Water taps - Single and combination taps - Specification
SURUHANJAYA PERKHIDMATAN AIR NEGARA (SPAN)

Suruhanjaya Perkhidmatan Air Negara (SPAN) is a technical and economic regulatory body for the water supply and sewerage services in Peninsular Malaysia and Federal Territories of Putrajaya and Labuan. The Commission regulates all entities in the water supply and sewerage services industry including public and private water supply and sewerage services operators, water supply and sewerage contractors, permit holders and suppliers of water and sewerage products.

SPAN vision is towards a sustainable, reliable and affordable water service for all and with the mission to regulate the water services industry through fair, effective and transparent implementation of Water Services Industry Act 2006 (Act 655).

SPAN TECHNICAL SPECIFICATION

SPAN Technical Specification (SPAN-TS) is developed according to SIRIM standardisation procedures, which are in line with international practices that ensure appropriate notification of work programmes and participation of interested parties. As a standards development organisation, SIRIM Berhad has extensive expertise in standards research and consultancy which helps industries and businesses meet local and international requirements and practices.

SPAN-TS is developed from SPAN initiatives as a regulatory body for the water supply and sewerage services through collaboration with SIRIM which provides requirements, specifications, guidelines or characteristics that can be used to ensure that materials, products, processes and services are fit for their purpose.

SPAN-TS is developed through consensus by established committee, which consists of experts in the subject matter. The use of this standard is mandatory, and it is open for adoption by regulators, government agencies, associations, industries, professional bodies, etc.

© Copyright 2020

For further info or enquiries on SPAN-TS, please contact:

Bahagian Pembangunan Industri
Suruhanjaya Perkhidmatan Air Negara (SPAN)
Ground Floor
Prima Avenue 8
Block 3510, Jalan Teknokrat 6
63000 Cyberjaya
Selangor Darul Ehsan

Tel: 60 3 8317 9333/334/335
Fax: 60 3 8317 9336
E-mail:
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>ii</td>
</tr>
<tr>
<td>1 Scope</td>
<td>1</td>
</tr>
<tr>
<td>2 Normative references</td>
<td>1</td>
</tr>
<tr>
<td>3 Terms and definitions</td>
<td>2</td>
</tr>
<tr>
<td>4 Designation</td>
<td>4</td>
</tr>
<tr>
<td>5 Materials</td>
<td>5</td>
</tr>
<tr>
<td>6 Design and dimension characteristic</td>
<td>5</td>
</tr>
<tr>
<td>7 Sequence of testing</td>
<td>15</td>
</tr>
<tr>
<td>8 Performance requirements</td>
<td>15</td>
</tr>
<tr>
<td>9 Marking and labelling</td>
<td>21</td>
</tr>
<tr>
<td>Annex A: Flow rate test</td>
<td>22</td>
</tr>
<tr>
<td>Annex B: Leak tightness characteristics</td>
<td>24</td>
</tr>
<tr>
<td>Annex C: Pressure resistance characteristics - Mechanical performance under pressure</td>
<td>30</td>
</tr>
<tr>
<td>Annex D: Mechanical strength characteristics - torsion test for operating mechanism</td>
<td>32</td>
</tr>
<tr>
<td>Annex E: Mechanical endurance characteristics</td>
<td>41</td>
</tr>
<tr>
<td>Bibliography</td>
<td>41</td>
</tr>
</tbody>
</table>
Foreword

This SPAN-TS was developed by the Working Group Water Taps for Water Efficient Product Labelling Scheme (WEPLS).

This standard was developed with the following objectives:

a) to provide a comprehensive standard that prescribes requirements for single and combination taps;

b) to assist the industries to certify their products against a given standard; and

c) to provide the regulatory bodies a standard for monitoring of the products.

This standard will be subjected to review to reflect current needs and conditions. Users and other interested parties may submit comments on the contents of this standard for consideration into future versions.

Compliance with this standard does not by itself grant immunity from legal obligations.
Water taps - Single taps and combination taps - Specification

1. Scope

This standard specifies requirements for the materials, design, performance, test methods, marking and labelling for water taps.

This standard applies to single and combination taps of nominal size $\frac{1}{2}$ inch (DN 15) and $\frac{3}{4}$ inch (DN 20), water pressure up to PN 10 (10 bar).

Water taps (either as single tap or combination tap) that are produced with intended use as:

a) ablution tap
b) angle valve
c) basin taps
d) hose/garden tap
e) kitchen sink tap
f) laundry/washing/washing machine tap
g) shower/bath tap
h) two-way tap (multipurpose)

The test described in this standard are type tests (laboratory tests) and not quality control tests carried out during manufacture.

2. Normative references

The following normative references are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the normative reference (including any amendments) applies.

MS 1583 series, Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water

MS ISO 228-1, Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimensions, tolerances and designation

BS EN 246, Sanitary tapware - General specifications for flow rate regulators

BS EN 248, Sanitary tapware - General specification for electrodeposited coatings of Ni-Cr
3. Terms and definitions

For the purposes of this standard, the terms and definitions given in WEPLS and the following apply.

3.1 Diverter with automatic return

Mechanical backflow prevention device used in bath/shower combination tap assemblies which automatically returns the bath outlet open to atmosphere if a vacuum occurs at the inlet to the device.

3.2 Intended use of taps

3.2.1 ablution tap

Tap that is designed with intended use to flow water for ritual purification of body before performing a prayer.

3.2.2 angle valve

Variation of valve, in which the end connections are at the right angles to each other rather than being inline.

3.2.3 basin tap

Tap that is designed with intended use to flow water into a basin or a bowl that is used primarily for washing the hands and face.

3.2.4 bath tap

Tap that is designed with intended use to flow water for bathing purposes.

3.2.5 hose/garden tap

Tap used on the outside of a building to which the garden hose can be attached.

3.2.6 laundry/washing/washing machine tap

Device to control the flow of water either hot, cold or mixed hot and cold, at laundry and washing area.
3.2.7 kitchen sink tap
Tap that is designed with intended use to flow water into a sink in a kitchen.

3.2.8 shower tap
Tap that is designed with intended use to flow water for showering purposes.

3.2.9 two-way tap (multipurpose)
Device that control multiple flow of water and able to be used for several purposes.

3.3 nominal size
Numerical designation of size, which is common to all components in a piping system other than components designated by outside diameters or by tread size. It is a convenient round number for reference purposed and is only loosely related to manufacturing dimensions.

NOTES:
1. Nominal size is designated by DN followed by number.
2. Not all piping components are designated by nominal size, for example, steel tubes are designated and ordered by outside diameter and thickness.
3. The nominal size (DN) cannot be subject to measurement and is not to be used for purpose of calculation.

3.4 obturator
Moving member that operates to close the seat and, where applicable, contains washer or similar sealing member.

3.5 outlet
Portion of the tap assembly after the shut-off where water flows for its intended use.

3.6 Type of tap
3.6.1 bib tap
Tap with a horizontal inlet and a nozzle arranged to discharge in a downward direction.

3.6.2 combination tap assembly
Hot water tap and cold water tap coupled together with a common nozzle that may be either fixed or swivelling, so as to discharge hot, cold or mixed hot and cold water.

