



U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

March 21, 2003

Mr. Frank Stanonik
Chief Technical Advisor
Gas Appliance Manufacturers Association
2107 Wilson Blvd.
Suite 600
Arlington, VA 22201

Dear Mr. Stanonik:

At the January 14, 2003 meeting of the ANSI Z21/83 CO/Combustion Sensor Ad Hoc Working Group, I volunteered to draft initial test and evaluation considerations to be included in the work plan being developed for presentation to the ANSI Z21/83 Committee. Attached you will find a table of these considerations for distribution to the working group members. Where it seemed appropriate, I cited test provisions currently found in CSA 6.19-01, Residential Carbon Monoxide Alarming Devices and GRI-02/0112, Evaluating the Performance of Residential CO Alarms. I based additional chamber as well as in-situ gas appliance test considerations on the broad range of potential appliance operating environments we discussed during our working group meeting. However, the operating parameters (i.e. temperature and humidity) and flue gas sampling method (i.e. flow through or aspiration) of each sensor technology selected for evaluation should be used to determine the appropriateness of a given test condition. I look forward to further discussion of test and evaluation of sensors and development of the work plan.

These views represent the position of the CPSC staff; they have not been reviewed or approved by the Commissioners. If you have any questions, I can be reached at (301) 504-7575 or by email at rjordan@cpsc.gov.

Regards,

A handwritten signature in black ink that reads "Ronald A. Jordan".

Ronald A. Jordan
Project Manager, Fire/Gas Codes & Standards
Directorate for Engineering Sciences

cc:

Daryl Hosler, Chairman, ANSI Z21/83 Committee
Al Callahan, CSA-America
Colin Church, CPSC

List of Sensitivity Tests

Sensitivity Tests (Ambient Conditions)

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Sensitivity Tests (Appliance Operating Conditions)

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SENSITIVITY TESTS (AMBIENT CONDITIONS)

SENSITIVITY TEST 1: RESPONSE TO CARBON MONOXIDE AT 50 % RELATIVE HUMIDITY AND 70°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Response to Target Gas	
					Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	1	50	70	0		
	2	50	70	100		
	3	50	70	200		
	4	50	70	320		
	5	50	70	340		
	6	50	70	360		
	7	50	70	380		
	8	50	70	400		
	9	50	70	420		
	10	50	70	440		
	11	50	70	460		
	12	50	70	480		
	13	50	70	500		

SENSITIVITY TEST 2: RESPONSE TO CARBON MONOXIDE AT 75 % RELATIVE HUMIDITY AND 70°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Response to Target Gas	
					Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	14	75	70	0		
	15	75	70	100		
	16	75	70	200		
	17	75	70	320		
	18	75	70	340		
	19	75	70	360		
	20	75	70	380		
	21	75	70	400		
	22	75	70	420		
	23	75	70	440		
	24	75	70	460		
	25	75	70	480		
	26	75	70	500		

SENSITIVITY TESTS (Operating Conditions)

SENSITIVITY TEST 3: RESPONSE TO CARBON MONOXIDE AT 50% RELATIVE HUMIDITY AND 100°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	27	50	100	0		
	28	50	100	100		
	29	50	100	200		
	30	50	100	300		
	31	50	100	400		
	32	50	100	500		
	33	50	100	600		
	34	50	100	700		
	35	50	100	800		
	36	50	100	900		
	37	50	100	1000		
	38	50	100	1100		
	39	50	100	1200		

SENSITIVITY TEST 4: RESPONSE TO CARBON MONOXIDE AT 75% RELATIVE HUMIDITY AND 100°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	40	75	100	0		
	41	75	100	100		
	42	75	100	200		
	43	75	100	300		
	44	75	100	400		
	45	75	100	500		
	46	75	100	600		
	47	75	100	700		
	48	75	100	800		
	49	75	100	900		
	50	75	100	1000		
	51	75	100	1100		
	52	75	100	1200		

SENSITIVITY TEST 5: RESPONSE TO CARBON MONOXIDE AT 95% RELATIVE HUMIDITY AND 100°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	53	95	100	0		
	54	95	100	100		
	55	95	100	200		
	56	95	100	300		
	57	95	100	400		
	58	95	100	500		
	59	95	100	600		
	60	95	100	700		
	61	95	100	800		
	62	95	100	900		
	63	95	100	1000		
	64	95	100	1100		
	65	95	100	1200		

SENSITIVITY TESTS (Operating Conditions)

SENSITIVITY TEST 6: RESPONSE TO CARBON MONOXIDE AT 100% RELATIVE HUMIDITY AND 100°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	66	100	100	0		
	67	100	100	100		
	68	100	100	200		
	69	100	100	300		
	70	100	100	350		
	71	100	100	360		
	72	100	100	380		
	73	100	100	400		
	74	100	100	420		
	75	100	100	440		
	76	100	100	460		
	77	100	100	480		
	78	100	100	500		

