SINGAPORE LABORATORY ACCREDITATION SCHEME

Accredited Laboratory SAC-SINGLAS

Schedule

Setsco Services Pte Ltd
531 Bukit Batok Street 23
Singapore 659547

Certificate No. : LA-1993-0067-G (Part 1 of 5)

Issue No. : 40

Date : 30 November 2022

FIELD OF TESTING : Mechanical Testing

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A. METALS AND METAL PRODUCTS			
A1. Metal & Metal Products	1. Tensile Test (i) Tensile Strength Test (ii) Yield or Proof Strength Test (iii) Elongation	) BS EN 10002-1:2001) ASTM A370: 2020) ASTM E8 / E8M: 2021) ISO 6892-1: 2019) AS 1391: 2007) JIS Z 2241: 1998) SS 456: 1999) ASTM B557: 2015	) YA / CKM /) NAM / YPS /) TKC / LCS /) CKT / LY /) TST)))
	2. Impact Test	) ASTM E 23: 2018) BS EN ISO 148-1: 2016	) YA / CKM /) NAM / YPS /) LCS / CKT /) LY / TST
	3. Hardness Test (i) Brinell (ii) Vickers (iii) Rockwell	) ASTM E10: 2018) BS EN ISO 6506-1: 2014) ISO 6506-1: 2014) BS EN ISO 6507-1: 2018) ASTM E92: 2017) BS EN ISO 6508-1: 2016) ASTM E18: 2020	) YA / CKM /) NAM / LCS /) CKT / TST /) LY / YPS)))
	(iv) Portable Hardness Test - Brinell / Rockwell	) ASTM E110: 2014	) YA / CKM /) NAM / LCS /) CKT / LY /) TST

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A1. Metal & Metal Products	4. Coating Measurement		
	(i) Micro-hardness Test	) ASTM E384: 2017) ASTM B578: 1987(2015))	) YA / CKM /) WKW / NKG /) CKS / NCC
	(ii) Thickness	) ASTM B487: 2020	) YA / CKM /) WKW / NKG /) CKS / NCC
		) BS EN ISO 1463: 2021	) WKW / CKS /) NCC / NKG
	(iii) Coating Thickness Measurement for Metallic and Related Coatings (Magnetic Method)	) ISO 2361: 1995) ISO 2178: 2016) ISO 2177: 2003)))	) YA / CKM /) WKW/ CKT /) CKS / LCS /) LY / NAM /) NCC / NKG /) TST
	5. Mechanical Hydrogen Embrittlement (Annex A2 in Air Environment)	ASTM F519: 2005	YA / CKM
	6. Metallurgical Examination		
	(i) Preparation of Metallographic Samples	ASTM E3: 2011 (2017)	) YA / CKM /) WKW / NCC) NKG / CKS
	(ii) Microetching of Metals & Alloys	) ASTM E 407: 2007(2015)) CAAS SAR Chapter 6.5 Appendix 1 (15Dec2011)	) YA / CKM /) WKW / NCC /) NKG / CKS
	(iii) Macroetching of Metals & Alloys	) ASTM E340: 2015	) YA / CKM /) WKW / CKS /) NCC / NKG
	(iv) Determination of Ave Grain	) ASTM E112: 2013	) YA / CKM /) WKW / NKG) NCC / CKS
	(v) Volume Fraction Manual Point Count	) ASTM E562: 2019e1	) YA / CKM /) WKW / NKG) NCC / CKS

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A1. Metal & Metal Products	(vi) Corrosion Test	) ASTM G48: 2011(2020)e1) (Method A)	) YA / CKM /) WKW / CKS /) NCC / NKG
		) ASTM G28: 2002(2015)) (Method A)	) WKW / CKS /) NCC / NKG
		) ASTM A923: 2014) (Method C)	) WKW / NCC /) CKS / NKG
		) ASTM A262: 2015(2021)) (Method A & E)	) WKW / CKS /) NCC / NKG
	(vii) In-situ Replica Metallography	) ASTM E1351: 2001(2020)	) CKS / LZY) NCC / NKG /) WKW
	(viii) Decarburization & Carburization Test	) ASTM F2328: 2017) ISO 898-1: 2013 (Clause) 9.10 & 9.11)) ASTM A962: 2019	) NCC / NKG) WKW / CKS))
	(ix) Inclusion Content of Steel	) ASTM E45: 2018a	) NCC / NKG) WKW / CKS
	(x) Cast Iron Microstructure Classification	) BS EN ISO 945-1: 2019	) NCC / WKW /) CKS / NKG
A2. Reinforcement Bar	1. Dimensional Measurement	) SS 2: 1987) BS 4449: 1997,1988, 2005 + A3: 2016	) CKM / NAM /) TAS)
	2. Tensile Strength Test (Uniform Cross Sectional Area)	) SS 2-1: 1999) SS 2-2: 1999) SS 2-3: 1987	)))
	3. Tensile Strength Test (Variable Cross Sectional Area)	) SS 427: 1998) ASTM A615 / A615M: 2020) SAA AS/NZS 4671 : 2001	)))
	4. Bend Test 5. Re-bend Test	) SS 560: 2010, 2016	) CKM /NAM /) TAS / LCS /) YTN / TQZ /) OJX
		) MS 146: 2014	) CKM / TAS /) YTN / NAM

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A2. Reinforcement Bar		) SS 566: 2010	) CKM / NAM /) TAS / YTN /) TQZ
		) BS EN ISO 15630-1: 2010, 2019	) CKM / NAM /) TAS / YTN /) TQZ / OJX
A3. Steel Fabric	1. Dimensional Measurement 2. Tensile Strength Test 3. Reverse Bend 4. Weld Shear Test 5. Rebend Test	) SS 18 : Part 1 : 1999) SS 18 : Part 2 : 1970) SS 32 : Part 1 : 1999) SS 32 : Part 2 : 1986) BS 4483 : 2005) SS 561 : 2010) BS EN ISO 15630-2:2019	) CKM / NAM /) TAS)))) CKM / NAM) TAS / YTN) TQZ / OJX
A4. Seven Wire Steel Strands	1. Dimensional Measurement	) BS 5896: 1980, 2012	) YA / CKM
	2. Tensile Strength Test	) ASTM A416 / A416M: 2018) BS EN 10218-1: 2012	) TAS / LL /) YTN
A5. Structural Steel	1. Dimensional Measurement 2. Tensile Strength Test 3. Bend Test	) ASTM A20 / A20M: 2020) *ASTM A36 / A36M: 2019) ASTM A500 / A500M: 2021) *ASTM A516 / A516M: 2017) BS EN 10025-1: 2004) BS EN 10025-2: 2019) *BS EN 10210-1: 2006) BS EN 10002-1: 2001) ASTM A307: 2021) BS EN ISO 7438: 2020 (excludes 6.2 (b) & (c))) GB 2975: 1998) GB 228: 2010) GB 232: 2010	) YA / CKM /) NAM / LCS /) CKT / LY /) TST)))))))))))
A6. Bolts & Nuts	1. Tensile Strength Test (Bolts) 2. Yield Strength Test (Bolts) 3. Hardness Test 4. Proof Load Test	) BS 3692: 2014) BS 4395: 1969) BS EN 10029: 2010) BS EN 10034: 1993) *ASTM A325: 2014) *ASTM A490 / A490M: 2014)ASTM F3125 / F3125M:2019e2	) YA / CKM /) NAM / LCS /) CKT / LY /) TST / YPS))))