3.6.3 pillar tap
Tap, suitable for mounting on a horizontal surface; having a vertical inlet and a nozzle arranged to discharge in a downward direction.
4. Designation

The water taps covered in this standard are designated by characteristics identified in Table 1.

EXAMPLE. Example of designation:

Combination tap, basin taps, nominal size ½ (DN 15), for mounting on horizontal surface, two-hole with combined visible body, diverter, fixed outlet, water efficiency (3 ★), SPAN-TS 2006-06-R0.

<table>
<thead>
<tr>
<th>Table 1. Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tapware according to application</strong></td>
</tr>
<tr>
<td>Type of tap</td>
</tr>
</tbody>
</table>
| Intended use | a) ablution tap  
| | b) angle valve  
| | c) basin tap  
| | d) hose/garden tap  
| | e) kitchen sink tap  
| | f) laundry/washing/washing machine tap  
| | g) shower/bath tap  
| | h) two-way tap (multipurpose) |
| Nominal size | ½ inch (DN 15) and ¾ inch (DN 20) |
| Mounting method | Horizontal or vertical surfaces |
| Body | Single or multi-hole, visible, or concealed |
| Diverter | With or without diverter |
| Type of outlet | Fixed, moveable, divided, with or without flow rate regulator |
| Water saving properties | Tables 6 to Table 13 |
| Water efficiency rating | 1 ★  
| | 2 ★  
| | 3 ★ |
| Reference to this standard | SPAN-TS 2006-06-R0 |
5. Materials

5.1 Chemical and hygiene requirements

All materials coming into contact with water intended for human consumption shall present no risk to health at temperature up to the maximum working temperature of tap. They shall not cause any change of the drinking water in terms of quality, appearance, smell or taste.

The product which is in permanent or in temporary contact with water intended for the conveyance of water for human consumption shall comply with MS 1583 series for non-metallic products and AS/NZS 4020 for metallic products, whichever applicable.

5.2 Exposed surface conditions

Visible chromium plated surfaces and Ni-Cr coatings shall comply with the requirements of BS EN 248.

5.3 Body materials

Body materials used shall be declared by manufacturer and verified that they are suitable for application.

6. Design and dimension characteristics

6.1 General remarks

The design and construction of components without defined dimensions permits various design solutions to be adopted by the manufacturer. Special cases are covered in 6.5.

6.2 Inlet dimensions

Inlet dimensions shall be as specified in Table 2, Figures 1, 2 and 3.
## Table 2. Inlet dimensions (pillar and bib taps, single and multi-hole combination taps)

<table>
<thead>
<tr>
<th>Inlet dimensions</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shank, union, bib tap, captive nut</strong></td>
<td></td>
</tr>
<tr>
<td>A G ½ B</td>
<td>Shank, union</td>
</tr>
<tr>
<td>A1 G ¾ B</td>
<td>In accordance with MS ISO 228-1</td>
</tr>
<tr>
<td>A2 9 mm min.</td>
<td>Captive nut</td>
</tr>
<tr>
<td>A3 15 mm min.</td>
<td>Shank, union (straight or eccentric)</td>
</tr>
<tr>
<td>A6 11 mm min.</td>
<td>Useful thread length</td>
</tr>
<tr>
<td>A7 14 mm min.</td>
<td>Bib tap size ½ inch (DN 15)</td>
</tr>
<tr>
<td><strong>Connecting centres (mm)</strong></td>
<td></td>
</tr>
<tr>
<td>G² 150 ± 1</td>
<td>Two-hole wall mounted size ½ inch (DN 15)</td>
</tr>
<tr>
<td>G1 140 to 160</td>
<td>Supply connection, straight unions</td>
</tr>
<tr>
<td>G2 200 ± 3.5</td>
<td>With eccentric unions (extension of this range is permitted)</td>
</tr>
<tr>
<td>G3 180 ± 5</td>
<td>Multi-hole combination tap</td>
</tr>
<tr>
<td><strong>Inlet connections (mm)</strong></td>
<td></td>
</tr>
<tr>
<td>N1 12.3 ± 0.2</td>
<td>Type A size ½ inch (DN 15)</td>
</tr>
<tr>
<td>N2 5 min.</td>
<td></td>
</tr>
<tr>
<td>N1 15.2 ± 0.05</td>
<td>Type B size ½ inch (DN 15)</td>
</tr>
<tr>
<td>N2 13 min.</td>
<td>30° chamfer/flat 0.3</td>
</tr>
<tr>
<td>N1 14.7 ± 0.3</td>
<td>Type C size ½ inch (DN 15)</td>
</tr>
<tr>
<td>N2 6.4 min.</td>
<td></td>
</tr>
<tr>
<td>N1 19.9 ± 0.3</td>
<td>Type C size ¾ inch (DN 20)</td>
</tr>
<tr>
<td>N2 6.4 min.</td>
<td></td>
</tr>
<tr>
<td>T -</td>
<td>Plain end Ø 10, 12, 15, G ½ or G 3/8 male or female</td>
</tr>
<tr>
<td>U 350 min.</td>
<td>Copper tube (s) or flexible hose (s)</td>
</tr>
<tr>
<td></td>
<td>Tube(s) or flexible hose(s)</td>
</tr>
<tr>
<td></td>
<td>Flexible hoses in accordance with BS EN 13618</td>
</tr>
</tbody>
</table>

* Other dimensions are permissible (for replacement) when market tradition requires it, provided the manufacturer specifies the actual dimension in literature to avoid confusion with the standard dimension – which can be achieved using an eccentric connection.
Key
1 Flexible hose
2 Plain tube

Figure 1. Bib taps ½ inch (DN 15) and ¾ inch (DN 20) - Single-hole combination taps
½ inch (DN 15)
Figure 2. Multi-hole combination taps

Figure 3. Supply connections for taps and remote outlets
6.3 Outlet dimensions

Outlet dimensions shall be as specified in Table 3, Figures 4, 5, 6 and 7.

When nozzle outlets are used with flow rate regulators conforming with BS EN 246, the manufacturing tolerances chosen for the connecting threads of the outlets shall be compatible with those of the connecting threads of the flow rate regulators, to ensure interchangeability.

Table 3. Outlet dimensions (remote outlets, pillar taps, bib taps, single- and multi-hole combination taps)

<table>
<thead>
<tr>
<th>Outlet dimension</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outlet Orifice</strong></td>
<td>Outlet Orifice including any flow rate regulator or flow straightener, to the mounting surface. For a period of 5 years following approval at final vote a value of 20 mm is acceptable for size ½ inch (DN 15) taps.</td>
</tr>
<tr>
<td><strong>E</strong> 25 mm min.</td>
<td>Lowest point - All taps and outlets</td>
</tr>
<tr>
<td><strong>D</strong> 80 mm min.</td>
<td>Pillar tap ¾ inch (DN 20), bib tap</td>
</tr>
<tr>
<td>67 mm min.</td>
<td>Pillar tap ½ inch (DN 15)</td>
</tr>
<tr>
<td><strong>D1</strong> 90 mm min.</td>
<td>Horizontal mounted combination tap</td>
</tr>
<tr>
<td><strong>A</strong> G ½ B</td>
<td>Remote outlet</td>
</tr>
<tr>
<td><strong>A1</strong> G ¾ B</td>
<td>In accordance with MS ISO 228-1</td>
</tr>
<tr>
<td><strong>A4</strong> 7.5 mm min.</td>
<td>Shower outlet</td>
</tr>
<tr>
<td><strong>A5</strong> 9.5 mm min.</td>
<td>Useful thread length</td>
</tr>
<tr>
<td></td>
<td>Free length of connection</td>
</tr>
</tbody>
</table>

Nozzle outlets to accept flow rate regulators shall be in accordance with BS EN 246.

