



TEST REPORT

TEST REPORT NO : B60022063

Jan.10,2020

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Applicant : FICO INDUSTRIAL CO., LTD
 Address : NO.701-1 T8 Smart City NO. 1 Building BLOCK 3, NO. 28 JIHUA 1STRoad Chancheng District, Foshan GuangDong China
 Contact Person : SHIRLEY HUANG
 Test Date : Jan 10, 2020
 Received Date: Jan 10, 2020
 Contact Info: fico@fico.com.cn

Sample Description: Ledbury thermostatic bar mixer

Buyer: CITY PLUMBING SUPPLIES
 Manufacturer: WEILAIWOLAI SANITARY WARE TECHNOLOGY (GUANGDONG)CO.,LTD
 Country of Origin: China
 PO No.: 564218419
 Model No.: 327477
 SKU No.: 327477
 Exported to: UK

Test Item	Conclusion
EN 1111:2017 Sanitary tapware — Thermostatic mixing valves (PN 10) —General technical specification	PASS#
Remark: 1. The results relate only to the samples tested. 2. The tested Samples/Components/Test Item were selected by client. 3. #:These tests were subcontracted.	

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For and on behalf of
UL VS Shanghai Limited

Justin Zhou - Technical Manager

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Sample Information :

Sample	Product	Applicant's equivalent code / Color
001	Ledbury Thermostatic Bar Mixer	

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1. EN 1111:2017 Sanitary tapware—Thermostatic mixing valves (PN 10) – General technical specification

Clause	Requirement	Result	Verdict
7	Marking/identification		
7.1	Marking	Complied	P
7.2	Identification	Complied	P
8.1	Chemical and hygiene requirements	It's the manufacturer's responsibility to assure the compliance of this clause	-
8.2	Exposed surface condition and quality of coating		
	Visible chromium plated surfaces and Ni-Cr coatings shall comply with the requirements of EN 248.	Complied	P
9	Dimensional characteristics	Complied	P
10	Backflow protection	Complied	P
12	Leaktightness		
12.2	Leaktightness of the obturator and upstream thereof		
	The outlet of TMVs without flow control (Type 4, Clause 5) shall be plugged. In the case of thermostatic mixing valves without obturator (type 4, clause 4) the outlet orifice shall be artificially closed		
12.2.2	Procedure		
	a) Connect both inlets of the valve to the test circuit; b) with the outlet open and the flow control closed, apply a water pressure of (1,6 ± 0,05) MPa [(16 ± 0,5) bar] to the TMV for (60 ± 5) s and adjust its temperature control over the full range.		

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Clause	Requirement	Result	Verdict
12.2.3	Requirements		
	There shall be no leakage.	Complied (Type 2)	P
12.3	Cross-flow between inlets		
	The outlet of TMVs without flow control (Type 4, Clause 5) shall be plugged. In case of a single sequential TMV (Type 3, Clause 5) the flow control shall be left in the flow closed position.		
12.3.2	Procedure		
	a) Connect the cold inlet of the TMV to the test circuit. b) With the outlet open and the flow control closed, apply a water pressure of $(0,4 \pm 0,02)$ MPa [$(4 \pm 0,2)$ bar] to the TMV for (60 ± 5) s and adjust its temperature control over the full range. c) Disconnect the inlet and repeat the test with the hot inlet connected.		
12.3.3	Requirements		
	There shall be no leakage at the end of the unconnected inlet or at the outlet. The valve shall subsequently be subjected to 12.4. Check valves if used shall comply with EN 13959.	Complied (Type 2)	P
12.4	Leaktightness downstream of the obturator		
12.4.1	Procedure		
	a) Connect the TMV to the test circuit; b) with the outlet orifice(s) artificially closed, and generally turned downwards open the obturator(s); c) apply to the inlet of the TMV a water pressure of $(0,4 \pm 0,02)$ MPa [$(4,0 \pm 0,2)$ bar] and maintain it for (60 ± 5) s and adjust its temperature control over the full range; d) within (5 ± 1) s reduce the pressure to $(0,02 \pm 0,002)$ MPa [$(0,2 \pm 0,02)$ bar] and maintain it for (60 ± 5) s		

