KJ TAIT ENGINEERS

MRC LABORATORY OF MOLECULAR BIOLOGY

NEW IT ROOM IS001

CAMBRIDGE

SPECIFICATION – VOLUME 2

MECHANICAL SERVICES MATERIALS AND WORKMANSHIP SPECIFICATION

REVISION P01

TENDER ISSUE

KJ TAIT ENGINEERS

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KJ TAIT ENGINEERS

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IT-PCHW P1 & P2 Control

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60-45-10 CHILLED WATER SYSTEMS

System outline

110 Chilled water systems

- **System performance**: 60-45-10/250 System operating parameters for chilled water systems type IT-PCHW; 60-45-10/260 IT cooling system capacity; 60-45-10/265 Variable flow pipework systems; 60-45-10/270 Water treatment for chilled water systems; and 60-45-10/250 System operating parameters for chilled water systems type PCHW.
- **System**:
- **Arrangement**: Two pipe.
- **Pipeline circuits**: Variable flow.
- **Heat exchangers**: 90-40-45/330 Plate heat exchangers.
- **Pressurization units**: 90-10-70/400 Pressurization units.
- **Pumps**: 90-10-70/350 Close coupled end suction pumps; IT-PCHW P1 & P2.
- **Pumps**: 90-10-70/350 Close coupled end suction pumps; PCHW P-30 & P-31.
- **Water treatment**:
- **Plant**: 90-15-95/350 Dosing pots.
- **Chemicals for closed circuit systems**: 90-15-95/317 Corrosion inhibitors for closed circuit systems.
- **Pipelines**: 90-10-65/415 Steel pipelines.
- **Pipelines accessories**:
- **Venting devices**: 90-10-60/310 Automatic air vents.
- **Expansion devices**: Contractor's design.
- **De-aerators**: Submit proposals.
- **Gauges**: 90-10-60/370 Pressure gauges and 90-10-60/380 Temperature gauges.
- **Accessories**: 90-10-60/400 Pipeline strainers.
- **Valves**:
- **Isolating valves**: 90-10-90/336 Cast iron gate valves.
- **Check valves**: 90-10-90/348 Cast iron check valves.
- **Regulating valves**: 90-10-90/358 Flow measuring devices and 90-10-90/420 Pressure independent control valves (PICV) type IT-PCHW.90-10-90/420 Pressure independent control valves (PICV) type PCHW
- **Draining and venting devices**: 90-10-90/374 Draining taps.
- **Accessories**: 90-10-90/360 Test points.
- **Thermal insulation**: 90-90-40/360 Phenolic foam insulation.
- **Vibration isolation**: Contractor's design.
- **Controls**: 75-75-50/125 Cooling systems control type IT-PCHW.
- **Specialist equipment**: 90-70-25/310 Data equipment; rear cabinet cooler.
- **Leak detection**: To match existing
- **Plant and equipment identification**: 90-90-55/430 Identifying pipework; 90-90-55/490 Valve charts and schematics; and 90-90-55/495 Valve identification labels.
- **Execution**: 60-45-10/615 Installing water based cooling systems; 60-45-10/620 Filling and pressure testing of chilled water systems; 60-45-10/630 Flushing and pre-commission cleaning of chilled water systems; and 60-45-10/640 Installing water treatment for chilled water and condenser water systems.
- **System completion**: 60-45-10/810 Commissioning chilled water systems; 60-45-10/830 Performance testing chilled water systems; 60-45-10/840 Inspection and test records for chilled water systems; and 60-45-10/860 Documentation.

System performance

250 System operating parameters for chilled water systems type IT-PCHW
Used by: 60-45-10/110 Chilled water system.

- **Design flow temperature**: 14°C.
- **Temperature difference across water circuit**: 11.
- **Water velocity**: Nominal 1 m/s and Maximum 1.5 m/s.

250 System operating parameters for chilled water systems type PCHW
Used by: 60-45-10/110 Chilled water system.

- **Design flow temperature**: 3.3
- **Temperature difference across water circuit**: 7
- **Water velocity**: Nominal 1 m/s and Maximum 1.5 m/s.

260 IT cooling system capacity
Used by: 60-45-10/110 Chilled water system.

- **Output of total cooling surface area in a space**: 100kW (Day 1) and 192kW (Max).

265 Variable flow pipework systems
Used by: 60-45-10/110 Chilled water system.

- **Design options**: Utilizing self-balancing layouts and Incorporating differential pressure control valves.