NOTE. Nozzle outlets not in accordance with BS EN 246, are covered by 6.5.
Key
1  Pillar tap
2  Bib tap

Figure 4. Pillar tap and bib taps

Figure 5. Remote outlet
Figure 6. Single hole combination tap

Figure 7. Bath/shower combination tap
6.4 Mounting dimension

Mounting dimensions shall be as specified in Table 4, Figures 8, 9 and 10.

Table 4. Mounting dimensions (Pillar taps, single- and multi-hole combination taps)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shank diameter</td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>24 mm max.</td>
</tr>
<tr>
<td>H2</td>
<td>29 mm max.</td>
</tr>
<tr>
<td>H3</td>
<td>33.5 mm max.</td>
</tr>
<tr>
<td>Three-hole combination tap size ½ inch (DN 15)</td>
<td></td>
</tr>
<tr>
<td>Base of flange</td>
<td></td>
</tr>
<tr>
<td>J1</td>
<td>42 mm min.</td>
</tr>
<tr>
<td>50 mm min.</td>
<td>Pillar tap size ¾ inch (DN 20), two-hole combination tap size ¾ inch (DN 20)</td>
</tr>
<tr>
<td>J2</td>
<td>45 mm min.</td>
</tr>
<tr>
<td>J3</td>
<td>50 mm max.</td>
</tr>
<tr>
<td>V</td>
<td>32 mm max.</td>
</tr>
<tr>
<td>V1</td>
<td>35 mm max.</td>
</tr>
<tr>
<td>V3</td>
<td>47 mm max.</td>
</tr>
<tr>
<td>L</td>
<td>Dimension which allows taps and outlets to be fitted on to supports of thickness between 1 mm and 18 mm</td>
</tr>
</tbody>
</table>
Key
1 Basin, bidet, sink
2 Remote spray attachment
3 Pillar tap

Figure 8. Single hole combination tap

Figure 9. Two-hole combination tap (fixed centres)
6.5 Special cases

Single taps and combination taps intended for special applications, e.g. for installation on sanitary appliances not conforming with standards, or where dimensional interchangeability is not a requirement; can incorporate dimensional deviations, provided that:

a) all other requirements of this standard are satisfied;

b) secure fixing to the mounting surface is provided with all fixing holes covered;

c) thread connections to the supply pipes comply with MS ISO 228-1;

d) the air gap dimension shall be $E \geq 25$ mm; and

e) the $D1$ dimension shall be coordinated with the appropriate sanitary appliance.

The manufacturer’s literature including the installation instructions supplied with the tapware shall indicate clearly that the tapware is for special applications.
7. **Sequence of testing**

The samples shall be subjected to the test sequences shown in Table 5.

**Table 5. Test sequence**

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dimension (see Clause 6)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Leak tightness (see 8.3)</td>
<td>Nominal flow rate (see 8.2)</td>
</tr>
<tr>
<td>3</td>
<td>Mechanical endurance (see 8.6)</td>
<td>Mechanical strength (see 8.5)</td>
</tr>
<tr>
<td>4</td>
<td>Leak tightness (see 8.3)</td>
<td>Leak tightness (see 8.3)</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Pressure resistance (see 8.4)</td>
</tr>
</tbody>
</table>

8. **Performance requirements**

8.1 **Water efficiency rating**

The water efficiency of a product is rated to three different grades according to the water consumption as tabulated in Tables 6 to Table 13.

Water efficiency for water taps is taken to be the nominal flow rate of taps compute at the mean of the average flow rates obtain at the following dynamic flow pressures of 100 kPa, 150 kPa, 250 kPa, 350 kPa and 500 kPa.

Water efficiency for taps not covered in this SPAN TS shall be rated in accordance with the water consumption tabulated in Table 12 (Shower/bath taps).

8.2 **Nominal flow rate**

The following test requirements shall be followed in measuring and computing flow rates and nominal flow rates:

a) The flow rates shall be measured in accordance with Annex A at each of the dynamic flow pressures of 50 kPa, 100 kPa, 150 kPa, 200 kPa, 250 kPa, 300 kPa, 350 kPa, 400 kPa, 450 kPa, 500 kPa and 550 kPa.

b) The nominal flow rate shall be the mean of the average flow rates which are obtained at the following dynamic flow pressures of 100 kPa, 150 kPa, 250 kPa, 350 kPa and 500 kPa.

c) The highest average flow rate determined in accordance with Annex A at each of the dynamic flow pressures of 100 kPa, 150 kPa, 250 kPa, 350 kPa and 500 kPa shall not exceed the upper limit of the flow range for the applicable rating for the determined nominal flow rate in Tables 6 to Table 13.
d) The lowest average flow rate determined in accordance with Annex A at each of the dynamic flow pressures of 100 kPa, 150 kPa, 250 kPa, 350 kPa and 500 kPa shall not exceed the lower limit of the flow range for the applicable rating for the determined nominal flow rate in Tables 6 to Table 13.

e) The differences between the highest and lowest average flow rate determined in c) and d) above, shall not exceed 2 l/min.

f) The recording of the average flow rates at 50 kPa, 200 kPa, 300 kPa, 400 kPa, 450 kPa and 550 kPa are for data collection purposes only.

g) The water efficiency of a tap shall be taken to be the nominal flow rate determined in b) above.

h) The tap shall also comply with the requirements specified in c), d) and e) above to be qualified for WEPLS.

Tables 6 to 13 below show the conversion of water consumption to water efficiency rating for taps.

Table 6. Conversion of water consumption to water efficiency rating for ablution taps

<table>
<thead>
<tr>
<th>Water consumption Nominal flow rates (f) (l/min)</th>
<th>Water efficiency grade</th>
<th>Rating</th>
<th>Symbol on label</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 &lt; f ≤ 8.0</td>
<td>Efficient</td>
<td>1 ★</td>
<td>★</td>
</tr>
<tr>
<td>4.0 &lt; f ≤ 6.0</td>
<td>Highly efficient</td>
<td>2 ★</td>
<td>★ ★</td>
</tr>
<tr>
<td>1.5 &lt; f ≤ 4.0</td>
<td>Most efficient</td>
<td>3 ★</td>
<td>★ ★ ★</td>
</tr>
</tbody>
</table>

Table 7. Conversion of water consumption to water efficiency rating for angle valve

