COMMITTEE WS-026

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Draft for Public Comment Australian Standard

LIABLE TO ALTERATION—DO NOT USE AS A STANDARD

BEGINNING DATE FOR COMMENT:	**23 September 2008**
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Technical Specification for plumbing and drainage products
Part 464: Hot water manual or sensor-activated pumping systems
(Revision of ATS 5200.464—2004)

STANDARDS Australia

Draft for Public Comment
Australian Standard

The committee responsible for the issue of this draft comprised representatives of organizations interested in the subject matter of the proposed Standard. These organizations are listed on the inside back cover.

Comments are invited on the technical content, wording and general arrangement of the draft.

The preferred method for submission of comment is to download the MS Word comment form found at http://www.standards.com.au/Catalogue/misc/Public Comment Form.doc. This form also includes instructions and examples of comment submission.

When completing the comment form ensure that the number of this draft, your name and organization (if applicable) is recorded. Please place relevant clause numbers beside each comment.

Editorial matters (i.e. spelling, punctuation, grammar etc.) will be corrected before final publication.

The coordination of the requirements of this draft with those of any related Standards is of particular importance and you are invited to point out any areas where this may be necessary.

Please provide supporting reasons and suggested wording for each comment. Where you consider that specific content is too simplistic, too complex or too detailed please provide an alternative.

If the draft is acceptable without change, an acknowledgment to this effect would be appreciated.

When completed, this form should be returned to the Projects Manager, Chandima Nawela via email to chandima.nawela@standards.org.au.

Normally no acknowledgment of comment is sent. All comments received electronically by the due date will be put before the relevant drafting committee. Because Standards committees operate electronically we cannot guarantee that comments submitted in hard copy will be considered along with those submitted electronically. Where appropriate, changes will be incorporated before the Standard is formally approved.

If you know of other persons or organizations that may wish to comment on this draft Standard, could you please advise them of its availability. Further copies of the draft are available from the SAI Global Customer Service Centre listed below and from our website at http://www.saiglobal.com/.

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Draft for Public Comment

STANDARDS AUSTRALIA

Committee WS-026—Valves Primarily for Use in Warm and Hot Water Systems

DRAFT

Australian Standard

Technical Specification for plumbing and drainage products

Part 464: Hot water manual or sensor-activated pumping systems

(Revision of ATS 5200.464—2004)

(To be AS 5200.464—200X)

Comment on the draft is invited from people and organizations concerned with this subject. It would be appreciated if those submitting comment would follow the guidelines given on the inside front cover.

This document is a draft Australian Standard only and is liable to alteration in the light of comment received. It is not to be regarded as an Australian Standard until finally issued as such by Standards Australia.

PREFACE

This Technical Specification was prepared by the Joint Standards Australia/Standards New Zealand Committee WS-031, Technical Procedures for Plumbing and Drainage Products Certification.

The objective of this Technical Specification is to enable product certification in accordance with the requirements of the proposed Plumbing Code of Australia (PCA) and will continue until converted into an Australian Standard with the objective of converting within two (2) years of the approval date by the National Plumbing Regulatory Forum (NPRF).

The word 'VOID' set against a clause indicates that the Clause is not used in this Technical Specification. The use of this word allows for the use of a common clause numbering system for the Plumbing and Drainage Technical Specifications.

The test protocol and information in this Specification was arranged by committee members to meet the authorization requirements given in the Plumbing Code of Australia.

CONTENTS

STANDARDS AUSTRALIA

Australian Standard
Technical Specification for plumbing and drainage products

Part 464: Hot water manual or sensor-activated pumping systems

1 SCOPE

This Standard sets out requirements for demand/program-activated hot water pumping systems, primarily intended for saving water and/or energy. The system moves the hot water from the water heater to end of line fittings. It returns water that would otherwise have been wasted to the water heater either:

(a) through a dedicated recirculation line; or

(b) through the cold water pipework.

2 APPLICATION

This Standard will be referenced in AS 5200.000.

NOTE: AS 5200.000 provides the level of WaterMark Certification required for this product to be used in plumbing systems in accordance with the Plumbing Code of Australia.

Appendix A sets out the means by which compliance with this Standard can be demonstrated by a manufacturer for the purpose of product certification.

3 REFERENCED DOCUMENTS

Refer to Appendix B.

4 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 3500.0 and the following apply:

4.1 Manually activated pumping system

A system including any pumps, valves and controls that delivers hot water from a remote source to the point of use that is activated upon command of the user (e.g., by pressing a button).

4.2 Automatically activated pumping system

A system including any pumps, valves and controls that delivers hot water from a remote source to the point of use that is activated automatically (e.g., by means of a proximity sensor).

4.3 Program activated pumping system

A system including any pumps, valves and controls that delivers hot water from a remote source to the point of use that is activated by a program (e.g., by means of a timer).

5 MATERIALS

5.1 Copper

Copper shall comply with the following:

(a) *Wrought products* AS 2738.

(b) *Tubular components* Copper tube shall comply with AS 1432.

5.2 Copper alloy

Copper alloy shall comply with the following:

(a) *Castings* AS 1565 or capable of passing the requirements of Clause 3.3 provided that the alloy contains not less than 58% copper and not more than 1% aluminium.

(b) *Hot pressings* AS/NZS 1568 or an alloy complying with AS 2345.