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Clause	Requirement	Result	Verdict
12.4.2	Requirement		
	There shall be no leakage. Valves incorporating diverters shall subsequently either be subjected to 12.5 or 12.6 as applicable.	Complied	P
12.5	Leaktightness of manually operated diverter		
12.5.1	Procedure		
	a) Connect the TMV to the test circuit in its position of use; b) put the diverter in the outlet 2 position with the outlet 2 artificially closed and the outlet 1 open; c) apply a water pressure of (0,4 ± 0,02) MPa [(4 ± 0,2) bar] for (60 ± 5) s. Check that leaktightness is obtained on the outlet 1; d) within (5 ± 1) s reduce to a static water pressure of (0,02 ± 0,002) MPa [(0,2 ± 0,02) bar] and maintain for (60 ± 5) s. Check that leaktightness is obtained on the outlet 1; e) put the diverter in the outlet 1 position with the outlet 1 artificially closed and the outlet 2 open; f) apply a static water pressure of (0,4 ± 0,02) MPa ((4 ± 0,2) bar) for (60 ± 5) s. Check that leaktightness is obtained on the outlet 2; g) within (5 ± 1) s reduce to a static water pressure of (0,02 ± 0,002) MPa [(0,2 ± 0,02) bar] and maintain for (60 ± 5) s. Check that leaktightness is obtained on the outlet 2.		
12.5.2	Requirement		
	For the duration of the test there shall be no leakage at the outlet points indicated.	Complied	P
12.6	Leaktightness of diverters with automatic return		

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Clause	Requirement	Result	Verdict
12.6.1	Procedure		
	a) Connect the TMV to the test circuit in its position of use with the outlets fully open. b) Connect the hydraulic resistance A to the outlet 2. c) Put the diverter in the outlet 1 position and apply a dynamic water pressure of $(0,4 \pm 0,02)$ MPa [$(4 \pm 0,2)$ bar]. Maintain this pressure for (60 ± 5) s and check that leaktightness is obtained on the outlet 2. d) Put the diverter in the outlet 2 position. Maintain this pressure for (60 ± 5) s and check that leaktightness is obtained on the outlet 1. e) With the diverter still in the outlet 2 position, reduce the dynamic pressure to a value of $(0,05 \pm 0,005)$ MPa [$(0,5 \pm 0,05)$ bar]. Check that the diverter does not revert to outlet 1. Maintain this pressure for (60 ± 5) s and check that leaktightness is obtained on the outlet 1. f) Turn the water off. Check that the diverter returns to the outlet 1 position. g) Reapply the dynamic pressure of $(0,05 \pm 0,005)$		
12.6.2	Requirement		
	For the duration of the test there shall be no leakage.	-	N/A
13	Performance		
13.2	Determination of flow rate		

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Clause	Requirement	Result	Verdict
13.2.2.2	Procedure 1		
	<p>If the TMV has standard accessories (aerators, showers, etc.), the measurement is carried out replacing these with a hydraulic resistance corresponding to the flow rate class marking, as defined in 17.3.3.</p> <p>a) Fully open any integral flow controls (if applicable).</p> <p>b) Apply and maintain the initial inlet settings shown in Table 8.</p> <p>c) Start at the full cold position.</p> <p>d) Start recording the outlet temperature over flow rate.</p> <p>e) Adjust the temperature control gradually to full hot position and then return to full cold position, over a period of at least 20 s.</p> <p>f) Stop recording outlet temperature over flow rate.</p>	-	N/A
13.2.2.3	Procedure 2		
	<p>The flow rate is measured at a pressure drop of (0,15 + 0,02) MPa [(1,5 + 0,2) bar] across the valve.</p> <p>a) Fully open any integral flow controls (if applicable).</p> <p>b) Apply and maintain the initial inlet settings shown in Table 8.</p> <p>c) Create the pressure drop across the valve by adjustment of the regulating valve as detailed in Figure A.3 and Figure A.4.</p> <p>d) Start at the full cold position.</p> <p>e) Start recording the outlet temperature over flow rate.</p> <p>f) Adjust the temperature control gradually to full hot position and then return to full cold position, over a period of at least 20 s.</p> <p>g) Stop recording outlet temperature over flow rate.</p>	Complied	P

