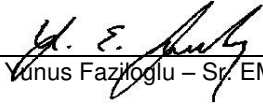




**BUREAU
VERITAS**

Curtis-Straus LLC, a wholly owned subsidiary of BV CPS

Test Report

Report No	EQ2908-1
Client	ASSA ABLOY Inc.
Address	110 Sargent Drive New Haven, CT, 06511
Phone	203-499-6836
Items tested FCC ID IC FRN	H2SE Mortise and H2SE Cylindrical U4A-SCSEHF 6982A-SCSEHF 0016550824
Equipment Type Equipment Code Emission Designator	Part 15 Low Power Communication Device Transmitter DXX 18K8F1D
FCC Rule Parts	CFR Title 47 FCC Part 15.225, ISED Canada RSS-210 Issue 9 Annex B.6
Test Dates	Sep 23 and 26, 2016
Results	As detailed within this report
Prepared by	 Yunus Faziloglu – Sr. EMC Engineer
Authorized by	 Christopher Reynolds – EMC Supervisor
Issue Date	<u>4/5/2017</u>
Conditions of Issue	This Test Report is issued subject to the conditions stated in the 'Conditions of Testing' section on page 17 of this report.

Curtis-Straus LLC is accredited by the American Association for Laboratory Accreditation for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation.



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828



Contents

Contents.....	2
Summary.....	3
Test Methodology.....	4
Product Tested - Configuration Documentation	5
Test Results	6
<i>Fundamental Emission</i>	6
<i>Radiated Spurious Emissions</i>	8
<i>Frequency Tolerance</i>	11
<i>99% Occupied Bandwidth</i>	13
Measurement Uncertainty.....	16
Conditions Of Testing	17

Form Final Report REV 7-20-07 (DW)



Summary

This test report supports a “Modular Approval” certification application of two transmitters operating pursuant to:

CFR Title 47 FCC Part 15.225, ISED Canada RSS-210 Issue 9 Annex B.6

The products are H2SE Mortise and H2SE Cylindrical modules operating at 13.56MHz. The modules are electrically identical. The only difference between the modules is the casing around it. The two types of casings are specifically tuned to the antenna for an effective reading pattern.

We found that the products met the above requirements without modifications. The test samples were received in good condition.

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	April 5, 2017



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828



page 3 of 18

Test Methodology

All testing was performed according to the following rules/procedures/documents;

CFR Title 47 FCC Part 15.225, ISED Canada RSS-210 Issue 9 Annex B.6, ISED Canada RSS-Gen Issue 4 and ANSI C63.10-2013.

Modules were tested in their only orientation of possible installation as part of a door lock assembly configuration. Emissions were maximized by rotating the turntable as well as varying the test antenna's height and polarity. The antenna of the modules cannot be maximized separately.

Operating voltage is 24VDC. AC line conducted emissions testing was performed on the AC side of a representative power supply with a 50 Ω /50 μ H LISN.

The following bandwidths were used during radiated spurious and line conducted emissions.

Frequency	RBW	VBW
0.15-30MHz	9kHz	30kHz
30-1000MHz	120kHz	1MHz

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	April 5, 2017



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828



Product Tested - Configuration Documentation

EUT Configuration										
Work Order:	Q2908									
Company:	Assa Abloy									
Company Address:	110 Sargent Drive									
	New Haven CT, 06511									
Contact:	Adam Oday									
	MN			PN			SN			
EUT:	H2SE Mortise, H2SE Cylindrical			--			Sample 1 (Mortise), Sample 2 (Cylindrical)			
EUT Description:	Wiegand Lock									
EUT Max Frequency:	13.56 MHz									
EUT Min Frequency:	2.1 MHz									
Support Equipment	MN			SN						
Wiegand Test Box	WT2			--						
Power Supply	3520			--						
Port Label	Port Type	# ports	# populated	cable type	shielded	ferrites	length (m)	in/out	under test	comment
E Links	Power + Data	1	1	other	No	No	10	in	yes	
Antenna	other	1	1	other	No	No	0.05	in	yes	interconnection
Software Operating Mode Description:										
EUT is set to transmit at 13.56 MHz. 100% on time with FSK modulation.										