(c) *Rod for machined parts* AS/NZS 1567 or an alloy complying with AS 2345.

(d) *Tubular components* Copper alloy tube shall comply with AS 1572 alloy designation C26130. Where bent or stamped in the fabrication process, the tube shall be sufficiently stress-relieved so that it is capable of passing the mercurous nitrate test specified in AS 2136 after all fabrication processes are complete.

5.3 Dezincification-resistant (DR) copper alloy

Copper alloys in contact with water shall comply with AS 2345.

5.4 Stainless steel

Stainless steel shall be grade 304 or 316 complying with the relevant ASTM Standard for the product form.

5.5 Plastics

Plastic materials under hydrostatic pressure shall be able to demonstrate suitability at the maximum operating pressure and temperature for the intended life of the product.

NOTE: It is an expectation that the minimum life of the product would be 15 years.

5.5.1 *General*

Plastic materials used in the system components shall be of a type recommended by the polymer manufacturer as suitable and appropriate for use in the manufacture of the component. Characteristics to be taken into account shall include compatibility and resistance to variations in water quality and elevated temperatures.

5.5.2 *Acetal*

Acetal plastics used for structural components that are in contact with the water supply shall be copolymer.

NOTES:

1 In view of the time involved in the preconditioning for certain tensile elongation at break tests, certified manufacturers' statements of compliance giving details of the testing body may be acceptable.

2 The property of tensile elongation at break has been used as a measure of deterioration of mechanical properties and to evaluate satisfactory grades or blends of acetal copolymer for use in these applications. Specimens are conditioned in a way to simulate the long-term performance under intermittent hot water conditions and then tested. Test results have to reach minimum figures as specified.

3 Manufacturers should consider the likelihood of acetal compounds being directly connected to copper alloys and the potential for breakdown. Manufacturers should provide installation instructions to prevent such conditions.

5.5.3 *UV resistance*

Plastics components, designed to be exposed to direct sunlight when installed, shall not crack, craze or exhibit signs of any defect when tested in accordance with AS 3558.5. Following exposure to the UV conditions specified in AS 3558.5, plastic-bodied valves shall pass the watertightness test specified in Clause 3.2.2.

6 MARKING

Each system shall be permanently and legibly marked with the following:

(a) Manufacturer's name, brand or trademark.

(b) WaterMark.

(c) Licence number.

(d) Batch identification, e.g., date of manufacture or individual serial number.

(e) The number of this Specification, i.e., ATS 5200.464.

7 'VOID'

8 DESIGN

8.1 End connectors

End connectors for connection to copper or copper alloy pipes or fittings shall comply with AS 3688. Other connection ends shall comply with the requirements relevant to the connection.

8.2 Cross-flow

(a) Flow of water from the hot line to the cold shall cease when

  (i) The water in the hot line reaches 35°C; or

  (ii) The water in the hot line increases in temperature by 3°C

(b) Flow of water in both directions shall be prevented when the system is inactive.

(c) Flow of cold water into the hot water line shall be prevented at all times.

8.3 Control strategy

Evidence shall be provided to demonstrate that the device will operate safely or fail in a safe mode when subjected, but not limited, to the following:

(a) Incorrect electrical installation.

(b) Failure of temperature sensor.

8.4 Cut-off temperature

Recirculation systems intended for connection to the cold water pipework shall have a maximum cut-off temperature of 35°C.

9 PERFORMANCE REQUIREMENTS AND TEST METHODS

9.1 Products in contact with drinking water

Products in contact with drinking water shall comply with AS/NZS 4020. A scaling factor of 0.1 shall be applied.

9.2 Flow capacity test

The system shall be tested for compliance with the manufacturer's stated flow capacity in accordance with Appendix C.

9.3 Endurance/Life test

Hot water pumping systems with moving parts shall be subjected to the life test for 100 000 cycles of operation. The system shall be subjected to a water temperature of 38 ±3°C and pressure of 350 ±35 kPa at the rate of 500 cycles per hour (minimum).

The system shall be considered to pass the test, if at the completion of 100 000 cycles the system can withstand a hydrostatic pressure of 860 kPa at 21 ±3°C for one minute without any permanent distortion or failure of the pressure envelope.

9.4 Intermittent shock test

Hot water pumping systems shall withstand an intermittent shock pressure to 1 240 kPa with a simulated apparatus connected to its outlet pipe.

Water supply to the system shall be at 60 ±5°C such that the flow pressure is 860 kPa at 0.12 ±0.016 L/s.

A rapid closing solenoid valve shall be connected downstream of the system so as to create a shock pressure of 1 240 kPa.

The solenoid valve shall be cycled at a rate of two second open, two second closed for a duration of 30 000 cycles.

At the end of the test, examine the pressure envelope while still at rest. Any leakage shall be cause for rejection.

9.5 Operational test

9.5.1 *Absolute temperature shut-off test*

The crossover of water from the hot water piping system to the cold water piping system shall cease before the water temperature exceeds 35°C, when tested in accordance with Appendix F.

9.5.2 *Temperature rise shut-off test*

For hot water pumping systems that are claimed to operate on the temperature rise principle, the crossover of water from the hot water piping system to the cold water piping system shall cease when the water temperature rises by 3°C, when tested in accordance with Appendix F.

