



Technical Guidance Note - 001

Hot and Cold Water, Storage and Mains Services

**Property & Architectural Services
The Highland Council**

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Hot and Cold Water, Storage and Mains Services

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Foreword

Technical Guidance Notes (TGN) are produced by the Highland Council. They are equally applicable to new and existing buildings and give advice and guidance to senior managers, designers, property managers and operational staff.

Technical Guidance Notes shall be read in conjunction with statutory instruments, HSE guidance and British Standards. TGN's do not replace statute but offer the reader the minimum standards of installation and maintenance required by the Highland Council.

Where practically possible it is the Councils policy to design out risk to property users and the general public. Where a risk has been identified the Council will implement written procedures to manage and minimise the risk. These guidance notes offer design and management solutions for the reduction of risk in premises managed by the Highland Council.

TGN Working Group

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October 2005

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Hot and Cold Water; Supply and Distribution

1 Introduction

Current statutory legislation requires both employer and staff to be aware of their individual and collective responsibility for the provision of hot and cold water supply, storage and distribution within Highland Council properties.

The development, construction, installation and maintenance of hot and cold water supply systems are vital for the health of staff and the public. Water quality is influenced by political, environmental and technical issues. It is governed by legislation, water byelaws, building regulations, approved codes of practice and technical standards.

Interruptions to water supply can place staff and properties at risk. The design of systems must ensure that sufficient reserve of water storage is available to minimise the consequence of disruption, whilst at the same time ensuring an adequate turnover of water to prevent stagnation.

Where existing installations do not meet current standards, designers will include all necessary works to comply with this Technical Guidance Note.

2 Scope

As well as complying with this document, the design, installation and maintenance of hot and cold water systems, new or extended, in Council premises shall comply with:

the water byelaws 2004, Scotland

the control of legionella bacteria in water systems (ACOP & Guidance) L8

BS6700, British Standard specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilage.

BS7942:2000, Thermostatic mixing valves for use in care establishments

Scottish Health Guidance Note: 'Safe' hot water and surface temperatures

and/or any subsequent legislation applicable to water systems.

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3 Drinking Water

All drinking water in Council properties shall be mains fed and supplied by the local water undertaker.

All catering areas shall be supplied with potable water for food preparation.

All bed-sitting rooms in residential accommodation shall be supplied with potable water.

Drinking water fountains shall be provided in schools as follows:

- 1 per 4 classrooms in Primary schools
- 1 per social area in Secondary Schools.

All pipework shall be adequately supported and insulated to provide water at the draw-off which has not exhibited a rise in temperature in excess of 2°C above the incoming supply.

All drinking water pipework shall be identified with a durable label fixed at 3m intervals or at change of direction.

Draw-offs supplying drinking water shall be identified with a suitable label.

A draw-off chart shall be included with all works identifying the location of water suitable for drinking. (See appendix 1; fig.1)

A draw-off shall be provided with ball valve isolation.

4 Cold Water Storage and Distribution

Stored water **shall not** be used for supplying drinking outlets or in kitchen areas where food is prepared.

Storage shall be calculated on the requirements of peak demand and the rate of makeup from the supply.

The volume of cold water stored shall be kept to a minimum and **shall not** exceed 24hrs. supply.

Design for water storage will be based on small decentralised systems as opposed to large central storage and distribution.

For design purposes the temperature of the incoming water supply may be assumed to be 10°C

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Location of storage tanks is important from an access and maintenance perspective and shall be where they will not be affected by frost or high temperature.

Systems shall be designed and constructed to store water at an ambient temperature of less than 20°C.

A clear working space of 1m. shall be maintained around the storage tank. Minimum clearances of 0.5m below and 0.75m above the tank shall be maintained to facilitate erection, inspection and maintenance. A minimum of 0.5m shall be maintained between the floor of the tank room and the underside of the storage tank.

Where tanks are installed in a roof space, trap door access shall be provided or other means of adequate entry. The roof space shall be boarded and be provided with adequate lighting to facilitate inspection and maintenance.

A durable sign shall be placed adjacent to the storage tank indicating its capacity and the areas being served by the system.

Hot water expansion pipes **shall not** discharge into cold water storage tanks.

All cold water down services pipework shall be identified with a durable label fixed at 3m intervals or at change of direction.