270 Water treatment for chilled water systems
Used by: 60-45-10/110 Chilled water system.

- **Closed circuit systems**:
- **Standard**: In accordance with BSRIABG 50/2013.
- **Fill water pre-treatment**:
- **Water conditioning**: Water softening; Filtration; and Automated chemical dosing.
- **Microbiological control**: Automated biocide dosing.
- **Chemical treatment**:
- **Corrosion inhibition**: Submit proposals.
- **Bacteria and biofouling inhibition**: Submit proposals.
- **Scale inhibition**: Submit proposals.
- **Non-chemical treatment**:
- **Filtration**: Strainers.
- **Deaeration**: Submit proposals.

Execution

615 Installing water based cooling systems
Used by: 60-45-10/110 Chilled water system.

- **Standard**: To BS EN 1264-4.

620 Filling and pressure testing of chilled water systems
Used by: 60-45-10/110 Chilled water system.

- **Testing**: In accordance with BSRIABG 29/2012.

- **Notice (minimum)**: 48 h.
- **Pressure**: 1.5 times working pressure.
- **Inspection and witnessing**: In accordance with the procedure in BSRIABG 29/2012.
- **Duration of test**: 1 h.
-

630 Flushing and pre-commission cleaning of chilled water systems
Used by: 60-45-10/110 Chilled water system.

- **Preliminary checks**: Thoroughly inspect pipework. Complete pressure tests before cleaning or chemical treatment.
- **Flushing**: In accordance with BSRIABG 29/2012.
- **Cleaning**: In accordance with BSRIABG 29/2012 and BG 50/2013.
- **Waste products**: Neutralize and dispose of to drain. Preferably direct to manhole.
-

640 Installing water treatment for chilled water and condenser water systems
Used by: 60-45-10/110 Chilled water system.

- **Treatment**:
- **Closed circuit systems**: In accordance with BSRIABG 50/2013.
- **Water sampling**: In accordance with BS 8552.

System completion

810 Commissioning chilled water systems
Used by: 60-45-10/110 Chilled water system.

- **Pre-commissioning**: In accordance with BSRIABG 2/2010 and CIBSECommissioning Code W.
- **Commissioning**: In accordance with BSRIA2/2010 and CIBSECommissioning Code W.
- **Seasonal commissioning**: In accordance with BSRIABG 44/2013.
- **Variable flow systems**: In accordance with CIBSEKS09 Commissioning variable flow pipework systems.
- **Notice (minimum)**: 48 h.
-

830 Performance testing chilled water systems
Used by: 60-45-10/110 Chilled water system.

- **General**: Demonstrate the performance of the installations.
- **Guaranteed efficiency**: Tolerances defined in this specification.
- **Environmental tests**: Carry out environmental testing. If necessary, use artificial loads to simulate operating conditions.
- **Recorders**:
- **Type**: Supply and maintain portable seven day space temperature and relative humidity recorders, complete with charts.
- **Reports**: Submit on completion.

840 Inspection and test records for chilled water systems
Used by: 60-45-10/110 Chilled water system.

- **Construction phase reports**: System design is commissionable; Post-installation; System cleanliness; and System commissionable.
- **Records for water systems**: In accordance with BSRIABG 2/2010 Commissioning water systems.

- **Record sheets submission**: On completion.

860 Documentation
Used by: 60-45-10/110 Chilled water system.

- **Operating and maintenance instructions**:
- **Scope**: Submit for the system giving optimum settings for controls.
- **Product information**: Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
- **Format**: Paper copy.
- **Record drawings**:
- **Content**: Location and arrangement of plant in plant rooms;
- Location, size and route of mechanical services;
- and Location and identification of pipework regulating, isolation and control valves.
- **Format**: Electronic drawing.
- **Submittal date**: At handover.

Ω End of section

System outline

101 Heat exchanger control strategy

- **Function**: Modulate the PICV actuator to control flow to heat exchanger using temperature measurements from the IT-PCHW flow temperature sensor.
- **System performance**: 75-75-50/253 Fixed plate heat exchanger control strategy
- **System control devices**: 90-65-50/310 Valve actuators type PICV Actuator and 90-65-50/430 Water temperature sensors.
- **System completion**: 75-75-50/830 Commissioning of automatic control systems type B

125 Cooling systems control type IT-PCHW

- **System performance**: 75-75-50/201 Design.
- **Objectives**: Modulate IT-PCHW pump operation to meet index pressure sensor demand.
- **Pressurization plant control strategies**: 75-75-50/229 Sealed expansion vessel pressurization unit control strategy.
- **Pumps control strategies**: 75-75-50/237 Variable speed pumps control strategy.
- **Additional functions**: 75-75-50/296 Plant monitoring.
- **Sensors**: 90-65-50/420 Pressure sensors
- **System completion**: 75-75-50/820 Start up and commissioning; 75-75-50/830 Commissioning of automatic control systems type A; and 75-75-50/860 Documentation.