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A6. Bolts & Nuts	4. Proof Load Test	) BS EN ISO 898-1: 2013) ASTM F606 / F606M: 2021) BS EN ISO 898-2 : 2012) BS EN ISO 15048-1: 2016) BS EN ISO 15048-2: 2016	) YA / CKM /) NAM / LCS /) CKT / LY /) TST / YPS)
	5. Tensile / Yield Strength Test	) ISO 3506-1: 2020	)
	6. Proof Load Test	) ISO 3506-2: 2020	)
	7. Single Shear Test	) ASTM F606 / F606M: 2021) *BS 4190: 2014	)
A7. Welded Plates / Pipes	1. Tensile Strength Test	) ASME Sect IX: 2017, 2019	) CKM / NAM
	2. Bend Test	) AWS D1.1 / D1.1M: 2020	) LCS / LY /
	3. Macroscopic Examination	) BS 4872-1: 1982	) CKT / TST
	4. Nick Break Test	) BS 2633: 1987	)
	5. Fracture Test	) API STD 1104: Sep 2013 (21st ed.)	)
		) BS EN 287-1: 2011	)
		) BS EN ISO 9606-1: 2017	) CKM / NAM
		) BS EN ISO 9018 : 2015	) LCS / LY /
		) BS EN 910: 1996	) CKT / TST
		) BS EN ISO 5173: 2010 + A1: 2011	)
		) BS EN 895: 1995	)
		) BS EN ISO 4136: 2012	)
		) BS EN 1320: 1997	)
		) BS EN ISO 9017: 2018	)
		) CAAS SAR Chapter 6.5 Appendix 1 (15 Dec 2011)	)
		) AWS D17.1 / D17.1M: 2017AMD2	)
A8. Manhole Covers Road Gully Grating and Frame for Drainage Purpose	1. Dimensional Measurement	) SS 30: 1999	) YA / CKM /) NAM / YPS
	2. Load Test	) BS EN 124: 2015	)
	3. Permanent Set	) BS 5834-2: 2011	)
A9. Reinforcement Steel with Coupler	1. Tension Load Test and Slip Test	) BS 8110-1: 1997 Clause 3.12.8.16.2	) YA / CKM
		) BS EN 1992-1-1: 2004 + A1: 2014	) NAM / TAS /) YTN / TQZ
		) BS 8597: 2015	)

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A10. Metal Scaffolds	1. Dimensional Measurement	) SS 280-1: 2006	) YA / CKM) TKC / YTN
	2. Vertical Frame		)
	(i) Load Test on Horizontal Tubes	) SS 280-1: 2006 (Appendix C1)	)
		)	)
	b. Compression Test on Vertical Tubes (Standard or Leg)	) SS 280-1: 2006 (Appendix C2)	)
		)	)
		)	)
	3. Horizontal Frame		)
	(i) Deflection and Bending Test	) SS 280-1: 2006 (Appendix E1)	)
		)	)
	(ii) Load Test on Clamp (Hook)	) SS 280-1: 2006 (Appendix E2)	)
			)
	4. Cross Brace		)
	(i) Load Test	) SS 280-1: 2006 (Appendix D)	)
	5. Treadboard (Catwalk) / Metal Decking		)
	(i) Deflection Bending Test	) SS 280-1: 2006 (Appendix F1)	)
		) SS 280-2: 2009 (Appendix E2)	)
	6. Treadboard (Catwalk) / Metal Decking		) YA / CKM) TKC
	(i) Deflection Bending Test	) SS 280-1: 2006 (Appendix F1)	)
		) SS 280-2: 2009 (Appendix E2)	)
			)
	(ii) Load Test on Clamp (Hook)	) SS 280-1: 2006 (Appendix F2)	)
		) SS 280-2: 2009 (Appendix E2)	)
			)
	(iii) Deflection and Punching Test on Expanded Metal	) SS 280-1: 2006 (Appendix F3)	)
		) SS 280-2: 2009 (Appendix E3)	)
			)
	7. Wall Tie		)
	(i) Tensile Test	) SS 280-1: 2006 (Appendix I1)	)
		) SS 280-2: 2009 (Appendix F1)	)
			)
	(ii) Compression Test	) SS 280-1: 2006 (Appendix I2)	)
		) SS 280-2: 2009 (Appendix F2)	)
	8. Jack Base		)
	(i) Load Test	) SS 280-1: 2006 (Appendix G)	)
		) SS 280-2: 2009 (Appendix C)	)

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A10. Metal Scaffolds	9. Cross Brace Pin		) YA / CKM /
	(i) Load Test	) SS 280-1: 2006 (Appendix K)	) TKC / LCS
			)
	10. Material Test		)
	(i) Tensile Test	) SS 311: 2005	)
	11. Modular Scaffolding		) YA / CKM /
	(i) Load Test	) SS 280-2: 2009 (Appendix D)	) TKC
A11. Guard Rail and Highway Parapet	1. Load Test	) BS 6779-3: 1994	) YA / CKM
	2. Bend Test		)
A12. Accelerated Corrosion Monitoring	1. Standard Practice for Modified Salt Spray (FOG) Testing	) ASTM G85: 2019	) YA / WKW /) NKG / CKS /) LZY / NCC)
	2. Standard Practice for Operating Salt Spray	) ASTM B117: 2019	))))
	3. Salt Spray Test	) ISO 9227: 2017	)
A13. Reinforcement couplers for Mechanical Splices of Bars	1. Tensile Test	) ISO 15835-1: 2009, 2018) SS ISO 15835-1: 2020) ISO 15835-2: 2009, 2018) SS ISO 15835-2: 2020	) YA/ CKM /) NAM / TAS /) LCS / YTN /) OJX / TQZ
	2. Slip Test	) NF A 35-020-1: 2011) NF A 35-020-2-1: 2011	))
	3. Cyclic Test	) ISO 15835-2: 2009, 2018) SS ISO 15835-2: 2020	))
A14. Connection Loops	1. Tension Load Test		
	(i) Circular	) MTD/PT/19: 2018	) YA / CKM /
	(ii) Single	) MTD/PT/20: 2018	) NAM / LCS /
	(iii) Double	) MTD/PT/21: 2018	) CKT / LY
A15. Reinforcing Steel Weldments	1. Tensile Test 2. Shear Test 3. Bend Test	) BS EN ISO 17660-1: 2006	) CKM / NAM /) LCS / LY /) TST / CKT /) TAS / OJX /
	4. Tensile Test	) BS EN ISO 17660-2: 2006	) YTN / TQZ
B TIMBER AND TIMBER PRODUCTS			
B1. Timber	1. Tension Test	) BS 373: 1957	) YA / CKM
	(i) Tension Parallel to Grain	)	) NAM / LCS
	(ii) Tension Perpendicular to Grain	)	)
		)	)

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B1. Timber	2. Compression Test (i) Compression Parallel to Grain (ii) Compression Perpendicular to Grain 3. Static Bend Test 4. Shear Test 5. Moisture Content	) BS 373: 1957))))) BS 373: 1957) BS 373: 1957) BS 373: 1957	) YA / CKM) NAM / LCS))))))))

* Product Specification

Approved Signatories

S/N	Name	Initials
1.	Mr Cheng Kwang Meng	CKM
2.	Mr Chew Keng Tiong	CKT
3.	Mr Choo Kok Siong	CKS
4.	Mr Lawrence Lim	LL
5.	Mr Lim Chin Seong	LCS
6.	Mr Liu Yang	LY
7.	Mr Ng Aik Miu	NAM
8.	Mr Ng Chang Chong	NCC
9.	Mr Ng Kian Guan	NKG
10.	Mr Ong Jian Xiang	OJX
11.	Mr Tan Ah Siong	TAS
12.	Mr Tan Kok Chuan	TKC
13.	Mr Tee Seng Thiam	TST
14.	Mr Toh Qi Zheng	TQZ
15.	Mr Wong Kok Wah	WKW
16.	Mr Yap Pa Sun	YPS
17.	Mr Ye Tun Naing	YTN
18.	Mr Yusoof Aynuddin	YA

Note:

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. A laboratory's fulfilment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and **management system requirements** that are necessary for it to consistently deliver technically valid test results. The **management system requirements** in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001.

