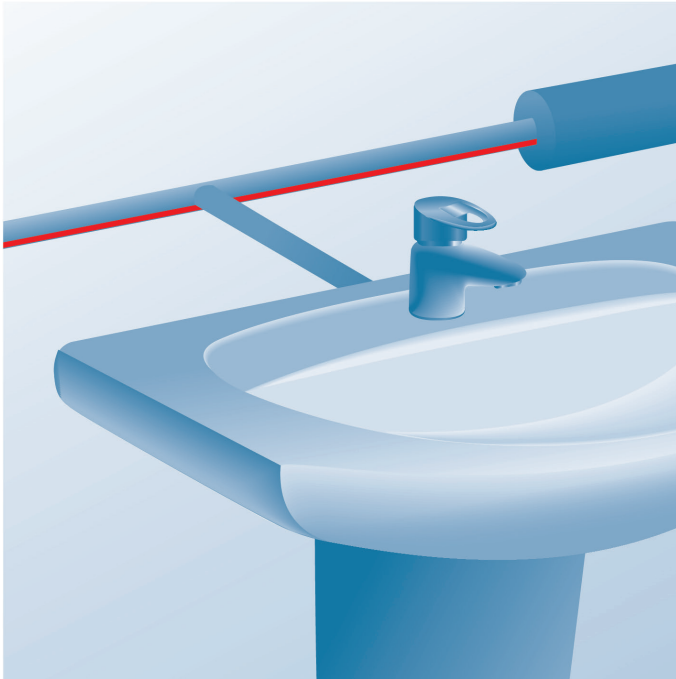


# HWAT STANDARD SYSTEM

## SPECIFICATION GUIDELINE SINGLE PIPE HOT WATER TEMPERATURE MAINTENANCE



### SCOPE

This specification describes an energy efficient system for temperature maintenance of a domestic potable hot water supply.

### GENERAL

The domestic hot water supply has been designed as a single pipe system, no return pipes or recirculation pumps shall be fitted and no hydraulic balancing is required.

To compensate for heat losses and to maintain pipe temperatures, all hot water supply pipes shall be fitted with an energy efficient self-regulating heating cable system, known as nVent RAYCHEM HWAT, manufactured by nVent.

The system shall be complete with self-regulating heating cables, advanced energy efficient controller and cold applied components for interconnection and termination.

All system components shall be sourced from a single manufacturer. Under no circumstances shall any interconnection or termination components be installed other than those supplied by the cable manufacturer, in order to ensure system integrity and meet warranty requirements.

The system shall be capable of being designed within a BIM

model and the manufacturer shall provide a BIM add-in for Autodesk Revit MEP to automate the design process.

The heating cables, controls and system components shall be CE marked and certified according to EN codes by BSI, VDE, CSTB, SEV, ÖVE and fulfil the hygiene requirements of DGWV and SVGW.

The manufacturer shall offer an extended warranty of 10 years for heating cables and components and 2 years for controllers, subject to the system being designed, installed, tested and commissioned strictly to their requirements. The warranty shall be extended to 12 years on heating cables/components and 6 years on controls when installed by the manufacturer or by a trained installer recognised by them. All subject to the completion of the online warranty registration.

Document submittal shall include all of the following: data sheets (for heating cables, interconnection/termination components and controller), system design guide, typical system schematic drawings, controller wiring diagrams, system installation and operation manual, along with approval certificates upon request.

### SELF-REGULATING HEATING CABLES

The self-regulating heating cables shall be specifically designed for this application, tested and approved to IEC 62395, suitable for use with 20A circuit breakers and with a minimum bend radius less than or equal to 10mm.

The manufacturer shall demonstrate minimum 40 year experience in producing self-regulating heating cables and be ISO-9001 registered.

The manufacturer shall provide an extensive global reference list for this application, including installations that have been in operation for over 15 years.

The self-regulating heating cables shall be qualified and tested to demonstrate a useful lifetime in excess of 40 years.

The construction of the self-regulating heating cable shall include a conductive polymer core (qualified for hot water temperature maintenance), modified polyolefin electrical insulation (radiation cross-linked, to ensure long life expectancy), laminated aluminium foil layer (to protect the heater core from chemical ingress), tinned copper braid with minimum 70% coverage and modified polyolefin over jacket printed with cable model, batch number and metre marks (for ease of installation within maximum circuit length).

### [Select One Option]

#### [Option 1 HWAT R]

The self-regulating heating cable shall be HWAT R and provide pipe maintained temperatures in the range 50-65°C.

#### [Option 2 HWAT M]

The self-regulating heating cable shall be HWAT M and provide pipe maintained temperatures in the range 50-55°C.

## INTERCONNECTION AND TERMINATION COMPONENTS

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Interconnection and termination shall be with cold applied insulation displacement connectors and gel type end seals, which are UV resistant, IP68 and 65°C rated, suitable for 2500Vdc insulation resistance test, with Torx head fittings for ease of installation and both audible & visual installation confirmation, known as RayClic, manufactured by nVent.