10 ~~'VOID'~~

11 PRODUCT DOCUMENTATION

11.1 Product data

Product data shall be available, which shall identify critical product characteristics, such as—

(a) physical size and componentry;

(b) minimum flow capacity;

(c) pressure/temperature or other limitations;

(d) suitable hot water installations and any limitations; and

(e) degradation due to UV exposure.

11.2 Installation and maintenance instructions

11.2.1 *Installation instructions*

Installation instructions shall be provided, which shall provide details of the system's installation procedure, including the following:

(a) Reference to installation in accordance with AS/NZS 3500.1.

(b) Detailed step-by-step instructions.

(c) The need for special tools or training.

(d) Commissioning procedures and adjustments required.

(e) Troubleshooting guide.

(f) Contact details for after sales service.

11.2.2 *Maintenance instructions*

Maintenance instructions shall be provided, which shall include—

(a) any regular maintenance requirements;

(b) spare parts information;

(c) troubleshooting guide; and

(d) contact details for after sales service.

11.2.3 *Operating instructions*

Consumer operating instructions shall be provided in a form suitable for display at the location of installation, e.g., within the vanity cabinet.

APPENDIX A

MEANS FOR DEMONSTRATING COMPLIANCE WITH THIS STANDARD

(Normative)

A1 SCOPE

This Appendix sets out the means by which compliance with this Technical Specification can be demonstrated by a manufacturer under the WaterMark product certification scheme.

A2 RELEVANCE

The long-term performance of plumbing systems is critical to the durability of building infrastructure, protection of public health and safety, and protection of the environment.

A3 PRODUCT CERTIFICATION

The purpose of product certification is to provide independent assurance of the claim by the manufacturer that products comply with this Technical Specification.

The certification scheme serves to indicate that products consistently conform to the requirements of this Technical Specification.

The frequency of the sampling and testing plan, as detailed in Paragraph A5, shall be used by the certifying body.

A4 DEFINITIONS

A4.1 Batch release test

A test performed by the manufacturer on a batch of components, which has to be satisfactorily completed before the batch can be released.

A4.2 Production batch

Clearly identifiable collection of units, manufactured consecutively or continuously under the same conditions.

A4.3 Sample

One or more units of product drawn from a batch, selected at random without regard to quality.

NOTE: The number of units of product in the sample is the sample size.

A4.4 Sampling plan

A specific plan, which indicates the number of units of components or assemblies to be tested.

A4.5 Type test batch

Schedule of units of the same type and nominal size. The batch is defined by the manufacturer.

A4.6 Type testing

Testing performed to demonstrate that the material, component, joint or assembly is capable of conforming to the requirements given in the Technical Specification.

A5 TESTING

A5.1 Type testing

Table A1 sets out the requirements for type testing and frequency of re-verification.

A5.2 Batch release testing

Table A2 sets out the minimum sampling and testing frequency plan for a manufacturer to demonstrate compliance of product(s) to this Technical Specification on an ongoing basis. However, where the manufacturer can demonstrate adequate process control to the certifying body, the frequency of the sampling and testing nominated by the manufacturer's quality plan and/or documented procedures shall take precedence for the purposes of WaterMark product certification.

A5.3 Retesting

In the event of a test failure, the products within the batch shall be 100% tested and only those batches found to comply may be claimed and/or marked as complying with this Technical Specification.

TABLE A1

TYPE TESTS

Characteristic	Clause	Requirement	Test method	Frequency
Materials	5	Materials	Review materials parts lists and compliance certificates	At any change in materials specification
Design	8.1	End connectors—AS 3688 or relevant connection	Dimensional assessment	At any change in the design
	8.2	Cross-flow	Design review	
	8.3	Over temp. shut-off		
	8.4	Control strategy		
Performance	9.1	Products in contact with drinking water	AS/NZS 4020	At any change in materials, formulation or design, or every five years, whichever occurs first
	9.2	Flow test	Appendix C	At any change in design or manufacturing process
	9.3	Endurance/Life test	Appendix D	
	9.4	Intermittent shock test	Appendix E	
	9.5	Operational test—shut-off	Appendix F	
Product documentation	11	Product data/ installation/ maintenance instructions	Documentation review	At any change to installation requirements

TABLE A2

BATCH RELEASE TESTS

Characteristic	Clause	Requirement	Test method	Frequency
Materials	5	Composition, DR, temper, etc.	Delivery acceptance tests or supplier's quality certificate	Each delivery batch
Marking	6	Marking	Visual examination	100%
Design	8.1	End connectors	AS 3688 or relevant connection	One sample per production batch
Performance	9.5	Operational test	Appendix 5*	100%

* Where an equivalent test has been established to detect faults within the assembly and general operation, it may be utilized in place of the formalized operational test.