125 Cooling systems control type PCHW

- **System performance**: 75-75-50/201 Design.
- **Objectives**: Modulate PCHW pump operation to meet index pressure sensor demand.
- **Pumps control strategies**: 75-75-50/237 Variable speed pumps control strategy.
- **Additional functions**: 75-75-50/296 Plant monitoring.
- **Sensors**: 90-65-50/420 Pressure sensors
- **System completion**: 75-75-50/820 Start up and commissioning; 75-75-50/830 Commissioning of automatic control systems type A; and 75-75-50/860 Documentation.

System performance

201 Design

Shared by: 75-75-50/125 Cooling systems control; type PCHW and type IT-PCHW.

- **Design**: Complete the design of the mechanical engineering services controls and monitoring system.
- **Submit including the following information**: Operation statements, point schedules, control logic diagrams, network topology schematics, panel diagrams and fascia drawings, method statements for testing and commissioning, method statements for witness testing and graphics.

237 Variable speed pumps control strategy

Shared by: 75-75-50/125 Cooling systems control; type PCHW and type IT-PCHW.

- **Running of plant**:
- **Operation**: Run pumps on receipt of signal. Modulate pumps to obtain design differential set point between flow and return circuits, across the load at furthest point or according to the lowest negative deviation from the differential set point.
- **Differential set point**: Establish during commissioning.

- **Shared duty**: Run pumps in duty and standby with automatic changeover.

253 Fixed plate heat exchanger control strategy
Used by: 75-75-50/101 Heat exchanger control strategy.

- **Equipment to be controlled**: 90-65-50/310 Valve actuators type PICV Actuator.
- **Operation**: Modulate to maintain set temperature in IT-PCHW F
- **Sequence**: Output signal from temperature sensors monitored through BMS. When a change in temperature is detected outside of tolerance band by the BMS, the BMS will instruct the PICV valve actuator to modulate to meet demand.

296 Plant monitoring
Shared by: 75-75-50/125 Cooling systems control; type PCHW and type IT-PCHW.

- **Pumps**:
- **Output**: Frequency

System completion

820 Start up and commissioning
Shared by: 75-75-50/125 Cooling systems control; type PCHW and type IT-PCHW.

- **Standard**: In accordance with BCIA Start up and commissioning guide.

830 Commissioning of automatic control systems; PCHW/IT-PCHW
Shared by: 75-75-50/125 Cooling systems control; type PCHW and type IT-PCHW.

- **Pre-commissioning**: In accordance with Commissioning Code C.
- **Commissioning**: In accordance with Commissioning Code C.

830 Commissioning of automatic control systems; Heat exchangers
Used by: 75-75-50/101 Heat exchanger control strategy.

- **Pre-commissioning**: In accordance with Commissioning Code C.
- **Commissioning**: In accordance with Commissioning Code C.

860 Documentation
Shared by: 75-75-50/125 Cooling systems control; type PCHW and type IT-PCHW.

- **Operating and maintenance instructions**:
- **Scope**: Submit giving optimum settings for controls.
- **Product information**: Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
- **Format**: Paper copy.
- **Record drawings**:
- **Content**: For all controls cabling, the cable origin, circuit designation, route, conductor material and insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder and Location of control panels, equipment and repeater panels.
- **Format**: Electronic.
- **Cable schedules**:
- **Format**: Electronic.
- **Submittal date**: At handover.

Ω End of section

90-10-60 PIPELINE ACCESSORIES

Products

310 Automatic air vents
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Refer to approved manufacturers list.

370 Pressure gauges
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Contractor's choice.
- **Standard**: To BS EN 837-1.
- **Diameter**: 150 mm.
- **Scale subdivisions**: Dial graduation between 1.5 to 3.0 times normal working pressure.;
- Graduate in bar (gauge) on reading head or working pressure.;
- and Graduate in Pascals where pressure differences accross plant is to be established..
- **Material**: Black steel case.
- **Connections**: Connect to pipeline system via matched guage cocks and cock connections.
- **Execution**: 90-10-60/630 Installing pressure gauges.

380 Temperature gauges
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Contractor's choice.
- **Standard**: To BS EN 13190.
- **Format**: Mercury in steel and Vapour pressure.
- **Diameter**: 150.
- **Case**: Black steel.
- **Connections**: Mount direct in pocket.

400 Pipeline strainers
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Refer to approved manufacturers list.
- **Pattern**: Y pattern.
- **Baskets**:
- **Mesh size**: 400 mesh.
- **Material**: Cast iron.
- **Connections**: Flanged.
- **Integral accessories**: Plugged connections for drain, air vent and differential pressure monitoring.
- **Execution**: 90-10-60/650 Installing strainers.