<table>
<thead>
<tr>
<th>Water consumption Nominal flow rates (f) (l/min)</th>
<th>Water efficiency grade</th>
<th>Rating</th>
<th>Symbol on label</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 &lt; f ≤ 8.0</td>
<td>Efficient</td>
<td>1 ★</td>
<td>★</td>
</tr>
<tr>
<td>4.0 &lt; f ≤ 6.0</td>
<td>Highly efficient</td>
<td>2 ★</td>
<td>★ ★</td>
</tr>
<tr>
<td>2.5 &lt; f ≤ 4.0</td>
<td>Most efficient</td>
<td>3 ★</td>
<td>★ ★ ★</td>
</tr>
</tbody>
</table>
Table 8. Conversion of water consumption to water efficiency rating for basin taps

<table>
<thead>
<tr>
<th>Water consumption Nominal flow rates (f) (l/min)</th>
<th>Water efficiency grade</th>
<th>Rating</th>
<th>Symbol on label</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 (&lt; f \leq 8.0)</td>
<td>Efficient</td>
<td>1 ★</td>
<td>★</td>
</tr>
<tr>
<td>4.0 (&lt; f \leq 6.0)</td>
<td>Highly efficient</td>
<td>2 ★</td>
<td>★ ★</td>
</tr>
<tr>
<td>1.5 (&lt; f \leq 4.0)</td>
<td>Most efficient</td>
<td>3 ★</td>
<td>★ ★ ★</td>
</tr>
</tbody>
</table>

Table 9. Conversion of water consumption to water efficiency rating for hose/garden taps

<table>
<thead>
<tr>
<th>Water consumption Nominal flow rates (f) (l/min)</th>
<th>Water efficiency grade</th>
<th>Rating</th>
<th>Symbol on label</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 (&lt; f \leq 8.0)</td>
<td>Efficient</td>
<td>1 ★</td>
<td>★</td>
</tr>
<tr>
<td>4.0 (&lt; f \leq 6.0)</td>
<td>Highly efficient</td>
<td>2 ★</td>
<td>★ ★</td>
</tr>
<tr>
<td>2.5 (&lt; f \leq 4.0)</td>
<td>Most efficient</td>
<td>3 ★</td>
<td>★ ★ ★</td>
</tr>
</tbody>
</table>

Table 10. Conversion of water consumption to water efficiency rating for kitchen sink taps

<table>
<thead>
<tr>
<th>Water consumption Nominal flow rates (f) (l/min)</th>
<th>Water efficiency grade</th>
<th>Rating</th>
<th>Symbol on label</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 (&lt; f \leq 8.0)</td>
<td>Efficient</td>
<td>1 ★</td>
<td>★</td>
</tr>
<tr>
<td>4.0 (&lt; f \leq 6.0)</td>
<td>Highly efficient</td>
<td>2 ★</td>
<td>★ ★</td>
</tr>
<tr>
<td>2.5 (&lt; f \leq 4.0)</td>
<td>Most efficient</td>
<td>3 ★</td>
<td>★ ★ ★</td>
</tr>
</tbody>
</table>

Table 11. Conversion of water consumption to water efficiency rating for laundry/washing/washing machine taps

<table>
<thead>
<tr>
<th>Water consumption Nominal flow rates (f) (l/min)</th>
<th>Water efficiency grade</th>
<th>Rating</th>
<th>Symbol on label</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 (&lt; f \leq 8.0)</td>
<td>Efficient</td>
<td>1 ★</td>
<td>★</td>
</tr>
<tr>
<td>4.0 (&lt; f \leq 6.0)</td>
<td>Highly efficient</td>
<td>2 ★</td>
<td>★ ★</td>
</tr>
<tr>
<td>2.5 (&lt; f \leq 4.0)</td>
<td>Most efficient</td>
<td>3 ★</td>
<td>★ ★ ★</td>
</tr>
</tbody>
</table>
Table 12. Conversion of water consumption to water efficiency rating for shower/bath taps

<table>
<thead>
<tr>
<th>Water consumption Nominal flow rates ( (f) ) (l/min)</th>
<th>Water efficiency grade</th>
<th>Rating</th>
<th>Symbol on label</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0 &lt; ( f \leq 10.0 )</td>
<td>Efficient</td>
<td>1 ★</td>
<td>★</td>
</tr>
<tr>
<td>6.0 &lt; ( f \leq 8.0 )</td>
<td>Highly efficient</td>
<td>2 ★</td>
<td>★ ★</td>
</tr>
<tr>
<td>4.5 &lt; ( f \leq 6.0 )</td>
<td>Most efficient</td>
<td>3 ★</td>
<td>★ ★ ★</td>
</tr>
</tbody>
</table>

Table 13. Conversion of water consumption to water efficiency rating for two-way taps (multipurpose taps)

<table>
<thead>
<tr>
<th>Water consumption Nominal flow rates ( (f) ) (l/min)</th>
<th>Water efficiency grade</th>
<th>Rating</th>
<th>Symbol on label</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 &lt; ( f \leq 8.0 )</td>
<td>Efficient</td>
<td>1 ★</td>
<td>★</td>
</tr>
<tr>
<td>4.0 &lt; ( f \leq 6.0 )</td>
<td>Highly efficient</td>
<td>2 ★</td>
<td>★ ★</td>
</tr>
<tr>
<td>2.5 &lt; ( f \leq 4.0 )</td>
<td>Most efficient</td>
<td>3 ★</td>
<td>★ ★ ★</td>
</tr>
</tbody>
</table>
8.3 Leak tightness characteristics

When tested in accordance with Annex B, the requirement shall be as described in Table 14 below.

**Table 14. Requirements for leak tightness characteristics**

<table>
<thead>
<tr>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
</table>
| B.3 Leak tightness of the obturator and of the tap upstream of the obturator(s) with the obturator in the closed position | a) Verification of leak tightness upstream of the obturator:  
- Throughout the duration of the test there shall be no leakage or seepage through the walls.  
b) Verification of leak tightness of the obturator:  
- Throughout the duration of the test, there shall be no leakage of the obturator, i.e. at the outlet |
| B.4 Leak tightness of the tap downstream of the obturator(s) with the obturator open | Throughout the duration of the test there shall be no leakage, or seepage through the walls. |
| B.5 Leak tightness of manually operated diverter | Flow to bath  
There shall be no leakage at the outlet to shower.  
**Flow to shower**  
There shall be no leakage at the outlet to bath. |
| B.6 Leak tightness and operation of diverter with automatic return | Flow to bath  
There shall be no leakage at the shower connection point.  
**Flow to shower**  
a) There shall be no leakage at the outlet to bath whilst the diverter remains in the flow to shower position;  
b) the diverter shall not return to the flow to bath position until the obturators are closed; and  
c) the diverter shall return to the flow to bath position when the obturators are closed.  
**Continuation procedure: flow to bath**  
There shall be no leakage from the hose attachment point. |
8.4 Pressure resistance characteristics – mechanical performance under pressure

When tested in accordance with Annex C, there shall be no permanent deformation in any part of the tap.

8.5 Mechanical strength characteristics – torsion test for operating mechanism

When tested in accordance with Annex D, tap shall meet the following requirements:

a) There shall be no deformation or other deterioration which impairs the function of the tap.

b) The tap shall satisfy the requirement for leak tightness in 8.3 (B.3).

8.6 Mechanical endurance characteristics

When tested in accordance with Annex E, the requirement shall be as described in Table 15.