Test Results

Fundamental Emission

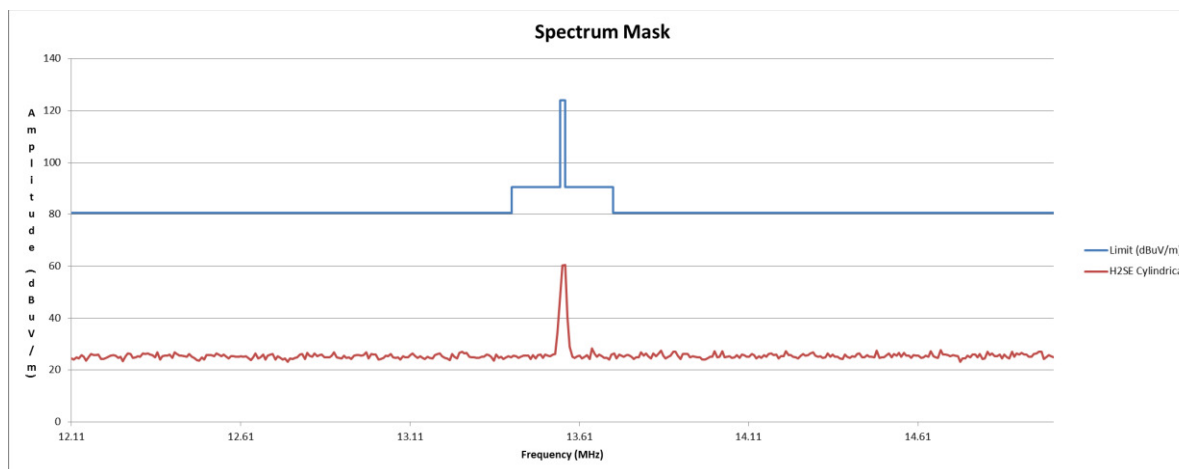
LIMIT

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters, (124 dBuV/m at 3m.)

[15.225 (a)]

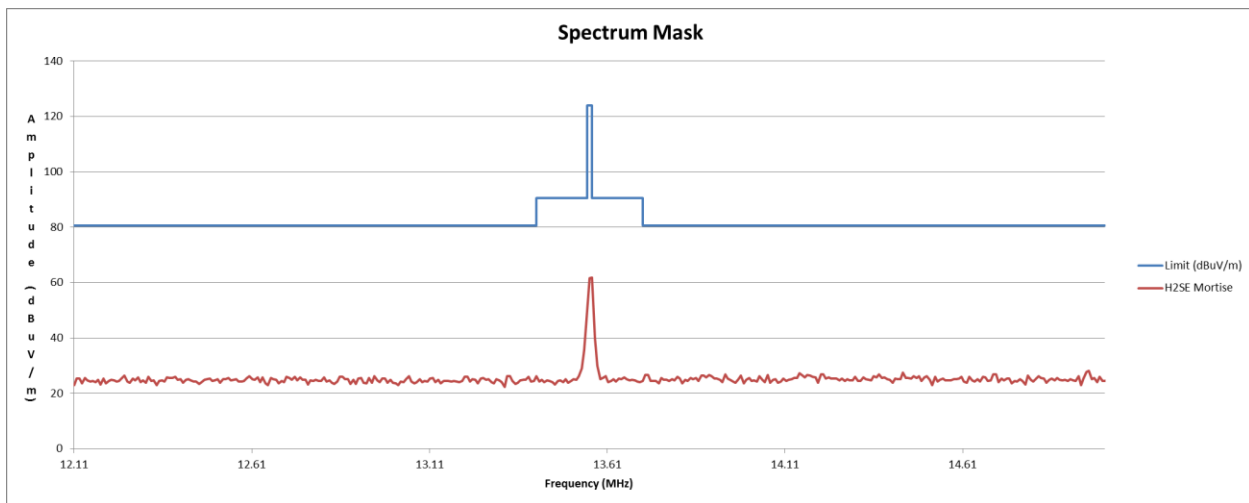
MEASUREMENTS / RESULTS

Radiated Emissions Table												
Date: 23-Sep-16			Company: Assa Abloy						Work Order: Q2908			
Engineer: Tuyen Truong			EUT Desc: H2SE Cylindrical						EUT Operating Voltage/Frequency: 24Vdc			
Temp: 22°C			Humidity: 42%			Pressure: 1006mBar						
Frequency Range: 13.56 MHz								Measurement Distance: 3 m				
Notes: Fundamental								EUT Max Freq: 13.56 MHz				
Antenna Polarization (0° - 90°)	Frequency (MHz)	Reading (dBuV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBuV/m)	---			FCC Class B		
							Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)
90	13.56	43.8	22.5	39.0	0.3	60.6	---	---	---	124.0	-63.4	Pass
0	13.56	41.2	22.5	39.0	0.3	58.0	---	---	---	124.0	-66.0	Pass
Table Result: Pass by -63.4 dB Worst Freq: 13.56 MHz												
Test Site: EMI Chamber 2			Cable 1: Asset #1784				Cable 2: Asset #2052			Cable 3: ---		
Analyzer: Asset #1328			Preamp: Blue				Antenna: Sm Loop (high)			Preselector: ---		
CSsoft Radiated Emissions Calculator v 1.017.173												
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor												
Copyright Curtis-Straus LLC 2000												