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FIELD OF TESTING : Mechanical Testing

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A. TAPS AND MIXERS			
A1 Taps and Combination Tap Assemblies	1. Dimensional Measurement 2. Water Tightness Test 3. Pressure Resistance Characteristics 4. Hydraulic Characteristics 5. Mechanical Strength 6. Endurance Test Delay Action 7. Backflow Prevention	) BS 5412: 1996)) BS EN 200: 1989,) 2008))))	) YA / CKM /) CY / MA) YA / CKM /) CY / MA /) HWC)))
	1. Dimension Measurement 2. Watertightness Characteristics 3. Hydraulic Test 4. Endurance Test 5. Pressure Resistance Test 6. Backflow Prevention 7. Thermal Shock Resistance 8. Salt Spray Test	) SS 448-1 to -4: 1998) BS EN 248: 2002)))))) ISO 9227: 2006, 2012,) 2017)	) YA / CKM /) CY / MA)))))) YA / CKM /) NCC / NKG /) WKW
A2 Mechanical Mixer	1. Leaktightness Characteristics 2. Sensitivity 3. Flow Rate 4. Mechanical Strength Characteristics 5. Pressure Resistance Characteristics	) BS EN 817: 2008))))))	) YA / CKM /) CY / MA)))))

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A2 Mechanical Mixer	6. Mechanical Endurance Characteristics 7. Backflow Prevention	) BS 5412: 1996)) SS 448-1 to -4: 1998	) YA / CKM /) CY / MA)
A3 Thermomixing Valves	1. Dimensional Characteristics (inlet thread) 2. Leaktightness Characteristics 3. Hydraulic Operating Characteristic 4. Mechanical Performance under Pressure 5. Mechanical Endurance Characteristics 6. Torsional Resistance Characteristics	) BS EN 1287: 1999) BS EN 1111: 1999)))))))	) YA / CKM /) CY / MA /) HWC)))))))
	1. Torque Test 2. Watertightness at ambient temperature 3. Endurance Test	) AS 4032.1: 2005)))	) YA / CKM /) CY / MA /) HWC)
	1. Leaktightness Characteristics 2. Hydraulic Operating Characteristic – Flow Rate 3. Pressure Resistance 4. Torsional Resistance Characteristics	) BS EN 1111: 2017))))	) YA / CKM /) CY / MA /) HWC))
A4 Shower Head	1. Flow Rate 2. Spray Force 3. Spray Coverage	) AS/NZS 3662: 2005, 2013	) YA / CKM /) CY / MA /) HWC
A5 Washing Machine	1. Water Consumption Test	IEC 60456 Edition 5.0 (2010-02) Clause 8.6 and PUB Requirement	) YA / CKM /) CY / MA))
A6 Coating Thickness Measurement	1. Measurement of coating thickness – Coulometric method by anodic dissolution	) BS EN ISO 2177: 2004))	) YA / CKM /) CY / MA /) NCC
A7 Automatic Diverter	1. Vacuum Test	) BS EN 14506: 2005)	) YA / CKM /) CY / MA /) HWC

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
B. PIPES AND FITTINGS			
B1 PVC Pipes and Fittings	1. Tensile Strength Test 2. Heat Reversion Test 3. Impact Test 4. Hydrostatic Pressure Test 5. Stress Relief 6. Dimensional Measurement 7. Opacity	) SS 141: 1976, 2013) SS 213: 1998 (1979)) SS 272: 1983, 2012) BS 4514: 2001) BS 3506: 1969) BS EN 1452-1 to -2 : 2000)	) YA / CKM))))))
B2 Polypropylene Pipes	1. Dimensional Measurement 2. Surface Finish 3. Creep Strength 4. Heat Reversion 5. Ovality 6. Long-term Hydrostatic Strength Test 7. Opacity test	) DIN 8077: 1999) DIN 8078: 1996, 2008) DIN 16962-1 to -13: 1989) BS EN ISO 15874-2: 2003,) 2013) BS EN ISO 15874-3: 2003,) 2013)	) YA / CY /) MA / CKM))))))
B3 Acrylonitrile Butadiene Styrene (ABS) Pipes and Fittings for Pressure Applications	1. Dimension 2. Heat Reversion 3. Impact 4. Short Term Hydrostatic 5. Heat Ageing	) AS 3518.1: 1988))))	) YA / CKM))))
B4 Polybutylene (PB) Pipes and Associated Fittings	1. Dimension 2. Short Term Hydrostatic (20°C) 3. Short Term Hydrostatic (95°C) 4. Short Term Hydrostatic – Assembled Pipes (20°C)	) BS 7291-2: 2001, 2010))))	) YA / CKM /) MA / CY)))
B5 Crosslinked Polyethylene (PE- X) Pipes and Associated Fittings	1. Dimension 2. Coil Diameter 3. Short Term Hydrostatic (20°C) 4. Short Term Hydrostatic (95°C) 5. Short Term Hydrostatic – Assembled Pipes (20°C)	) BS 7291-3: 2001, 2010)))))	) YA / CKM) MA / CY))))

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
B6 Chlorinated Polyvinyl Chloride (PVC-C) Pipes and Associated Fittings and Solvent Cement	1. Opacity 2. Dimensions 3. Longitudinal Reversion 4. Short Term Hydrostatic (20°C) 5. Short Term Hydrostatic (82°C) 6. Short Term Hydrostatic – Assembled Pipes (20°C)	) BS 7291-4: 1990))))))	) YA / CKM))))))
B7 Epoxy Coated Galvanized Iron / Malleable Iron Pipe Fittings	1. Jointing Threads 2. Visual Inspection 3. Leak Tightness Test 4. Coating Thickness Measurement	) BS 143 & 1256: 2000))))	) YA / CKM) CY / LCS)))
B8 Constant Flow Regulator	1. Constant Flow Measurement	) BS EN 246: 2003)	) YA / CKM /) CY / MA
B9 Flexible Tube	1. Heat Aging 2. Watertightness 3. Endurance Test	) AS/NZS 3499: 1997))	) YA / CKM /) CY / MA)
	1. Watertightness 2. Preparation of Samples 3. Tensile Stress Resistance 4. Hydraulic Strength Test 5. Resistance to Pressure Jumps 6. Bending Test	) AS/NZS 3499: 2006)))))	) YA / CKM /) CY / MA))))
B10 Line Pipe	1. Flattening Test	) API SPEC 5L: 2004, 2012) 2018	) YA / CKM
B11 Ductile Iron Pipe & Fitting	1. Dimensional Measurement 2. Tensile Strength Test 3. Hardness Test – Brinell 4. Diametral Stiffness 5. Abrasion Resistance 6. Hydrostatic Pressure Test 7. Thickness Measurement on Cement Lining 8. Microstructure	) BS EN 545: 2006, 2010) BS EN 598: 1995, 2007) + A1:2009)) BS EN 969: 1996) ISO 2531: 1998)))	) YA / CKM) CY/ MA /) WKW /) NCC / NKG) CKS / LZY)))) WKW /) NCC / NKG) CKS / LZY

