

TEST REPORT **EN1111** **Sanitary tapware – Thermostatic mixing valves (PN 10) – General technical specifications**

Report Reference No.: 180424199GZU-002

Tested by (name and signature): Felix Li *Felix Li*
Project Engineer

Approved by (name and signature) ...: Bink Xu *Bink Xu*
Senior Project Engineer

Date of issue.....: July 27, 2018

Date of revised issue.....: -----

Contents: Total test report 23 pages including:
Report text: 19 pages
Appendix A for tested product photos: 1 page
Appendix B for Dimensional characteristics: 1 page
Appendix C for Determination of flow rate: 1 page
Appendix D for Revision Page: 1 page

Testing Laboratory name: Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

Address: Room 4103 & 4203, No. 63, Punan Road, Huangpu District, Guangzhou, Guangdong Province, China

Applicant's name.....: KAIPING HIMARK SANITARY WARE CO., LTD.

Address: NO. 6 SHUI KOU JINSHAN ROAD SHUI KOU TOWN KAIPING, GUANGDONG CHINA

Test specification:

Standard.....: EN 1111: 2017 (E)

Non-standard test method.....: N/A

Test Report Form No......: TTRF_EN 1111_b

TTRF Originator: Intertek Testing Services Shenzhen Ltd. Guangzhou Branch

Master TTRF: Dated 2018-5-25

Test item description: Thermostatic shower mixer

Trade Mark: —

Model and/or type reference: See general product information of page 2

Manufacturer: KAIPING HIMARK SANITARY WARE CO., LTD.

Rating(s): See general product information of page 2

Summary of testing:

The submitted samples were tested and found to **COMPLY WITH** applicable requirements of EN 1111: 2017 except clause 5, 6, 7, 8.1 and 17.

Possible test case verdicts:

- test case does not apply to the test object.....: N/A
- test object does meet the requirement.....: P(Pass)
- test object does not meet the requirement.....: F(Fail)

Testing

Date of receipt of test item: April 24, 2018

Date (s) of performance of tests: April 24, 2018 to July 6, 2018

General remarks:

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"(see remark #)" refers to a remark appended to the report.

"(see Appendix #)" refers to an appendix appended to the report.

The clause which indicated with "*" is subcontracting item.

Throughout this report a comma (point) is used as the decimal separator.

When determining the test result, measurement uncertainty has been considered.

General product information:

Item No.	Model No.	Product Description	Coatings	Cartridge	Remark
1	1441200	Thermostatic rain shower mixer	chrome	thermostatic cartridge with diverter cartridge	Covered Model
2	1441239	Thermostatic rain shower mixer	black painting	thermostatic cartridge with diverter cartridge	Covered Model
3	1441231/ 1441207/ 1441201	Thermostatic rain shower mixer	gold/ brushed nickel	thermostatic cartridge with diverter cartridge	Covered Model
4	1445000/ 1445001/ 1445039/ 1445031	Thermostatic rain shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
5	1440900.T45/ 1440900/ 1440901	Thermostatic rain shower mixer	chrome/ brushed nickel	thermostatic cartridge with diverter cartridge	Test Model
6	1440939.T43	Thermostatic rain shower mixer	black painting	thermostatic cartridge with diverter cartridge	Covered Model
7	1440931.T803/ 1440907	Thermostatic rain shower mixer	gold	thermostatic cartridge with diverter cartridge	Covered Model
8	1445300/ 1445301/ 1445339/ 1445331	Thermostatic rain shower mixe	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
9	1442300/ 1442301/ 1442339/ 1442331	Thermostatic rain shower mixe	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
10	1442100/ 1442101/ 1442139/ 1442131	Thermostatic rain shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model

11	1445100/ 1445101/ 1445139/ 1445131	Thermostatic rain shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
12	1441100/ 1441101/ 1441139/ 1441131	Thermostatic rain shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Test Model
13	1442000	Thermostatic rain shower mixer	chrome	thermostatic cartridge with diverter cartridge	Covered Model
14	1442001/ 1442039/ 1442031	Thermostatic rain shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
15	1441300/ 1441301/ 1441339/ 1441331	Thermostatic rain shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
16	1441500/ 1441501/ 1441539/ 1441531	Thermostatic rain shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
17	1442900/ 1442901/ 1442939/ 1442931	Thermostatic rain shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
18	1441600.T899	Thermostatic rain shower mixer	chrome/ brushed nickel	thermostatic cartridge with diverter cartridge	Covered Model
19	1441700.T899	Thermostatic rain shower mixer	chrome/ brushed nickel	thermostatic cartridge with diverter cartridge	Covered Model
20	1441700/ 1441701/ 1441739/ 1441731	Thermostatic rain shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
21	1443400/ 1443401/ 1443413/ 1443439	Thermostatic rain shower mixer	chrome/ brushed nickel/ white painting/ black painting	thermostatic cartridge with diverter cartridge	Covered Model
22	1443415/ 1443416/ 1443431/ 1443407	Thermostatic rain shower mixer	ORB/ Rose gold/ gold	thermostatic cartridge with diverter cartridge	Covered Model
23	1445200/ 1445201/ 1445213/ 1445239	Thermostatic rain shower mixer	chrome/ brushed nickel/ white painting/ black painting	thermostatic cartridge with diverter cartridge	Covered Model
24	1445207/ 1445231/ 1445216	Thermostatic rain shower mixer	gold/ rose gold	thermostatic cartridge with diverter cartridge	Covered Model
25	1424600/ 1424601/ 1424639/ 1424631	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
26	1424500/ 1424501/ 1424539/ 1424531	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model