SENSITIVITY TEST 7: RESPONSE TO CARBON MONOXIDE AT 50% RELATIVE HUMIDITY AND 100°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	79	50	100	0		
	80	50	100	100		
	81	50	100	200		
	82	50	100	320		
	83	50	100	340		
	84	50	100	360		
	85	50	100	380		
	86	50	100	400		
	87	50	100	420		
	88	50	100	440		
	89	50	100	460		
	90	50	100	480		
	91	50	100	500		

SENSITIVITY TEST 8: RESPONSE TO CARBON MONOXIDE AT 75% RELATIVE HUMIDITY AND 100°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	92	75	100	0		
	93	75	100	100		
	94	75	100	200		
	95	75	100	320		
	96	75	100	340		
	97	75	100	360		
	98	75	100	380		
	99	75	100	400		
	100	75	100	420		
	101	75	100	440		
	102	75	100	460		
	103	75	100	480		
	104	75	100	500		

SENSITIVITY TESTS (Operating Conditions)

SENSITIVITY TEST 9: RESPONSE TO CARBON MONOXIDE AT 95 % RELATIVE HUMIDITY AND 130°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	105	95	130	0		
	106	95	130	100		
	107	95	130	200		
	108	95	130	300		
	109	95	130	340		
	110	95	130	360		
	111	95	130	380		
	112	95	130	400		
	113	95	130	420		
	114	95	130	440		
	115	95	130	460		
	116	95	130	480		
	117	95	130	500		

SENSITIVITY TEST 10: RESPONSE TO CARBON MONOXIDE AT 100 % RELATIVE HUMIDITY AND 130°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	118	100	130	0		
	119	100	130	100		
	120	100	130	200		
	121	100	130	320		
	122	100	130	340		
	123	100	130	360		
	124	100	130	380		
	125	100	130	400		
	126	100	130	420		
	127	100	130	440		
	128	100	130	460		
	129	100	130	480		
	130	100	130	500		

SENSITIVITY TEST 11: RESPONSE TO CARBON MONOXIDE AT 50 % RELATIVE HUMIDITY AND 200°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	131	50	200	0		
	132	50	200	100		
	133	50	200	200		
	134	50	200	320		
	135	50	200	340		
	136	50	200	360		
	137	50	200	380		
	138	50	200	400		
	139	50	200	420		
	140	50	200	440		
	141	50	200	460		
	142	50	200	480		
	143	50	200	500		

SENSITIVITY TESTS (Operating Conditions)

SENSITIVITY TEST 12: RESPONSE TO CARBON MONOXIDE AT 75 % RELATIVE HUMIDITY AND 200°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Response to Target Gas (Other Gas Sensor Output (voltage, amperage, resistance, or other))
	144	75	200	0	0	
	145	75	200	100	100	
	146	75	200	200	200	
	147	75	200	300	300	
	148	75	200	400	400	
	149	75	200	500	500	
	150	75	200	600	600	
	151	75	200	700	700	
	152	75	200	800	800	
	153	75	200	900	900	
	154	75	200	1000	1000	
	155	75	200	1100	1100	
	156	75	200	1200	1200	

SENSITIVITY TEST 13: RESPONSE TO CARBON MONOXIDE AT 95 % RELATIVE HUMIDITY AND 200°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Response to Target Gas (Other Gas Sensor Output (voltage, amperage, resistance, or other))
	157	95	200	0	0	
	158	95	200	100	100	
	159	95	200	200	200	
	160	95	200	300	300	
	161	95	200	400	400	
	162	95	200	500	500	
	163	95	200	600	600	
	164	95	200	700	700	
	165	95	200	800	800	
	166	95	200	900	900	
	167	95	200	1000	1000	
	168	95	200	1100	1100	
	169	95	200	1200	1200	

SENSITIVITY TEST 14: RESPONSE TO CARBON MONOXIDE AT 100 % RELATIVE HUMIDITY AND 200°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Response to Target Gas (Other Gas Sensor Output (voltage, amperage, resistance, or other))
	170	100	200	0	0	
	171	100	200	100	100	
	172	100	200	200	200	
	173	100	200	300	300	
	174	100	200	400	400	
	175	100	200	500	500	
	176	100	200	600	600	
	177	100	200	700	700	
	178	100	200	800	800	
	179	100	200	900	900	
	180	100	200	1000	1000	
	181	100	200	1100	1100	
	182	100	200	1200	1200	