Radiated Emissions Table

Date: 23-Sep-16		Company: Assa Abloy				Work Order: Q2908							
Engineer: Tuyen Truong		EUT Desc: H2SE Mortise				EUT Operating Voltage/Frequency: 24Vdc							
Temp: 22°C		Humidity: 42%		Pressure: 1006mBar									
Frequency Range: 13.56 MHz						Measurement Distance: 3 m							
Notes: Fundamental						EUT Max Freq: 13.56 MHz							
Antenna Polarization (0° - 90°)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	---			FCC Class B			
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	
							90	13.56	45.1	22.5	39.0	0.3	61.9
0	13.56	44.2	22.5	39.0	0.3	61.0	---	---	---	124.0	-63.0	Pass	
Table Result: Pass by -62.1 dB						Worst Freq: 13.56 MHz							
Test Site: EMI Chamber 2		Cable 1: Asset #1784				Cable 2: Asset #2052		Cable 3: ---					
Analyzer: Asset #1328		Preamp: Blue				Antenna: Sm Loop (high)		Preselector: ---					
CSsoft Radiated Emissions Calculator v 1.017.173						Copyright Curtis-Straus LLC 2000							
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor													



Rev: 9/18/2016										
Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mtr	SN	Asset	Cat	Calibration Due	Calibrated on		
SA EMI Chamber (1328)	9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	2/26/2017	2/26/2016		
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due	Calibrated on		
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz		II	3/22/2017	3/22/2015		
Preamps / Couplers / Attenuators / Filters	Range	MN	Mtr	SN	Asset	Cat	Calibration Due	Calibrated on		
Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	5/13/2017	5/13/2016		
Antennas	Range	MN	Mtr	SN	Asset	Cat	Calibration Due	Calibrated on		
Small Loop	10kHz-30MHz	PLA-130/A	ARA	1024	755	I	6/14/2018	6/14/2016		
Meteorological Meters		MN	Mtr	SN	Asset	Cat	Calibration Due	Calibrated on		
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016		
TH A#2081		HTC-1	HDE		2081	II	4/5/2017	4/5/2016		
Cables	Range		Mtr			Cat	Calibration Due	Calibrated on		
Asset #1784	9kHz - 18GHz		Florida RF			II	3/7/2017	3/7/2016		
Asset #2052	9kHz - 18GHz		Florida RF			II	3/2/2017	3/2/2016		

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-



Radiated Spurious Emissions

LIMITS

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

[15.225(d)]

MEASUREMENTS / RESULTS

Radiated Emissions Table												
Date: 23-Sep-16			Company: Assa Abloy						Work Order: Q2908			
Engineer: Tuyen Truong			EUT Desc: H2SE Cylindrical						EUT Operating Voltage/Frequency: 24Vdc			
Temp: 22°C			Humidity: 42%			Pressure: 1006mBar						
Frequency Range: 9 KHz to 30 MHz							Measurement Distance: 3 m					
Notes:							EUT Max Freq: 13.56 MHz					
Antenna Polarization (0° - 90°)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	---			FCC Class B		
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
No emissions found in this range within 10dB of limit												
Table Result:			---		by		---		dB		Worst Freq: --- MHz	
Test Site: EMI Chamber 2			Cable 1: Asset #1784				Cable 2: Asset #2052			Cable 3: ---		
Analyzer: Asset #1328			Preamp: Blue				Antenna: Sm Loop			Preselector: ---		
CSsoft Radiated Emissions Calculator						v 1.017.173						
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor						Copyright Curtis-Straus LLC 2000						

Radiated Emissions Table												
Date: 23-Sep-16			Company: Assa Abloy						Work Order: Q2908			
Engineer: Tuyen Truong			EUT Desc: H2SE Mortise						EUT Operating Voltage/Frequency: 24Vdc			
Temp: 22°C			Humidity: 42%			Pressure: 1006mBar						
Frequency Range: 9 KHz to 30 MHz								Measurement Distance: 3 m				
Notes:								EUT Max Freq: 13.56 MHz				
Antenna Polarization (0° - 90°)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	---			FCC Class B		
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
No emissions found in this range within 10dB of limit												
Table Result:			---		by		---		dB		Worst Freq: --- MHz	
Test Site: EMI Chamber 2			Cable 1: Asset #1784				Cable 2: Asset #2052			Cable 3: ---		
Analyzer: Asset #1328			Preamp: Blue				Antenna: Sm Loop			Preselector: ---		
CSsoft Radiated Emissions Calculator v 1.017.173												
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor												
Copyright Curtis-Straus LLC 2000												