27	1424800/ 1424801/ 1424839/ 1424831	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Test Model
28	1424700/ 1424701/ 1424739/ 1424731	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
29	1424900/ 1424901/ 1424939/ 1424931	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Test Model
30	1425100/ 1425101/ 1425139/ 1425131	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
31	1425200/ 1425201/ 1425239/ 1425231	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
32	1426200/ 1426201/ 1426239/ 1426231	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
33	1426100/ 1426101/ 1426139/ 1426131	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
34	1426000/ 1426001/ 1426039/ 1426031	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
35	1426300/ 1426301/ 1426339/ 1426331	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
36	1426400/ 1426401/ 1426439/ 1426431	Thermostaic shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
37	65560900/ 65560901/ 65560950/ 65560931	Wall-mounted thermostatic shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
38	65561000/ 65561001/ 65561050/ 65561031	Wall-mounted thermostatic shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
39	65561100/ 65561101/ 65561150/ 65561131	Wall-mounted thermostatic shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Test Model
40	65561200/ 65561101/ 65561150/ 65561131	Wall-mounted thermostatic shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model

41	1444900/ 5090512/ 1444901	Thermostatic rain shower faucet	chrome/ brushed nickel	thermostatic cartridge with diverter cartridge	Covered Model
42	1444938/ 5090513/ 1444913	Thermostatic rain shower faucet	white painting	thermostatic cartridge with diverter cartridge	Covered Model
43	1444939/ 5090514	Thermostatic rain shower faucet	black painting	thermostatic cartridge with diverter cartridge	Covered Model
44	1444800/ 5090517/ 1444801	Thermostatic rain shower faucet	chrome/ brushed nickel	thermostatic cartridge with diverter cartridge	Covered Model
45	1444831/ 5090516/ 1444807	Thermostatic rain shower faucet	gold	thermostatic cartridge with diverter cartridge	Covered Model
46	1441800/ 1441801/ 1441839/ 1441831	Thermostatic rain shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
47	1441900/ 1441901/ 1441939/ 1441931	Thermostatic rain shower faucet	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
48	1425900/ 1425901/ 1425931/ 5090401	Thermostatic shower mixer	chrome/ brushed nickel/ gold	thermostatic cartridge with diverter cartridge	Covered Model
49	1425938/ 5090402/ 1425913	Thermostatic shower mixer	white painting	thermostatic cartridge with diverter cartridge	Covered Model
50	1425939/ 5090403	Thermostatic shower mixer	black painting	thermostatic cartridge with diverter cartridge	Covered Model
51	1425800	Thermostatic shower mixer	chrome/ brushed nickel	thermostatic cartridge with diverter cartridge	Tested Model
52	1425801/ 1425839/ 1425831	Thermostatic shower mixer	brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
53	1421900/ 5090404	Thermostatic shower mixer	chrome/ brushed nickel	thermostatic cartridge with diverter cartridge	Covered Model
54	1421938/ 5090405/ 1421901/ 1421931	Thermostatic shower mixer	white painting/ brushed nickel/ gold	thermostatic cartridge with diverter cartridge	Covered Model
55	1421939/ 5090406	Thermostatic shower mixer	black painting	thermostatic cartridge with diverter cartridge	Covered Model
56	1421800/ 1421801/ 1421839/ 1421831	Thermostatic shower mixer	chrome/ brushed nickel/ black painting/ gold	thermostatic cartridge with diverter cartridge	Covered Model
57	1421838/ 1421813	Thermostatic shower mixer	white painting	thermostatic cartridge with diverter cartridge	Covered Model

Note: These test samples have same thermostatic cartridge and diverter cartridge, so chose model 1424900/ 1424901/ 1424939/ 1424931 to test clause 13.3, 13.4, 13.5 and 16.

