Test Report No. 719176458-MEC10/03-CLC
dated 22 SEPT 2010

PSB Singapore

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SUBJECT:

Testing of Tap/Fitting/Mixers.

TESTED FOR:

Vola A/S
Lunavej 2
DK 8700 Horsens
Denmark

Attn: Mr. Tommy Jorgenson

METHOD OF TEST:

BS EN 1287 : 1999 Sanitary tapware – Low pressure thermosatic mixing valves – General technical specifications

DESCRIPTION OF SAMPLE:

Product : Tap/Fittings/Mixers
Brand Name : Vola

S/N	Description
1.	VOLA 5100 (Thermostatic Concealed Valve)
2.	VOLA 6400 (Thermostatic Concealed Valve)

Note:

Refer to APPENDIX for photo.

TÜV SÜD PSB

Laboratory:
TÜV SÜD PSB Pte. Ltd.
No.1 Science Park Drive
Singapore 118221

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223

TEST RESULTS:

(A1) Leaktightness Characteristics

Sample Reference / Characteristics	VOLA 5100	BS EN 1287 : 1999 Requirement
Leaktightness of the thermostatic mixing valve upsteam of the obturator and of the obturator	Passed	Clause 9.3.2 The valve shall withstand a hydraulic pressure of 16 bar for a duration of 60 seconds without leakage.
Leaktightness of the thermostatic mixing valve downstream of the obturator	Passed	Clause 9.5.2 The valve shall withstand a hydraulic pressure of 16 bar for a duration of 60 seconds without leakage.
Leaktightness of the manual diverter of the thermostatic mixing valve	N.A	Clause 9.6.2 For the duration of the test, there shall be no leakage at the outlet points indicated.

(B1) Torsion Test

Sample Reference / Characteristics	VOLA 5100	BS EN 1287 : 1999 Requirement
Submitting the operating mechanism to a given torque to verify its strength with no water supplied	Passed	Clause 13.2.4 There shall be no deformation or other deterioration which impairs the function of the mixing valve; the mixing valve shall satisfy the requirement for leaktightness.

TEST RESULTS: (Cont'd)

(C1) Mechanical Performance under Pressure Characteristics

Sample Reference **Characteristics**	VOLA 5100	**BS EN 1287 : 1999 Requirement**
Mechanical behaviour upstream of the obturator - Obturator in the close position	Passed	Clause 11.3.2 Throughout the duration of the test, there shall be no permanent deformation of the thermostatic mixing valve.
Mechanical behaviour downstream of the obturator - Obturator in the open position	Passed	Clause 11.4.2 There shall be no permanent deformation of the thermostatic mixing valve.

(D1) Mechanical Endurance Characteristics (On/Off Flow control device)

Sample Reference **Characteristics**	VOLA 5100	**BS EN 1287 : 1999 Requirement**
50,000 cycles of opening & closing	Passed	Clause 12.2.4 During the test, no failure of any component part shall occur. After the test, verify the application of the tests given in 9.3 to 9.5.

TEST RESULTS: (Cont'd)

(E1) Hydraulic Operating Characteristics – Determination of flow rate

Sample Reference / Characteristics		VOLA 5100		BS EN 1287 : 1999 Requirement	
Flow rate test at dynamic reference pressure 0.1 bar	Combined	Shower	0.8**	4,8 to 6,0 l/min 6,0 to 7,5 l/min 7,5 to 15,0 l/min	Wash basin Showers, sinks bidet
				Min. 15 l/min	Baths

"**"Non-compliance with BS EN 1287 : 1999 requirements (Please refer to page 6 of 8).

(F1) Hydraulic Operating Characteristics – Sensitivity

Sample Reference / Characteristics	VOLA 5100	BS EN 1287 : 1999 Requirement
Sensitivity	Passed	Shall comply with Clause 10.6

TEST RESULTS: (Cont'd)

(G1) Hydraulic Operating Characteristics – Safety with Cold Water Failure

Sample Reference / Characteristics	VOLA 5100	BS EN 1287 : 1999 Requirement
Blend water temperature before test (°C)	38.2º C	38 ± 1 °C
Volume of water collected during the first 5s after cold water failure	20 ml	200 ml max
Volume of water collected during the second collection period of 30s after cold water failure	20 ml	300 ml max
Temperature of mixed water after restoration of the cold water	39.3º C	Deviation from set temperature shall not exceed 2°C

(H1) Hydraulic Operating Characteristics – Temperature stability with changing inlet pressure

Sample Reference / Characteristics	VOLA 5100	BS EN 1287 : 1999 Requirement
Blend water temperature before test (°C)	38.4º C	38 ± 1 °C
Temperature of the mixed water after pressure reduction and stabilization	38.7°C	Deviation from set temperature shall not exceed 2°
Temperature of the mixed water after pressure restoration and stabilization	39.3°C	Deviation from set temperature shall not exceed 2°

TEST RESULTS:

(A2) Leaktightness Characteristics

Sample Reference / Characteristics	VOLA 6400	BS EN 1287 : 1999 Requirement
Leaktightness of the thermostatic mixing valve upsteam of the obturator and of the obturator	Passed	Clause 9.3.2 The valve shall withstand a hydraulic pressure of 16 bar for a duration of 60 seconds without leakage.
Leaktightness of the thermostatic mixing valve downstream of the obturator	Passed	Clause 9.5.2 The valve shall withstand a hydraulic pressure of 16 bar for a duration of 60 seconds without leakage.
Leaktightness of the manual diverter of the thermostatic mixing valve	Passed	Clause 9.6.2 For the duration of the test, there shall be no leakage at the outlet points indicated.