Rev: 9/18/2016	Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mtr	SN	Asset	Cat	Calibration Due	Calibrated on
	SA EMI Chamber (1328)	9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	2/26/2017	2/26/2016
	Radiated Emissions Site	FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due	Calibrated on
	EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz		II	3/22/2017	3/22/2015
	Preamps / Couplers / Attenuators / Filters	Range	MN	Mtr	SN	Asset	Cat	Calibration Due	Calibrated on
	Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	5/13/2017	5/13/2016
	Antennas	Range	MN	Mtr	SN	Asset	Cat	Calibration Due	Calibrated on
	Small Loop	10kHz-30MHz	PLA-130/A	ARA	1024	755	I	6/14/2016	6/14/2016
	Meteorological Meters		MN	Mtr	SN	Asset	Cat	Calibration Due	Calibrated on
	Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
	TH A#2081		HTC-1	HDE		2081	II	4/5/2017	4/5/2016
	Cables	Range		Mtr			Cat	Calibration Due	Calibrated on
	Asset #1784	9kHz - 18GHz		Florida RF			II	3/7/2017	3/7/2016
	Asset #2052	9kHz - 18GHz		Florida RF			II	3/2/2017	3/2/2016

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Radiated Emissions Table

Date: 23-Sep-16		Company: Assa Abloy		Work Order: Q2908								
Engineer: Tuyen Truong		EUT Desc: H2SE Cylindrical		EUT Operating Voltage/Frequency: 24Vdc								
Temp: 22°C		Humidity: 42%		Pressure: 1006mBar								
Frequency Range: 30 to 1000 MHz				Measurement Distance: 3 m								
Notes:				EUT Max Freq: 13.56 MHz								
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	---			FCC Class B		
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
v	40.67	34.2	22.4	13.3	0.4	25.5	---	---	---	40.0	-14.5	Pass
v	67.8	38.8	22.5	8.3	0.6	25.2	---	---	---	40.0	-14.8	Pass
h	94.89	47.9	22.5	9.0	0.7	35.1	---	---	---	43.5	-8.4	Pass
v	94.91	46.7	22.5	9.0	0.7	33.9	---	---	---	43.5	-9.6	Pass
v	108.5	45.5	22.4	12.6	0.7	36.4	---	---	---	43.5	-7.1	Pass
v	122.0	41.3	22.5	14.3	0.9	34.0	---	---	---	43.5	-9.5	Pass
h	122.055	46.8	22.5	14.3	0.9	39.5	---	---	---	43.5	-4.0	Pass
v	135.6	30.5	22.5	13.7	0.9	22.6	---	---	---	43.5	-20.9	Pass
Table Result: Pass by -4.0 dB Worst Freq: 122.055 MHz												
Test Site: EMI Chamber 2		Cable 1: Asset #1784		Cable 2: Asset #2052		Cable 3: ---						
Analyzer: Asset #1328		Preamp: Blue		Antenna: Red-White		Preselector: ---						
CSsoft Radiated Emissions Calculator		v 1.017.173										
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor												
Copyright Curtis-Straus LLC 2000												