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B12 Carbon Pipe Tube Polyethylene (PE-X) Pipes and Associated Fittings	1. Dimensional Measurement 2. Tensile Strength Test 3. Hydrostatic Pressure Test 4. Bend Test 5. Flattening Test	) BS 3601: 1987) BS EN 10002-1: 2001) BS EN 10216-1: 2002, 2013) BS EN 10217-1: 2002) BS EN ISO 6892-1: 2009	) YA / CKM) CY/ MA /)))
B13 Stainless Steel Tubes and Pipes	1. Dimensional Measurement 2. Hydrostatic Pressure Test 3. Drifting Test 4. Flattening Test 5. Mechanical Properties at Room Temperature 6. Bend Test 7. Leak Tightness	) BS EN 10312: 2002) BS EN ISO 8492: 2004, 2013) BS EN ISO 8493: 2004)) BS EN 10216-5: 2004, 2013 (exclude clause 11.2.2 on elevated temperature)) BS EN 10217-7: 2005, 2014)	) YA / CKM /) CY / MA)))))))
	8. Intergranular Corrosion Test	) BS EN ISO 3651-2: 1998	) WKW /) NCC / NKG) CKS / LZY
	9. Mechanical Properties at Room Temperature 10. Flattening Test 11. Bend Test 12. Weld Bend Test 13. Leak Tightness	) BS 3605-1: 1991) BS 3605-2: 1992))))	) YA / CKM /) CY / MA))))
B14 Screwed and Socketed Steel Tubes and Tubulars	1. Tensile Strength Test 2. Flattening Test 3. Hydrostatic Pressure Test	) BS EN 10255: 2004))	) YA / NAM /) YPS / CKM)
B15 Copper Tubing	1. Tensile Strength Test 2. Drifting Test 3. Hydrostatic Pressure Test 4. Flanging Test 5. Dimension Measurement 6. Hardness Test 7. Carbon Film Test	) BS EN 1057: 2006) BS EN 1057: 2006 +) A1: 2010))))	) YA / CKM) CY/ MA)))))
B16 Corrosion of Metals and Alloys	1. Dezincification Resistance 2. Stress Corrosion Resistance	) BS EN ISO 6509: 1995,) 2014) ISO 6957: 1988	) YA / WKW /) NCC / NKG) CKS / LZY

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
B17 Y-Strainer	1. Mating Dimension & Flange Tolerance 2. Pressure Test / Temperature Rating	) BS EN 1092-1: 2002,) 2007 + A1: 2013, 2018) BS EN 1092-2: 1997) BS EN 545: 2006, 2010)	) YA / CKM))))
B18 Steel Flange Adaptor	1. Mating Dimension & Flange Tolerance 2. Pressure Test/ Temperature Rating	) BS EN 1092-1 : 2002,) 2007 + A1: 2013, 2018) BS EN 1092-2: 1997) BS EN 545: 2006, 2010)	) YA / CKM))))
B19 Copper/Copper Alloy or Stainless Steel Mechanical Joining End Connectors	1. Resistance Pull Out 2. Leaktightness under internal hydrostatic pressure while subjected to bending 3. Leaktightness / Pressure Test	) BS EN 1254-2: 1998)))	) YA / CKM /) CY / MA)))
	1. Strength of Joint Assembly 2. Resistance to Pull Out of Assembled Joint 3. Method of Determining Compatibility of fittings with pipe	) AS 3688: 2005)))	) YA / CKM /) CY / MA)))
B20 Thermoplastic Pipes and Fittings	1. Opacity	) BS 7291-1: 2010)	) YA / CKM /) CY / MA
B21 Fitting	1. Body Pressure Resistance 2. Elongation Resistance 3. Internal Pressure 4. Resistance Repeatability 5. Vibration	JWWA G 116: 2007 (in general accordance based on translated document in English)	) YA / CKM /) CY / MA)))
B22 Adhesives for Thermoplastic Piping	1. Resistance Pull Out 2. Internal Pressure 3. Resistance to High Temperature 4. Durability 5. Shelf Life	) BS EN 14814: 2016	) YA / CKM /) CY / MA)
B23 External Polyurethane Coating for Ductile Iron Pipe	1. Minimum Thickness 2. Hardness 3. Adhesion	) BS EN 15189: 2006))	) SL))

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
	4. Elongation at Break 5. Non-Porosity 6. Chemical Resistance	)))	)))
C. SOLVENT CEMENT	1. Shear Strength Test 2. Film Properties 3. Long Term Hydrostatic Pressure Test	) BS 4346-3: 1982)))	) YA / CKM /) CY / MA))
D. SANITARY WARE			
D1 WC Pan	1. Dimension Measurement 2. Flushing Test 3. Quality of Glazing and Visual Exam 4. Warpage 5. Burning Resistance 6. Chemical Resistance 7. Stain Test 8. Load Test for Wall Hung Pan 9. Integral Water Seat Test	) SS 379: 1996)))))))))	) YA / CKM /) CY / MA))))))))
	1. Flushing Test 2. Load Test for Wall Hung Pan 3. Trap Seal Depth Determination and Restoration Test	) SS 574-2: 2012))))	) YA / CKM /) CY / MA)))
D2 Wash Basin	1. Quality of Glazing and Visual Exam 2. Warpage 3. Burning Resistance 4. Dimensional Measurement 5. Water Absorption 6. Chemical Resistance	) SS 42: 1971))))))	) YA / CKM /) MA)))))
D3 WC Cisterns	1. Dimension 2. Volume of Discharge 3. Flushing Test 4. Endurance Test 5. Hydraulic Test 6. Resistance to Torque of Flushing Device	) SS 378: 1996) PUB Specs (Dual-Flush) Low Capacity Cistern -) Sep 07))))	) YA / CKM /) CY / MA)))))

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
	7. Dead Load Test on Operating Mechanism 8. Front Thrust 9. Backflow Prevention 10. Adjustability of Float Operated Valve 11. Water Line	)))))))	)))))))
	1. Materials & Design / Dimension 2. Marking 3. Front Thrust Test (except conceal cistern) 4. Distortion Test 5. Leakage Test 6. Torque Test 7. Volume of Discharge per Flush (for full & reduced flush) 8. Water Line 9. Water Inlet Valve 10. Hydraulic Test 11. Endurance Test (for full & reduced flush) 12. Flushing Tests 13. Load Test on Operating Mechanism (for full & reduced flush) 14. Flush Button Design 15. WC Drainline Transportation Test (For cisterns with full flush volume of less than 3.5 litres/flush)	) SS 574-1: 2012)	) YA / CKM /) CY / MA
D4 Inlet Valve (Float Operated Valve – WC Flushing System)	1. General Dimension 2. Inlet Connection 3. Backnuts 4. Float Adjustment 5. Discharge Arrangement 6. Inlet Shank & Backnuts 7. Distortion test 8. Static Pressure Test 9. Shut-off Pressure and level deflection 10. Dynamic Pressure	) BS 1212-4: 1991)	) YA / CKM /) CY / MA