## THERMAL INSULATION

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Insulation selection and thickness shall be strictly in accordance with the self-regulating heating cable system design guide, with variations in ambient temperature fully considered. Insulation sections shall be applied without delay after the heating cable installation, affixed with suitable warning labels less than 3 m apart on alternate sides and visible from all sections.

## ENERGY EFFICIENT, CONTROL SYSTEM

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### [Select One Option]

#### [Option 1]

#### Multi-Circuit, Multi-Application Distributed Digital Control System

All hot water temperature maintenance circuits shall be controlled and monitored using a centralised control system with distributed power and control modules, known as nVent RAYCHEM ACS-30, complete with integrated nVent RAYCHEM HWAT ECO, manufactured by nVent.

The centralised control system shall provide pre-programmed parameters to provide concurrent control for heating cables used for hot water temperature maintenance, pipe freeze protection, flow maintenance, surface snow melting, roof and gutter de-icing and floor heating applications.

The control & monitoring system shall be modular for easy design and include:

#### **[select some or all of the following product modules]**

User Interface Terminal (UIT): a colour touch-screen central user interface terminal for control and monitoring up to 260 heating cable circuits, known as ACS-30-EU-UIT2, manufactured by nVent **[always included in the system]**

Power Connection Module (PCM): to provide distributed power connection, control and monitoring of heating cable circuits, and integrated electrical protection, known as ACS-30-EU-PCM2, manufactured by nVent **[at least 1 PCM shall be included in the system, up to 52 PCMs may be connected to each UIT]**

Remote Monitoring Modules (RMM): to measure additional temperatures for control and monitoring of heating cable tracing circuits, known as ACS-30-EU-Moni-RMM2-E, manufactured by nVent. **[up to 16 RMM modules may be controlled via a single UIT, with up to 8 RTDs per RMM]**

#### **The centralised control system shall have the following capabilities:**

Multiple circuit, multiple heating cable applications

Modular design and installation - to provide total flexibility, including any future building modifications

Control and monitoring of up to 260 heating cable circuits - through a single user interface terminal (UIT)

Central programming through the UIT

3 user programmable alarm relays for user specified communication of alarm conditions

ProtoNode high performance protocol gateway connection to allow translation from native ModBus to BacNet protocols

Distributed power control modules (PCMs) - for placement throughout the building or group of buildings, to provide power connection, circuit protection and integrated control & monitoring in proximity to all required heating cable applications and to limit the power cabling needed

PCMs with 1 sensor input per circuit for individual circuit temperature monitoring

Remote monitoring modules (RMMs) - to measure additional temperatures for control and monitoring

RMMs with up to 8 additional resistance temperature detectors (RTDs)

UIT communication with up to 52 PCMs and up to 16 RMMs

PCMs shall additionally

- provide 5, 10 or 15 circuits with integrated electrical and circuit protection (either 20A or 32A)
- contain control logic circuitry to ensure continuity of heating cable operation in the event of power failure or communication failure with the UIT
- provide circuit by circuit monitoring of line or ambient temperature, energy consumption, energy usage pattern and ground fault/earth fault detection
- enable circuit by circuit alarm function, with the UIT providing details of the alarm, the circuit(s) affected and capture automatically in the event log.
- connect to the UIT via RS-485 cable for communication, control & monitoring purposes

The control system shall be compliant with IEC61439 and be tested and CE approved to this standard.

**The integrated energy efficiency controller shall have the following functions:**

Adjustable maintenance temperatures in the range 50-65°C

Water heater temperature sensor (HWS flow temp) and alarm system

Integrated power off timer function with 7 day programmable temperature versus time function, 8 editable built-in building specific programs for temperature maintenance, thermal shock program (for use with HWAT R), automatic summer/winter time and leap year correction

Integrated power-off timer and clock

Visible and audible alarm

5" Colour touch screen user interface

Password protection

IP54 rated

**[Option 2]**

**Multi-Circuit, Single Application Controller, Panel Mounted**

All hot water temperature maintenance circuits shall be controlled and monitored using an energy saving, programmable, electrically protected, multi-circuit control panel SBS-xx-HV-ECO-10, complete with integrated HWAT ECO, as manufactured by nVent.

The electrical panel shall be approved for use with the self-regulating heating cable system and be certified for use by the manufacturer.

**The nVent RAYCHEM control panel shall be available, as standard, in the following variants:**

SBS-01-HM-ECO-10 (Control & monitoring for 1 circuit)

SBS-03-HV-ECO-10 (Control & monitoring for up to 3 circuits)

SBS-06-HV-ECO-10 (Control & monitoring for up to 6 circuits)

SBS-09-HV-ECO-10 (Control & monitoring for up to 9 circuits)

**The control panel shall have the following functions:**

An integrated power load management algorithm to avoid peak power loading.  
IEC61439 compliance, CE approved for use with heat tracing systems.

RAL7035 (Light Grey) Coated Metal Housing – IP54 rated.

A volt free alarm contact to indicate RCD or circuit breaker failure, loss of power and controller or sensor error.

A phased switch on, for peak load management, with integrated time-shift duty-cycle control.

Type C circuit protection and residual current device (30 mA rated) per heating circuit.

Mounted terminal blocks for easy connection of the heating circuits within the panel.