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13.3	Sensitivity																																								
13.3.3	Procedure																																								
	<p>a) Apply and maintain the initial settings shown in Table 8 and allow water to flow until the outlet temperature has stabilized; b) adjust to the full cold position and start recording mixed water temperature versus temperature control device displacement; c) using the apparatus in 13.1.2 and adjust the temperature control device to lowest obtainable temperature then to highest obtainable temperature and back to lowest obtainable temperature; d) stop recording mixed water temperature versus temperature control device displacement</p> <p style="text-align: center;">Table 8 — Initial settings</p> <table border="1"> <thead> <tr> <th rowspan="3">point of use</th> <th colspan="4">Inlet</th> <th colspan="2">Outlet</th> </tr> <tr> <th colspan="2">Cold</th> <th colspan="2">Hot</th> <th rowspan="2">Flow (l/min)</th> <th rowspan="2">Temperature T_o (°C)</th> </tr> <tr> <th>Temperature T_c (°C)</th> <th>Dynamic pressure (MPa) [bar]</th> <th>Temperature T_h (°C)</th> <th>Dynamic pressure (MPa) [bar]</th> </tr> </thead> <tbody> <tr> <td>shower</td> <td>(10 to 15)</td> <td>(0,3±0,02) [3±0,2]</td> <td>(7± 50) ± 1</td> <td>(0,3±0,02) [3±0,2]</td> <td>(12-1)</td> <td>(38-1)</td> </tr> <tr> <td>basin, bidet, sink</td> <td></td> <td></td> <td></td> <td></td> <td>(9-1)</td> <td>(38-1)</td> </tr> <tr> <td>bath</td> <td></td> <td></td> <td></td> <td></td> <td>(20-1)</td> <td>(44-1)</td> </tr> </tbody> </table> <p>Water saving valves with flow rates < 9 l/min and < 12 l/min shall be adjusted to their maximum flow.</p>	point of use	Inlet				Outlet		Cold		Hot		Flow (l/min)	Temperature T _o (°C)	Temperature T _c (°C)	Dynamic pressure (MPa) [bar]	Temperature T _h (°C)	Dynamic pressure (MPa) [bar]	shower	(10 to 15)	(0,3±0,02) [3±0,2]	(7± 50) ± 1	(0,3±0,02) [3±0,2]	(12-1)	(38-1)	basin, bidet, sink					(9-1)	(38-1)	bath					(20-1)	(44-1)		
point of use	Inlet				Outlet																																				
	Cold		Hot		Flow (l/min)	Temperature T _o (°C)																																			
	Temperature T _c (°C)	Dynamic pressure (MPa) [bar]	Temperature T _h (°C)	Dynamic pressure (MPa) [bar]																																					
shower	(10 to 15)	(0,3±0,02) [3±0,2]	(7± 50) ± 1	(0,3±0,02) [3±0,2]	(12-1)	(38-1)																																			
basin, bidet, sink					(9-1)	(38-1)																																			
bath					(20-1)	(44-1)																																			
13.3.4	Evaluation of results																																								
	<p>Figure 10 shows a typical temperature hysteresis when tested as outlined in 13.3.3, whereas Figure 11 takes a closer look at the temperature range of interest. Draw the (38 + 2) °C line for the upper limit and the (38 – 2) °C line for the lower limit and obtain x1 and x2 as indicated in Figure 11.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Figure 10 — Temperature hysteresis (sensitivity and fidelity)</p> </div> <div style="text-align: center;"> <p>Figure 11 — Temperature hysteresis (sensitivity and fidelity, close-up)</p> </div> </div>																																								