APPENDIX B

REFERNCED DOCUMENTS

The following documents are referred to in this Standard:

AS	
1349	Bourdon tube pressure and vacuum gauges
1432	Copper tubes for plumbing, gasfitting and drainage applications
1565	Copper and copper alloys—Ingots and castings
1572	Copper and copper alloys—Seamless tubes for engineering purposes
2136	Method for detecting the susceptibility of copper and its alloys to stress corrosion cracking using the mercurous nitrate test
2345	Dezincification resistance of copper alloys
2738	Copper and copper alloys—Compositions and designations of refinery products, wrought products, ingots and castings
3558.5	Methods of testing plastics and composite materials sanitary plumbing fixtures - Determination of degradation by ultraviolet light
3688	Water supply—Copper and copper alloy body compression and capillary fittings and threaded-end connectors
4087	Metallic flanges for water works purposes
AS/NZS	
1567	Copper and copper alloys—Wrought rods, bars and sections
1568	Copper and copper alloys—Forging stock and forgings
3500	Plumbing and drainage
3500.0	Part 0: Glossary of terms
3500.1	Part 1 Water services
4020	Testing of products for use in contact with drinking water
5200.000	Technical specification for plumbing and drainage products - Procedures for certification of plumbing and drainage products
IAPMO	
PS 115	Material and property standard for hot water demand or automatic activated hot water pumping systems

APPENDIX C

FLOW CAPACITY TEST

(Normative)

C1 SCOPE

This Appendix sets out the methods for conducting a minimum flow capacity test on a hot water manual or sensor-activated pumping system.

C2 PRINCIPLE

The device under test is mounted in a test rig (see Figure C1) and all electrical connections completed in accordance with the manufacturer's instructions. The device is subject to a pressure of 140 kPa and with water at 60 ±5°C and the water flow rate is measured.

C3 APPARATUS

The following apparatus is required:

(a) a test rig similar to Figure C1.

(b) a source of water at 20 ±5°C at a pressure >140 kPa.

(c) a temperature measuring device with an accuracy of ±0.5°C.

(d) a pressure measuring device complying with AS 1349.

(e) a water flow measuring device with a accuracy of 0.004 L/sec.

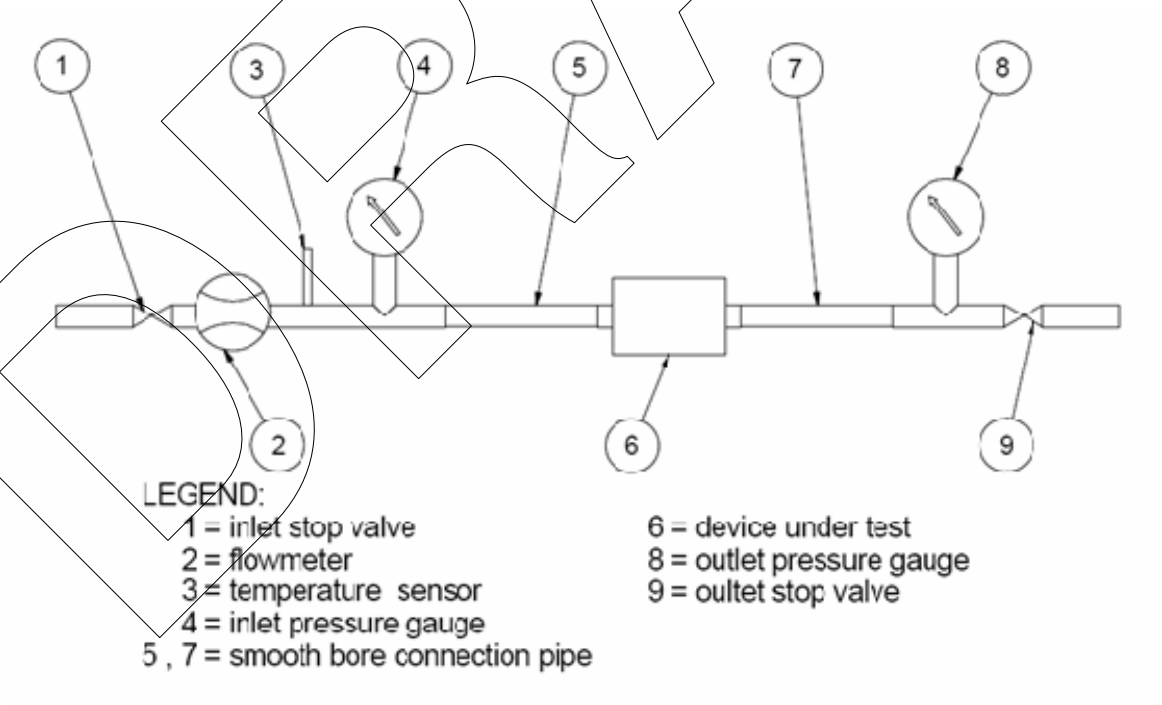


FIGURE C1 TYPICAL TEST RIG FOR FLOW CAPACITY TEST

C4 PROCEDURE

The procedure shall be as follows:

(a) Physically mount the device under test (6) orientated in accordance with the manufacturer's installation instructions and connect the electrical supply in accordance with the manufacturer's instructions.

(b) At the inlet and outlet of the device fit horizontal straight smooth bore piping (5), (7) at least 20 inside diameters long.

(c) Connect the water supply to valve (1). Purge air from the test rig pipe work and the device under test.

(d) Gradually open valve (1) adjusting so the pressure at the inlet of the device (4) is 140 ±10 kPa.

(e) Activate the device.

(f) Measure and record the reading of the flow-measuring device (2) for the flow rate through the device under test.

C5 REPORT

The report shall include the following information for each test valve:

(a) Manufacturer, model, type and size of valve.

(b) Flow rate, in litres per second.

(c) Reference to this test method, i.e. Appendix X, AS 5200.464.