<table>
<thead>
<tr>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.1 Mechanical endurance of the operating mechanism</td>
<td>After testing, tap shall again satisfy the leak tightness criteria given in 8.3 (B.3 and B.4), and there shall be no failure of any component part.</td>
</tr>
<tr>
<td>E.2 Mechanical endurance of diverters</td>
<td>Throughout the test, there shall be no incidents of leaks, failure of diverter to reset, blockage, etc. On completion of 30 000 cycles the assembly shall be leak tight when tested according to B.5 for manual diverters or B.6 for diverters with automatic return.</td>
</tr>
</tbody>
</table>
| E.3 Mechanical endurance of swivel spouts (single and divided outlet type) | During the test there shall be:  
   a) no deformation or fracture of the swivel spout;  
   b) no deformation or fracture of the device connecting the spout to the body;  
   c) no leakage of the assembly; and  
   d) no increase in the water level in the sight tube (divided outlet type).  
   At the end of the test the spout shall be leak tight under the conditions given in B.4. |
9 Marking and labelling

9.1 Marking

Taps shall be legibly and permanently marked with the manufacturer’s name or trademark.

9.2 Identification

9.2.1 Colour code

The control devices for taps shall be identified:

a) for cold water by the colour blue or word/letters for cold;

b) for hot water by the colour red or word/letters for hot; and

c) any other suitable means.

9.2.2 Disposition of control device

When hot and cold water taps are provided together, the hot tap shall be on the left side (see Figures 9 and 10).

9.3 Water efficiency label

An approved Water Efficient Product shall be labelled with the approved water efficiency label in accordance with WEPLS Guideline. Labelling and the use of WEPLS label on water taps product shall be in accordance with WEPLS Guideline.
Annex A
(normative)

Flow rate test

A.1 General
This annex describes the test methods for measuring the flow rate of single and combination taps.

A.2 Test method
A.2.1 Principle
The value of the flow rate corresponding to a dynamic flow pressure is determined, the measurement being carried out with the tap fully open. In the case of combination taps, each side is tested separately and in some cases with both sides open.

If the tap is equipped with water saving devices or aerators not complying with the dimensions specified in BS EN 246, the flow rate test shall be made with the tap as delivered by the manufacturer.

A.2.2 Apparatus
A cold water supply system with temperature < 30 °C, capable of supplying the tap under test with a dynamic flow pressure.

A test rig, according to Figure A.1.

Equipment for measuring:
a) pressures (measurement accuracy ± 1 % of the measured values); and
b) flow rates (measurement accuracy ± 2 % of the measured values).

A.2.3 Procedure
a) Fit the tap to be tested onto the test rig.
b) Deformable inlet supply tubes (flexible supply hoses) shall be tested in a straight condition.
c) Open the obturator to its maximum position (one only when testing each side of a combination tap separately).
e) Adjust the dynamic pressure to 50 kPa, 100 kPa, 150 kPa, 200 kPa, 250 kPa, 300 kPa, 350 kPa, 400 kPa, 450 kPa, 500 kPa and 550 kPa.
f) When a stable and continuous flow has been established, measure and record the corresponding flow rate.

Dimensions in millimetres

Key

1 Pressure take-off tee
2 Control valve
3 Flow meter
4 Cold supply
5 Stop valve
6 Centres to suit tap assemblies
7 Pressure gauge (manometer)
8 1020 mm of water (0.1 bar)

NOTE. The tube ends are straight, without burrs and inserted to the full depth of dimension A in the pressure take-off tee.

Figure A.1 - Flow rate test apparatus
Annex B
(normative)

Leak tightness characteristics

B.1 General
This annex describes the test methods that shall be carried out to verify the leak tightness of the complete tap and specifies the corresponding requirements.

B.2 Test methods
B.2.1 Principle
The principle of the test consists of checking under cold water pressure the leak tightness of:

a) the obturator (see B.3);

b) the complete tap (see B.4); and

c) the bath/shower diverter (either manual or with automatic return) (see B.5 and B.6).

B.2.2 Apparatus

A hydraulic test circuit, capable of supplying the required pressures and of maintaining them throughout the duration of the tests.

A hydraulic test circuit, capable of supplying gradually the required static and dynamic pressures and of maintaining them throughout the duration of the test.

B.3 Leak tightness of the obturator and of the tap upstream of the obturator(s) with the obturator in the closed position

B.3.1 Procedure

a) Connect the tap to the test circuit.

b) With the outlet orifice open, and generally turned downwards, close the obturator(s) using a torque of (1.5 ± 0.15) Nm for nominal size ½ (DN 15) and (2.5 ± 0.25) Nm for nominal size ¾ (DN 20); if a stuffing box is used to ensure leak tightness of the headwork, the packing gland shall be loosened before application of the closing torque.

c) Apply to the inlet of the tap a water pressure of (1 600 ± 50) kPa [(16.0 ± 0.5) bar] and maintain it for (60 ± 5) s.
B.4 Leak tightness of the tap downstream of the obturator(s) with the obturator open

B.4.1 General

Not applicable when the outlet cannot be closed.

B.4.2 Procedure

a) Connect the tap to the test circuit.

b) If a stuffing box is used to ensure leak tightness of the headwork, ensure that the packing gland is tightened in accordance with the manufacturer’s instructions.

c) With the outlet orifice(s) artificially closed, and generally turned downwards open the obturator(s).

d) Apply to the inlet of the tap a water pressure of \((400 \pm 20)\) kPa \([(4.0 \pm 0.2)\) bar] and maintain it for \((60 \pm 5)\) s.

e) Gradually reduce the pressure to \((20 \pm 2)\) kPa \([(0.2\pm0.02)\) bar] and maintain it for \((60 \pm 5)\) s.

B.5 Leak tightness of a manually operated diverter

B.5.1 Procedure: flow to bath

a) Connect the tap, in its normal position of use, to the test circuit.

b) Put the diverter in the flow-to-bath mode, the outlet to bath being artificially closed and the outlet to shower open.

c) Apply a static water pressure of \((400 \pm 20)\) kPa \([(4.0 \pm 0.2)\) bar] and maintain it for \((60 \pm 5)\) s.

d) Gradually reduce the pressure to \((20 \pm 0.002)\) kPa \([(0.2 \pm 0.02)\) bar] and maintain it for \((60 \pm 5)\) s.

e) Check for leakage at the outlet to shower.

B.5.2 Procedure: flow to shower

a) Put the diverter in the flow-to-shower mode, the outlet to shower being artificially closed and the outlet to bath open.

b) Apply a static water pressure of \((400 \pm 20)\) kPa \([(4.0 \pm 0.2)\) bar] and maintain it for \((60 \pm 5)\) s.
c) Gradually reduce the pressure to (20 ±2) kPa [(0.2 ±0.02) bar] and maintain it for (60 ±5) s.

d) Check for leakage at the outlet to bath.

B.6 Leak tightness and operation of diverter with automatic return

B.6.1 Procedure: flow to bath

a) Connect the tap to the test circuit shown in Figure B.1 with the control valves of the test circuit closed.

b) With the diverter in the flow-to-bath mode, fully open the tap obturator(s).

c) Open the control valve of the test circuit to supply a combined flow rate of 45 l/min for (60 ±5) s.

d) Check for leakage at the shower connection point.