SENSITIVITY TESTS (Operating Conditions)

SENSITIVITY TEST 15: RESPONSE TO CARBON MONOXIDE AT 50 % RELATIVE HUMIDITY AND 300°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Response to Target Gas Other Gas Sensor Output (voltage, amperage, resistance, or other)
	183	50	50	300	0	
	184	50	50	300	100	
	185	50	50	300	200	
	186	50	50	300	320	
	187	50	50	300	340	
	188	50	50	300	360	
	189	50	50	300	380	
	190	50	50	300	400	
	191	50	50	300	420	
	192	50	50	300	440	
	193	50	50	300	460	
	194	50	50	300	480	
	195	50	50	300	500	

SENSITIVITY TEST 16: RESPONSE TO CARBON MONOXIDE AT 75 % RELATIVE HUMIDITY AND 300°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Response to Target Gas Other Gas Sensor Output (voltage, amperage, resistance, or other)
	196	75	75	300	0	
	197	75	75	300	100	
	198	75	75	300	200	
	199	75	75	300	320	
	200	75	75	300	340	
	201	75	75	300	360	
	202	75	75	300	380	
	203	75	75	300	400	
	204	75	75	300	420	
	205	75	75	300	440	
	206	75	75	300	460	
	207	75	75	300	480	
	208	75	75	300	500	

SENSITIVITY TEST 17: RESPONSE TO CARBON MONOXIDE AT 95 % RELATIVE HUMIDITY AND 300°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Response to Target Gas Other Gas Sensor Output (voltage, amperage, resistance, or other)
	209	95	95	300	0	
	210	95	95	300	100	
	211	95	95	300	200	
	212	95	95	300	320	
	213	95	95	300	340	
	214	95	95	300	360	
	215	95	95	300	380	
	216	95	95	300	400	
	217	95	95	300	420	
	218	95	95	300	440	
	219	95	95	300	460	
	220	95	95	300	480	
	221	95	95	300	500	

SENSITIVITY TESTS (Operating Conditions)

SENSITIVITY TEST 16: RESPONSE TO CARBON MONOXIDE AT 100 % RELATIVE HUMIDITY AND 300°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	222	100	300	0		
	223	100	300	100		
	224	100	300	300		
	225	100	300	300		
	226	100	300	300		
	227	100	300	300		
	228	100	300	300		
	229	100	300	300		
	230	100	300	300		
	231	100	300	300		
	232	100	300	300		
	233	100	300	300		
	234	100	300	300		

SENSITIVITY TEST 15: RESPONSE TO CARBON MONOXIDE AT 50 % RELATIVE HUMIDITY AND 400°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	235	50	400	0		
	236	50	400	100		
	237	50	400	200		
	238	50	400	300		
	239	50	400	300		
	240	50	400	300		
	241	50	400	300		
	242	50	400	300		
	243	50	400	300		
	244	50	400	300		
	245	50	400	300		
	246	50	400	300		
	247	50	400	300		

SENSITIVITY TEST 20: RESPONSE TO CARBON MONOXIDE AT 75 % RELATIVE HUMIDITY AND 400°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	248	75	400	0		
	249	75	400	100		
	250	75	400	200		
	251	75	400	300		
	252	75	400	300		
	253	75	400	300		
	254	75	400	300		
	255	75	400	300		
	256	75	400	300		
	257	75	400	300		
	258	75	400	300		
	259	75	400	300		
	260	75	400	300		

SENSITIVITY TESTS (Operating Conditions)

SENSITIVITY TEST 21: RESPONSE TO CARBON MONOXIDE AT 95 % RELATIVE HUMIDITY AND 400°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	261	95	400	0		
	262	95	400	100		
	263	95	400	200		
	264	95	400	320		
	265	95	400	340		
	266	95	400	360		
	267	95	400	380		
	268	95	400	400		
	269	95	400	420		
	270	95	400	440		
	271	95	400	460		
	272	95	400	480		
	273	95	400	500		

SENSITIVITY TEST 22: RESPONSE TO CARBON MONOXIDE AT 100 % RELATIVE HUMIDITY AND 400°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	274	100	400	0		
	275	100	400	100		
	276	100	400	200		
	277	100	400	320		
	278	100	400	340		
	279	100	400	360		
	280	100	400	380		
	281	100	400	400		
	282	100	400	420		
	283	100	400	440		
	284	100	400	460		
	285	100	400	480		
	286	100	400	500		