Execution

630 Installing pressure gauges
Used by: 90-10-60/370 Pressure gauges.

- **Position**: Downstream of outlet check valve and upstream of outlet stop valve on pump supply.

650 Installing strainers
Used by: 90-10-60/400 Pipeline strainers.

- **Y-type**: Install in direction of flow with the pocket in the horizontal plane.

90-10-65 PIPELINES

Products

415 Steel pipelines
Used by: 60-45-10/110 Chilled water system.

- **General requirements**: 90-10-65/425 Steel pipeline jointing materials and 90-10-65/420 Steel pipeline fittings.
- **Manufacturer**: Contractor's choice.
- **Standard**:
- **Up to 150mm**: To BS EN 10255, heavy weight.
- **Finish**: Varnish.
- **Execution**: 90-10-65/680 Installing steel pipelines and 90-10-65/685 Welding steel pipelines.

420 Steel pipeline fittings
Used by: 90-10-65/415 Steel pipelines.

- **Manufacturer**: Refer to approved manufacturers list.
- **Standards**:
- **Flanged**: To BS EN 1092-1.
- **Welded**: To BS EN 10253-1 and BS EN 10253-2.

425 Steel pipeline jointing materials
Used by: 90-10-65/415 Steel pipelines.

- **Manufacturer**: Contractor's choice.
- **Standards**:
- **Flange jointing rings**: To BS EN 1514-4.
- **Welding rods**:
- **Gas welding**: To BS EN 12536.
- **Arc welding**: To BS EN ISO 636.

Execution

610 Pipelines installation generally
Used by: 90-10-65/680 Installing steel pipelines.

- **Standard**: BESATechnical Report TR/20/6 Chilled water.
- **Dissimilar metals**: Prevent electrolytic corrosion.

615 Installing pipeline fittings
Used by: 90-10-65/680 Installing steel pipelines.

- **Fabricated junctions and fittings**: Same material as the main pipeline.
- **Demountable joints**: Regularly spaced along pipeline runs and at items of equipment.

620 Installing anchors generally
Used by: 90-10-65/680 Installing steel pipelines.

- **Purpose**: To resist axial stress transmitted by flexure of horizontal and vertical pipe runs, and loading on vertical pipes.

- **Fixings**: Provide associated backing plates, nuts, washers and bolts for attachment to, or building into building structure.
- **Fixing to building structure**: Bolted.
- **Building structure**: Suitable for transmitted stress.

625 Installing slide guides
Used by: 90-10-65/680 Installing steel pipelines.

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

680 Installing steel pipelines
Used by: 90-10-65/415 Steel pipelines.

- **General requirements**: 90-10-65/690 Spacing of pipelines; 90-10-65/625 Installing slide guides;
- 90-10-65/615 Installing pipeline fittings; 90-10-65/610 Pipelines installation generally; 90-10-65/710 General inspection and testing; and 90-10-65/620 Installing anchors generally.
- **Permanently concealed joints**: Welded.
- **Accessible joints**: Mechanical grooved, 50–300 mm and Welded and flanged, 65 mm and over.
- **Expansion loops**: Arrange supports and fixing to accommodate pipe movement caused by thermal changes, generally allow the flexure at changes in direction. Allow for movement at branch connections.
- **Anchor**:
- **Method**: Provide anchors constructed using mild steel over-straps or heavy U-bolts. Secure to channel section, adequately attached to or grouted into building structure; weld logitudinal edges of trap to pipe. and Provide anchors by constructed by passing two slip-on flanges over pipe to anchor point. Bolt together through an interposed mild steel channel section attached or grouted into building structure, and finally welded to pipe.

685 Welding steel pipelines
Used by: 90-10-65/415 Steel pipelines.

- **Standard**: In accordance with BESATechnical Report TR/5.
- **Welder identification**: Contractor's choice.
- **Non-destructive examination**: Submit proposals.
- **Completed welds**: Wire brush and protect from corrosion.

690 Spacing of pipelines
Used by: 90-10-65/680 Installing steel pipelines.

- **Minimum clearance between insulated pipelines and**:
  - **Wall finish**: 25 mm.
  - **Ceiling finish or soffit**: 50mm.
  - **Floor**: 150 mm.
  - **Electrical services**: 150 mm.
  - **Adjacent services**: 25mm.
  - **Uninsulated pipeline**: 75 mm.
  - **Another insulated pipeline**: 25 mm.
- **Minimum clearance between uninsulated pipelines and**:
  - **Wall finish**: 25 mm.

