Lettering: Contractor's choice .
5. Typography:
 - 5.1. Font: Contractor's choice .
 - 5.2. Size: Contractor's choice .
6. Information: Purpose and reference number.
7. Execution: Installing valve identification labels.

Pr_40_10_57_78 Self-adhesive colour pipe bands

1. Description: For new LTHW piping systems

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Low-temperature hot water heating systems

2. Manufacturer: Contractor's choice .
3. Standards: To IS 1710.
4. Identification type: Adhesive colour bands.
5. Identification label: Applied to the piping
6. Execution: [Pr_40_10_57/660 Installing identification on pipework.](#)

Pr_60_55_96_06 Bacteria and biofouling inhibitors

1. Manufacturer: Contractor's choice .
2. Non-oxidizing biocides: Biocide to adequately treat system from microbiological growth to water treatment specialists recommendations.

Pr_60_55_96_16 Corrosion inhibitor chemicals for closed circuits

1. Manufacturer: Submit proposals .
2. Corrosion inhibitors: Scale and corrosion inhibitor to adequately treat system from corrosion to water treatment specialists recommendations.

Pr_65_52_34_65 Pressure and altitude gauges

1. Description: As required per heating schematics
2. Manufacturer: Contractor's choice .
3. Standard
 - 3.1. Bourdon: To IS EN 837-1.
 - 3.2. Diaphragm: To IS EN 837-3.
4. Diameter: 100 mm.
5. Case: Stainless steel.
6. Connections: 'Ring' pattern siphon and gauge cock.
7. Execution: [Pr_65_52_34/630 Installing pressure gauges.](#)

Pr_65_52_34_88 Temperature gauges

1. Description: As required per heating schematics
2. Manufacturer: Submit proposals .
3. Standard: To IS EN 13190.
4. Format: Manufacturer's standard .
5. Diameter: 100.
6. Case: Manufacturer's standard .
7. Connections: Contractor's choice .
8. Integral accessories: 100 mm immersion length pocket.

Pr_65_52_61_63 Pipe sleeves

1. Sleeves: Pipework passing through walls, floors, ceilings and partitions shall be fitted with sleeves of internal diameter at least 10 mm larger than the external diameter of the pipework insulation passing through the sleeve to allow clearance. Pipework insulation shall always pass through walls uninterrupted and suitably fire stopped where passing through fire rated walls.
2. Manufacturer: Contractor's choice .
3. Material: Sleeves shall be of a material similar to that of the pipe, steel or copper and for plastic pipes, rigid plastic or copper, with lugs to locate in floors and ceiling and treated against corrosion.
4. Finish: Install sleeves flush with the finished face(s) of walls, floors, ceilings and partitions. In areas where floors are washed down, in wet working areas or ablutions install protruding 100 mm

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above floor finish, with the clearance around the pipe sealed with waterproof mastic or screwed plastic thimbles.

5. **Masking Plates:** Fit at visible penetrations (or sleeves in wet areas), including through false ceilings of occupied rooms.
6. **Form:** Submit proposals .

Pr_65_52_61_91 Tundishes

1. **Manufacturer:** Contractor's choice .
2. **Material:** Copper sheet.
3. **Connections:** Diameter to suit drain line and discharge rate.

Pr_65_52_63_82 Steel pipelines

1. **Description:** New LTHW piping
2. **General requirements:** [90-10-65/425 Steel pipeline jointing materials](#) and [Pr_65_52_63_83 Steel pipeline fittings](#).
3. **Manufacturer:** Submit proposals .
4. **Standard:**
 - 4.1. Up to 150mm: To IS EN 10255, heavy weight.
 - 4.2. 150 mm and above: To IS EN 10216-1, designation TR1 and To IS EN 10217-1, designation TR1.
5. **Finish:** Varnish.
6. **Pipe ends:** Square, grooved to AWWA Standard C606-22: Grooved and shouldered joints.
7. **Execution:** [Pr_65_52_63/685 Welding steel pipelines](#).