SENSITIVITY TEST 23: RESPONSE TO CARBON MONOXIDE AT 50 % RELATIVE HUMIDITY AND 500°F				Response to Target Gas		
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Other Gas Sensor Output (voltage, amperage, resistance, or other)
	287	50	500	0		
	288	50	500	100		
	289	50	500	200		
	290	50	500	320		
	291	50	500	340		
	292	50	500	360		
	293	50	500	380		
	294	50	500	400		
	295	50	500	420		
	296	50	500	440		
	297	50	500	460		
	298	50	500	480		
	299	50	500	500		

SENSITIVITY TESTS (Operating Conditions)

SENSITIVITY TEST 24: RESPONSE TO CARBON MONOXIDE AT 75% RELATIVE HUMIDITY AND 500°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Response to Target Gas Other Gas Sensor Output (voltage, amperage, resistance, or other)
	300	75	500	0		
	301	75	500	100		
	302	75	500	200		
	303	75	500	300		
	304	75	500	330		
	305	75	500	340		
	306	75	500	360		
	307	75	500	388		
	308	75	500	400		
	309	75	500	420		
	310	75	500	440		
	311	75	500	460		
	312	75	500	480		
				500		

SENSITIVITY TEST 25: RESPONSE TO CARBON MONOXIDE AT 95% RELATIVE HUMIDITY AND 500°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Response to Target Gas Other Gas Sensor Output (voltage, amperage, resistance, or other)
	313	95	500	0		
	314	95	500	100		
	315	95	500	200		
	316	95	500	220		
	317	95	500	240		
	318	95	500	340		
	319	95	500	360		
	320	95	500	380		
	321	95	500	400		
	322	95	500	420		
	323	95	500	440		
	324	95	500	460		
				480		
				500		

SENSITIVITY TEST 26: RESPONSE TO CARBON MONOXIDE AT 100% RELATIVE HUMIDITY AND 500°F						
Target Gas: Carbon Monoxide	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Variable Chamber Carbon Monoxide (ppm +/- 10 ppm)	Carbon Monoxide Sensor Output (voltage, amperage, resistance, or other)	Response to Target Gas Other Gas Sensor Output (voltage, amperage, resistance, or other)
	326	100	500	0		
	327	100	500	100		
	328	100	500	200		
	329	100	500	320		
	330	100	500	340		
	331	100	500	360		
	332	100	500	380		
	333	100	500	400		
	334	100	500	420		
	335	100	500	440		
	336	100	500	460		
	337	100	500	480		
	338	100	500	500		

SELECTIVITY TESTS (AMBIENT CONDITIONS)

SELECTIVITY TEST 1: RESPONSE TO INTERFERENT GASES AT 50 % RELATIVE HUMIDITY AND 70°F					
Gas or Vapor	Concentration (ppm)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			50	70	
n-Butane	300	1	50	70	
Clean Air			50	70	
Methane	500	2	50	70	
Clean Air			50	70	
Ammonia	50	3	50	70	
Clean Air			50	70	
Methanol	200	4	50	70	
Clean Air			50	70	
Ethanol	200	5	50	70	
Clean Air			50	70	
Acetone	200	6	50	70	
Clean Air			50	70	
n-Propanol	200	7	50	70	
Clean Air			50	70	
Ethyl-acetate	200	8	50	70	
Clean Air			50	70	
n-Heptane	500	9	50	70	
Clean Air			50	70	
Toluene	200	10	50	70	
Clean Air			50	70	
Tetrachloroethylene	200	11	50	70	

SELECTIVITY TEST 2: RESPONSE TO INTERFERENT GASES AT 75 % RELATIVE HUMIDITY AND 70°F					
Gas or Vapor	Concentration (ppm)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			75	70	
n-Butane	300	12	75	70	
Clean Air			75	70	
Methane	500	13	75	70	
Clean Air			75	70	
Ammonia	50	14	75	70	
Clean Air			75	70	
Methanol	200	15	75	70	
Clean Air			75	70	
Ethanol	200	16	75	70	
Clean Air			75	70	
Acetone	200	17	75	70	
Clean Air			75	70	
n-Propanol	200	18	75	70	
Clean Air			75	70	
Ethyl-acetate	200	19	75	70	
Clean Air			75	70	
n-Heptane	500	20	75	70	
Clean Air			75	70	
Toluene	200	21	75	70	
Clean Air			75	70	
Tetrachloroethylene	200	22	75	70	

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 3: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 100°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	100
HCl _x -MIN	tbd	23	50	50	100
HCl _x -AVG	tbd	24	50	50	100
HCl _x -MAX	tbd	25	50	50	100
Clean Air				50	100
NO _x -MIN	tbd	26	50	50	100
NO _x -AVG	tbd	27	50	50	100
NO _x -MAX	tbd	28	50	50	100
Clean Air				50	100
SO _x -MIN	tbd	29	50	50	100
SO _x -AVG	tbd	30	50	50	100
SO _x -MAX	tbd	31	50	50	100