All cold water down services shall be adequately insulated to provide water at the draw-off, at a temperature of less than 20°C, within 2 minutes of use or at a temperature not exceeding 2C above the storage tank temperature.

The nearest and furthest draw-off (sentinels) from the storage tank shall each be identified with a blue circular disc and shall be tested periodically as described in appendix 2.

All appliances shall have a means of isolation upstream of the device.

4.1 Fire Suppression – Sprinkler Systems

The installation, maintenance and use of sprinkler systems for residential properties shall comply with BS 9251:2005.

For existing premises, the water undertaker shall be consulted before specifying a sprinkler system. If the premises are metered suitable arrangements to provide an adequate water flow shall be requested from the undertaker.

Where the supply is taken from an existing hose reel service all redundant equipment shall be removed and pipework cut back to the main, removing the potential to create 'dead legs'.

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All sprinkler system pipework shall be identified with a durable label fixed at 3m intervals or at change of direction.

Fluid contained within a sprinkler system shall be designated Category 4.

4.1.1 Prevention of Back Flow

For new build and existing installations a sprinkler system shall be supplied through a break tank with a type AA or AB air gap. Alternatively, a sprinkler system may be connected to a dedicated non metered supply provided by the water undertaker.

Where the water supply is taken directly from the water undertakers supply the system shall be fitted with a Type BA – verifiable back flow preventer with reduced pressure zone (RPZ valve)

Where the water supply is taken directly from the water undertakers supply a priority demand valve shall be installed after the domestic stop valve.

5 Hot Water Service

Hot water storage shall be kept to a minimum.

For new and refurbishment works with distribution systems an instantaneous water heater shall be specified of the plate heat exchanger type. To minimise temperature loss at peak demand a suitably sized buffer vessel may be included in the design.

Buffer vessels shall be fitted with an adequately sized ‘mud’ door for inspection and cleaning purposes.

Where existing calorifiers are to be retained measures shall be introduced to minimise stratification. This may be achieved by circulating the water within the calorifier or introducing the secondary return at the same level as the cold feed and below the heating element.

Hot water distribution systems shall be designed to provide water at the draw-off at a minimum temperature of 50C with in one minute of use.

Operating pressures for hot and cold water systems at the draw-off shall be the same.

All hot water pipework shall be identified with a durable label fixed at 3m intervals or at change of direction.

The nearest and furthest (sentinels) draw-off from the calorifier shall each be identified with a red circular disc and shall be tested periodically as described in Appendix 2.

Hot water distribution systems shall be designed to keep pipe work that contains water below 50C at an absolute minimum.

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Where existing distribution systems do not meet the requirements of this Technical Guidance Note, designers shall include for all works to comply with this document.

5.1 Thermostatic Mixing Valves

Where, if necessary, to avoid the prospect of scalding Thermostatic Mixing Valves (TMV)s shall be installed at the draw-off.

TMVs shall be: TYPE 3 (NHS DO8 SPECIFICATION)

Valve to Include:

Non return valves

Strainers (Baskets to be removable without breaking pipe connections)

Flushing kit to enable the pipework to be flushed without breaking pipe connections.

Isolating valves

Valve Set Point Temperatures:

Bath	42 ⁰ C	WHB	41 ⁰ C
Shower	41 ⁰ C	Bidet	38 ⁰ C

Shower valves shall be adjustable between cold & 41⁰C. Shower blending valves shall not deliver water above 41⁰C.

For Social Work residential properties one TMV shall be fitted per draw-off.

For other properties the TMV may serve more than one draw-off dependant on design conditions and an element of discrimination.

Every TMV shall be assigned a unique identification, be commissioned and maintained in accordance with the Councils requirements. See appendix 3.

Draw-offs delivering water at full temperature will be secured, managed by the Responsible Premises Officer (RPO) and identified with a 'CAUTION HOT WATER' label.

In kitchens, hand washing facilities will be provided through a lever action single draw-off, delivering water at 41⁰C.

6 Cleaning and Disinfection

New installations or where systems have been drained and the pipe work disconnected, shall be flushed and disinfected before being brought into service.

The disinfection process shall comply with BS6700.

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7 Conservation Measures

Cold water systems shall incorporate an adequate number of meters to allow monitoring of consumption.

Meters shall be fitted with a set of no-volt contacts for connection to a building management system.