Pr_65_52_63_83 Steel pipeline fittings

1. **Manufacturer:** Contractor's choice .
2. **Standards**
 - 2.1. Malleable: To IS 143 and 1256.
 - 2.2. Flanged: To IS EN 1092-1.
 - 2.3. Welded: To IS EN 10253-1 and IS EN 10253-2.
 - 2.4. Wrought: To IS EN 10241.
 - 2.5. Press fit fittings: Not acceptable
 - 2.6. Crimp fittings: Not acceptable
 - 2.7. Mechanical couplings: Submit proposals .

Pr_65_54_93_05 Automatic air vents

1. **Description:** At system high points
2. **Manufacturer:** Contractor's choice .
3. **Arrangement:** Vertical inlet with integral lockshield isolating valve and check valve.
4. **Material:** Gunmetal.
5. **Connections:** Threaded.

Pr_65_54_93_87 Test points

1. **Description:** As required in the system
2. **Manufacturer:** Contractor's choice .
3. **Arrangement:** Self sealing.

4. Material: Manufacturer's standard .
5. Connections: 6 mm (¼ inch) extended length.
6. Verification
 - 6.1. Third-party certification: Required

Pr_65_54_95_27 Draining taps

1. Description: At low points in system
2. Manufacturer: Contractor's choice .
3. Standard: To IS 2879.
4. Size: ½ inch.
5. Arrangement: Type 2.
6. Material: Copper alloy.
7. Connections: Threaded joints to IS EN 10226-1.
8. Accessories: Lever pattern key and Spare hose union.
9. Execution: [Pr_65_54_95/610 Installation of valves generally.](#)

Pr_65_54_95_63 Pressure-independent control valves

1. Description: 2-port control valves where shown on schematic. 3-way control valves for DHW production from ASHP-08.
2. Manufacturer: Submit proposals - accepted manufacturers are Belimo, Hattersley, Samson or equal and approved.
3. Standard: IS EN 12266-1 and IS EN 12266-2
4. Pressure rating: To suit application allowing for 1.5 times working pressure
5. Temperature range: To suit application
6. Material: Manufacturer's standard .
7. Connections: Manufacturer's standard .
8. Actuator: Modulating.
9. Accessories: Drain;
Flushing bypass;
Isolating valve;
and Strainer.
10. Execution: [Pr_65_54_95/610 Installation of valves generally.](#)

Pr_65_54_95_83 Steel globe stop and check valves

1. Manufacturer: Submit proposals .
2. Standard: To IS EN 13709 and IS EN 16668.
3. Pattern: Manufacturer's standard .
4. Body ends: Manufacturer's standard .
5. DN rating: To suit system
6. PN rating: To suit system
7. Stem: Manufacturer's standard .
8. Operation: To suit application
9. Auxiliary connections designation: As required.
10. Body tappings: Required.
11. Accessories: NA
12. Execution: [Pr_65_54_95/610 Installation of valves generally.](#)

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Pr_65_55_76_15 Combined air and dirt separators

1. Manufacturer: Submit proposals
2. Arrangement: Vertical housing with internal large surface area mechanism to remove microbubbles via coalescence effect.
3. Material: Carbon steel.
4. Connections: Butt weld ends and Flanged. To suit pipework installation
5. Execution: [Pr_65_55_76/640 Installing combined air and dirt separators](#).

Pr_80_77_76_47 Loadbearing pipeline support insulation

1. Pipelines carrying fluids at temperature up to 120°C: 300 mm length of high density phenolic foam.
2. Pipelines carrying cold fluids: 300 mm length of high density phenolic foam.
3. Environmental rating: Submit Proposals
4. Volatile organic compounds (VOC) emissions level (maximum): Submit Proposals
5. Recycled content: IS EN ISO 14021, 30% (minimum)
6. Execution: Installing at loadbearing pipelines supports.