EN1111: 2017																								
Clause	Requirement - Test	Result - Remark	Verdict																					
5	Classification: Type 1- Single control; Type 2- Dual control; Type 3- Single sequential control; Type 4- TMVs without flow control device; Type 5- Preset: valves not adjustable by the user of a sanitary appliance; Type 6- Other.....:	Type 2- Dual control	—																					
6	Designation - its nominal inlet size, with or without diverter - type of body - type of outlet - the sanitary appliance on which it shall be used - the method of mounting - its acoustic group and flow rate classes - the reference to this standard (EN 1111).	See below table	—																					
	<table><tr><th>Item No.</th><th>Model No.</th><th>Product Description</th></tr><tr><td>1</td><td>1440900.T45/ 1440900/ 1440901</td><td>Thermostatic shower mixer 1/2, with diverter, visible body, fixed outlet, two outlets, one was hand shower, another was used for showerhead, mounting on vertical surfaces, EN 1111.</td></tr><tr><td>2</td><td>1441100/ 1441101/ 1441139/ 1441131</td><td>Thermostatic shower mixer 1/2, with diverter, visible body, fixed outlet, two outlets, one was hand shower, another was used for showerhead, mounting on vertical surfaces, EN 1111.</td></tr><tr><td>3</td><td>1424800/ 1424801/ 1424839/ 1424831</td><td>Thermostatic shower mixer 1/2, without diverter, visible body, fixed outlet, one outlet, used for shower, mounting on vertical surfaces, EN 1111.</td></tr><tr><td>4</td><td>1424900/ 1424901/ 1424939/ 1424931</td><td>Thermostatic shower mixer 1/2, with diverter, visible body, fixed outlet, two outlets, one was aerator, another was used for shower, mounting on vertical surfaces, EN 1111.</td></tr><tr><td>5</td><td>65561100/ 65561101/ 65561150/ 65561131</td><td>Thermostatic shower mixer 1/2, with diverter, concealed body, fixed outlet, one was aerator, another was used for shower, mounting on vertical surfaces, EN 1111.</td></tr><tr><td>6</td><td>1425800</td><td>Thermostatic shower mixer 1/2, with diverter, visible body, fixed outlet, two outlets, one was aerator, another was used for shower, mounting on vertical surfaces, EN 1111.</td></tr></table>	Item No.	Model No.	Product Description	1	1440900.T45/ 1440900/ 1440901	Thermostatic shower mixer 1/2, with diverter, visible body, fixed outlet, two outlets, one was hand shower, another was used for showerhead, mounting on vertical surfaces, EN 1111.	2	1441100/ 1441101/ 1441139/ 1441131	Thermostatic shower mixer 1/2, with diverter, visible body, fixed outlet, two outlets, one was hand shower, another was used for showerhead, mounting on vertical surfaces, EN 1111.	3	1424800/ 1424801/ 1424839/ 1424831	Thermostatic shower mixer 1/2, without diverter, visible body, fixed outlet, one outlet, used for shower, mounting on vertical surfaces, EN 1111.	4	1424900/ 1424901/ 1424939/ 1424931	Thermostatic shower mixer 1/2, with diverter, visible body, fixed outlet, two outlets, one was aerator, another was used for shower, mounting on vertical surfaces, EN 1111.	5	65561100/ 65561101/ 65561150/ 65561131	Thermostatic shower mixer 1/2, with diverter, concealed body, fixed outlet, one was aerator, another was used for shower, mounting on vertical surfaces, EN 1111.	6	1425800	Thermostatic shower mixer 1/2, with diverter, visible body, fixed outlet, two outlets, one was aerator, another was used for shower, mounting on vertical surfaces, EN 1111.		
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	3	1424800/ 1424801/ 1424839/ 1424831	Thermostatic shower mixer 1/2, without diverter, visible body, fixed outlet, one outlet, used for shower, mounting on vertical surfaces, EN 1111.																					
	4	1424900/ 1424901/ 1424939/ 1424931	Thermostatic shower mixer 1/2, with diverter, visible body, fixed outlet, two outlets, one was aerator, another was used for shower, mounting on vertical surfaces, EN 1111.																					
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EN1111: 2017			
Clause	Requirement - Test	Result - Remark	Verdict
7	Marking/Identification		
7.1	<p>Marking</p> <p>TMVs shall be permanently and legibly marked with:</p> <p>a) the manufacturer's or agent's name or identification on the body or handle;</p> <p>b) the acoustic group and flow rate class or classes if classified.</p> <p>A bath/shower mixer shall indicate both flow rate classes (the first for the bath outlet (outlet 1) and the second for the shower outlet (outlet 2)).</p> <p>For water saving mixing valves, appropriate information to installers and users shall be provided.</p>	Not Check	—
7.2	<p>Identification</p> <p>The temperature control device for the valve shall be identified by means of a scale or symbols or colours or any combination thereof.</p> <p>TMVs shall be legibly marked to indicate cold / hot inlets.</p>	Not Check	—
8	Materials		
8.1	<p>Chemical and hygienic characteristics</p> <p>All materials coming into contact with water intended for human consumption shall present no health risk nor cause any change to the water in terms of quality, appearances, smell or taste.</p>	Products shall meet the requirement of national regulations on chemical and hygienic characteristics.	—
8.2	<p>Exposed surface condition and quality of coating</p> <p>Exposed chromium plated surfaces and Ni-Cr coatings shall comply with the requirements of EN 248.</p>	No any blister on exposed surface after the test.	P
9	Dimensional characteristics		
9.1	<p>General remarks</p> <p>The design and construction of components without defined dimensions permits various design solutions to be adopted by the manufacturer. Special cases are covered in 9.5.</p>	Complied	P