APPENDIX D

ENDURANCE / LIFE TEST

(Normative)

D1 SCOPE

This Appendix sets out the methods for conducting an endurance/life tests on a hot water manual or sensor-activated pumping system.

D2 PRINCIPLE

The device under test is mounted in a test rig (see Figure D1). The device is subject to supply water pressure of 350 ±10 kPa and temperature of 38 ±3°C while performing 100 000 cycles of operation.

NOTE: None full cycle of operation is defined as the device cycling from an inactive state where it does not act on the water flow, to an activated state and back to an inactive state).

D3 APPARATUS

The following apparatus is required:

(a) a test rig similar to Figure D1.

(b) a sequencing controller with counter to control the operation of the device under test at a rate of not less than 500 cycles per hour.

(c) a source of water at 20 ±3°C at a pressure 350 ±10 kPa.

(d) a temperature measuring device with an accuracy of ±0.5°C.

(e) a pressure measuring device complying with AS 1349.

D4 PROCEDURE

The procedure shall be as follows:

(a) physically mount the device under test (7) orientated in accordance with the manufacturer's installation instructions.

(b) connect the device under test to the sequencing controller.

(c) connect mains supply to the test rig (1) and purge air from the test rig pipe work and the device under test.

(d) adjust the pressure reducing valve to maintain a system pressure of 350 ±10 kPa.

(e) record the system temperature (6) and pressure (3).

(f) activate the device and allow to run for no less than 2 s, and then turn the device off (this constitutes one cycle).

(g) repeat Step (f) 100 000 +1000, -0 times at not less than 500 cycles per hour maintaining the system temperature and pressure.

(h) record the system temperature (6) and pressure (3).

(i) observe the device for permanent distortion or failure of the pressure envelope.

D5 REPORT

The report shall include the following information for each test valve:

(a) manufacturer, model, type and size of valve.

(b) test pressures (3) and temperatures (6).

(c) any leakage or other failure of the device.

(d) reference to this test method, i.e., Appendix X, AS 5200.464.

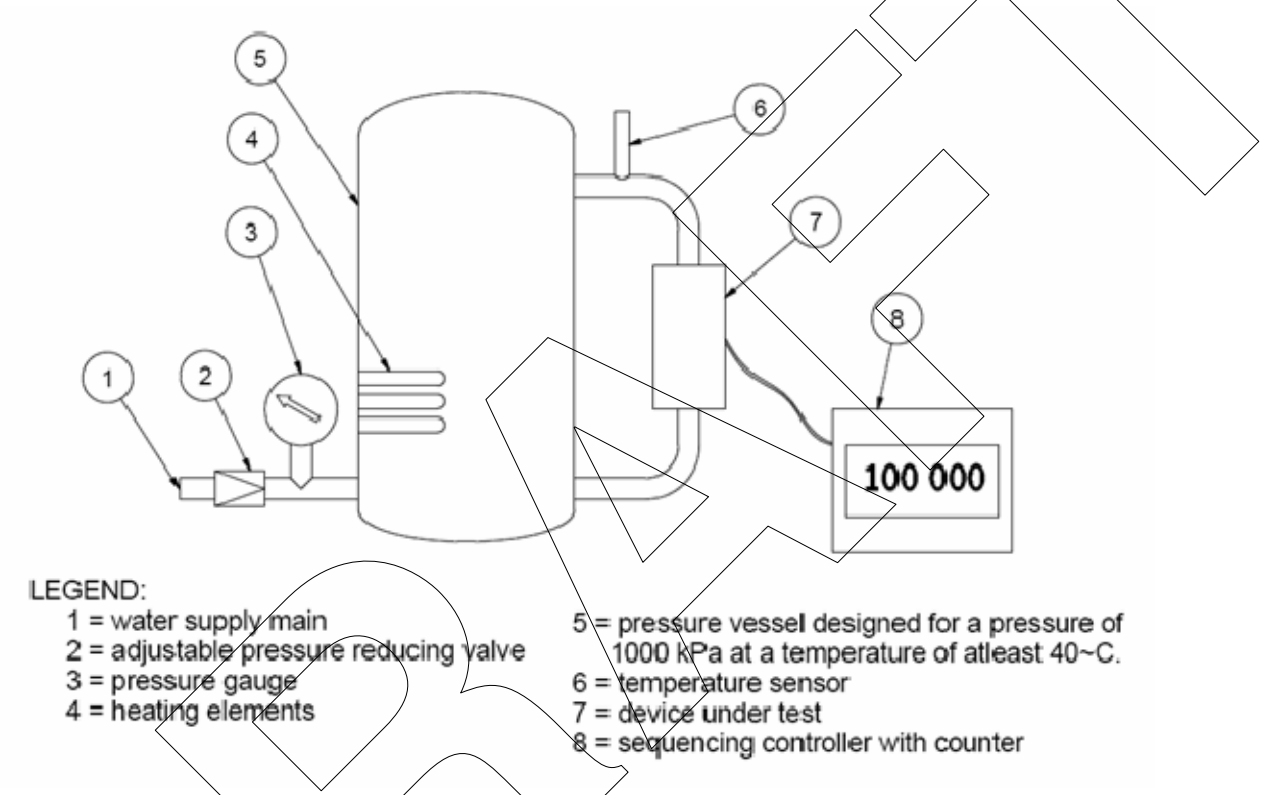


FIGURE D1 TYPICAL TEST RIG FOR ENDURANCE/LIFE TESTING

APPENDIX E

INTERMITTENT SHOCK TEST

(Normative)

E1 SCOPE

This Appendix sets out the methods for conducting an intermittent shock test on a hot water manual or sensor-activated pumping system.