Pr_80_77_76_54 Mineral wool pipe section insulation

1. Manufacturer: Submit proposals .
2. Standard: To IS 3958-4 and To IS EN 14303.
3. Environmental rating: BRE GreenBookLive rating A
4. Recycled content: 50% (minimum) to IS EN ISO 14021.
5. Thermal conductivity: 0.032 W/m·K at 0°C.
0.034 W/m·K at 10°C.
0.037 W/m·K at 50°C.
0.040 W/m·K at 75°C.
0.044 W/m·K at 100°C.
6. Finish: Aluminium foil faced.
7. Fire performance: Reaction to fire classification of A2L-s1, d0, as defined in BS EN 13501-1
8. Insulation thickness (minimum): To BS 5422 and TIMSA guide in accordance with Approved Document L
9. Vapour barrier
 - 9.1. Material: Aluminium Foil face
 - 9.2. Vapour permeability: To BS 5422, clause 5.6.
10. Protection: [90-90-40/390 Protection](#).
11. Accessories: [Pr_80_77_76_94 Valve and flange insulation](#) and [Pr_80_77_76_47 Loadbearing pipeline support insulation](#).
12. Execution: Installing at non-loadbearing pipelines supports.

Pr_80_77_76_62 Phenolic foam insulation

1. Manufacturer: Submit proposals .
2. Standard: To IS EN 13166.
3. Form: Pipe section.
4. Thermal conductivity: 0.018 W/m·K at 0°C.
0.018 W/m·K at 10°C.
0.023 W/m·K at 50°C.
0.025 W/m·K at 75°C.

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Low-temperature hot water heating systems

5. Finish: Aluminium.
6. Fire performance: Reaction to fire classification of A2L-s1, d0, as defined in BS EN 13501-1
7. Insulation thickness (minimum): To IS 5422 and TIMSA guide in accordance with Approved Document L
8. Vapour barrier
 - 8.1. Material: Aluminium Foil faced
 - 8.2. Vapour permeability: To IS 5422, clause 5.6.
9. Protection: [90-90-40/390 Protection](#).
10. Accessories: [Pr_80_77_76_94 Valve and flange insulation](#) and [Pr_80_77_76_47 Loadbearing pipeline support insulation](#).
11. Items to be insulated: Cover plates and Removable access covers.
12. Execution: Installing at non-loadbearing pipelines supports;
[Pr_80_77_76/690 Installing phenolic foam insulation on vessels](#);
and [Pr_80_77_76/640 Installing phenolic foam insulation on pipelines](#).

Pr_80_77_76_94 Valve and flange insulation

1. Material: Match pipework insulation material
2. Form: Removable and reusable preformed rigid covers.
3. Finish: To match pipelines finish.
4. Environmental rating: Submit Proposals
5. Volatile organic compounds (VOC) emissions level (maximum): Submit Proposals
6. Recycled content: Submit Proposals
7. Execution: Installing at valves and flanges.

Pr_80_77_94_84 Spring isolators

1. Manufacturer: Submit proposals .
2. Spring isolators type: Caged and Vertical restrained.
3. Colour code: Manufacturer's standard .
4. Load: As plant weight
5. Deflection: As required to suit application

Execution

Pr_40_10_57/611 Installing mechanical plant and equipment identification

1. Fixing: Fix with adhesive to equipment.
2. Position: On equipment.

Pr_40_10_57/620 Installing valve charts and schematics

1. Fixing: Plug and screw to wall.
2. Position: Boiler house

Pr_40_10_57/660 Installing identification on pipework

1. Application of basic identification colour: Coloured bands as IS 1710 clause 3.3.
2. Safety colour identification: On or next to the colour bands
3. Information: Abbreviation of name;
Colour bands as IS 1710 appendix D

4. **Direction of flow:** Indication arrow;
Indication arrow and the word FLOW or the letter F;
and Indication arrow and the word RETURN or the letter R.

Pr_60_55_97/610 Installing dosing equipment

1. **Position:** Install where there is a high differential pressure between flow and return pipeline.
2. **Drain point:** Provide adjacent to the unit and positioned to allow safe operation / avoid trip hazard
3. **Fixing:** Securely to a wall using mounting bracket.

Pr_65_52_34/630 Installing pressure gauges

1. **Position:** Immediately downstream of the tail end valve but upstream of any subsidiary stop valve;
and Immediately upstream of the main control stop valve.