EN1111: 2017					
Clause	Requirement - Test			Result - Remark	Verdict
9.2	Inlet dimensions			Refer to Appendix B	P
	Dimensions (mm)	Requirement (mm)			
	Shank, union, captive nut				
	A	G1/2 B			
	A1	G3/4 B			
	A2	9min			
	A3	15min			
	Connecting centres				
	G	150±1	2-hole wall mounted		
	G1	140 to 160			
	Ga	150±1	Multi-hole combination TMV		
	G2	200 ± 3.5			
	G3	180 ± 5			
	Inlet connections				
	N1	12,3+0,2	Type A		
	N2	5min			
	N1	15,2±0,05	Type B 30° chamfer/flat 0,3		
	N2	13min			
	N1	14,7+0,3	Type C		
	N2	6,4min			
	N1	19,9±0,3	Type C		
	N2	6,4min			
	T	Plain end Ø10 or 12 or 15 or G1/2 or 3/8 male or female			
	U	350min			
9.3	Outlet dimension			Refer to Appendix B	P
	Dimensions (mm)	Requirement (mm)			
	E	25min	Outlet orifice — Lowest point — All TMVs and outlets		
	D1	90min	Horizontal mounted combination TMV		
	D3	115min	Wall mounted combination TMV Separate spout		
	A	G1/2B	Remote outlet		
	A1	G3/4 B			
	A4	7,5min	Outlet 2		
	A5	9,5min			

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Clause	Requirement - Test	Result - Remark	Verdict																										
9.4	Mounting dimensions		N/A																										
	<table><tr><td>Dimensions (mm)</td><td>Requirement (mm)</td></tr><tr><td colspan="2">Shank dimension</td></tr><tr><td>H1</td><td>24max</td></tr><tr><td>H2</td><td>29max</td></tr><tr><td>H3</td><td>33,5max</td></tr><tr><td colspan="2">Base or flange</td></tr><tr><td>J1</td><td>50min</td></tr><tr><td>J2</td><td>45min</td></tr><tr><td>J3</td><td>50max</td></tr><tr><td>V</td><td>32max</td></tr><tr><td>V1</td><td>35max</td></tr><tr><td>V3</td><td>47max</td></tr><tr><td>L</td><td>Dimension which allows TMVs and outlets to be fitted on to supports of thickness between 1 mm and 18 mm</td></tr></table>			Dimensions (mm)	Requirement (mm)	Shank dimension		H1	24max	H2	29max	H3	33,5max	Base or flange		J1	50min	J2	45min	J3	50max	V	32max	V1	35max	V3	47max	L	Dimension which allows TMVs and outlets to be fitted on to supports of thickness between 1 mm and 18 mm
	Dimensions (mm)	Requirement (mm)																											
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L	Dimension which allows TMVs and outlets to be fitted on to supports of thickness between 1 mm and 18 mm																												
9.5	Special cases		N/A																										
	TMVs intended for special applications, e.g. for installation on sanitary appliances not conforming with European Standards, or where dimensional interchangeability is not a requirement can incorporate dimensional deviations provided that: - all other requirements of this standard are satisfied; - secure fixing to mounting surface is provided with all fixing holes covered; - thread connection to the supply pipes comply with EN ISO 228-1; - the air gap $E \geq 25$ mm, or a backflow prevention device is necessary in accordance with EN 1717; - the D1/D3 dimension shall be coordinated with the sanitary appliance; - The manufacturer's literature including the installation instructions supplied with the TMV shall indicate clearly that the TMV is for special applications.																												
	Flexible hoses for outlet 2			Refer to Intertek test report 180424199GZU-004	P																								
	Connecting dimensions for flexible hoses for outlet 2 shall be as specified in EN 1113.																												
	9.7	Outlet 2		Refer to Intertek test report 180424199GZU-003	P																								
		Connecting dimensions for outlet 2 shall be as specified in EN 1112.																											

EN1111: 2017			
Clause	Requirement - Test	Result - Remark	Verdict
10	<p>Backflow protection</p> <p>Backflow protection shall be provided using appropriate devices referenced in EN 1717.</p> <p>In the case of a diverter with automatic return being considered to provide backflow prevention, it shall comply with the requirements of EN 14506.</p> <p>Check valves shall comply with EN 13959.</p> <p>In the case of sanitary tapware with extractable outlets, backflow prevention shall be in compliance with EN 16145.</p>	<p>Complied</p> <p>Except model 65561100/ 65561101/ 65561150/ 65561131, other models each inlet have a check valve and the hand shower of model 1440900.T45/ 1440900/ 1440901 and 1441100/ 1441101/ 1441139/ 1441131 have a check valve on the inlet.</p>	P
11	<p>Test sequence</p> <p>The samples shall be subjected to the test sequence shown in Table 7.</p>	Followed	P
12	Leaktightness		
12.2	<p>Leaktightness of the obturator and upstream thereof</p> <p>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 $(1,6 \pm 0,05)$ MPa [$(16 \pm 0,5)$ bar] to the TMV for (60 ± 5) s and adjust its temperature control over the full range.</p> <p>Requirements There shall be no leakage.</p>	No leakage or seepage	P
12.3	<p>Cross-flow between inlets</p> <p>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.</p> <p>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.</p>	No cross-flow and no leakage or seepage.	P
12.4	<p>Leaktightness downstream of the obturator</p> <p>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 $(0,02 \pm$</p>	No leakage or seepage	P

EN1111: 2017			
Clause	Requirement - Test	Result - Remark	Verdict
	0,002) MPa [(0,2 ± 0,02) bar] and maintain it for (60 ± 5) s Requirements There shall be no leakage. Valves incorporating diverters shall subsequently either be subjected to 12.5 or 12.6 as applicable.		