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
	11. Impact Test 12. Backflow	))	))
D5 Toilet Seat & Cover	1. Water Absorption 2. Rigidity 3. Distortion	) SS 16: 1985))	) YA / CKM))
D6 Sensors of Flushing Devices	1. Requirements	) PUB – Stipulation of Standards for Water Fittings	) YA / CKM) CY / MA
D7 Sensor Device for Urinal Flush Valve	1. Endurance 2. Determination of Sensing Distance 3. Manual Over-Ride	) PUB – Stipulation of Standards for Water Fittings	) YA / CKM) CY / MA))
D8 Urinal Flush Valve	1. Endurance Test 2. Hydraulic Test 3. Volume Discharge 4. Effectiveness of Vacuum Breaker Test	) PUB – Stipulation of Standards for Water Fittings	) YA / CKM) CY / MA)))
D9 Manual Operated Urinal Flush Valve	1. Endurance Test 2. Hydraulic Test 3. Volume Discharge 4. Effectiveness of Vacuum Breaker Test	) PUB – Stipulation of Standards for Water Fittings	) YA / CKM) CY / MA)))
D10 Sensor Device for 4.5 Water Closet Flush Valve	1. Endurance Test 2. Determination of Sensing Distance 3. Manual Over-Ride	) PUB – Stipulation of Standards for Water Fittings	) YA / CKM)))
D11 4.5 Litre Water Close Flush Valve	1. Endurance Test 2. Hydraulic Test 3. Volume Discharge 4. Flushing Test 5. Effectiveness of Vacuum Breaker Test	) PUB – Stipulation of Standards for Water Fittings	) YA / CKM)))))

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
D12 Manual Operated 1.5 Litre Water Closet Flush Valve	1. Endurance Test 2. Hydraulic Test 3. Volume Discharge 4. Flushing Test 5. Effectiveness of Vacuum Breaker Test	) PUB – Stipulation of Standards for Water Fittings	) YA / CKM)))))
D13 Low Capacity Flushing Cisterns	1. Quality of Glazing and Visual Exam 2. Warpage 3. Burning / Staining Resistance 4. Dimensional Measurement 5. Water Absorption 6. Chemical Resistance 7. Crazing	) BS 3402: 1969)))))))	) YA / CKM /) CY / MA))))))
D14 Ceramic Plumbing Fixture	1. Drain Line Transport Characteristics 2. Dye Test	) ASME A112.119.2: 2008,) 2013, 2018)	) YA / CKM /) CY / MA)
D15 Toilet Seat with Bidet	1. Wash Water Temperature Test 2. Warm Wind Temperature Test 3. Toilet Seat Temperature Test 4. Washing Water Quantity Test 5. Anus Douch Capacity Test 6. Warm Wind 7. Performance Test 8. Insulation Resistance Test 9. Moisture Proof Insulation Resistance Test 10. Withstand Voltage Test 11. Ordinary Temperature Test 12. Abnormal Temperature Test 13. Toilet Seat Strength Test 14. Toilet Seat Cover Strength Test 15. Construction Test	) JIS A 4422: 1986)))) JIS A 4422: 1986))))))))))	) YA / CKM /) CY / MA))) YA / CKM /) CY / MA)))))))))
	1. Wash Water Temperature Test 2. Washing Water Quantity Test 3. Warm Air Temperature Test 4. Warm Air Volume Test 5. Heated Seat Temperature 6. Pressure Withstanding Test	) JIS A 4422: 2011)))))	) YA / CKM /) CY / MA))))

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
	7. Water Hammer Test 8. Backflow Prevention & Vacuum Breaker Test 9. Mechanical Strength – Seats, Bowl Covers, Installation 10. Endurance – Operation, Seats and Bowl Covers 11. Seat Endurance Test 12. Construction Test 13. Water System Test 14. Electrical System Test	) JIS A 4422: 2011	) EL
D16 WC Flush Valve with Manual Operated Reduced Flush	1. Endurance for Reduce Flush 2. Volume of Discharge per Reduced Flush 3. Dilution Test for Reduce Flush 4. Paper Discharge Test 5. Flush Buttons Design	) In-house method) MTD/PT/29 Rev 0) (based on PUB S&R) document)	) CKM / CY /) MA
E. VALVES			
E1. Copper and Copper Alloys	1. Tensile Test	) BS EN 10002-1: 2001) BS EN ISO 6892-1: 2009	) YA / CKM) CY / MA
	2. Tensile Test	) *BS EN 1982: 1999, 2008) 2017	) YA / CKM) CY / MA
	3. Alpha-Phase Determination	) BS EN 1982: 1999, 2008,) 2017	) YA/ NCC)
	4. Grain Size Determination	) BS EN ISO 2624: 1995) *BS EN 1982: 1999, 2008) 2017	) YA / WKW /) NCC)
	5. Dezincification Resistance	) BS EN ISO 6509: 1995, 2014) *BS EN 1982: 1999, 2008) 2017) *BS EN 12420: 1999, 2014) *BS EN 12163: 1998, 2011) 2016) *BS EN 12165: 1998, 2011) 2016	) YA / WKW /) NCC / NKG)))))))

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
	6. Stress Corrosion Resistance Test	) ISO 6957: 1988) *BS EN 12163: 1998, 2011) 2016) *BS EN 12420: 1999, 2014	) YA / WKW /) NCC / NKG) YA / WKW)
E2. Cast Iron/ Ductile Iron/ Check Valve	1. Pressure Test	) BS 5153: 1974)	) YA / CKM) CY / MA
E3. Cast Iron Check Valve	1. Dimension and Tolerance on Body End	) *BS EN 12334: 2001) BS EN 558-1: 1996) BS EN 558: 2008+A1:2011) BS EN 1092-2: 1997	) YA / CKM) CY / MA))
		) BS EN 16767: 2016	) CKM / CY) MA
	2. Pressure Test	) BS EN 12266-1: 2003, 2012	) YA / CKM) CY / MA
E4. Metallic Iron Butterfly Valve	1. Dimension Measurement 2. Pressure Test	) BS EN 593: 2004, 2017) BS EN 558-1: 1996) BS EN 558: 2008+A1:2011) BS EN 558-2: 1996) BS EN 1092-1: 2002, 2007+A1: 2013) BS EN 1092-2: 1997) BS EN 1092-3: 2003	) YA / CKM) CY / MA))))))
E5. Cast Iron / Ductile Iron Gate Valve	1. Dimension Measurement 2. Strength Test 3. Functional Test 4. Pressure Test	) BS 5163 : 1986)))	) YA / CKM) CY / MA))
E6. Solenoid Gate Valve	1. Pressure Test	) *BS 5163-1 & -2: 2004) BS EN 1074-1: 2000	) YA / CKM) CY / MA
E7. Cast Iron / Ductile Iron Globe & Check Valve	1. Dimension Measurement 2. Pressure Test	) BS 5152: 1974)	) YA / CKM) CY / MA
	1. Dimension Measurement 2. Pressure Test 3. Design (i) Material	) * BS EN 13789: 2010)))	) YA / CKM /) CY / MA

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
	(ii) Pressure / Temperature Rating	)	
	(iii) Dimension	)	
	(iv) Operating	)	
	4. Functional Characteristics	)	
	(i) Functional Characteristics	)	
	(ii) Shell Design Strength	)	
	(iii) Flow Characteristics	)	
	(iv) Allowable Differential Pressure	)	
	(v) Seat Tightness	)	
	(vi) Sizing Operating Element	)	
	5. Designation	)	
	6. Marking	)	
E8. Cast Iron Globe Valve	1. Dimension and Tolerance on Body End	) *BS EN 13789 : 2002) BS EN 588-1: 1996) BS EN 1092-2: 1997	) YA / CKM) CY / MA)
	2. Pressure Test	) BS EN 12266-1: 2003, 2012	)
E9. Copper Alloy / Cast Iron / Ductile Iron Float Operated Valve (Diaphragm)	1. Construction & Dimension	) BS 1212-2: 1990	) YA / CKM
	2. Hydraulic Pressure	)	) CY / MA
	3. Shut-Off	)	)
	4. Backnut Distortion	)	)
	5. Backflow Prevention	)	)
	6. Jointing Method	)	)
	7. Float Shape	) BS 1968: 1953	)
	8. Dimension & Weight	)	)
	9. Immersion	)	)
	10. Marking	)	)
	11. Mating Dimensions	) BS 4504-3: 1989 (Section	)
	12. Flange Thickness	) 3.2)	)
		) BS EN 1092-2: 1997	)
	13. Elastomeric Seal:	) SS 270: 1996, 2015	) YA / CKM /
	(i) Tensile Properties	)	) CY/ MA / SL
	(ii) Compression Test	)	)
	(iii) Elongation at Break	)	)
	(iv) Water Absorption	)	)
	(v) Accelerated Aging	)	)
	(vi) Hardness	)	) YA / CKM /
	(vii) Stress Relaxation	)	) CY/ MA
	(viii) Ozone Test	)	)