Pr_65_52_63/685 Welding steel pipelines

1. **Standard:** In accordance with BESATechnical Report TR/5.
2. **Welding rods**
 - 2.1. **Arc welding:** To IS EN ISO 636.
 - 2.2. **Gas welding:** To IS EN ISO 20378.
3. **Welder identification:** Mark each weld to identify operative.
4. **Non-destructive examination:** Visual examination, to IS EN ISO 17637.
5. **Completed welds:** Wire brush and protect from corrosion

Pr_65_54_93/610 Air bottles

1. **Construction:** A vertical extension from pipe.
2. **Size:** Bore of pipe.
3. **Length:** 100 mm.
4. **Extension pipe:** Copper with a manual vent cock located in an easily accessible position.
5. **Discharge pipes:** Terminate with air cock or needle valve in an accessible position.

Pr_65_54_95/610 Installation of valves generally

1. **Installation:** In accordance with IS 6683.
2. **Position:** In accessible pipeline positions and in accordance with manufacturers recommendations
3. **Isolation and regulation valves:** Provide at equipment and on sub-circuits.
4. **New clause item 1:** Glands on valve stuffing boxes shall be adjusted at normal plant operating conditions in accordance with manufacturers recommendations, without impairing the valve action by over tightening
5. **Pipeline security:** Ensure pipes on both sides of valve are securely fastened
6. **Access:** Locate valves so they can be readily operated and maintained. Locate next to equipment which is to be isolated.
7. **Connection to pipework:** Fit with joints that suit the pipe material.

Pr_65_55_76/640 Installing combined air and dirt separators

1. **Position:** Fit with dirt drain at lowest point for removing dirt that sinks. Install in hottest part of system.

Pr_65_57_96/650 Installing strainers

1. Orientation: Install with strainer cap at the bottom. Inlet at the top or side.
2. Direction of flow: Install in direction of flow with the pocket in the horizontal plane.

Pr_80_77_76/610 Installing insulation and protection products generally type A

1. Standard: In accordance with IS 5970.
2. Timing: Insulate after installed system has been fully tested and joints proved sound.
3. Insulation: Do not enclose adjacent units together.
4. Clearance: Maintain between pipes.
5. Finish: Neatly finish joints, corners, edges and overlaps.

Pr_80_77_76/640 Installing phenolic foam insulation on pipelines

1. General requirements: [Pr_80_77_76/610 Installing insulation and protection products generally type A](#).
2. Joints: Close butt, seal with 50 mm wide class 0 foil tape on both longitudinal and circumferential joints.
3. At fittings: Mitre. Secure with tape.
4. Vapour seal: Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 foil tape.

Pr_80_77_76/690 Installing phenolic foam insulation on vessels

1. General requirements: [Pr_80_77_76/610 Installing insulation and protection products generally type A](#).
2. Application: Install pre-formed segments or pre-slotted foil faced insulation around the diameter of the vessel. Lay with staggered joints.
3. Joints: Seal joints and gaps around protrusions with jointing compound.
4. Finish: Secure with aluminium banding.
5. Access: Allow for removal of access covers.

Ss_60_40_37/620 Installing water based heating systems

1. Standard: To IS EN 14336.

Ss_60_40_37/650 Filling and pressure testing of water based heating systems

1. Testing: Water tightness test in accordance with IS EN 14336, Annex A and Pressure testing in accordance with IS EN 14336, Annex B.
2. Notice (minimum): 5 working days.
3. Pressure: 1.5 times working pressure.
4. Inspection and witnessing: In accordance with the procedure in BSRIA BG 29/2012
5. Duration of test: 2 h.

Ss_60_40_37/660 Flushing and pre-commission cleaning of heating systems

1. Preliminary checks: Thoroughly inspect pipework. Complete pressure tests before cleaning.
2. Flushing: In accordance with BSRIA BG 29/2012.
3. Cleaning: In accordance with BSRIA BG 29/2012 and BSRIA BG 50/2013.
4. Waste products: Neutralize, and dispose of to drain. Preferably direct to manhole.