(B2) Torsion Test

Sample Reference / Characteristics	VOLA 6400	BS EN 1287 : 1999 Requirement
Submitting the operating mechanism to a given torque to verify its strength with no water supplied	Passed	Clause 13.2.4 There shall be no deformation or other deterioration which impairs the function of the mixing valve; the mixing valve shall satisfy the requirement for leaktightness.

TEST RESULTS: (Cont'd)

(C2) Mechanical Performance under Pressure Characteristics

Sample Reference Characteristics	VOLA 6400	BS EN 1287 : 1999 Requirement
Mechanical behaviour upstream of the obturator - Obturator in the close position	Passed	Clause 11.3.2 Throughout the duration of the test, there shall be no permanent deformation of the thermostatic mixing valve.
Mechanical behaviour downstream of the obturator - Obturator in the open position	Passed	Clause 11.4.2 There shall be no permanent deformation of the thermostatic mixing valve.

(D2) Mechanical Endurance Characteristics (Manual Diverter)

Sample Reference Characteristics	VOLA 6400	BS EN 1287 : 1999 Requirement
30,000 cycles of opening & closing	Passed	Clause 12.3.2 During the test, no component fracture, blockage of the mechanism, leakage from the nozzle or shower/shower head or the diverter control joint shall occur.

TEST RESULTS: (Cont'd)

(E2) Hydraulic Operating Characteristics – Determination of flow rate

Sample Reference / **Characteristics**		VOLA 6400		**BS EN 1287 : 1999 Requirement**	
Flow rate test at dynamic reference pressure 0.1 bar	Combined	Shower	0.7**	4,8 to 6,0 l/min 6,0 to 7,5 l/min 7,5 to 15,0 l/min	Wash basin Showers, sinks bidet
				Min. 15 l/min	Baths

"**"Non-compliance with BS EN 1287 : 1999 requirements (Please refer to page 6 of 8).

(F2) Hydraulic Operating Characteristics – Sensitivity

Sample Reference / **Characteristics**	VOLA 6400	**BS EN 1287 : 1999 Requirement**
Sensitivity	Passed	Shall comply with Clause 10.6

TEST RESULTS: (Cont'd)

(G2) Hydraulic Operating Characteristics – Safety with Cold Water Failure

Sample Reference / Characteristics	VOLA 6400	BS EN 1287 : 1999 Requirement
Blend water temperature before test (°C)	38.5º C	38 ± 1 °C
Volume of water collected during the first 5s after cold water failure	10 ml	200 ml max
Volume of water collected during the second collection period of 30s after cold water failure	10 ml	300 ml max
Temperature of mixed water after restoration of the cold water	39.5º C	Deviation from set temperature shall not exceed 2°C

(H2) Hydraulic Operating Characteristics – Temperature stability with changing inlet pressure

Sample Reference / Characteristics	VOLA 6400	BS EN 1287 : 1999 Requirement
Blend water temperature before test (°C)	38.7º C	38 ± 1 °C
Temperature of the mixed water after pressure reduction and stabilization	38.8°C	Deviation from set temperature shall not exceed 2°
Temperature of the mixed water after pressure restoration and stabilization	39.6°C	Deviation from set temperature shall not exceed 2°

REMARKS:

S/N	Type of tap fittings/ Model	BS EN 1287 : 1999 Requirement	Characteristics
1.	VOLA 5100 (Thermostatic Concealed Valve)	Complied	A) Leaktightness Characteristics B) Torsion Test C) Mechanical Performance under Pressure Characteristics D) Mechanical Endurance Characteristics (On/off Flow control device) & (Manual Diverter) E) Hydraulic Operating Characteristics – Determination of flow rate F) Hydraulic Operating Characteristics – Sensitivity G) Hydraulic Operating Characteristics – Safety with Cold Water Failure H) Hydraulic Operating Characteristics – Temperature stability with changing inlet pressure
2.	VOLA 6400 (Thermostatic Concealed Valve)	Complied	

a) The test samples complied with BS EN 1287 : 1999 requirements except hydraulic characteristics **-** Determination of flow rate which complied with SS CP 48 : 2005 requirements.

b) Effect on Water Reference : S08MEC07709-1A&1B-LYP dated 08/04/2009 and S08MEC07709-2A&2B-LYP dated 08/04/2009

c) Chemical Composition BS EN 12165 Reference : 719176458-MEC10-CES dated 29/Apr/2010.

d) DZR BS EN 12165 Reference : 719176458-MEC10-YYH-SBT dated 27 Apr 2010.

Chua Lee Choong
Associate Engineer

Chua Peck Cheong
Product Manager
Automotive & Industrial Group
Mechanical Centre

APPENDIX:

Photo 1. VOLA 5100
(Thermostatic Concealed Valve)

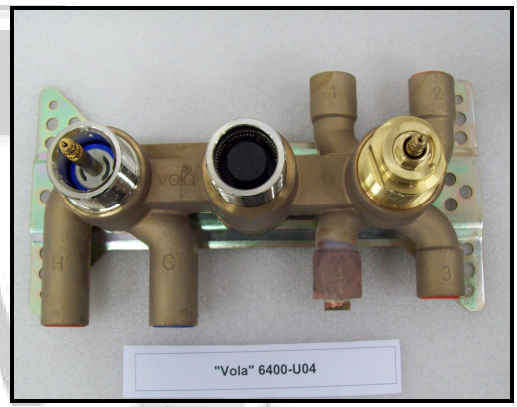

Photo 2. VOLA 6400
(Thermostatic Concealed Valve)

PSB Singapore

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March 2010