- **Ceiling finish or soffit**: 50mm.
- **Floor**: 150 mm.
- **Electrical services**: 150 mm.
- **Adjacent services**: 50mm.
- **Another uninsulated pipeline**: 150mm.

710 General inspection and testing
Used by: 90-10-65/680 Installing steel pipelines.

- **Inspection of joints**:
- **Joints**: Cut out, cut open and inspect.
- **Number of joints**: Submit proposals.
- **Safety precautions**: In accordance with HSEGS 4.

Ω End of section

Products

320 Pumps generally
Shared by: 90-10-70/350 Close coupled end suction pumps type PCHW P-30 & P-31; and 90-10-70/350 Close coupled end suction pumps; IT-PCHW P1 & P2 type IT-PCHW P1 & P2.

- **General safety standard**: To BS EN 809.
- **Electrical safety**: To BS EN 60335-1 and BS EN 60335-2-51.
- **Dynamic balance**: To BS ISO 21940-21.
- **Test standards**: To BS EN ISO 9906 and in accordance with BS EN ISO 5198.
- **Belts and pulleys**: To BS 3790.
- **Rotodynamic pumps**: To BS EN 16297-1 and BS EN 16644.
- **Connections**:
  - **Flanged, copper alloy and composite**: To BS EN 1092-3.
  - **Flanged, cast iron**: To BS EN 1092-2.
  - **Threaded**: To BS EN 10226-1.

350 Close coupled end suction pumps; IT-PCHW P1 & P2 type IT-PCHW P1 & P2
Used by: 60-45-10/110 Chilled water system.

- **General requirements**: 90-10-70/320 Pumps generally.
- **Manufacturer**: Wilo UK Ltd or approved equivalent.
- **Basis of design:**
  - **Product reference**: BL 32/210-1,1/4
  - **Standard**: To BS EN ISO 2858.
  - **Arrangement**: Two pump set.
  - **Duties**:
    Operation: Duty/standby.
    Flow rate: 4.1
    Resistance: 90
  - **Motor**:
    Nominal voltage: Three phase 400 V a.c.
    Frequency: 50 Hz.
    Motor and impeller speed (maximum): 1500 rpm.
    Speed control: Variable.
  - **Discharge branch**: North.
  - **Casing material**: Manufacturer's standard.
  - **Connections**: Manufacturer's standard.
  - **Accessories**: Manufacturer's standard.
- **Execution**: 90-10-70/610 Installation of pumps generally.

350 Close coupled end suction pumps type PCHW P-30 & P-31
Used by: 60-45-10/110 Chilled water system.

- **General requirements**: 90-10-70/320 Pumps generally.
- **Manufacturer**: Wilo UK Ltd or approved equivalent.
- **Basis of design:**
  - **Product reference**: BL 65/190-15/2
  - **Arrangement**: Two pump set.

  - **Duties**:
    Operation: Duty/standby.
    Flow rate: 4.7
    Resistance: 256
  - **Motor**:
    Nominal voltage: Three phase 400 V a.c.
    Frequency: 50 Hz.
    Motor and impeller speed (maximum): 2900 rpm.
    Speed control: Variable.
    Discharge branch: North.
  - **Casing material**: Manufacturer's standard.
  - **Connections**: Flanged, cast iron.
  - **Accessories**: Manufacturer's standard.
- **Execution**: 90-10-70/610 Installation of pumps generally.

400 Pressurization units
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Aquatech Pressmain or approved equivalent.
- **Basis of design:**
  - **Product reference**: MP32-E
- **Standards**:
  - **General**: To BS EN 13831.
    Domestic heating and hot water supply: In accordance with BS 7074-1.
    Low and medium temperature hot water heating: In accordance with BS 7074-2.
    Chilled water and condenser water: In accordance with BS 7074-3.
- **Format**: Fully automatic pre-wired packaged unit on common base plate.
- **Arrangement**: Diaphragm expansion tank with air.
  - **Duties**:
    Static head: 13
    Plant rating: 190
    System water content: 1000
  - **Operating temperatures**:
    Flow: 14
    Return: 25
  - **Operating pressure**: 2.9
  - **Motor**:
    Nominal voltage: Manufacturer's standard.
    Frequency: 50 Hz.
  - **Components**: Non-return valve; Pressure control switch; and Pressure gauge.
  - **Accessories**: Air separator and Manual fill unit for initial filling and routine maintenance.
- **Execution**: 90-10-70/630 Installing pressurization units.

Execution

610 Installation of pumps generally
Shared by: 90-10-70/350 Close coupled end suction pumps type PCHW P-30 & P-31; and 90-10-70/350 Close coupled end suction pumps; IT-PCHW P1 & P2 type IT-PCHW P1 & P2.