Ss_60_40_37/670 Installing water treatment for heating systems

1. Treatment: Closed circuit systems in accordance with BSRIA BG 50/2013.
2. Water sampling: In accordance with IS 8552.

System completion

Ss_60_40_37/810 Commissioning water heating systems

1. Pre-commissioning: In accordance with BSRIA BG 2/2010 and CIBSE Commissioning Code W.
2. Commissioning: In accordance with BSRIA BG 2/2010 and CIBSE Commissioning Code W.
3. Seasonal commissioning: In accordance with BSRIA BG 44/2013.
4. Variable flow systems: In accordance with CIBSE Knowledge Series KS09.
5. Notice (minimum): One week.

Ss_60_40_37/845 Demonstrations

1. Running of plant
 - 1.1. Operation: Run, maintain and supervise the installations under normal working conditions.
 - 1.2. Duration: One week.
2. Instruction: Instruct and demonstrate the purpose, function and operation of the installations.

Ss_60_40_37/860 Documentation

1. Operating and maintenance instructions
 - 1.1. Scope: Submit for the system giving optimum settings for controls.
 - 1.2. Product information: Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
 - 1.3. Format: Paper copy and Electronic.
 - 1.4. Number of copies: Two.
2. Record drawings
 - 2.1. Content: Location and arrangement of plant in plant rooms;
Location, size and route of mechanical services;
Location and identification of pipework regulating, isolation and control valves
 - 2.2. Format: A1 paper print drawing and Electronic drawing.
 - 2.3. Number of copies: Three.
3. Submittal date: At handover. Draft copies to be issued 6 weeks prior to Handover for comment

Ss_60_40_37/870 Operating tools

1. Tools: Supply tools for operation, maintenance and cleaning purposes.
2. Keys: Supply keys for valves and vents.

Ss_60_40_37/880 Servicing and maintenance

1. Requirement: Undertake throughout defects liability period unless specifically stated elsewhere within this specification.

Ω End of System

Ss_75_70_54_10

Building monitoring and management systems

Systems

Ss_75_70_54_10 Building monitoring and management systems

1. Description: New heat pump controller to be integrated into existing BMS via BACnet.
2. System performance: Heating systems monitoring and management
3. Water supply systems linked to BMMS: Indirect hot water storage
4. Heating systems linked to BMMS: Air source heat pump system.
5. Ancillary equipment: Field controllers
6. Computer components: As per existing - new heat pump controller and software to be integrated into existing BMS front-end. Contact existing control vendor for coordination (contact information in Preliminaries Specification).
7. Cables: As specialist's recommendations.
8. Control equipment power supply: Mains supply.
9. Execution: [Ss_75_70_54/620 Installation of building monitoring and management systems](#); [Installation of field controllers](#); [Ss_75_70_54/650 Installation of sensors](#)
10. System completion: [Ss_75_70_54/810 Inspection and testing](#); [Ss_75_70_54/820 Commissioning](#)

Execution

Ss_75_70_54/620 Installation of building monitoring and management systems

1. General: Install in accordance with BSRIA AG 9/2001.
2. Overview: Heat pump system PLC is within the 'Master' heat pump unit (ASHP-01, or can be designated on site). This PLC receives signals from each of the remaining seven (7) heat pumps and also communicates with the extension box (mounted in boiler room) to control the heating circuits and bivalent heat sources. A single BACnet connection from the Master unit PLC to the existing BMS allows for integration into the Siemens front end graphics. Relevant existing information (such as weather compensation curves, circuit status etc) to be shared with the Master heat pump controller via BACnet.