EN1111: 2017			
Clause	Requirement - Test	Result - Remark	Verdict
12.5	<p>Leaktightness of manually operated diverter</p> <p>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 $(0,4 \pm 0,02)$ MPa [$(4 \pm 0,2)$ 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 $(0,02 \pm 0,002)$ MPa [$(0,2 \pm 0,02)$ 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 $(0,4 \pm 0,02)$ MPa [$(4 \pm 0,2)$ 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 $(0,02 \pm 0,002)$ MPa [$(0,2 \pm 0,02)$ bar] and maintain for (60 ± 5) s. Check that leaktightness is obtained on the outlet 2.</p> <p>Requirement For the duration of the test there shall be no leakage at the outlet points indicated.</p>	There was no leakage at the outlet points indicated.	P
12.6	<p>Leaktightness of the thermostatic mixing valve diverter with automatic return</p> <p>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 $(0,05 \pm 0,005)$ MPa [$(0,5 \pm 0,05)$ bar] for (60 ± 5) s. Check that leaktightness is obtained on the outlet 2.</p> <p>Requirement For the duration of the test there shall be no leakage.</p>		N/A
13	Performance		

EN1111: 2017															
Clause	Requirement - Test	Result - Remark	Verdict												
13.2	<p>Determination of flow rate</p> <p>To determine the flow rate of the TMV within a temperature range of (34 to 44) °C. Where the TMV has more than one outlet, each shall comply with the flow rate requirements.</p> <p>Requirements</p> <table><caption>Table 9 — Flow rates according to application</caption><thead><tr><th>Application of mixing valve</th><th>Requirement</th></tr></thead><tbody><tr><td>Basin, bidet, sink (with water saving)</td><td>(4,0 to 9,0) l/min</td></tr><tr><td>shower (with water saving)</td><td>(4,0 to 12,0) l/min</td></tr><tr><td>Basin, bidet, sink (without water saving)</td><td>min. 9,0 l/min (sink min. 9,0 l/min throughout the full temperature range)</td></tr><tr><td>shower (without water saving)</td><td>min. 12,0 l/min</td></tr><tr><td>Bath</td><td>min. 20,0 l/min</td></tr></tbody></table>	Application of mixing valve	Requirement	Basin, bidet, sink (with water saving)	(4,0 to 9,0) l/min	shower (with water saving)	(4,0 to 12,0) l/min	Basin, bidet, sink (without water saving)	min. 9,0 l/min (sink min. 9,0 l/min throughout the full temperature range)	shower (without water saving)	min. 12,0 l/min	Bath	min. 20,0 l/min	Refer to Appendix C	P
Application of mixing valve	Requirement														
Basin, bidet, sink (with water saving)	(4,0 to 9,0) l/min														
shower (with water saving)	(4,0 to 12,0) l/min														
Basin, bidet, sink (without water saving)	min. 9,0 l/min (sink min. 9,0 l/min throughout the full temperature range)														
shower (without water saving)	min. 12,0 l/min														
Bath	min. 20,0 l/min														
13.3	<p>Sensitivity</p> <p>To determine the sensitivity of the movement of the temperature control device within a reference range. Other device control systems (e.g. push-buttons, touch screens, etc.) shall be tested by a method that ensures the correlation between outlet temperature and control device movement can be suitably recorded.</p> <p>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.</p> <p>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.</p>	<p>Model 1424900/ 1424901/ 1424939/ 1424931</p> <p>Line movement: 16.2mm</p>	P												
13.4	<p>Fidelity</p> <p>To verify the certainty of the 38 °C position of the temperature control device after it has been varied over its full temperature range.</p> <p>Section CD shown in Figure 11 shall not exceed 1 K.</p>	<p>Model 1424900/ 1424901/ 1424939/ 1424931</p> <p>CD value: 0.3°C</p>	P												
13.5	Temperature stability														
13.5.1	<p>Temperature control operation</p> <p>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 $\vartheta_x = 3K$.</p> <p>$t_3 = 5$ 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}.</p>	<p>Model 1424900/ 1424901/ 1424939/ 1424931</p> <p>Set temperature $\vartheta_0 = 38^{\circ}C$ Temperature control $\vartheta_{mix}=36^{\circ}C$ $t_{v0} = t_2 - t_1 = 0s$ $\Delta \vartheta = \vartheta_{t3} - \vartheta_0 = 0.14^{\circ}C < 1 \vartheta_{PP}$</p> <p>Temperature control $\vartheta_{mix}=40^{\circ}C$ $t_{v0} = t_2 - t_1 = 0s$ $\Delta \vartheta = \vartheta_{t3} - \vartheta_0 = 0.12^{\circ}C$ Oscillate $< 1 \vartheta_{PP}$</p>	P												