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Clause	Requirement	Result	Verdict
13.3.5	Requirements		
	The minimum linear movement, x1 and x2, of the temperature control device required to obtain a variation of 4 K within the reference range shall be at least 10 mm for wash basins, bidets, sinks and 12 mm for showers. Linear movement is a function of the angle and the maximum radius of the temperature control device. TMVs with special design can be approved in accordance with this standard, if the verified sensitivity meets the requirements of the standard.	Complied	P
13.4	Fidelity		
13.4.3	Procedure		
	See 13.3.3		
13.4.4	Evaluation of results		
	Draw the median of section AB as per Figure 11 and determine section CD resembling the width of the curve at (38) °C.		
13.4.5	Requirements		
	Section CD shown in Figure 11 shall not exceed 1 K.	Complied	P
13.5	Temperature stability		
13.5.1	Temperature Control operation		

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Clause	Requirement	Result	Verdict
13.5.1.3	Procedure		
	a) Starting from full hot determine the reference points in the following sequence: $(38 \pm 0,5) ^\circ\text{C}$, $(36 - 1) ^\circ\text{C}$, $(40 - 1) ^\circ\text{C}$ b) apply and maintain the initial settings shown in Table 8 and allow water to flow until the outlet temperature has stabilized; c) start recording the mixed water temperature versus time; d) within 1 s adjust the temperature control device to read $\vartheta_{\text{mix}} = (36 - 1) ^\circ\text{C}$; e) allow the outlet temperature to stabilize; f) restore the settings in b); g) within 1 s adjust the temperature control device to read $\vartheta_{\text{mix}} = (40 - 1) ^\circ\text{C}$; h) upon temperature stabilization stop recording mixed water temperature versus time.		
13.5.1.5	Requirements		
	The mixed water temperature ϑ_{mix} shall not differ from the set temperatures ϑ_0 for a duration $(t_2 - t_1)$ longer than 1s with an amplitude of more than $\vartheta_x = 3\text{K}$. $t_3 = 5$ s after disturbing the respective equilibrium the mixed water temperature shall not differ by more than 2K from the set temperatures nor oscillate in excess of 1 ϑ PP. NOTE If this is done with single sequential control valves (Type 3) the flow rate will also change i.e. not maintaining Table 8 conditions. K.	Complied	P
13.5.2	Flow rate reduction		
13.5.2.3	Procedure		
	a) Apply and maintain the initial settings shown in Table 8 and allow water to flow until the outlet temperature has stabilized; b) Start recording mixed water temperature versus time. c) Within (5 to 6) s adjust the flow control of the valve under test to deliver 50 % of the flow rate according to a), in case the tested valve has no flow control the outlet pipework A.3 or A.4 shall be used instead. d) Upon temperature stabilization stop recording mixed water temperature versus time.		

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Clause	Requirement	Result	Verdict
13.5.2.5	Requirement		
	After 30 s the mixed water temperature shall not differ from the set temperature by more than 2 K nor oscillate in excess of 1 \varnothing PP.	Complied	P
13.5.3	Cold supply failure and restoration		
13.5.3.2	Procedure		
	a) Apply and maintain the initial settings shown in Table 8 and allow water to flow until the outlet temperature has stabilized; b) within 1 s isolate the cold water supply to the TMV. c) collect the water discharged from the TMV outlet for a period of (5 \pm 0,5) s and measure its volume. d) Continue to collect the water discharged from the TMV in a second vessel for a further period of (30 \pm 0,5) s. e) Re-open the cold water supply within 2 s, after 30 s measure the mixed water temperature. When tested in outlet 2 position, bath shower mixers with automatic diverters shall be artificially held in the outlet 2 position.		
13.5.3.4	Requirement		
	Bath outlets The volume collected in the first period of 5 s shall not exceed 400 ml. The volume collected in the second period of 30 s shall not exceed 500 ml. Upon temperature stabilization after cold supply restoration the outlet temperature shall not differ by more than 2 K from the set temperature \varnothing 0.	-	N/A
	Other outlets The volume collected in the first period of 5 s shall not exceed 200 ml. The volume collected in the second period of 30 s shall not exceed 300 ml. Upon temperature stabilization after cold supply restoration the outlet temperature shall not differ by more than 2 K from the set temperature \varnothing 0.	Complied	P