Ss_75_70_54/650 Installation of sensors

1. General: Install in accordance with BCIA Controls for End Users.

Sequence of Operation

GENERAL INTENT - BIVALENT HEATING SYSTEM (ASHP-01-08, (E)B-01,02)

1. THE WORKS COMPRISE THE INTEGRATION OF NEW HEAT PUMPS WITH EXISTING BUILDING HEATING DISTRIBUTION SYSTEM TO OPERATE AS A BIVALENT HEATING ARRANGEMENT IN CONJUNCTION WITH EXISTING GAS BOILERS. THE PRIORITY IS TO UTILISE HEAT PUMP OPERATION FOR AS MUCH OF THE HEATING SEASON AS POSSIBLE, AIMING FOR AN 80% / 20% SPLIT (OR BETTER) IN FAVOUR OF HEAT PUMPS.
2. THE CONTRACTOR SHALL BE DEEMED TO HAVE ALLOWED FOR ALL INVESTIGATIONS, MODIFICATIONS, ADJUSTMENTS, COMMISSIONING ACTIVITIES AND ANCILLARY WORKS NECESSARY TO ACHIEVE A FULLY FUNCTIONAL, STABLE

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Building monitoring and management systems

AND CONTROLLABLE HEATING SYSTEM NOTWITHSTANDING INCOMPLETE INFORMATION RELATING TO THE EXISTING INSTALLATION.

3. NEW HEAT PUMPS TO BE COMPLETE WITH CONTROLS PACKAGE WHICH WILL CONTROL THE FULL BIVALENT HEATING SYSTEM INCLUDING AIR SOURCE HEAT PUMPS AND EXISTING GAS FIRED BOILERS. REFER TO MANUFACTURER FOR FULL DETAILS OF ALL CONTROL COMPONENTS REQUIRED FOR A FULLY OPERATIONAL SYSTEM.
4. NEW CONTROLS PACKAGE WILL BE COMPLETE WITH BACNET CONNECTION TO LOCAL EXISTING BMS FOR INTEGRATION INTO EXISTING FRONT END GRAPHICS SOFTWARE.

SUMMARY OF SYSTEM ARRANGEMENT:

PRIMARY PLANT:

AIR SOURCE HEAT PUMPS (ASHPs) ----> BUFFER TANK
(E) GAS BOILERS (2No. 660kW) ----> BUFFER TANK

SECONDARY (DISTRIBUTION SIDE);

BUFFER TANK ----> FLOW HEADER ----> EXISTING HEATING CIRCUITS --> RETURN HEADER --> BUFFER TANK

CONTROL BASED ON SUPPLY WATER TEMPERATURE / BUFFER TANK TEMPERATURE WITH HEAT PUMPS AS THE LEAD HEAT SOURCE AND EXISTING GAS BOILERS AS BACKUP / PEAK CONDITIONS.

EXISTING SYSTEMS:

EXISTING HEATING SYSTEM INFORMATION IS INDICATIVE ONLY AND SHALL BE VERIFIED ON SITE BY THE CONTRACTOR.

CONTRACTOR IS TO REVIEW EXISTING DISTRIBUTION PUMPS (6No.) FOR DUTY AND HEAD AND PROVIDE INFORMATION TO CONSULTANT FOR REVIEW. THIS SHOULD OCCUR PRIOR TO ORDERING EQUIPMENT.

THE CONTRACTOR SHALL ALLOW FOR ALL COMMISSIONING (INCLUDING OUT OF HOURS), BALANCING, CONTROLS INTEGRATION, OPTIMISATION, AND MINOR MODIFICATIONS NECESSARY TO ACHIEVE STABLE OPERATION OF THE NEW HEAT PUMP INSTALLATION INTEGRATED WITH THE EXISTING BOILERS AND DISTRIBUTION SYSTEMS OPERATING IN BIVALENT MODE. ALLOW FOR RETURN VISITS (x2) AND SEASONAL ADJUSTMENT FOLLOWING PRACTICAL COMPLETION.