B.6.2 Continuation procedure: flow to shower

a) Regulate the dynamic pressure to (20 ±2) kPa [(0.2 ± 0.02) bar].

b) Close the manometer isolating valve.

c) Connect the hydraulic resistance shown in Figure B.1 (calibrated to 9 l/min at 20 kPa) to the hose attachment point.

d) Put the diverter in the flow-to-shower mode without altering the settings of the test circuit. The outlet to bath shall be open.

e) Check for (60 ± 5) s for leakage at the outlet to bath.

f) Open the manometer isolating valve.

g) Readjust the dynamic pressure at the tap inlet, by adjustment of the test circuit control valve, to (20 ± 2) kPa [(0.2 ± 0.02) bar] referenced to the bath outlet datum.

h) Check the diverter position and check for leakage at the outlet to bath for (60 ±5) s.

i) Close the manometer isolating valve and then close the tap obturators.

j) Check the diverter position.
B.6.3 Continuation procedure: flow to bath

a) Disconnect the hydraulic resistance.

b) Fully re-open the tap obturators for (60 ±5) s.

c) Record any leakage from the hose attachment point.

NOTE. Tables B.1, B.2 and B.3 summarise the leak tightness test conditions.

Figure B.1. Apparatus for testing the leak tightness of automatic diverters for taps
Table B.1. Leak tightness of tap assembly

<table>
<thead>
<tr>
<th>Size</th>
<th>Tightness of:</th>
<th>Cold water test</th>
<th>Test conditions</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Position of obturator(s)</td>
<td>Torque (Nm)</td>
<td>Condition of outlet orifice(s)</td>
</tr>
<tr>
<td>½ inch (DN 15)</td>
<td>Upstream of obturators</td>
<td>Closed&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.5 ± 0.15</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td>Downstream of obturators</td>
<td>Open</td>
<td>-</td>
<td>Closed</td>
</tr>
<tr>
<td>¾ inch (DN 20)</td>
<td>Upstream of obturators</td>
<td>Closed&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.5 ± 0.25</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td>Downstream of obturators</td>
<td>Open</td>
<td>-</td>
<td>Closed</td>
</tr>
</tbody>
</table>

<sup>a</sup> If a stuffing box is used to ensure leak tightness of the headwork, the packing gland shall be loosened before application of the closing torque.

Table B.2. Leak tightness of manually operated diverter

<table>
<thead>
<tr>
<th>Tightness of:</th>
<th>Cold water test</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Position of obturator(s)</td>
<td>Condition of outlet orifice(s)</td>
</tr>
<tr>
<td>Manually operated diverter</td>
<td>Outlet to bath</td>
<td>Outlet to shower</td>
</tr>
<tr>
<td>Open diverter in flow-to-bath mode</td>
<td>Closed</td>
<td>Open</td>
</tr>
<tr>
<td>Open diverter in flow-to-shower mode</td>
<td>Open</td>
<td>Closed</td>
</tr>
<tr>
<td>Open diverter in flow-to-bath mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open diverter in flow-to-shower mode</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table B.3. Leak tightness of automatic return diverter

<table>
<thead>
<tr>
<th>Tightness of:</th>
<th>Position of obturator(s)</th>
<th>Condition of outlet orifice(s)</th>
<th>Test conditions</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic return diverter</td>
<td>Open Diverter in flow to bath mode</td>
<td>Outlet to bath Open</td>
<td>Dynamic pressure (kPa)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outlet to shower Open</td>
<td>Isolating valve</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flowrate (L/min)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Open Diverter in flow to shower mode</td>
<td>Open</td>
<td></td>
<td>20 ± 2</td>
</tr>
<tr>
<td></td>
<td>Closed</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Open Diverter in flow to bath mode</td>
<td></td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>
Annex C
(normative)

Pressure resistance characteristics - Mechanical performance under pressure

C.1 General

This annex describes the test method that shall be carried out to verify the mechanical performance under high pressure and specifies the test criteria.

C.2 Principle

The principle is to detect any deformation of the tap which may occur using cold water under pressure. The test is carried out both upstream and downstream of the obturator.

C.3 Apparatus

A hydraulic test circuit, capable of supplying and of maintaining the required pressures for the duration of the test.

C.4 Mechanical behaviour upstream of the obturator- Obturator in the closed position

C.4.1 Procedure

a) Connect the tap to the test circuit.

b) With the obturator(s) closed apply at the tap inlet(s) a static water pressure of (2500 ± 50) kPa [(25±0.5) bar] for (60 ±5) s.

c) Check whether there is permanent deformation in any part of the tapware upstream of the obturator.
C.5 Mechanical behaviour downstream of the obturator - Obturator in the open position

C.5.1 Procedure

a) Connect the tap as supplied to the test circuit.

b) Open the tap obturator(s) fully.

c) For taps with a flow rate regulator fitted apply at the tap inlet a dynamic water pressure of \((400 \pm 20)\) kPa \([(4.0 \pm 0.2)\) bar\] and maintain it for \((60 \pm 5)\) s.

d) For taps without flow rate regulator apply at the tap inlet, for \((60 \pm 5)\) s, the water pressure needed to give a flow rate of \((0.4 \pm 0.04)\) l/s through taps of nominal size \(\frac{1}{2}\) inch (DN 15) and a flow rate of \((0.8 \pm 0.08)\) l/s through taps of nominal size \(\frac{3}{4}\) inch (DN 20).

e) For taps with removable flow rate regulator, the test is carried out both with and without this regulator.

f) Check whether there is permanent deformation in any part of the tapware downstream of the obturator.

NOTE. Table C.1 summarises the pressure resistance characteristic test conditions.

**Table C.1. Summary of pressure resistance characteristic tests**

<table>
<thead>
<tr>
<th>Pressure resistance of: Taps (\frac{1}{2}) inch (DN15) and (\frac{3}{4}) inch (DN 20)</th>
<th>Cold water test</th>
<th>Test conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positions of obturator(s)</td>
<td>Condition of outlet orifices</td>
</tr>
<tr>
<td>Tap assembly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upstream of obturator</td>
<td>Obturator(s) closed</td>
<td>Open</td>
</tr>
<tr>
<td>Downstream of obturator - Taps with flow rate regulator</td>
<td>Obturator(s) open</td>
<td>Open</td>
</tr>
<tr>
<td>Taps size (\frac{1}{2}) – without flow rate regulator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taps size (\frac{3}{4}) – without flow rate regulator</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Annex D
(normative)

Mechanical strength characteristics - torsion test for operating mechanism

D.1 General
This annex describes a test method that shall be carried out to verify the torsional strength of the operating mechanisms of single and combination taps and specifies the test criteria.

D.2 Test method
D.2.1 Principle
The principle of the test consists of submitting the operating mechanism to a given torque to verify its strength, with not water supplied.

D.2.2 Apparatus
This consists of either a torque wrench having an accuracy of 2 % fitted to the operating member or a lever arm and a device for measuring the force applied.

D.2.3 Test piece
The tap with its operating mechanism with, in the case of screw down taps, the seat washer removed.