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Clause	Requirement	Result	Verdict
13.5.4	Supply pressure variation		
13.5.4.2	Procedure		
	a) Apply and maintain the initial settings shown in Table 8 and allow water to flow until the outlet temperature has stabilized; b) Start recording outlet temperature versus time. c) Within 1 s reduce the cold supply pressure to (0,2 + 0,02) MPa [(2 + 0,2/0) bar] and maintain this condition for at least 15 s before restoring the nominal supply pressure under a). d) Allow water to flow for at least 60 s. e) Within 1 s reduce the hot supply pressure to (0,2 + 0,02) MPa [(2 + 0,2/0) bar] and maintain this condition for at least 15 s before restoring the nominal supply pressure under a). f) Allow water to flow for at least 60 s. g) Stop recording outlet temperature versus time		
13.5.4.4	Requirements		
	Bath outlets Upon temperature stabilization the outlet temperature shall not differ by more than 2 K from the set temperature ϑ_0 .	-	N/A
	Other outlets The mixed water temperature ϑ_{mix} shall not differ from the set temperature ϑ_0 with more than 3 K for a duration longer than 1 s ($t_2 - t_1$). $t_3 = 5$ s after disturbing the respective equilibrium (t_0) the mixed water temperature shall not differ by more than 2 K from the set temperatures (ϑ_0) nor oscillate in excess of 1 ϑ PP.	Complied	P

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Clause	Requirement	Result	Verdict
13.5.5	Supply temperature variation		
13.5.5.2	Procedure		
	a) Apply and maintain the initial settings shown in Table 8 and allow water to flow until the outlet temperature has stabilized; b) Start recording outlet temperature versus time. c) Reduce the hot supply temperature by (10 ± 1) °C within 10 s and maintain this condition for at least 30 s. d) Restore the hot supply temperature within 10 s and maintain this condition for 40 s. e) Stop recording outlet temperature versus time.		
13.5.5.4	Requirement		
	Bath outlets $t_3 = 20$ s after restoration the outlet temperature shall not differ by more than 2 K from the set temperature ϑ_0 .	-	N/A
	Other outlets The mixed water temperature ϑ_{mix} shall not differ from the set temperature ϑ_0 for a duration longer than 1 s ($t_2 - t_1$) with an amplitude of more than 3 K. $t_3 = 20$ s after disturbing the respective equilibrium (t_0) the mixed water temperature shall not differ by more than 2 K from the set temperatures (ϑ_0) nor oscillate in excess of 1 ϑ PP.	Complied	P