SELECTIVITY TEST 4: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 100°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	100
HCl _x -MIN	tbd	32	75	75	100
HCl _x -AVG	tbd	33	75	75	100
HCl _x -MAX	tbd	34	75	75	100
Clean Air				75	100
NO _x -MIN	tbd	35	75	75	100
NO _x -AVG	tbd	36	75	75	100
NO _x -MAX	tbd	37	75	75	100
Clean Air				75	100
SO _x -MIN	tbd	38	75	75	100
SO _x -AVG	tbd	39	75	75	100
SO _x -MAX	tbd	40	75	75	100

SELECTIVITY TEST 5: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 100°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	100
HCl _x -MIN	tbd	41	95	95	100
HCl _x -AVG	tbd	42	95	95	100
HCl _x -MAX	tbd	43	95	95	100
Clean Air				95	100
NO _x -MIN	tbd	44	95	95	100
NO _x -AVG	tbd	45	95	95	100
NO _x -MAX	tbd	46	95	95	100
Clean Air				95	100
SO _x -MIN	tbd	47	95	95	100
SO _x -AVG	tbd	48	95	95	100
SO _x -MAX	tbd	49	95	95	100

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 6: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 100°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			100	100	
HCl _x -MIN	tbd	50	100	100	
HCl _x -AVG	tbd	51	100	100	
HCl _x -MAX	tbd	52	100	100	
Clean Air			100	100	
NO _x -MIN	tbd	53	100	100	
NO _x -AVG	tbd	54	100	100	
NO _x -MAX	tbd	55	100	100	
Clean Air			100	100	
SO _x -MIN	tbd	56	100	100	
SO _x -AVG	tbd	57	100	100	
SO _x -MAX	tbd	58	100	100	

SELECTIVITY TEST 7: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 130°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			50	130	
HCl _x -MIN	tbd	59	50	130	
HCl _x -AVG	tbd	60	50	130	
HCl _x -MAX	tbd	61	50	130	
Clean Air			50	130	
NO _x -MIN	tbd	62	50	130	
NO _x -AVG	tbd	63	50	130	
NO _x -MAX	tbd	64	50	130	
Clean Air			50	130	
SO _x -MIN	tbd	65	50	130	
SO _x -AVG	tbd	66	50	130	
SO _x -MAX	tbd	67	50	130	

SELECTIVITY TEST 8: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 130°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			75	130	
HCl _x -MIN	tbd	68	75	130	
HCl _x -AVG	tbd	69	75	130	
HCl _x -MAX	tbd	70	75	130	
Clean Air			75	130	
NO _x -MIN	tbd	71	75	130	
NO _x -AVG	tbd	72	75	130	
NO _x -MAX	tbd	73	75	130	
Clean Air			75	130	
SO _x -MIN	tbd	74	75	130	
SO _x -AVG	tbd	75	75	130	
SO _x -MAX	tbd	76	75	130	

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 9: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 130°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	130
HCl _{x-MIN}	tbd	77	95	95	130
HCl _{x-AVG}	tbd	78	95	95	130
HCl _{x-MAX}	tbd	79	95	95	130
Clean Air				95	130
NO _{x-MIN}	tbd	80	95	95	130
NO _{x-AVG}	tbd	81	95	95	130
NO _{x-MAX}	tbd	82	95	95	130
Clean Air				95	130
SO _{x-MIN}	tbd	83	95	95	130
SO _{x-AVG}	tbd	84	95	95	130
SO _{x-MAX}	tbd	85	95	95	130

SELECTIVITY TEST 10: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 130°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				100	130
HCl _{x-MIN}	tbd	86	100	100	130
HCl _{x-AVG}	tbd	87	100	100	130
HCl _{x-MAX}	tbd	88	100	100	130
Clean Air				100	130
NO _{x-MIN}	tbd	89	100	100	130
NO _{x-AVG}	tbd	90	100	100	130
NO _{x-MAX}	tbd	91	100	100	130
Clean Air				100	130
SO _{x-MIN}	tbd	92	100	100	130
SO _{x-AVG}	tbd	93	100	100	130
SO _{x-MAX}	tbd	94	100	100	130

SELECTIVITY TEST 11: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 200°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	200
HCl _{x-MIN}	tbd	95	50	50	200
HCl _{x-AVG}	tbd	96	50	50	200
HCl _{x-MAX}	tbd	97	50	50	200
Clean Air				50	200
NO _{x-MIN}	tbd	98	50	50	200
NO _{x-AVG}	tbd	99	50	50	200
NO _{x-MAX}	tbd	100	50	50	200
Clean Air				50	200
SO _{x-MIN}	tbd	101	50	50	200
SO _{x-AVG}	tbd	102	50	50	200
SO _{x-MAX}	tbd	103	50	50	200