- **Pipeline connections**: Arrange to prevent transmission of pipeline forces to pump casing.

- **Pressure gauge tappings**: Provide in flow and return pipeline connections and in common suction and delivery pipeline.
- **Brackets**: Support pipeline mounted pumps on purpose made brackets lined with vibration absorbent material.
- **Alignment**: Align and balance to minimize vibration.
- **Access**: Provide adequate space for service and maintenance.
- **Identification plate**:
- **Format**: Engraved.
- **Details**: Manufacturer's name and address, serial number, duty and maximum head, speed and electrical loading.

630 Installing pressurization units
Used by: 90-10-70/400 Pressurization units.

- **Standards**: Chilled and condenser systems in accordance with BS 7074-3.
- **Location of expansion vessel**: In the system return pipeline close to the heat source or chilled water unit.

Ω End of section

Products

336 Cast iron gate valves
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Refer to approved manufacturers list.
- **Standard**: To BS EN 1171.
- **Series**: Submit proposals.
- **Stem**: Submit proposals.
- **Body and bonnet material**: Grey.
- **Connections**: Flanged to BS EN 1092-2.
- **Operation**: Handwheel.
- **Strength torque**: Category 1.
- **Execution**: 90-10-90/610 Installation of valves generally.

348 Cast iron check valves
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Refer to approved manufacturers list.
- **Standard**: To BS EN 16767.
- **Arrangement**:
- **Type**: Swing.
- **Body pattern**: Straight.
- **Body ends**: Flanged.
- **Mounting**: Horizontal and Vertical.
- **Iron type**: Grey and Spheroidal graphite.
- **Auxiliary connections**: Body tappings and drain plug
- **Execution**: 90-10-90/670 Installation of check valves.

358 Flow measuring devices
Used by: 60-45-10/110 Chilled water system.

- **General requirements**: 90-10-90/360 Test points.
- **Manufacturer**: Refer to approved manufactures list.
- **Standard**: To BS 7350.
- **Arrangement**: 3.
- **Material**: Cast iron.
- **Connections**: Flanged to BS EN 1092-2 for cast iron.
- **Accessories**: Independent means for positive isolation on pressure tapping point and Independent means for positive isolation on adaptor.
- **Execution**: 90-10-90/630 Installation of flow measurement devices.

360 Test points
Shared by: 60-45-10/110 Chilled water system; and 90-10-90/358 Flow measuring devices.

- **Manufacturer**: Contractor's choice.
- **Arrangement**: Self-sealing.
- **Material**: DZR copper alloy.

374 Draining taps
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Refer to approved manufacturers list.
- **Standard**: To BS 2879.
- **Arrangement**: Type 1.
- **Material**: Copper alloy.
- **Connections**: Threaded joints to BS EN 10226-1.
- **Accessories**: Lever pattern key.
- **Execution**: 90-10-90/610 Installation of valves generally.

420 Pressure independent control valves (PICV) type IT-PCHW
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Free Issued by Rear Cabinet Cooler Specialist
- **Execution**: 90-10-90/610 Installation of valves generally.

420 Pressure independent control valves (PICV) type PCHW
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Refer to approved manufacturers list.
- **Pressure rating**: Manufacturer's standard.
- **Temperature range**: To suit PCHW design temperatures.
- **Material**: Submit proposals.
- **Connections**: To suit pipework.
- **Actuator**: Modulating.
- **Accessories**: Manufacturer's standard.
- **Execution**: 90-10-90/610 Installation of valves generally.

Execution

610 Installation of valves generally
Shared by: 90-10-90/336 Cast iron gate valves; 90-10-90/374 Draining taps; 90-10-90/420 Pressure independent control valves (PICV); type PCHW and type IT-PCHW; 90-10-90/630 Installation of flow measurement devices; and 90-10-90/670 Installation of check valves.

- **Installation**: In accordance with BS 6683.
- **Position**: Submit proposals.
- **Isolation and regulation valves**: Provide at equipment and on sub-circuits.
- **Access**: Locate valves so they can be readily operated and maintained. Locate next to equipment which is to be isolated.
- **Connection to pipework**: Fit with joints that suit the pipe material.

630 Installation of flow measurement devices
Used by: 90-10-90/358 Flow measuring devices.

- **General requirements**: 90-10-90/610 Installation of valves generally.
- **Position**: Provide straight length of pipe upstream and downstream.

670 Installation of check valves
Used by: 90-10-90/348 Cast iron check valves.

- **General requirements**: 90-10-90/610 Installation of valves generally.