Radiated Emissions Table

Date: 23-Sep-16		Company: Assa Abloy		Work Order: Q2908								
Engineer: Tuyen Truong		EUT Desc: H2SE Mortise		EUT Operating Voltage/Frequency: 24Vdc								
Temp: 22°C		Humidity: 42%		Pressure: 1006mBar								
Frequency Range: 30 to 1000 MHz				Measurement Distance: 3 m								
Notes:				EUT Max Freq: 13.56 MHz								
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	---			FCC Class B		
							Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
v	40.68	42.9	22.4	13.3	0.4	34.2	---	---	---	40.0	-5.8	Pass
v	67.8	47.6	22.5	8.3	0.6	34.0	---	---	---	40.0	-6.0	Pass
h	87.375	44.6	22.5	7.7	0.6	30.4	---	---	---	40.0	-9.6	Pass
v	88.75	44.0	22.5	7.8	0.6	29.9	---	---	---	43.5	-13.6	Pass
v	94.91	50.5	22.5	9.0	0.7	37.7	---	---	---	43.5	-5.8	Pass
h	95.025	47.1	22.5	9.0	0.7	34.3	---	---	---	43.5	-9.2	Pass
h	108.47	49.0	22.4	12.6	0.7	39.9	---	---	---	43.5	-3.6	Pass
v	108.5	47.5	22.4	12.6	0.7	38.4	---	---	---	43.5	-5.1	Pass
v	122.0	39.3	22.5	14.3	0.9	32.0	---	---	---	43.5	-11.5	Pass
v	135.6	30.9	22.5	13.7	0.9	23.0	---	---	---	43.5	-20.5	Pass
v	149.14	30.5	22.4	12.7	0.9	21.7	---	---	---	43.5	-21.8	Pass
v	162.7	27.9	22.6	12.3	1.0	18.6	---	---	---	43.5	-24.9	Pass
Table Result: Pass				by -3.6 dB		Worst Freq: 108.47 MHz						
Test Site: EMI Chamber 2		Cable 1: Asset #1784		Cable 2: Asset #2052		Cable 3: ---						
Analyzer: Asset #1328		Preamp: Blue		Antenna: Red-White		Preselector: ---						
CSsoft Radiated Emissions Calculator v 1.017.173				Copyright Curtis-Straus LLC 2000								
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor												

Rev. 9/18/2016

Spectrum Analyzers / Receivers/Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
SA EMI Chamber (1328)	9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	2/26/2017	2/26/2016
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range		Cat	Calibration Due	Calibrated on
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz		II	3/22/2017	3/22/2015
Preamps/Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	5/13/2017	5/13/2016
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Red-White Bilog	30-2000MHz	JB1	Sunol	A091604-1	1105	I	8/12/2017	8/12/2015
Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2081		HTC-1	HDE		2081	II	4/5/2017	4/5/2016
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #1784	9kHz - 18GHz		Florida RF			II	3/7/2017	3/7/2016
Asset #2052	9kHz - 18GHz		Florida RF			II	3/2/2017	3/2/2016

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS
 One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-



Frequency Tolerance

LIMITS

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+ 50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

[15.225(e)]

MEASUREMENTS / RESULTS

Frequency Stability					
Test Date:	9/26/2016		Company:	Assa Abloy	WO: Q2908
Test Engineer:	Tuyen Truong		EUT:	H2SE Cyclindrical	Operating Voltage: 24Vdc
SA:	1860		Cable:	1522	
Antenna:	Small Loop		Test Site:	Safety / ENV #17	
Voltage (Vdc)	Temp (°C)	Freq (MHz)	Δ Freq (MHz)	Limit (MHz)	Result (Pass/Fail)
Voltage Variation:					
24	20	13.55970	n/a	n/a	n/a
20.4	20	13.55970	0.000000	± 0.001356	Pass
27.6	20	13.55970	0.000000	± 0.001356	Pass
Temperature Variation:					
24	20	13.55970	n/a	n/a	n/a
24	30	13.55950	-0.000200	± 0.001356	Pass
24	40	13.55965	-0.000050	± 0.001356	Pass
24	50	13.55930	-0.000400	± 0.001356	Pass
24	10	13.55975	0.000050	± 0.001356	Pass
24	0	13.55990	0.000200	± 0.001356	Pass
24	-10	13.55955	-0.000150	± 0.001356	Pass
24	-20	13.56000	0.000300	± 0.001356	Pass

Frequency Stability

Test Date:	9/26/2016		Company:	Assa Abloy	WO:	Q2908
Test Engineer:	Tuyen Truong		EUT:	H2SE Mortise	Operating Voltage:	24Vdc
SA:	1860		Cable:	1522		
Antenna:	Small Loop		Test Site:	Safety / ENV #17		
Voltage (Vdc)	Temp (°C)	Freq (MHz)	Δ Freq (MHz)	Limit (MHz)	Result (Pass/Fail)	
Voltage Variation:						
24	20	13.55970	none	n/a	n/a	
20.4	20	13.56015	-0.000450	+/-0.001356	Pass	
27.6	20	13.56000	-0.000300	+/-0.001356	Pass	
Temperature Variation:						
24	20	13.55970	none	n/a	n/a	
24	30	13.55965	-0.000050	+/-0.001356	Pass	
24	40	13.55955	-0.000150	+/-0.001356	Pass	
24	50	13.55955	-0.000150	+/-0.001356	Pass	
24	10	13.55955	-0.000150	+/-0.001356	Pass	
24	0	13.55975	0.000050	+/-0.001356	Pass	
24	-10	13.55955	-0.000150	+/-0.001356	Pass	
24	-20	13.55940	-0.000300	+/-0.001356	Pass	