Water usage in catering areas shall be monitored separately.

The RPO shall read water meters monthly and the consumption recorded in the water log book. (See appendix 1)

Water for flushing urinals shall be managed with an automatic, electronic flush control device.

WC pans shall be installed which deliver no more than 7.5 litres per flush.

Flow at wash hand basins shall be limited to 6 litres per minute.

Where existing draw-offs are to remain a flow restriction device shall be fitted.

The use of percussion taps shall be considered for installations which are infrequently attended and school wash rooms.

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A1 Water Management

The responsible Premises Officer (RPO) shall maintain a Water Log Book on site which shall contain as a minimum requirement all of the information contained within these appendices.

The log book shall be kept in an accessible place and be made available for inspection by senior managers and external agencies, who from time to time may visit the premises for the purpose of audit.

The Area Service Manager shall audit the log book on a quarterly basis.

The RPO shall maintain a register of all agencies that are integral to water management. See fig. 1.

The RPO shall maintain a register of all draw-offs for potable (drinking) water. See fig. 2

The RPO shall ensure that personnel are available to read and record water consumption monthly. See fig. 3

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HC Property & No.	
Site Address	

Designation	Name	Address	Contact	
			Telephone	email
Responsible Premises Officer				
Senior Building Services Inspector				
Building Services Inspector				
Water Undertaker				
Control of Waterborne Infection Team				
Environmental Health Officer				

A2 Control measures for the prevention of Legionella bacteria

A2.1 Temperature measurement

Regular testing is a requirement to determine the temperature of hot and cold water at the draw-off to ensure measures for the control of legionella bacteria are maintained.

Temperature control measures include testing hot and cold water at specified locations (i.e. sentinel taps; nearest and furthest from the calorifier and the cold water storage tank, which will be marked with coloured identification discs), by:

- Checking and recording the water temperature at the draw-off. For the hot service water should achieve a temperature of **50°C** within one minute of running the tap. For cold water the temperature should remain **below 20°C** after running the tap for up to two minutes.
- Where a TMV is fitted; checking and recording the surface temperature of the **hot water pipe up stream of the TMV**, one minute after running the water, to see if it has reached a temperature of **50°C** or higher. (Note this is not the temperature of the water coming out of the tap, but the temperature of the **hot water pipe prior to entering the TMV**).

The location to measure the temperature shall to be marked on pipework with an arrowhead or suitable indicator.

Temperatures will be taken at the specified locations with a pipe thermocouple (touch probe).

If the measured temperature falls out with the above parameters the Responsible Premises Officer (RPO) should be notified, who intern will contact the area Building Services Inspector.

Arrangements to access TMV locations that are concealed behind bath panels or access hatches, will need to be agreed by the RPO. Where accessibility requires a tradesman to attend, access shall be arranged through the Maintenance Request Order process.

Each establishment will require to be assessed on an individual basis to determine whether this task can be undertaken by Unit staff e.g. Caretaker, or whether a Maintenance Contractor will need to be used.

The frequency of the temperature checking of the sentinel taps shall be **Monthly**.

The results of the monthly temperature checks shall be recorded on the **Legionella Temperature Control Log**. (fig.4)

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The Legionella Temperature Control Log shall be kept in the **Water Safety Log Book**. The Log Book shall be kept in the unit and be deemed a controlled document. The Log Book shall be the responsibility of the Responsible Premises Officer to ensure records are kept up to date and standards maintained. The Area Service Manager shall carry out an audit at 3 monthly intervals.

A2.2 Flushing of Systems

Where a draw-off or system has not been used for a period in excess of 5 days a flushing regime shall be introduced.

NOTE: Draw-off includes showers.

Each draw-off (hot & cold) shall be operated to allow water to flow for a minimum of 5 minutes. This operation shall be recorded in the water log book.

Where a hot water system has been isolated and the calorifier allowed to cool (i.e. at school holidays) the following procedure shall be adopted before reinstating the service:

The calorifier shall be heated up to 60°C and where possible to pasteurising temperature (70°C) allowed to soak for 1 hour with the circulating pumps running, after which all draw-offs shall be opened sequentially for water to flow for a minimum of 5 minutes.

NOTE: It is important that this procedure is carried out with the minimum production of aerosols.

This action shall be recorded in the water log book.