SPECIFIC SEQUENCES:

1. HEATING SYSTEM ENABLED WHEN ANY ZONE CALLS FOR HEAT OR OUTSIDE TEMPERATURE IS BELOW SETPOINT (I.E. 18degC, ADJUSTABLE).
2. WHEN SYSTEM ENABLED, DISTRIBUTION PUMPS WILL BE ENABLED AND HEAT PUMP CONTROLLER ENABLED.
3. TEMPERATURE SENSORS WITHIN THE BUFFER TANK ARE THE MAIN CONTROL POINTS FOR THE HEATING SYSTEM OPERATION. SENSORS IN LOWER AND MID SECTION OF BUFFER TANK TO CONTROL ASHP STAGING, WITH THE TOP MOUNTED SENSOR CONTROLLING GAS BOILER(S) OPERATION.
4. BUFFER TANK SETPOINT IS 65degC (ADJUSTABLE). WHEN TANK TEMPERATURE DROPS BELOW 55degC (ADJ), THE HEAT PUMPS ARE ENABLED. WHEN TANK TEMPERATURE IS STILL NOT AT SETPOINT AFTER 5mins (ADJ) ADDITIONAL HEAT PUMPS STAGE ON AS REQUIRED TO GET BUFFER TANK TO SETPOINT. WHEN BUFFER TANK REACHES 65degC (ADJ) THE HEAT PUMPS ARE DISABLED.

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Building monitoring and management systems

5. HEAT PUMPS ARE THE FIRST STAGE HEATING. ASHP-01 (MASTER) STARTS FIRST, WITH ASHP-02-08 STAGING ON BASED ON BUFFER TANK TEMPERATURE. HEAT PUMPS CAN ROTATE MASTER / SLAVE OPERATION FOR EQUAL RUN TIME.
6. HEAT PUMPS TO HAVE WEATHER COMPENSATED FLOW TEMPERATURE CONTROL, WITH THE SUPPLY TEMPERATURE REDUCING AS EXTERNAL AMBIENT TEMPERATURE INCREASES, THUS IMPROVING COP OF UNITS.
7. HEAT PUMP CONTROLLER TO HAVE ALL ITS OWN SAFETIES AND ALARMS (I.E. HIGH/LOW TEMP, FAULT ETC.)
8. GAS BOILER(S) SHALL BE ENABLED IN SEQUENCE BASED ON BUFFER TANK TEMPERATURE AND EXTERNAL AMBIENT TEMPERATURE. IF BUFFER TANK TEMPERATURE CONTINUES TO DROP WITH ALL HEAT PUMPS IN OPERATION, PLUS THE EXTERNAL AMBIENT TEMPERATURE IS BELOW THE BIVALENT POINT (6degC, ADJ), THEN HEAT PUMP CONTROLLER TO ENGAGE BOILER(S) TO CHARGE THE BUFFER TANK.
9. GAS BOILER(S) TO OPERATE WHEN TOP OF BUFFER TANK TEMPERATURE DROPS TO 45degC (AND ALL HEAT PUMPS ARE OPERATIONAL) AND CONTINUE TO RUN UNTIL TOP OF TANK TEMPERATURE REACHES 65degC (ADJ DEPENDING ON HEATING DEMAND).
10. DISTRIBUTION PUMPS (C/W VFDs) TO OPERATE AS PER EXISTING SEQUENCES
11. NIGHTTIME SETBACK - BUFFER TANK SETPOINT CAN BE REDUCED TO 40-45degC (ADJ) WITH HEAT PUMPS ONLY SET TO RUN. BOILERS DISABLED UNLESS CRITICAL.

DHW HEATING:

SUMMARY OF SYSTEM ARRANGEMENT:

PRIMARY PLANT:

AIR SOURCE HEAT PUMP (ASHP-08) ----> PUMP 'P-DHW-01' ----> CALORIFIER COIL

SECONDARY (DISTRIBUTION SIDE);

CALORIFIER ----> EXISTING DISTRIBUTION ----> EXISTING DHW RECIRCULATION PUMP

SPECIFIC SEQUENCES:

1. DHW CALORIFIER CONSISTS OF SINGLE HEAT PUMP COIL
2. CONTROLS OPERATE TO MAINTAIN A TANK TEMPERATURE OF 50degC, WITH PERIODIC TEMPERATURE BOOST TO 60degC FOR LEGIONELLA STORAGE REQUIREMENTS.
3. UPON A DROP IN TEMPERATURE IN THE CALORIFIER BELOW 45degC (ADJ), 3-WAY CONTROL VALVES AT ASHP-08 ENGAGE TO DIVERT HEATING WATER FOR USE BY THE DHW SYSTEM.
4. UPON SENSING 3-WAY VALVES OPEN, PUMP 'P-DHW-01' ENGAGES AND DISTRIBUTES HEATING WATER TO THE CALORIFIER COIL TO REHEAT THE CALORIFIER.
5. ONCE TANK TEMPERATURE REACHES 55degC (ADJ) THE 3-WAY VALVES DIVERT BACK TO SPACE HEATING MODE AND PUMP 'P-DHW-01' SHUTS OFF. ASHP-08 GOES BACK TO SPACE HEATING MODE IF REQUIRED TO MEET LOAD REQUIREMENTS.

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Building monitoring and management systems

6. EXISTING DHW RECIRCULATION PUMP OPERATES AS PER EXISTING SEQUENCES TO MAINTAIN DHW LOOP TEMPERATURE ENSURING HOT WATER IS SUPPLIED TO FIXTURES WHEN NEEDED.
7. 1No. 6kW ELECTRIC IMMERSION HEATERS IN CALORIFIER OPERATE AS BACKUP / BOOST HEATING IN THE EVENT OF THE AIR SOURCE HEAT PUMP NOT OPERATING OR NOT BEING ABLE TO BOOST TANK TEMPERATURE ABOVE 60degC. ELECTRIC IMMERSION HEATERS NOT TO RUN AT SAME TIME AS HEAT PUMP.

System completion

Ss_75_70_54/810 Inspection and testing

1. Standard: In accordance with BS 7671.
2. Notice before commencing tests (minimum): 24 h
3. Certificates
 - 3.1. Submission: On completion
 - 3.2. Number of copies: One (digital)
4. Test equipment identity: Record on test certificates.
5. Certificates of calibration: Submit for each test instrument.
6. Control panel test certificates
 - 6.1. Submission: On completion
 - 6.2. Number of copies: One (digital)

Ss_75_70_54/820 Commissioning

1. General: CIBSE Code: C.

Ω End of System

90-45-10/440 Pressure gauges

Products

90-45-10/440 Pressure gauges

1. Manufacturer: Submit proposals .
2. Arrangement: Inclined manometer.
3. Gauge markings: Positions equivalent to 'Filter Dirty' and 'Filter Clean' conditions.
4. Accessories: Pressure differential switch.
5. Execution: [Pr_65_52_34/660 Installing pressure gauges](#).

Execution

Pr_65_52_34/660 Installing pressure gauges

1. General: Fix external to unit to allow easy observation, within 3 m of filter.
2. Differential pressure switch: Connected to provide visual or audio warning of filter blocked condition.

Ω End of Product

Pr_65_54_95_82 Steel globe valves

Products

Pr_65_54_95_82 Steel globe valves

1. Manufacturer: Submit proposals .
2. Standard: To IS EN 13709.
3. Pattern: Oblique.
4. Body ends: Manufacturer's standard .
5. DN rating: To suit system
6. PN rating: To suit system
7. Stem: Manufacturer's standard .
8. Operation: Actuator (where used for control) and Handwheel (where used for balancing or other uses).
9. Auxiliary connections designation: Manufacturer's standard .
10. Body tappings: Required.
11. Accessories: NA
12. Execution: [Pr_65_54_95/610 Installation of valves generally](#).

Execution

Pr_65_54_95/610 Installation of valves generally

1. Installation: In accordance with IS 6683.
2. Position: In accessible pipeline positions and in accordance with manufacturers recommendations
3. Isolation and regulation valves: Provide at equipment and on sub-circuits.
4. New clause item 1: Glands on valve stuffing boxes shall be adjusted at normal plant operating conditions in accordance with manufacturers recommendations, without impairing the valve action by over tightening
5. Pipeline security: Ensure pipes on both sides of valve are securely fastened
6. Access: Locate valves so they can be readily operated and maintained. Locate next to equipment which is to be isolated.
7. Connection to pipework: Fit with joints that suit the pipe material.

Ω End of Product