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 12: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 200°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	200
HCl _x -MIN	tbd	104		75	200
HCl _x -AVG	tbd	105		75	200
HCl _x -MAX	tbd	106		75	200
Clean Air				75	200
NO _x -MIN	tbd	107		75	200
NO _x -AVG	tbd	108		75	200
NO _x -MAX	tbd	109		75	200
Clean Air				75	200
SO _x -MIN	tbd	110		75	200
SO _x -AVG	tbd	111		75	200
SO _x -MAX	tbd	112		75	200

SELECTIVITY TEST 13: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 200°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	200
HCl _x -MIN	tbd	113		95	200
HCl _x -AVG	tbd	114		95	200
HCl _x -MAX	tbd	115		95	200
Clean Air				95	200
NO _x -MIN	tbd	116		95	200
NO _x -AVG	tbd	117		95	200
NO _x -MAX	tbd	118		95	200
Clean Air				95	200
SO _x -MIN	tbd	119		95	200
SO _x -AVG	tbd	120		95	200
SO _x -MAX	tbd	121		95	200

SELECTIVITY TEST 14: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 200°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				100	200
HCl _x -MIN	tbd	122		100	200
HCl _x -AVG	tbd	123		100	200
HCl _x -MAX	tbd	124		100	200
Clean Air				100	200
NO _x -MIN	tbd	125		100	200
NO _x -AVG	tbd	126		100	200
NO _x -MAX	tbd	127		100	200
Clean Air				100	200
SO _x -MIN	tbd	128		100	200
SO _x -AVG	tbd	129		100	200
SO _x -MAX	tbd	130		100	200

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 15: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 300°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	300
HCl _x -MIN	tbd	131		50	300
HCl _x -AVG	tbd	132		50	300
HCl _x -MAX	tbd	133		50	300
Clean Air				50	300
NO _x -MIN	tbd	134		50	300
NO _x -AVG	tbd	135		50	300
NO _x -MAX	tbd	136		50	300
Clean Air				50	300
SO _x -MIN	tbd	137		50	300
SO _x -AVG	tbd	138		50	300
SO _x -MAX	tbd	139		50	300
				50	300

SELECTIVITY TEST 16: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 300°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	300
HCl _x -MIN	tbd	140		75	300
HCl _x -AVG	tbd	141		75	300
HCl _x -MAX	tbd	142		75	300
Clean Air				75	300
NO _x -MIN	tbd	143		75	300
NO _x -AVG	tbd	144		75	300
NO _x -MAX	tbd	145		75	300
Clean Air				75	300
SO _x -MIN	tbd	146		75	300
SO _x -AVG	tbd	147		75	300
SO _x -MAX	tbd	148		75	300

SELECTIVITY TEST 17: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 300°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	300
HCl _x -MIN	tbd	149		95	300
HCl _x -AVG	tbd	150		95	300
HCl _x -MAX	tbd	151		95	300
Clean Air				95	300
NO _x -MIN	tbd	152		95	300
NO _x -AVG	tbd	153		95	300
NO _x -MAX	tbd	154		95	300
Clean Air				95	300
SO _x -MIN	tbd	155		95	300
SO _x -AVG	tbd	156		95	300
SO _x -MAX	tbd	157		95	300

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 18: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 300°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				100	300
HCl _k -MIN	tbd	158		100	300
HCl _k -AVG	tbd	159		100	300
HCl _k -MAX	tbd	160		100	300
Clean Air				100	300
NO _x -MIN	tbd	161		100	300
NO _x -AVG	tbd	162		100	300
NO _x -MAX	tbd	163		100	300
Clean Air				100	300
SO _x -MIN	tbd	164		100	300
SO _x -AVG	tbd	165		100	300
SO _x -MAX	tbd	166		100	300

SELECTIVITY TEST 19: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 400°F					
Target Gas: Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	400
HCl _k -MIN	tbd	167		50	400
HCl _k -AVG	tbd	168		50	400
HCl _k -MAX	tbd	169		50	400
Clean Air				50	400
NO _x -MIN	tbd	170		50	400
NO _x -AVG	tbd	171		50	400
NO _x -MAX	tbd	172		50	400
Clean Air				50	400
SO _x -MIN	tbd	173		50	400
SO _x -AVG	tbd	174		50	400
SO _x -MAX	tbd	175		50	400