Rev. 9/25/2016

Spectrum Analyzers / Receivers / Preselectors

SA #2 (1860)

Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
9kHz-26.5 GHz	E7405A	Agilent	MY45104916	1860	I	12/23/2016	12/23/2015

Antennas

Small Loop

Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
10kHz-30MHz	PLA-130/A	ARA	1024	755	I	6/14/2018	6/14/2016

Meteorological Meters

Weather Clock (Pressure Only)

TH A#2085

MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
HTC-1	HDE		2085	II	4/5/2017	4/5/2016

Cables

Asset #1522

Range	Mfr	Cat	Calibration Due	Calibrated on
9kHz - 18GHz	Florida RF	II	2/14/2017	2/14/2016

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS
 One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-

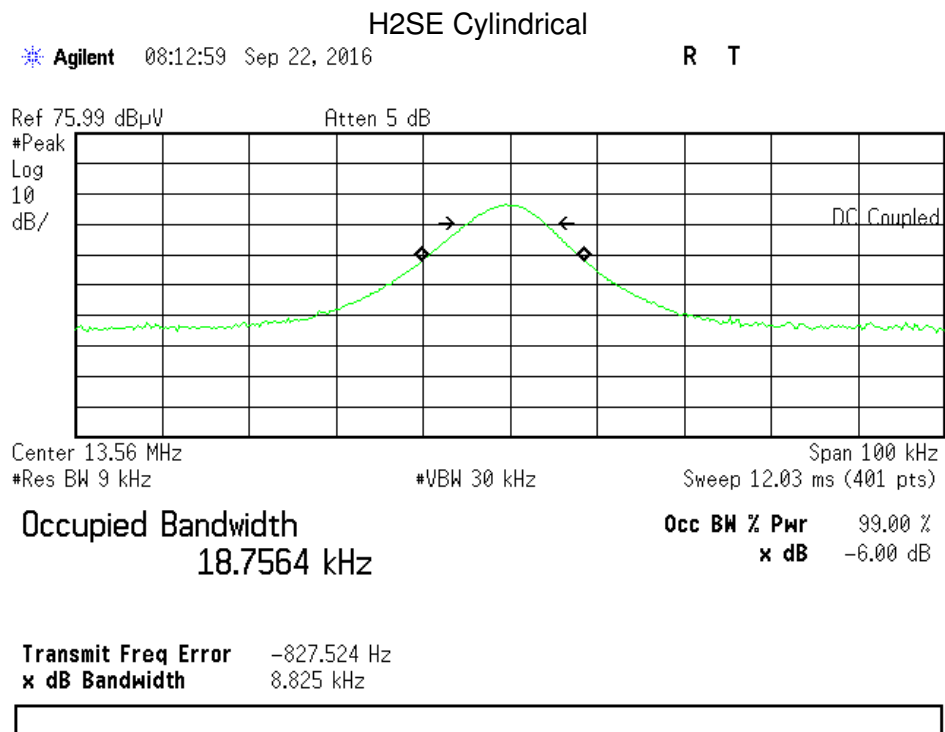


99% Occupied Bandwidth

REQUIREMENT

When an occupied bandwidth is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.
[RSS-GEN 6.6]

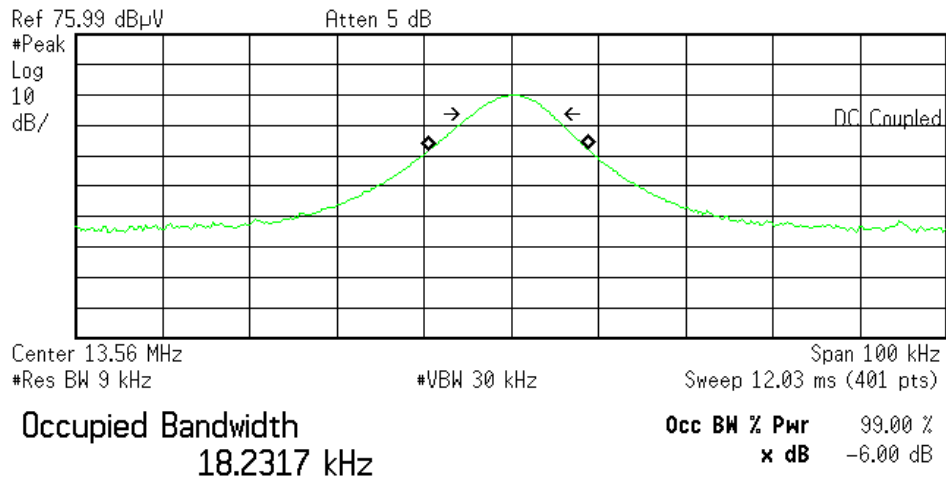
Note: Since the signal is narrowband, reduction in RBW causes the 99% occupied bandwidth to get smaller and smaller at each iteration. Therefore to have a meaningful reading, an RBW value that is higher than 5% of the emission bandwidth is selected.