- **Lift type**: Install in direction of flow as indicated on the body.
- **Disc type**: With spring, fit in any plane. Without spring, fit in vertical plane with flow from bottom to top.

Ω End of section

90-15-95 WATER TREATMENT PRODUCTS

Products

317 Corrosion inhibitors for closed circuit systems
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Contractor's choice.
- **Corrosion inhibitors**: Submit proposals.

350 Dosing pots
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Contractor's choice.
- **Standard**: To PD 5500.
- **Material**: Submit proposals.
- **Working pressure (maximum)**: 10 bar.
- **Execution**: 90-15-95/610 Installing dosing equipment.

Execution

610 Installing dosing equipment
Used by: 90-15-95/350 Dosing pots.

- **Position**: Install where there is a high differential pressure between flow and return pipeline.
- **Drain point**: Provide adjacent to the unit.
- **Fixing**: Submit proposals.

Ω End of section

Products

330 Plate heat exchangers
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Alfa Laval or approved equivalent.
- **Basis for design:**
  - **Product reference**: T5-MFG 192kW
- **PCHW side**:
  - **Fluid**: Water (15% glycol).
  - **Flow rate**: 3.6l/s
  - **Inlet temperature**: 3.3°C
  - **Outlet temperature**: 10.0°C
  - **Working pressure**: 256kPa
  - **Pressure loss**: 23kPa
- **IT-PCHW side**:
  - **Fluid**: Water.
  - **Flow rate**: 2.4
  - **Inlet temperature**: 14
  - **Outlet temperature**: 23
  - **Working pressure**: 90kPa
- **Pressure loss**: 13kPa
- **Output**: 100 kW (Day 1) / 192kW Maximum
- **Material**:
  - **Plates**: Alloy 304
  - **Gaskets**: NBRP Clip-on
- **Execution**: 90-40-45/610 Installing heat exchangers.

Execution

610 Installing heat exchangers
Used by: 90-40-45/330 Plate heat exchangers.

- **Function**: Store, handle and erect all equipment in accordance with manufacturer's recommendations and relevant British Standards. Make due allowance for valves, fittings, access etc., to accommodate insulation where specified. Support equipment such that all component parts, connections of insulation have clearance from supports.

Ω End of section

Products

310 Valve actuators type PCHW PICV Actuator
Shared by: 75-75-50/101 Heat exchanger control strategy; and 75-75-50/253 Fixed plate heat exchanger control strategy.

- **Manufacturer**: Refer to approved manufacturers list
- **Standard**: To BS EN 60730-2-8.
- **Actuator type**: Electro-Mechanical.
- **Action**: Submit proposals.
- **Torque**: Submit proposals.
- **Stroke**: Submit proposals.
- **Running time**: Submit proposals.
- **Operation**: Modulating.
- **Electrical supply**: 24 V a.c and 24 V d.c.
- **Ancillaries**: Submit proposals.
- **Execution**: 90-65-50/610 Installing valve actuators.

420 Pressure sensors
Shared by: 75-75-50/125 Cooling systems control; type PCHW and type IT-PCHW.

- **Manufacturer**: Refer to approved manufacturers list.
- **Standards**: To BS EN 60730-1 and BS EN 60730-2-6.
- **Application**: Differential pressure.
- **Accuracy**: Manufacturer's standard.
- **Equipment interconnectivity**:
  - **Wired**: Required.
- **Execution**: 90-65-50/670 Installing pressure sensors.

430 Water temperature sensors
Used by: 75-75-50/101 Heat exchanger control strategy.

- **Manufacturer**: Contractor's choice.
- **Standards**: To BS EN 60730-1 and BS EN 60730-2-9.
- **Sensor type**: Submit proposals.
- **Application**: Pipe mounted immersion.
- **Range**: -10°C to 30°C.
- **Accuracy**: ±0.5°C.
- **Equipment interconnectivity**:
  - **Wired**: Required.
- **Execution**: 90-65-50/675 Installing temperature sensors.

Execution

605 Installing control components
Used by: 90-65-50/610 Installing valve actuators.

- **Insulation**: Submit details of proposed insulation method where control components are on insulated pipelines.

- **Supports**: Do not strain components.
- **Access**: Adequate for operation and maintenance.

610 Installing valve actuators
Shared by: 90-65-50/310 Valve actuators; type A and type PICV Actuator.

- **General requirements**: 90-65-50/605 Installing control components.
- **Position**: Top of valve.
- **Interconnection**: To central control panel.

650 Installing sensors generally
Shared by: 90-65-50/670 Installing pressure sensors; and 90-65-50/675 Installing temperature sensors.