D.2.4 Procedure
a) Fully open the obturator.
b) Gradually apply over (4 + 2) s a torque of (6 ± 0.2) Nm to the operating mechanism in the opening direction.
c) Maintain this torque for (300 + 15) s.
d) Fully close the obturator.
e) Gradually apply over (4 + 2) s a torque of (6 ± 0.2) Nm to the operating mechanism in the closing direction.
f) Maintain this torque for (300 +15) s.
g) Reinsert the seat washer of screw down taps.
Annex E
(normative)

Mechanical endurance characteristics

E.1 Mechanical endurance characteristics of the operating mechanism

E.1.1 General

This annex describes a test method that shall be carried out to verify the mechanical endurance of the operating mechanisms (head and handle) of single taps and combination taps of nominal sizes ½ inch (DN 15) and ¾ inch (DN 20) and specifies the test criteria. Taps shall first satisfy the leak tightness tests described in 8.3 (B.3 and B.4).

E.1.2 Test method

E.1.2.1 Principle

The principle of the test consists of checking the behavior of the operating mechanism by carrying out a number of opening and closing operations with water at specified pressure/temperature and with a specified dwell time (see Table E.1).

E.1.2.2 Apparatus

An automatic test rig, which rotates in both directions, the closing torque shall remain constant irrespective of wear of the test piece.

The set closing torque shall not be affected by the momentum of the equipment during the test.

A supply circuit with a pump or a similar device, capable of producing the required pressure at a temperature ≤ 30 °C for the cold water and (65 ±2) °C for the hot water.

If the water is supplied by a circulation system, it is necessary to ensure that the quality of the water does not change during the test (e.g. ingress of grease or other contaminants).

A device to actuate the operating mechanism of the tap. This shall not impose, by virtue of misalignment or otherwise, any axial or radial forces that would not occur in normal use.

NOTE. The test sample can show abnormal wear due to loads imposed by the test equipment resulting from eccentricity of the two axes. This results in pick-up on one side only due to lateral forces which do not occur in normal use. The tolerance on concentricity should therefore be as small as possible.

E.1.3 Procedure

a) Fit the tap to be tested complete with its handle onto the test rig and connect to the water supply circuit.

© SPAN 2020 - All rights reserved
b) For taps with elastomeric washer(s), adjust the closing torque to a constant value of 
\((2.5 \pm 0.25) \text{ Nm}\); for ceramic disc valves, adjust the closing torque to a constant value of 
\((1.5 \pm 0.25) \text{ Nm}\).

c) With the tap closed, adjust the static water pressure, to \((400 \pm 50) \text{ kPa } [4 \pm 0.5 \text{ bar}]\).

d) With the tap open, adjust the flow rate, by throttling the outlet of the tap, to \((6 \pm 1) \text{ l/min}\).

e) Where leak tightness of the spindle is ensured by a stuffing box the gland nut is loosened as follows:

i) loosen the gland nut;

ii) with the outlet orifice closed, open the obturator; apply a water pressure of \(100 \text{ kPa (1.0 bar)}\); and

iii) tighten the gland nut until a watertight seal is just obtained.

f) Carry out 200 000 opening and closing cycles, with a speed as specified in the Table E.1, using hot and cold water alternately for periods of \((15 \pm 1) \text{ min each}\):

i) open to 75 % of the total opening movement;

ii) dwell in the open position for \((1 \text{ to } 2) \text{ s}\);

iii) close completely with a torque of \((2.5 \pm 0.25) \text{ Nm or } (1.5 \pm 0.25) \text{ Nm as appropriate and maintain this torque for time } t \leq 0.4 \text{ s; and}

iv) retain the closed position for a total dwell time \( t \text{ of } (2 \text{ to } 3) \text{ s}\).

In the case of taps having a stuffing box to ensure tightness of the headwork the gland nut can be adjusted at intervals of not less than 50 000 cycles.

NOTE. Table E.1 summarises the endurance test conditions and Figure E.1 shows the curve of closing torque vs time.
Table E.1. Endurance test conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water temperature:</td>
<td></td>
</tr>
<tr>
<td>- cold</td>
<td>≤ 30 °C</td>
</tr>
<tr>
<td>- hot</td>
<td>(65 ± 2)°C</td>
</tr>
<tr>
<td>Flow rate adjusted by throttling outlet</td>
<td>(6 ± 1) l/min</td>
</tr>
<tr>
<td>Static pressure (kPa)</td>
<td>400 ± 50 kPa [(4 ± 0.5) bar]</td>
</tr>
<tr>
<td>Rotations per minute:</td>
<td></td>
</tr>
<tr>
<td>- for elastomeric seal</td>
<td>30 ± 0.1 rpm</td>
</tr>
<tr>
<td>- for ceramic valves</td>
<td>10 ± 0.1 rpm</td>
</tr>
<tr>
<td>Dwell time in open position</td>
<td>1 to 2 s</td>
</tr>
<tr>
<td>Dwell time in closed position with applied torque</td>
<td>≤ 0.4 s</td>
</tr>
<tr>
<td>Total dwell time in closed position</td>
<td>2 to 3 s</td>
</tr>
<tr>
<td>Closing torque (Nm) elastomeric washer</td>
<td>2.5 ± 0.25 Nm</td>
</tr>
<tr>
<td>Closing torque (Nm) ceramic discs</td>
<td>1.5 ± 0.25 Nm</td>
</tr>
<tr>
<td>Number of cycles</td>
<td>200 000</td>
</tr>
</tbody>
</table>
Key

1. Closing torque (Nm)
2. Time (s)

$\Delta t$ < 0.4 s dwell time in closed position with applied torque

$t\Delta t$ = 2 to 3 s total dwell in closed position

$tA$ Time for compression of rubber washer

$tC$ Time dependent on type of headwork

A Rubber washer contacting the seat

B1 Rubber washer leaving the seat

B2 Ceramic disc just open

C Curve depending on type of headwork (ceramic, rubber)

Figure E.1. Life test – Closing torque vs time
E.2 Mechanical endurance of diverters

E.2.1 General

This annex describes two methods, one for manual diverters and one for diverters with automatic return, that shall be carried out to evaluate the mechanical endurance of diverters of combination taps and specifies the test criteria.

E.2.2 Test method

E.2.2.1 Principle

The diverter is subjected to a specified number of operations whilst being supplied alternately with cold water and with hot water to test its behaviour over a period of time, taking into account the effect of water temperature.

E.2.2.2 Apparatus

For manual diverter, an automatic machine that ensures alternate operations at the rate of (15 ± 1) cycles per minute and supply circuits with a pump or similar device to supply the required cold water static pressure at a temperature of ≤ 30 °C and the required hot water static pressure at a temperature of (65 ± 2) °C.

For diverter with automatic return, a mechanism for moving the diverter to the shower position under the conditions specified in B.6 and supply circuits identical to those specified above with, in addition, an automatic quick acting valve to cut off the supply to the combination tap under test.

E.2.3 Procedure

For manual diverter:

a) Install the tap, as supplied, onto the test rig and connect both inlets to both supply circuits.

b) Connect the drive device to the diverter operating member by means of a flexible component.

c) Adjust the static water pressure of both hot and cold circuit to (20 ± 2) kPa [(0.2±0.02) bar].

d) In the flow-to-bath and flow-to-shower mode, adjust the flow rate to (6 ±1) l/min by restricting the outlet.

e) Subject the diverter to a test of 30 000 cycles, each comprising a return movement between the extreme positions; throughout the test, supply the tap alternately at both inlets with cold water for (15 ±1) min then hot water for (15 ±1) min.