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Clause	Requirement	Result	Verdict
13.5.6	Temperature Override Stops		
13.5.6.2	Procedure		
	a) Apply and maintain the initial inlet settings shown in Table 8 and allow water to flow until the outlet temperature has stabilized; b) Adjust the temperature control to the override stop and note the temperature and start recording outlet temperature versus time. c) Adjust the temperature control to fully cold and maintain the position for at least for 5 s. d) Within 3 s adjust the temperature control to the override stop. e) Allow water to flow for at least 30 s. f) Repeat steps c) to e) to give a total of 5 results. g) Stop recording outlet temperature versus time.		
13.5.6.4	Requirements before the endurance test		
	After step e), the outlet temperature shall not differ from the temperature override stop setting more than 1 K.	Complied	P
13.5.6.5	Requirements after the endurance test		
	After the endurance test the outlet temperature shall not differ from the initial temperature override stop setting more than 4 K.	Complied	P
14	Pressure resistance		
14.3	Testing of mechanical performance of the thermostatic mixing valve upstream of the obturator in the closed position		
14.3.1	Procedure		
	Gradually apply a static water pressure of (2,5 ± 0,05) MPa [(25 ± 0,5) bar] simultaneously to the two supplies for (60 ± 5) s. The outlet orifice of TMVs without obturator shall be artificially closed.		

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Clause	Requirement	Result	Verdict
14.3.2	Requirement		
	This test shall not cause permanent deformation of the TMV.	Complied	P
14.4	Mechanical behaviour downstream of the obturator – Obturator in the open position		
14.4.1	Procedure		
	a) Connect the TMV as supplied to the test circuit. b) Open the obturator(s) fully. 1) For TMVs with a flow rate regulator fitted apply at the TMV inlet a dynamic water pressure of (0,4 ± 0,02) MPa [(4,0 ± 0,2) bar] and maintain it for (60 ± 5) s. 2) For TMVs without a flow rate regulator apply at the TMV inlet the water pressure needed to give a flow rate of (24 ± 0,24) l/min through TMVs of nominal size 1/2 and a flow rate of (48 ± 0,48) l/min through TMVs of nominal size 3/4 and maintain it for (60 ± 5)s. 3) For TMVs with removable flow rate regulator, the test is carried out both with and without this regulator. c) Check whether there is permanent deformation in any part of the TMV downstream of the obturator.		
14.4.2	Requirement		
	There shall be no permanent deformation in any part of the TMV.	Complied	P
15	Torsional resistance of the operating controls		
15.2.3	Procedure		
	Flow control Gradually apply over a period of 4 s to 6 s and maintain for 5 min a torque of (6 ± 0,6) Nm to the flow control device in the closing direction of travel. Temperature control Gradually apply over a period of 4 s to 6 s and maintain for 5 min a torque of (3 ± 0,5) Nm to the end of the temperature control device both in the direction of cold water and separately in the direction of hot water. Temperature override stop Gradually apply over a period of 4 s to 6 s and maintain for 5 min a torque of (3 ± 0,5) Nm to the temperature control device in the direction of increasing temperature.		
15.2.3.5	Requirement		
	After the test, there shall be no visible deformation on any component or any deterioration in operation.	Complied	P

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Floor 1 & 2, Building 1, Caohejing Hi Tech Park Ju Xin Park, No. 188, Ping Fu Road, Xu Hui District Shanghai 200231, P.R.China

Flammability Lab (Furniture/Toys): Room 602, Building 4, No. 218, Yin Du Road, Xu Hui District, Shanghai 200231, P.R.China

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Clause	Requirement	Result	Verdict
16	Mechanical endurance characteristics		
16.2	Endurance test for single sequential control device		
16.2.3	Procedure		
	a) Connect the TMV to a suitable test apparatus. b) Supply hot water at a temperature of (65 +2/-5) °C and cold water at a temperature of max. 30 °C to the valve under test. c) With the control device in the closed position, adjust the static water pressure of the two supply circuits to (0,4 ± 0,05) MPa [(4 ± 0,5) bar]. d) Subject the single sequential control device to 200 000 on/off cycles. The following procedure constitutes only one cycle: 1) open to at least 75 % of the total opening movement starting from the off-position; 2) dwell in the open position for 1 s to 2 s; 3) close completely with a maximum torque of 1,5 Nm and maintain this torque for time t < 0,4 s; 4) retain the closed position for a total dwell time of 2 s to 3 s.		
16.2.4	Requirement		
	During the test no failure of any component part shall occur. After 50 000 on/off cycles, the thermal performance shall comply with Table 7, sequence 5. The requirements for the thermal performance test shall be relaxed by 1 K. After 200 000 on/off cycles, the leaktightness of the TMV shall comply with 12.2 to 12.4.	-	N/A
16.3	Endurance test for on/off flow control device operated by rotating the control handle		
16.3.2	General		
	The test method as described in EN 200 shall be followed.	-	N/A