- **Standard**: In accordance with BCIAGuide: Control sensor installation.
- **Screening**: Screen from direct sunlight.
- **Immersion**: Immerse the sensor adequately in the medium.
- **Immersion pockets**: Provide for pipe sensors. Fill with thermal conductive compound.
- **Cable**: Flexible. Allow sufficient spare cable to allow for removal of sensor.
- **Stratification**: Install more than one sensor or an averaging sensor if necessary.
- **Positions of sensors**: Submit proposals.

670 Installing pressure sensors
Used by: 90-65-50/420 Pressure sensors.

- **General requirements**: 90-65-50/650 Installing sensors generally.
- **Tapping points**: Do not locate in turbulent flow. Locate an adequate distance from bends or fittings.
- **Vibration**: Install on vibration free surface.
- **Interconnection**: To central control panel.

675 Installing temperature sensors
Used by: 90-65-50/430 Water temperature sensors.

- **General requirements**: 90-65-50/650 Installing sensors generally.
- **Pipe mounted immersion sensors**: Immerse full length of sensor in water and Locate an adequate distance from bends or fittings.
- **Interconnection**: To central control panel.

Ω End of section

Products

310 Data equipment; rear cabinet cooler
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: ColdLogic, Airedale, Stulz or approved equipment
- **Basis of design:**
  - **Product reference**: ColdLogic CL20-C12sc (5-45kW)
- **Format**: To fit 3rd party cabinet via adapter frame
- **Size**:
  - **Width**: 600 mm and 800 mm.
  - **Depth**: Manufacturer's standard.
  - **Height**: 48U
- **Enclosure**:
  - **Mounting**: 48U 600 interface adapter frame and 48U 800 interface adapter frame.
  - **Material**: Manufacturer's standard.
  - **Finish**: Manufacturer's standard.
- **Accessories**: Modbus RS485 Communications card; Rack front air on temperature probe;ColdLogic Room Management System (RMS); Leak detection circuit and cable; and ColdLogic compliant hoses (pairs).

Ω End of section

90-90-40 INSULATION AND PROTECTION PRODUCTS

Products

360 Phenolic foam insulation
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Kingspan Insulation or approved equivalent
- **Basis of design:**
  - **Product reference**: Kooltherm® Pipe Insulation System
- **Dimensions**:
  - **Kooltherm® FM Pipe Insulation thickness**: 20mm.
  - **Kooltherm® Insulated Pipe Support Inserts**: Submit proposals.
- **Execution**: 90-90-40/640 Installing phenolic foam insulation on pipelines.

Execution

610 Installing insulation and protection products generally
Used by: 90-90-40/640 Installing phenolic foam insulation on pipelines.

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

640 Installing phenolic foam insulation on pipelines
Used by: 90-90-40/360 Phenolic foam insulation.

- **General requirements**: 90-90-40/610 Installing insulation and protection products generally.
- **Joints**: Close butt, seal with 50 mm wide class 0 tape on both longitudinal and circumferential joints.
- **At fittings**: Mitre. Secure with tape.
- **Vapour seal**: Tape exposed insulation membrane. Seal vapour barrier at pipe support with class 0 tape.

Ω End of section

Products

430 Identifying pipework
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Contractor's choice.
- **Standards**: To BS 1710.
- **Identification type**: Adhesive colour bands.
- **Execution**: 90-90-55/660 Installing identification on pipework.

490 Valve charts and schematics
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Contractor's choice.
- **Material**: Submit proposals.
- **Information to be included**: Location and identification of pipework regulating, isolating and control valves.
- **Execution**: 90-90-55/620 Installing valve charts and schematics.

495 Valve identification labels
Used by: 60-45-10/110 Chilled water system.

- **Manufacturer**: Contractor's choice.
- **Material**: Submit proposals.
- **Label size**: Submit proposals.
- **Information**: Purpose and reference number.
- **Execution**: 90-90-55/630 Installing valve identification labels.

Execution

620 Installing valve charts and schematics
Used by: 90-90-55/490 Valve charts and schematics.

- **Fixing**: Submit proposals.
- **Position**: Plant room.

630 Installing valve identification labels
Used by: 90-90-55/495 Valve identification labels.

- **Fixing**: Secure with metal chain.

660 Installing identification on pipework
Used by: 90-90-55/430 Identifying pipework.

- **Application of basic identification colour**: Coloured bands as BS 1710 and Over the whole length of the pipe.
- **Safety colour identification**: On or next to the colour bands.
- **Information**: Colour bands as BS 1710.
- **Direction of flow**: Indication arrow and the word FLOW or the letter F and Indication arrow and the word RETURN or the letter R.

Ω End of section