E2 PRINCIPLE

The device under test is mounted in a test rig (see Figure E1). The device is subject to supply water pressure of 860 ±10 kPa and temperature of 60 ±5°C while performing 30 000 cycles of intermittent shock with shock pressures of 1240 +200, -0 kPA.

E3 APPARATUS

The following apparatus is required:

(a) a test rig similar to Figure E1.

(b) a sequencing controller with counter to control the operation of the solenoid valve (6) at a rate of 2 sec open, 2 sec closed.

(c) a temperature measuring device with an accuracy of ±0.5°C.

(d) a pressure measuring device complying with AS 1349.

(e) a water flow measuring device with a accuracy of 0.004 L/sec.

E4 PROCEDURE

The procedure shall be as follows:

(a) physically mount the device under test (9) orientated in accordance with the manufacturer's installation instructions.

(b) Fill the vented storage tank (1) to the appropriate level and switch on the heating elements(2) until a temperature of 60 ±5°C is obtained and stabilised.

(c) close the bypass stop valve (7) and the pressure control stop valve (8), open the solenoid valve (5).

(d) turn on the pressure pump (11) and activate the device under test (9) so that it remains on for the duration of the test.

(e) interactively adjust the pressure pump (11) speed and the bypass stop valve (7) until the pressure gauge (10) reads 1240 +200, -0 kPa with sufficient water discharging through the bypass line to protect the pressure pump during operation.

(f) record the system temperature (3) and pressure (10).

(g) gradually open the pressure control stop valve (8) until the pressure gauge (10) reads 860 ±10 kPa, record the system pressure (10).

(h) close the solenoid valve (5) for 2 sec, open the solenoid valve (5) for 2 sec (this constitutes one cycle).

(i) repeat Step (i) 30 000 +1000, -0 times maintaining the system temperature and pressures.

(j) at the completion of the test open the solenoid valve (5) and observe the device for permanent distortion, leaking or failure of the pressure envelope.

E5 REPORT

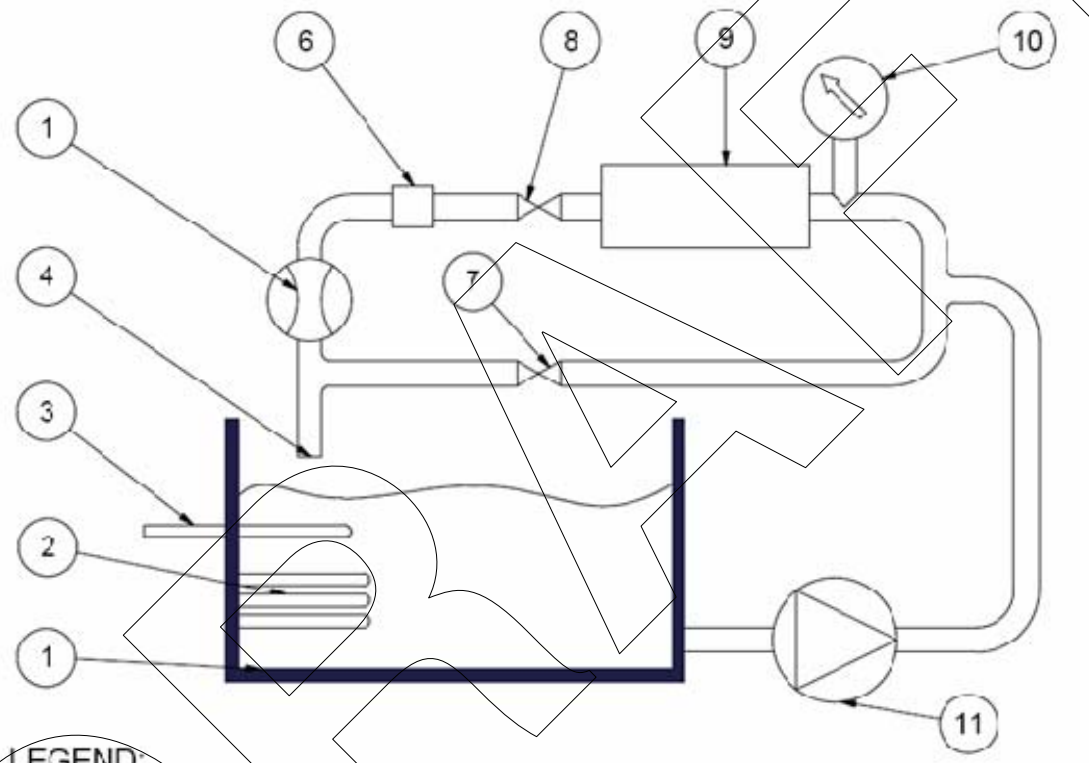
The report shall include the following information for each test valve:

(a) manufacturer, model, type and size of valve.

(b) test pressures (10) and temperatures (3).

(c) any leakage or other failure of the device.

(d) reference to this test method, i.e., Appendix X, AS 5200.464.