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
	1. Hardness Test 2. Aging Test 3. Constant Strain Test 4. Water Absorption test	) BS 3457: 1973)))	) YA / CKM /) CY/ MA))
E10. Copper Alloy / Cast Iron / Ductile Iron Float Operated Valve (Piston)	1. Construction & Dimension 2. Performance 3. Jointing Method 4. Float Shape 5. Dimension & Weight 6. Immersion 7. Marking 8. Mating Dimensions 9. Flange Thickness	) BS 1212-1: 1990)) BS 1968: 1953))))) BS 4504-3: 1989 (Section) 3.2)) BS EN 1092-2: 1997	) YA / CKM) CY / MA))))))))
E11. Cast Iron / Ductile Iron Water Pressure Reducing Valve	1. Pressure Strength & Tightness of Body 2. Tightness between Inlet & Outlet Chamber 3. Set Point Flange for Adjustable / Non-Adjustable Valves	) BS EN 1567 :1999)))))	) YA / CKM) CY / MA))))
E12. Copper Alloy Gate, Globe and Check Valves, Solenoid Valve	1. Dimension Measurement 2. Pressure Test	) BS 5154: 1991))	) YA / CKM) CY / MA)
	1. Dimension Measurement 2. Pressure Test 3. Design (i) Material (ii) Pressure / Temperature (iii) Rating (iv) Dimension (v) Operating (vi) Auxiliary Connection 4. Functional Characteristics (i) Shell Design Strength (ii) Obturator Design Strength (iii) Shell Tightness (iv) Seat Tightness	) * BS EN 12288: 2010))))))))))))))	) YA / CKM /) CY / MA)))))))))))))

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
	(v) Flow Characteristics (vi) Sizing Operating Element 5. Designation 6. Marking	))))	))))
E13. Copper Alloy Gate Valve	1. Dimension and Tolerance on Body End 2. Pressure Test	) * BS EN 12288 : 2003) BS EN 558-1: 1996) BS EN 558: 2008+A1:2011) BS EN 1092-3: 2003) BS EN 12266-1: 2003, 2012	) YA / CKM) CY / MA)))
E14. Copper Alloy Stopcock, Ball Stopvalves and Stopvalves	1. Dimension Measurement 2. Pressure Test	) SS 75-2: 1978))	) YA / CKM) CY / MA
	1. Pressure Resistance Test 2. Bending Moment Test 3. Leaktightness Test 4. Torque Test 5. Endurance Test 6. Flow Capacity	) BS EN 1213: 2000)))))	) YA / CKM /) CY / MA))))
E15. Compression & Capillary Pipe Fittings	1. Dimension 2. Leak Tightness / Pressure Test	) BS EN 1254-1 & -2: 1998)	) YA / CKM /) CY / MA
E16. Ductile Iron Gate Valve	1. Max. Operating Torque for Operation & Leak Tightness 2. Hydraulic Characteristics 3. Resistance of Valves to Bending	) BS EN 1074-1: 2000) BS EN 1074-2: 2000))	) YA / CKM /) CY / MA))
E17. Copper Alloy Stainless Steel Ball Valve	1. Operating Torque Test 2. Torque and Bending Test 3. Mechanical Resistance Test (Stops & Spindle) 4. Hydraulic Test 5. Endurance Test	) BS EN 13828: 2003)))))	) YA / CKM /) CY / MA))))
E18. General Valves	1. Pressure Test 2. Flange Mating Dimension and Thickness 3. Face-to-Face Dimension	) BS EN 12266-1: 2012) BS EN 12266-2: 2012) BS EN 1092-2: 1997) BS EN 1092-1: 2018) BS EN 558: 2017	) YA / CKM /) CY / MA)))

* Product Specification

Approved Signatories

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Note :

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. A laboratory's fulfilment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and **management system requirements** that are necessary for it to consistently deliver technically valid test results. The **management system requirements** in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001.

SINGAPORE LABORATORY ACCREDITATION SCHEME

Accredited Laboratory SAC-SINGLAS

Schedule

Setsco Services Pte Ltd
531 Bukit Batok Street 23
Singapore 659547

Certificate No. : LA-1993-0067-G (Part 3 of 5)

Issue No. : 40

Date : 30 November 2022

FIELD OF TESTING : Mechanical Testing

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A. FIRE PROTECTION PRODUCTS			
A1. Fire Hose Reel	1. Dimension Measurement and Design Observation 2. Opening of manual inlet stop valve 3. Opening of automatic inlet stop valve 4. Resistance to external corrosion on coated parts 5. Resistance to corrosion of waterways 6. Ageing tests for plastic materials 7. Resistance to impact, for shut-off nozzle 8. Operating torque, for shut-off nozzle 9. Measurement of spray angle 10. Minimum flow rate 11. Effective throw range 12. Endurance - Rotating 13. Endurance - Swinging 14. Unwinding load 15. Dynamic braking 16. Resistance to impact and load 17. Resistance to internal pressure 18. Strength	) BS EN 671-1: 2012)	) CKM / CY /) MA)

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A2. Fire Fighting – Semi Rigid Hoses for Fixed Systems	1. Inside Diameter and Maximum Mass 2. Hydrostatic Pressure Test (i) Deformation under Maximum Working Pressure (ii) Deformation under Proof Pressure (iii) Maximum Burst Pressure Test 3. Kink Pressure Test 4. Adhesion Test	) BS EN 694: 2001, 2014))))))))) BS EN ISO 8033: 2017	) CKM / CY /) MA))))))))
A3. Landing Valve (Wet Riser)	1. Dimensional Measurement 2. Hydrostatic Pressure on Body 3. Hydrostatic Pressure on Seat 4. Spring Strength (refer to BS 336)	) BS 5041-1 : 1987)))	) CKM / CY /) MA))
A4. Inlet Breeching (Dry Riser)	1. Dimensional Measurement 2. Hydrostatic Pressure on the Body 3. Hydrostatic Pressure on seat 4. Material Test (i) Tensile Strength Test (ii) Microstructure	) BS 5041-3 : 1975)))))	) CKM / CY /) MA))))
A5. Layflat Delivery Hose and Hose Assembly	1. Construction 2. Dimension 3. Mass 4. Hydrostatic tests 5. Moisture absorption 6. Flexibility 7. Coupling 8. Adhesion Test	) BS 6391: 1983, 2009))))))) BS 6391: 2009	) CKM / CY /) MA)))))))
A6. Portable Fire Extinguisher	1. Weight of extinguisher 2. Duration of operation 3. Residual charge 4. Commencement of discharge 5. Tightness 6. Controlled discharge – self-closing valve / control valve 7. Operation position 8. Hose assembly 9. Closures	) SS EN 3-7 to -9: 2012)))))))))	) CKM / CY /) MA))))))))