SELECTIVITY TEST 20: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 400°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	400
HCl _k -MIN	tbd	176		75	400
HCl _k -AVG	tbd	177		75	400
HCl _k -MAX	tbd	178		75	400
Clean Air				75	400
NO _x -MIN	tbd	179		75	400
NO _x -AVG	tbd	180		75	400
NO _x -MAX	tbd	181		75	400
Clean Air				75	400
SO _x -MIN	tbd	182		75	400
SO _x -AVG	tbd	183		75	400
SO _x -MAX	tbd	184		75	400

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 21: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 400°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	400
HCl _x -MIN	tbd	185	95	95	400
HCl _x -AVG	tbd	186	95	95	400
HCl _x -MAX	tbd	187	95	95	400
Clean Air				95	400
NO _x -MIN	tbd	188	95	95	400
NO _x -AVG	tbd	189	95	95	400
NO _x -MAX	tbd	190	95	95	400
Clean Air				95	400
SO _x -MIN	tbd	191	95	95	400
SO _x -AVG	tbd	192	95	95	400
SO _x -MAX	tbd	193	95	95	400

SELECTIVITY TEST 22: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 400°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				100	400
HCl _x -MIN	tbd	194	100	100	400
HCl _x -AVG	tbd	195	100	100	400
HCl _x -MAX	tbd	196	100	100	400
Clean Air				100	400
NO _x -MIN	tbd	197	100	100	400
NO _x -AVG	tbd	198	100	100	400
NO _x -MAX	tbd	199	100	100	400
Clean Air				100	400
SO _x -MIN	tbd	200	100	100	400
SO _x -AVG	tbd	201	100	100	400
SO _x -MAX	tbd	202	100	100	400

SELECTIVITY TEST 23: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 500°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	500
HCl _x -MIN	tbd	203	50	50	500
HCl _x -AVG	tbd	204	50	50	500
HCl _x -MAX	tbd	205	50	50	500
Clean Air				50	500
NO _x -MIN	tbd	206	50	50	500
NO _x -AVG	tbd	207	50	50	500
NO _x -MAX	tbd	208	50	50	500
Clean Air				50	500
SO _x -MIN	tbd	209	50	50	500
SO _x -AVG	tbd	210	50	50	500
SO _x -MAX	tbd	211	50	50	500

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 24: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 500°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	500
HCl _x -MIN	tbd	212		75	500
HCl _x -AVG	tbd	213		75	500
HCl _x -MAX	tbd	214		75	500
Clean Air				75	500
NO _x -MIN	tbd	215		75	500
NO _x -AVG	tbd	216		75	500
NO _x -MAX	tbd	217		75	500
Clean Air				75	500
SO _x -MIN	tbd	218		75	500
SO _x -AVG	tbd	219		75	500
SO _x -MAX	tbd	220		75	500

SELECTIVITY TEST 25: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 500°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	500
HCl _x -MIN	tbd	221		95	500
HCl _x -AVG	tbd	222		95	500
HCl _x -MAX	tbd	223		95	500
Clean Air				95	500
NO _x -MIN	tbd	224		95	500
NO _x -AVG	tbd	225		95	500
NO _x -MAX	tbd	226		95	500
Clean Air				95	500
SO _x -MIN	tbd	227		95	500
SO _x -AVG	tbd	228		95	500
SO _x -MAX	tbd	229		95	500

SELECTIVITY TEST 26: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 500°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				100	500
HCl _x -MIN	tbd	230		100	500
HCl _x -AVG	tbd	231		100	500
HCl _x -MAX	tbd	232		100	500
Clean Air				100	500
NO _x -MIN	tbd	233		100	500
NO _x -AVG	tbd	234		100	500
NO _x -MAX	tbd	235		100	500
Clean Air				100	500
SO _x -MIN	tbd	236		100	500
SO _x -AVG	tbd	237		100	500
SO _x -MAX	tbd	238		100	500

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 3: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 100°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	100
HCl _x -MIN	tbd	23		50	100
HCl _x -AVG	tbd	24		50	100
HCl _x -MAX	tbd	25		50	100
Clean Air				50	100
NO _x -MIN	tbd	26		50	100
NO _x -AVG	tbd	27		50	100
NO _x -MAX	tbd	28		50	100
Clean Air				50	100
SO _x -MIN	tbd	29		50	100
SO _x -AVG	tbd	30		50	100
SO _x -MAX	tbd	31		50	100

SELECTIVITY TEST 4: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 100°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	100
HCl _x -MIN	tbd	32		75	100
HCl _x -AVG	tbd	33		75	100
HCl _x -MAX	tbd	34		75	100
Clean Air				75	100
NO _x -MIN	tbd	35		75	100
NO _x -AVG	tbd	36		75	100
NO _x -MAX	tbd	37		75	100
Clean Air				75	100
SO _x -MIN	tbd	38		75	100
SO _x -AVG	tbd	39		75	100
SO _x -MAX	tbd	40		75	100