LEGEND:

1 = vented water storage tank (min. 20L)
2 = heating elements
3 = temperature sensor
4 = flow return
5 = flow meter
6 = solenoid valve
7 = bypass stop valve
8 = pressure control stop valve
9 = device under test
10 = pressure gauge
11 = pressure pump

FIGURE E1 TYPICAL TEST RIG FOR INTERMITTENT SHOCK TESTING

APPENDIX F

OPERATIONAL TESTING

(Normative)

F1 SCOPE

This Appendix sets out the methods for conducting operational testing on a hot water manual or sensor-activated pumping system.

F2 PRINCIPLE

The device under test is mounted in a test rig (see Figure F1). The device is subject to supply water pressure of 300 ±10 kPa and temperature of 60 ±5°C while performing an normal cycle of operation.

F3 APPARATUS

The following apparatus is required:

(a) a test rig similar to Figure F1.

(b) Water supply at a pressure of 300 ±10 kPa and temperature not exceeding 27°C.

(c) warm water supply with temperature adjustable between 30°C and 36°C (for testing only of valves operating on temperature-rise principle).

(d) a temperature recording system with an accuracy of ±0.5°C, with a response time of <1 s and with a temperature sensing probe in the water stream at a position 76 ±5 mm downstream from the outlet of the device under test.

(e) a pressure measuring device complying with AS 1349.

(f) A stopwatch with an accuracy of ±0.5 sec.

F4 PROCEDURE

F4.1 Devices without temperature-rise shutoff

The procedure shall be as follows:

(a) mount the device under test (5) in the test rig, orientated in accordance with the manufacturer's installation instructions.

(b) turn valve (4) to connect the inlet of the device under test to the water heater outlet and valve (7) to connect the outlet of the device under test to the water heater inlet.

(c) connect the cold supply to the test rig, open supply stop valve (8) and purge air from the system.

(d) switch on the heating elements (2) in the storage tank (1) until a temperature of 60 ±5°C is obtained and stabilised.

(e) record the return line temperature (6).

(f) activate the device under test (5) as per the manufactures instructions.

(g) monitor the return line temperature (6) and record the temperature at which the device (5) turns off.

F4.2 Devices with temperature-rise shutoff

The procedure shall be as follows:

(a) mount the device under test (5) in the test rig, orientated in accordance with the manufacturer's installation instructions.

(b) turn valve (4) to connect the inlet of the device under test to the water heater outlet and valve (7) to connect the outlet of the device under test to the water heater inlet.

(c) connect the cold supply to the test rig, open supply stop valve (8) and purge air from the system.

(d) switch on the heating elements(2) in the storage tank (1) until a temperature of 60 ±5°C is obtained and stabilised.

(e) record the return line temperature (6).

(f) activate the device under test (5) as per the manufactures instructions.

(g) monitor the return line temperature (6), start the stopwatch when the temperature 3°C above the temperature recorded in Step (e).

(h) record time at which device under test (5) turns off.

(i) turn valve (4) to connect the inlet of the device under test to the warm water supply and valve (7) to connect the outlet of the device under test to drain.

(j) activate the device under test (5) and run warm water at a temperature of 34°C through the device until the return line temperature (6) stabilises.

(k) if the device under test will not continue to operate, reduce the warm water temperature by 1°C and repeat Step (j).

(l) turn valve (7) to connect the outlet of the device under test to the water heater inlet then quickly turn valve (4) to connect the inlet of the device under test to the water heater outlet.

(m) monitor the return line temperature (6) and record the temperature at which the device (5) turns off.

F5 REPORT

F5.1 General

The report shall include the following information for each test valve:

(a) manufacturer, model, type and size of valve.

(b) Initial test pressure and temperatures (3) and (6).

(c) reference to this test method, i.e., Appendix X, AS 5200.464.

F5.2 Automatic Activated Hot Water Pumping System

Report the following—

(a) the return line temperature recorded at Step F4.1 (f).

(b) compliance or otherwise with Clause 9.5.1.

F5.3 Hot Water Demand Pumping System

Report the following—

(a) the elapsed time recorded at Step F4.2 (h).

(b) compliance or otherwise with Clause 9.5.2.

(c) the return line temperature recorded at Step F4.2 (m).

(d) compliance or otherwise with Clause 9.5.1.