A2.3 Cleaning of Shower Heads

All shower heads shall be removed, cleaned and disinfected on a quarterly basis.

This action shall be monitored and recorded in the water log book. See fig. 5.

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Property & Architectural Services

Highland Council Properties Legionella Temperature Control Log

Property Name & HC No. _____ Responsible Premises Officer (R P O) _____

Safe Temperature Measured at Sentinel Points

Hot Water greater than 50° C after One Minute
Cold Water less than 20° C After 2 Minutes

If Temperature Fall Outside These Parameters Contact The Area Building Services Inspector Immediately

Month	Room 1		Room 2		Room 3		Room 4		Room 5		Room 6		Room 7		Room 8		Room 9		Room 10		Date	Signatures Required	
	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold	Hot	Cold		Competent Person	R P O
1																							
2																							
3																							

4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						

A3 Installation and Maintenance of a Thermostatic Mixing Valve (TMV)

Prior to installation, pressure tests shall be taken at the valve location and recorded on the **pre installation pressure test log sheet**. (fig.6)

Each TMV installed will be allocated an individual identification number.

Following initial installation, a **Thermostatic Mixing Valve Commissioning Sheet** (fig.7) shall be completed in conjunction with valve manufacturer installation instructions.

The TMV Commissioning Sheet will be located in the **Water Log Book**.

The TMV commissioning sheet records works carried out by the installing contractor to ensure the valve functions and delivers hot water at the correct temperature prior to handover.

Commissioning works include:-

- pressure testing,
- temperature of hot and cold water up stream of the valve.
- water flow rates
- valve operation,
- fail safe tests, and
- a record of the temperature measuring device calibration.

The TMV commissioning sheet will be signed by the installing contractor.

A note of the TMV commissioning will be recorded on the **Thermostatic Mixing Valve Log Sheet**. (fig.8) The log sheet shall identify all subsequent tests or maintenance work carried out on the TMV.

A3.1 Post-Commissioning and In-service testing

The purpose of post commissioning and in-service tests are to regularly monitor and record the performance of the TMV to ensure that there is no deterioration in the valve function or efficiency due to water supply quality.

The findings of the in-service test shall also assist in establishing / reviewing the time interval between tests and maintenance service inspections.

The post commissioning test and subsequent in-service tests shall comprise carrying out the same procedure as TMV commissioning.

A thermostatic mixing valve commissioning sheet shall be completed to record the results of the post commissioning test.

A note of the post commissioning test and in-service tests shall be recorded on the thermostatic mixing valve log sheet.

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The following tests shall be carried out and recorded on thermostatic mixing valve commissioning sheets:-

- a) **4 weeks** after the initial installation commissioning has taken place a **Post Commissioning Test** shall be carried out by the installing contractor.
- b) During the first 12 months following installation in Social Work properties, the installing contractor shall carry out an **In-Service** test of the TMV every, **15 weeks** until the 12 month contract defects period ends. For all other properties the installing contractor shall carry out an in-service test of the TMV at 26 weeks after the post commissioning test.
- c) thereafter, a competent maintenance contractor shall undertake **In-Service** tests on a **26 week** cyclical basis.

In service tests shall be recorded on a thermostatic mixing valve **Service Record** (fig.9)

A3.2 Maintenance work to a Thermostatic Mixing Valve

Maintenance work may be required to a TMV e.g. to clear small pieces of dirt or debris which may restrict the operation of the temperature control mechanism and prevent the valve from cutting off the hot water supply in the event of cold water supply failure.

Any maintenance work carried out to a TMV will require a thermostatic mixing valve service record to be completed following the work.

A note of the maintenance work carried out shall be recorded on the thermostatic mixing valve log sheet.

Following completion of maintenance work, the frequency of the in-service test shall be reviewed. Subject to the number of maintenance call-outs and results of previous tests it may be necessary to adjust the in-service testing frequency (this will need to be done in conjunction with the Responsible Premises Officer and Property and Architectural Services).

A3.3 Temperature testing of hot water draw-offs

A regular regime of testing all hot water draw-offs shall be implemented at the following frequency using a digital calibrated thermometer.

- A competent person shall undertake temperature testing of all hot water draw-offs at **Weekly** intervals in Social Work Properties.
- A competent person shall undertake temperature testing of all hot water draw-offs at **Monthly** intervals in all other properties.