EN1111: 2017			
Clause	Requirement - Test	Result - Remark	Verdict
13.5.2	<p>Flow rate reduction</p> <p>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.</p> <p>Requirements 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 ϑ_{PP}.</p>	<p>Model 1424900/ 1424901/ 1424939/ 1424931 Set temperature $\vartheta_0 = 38^{\circ}\text{C}$ $\Delta \vartheta = \vartheta_{t3} - \vartheta_0 = 0.35^{\circ}\text{C}$ Oscillate < 1 ϑ_{PP}</p>	P
13.5.3	<p>Cold supply failure and restoration</p> <p>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.</p> <p>Requirements: 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 ϑ_0.</p> <p>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 ϑ_0.</p>	<p>Model 1424900/ 1424901/ 1424939/ 1424931 Set temperature: 38.0$^{\circ}\text{C}$</p> <p>Bath outlets: For 5 seconds: Collected water volume: 80 ml For 30 seconds: Collected water volume: 0 ml</p> <p>$\Delta T = \text{Outlet temperature} - \text{Set temperature} = 1.73\text{K}$</p> <p>Other outlets For 5 seconds: Collected water volume: 68 ml For 30 seconds: Collected water volume: 0ml</p> <p>$\Delta T = \text{Outlet temperature} - \text{Set temperature} = 1.70\text{K}$</p>	P

EN1111: 2017			
Clause	Requirement - Test	Result - Remark	Verdict
13.5.4	<p>Supply pressure variation</p> <p>a) Apply and maintain the initial settings shown in Table 8 and allow water to flow until the outlet temperature has stabilized;</p> <p>b) Start recording outlet temperature versus time.</p> <p>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).</p> <p>d) Allow water to flow for at least 60 s.</p> <p>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).</p> <p>f) Allow water to flow for at least 60 s.</p> <p>g) Stop recording outlet temperature versus time.</p> <p>Requirements</p> <p>Bath outlets</p> <p>Upon temperature stabilization the outlet temperature shall not differ by more than 2 K from the set temperature ϑ_0.</p> <p>Other outlets</p> <p>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}.</p>	<p>Model 1424900/ 1424901/ 1424939/ 1424931</p> <p>Set temperature: 38.0°C</p> <p>Reduce cold supply pressure:</p> <p>Bath outlets: $\Delta \vartheta = \vartheta_t - \vartheta_0 = 0.24^\circ\text{C}$</p> <p>Other outlets:</p> <p>$t_{v0} = t_2 - t_1 = 0\text{s}$</p> <p>$\Delta \vartheta = \vartheta_t - \vartheta_0 = 1.91^\circ\text{C}$</p> <p>Oscillate < 1 ϑ_{PP}</p> <p>Reduce hot supply pressure:</p> <p>Bath outlets: $\Delta \vartheta = \vartheta_t - \vartheta_0 = 0.22^\circ\text{C}$</p> <p>Other outlets:</p> <p>$t_{v0} = t_2 - t_1 = 0\text{s}$</p> <p>$\Delta \vartheta = \vartheta_t - \vartheta_0 = 1.76^\circ\text{C}$</p> <p>Oscillate < 1 ϑ_{PP}</p>	P

EN1111: 2017			
Clause	Requirement - Test	Result - Remark	Verdict
13.5.5	<p>Supply temperature variation</p> <p>a) Apply and maintain the initial settings shown in Table 8 and allow water to flow until the outlet temperature has stabilized;</p> <p>b) Start recording outlet temperature versus time.</p> <p>c) Reduce the hot supply temperature by $(10 \pm 1) ^\circ\text{C}$ within 10 s and maintain this condition for at least 30 s.</p> <p>d) Restore the hot supply temperature within 10 s and maintain this condition for 40 s.</p> <p>e) Stop recording outlet temperature versus time.</p> <p>Requirements</p> <p>Bath outlets</p> <p>$t_3 = 20$ s after restoration the outlet temperature shall not differ by more than 2 K from the set temperature ϑ_0.</p> <p>Other outlets</p> <p>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.</p> <p>$t_3 = 20$ 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 $1 \vartheta_{\text{PP}}$.</p>	<p>Model 1424900/ 1424901/ 1424939/ 1424931</p> <p>Set temperature: 38.0°C</p> <p>Bath outlets: $\Delta \vartheta = \vartheta_{t3} - \vartheta_0 = 1.0^\circ\text{C}$</p> <p>Other outlets:</p> <p>$t_{v0} = t_2 - t_1 = 0\text{s}$</p> <p>$\Delta \vartheta = \vartheta_{t3} - \vartheta_0 = 0.16^\circ\text{C}$</p> <p>Oscillate $< 1 \vartheta_{\text{PP}}$</p>	P
13.5.6	<p>Temperature Override Stops</p> <p>a) Apply and maintain the initial inlet settings shown in Table 8 and allow water to flow until the outlet temperature has stabilized;</p> <p>b) Adjust the temperature control to the override stop and note the temperature and start recording outlet temperature versus time.</p> <p>c) Adjust the temperature control to fully cold and maintain the position for at least for 5 s.</p> <p>d) Within 3 s adjust the temperature control to the override stop.</p> <p>e) Allow water to flow for at least 30 s.</p> <p>f) Repeat steps c) to e) to give a total of 5 results.</p> <p>g) Stop recording outlet temperature versus time.</p> <p>Requirements before the endurance test</p> <p>After step e), the outlet temperature shall not differ from the temperature override stop setting more than 1 K.</p> <p>Requirements after the endurance test</p> <p>After the endurance test the outlet temperature shall not differ from the initial temperature override stop setting more than 4 K.</p>	<p>Model 1424900/ 1424901/ 1424939/ 1424931</p> <p>Before the endurance test:</p> <p>$\Delta \vartheta = \vartheta_t - \vartheta_0 = 0.24^\circ\text{C}$</p> <p>After the endurance test:</p> <p>$\Delta \vartheta = \vartheta_t - \vartheta_0 = 1.10^\circ\text{C}$</p>	P
14	Pressure resistance		