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Clause	Requirement	Result	Verdict
16.4	Endurance test for on/off flow control device, combined with diverter mechanism		
16.4.3	Procedure		
	a) Connect the TMV to the test apparatus. b) Supply hot water at a temperature of (65 +2/-5) °C and cold water at a temperature of max. 30 °C to the valve under test. c) Adjust the static water pressure of both hot and cold circuits to a value of (0,4 ± 0,05) MPa [(4 ± 0,5) bar]. d) Set the mixed water temperature to (38 ± 2) °C. e) In the flow-to-outlet-1 and flow-to-outlet-2 mode, adjust the flow rate to (6 ± 1) l/min by restricting the outlets. f) Subject the on/off control device to 100 000 cycles each. The following procedure constitutes only one cycle: 1) open flow to outlet 1 (80 ± 5) % with a maximum torque of 1,5 Nm; 2) dwell in this position for 1 to 2 s; 3) move control to off position with no flow and retain this position for a dwell time of 2 s to 3 s; 4) open flow to outlet 2 (80 ± 5) % with a maximum torque of 1,5 Nm; 5) dwell in this position for 1 s to 2 s; 6) move control to off position with no flow and retain this position for a dwell time of 2 s to 3 s.		
16.4.4	Requirement		
	During the test no failure of any component part shall occur. The maximum torque shall not exceed 1,5 Nm. After 100 000 on/off cycles, verify the leaktightness of the TMV by the application of the test given in 12.2 to 12.4.	Complied	P

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Clause	Requirement	Result	Verdict
16.5	Endurance test for other on-off flow control device		
16.5.3	Procedure		
	a) Connect the TMV to a suitable test apparatus. b) Supply hot water at a temperature of (65 +2/-5) °C and cold water at a temperature of max. 30 °C to the valve under test. c) With the TMV closed and the temperature set to (38 ± 2) °C, adjust the static water pressure of both hot and cold circuits to a value of (0,4 ± 0,05) MPa [(4 ± 0,5) bar]. d) Subject the on/off flow control device to 200 000 on/off cycles being: 1) open to (80 ± 5) % of the total opening movement; 2) dwell in the open position for 1 s to 2 s; 3) close completely with a maximum torque of 1,5 Nm where applicable and maintain this torque for t < 0,4 s; 4) retain the closed position for a total dwell time of 2 s to 3 s.		
16.5.4	Requirement		
	During the test no failure of any component part shall occur. After 200 000 on/off cycles, verify the leaktightness of the TMV by the application of the test given in 12.2 to 12.4.	-	N/A