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A6. Portable Fire Extinguisher	10. Force measurement	)	) CKM / CY /
	11. Horns for carbon dioxide extinguisher	)	) MA
	12. Filing opening	)	)
	13. Mounting bracket	)	)
	14. Bursting Disk	)	)
	15. Hose and Coupling System	)	)
	16. Crushing Test	)	)
	17. Pressure Test	)	)
	18. Bursting Test	)	)
	19. Safety Device Force Measurement	)	)
	20. Discharge from Water Base Extinguisher	)	)
	21. Charges and Filling Tolerances	)	)
	22. Resistance to Impact	) SS EN 3-8 to -9: 2012	)
	23. Pressure at Maximum Operating Temperature	) SS EN 3-7: 2012	)
	24. Propellant	)	)
	25. Means of checking pressure for stored pressure extinguisher	)	)
	26. Temperature Cycling	)	)
	27. General	)	)
	28. Pressure Gauge	)	)
	29. Scale and Error	) SS EN 3-7: 2012	) CKM / CY /
	30. Cyclic Test	)	) MA
	31. Pressure Indicator	)	)
	32. Internal & External Corrosion	)	)
	33. Markings	)	)
	34. Minimum Wall Thickness	) SS EN 3-8: 2012	)
	35. Requirement for Base	)	)
	36. Markings	)	)
	37. Materials	) SS EN 3-9: 2012	)
	38. Cylinder & Operating Device	)	)
	39. Filling Ratio	)	)
	40. Operating Device	)	)
	41. Markings	)	)
	42. Macroscopic Examination	) BS EN 1320: 1997	) CKM / NCC
A7. Fire hose couplings and Ancillary Equipment	1. Plunger Springs	) BS 336: 1989, 2010	) CKM / CY /
	2. Dimension Measurement	)	) MA

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A8. Fire Pump	1. Pump Performance Test	) AS 2941: 2013 (Clause) 3.1 to 3.4, 3.13.1 to) 3.13.4, 3.15, 4.4 and) 4.5)	) CKM / CY /) MA)))
	2. Pump Structural Check	) AS 2941: 2013 (Clause) 4.1.4 to 4.1.12, 4.2, 4.3) and 4.5)	))))
	3. Hydrostatic Pressure Test	) AS 2941: 2013 (Clause) 10.2.1, 10.3.2.1 and) 10.3.2.2)	)))
A9. Shelter Door	1. Dimension Measurement	) MTD/ PT/ 26: 2020) MTD/ PT/ 27: 2020	) CKM / CY /) MA)
	2. Watertightness Test	) SCDF Requirements:	)
	3. Endurance Test	) 2006	)
A10. Door Closer	1. Durability	) BS EN 1154: 1997	) CKM / CY /
	2. Closing Moment	) SS 332: 2018 Annex C	) MA
	3. Opening Moment	)	)
	4. Efficiency	)	)
	5. Closing Time	)	)
	6. Angles of Opening	)	)
	7. Overload Performance	)	)
	8. Fluid Leakage	)	)
	9. Damage	)	)
A11. Single-Axis Hinges	1. Initial Friction Torque Requirements	) BS EN 1935: 2002) SS 332:2018 Annex K	) CKM / CY /) MA
	2. Static Load	)	)
	3. Durability	)	)
	4. Shear Strength	) BS EN 1935: 2002	)
A12. Cylinder for Locks	1. Durability	) SS 332: 2018 Annex M	) CKM / CY /) MA
	2. Key Strength	) BS EN 1303: 2015	)
	3. Key Related Security	)	)

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A13. Mechanically Operated Locks & Locking Plates	1. Key Identification 2. Resistance to side force on latch bolt 3. Torque to operate the lock 4. Strength of follower stops 5. Durability 6. Door Closing Force	) BS EN 12209: 2016))))))	) CKM / CY /) MA)))))
A14. Lever Handles & Knob Furniture	1. Spindle and fastening element 2. Axial strength of lock furniture or latch furniture and fixing 3. Rotational torque strength 4. Free play and safety 5. Free angular movement or misalignment 6. Torque of return mechanism 7. Durability 8. Axial strength of fastening of special safety furniture	) BS EN 1906: 2012	) CKM / CY /) MA

Approved Signatories

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2.	Mr Chen Yu	CY
3.	Mr Ho Wan Chong	HWC
4.	Mr Ng Chang Chong	NCC
5.	Mr Mohd Azam	MA

Note :

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Schedule

Setsco Services Pte Ltd
531 Bukit Batok Street 23
Singapore 659547

Certificate No. : LA-1993-0067-G (Part 4 of 5)

Issue No. : 40

Date : 30 November 2022

FIELD OF TESTING : Mechanical Testing

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A. SAFETY PRODUCTS			
1. Personal Protective Equipment – Safety Footwear	1. Design 2. Sole Construction 3. Toe protection, construction and dimension 4. Impact Resistance 5. Compression Resistance 6. Behaviour of toecaps 7. Ergonomic features 8. Determination of upper / outsole and interlayer bond strength 9. Determination of the dimensional conformity of inserts and the penetration resistance inserts 10. Penetration Resistance 11. Determination of flexing resistance of outsole 12. Abrasion Resistance 13. Electrical Properties Resistance of Outsole a) Conductive footwear b) Antistatic footwear 14. Determination of Electrical Resistance	) SS 513-1: 2005, 2013) ISO 20345: 2011) SS 513-2: 2005, 2013) ISO 20344: 2011)))))))))))))))))))))))	) CKM / CY /) MA / OWD)))))))))))))))))) CKM / CY /) MA / EL /) GP)))

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
2. Industrial Safety Helmet	1. Design and construction 2. Penetration resistance 3. Flame resistance 4. Chinstrap anchorage 5. Shock absorption / Force Transmission 6. Lateral deformation 7. Electrical properties	) SS 98: 2005, 2013))))))))	) CKM / CY /) MA / OWD))))))) CKM / CY /) MA / EL /) GP
3. Ceiling Fan	1. Mechanical Strength 2. Suspension System 3. Installation	) SS 360: 1992 Clause 5.7) SS 655: 2020 Annex ZA)	) CKM / CY /) MA / OWD)
4. Personal Fall-Arrest System			
i. Full-Body Harnesses	1. Buckle shake test 2. Dynamic performance test 3. Static suspension angle test for class AE FBH 4. Static Strength	) SS 528: Part 1:2006(2014)) ISO 10333-1: 2000)))	) CKM / CY /) MA)))
ii. Lanyard & Energy Absorbers	1. Dynamic test of energy when supplied as component 2. Dynamic test of FBH with integral energy absorbers 3. Elevated temperature conditioning 4. Wet conditioning 5. Cold conditioning 6. Wet and cold conditioning 7. Static Strength	) SS 528 Part 2: 2006(2014)) ISO 10333-2: 2000)))))))	) CKM / CY /) MA)))))))
iii. Connectors with self-closing and self-locking gates	1. Gate-face resistance test 2. Gate side load resistance test 3. Static strength test	) SS 528: Part 5: 2006) ISO 10333-5: 2001)	) CKM / CY /) MA)

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
iv. System performance	1. Performance test for A (anchor device) + EAL (energy absorbing lanyard or other lanyard energy absorber combination) + FBH (full body harness) type PFAS (Personal fall arrest system)	) SS 528: Part 6: 2006) ISO 10333-6: 2004)))))	) CKM / CY /) MA)))))
5. Restraint Belt	1. Material and Construction 2. Webbing strength 3. Static strength for lanyard 4. Static strength for metal components 5. Performance test 6. Salt spray test for metal components	) SS 541: 2008))))))	) CKM / CY /) MA)))))

Approved Signatories

S/N	Name	Initials
1.	Mr Cheng Kwang Meng	CKM
2.	Mr Chen Yu	CY
3.	Mr Edwin Leong Heng Fatt	EL
4.	Mr Gavin Pek Kian Chuan	GP
5.	Mr Mohd Azam	MA
6.	Mr Ow Wei De	OWD