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The results of temperature testing of all hot water draw-offs shall be recorded on the **Hot Water Draw-Off Temperature Log Sheet**. (fig.10 &11)

Draw-offs that are not fitted with a TMV shall be inspected at the same frequency to ensure security measures are in place and that caution notices are displayed.

The hot water draw-off temperature log sheet shall be located in the water log book.

The hot water draw-off temperature log sheet shall be signed off by the RPO after each set of tests.

Hot water thermometers will require to have calibration checks carried out on an annual basis (advice on arrangements for annual calibration shall be provided by Property and Architectural Services).

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Highland Council Properties Pre Installation Pressure Test Log Sheet

NAME OF PROPERTY:

Where design information is unavailable this form shall be used to record pressure variations under probable operational conditions.

The following readings shall be recorded at the inlet to the TMV.

This form shall be used to establish that the hot and cold water pressure is within the range specified by the TMV manufacturer.

P1 – HOT WATER SUPPLY STATIC PRESSURE	P5 – COLD WATER SUPPLY STATIC PRESSURE
P2 – HOT WATER SUPPLY FLOW PRESSURE	P6 – COLD WATER SUPPLY FLOW PRESSURE
P3 – HOT WATER SUPPLY FLOW PRESSURE WITH COLD WATER TAP TO BATH OR WHB FULLY OPEN	P7 – COLD WATER SUPPLY FLOW PRESSURE WITH COLD WATER TAP TO BATH OR WHB FULLY OPEN
P4 – HOT WATER SUPPLY FLOW PRESSURE WITH TWO OTHER COLD WATER SUPPLIES FULLY OPEN	P8 – COLD WATER SUPPLY FLOW PRESSURE WITH TWO OTHER COLD WATER SUPPLIES FULLY OPEN

Date	Valve Details & Exact Location	P1	P2	P3	P4	P5	P6	P7	P8	FLOW RATE	TEMPERATURE		COMMENTS & SIGNATURE
											COLD	HOT	
		KPa	KPa	KPa	KPa	KPa	KPa	KPa	KPa	l/sec	°C	°C	

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Thermostatic Mixing Valves Log Sheet

HC Property & No.	
Location	
Responsible Premises Officer (RPO)	
Asset Identification./Valve No	
Installation Date	
Manufacturer	
Model, Type and Designation of TMV	
Point Of Delivery	<i>See Note 1</i>
Set Water Temperature at Outlet °C	<i>See Note 2</i>
Location/Access To TMV	<i>See Note 3</i>
Location of Hot and Cold-Water Isolation Valves	

History *see note 4*

Date	Temp Before °C	Work Details & Comments	Temp After °C	Signatures	
				Competent Contractor	R P O

Notes

1. Point of delivery: bath, shower, washhand basin, bidet etc.
2. Set water temp at outlet: refer to Council policy guidance and risk assessments
3. Location/access of/to the TMV – under washhand basin, panel access in wall, ceiling or floor etc
4. History: state whether new, new replacement, refurbished, what parts were replaced, adjustment made etc.

The Responsible Premises Officer must sign all entries.

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Thermostatic Mixing Valve Service Record

Property _____
 Location _____
 Asset ident./Valve no _____
 Date of Service _____

Service Information:
 1 Blended water temperature before service: _____ °C
 2 Comment on condition of strainers:

3 Comment on state of the water: i.e. was the water dirty?

4 Comment on condition of valve and identify parts replaced:

5 Hot water supply temperature _____ °C

6 Cold water supply temperature _____ °C

7 Hot water supply pressure _____ bar

8 Cold water supply pressure _____ bar

9 Are the hot and cold water non return valves operating correctly? Yes/No

TMV set point	_____ °C
---------------	----------

10 Temperature of blended water at full flow 1st _____ °C 2nd _____ °C

11 Temperature of blended water at ¼ flow 1st _____ °C 2nd _____ °C

12 Isolate the cold water to the valve and simultaneously record the highest blended water temperature 1st _____ °C 2nd _____ °C

If the blended water temperature exceeds the valve set point temperature by more than 2°C reclean the valve and repeat tests 10,11, & 12.

13 Blended water temperature after service _____ °C

Temperature measuring device used:
 Make _____ Serial number _____
 Model _____ Date of last calibration _____

Signature of Contractor _____

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