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Clause	Requirement	Result	Verdict
16.6	Mechanical endurance of diverters of thermostatic mixing valves		
16.6.2.3	Procedure		
	<p>Manual diverter</p> <p>a) Connect the TMV to the test apparatus.</p> <p>b) Supply hot water at a temperature of (65 +2/-5) °C and cold water at a temperature of max. 30 °C to the valve under test.</p> <p>c) Adjust the static water pressure of both hot and cold circuits to a value of (0,4 ± 0,05) MPa [(4 ± 0,5) bar].</p> <p>d) Set the temperature to (38 ± 2) °C.</p> <p>e) Adjust the flow rate at the outlet 1 to 4 l/min to 6 l/min (0,066 l/s to 0,100 l/s). This flow adjustment shall be made by means of the independently operating on/off control device or in the absence of this device by partially obstructing the outlet.</p> <p>f) subject the diverter to a test of 30 000 cycles, each comprising a return movement between the extreme positions.</p> <p>Diverter with automatic return</p> <p>a) Connect the TMV to the test apparatus.</p> <p>b) Connect the drive device to the diverter operating member by means of a flexible component.</p> <p>c) With the TMV closed, adjust the water pressure on the supply circuits to a value of (0,4 ± 0,05) MPa [(4 ± 0,5) bar].</p> <p>d) With the temperature control device set to (38 ± 2) °C adjust the flow rate at the outlet 2 to 0,066 l/s to 0,100 l/s (4 l/min to 6 l/min). This flow adjustment shall be made by means of the independently operating on/off control device or in the absence of this device by partially obstructing the outlet.</p> <p>e) Subject the diverter to an endurance test of 30 000 cycles, one cycle is being defined as follows: 1) with the diverter in the outlet 1 position, allow water to flow through the outlet 1 for (5 ± 0,5) s; 2) move the diverter to the outlet 2 position; 3) allow water to flow through the outlet 2 for (5 ± 0,5) s; 4) use the quick action valve to cut off the supply to the TMV, allowing the diverter to return to the outlet 1 position, and then reopen the supply.</p>		

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Clause	Requirement	Result	Verdict
16.6.3	Requirement		
	During the test, no failure of any component part shall occur. At the end of the test, check the leaktightness: a) in the conditions specified in 12.5 for manual diverters; b) in the conditions specified in 12.6 for diverters with automatic return.	Complied	P
16.7	Mechanical endurance of swivel spouts		
16.7.2.3	Procedure		
	a) Connect the TMV to the test apparatus and connect the inlets to the supply circuit; b) with the TMV closed, adjust the static water pressure to (0,4 ± 0,05) MPa [(4 ± 0,5) bar]; c) open the TMV fully and adjust the flow rate to (6 ± 1) l/min by restricting the spout 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 ± 10)° in both directions or, if there is a stop before 120°, move (90-10) % of the available travel without reaching the stops.		
16.7.3	Requirements		
	During the test 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. At the end of the test the spout shall be leaktight under the conditions given in 12.4	-	N/A

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Clause	Requirement	Result	Verdict
16.8	Thermal Element		
16.8.2	Temperature adjustable valves (Type 1, 2, 4)		
16.8.2.2	Procedure		
	a) Connect the valve to the test rig and deactivate the override stop (if fitted). b) With the TMV closed, adjust the water pressure on the supply circuits to a value of (0,4 ± 0,05) MPa [(4 ± 0,5) bar]. c) Supply hot water at a temperature of (65 +2/-5) °C and cold water at a temperature of max. 30 °C to the valve under test. d) With the temperature control device set to full hot position adjust the flow rate at the outlet 1 to 4 l/min to 6 l/min. This flow adjustment shall be made by means of the independently operating on/off control device or in the absence of this device by partially obstructing the outlet. e) Subject the temperature controls to 50 000 cycles (one cycle is the movement from starting position to the end position and returning to the starting position) by moving the temperature control (80 to 90) % of the available travel without reaching		
16.8.2.3	Requirements		
	During the test there shall be no failure of any component part. The torque to operate the control shall not exceed 1,5 Nm. Upon test completion the valve shall undergo leaktightness 12.2, 12.3 and thermal performance testing as per 13.5.3 and 13.5.6.	Complied (Type 2)	P
16.8.3	Temperature set valves (Type 5)	-	N/A
16.8.4	Other valves with special control devices (Type 6)	-	N/A
17	Acoustic characteristics	Lap: 18 dB(A) Acoustic group I	-

Abbreviations: P = Pass N/A = Not Applicable

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Flammability Lab (Furniture/Toys): Room 602, Building 4, No. 218, Yin Du Road, Xu Hui District, Shanghai 200231, P.R.China

电话(T): +(8621) 24228200/传真(F): +(8621) 6855 6812 /网址(W): ul.com

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