H2SE Mortise

* Agilent 07:32:53 Sep 22, 2016

R T



Transmit Freq Error -300.465 Hz
x dB Bandwidth 8.826 kHz

C:\temp.gif file saved

Rev. 9/18/2016	Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mtr	S/N	Asset	Cat	Calibration Due	Calibrated on
	SA EMI Chamber (1328)	9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	2/26/2017	2/26/2016
...	Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Cat	Calibration Due	Calibrated on	
	EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz	II	3/22/2017	3/22/2015	
...	Preamplifiers / Couplers / Attenuators / Filters	Range	MN	Mtr	S/N	Asset	Cat	Calibration Due	Calibrated on
	Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	5/13/2017	5/13/2016
...	Antennas	Range	MN	Mtr	S/N	Asset	Cat	Calibration Due	Calibrated on
	Small Loop	10kHz-30MHz	PLA-130/A	ARA	1024	755	I	6/14/2016	6/14/2016
...	Metereological Meters		MN	Mtr	S/N	Asset	Cat	Calibration Due	Calibrated on
	Weather Clock (Pressure Only)		BA926	Oregon Scientific	C3166-1	831	I	4/28/2016	4/28/2016
	Th A#2081		HTC-1	HDE		2081	II	4/5/2017	4/5/2016
...	Cables	Range		Mtr			Cat	Calibration Due	Calibrated on
	Asset #1784	9kHz - 18GHz		Florida RF			II	3/7/2017	3/7/2016
	Asset #2052	9kHz - 18GHz		Florida RF			II	3/2/2017	3/2/2016

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-



AC Line Conducted Emissions**LIMITS**

Frequency of emission (MHz)	Quasi-peak limit (dBμV)	Average limit (dBμV)
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency. 47 CFR 15.207(a)

MEASUREMENTS / RESULTS

AC Conducted Emissions Data Table														
Date: 29-Sep-16 Engineer: Tuyen Truong, Arik Zwimer Temp: 20.7 °C Notes:						Company: Assa Abloy EUT Desc: H2SE Cylindrical Humidity: 47%				Work Order: Q2908 Pressure: 1016 mBar				
Frequency Range: 0.15 to 30 MHz EUT Input Voltage/Frequency: 120Vac/60Hz														
Frequency (MHz)	Quasi-Peak Readings		Average Readings		LISN Factors		Cable Factor (dB)	ATTN Factor (dB)	FCC/CISPR Class B			FCC/CISPR Class B		
	QP1 (dBµV)	QP2 (dBµV)	AVG1 (dBµV)	AVG2 (dBµV)	L1 (dB)	L2 (dB)			QP Limit (dBµV)	Margin (dB)	Result (Pass/Fail)	AVG Limit (dBµV)	Margin (dB)	Result (Pass/Fail)
11.44	17.8	14.6	15.0	16.4	-0.2	-0.1	-0.1	-20.8	60.0	-21.1	Pass	50.0	-12.5	Pass
13.54	24.6	22.2	23.6	24.2	-0.2	-0.2	-0.1	-20.9	60.0	-14.3	Pass	50.0	-4.7	Pass
18.84	25.0	25.6	15.5	15.3	-0.2	-0.2	-0.3	-20.9	60.0	-13.0	Pass	50.0	-13.1	Pass
19.10	24.4	25.5	24.6	26.0	-0.2	-0.2	-0.3	-20.9	60.0	-13.1	Pass	50.0	-2.6	Pass
19.38	26.3	26.6	22.5	26.6	-0.2	-0.2	-0.3	-20.9	60.0	-12.0	Pass	50.0	-2.0	Pass
29.73	21.7	20.0	21.5	19.3	-0.1	-0.2	-0.3	-20.8	60.0	-17.0	Pass	50.0	-7.2	Pass
Result: Pass						Worst Margin: -2.0 dB				Frequency: 19.375 MHz				
Measurement Device: LISN Asset 2092						Cable: CEMI-10 Attenuator: 20dB Attenuator-07				Spectrum Analyzer: SA EMI Chamber (1328) Site: CEMI 6				
C-S CEMI Calculator Version 3.0.14 Adjusted Reading = Raw Reading + LISN Insertion Loss + Cable Loss + Attenuation														
Equipment Factor Sheet rev: 9/19/2016														