EN1111: 2017			
Clause	Requirement - Test	Result - Remark	Verdict
14.3	<p>Testing of mechanical performance of the thermostatic mixing valve upstream of the obturator in the closed position</p> <p>Gradually apply a static water pressure of $(2,5 \pm 0,05)$ MPa [$(25 \pm 0,5)$ bar] simultaneously to the two supplies for (60 ± 5) s. The outlet orifice of TMVs without obturator shall be artificially closed.</p> <p>Requirement:</p> <p>This test shall not cause permanent deformation of the TMV.</p>	There was no permanent deformation for the duration of the test.	P
14.4	<p>Mechanical behaviour downstream of the obturator – Obturator in the open position</p> <p>a) Connect the TMV as supplied to the test circuit.</p> <p>b) Open the obturator(s) fully.</p> <p>1) For TMVs with a flow rate regulator fitted apply at the TMV inlet a dynamic water pressure of $(0,4 \pm 0,02)$ MPa [$(4,0 \pm 0,2)$ bar] and maintain it for (60 ± 5) s.</p> <p>2) For TMVs without a flow rate regulator apply at the TMV inlet the water pressure needed to give a flow rate of $(24 \pm 0,24)$ l/min through TMVs of nominal size 1/2 and a flow rate of $(48 \pm 0,48)$ l/min through TMVs of nominal size 3/4 and maintain it for (60 ± 5)s.</p> <p>3) For TMVs with removable flow rate regulator, the test is carried out both with and without this regulator.</p> <p>c) Check whether there is permanent deformation in any part of the TMV downstream of the obturator.</p> <p>Requirement:</p> <p>There shall be no permanent deformation in any part of the TMV.</p>	There was no permanent deformation for the duration of the test.	P
15	<p>Torsional resistance of the operating controls</p> <p>Flow control</p> <p>Gradually apply over a period of 4 s to 6 s and maintain for 5 min a torque of $(6 \pm 0,6)$ Nm to the flow control device in the closing direction of travel.</p> <p>Temperature control</p> <p>Gradually apply over a period of 4 s to 6 s and maintain for 5 min a torque of $(3 \pm 0,5)$ Nm to the end of the temperature control device both in the direction of cold water and separately in the direction of hot water.</p> <p>Temperature override stop</p> <p>Gradually apply over a period of 4 s to 6 s and maintain for 5 min a torque of $(3 \pm 0,5)$ Nm to the temperature control device in the direction of increasing temperature.</p> <p>Requirements</p> <p>After the test, there shall be no visible deformation on any component or any deterioration in operation.</p>	After the test, there was no deformation or other deterioration.	P

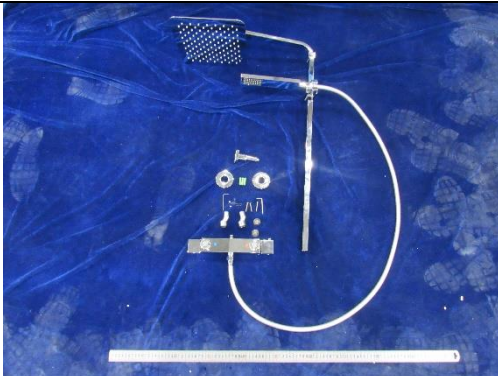
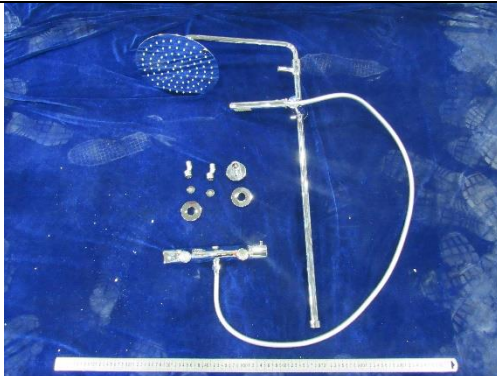