All electrical connections between the electrical supply, control panel, and the heating circuits shall be performed by an approved electrical contractor.

**The integrated energy efficient controller shall have the following functions:**

Adjustable maintenance temperatures in the range 50-65°C

Water heater temperature sensor (HWS flow temp) sensor and alarm system

Integrated power off timer function with 7 day programmable temperature versus time function, 8 editable built-in building specific programs for temperature maintenance, thermal shock program (for use with HWAT R), automatic summer/winter time and leap year correction

Visible and audible alarm

5" Colour touch screen user interface

Password protection

IP54 rated

**[Option 3]**

**Single Circuit, Single Application Controller**

All self-regulating heating cable circuits shall be controlled via an energy saving, programmable, single circuit local controller to provide adjustable maintained temperatures in the range 50-65°C, known as HWAT ECO, manufactured by nVent.

**The controller shall have the following functions:**

Adjustable maintenance temperatures in the range 50-65°C

Water heater temperature sensor (HWS flow temp) sensor and alarm system

Integrated power off timer function with 7 day programmable temperature versus time function, 8 editable built-in building specific programs for temperature maintenance, thermal shock program (for use with HWAT R), automatic summer/winter time and leap year correction

Visible and audible alarm

5" Colour touch screen user interface

Password protection

IP54 rated

## EXECUTION

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### Design Deliverables

The manufacturer shall be able to provide heat loss calculations and corresponding selection of self regulating heating cables with variations in ambient temperature, pipe size and thermal insulation fully considered, system layout and schematic drawings indicating power connections, tees and end seals, electrical schedules indicating cable length and circuit protection, controller configuration listing and wiring diagrams.

### Installation Deliverables

The self-regulating heating cables shall be installed in accordance with the design plans, 'straight traced' (i.e. not spirally wound) within the manufacturers defined maximum circuit lengths, tested and commissioned strictly in accordance with the manufacturer's instructions. Installation of thermal insulation shall be closely coordinated with the responsible sub-contractors.

#### [Select One Option]

##### [Option 1]

The system shall be installed, tested and commissioned by the manufacturer.

##### [Option 2]

The system shall be installed and tested by installers trained and recognised by the manufacturer and then commissioned by the manufacturer.

##### [Option 3]

The system shall be installed, tested and commissioned by installers trained and recognised by the manufacturer.

##### [Option 4]

The system shall be installed, tested and commissioned under periodical supervision by the manufacturer.

### Electrical Connection

All connections between the electrical supply, control panel and self-regulating heating cable circuits shall be installed by an approved electrical contractor. All self-regulating heating cable circuits shall be electrically protected by MCB (BS EN 60898 type C or D) and RCD (30 mA sensitivity, tripping within 100ms).

# ENGINEERING DRAWING NOTES

The domestic hot water supply has been designed as a single pipe system, no return pipes or recirculation pumps shall be fitted and no hydraulic balancing is required.

To compensate for heat losses and to maintain pipe temperatures, all hot water supply pipes shall be fitted with an energy efficient self-regulating heating cable system, known as RAYCHEM HWAT, manufactured by nVent.

Interconnection and termination shall be with cold applied insulation displacement connectors and gel type end seals, which are UV resistant, IP68 and 65°C rated, suitable for 2500Vdc insulation resistance test, with Torx head fittings for quality of closure and both audible & visual installation confirmation, known as RayClic, manufactured by nVent.

The circuits shall be controlled via an energy saving, programmable controller

## [Select One]

### [Option 1]

ACS-30 as manufactured by nVent

### [Option 2]

SBS-xx-HV-ECO-10, as manufactured by nVent

### [Option 3]

HWAT ECO as manufactured by nVent

The self-regulating heating cables shall be installed in accordance with the design plans, 'straight traced' (i.e. not spirally wound) within the manufacturers defined maximum circuit lengths, tested and commissioned strictly in accordance with the manufacturer's instructions. Installation of thermal insulation shall be closely coordinated with the responsible sub-contractors.

Insulation selection and thickness shall be strictly in accordance with the self-regulating heating cable system design guide, with variations in ambient temperature fully. Insulation sections shall be applied without delay after the heating cable installation, affixed with suitable warning labels less than 3 m apart on alternate sides and visible from all sections.

All connections between the electrical supply, control panel and self-regulating heating cable circuits shall be installed by an approved electrical contractor.

## United Kingdom

Tel 0800 969 013  
Fax 0800 968 624  
salesthermalUK@nvent.com

## Ireland

Tel 1800 654 241  
Fax 1800 654 240  
salesIE@nvent.com

## Australia

Tel +61 2 97920250  
Fax +61 2 97745931

## South East Asia

Tel +65 67685800  
Fax +65 67322263

## India - Noida

Tel +91 120 464 9500  
Fax +91 120 464 9548  
NTMinfome@nvent.com

## India - Mumbai

Tel +91 22 6775 8800/01  
Fax +91 22 2556 1491  
NTMinfome@nvent.com

## UAE

Tel +971 4 378 1700  
Fax +971 4 378 1777  
NTMinfome@nvent.com



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