AC Conducted Emissions Data Table														
Date: 29-Sep-16 Engineer: Tuyen Truong, Arik Zwimer Temp: 20.7 °C					Company: Assa Abloy EUT Desc: H2SE Mortise Humidity: 47%					Work Order: Q2908 Pressure: 1016 mBar				
Notes:														
Frequency Range: 0.15 to 30 MHz EUT Input Voltage/Frequency: 120Vac/60Hz														
Frequency (MHz)	Quasi-Peak Readings		Average Readings		LISN Factors		Cable Factor (dB)	ATTN Factor (dB)	FCC/CISPR Class B			FCC/CISPR Class B		
	QP1 (dBμV)	QP2 (dBμV)	AVG1 (dBμV)	AVG2 (dBμV)	L1 (dB)	L2 (dB)			QP Limit (dBμV)	Margin (dB)	Result (Pass/Fail)	AVG Limit (dBμV)	Margin (dB)	Result (Pass/Fail)
0.21	9.1	9.4	3.8	4.5	0.0	0.0	-0.1	-20.8	63.3	-33.0	Pass	53.3	-27.9	Pass
12.82	20.7	21.6	20.7	21.7	-0.2	-0.2	-0.1	-20.9	60.0	-17.3	Pass	50.0	-7.2	Pass
15.01	22.4	22.1	21.9	21.1	-0.2	-0.2	-0.2	-20.9	60.0	-16.3	Pass	50.0	-6.9	Pass
15.27	25.4	25.0	24.6	23.7	-0.2	-0.2	-0.2	-20.9	60.0	-13.4	Pass	50.0	-4.2	Pass
15.56	20.3	20.9	21.0	15.0	-0.2	-0.2	-0.2	-20.9	60.0	-17.9	Pass	50.0	-7.8	Pass
15.82	17.8	17.7	17.8	17.0	-0.2	-0.2	-0.2	-20.9	60.0	-21.0	Pass	50.0	-11.0	Pass
22.10	16.5	23.2	16.0	20.9	-0.2	-0.2	-0.4	-20.8	60.0	-15.5	Pass	50.0	-7.8	Pass
29.74	22.2	20.9	17.9	18.4	-0.1	-0.2	-0.3	-20.8	60.0	-16.5	Pass	50.0	-10.3	Pass
Result: Pass					Worst Margin: -4.2 dB					Frequency: 15.270 MHz				
Measurement Device: LISN Asset 2092					Cable: CEMI-10 Attenuator: 20dB Attenuator-07					Spectrum Analyzer: SA EMI Chamber (1328) Site: CEMI 6				
C-S CEMI Calculator Version 3.0.14 Adjusted Reading = Raw Reading + LISN Insertion Loss + Cable Loss + Attenuation														
Equipment Factor Sheet rev: 9/19/2016														

Rev. 9/25/2016

Spectrum Analyzers / Receivers / Preselectors
SA EMI Chamber (1328)

Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	2/26/2017	2/26/2016

LISNs/Measurement Probes
LISN Asset 2092

Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
9kHz-30MHz	NNLK 8121	Schwarzbeck	NNLK 8121-662	2092	I	7/14/2017	7/14/2016

Conducted Test Sites (Mains / Telco)
CEMI 6

FCC Code	VCCI Code	Cat	Calibration Due	Calibrated on
719150	A-0015	III	NA	N/A

Meteorological Meters
Weather Clock (Pressure Only)
TH A#2078

MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
HTC-1	HDE		2078	II	4/5/2017	4/5/2016

Cables
CEMI-10

Range	Mfr	Cat	Calibration Due	Calibrated on
9kHz - 2GHz	C-S	II	5/10/2017	5/10/2016

Attenuators
20dB Attenuator-07

Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
9kHz-2GHz	BW-N20W+	MCL	N/A		II	4/10/2017	4/10/2016

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-



page 15 of 18

Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radiated Emissions (30-1000MHz)	5.6dB	N/A
NIST	4.6dB	5.2dB (Ucisprr)
CISPR		
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions		
NIST	3.9dB	N/A
CISPR	3.6dB	3.6dB (Ucisprr)
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency (@ 2.4GHz)	3.23×10^{-8}	1×10^{-7}
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation:		
• Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	3.4%	5%
	0.3dB	3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		



Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPS," "MTL," "ACTS," "MTL-ACTS" and "CURTIS-STRAUS" (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only where such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.



13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.

14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B) NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.\$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

Rev.160009121(2)_#684340 v13CS