EN1111: 2017			
Clause	Requirement - Test	Result - Remark	Verdict
16	Mechanical endurance characteristics		
16.2	<p>Endurance test for single sequential control device</p> <p>During the test no failure of any component part shall occur. After 50 000 on/off cycles, the thermal performance shall comply 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.</p>		N/A
16.3	The test method as described in EN 200 shall be followed.		N/A
16.4	<p>Endurance test for on/off flow control device, combined with diverter mechanism</p> <p>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.</p>	<p>Model 1424900/ 1424901/ 1424939/ 1424931</p> <p>After the endurance test, no leakage and complied of clause 12.2 to 12.4 requirements.</p>	P
16.5	<p>Endurance test for other on-off flow control device</p> <p>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.</p>		N/A
16.6	<p>Mechanical endurance of diverters of thermostatic mixing valves</p> <p>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.</p>		N/A
16.7	<p>Mechanical endurance of swivel spouts</p> <p>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.</p>		N/A
16.8	Thermal Element		

EN1111: 2017											
Clause	Requirement - Test	Result - Remark	Verdict								
16.8.2	Temperature adjustable valves (Type 1, 2, 4) 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.	Model 1424900/ 1424901/ 1424939/ 1424931 During the test, there was no failure of any component part, and complied of clause 12.2, 12.3, 13.5.3 and 13.5.6 requirements.	P								
16.8.3	Temperature set valves (Type 5) During the test there shall be no failure of any component part. Upon test completion the valve shall undergo leaktightness and thermal performance testing as per 13.5.3.		N/A								
16.8.4	Other valves with special control devices (Type 6) The procedure for Type 6 is subject to agreement between manufacturer and test laboratory.		N/A								
17	Acoustic characteristics Depending on the values of Lap obtained at 0,3 MPa, a thermostatic mixing valve is classified in the following acoustic groups: <table><tr><td>Group</td><td>Lap dB(A)</td></tr><tr><td>I</td><td>Lap≤20</td></tr><tr><td>II</td><td>20<Lap≤30</td></tr><tr><td>Not classified</td><td>Lap>30</td></tr></table>	Group	Lap dB(A)	I	Lap≤20	II	20<Lap≤30	Not classified	Lap>30	Not Check	—
Group	Lap dB(A)										
I	Lap≤20										
II	20<Lap≤30										
Not classified	Lap>30										

*****End of this page*****

Appendix A

Product photos

	
1440900.T45/ 1440900/ 1440901	1441100/ 1441101/ 1441139/ 1441131
	
1424800/ 1424801/ 1424839/ 1424831	1424900/ 1424901/ 1424939/ 1424931
	
65561100/ 65561101/ 65561150/ 65561131	1425800

Appendix B

Dimensional characteristics

Dimensions (mm)	1440900.T45/ 1440900/ 1440901	1441100/ 1441101/ 1441139/ 1441131	1424800/ 1424801/ 1424839/ 1424831	1424900/ 1424901/ 1424939/ 1424931	65561100/ 65561101/ 65561150/ 65561131	1425800
Clause 9.2 Inlet dimensions						
A	G 1/2 B	G 1/2 B	G 1/2 B	G 1/2 B	G 1/2 B	G 1/2 B
A2	10.16	10.22	10.20	10.18	/	10.13
A3	16.36	16.30	16.22	16.28	/	16.34
G	150.04	150.10	150.08	150.16	/	150.06
G1	Met the requirements of 140 to 160	Met the requirements of 140 to 160	Met the requirements of 140 to 160	Met the requirements of 140 to 160	/	Met the requirements of 140 to 160
Clause 9.3 Outlet dimensions						
D3	/	/	/	140	/	133.14
A	G 1/2 B	G 1/2 B	G 1/2 B	G 1/2 B	G 1/2 B	G 1/2 B
A4	7.66	7.76	7.60	7.74	/	7.70
A5	9.72	9.70	9.56	9.98	/	9.82

Appendix C

Test results for flow rate

Model No.	Outlet Type	Flow rate (L/min)
1440900.T45/ 1440900/ 1440901	Showerhead	15.50
	Hand Shower	8.15*
1441100/ 1441101/ 1441139/ 1441131	Showerhead	28.00
	Hand Shower	11.20*
1424800/ 1424801/ 1424839/ 1424831	Shower	15.30
1424900/ 1424901/ 1424939/ 1424931	Bath	21.30
	Shower	18.20
65561100/ 65561101/ 65561150/ 65561131	Shower	16.33
1425800	Bath	20.42
	Shower	16.44

Note: “*” means the test sample with water saving.

Appendix D

Revision Page

Revision No.	Date	Changes	Author	Reviewer
0	July 27, 2018	First issue	Felix Li	Bink Xu

*****End of Report*****