For diverter with automatic return:

a) Install the tap, as supplied, on the test rig and connect both inlets to both supply circuits.
b) Connect the drive device to the diverter operating member by means of a flexible component.

c) Adjust the static pressure of both hot and cold circuits to \((20 \pm 2)\) kPa \([\(0.2 \pm 0.02\) bar]\).

d) In the flow-to-bath and flow-to-shower mode, adjust the flow rate to \((6 \pm 1)\) l/min by restricting the outlet.

e) Subject the diverter to a test of 30 000 cycles, one cycle being defined as follows:

i) with the diverter in the “flow to bath” position, allow water to flow through the bath outlet for \((5 \pm 0.5)\) s;

ii) move the diverter to the shower position;

iii) allow water to flow through the shower outlet for \((5 \pm 0.5)\) s; and

iv) use the quick-acting valve to cut off the supply to the tap, allowing the diverter to return to the “flow to bath” position, and then reopen the supply.

Throughout the test, supply the tap alternately at both inlets with cold water for \((15 \pm 1)\) min and then hot water for \((15 \pm 1)\) min.

NOTE. Table E.2 summarises the diverters test conditions.

Table E.2. Summary of test conditions for diverters

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Field of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure of:</td>
<td></td>
</tr>
<tr>
<td>Cold and hot water</td>
<td>((20 \pm 2)) kPa ([(0.2\pm0.02) bar])</td>
</tr>
<tr>
<td>Cold water temperature</td>
<td>(\leq 30) °C</td>
</tr>
<tr>
<td>Hot water temperature</td>
<td>(65\pm2) °C</td>
</tr>
<tr>
<td>Timing of supply (min):</td>
<td></td>
</tr>
<tr>
<td>Cold or hot water</td>
<td>((15 \pm1)) min</td>
</tr>
<tr>
<td>Time of flow (second):</td>
<td></td>
</tr>
<tr>
<td>to bath or to shower outlet</td>
<td>((5 \pm 0.5)) s</td>
</tr>
<tr>
<td>Flow rate to bath and to shower outlet</td>
<td>((6 \pm1)) l/min</td>
</tr>
<tr>
<td>Operation rate for manual diverters (cycles)</td>
<td>((15 \pm1)) min(^{-1})</td>
</tr>
<tr>
<td>Number of cycles</td>
<td>30 000</td>
</tr>
</tbody>
</table>
E.3  Mechanical endurance of swivel spouts (single and divided outlet type)

E.3.1  General

This annex describes a method that shall be carried out to test the mechanical endurance of swivel spouts (single and divided outlet type) of taps and specifies the corresponding test criteria.

E.3.2  Test method

E.3.2.1  Principle

The principle of the test is to reciprocate the spout of the tap with both inlets fed with cold water for a specified number of cycles in order to test its behaviour over a period of time.

E.3.2.2  Apparatus

Automatic machine, capable of swivelling the spout as described in E.3.3 and E.3.4 at a rate of (15 ±1) cycles per min.

Cold water supply circuit, ≤ 30 °C with pump or similar device, for supplying the required pressure.

Mass, of (1± 0.1) kg if the spout is ≤ 200 mm, or sufficient to apply a bending moment of (2 ±0.25) Nm if the spout is > 200 mm.

Sight glass, arranged as shown in Figure E.2 (for divided outlet type only).

E.3.3  Procedure divided outlet type

a)  Attach the sight glass to the cold inlet.

b)  Assemble the tap onto the machine and connect the hot inlet to the supply circuit.

c)  Manually fit the sight glass to a recorded level (15 ±0.1) mm above the topmost seal of the swivel nozzle and maintain the recorded level if evaporation takes place during the test.

d)  If the nozzle has a flow rate regulator, leave it in place and ensure that it does not obstruct the test path; securely, fix the appropriate weight at the end of the swivel nozzle.

e)  Connect the driving device to the swivel nozzle.

f)  With the tap closed, adjust the static water pressure to (400 ±50) kPa [(4 ±0.5) bar].

g)  Open the hot tap and adjust the flow rate to 6 ±1 l/min by restricting the nozzle outlet.

h)  Open the cold tap.
E.3.4 Procedure single outlet type

a) Mount the tap on the machine and connect the inlets to the supply circuit.

b) With the tap closed, adjust the static water pressure to $(400 \pm 50)$ kPa \([(4 \pm 0.5) \text{ bar}]\).

c) Open the taps fully and adjust the flow rate to $6 \pm 1$ l/min by restricting the nozzle outlet.

d) Subject the spout to a test of 80 000 cycles, each cycle comprising a movement of the spout through an arc of $120^\circ$ in both directions or, if there is a stop, over 90 % of the available travel.

Key

1 Cold supply
2 Sight glass
3 Water level

Figure E.1. Endurance test rig for divided-outlet swivel spout
Bibliography

[1] BS EN 200, *Sanitary tapware - Single taps and combination taps for water supply systems of type 1 and type 2 - General technical specification*

[2] BS EN 1213, *Building valves - Copper alloy stopvalves for potable water supply in buildings - Test and requirements*

[3] AS/NZS 3500.0, *Plumbing and drainage - Part 0: Glossary of terms*


[6] SS 448-3, *Specification for performance of draw-off taps with metal or plastic bodies for water services*


Acknowledgements

SPAN and SIRIM STS would like to thank the organisations who have contributed their ideas, time and expertise in the development of this SPAN-TS.

Ms Arni Shahrina Shaharum (Chairman) Suruhanjaya Perkhidmatan Air Negara
Ms Nor Azwamiza Abu Samah (Secretary) SIRIM STS Sdn Bhd
Mr Nasrul Najaha Mohamad Azahar/ Ms Sharifah Iffahanim Saiyed Ismail ANQAS Certification Sdn Bhd
IDr Sharifah Suzana Syed Hassan/ Mr Enrico Candido Martin DOE Industries Sdn Bhd
Mr Mohammad Akhir Abdullah IKRAM QA Services Sdn Bhd
Mr Mohammad Ezzani Iswan Ismail Malaysian Green Technology and Climate Change Centre
Ms Mariam Abdul Kadir/ Mr Khor Soon Seng/ Ms Asila Ku Ishak Perbadanan Bekalan Air Pulau Pinang
Mr Muhammad Nabil Abdullah ROCA Malaysia Sdn Bhd
Mr Chuah Seong Pwu Shun Yi Sdn Bhd
Ms Wan Norisah Wan Awang/ Mr Roslan Azizan/ Mr Mohamad Nurhidayat Rahmat SIRIM QAS International Sdn Bhd (Product Certification and Inspection)
Mr Mohd Faizar Mustafa/ Mr Mohd Rashidi Batcha SIRIM QAS International Sdn Bhd (Testing Services Department)
Ms Siti Aisyah Ab Rahman Suruhanjaya Perkhidmatan Air Negara
Mr Manimaran Ponnusamy Watertec (Malaysia) Sdn Bhd