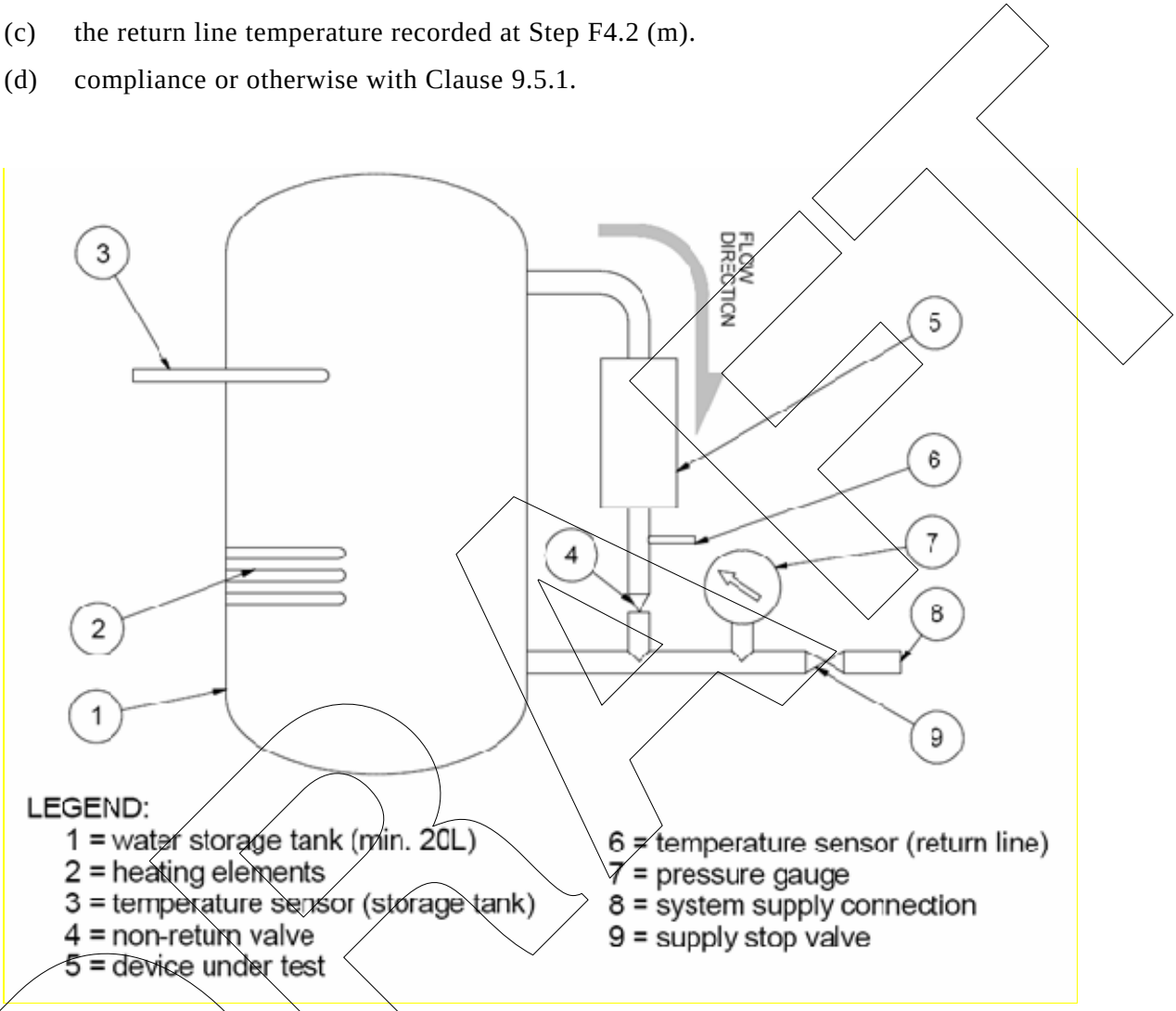


FIGURE F1 TYPICAL TEST RIG FOR OPERATIONAL TESTING

*** END OF DRAFT ***

PREPARATION OF AUSTRALIAN STANDARDS

Australian Standards are prepared by a consensus process involving representatives nominated by organizations drawn from all major interests associated with the subject. Australian Standards may be derived from existing industry Standards, from established international Standards and practices or may be developed within a Standards Australia technical committee.

During the development process, Australian Standards are made available in draft form at all sales offices and through affiliated overseas bodies in order that all interests concerned with the application of a proposed Standard are given the opportunity to submit views on the requirements to be included.

The following interests are represented on the committee responsible for this draft Australian Standard:

AUSTAP

Australian Chamber of Commerce and Industry

Australian Industry Group

Building Officials Institute of New Zealand

Consumers' Federation of Australia

Department of Health (South Australia)

Gas Appliance Manufacturers Association of Australia

Institute of Hospital Engineering Australia

Master Plumbers and Mechanical Services Association of Australia

Master Plumbers Association of NSW

Master Plumbers, Gasfitters and Drainlayers New Zealand

New Zealand Employers and Manufacturers Association

New Zealand Engineering Federation

NSW Health Department

Plumbing Products Industry Group

Water Corporation Western Australia

Standards Australia

Standards Australia is an independent company, limited by guarantee, which prepares and publishes most of the voluntary technical and commercial standards used in Australia. These standards are developed through an open process of consultation and consensus, in which all interested parties are invited to participate. Through a Memorandum of Understanding with the Commonwealth government, Standards Australia is recognized as Australia's peak national standards body.

Australian Standards

Australian Standards are prepared by committees of experts from industry, governments, consumers and other relevant sectors. The requirements or recommendations contained in published Standards are a consensus of the views of representative interests and also take account of comments received from other sources. They reflect the latest scientific and industry experience. Australian Standards are kept under continuous review after publication and are updated regularly to take account of changing technology.

International Involvement

Standards Australia is responsible for ensuring that the Australian viewpoint is considered in the formulation of international Standards and that the latest international experience is incorporated in national Standards. This role is vital in assisting local industry to compete in international markets. Standards Australia represents Australia at both ISO (The International Organization for Standardization) and the International Electrotechnical Commission (IEC).

Electronic Standards

All Australian Standards are available in electronic editions, either downloaded individually from our Web site, or via on-line and CD ROM subscription services. For more information phone 1300 65 46 46 or visit us at

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