Note :

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SINGAPORE LABORATORY ACCREDITATION SCHEME

Accredited Laboratory SAC-SINGLAS

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Setsco Services Pte Ltd
531 Bukit Batok Street 23
Singapore 659547

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FIELD OF TESTING : Mechanical Testing

ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
A. GLAZING MATERIALS			
1. Safety Glass	1. Impact Resistance	SS 341: 2001 AS/NZS 2208: 1996 (1999) BS 6206: 1981	) THC / RT)))
	2. Boil Test	SS 341: 2001 AS/NZS 2208: 1996 (1999)	))
	3. Fragmentation Test	BS 6206: 1981 SS 341: 2001 AS/NZS 2208: 1996 (1999)	) THC / OJW /) ACT / RT))
	4. Non-Destructive Photo-Elastic Measurement for Surface Compressive Stress using Glazing Angle Surface Polarimeter	ASTM C 1279: 2013 (2019) SS 341: 2001	)))))
	5. Thickness	SS 341: 2001 AS/NZS 2208: 1996 (1999)	) OJW / ACT /) RT)
	6. Size Tolerances, Flatness & Squareness Rectangular Panels	SS 341: 2001 AS/NZS 2208: 1996 (1999) ASTM C1048: 2018	)))

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
2. Glass in Building / Glazing System	1. Solar Energy Transmittance 2. Solar Energy Reflectance (Front and Back) 3. Visible Light Transmittance 4. Visible Light Reflectance (Front and Back) 5. Solar Heat Gain Coefficient (SHGC) 6. Shading Coefficient (SC) 7. American U-Value 8. Emittance	) ISO 9050: 2003) BS EN 410: 2011) NFRC 100: 2020) NFRC 200: 2020) NFRC 300: 2020) NFRC 301: 2020) ASTM E903: 2020) ASTM C1371: 2015	) THC
B. DRY/ PARTITION/ PRECAST WALL	1. Partition Stiffness – (Applied loads (and Deflection – Annex A) 2. Small hard body impact test (surface damage – Annex B) 3. Large soft body impact test (Perforation – Annex C) 4. Small hard body impact test (Perforation – Annex D) 5. Large soft body impact test (surface damage – Annex E) 6. Resistance to crowd pressure (Annex G) 7. Effects of door slamming (Annex F) 8. Lightweight anchorage pull-out tests (Annex H) 9. Lightweight anchorage pull-down tests (Annex J)	) SS 492: 2001) BS 5234-2: 1992	) THC

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
B. DRY/ PARTITION/ PRECAST WALL	10. Heavyweight anchorage (wash Basin) eccentric downward loading test (Annex K)	)	)
	11. Heavyweight anchorage (high level wall cupboard) eccentric downward loading (Annex L)	)	)
	12. Surface & Total water absorption	) BS EN 520: 2004 + A1: 2009	) THC / JS
	13. Flexural breaking load	)	)
	14. Density	)	)
	15. Density	) BS EN 12467: 2012 + A2: 2018	)
	16. Heat-rain	) ASTM C1185-08(2016)) ISO 8336: 2017	)
	17. Modulus of rupture	)	)
	18. Water impermeability	)	)
	19. Moisture movement	)	)
	20. Moisture Movement	ISO TR 1896: 1991 Cl. 6.4	) THC / JS /) /OJW
	21. Bending Strength (Dry & Saturated)	ISO TR 1896: 1991 Cl. 6.4	)
	22. Bending Strength	) BS EN 14306: 2015) Annex D8) BS EN 12089: 2013	)
C. FIRE DAMPER	1. Closing Reliability	SS 333: 2012 Cl. 6.5	) THC / JS) / OJW
	2. Spring Closing Force	SS 333: 2012 Cl. 6.6	)
D. BUILDING MATERIALS	1. Non-combustibility	BS 476-4: 1970 BS EN ISO 1182: 2020	) THC / JS)
	2. Limited Combustibility / Heat Emission	BS 476-11: 1982	)
	3. Gross Heat of Combustion (Calorific Value)	BS EN ISO 1716: 2010	) THC / JS) / OJW

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
E. FLOORING	1. Ease of Ignition	SS 495: 2001	) RT
F. INSULATION MATERIALS / FAÇADE / ROOFING MATERIALS / COATINGS	1. Thermal Conductivity	ASTM C518: 2021	) THC / JS
	2. Daylight Reflectance / Solar Reflectance	ASTM E903: 2020 ASTM C1549: 2016	) THC)
	3. Solar Reflectance Index	ASTM E1980: 2011(2019)	)
	4. Emittance	ASTM C1371: 2015	)
G. RUBBER	1. Tensile Strength and Elongation at Break	ASTM D412: 2016(2021) ISO 37: 2017 DIN 53504: 2017	) SL))
	2. Shore A & D Hardness	ASTM D2240: 2015(2021) DIN 53505: 2000 ISO 48-4: 2018	))))
	3. Compression Set	ASTM D395: 2018 (Method B) ISO 815-1: 2019	)))
	4. Compression Set Under Constant Deflection	) ASTM D1056: 2020	)
	5. Compression Deflection	)	)
	6. Compression Deflection After Oven Ageing	)	)
	7. Water Absorption	)	)
	8. Tear Resistance	ASTM D624: 2000(2020) ISO 34-1: 2015	))
H. PLASTICS	1. Tensile Strength and Elongation at Break	ASTM D638: 2014 ISO 527-2: 2012 DIN 53455: 1981 BS 2782-3: 1976 (Method 320E)	) SL)))
	2. Shore A & D Hardness	ASTM D2240:2015(2021) ISO 868: 2003	))

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ITEMS / MATERIALS / PRODUCTS TESTED	TESTS / PROPERTIES	STANDARD METHODS / TECHNIQUES / EQUIPMENT	APPROVED SIGNATORY
H. PLASTICS	3. Izod Impact Resistance	ASTM D256: 2010(2018) ISO 180: 2019	)
	4. Compressive Strength	ASTM D695: 2015	)
	5. Barcol Hardness	ASTM D2583: 2013a BS 2782-10: 1977 (Method 1001)	)
	6. Flexural Strength	ASTM D790: 2017 BS 2782-3: 1993 (Method 335A) ISO 178: 2019	)
	7. Density	ASTM D792: 2020 BS 2782-6: 1991 (Method 620A to 620D) ISO 1183 Pt 1: 2019	)
	8. Shear Strength	ASTM D732: 2017 BS 2782-3: 1978 (Method 340A & 340B)	)
	9. Abrasion Resistance	CTD/TP/09 -2012	)
	10. Long Term Flexural Modulus Under Dry or Wet Conditions	ISO 11296-4: 2018 + AMD 1: 2021	)
L. FACE MASK	1. Fluid Resistance / Synthetic Blood Penetration	ASTM F1862 / 1862M: 2017	) WJE / CTC /) SL
	2. Particulate Filtration Efficiency	ASTM F2299: 2003(2017)	) SL
	3. Differential Pressure	BS EN 14683: 2019 (Annex C)	)
	4. Flammability	16 CFR Part 1610	)

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Approved Signatories

S/N	Name	Initials
1.	Mr Aw Chong Tze	ACT
2.	Mr Chung Tying Chun	CTC
3.	Mr Jasbeer Singh	JS
4.	Mr Ong John Wei	OJW
5.	Mr Raymond Tan	RT
6.	Ms Shirley Lim Sui Di	SL
7.	Mr Tan Hong Choon	THC
8.	Dr Wu Ji'en	WJE

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