SELECTIVITY TEST 5: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 100°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	100
HCl _x -MIN	tbd	41		95	100
HCl _x -AVG	tbd	42		95	100
HCl _x -MAX	tbd	43		95	100
Clean Air				95	100
NO _x -MIN	tbd	44		95	100
NO _x -AVG	tbd	45		95	100
NO _x -MAX	tbd	46		95	100
Clean Air				95	100
SO _x -MIN	tbd	47		95	100
SO _x -AVG	tbd	48		95	100
SO _x -MAX	tbd	49		95	100

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 6: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 100°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			100	100	
HCl _k -MIN	tbd	50	100	100	
HCl _k -AVG	tbd	51	100	100	
HCl _k -MAX	tbd	52	100	100	
Clean Air			100	100	
NO _x -MIN	tbd	53	100	100	
NO _x -AVG	tbd	54	100	100	
NO _x -MAX	tbd	55	100	100	
Clean Air			100	100	
SO _x -MIN	tbd	56	100	100	
SO _x -AVG	tbd	57	100	100	
SO _x -MAX	tbd	58	100	100	

SELECTIVITY TEST 7: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 130°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			50	130	
HCl _k -MIN	tbd	59	50	130	
HCl _k -AVG	tbd	60	50	130	
HCl _k -MAX	tbd	61	50	130	
Clean Air			50	130	
NO _x -MIN	tbd	62	50	130	
NO _x -AVG	tbd	63	50	130	
NO _x -MAX	tbd	64	50	130	
Clean Air			50	130	
SO _x -MIN	tbd	65	50	130	
SO _x -AVG	tbd	66	50	130	
SO _x -MAX	tbd	67	50	130	

SELECTIVITY TEST 8: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 130°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			75	130	
HCl _k -MIN	tbd	68	75	130	
HCl _k -AVG	tbd	69	75	130	
HCl _k -MAX	tbd	70	75	130	
Clean Air			75	130	
NO _x -MIN	tbd	71	75	130	
NO _x -AVG	tbd	72	75	130	
NO _x -MAX	tbd	73	75	130	
Clean Air			75	130	
SO _x -MIN	tbd	74	75	130	
SO _x -AVG	tbd	75	75	130	
SO _x -MAX	tbd	76	75	130	

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 9: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 130°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	130
HCl _k -MIN	tbd	77	95	130	
HCl _k -AVG	tbd	78	95	130	
HCl _k -MAX	tbd	79	95	130	
Clean Air				95	130
NO _x -MIN	tbd	80	95	130	
NO _x -AVG	tbd	81	95	130	
NO _x -MAX	tbd	82	95	130	
Clean Air				95	130
SO _x -MIN	tbd	83	95	130	
SO _x -AVG	tbd	84	95	130	
SO _x -MAX	tbd	85	95	130	

SELECTIVITY TEST 10: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 130°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				100	130
HCl _k -MIN	tbd	86	100	130	
HCl _k -AVG	tbd	87	100	130	
HCl _k -MAX	tbd	88	100	130	
Clean Air				100	130
NO _x -MIN	tbd	89	100	130	
NO _x -AVG	tbd	90	100	130	
NO _x -MAX	tbd	91	100	130	
Clean Air				100	130
SO _x -MIN	tbd	92	100	130	
SO _x -AVG	tbd	93	100	130	
SO _x -MAX	tbd	94	100	130	

SELECTIVITY TEST 11: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 200°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	200
HCl _k -MIN	tbd	95	50	200	
HCl _k -AVG	tbd	96	50	200	
HCl _k -MAX	tbd	97	50	200	
Clean Air				50	200
NO _x -MIN	tbd	98	50	200	
NO _x -AVG	tbd	99	50	200	
NO _x -MAX	tbd	100	50	200	
Clean Air				50	200
SO _x -MIN	tbd	101	50	200	
SO _x -AVG	tbd	102	50	200	
SO _x -MAX	tbd	103	50	200	

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 12: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 200°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	200
HCl _x -MIN	tbd	104	75	200	
HCl _x -AVG	tbd	105	75	200	
HCl _x -MAX	tbd	106	75	200	
Clean Air				75	200
NO _x -MIN	tbd	107	75	200	
NO _x -AVG	tbd	108	75	200	
NO _x -MAX	tbd	109	75	200	
Clean Air				75	200
SO _x -MIN	tbd	110	75	200	
SO _x -AVG	tbd	111	75	200	
SO _x -MAX	tbd	112	75	200	

SELECTIVITY TEST 13: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 200°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	200
HCl _x -MIN	tbd	113	95	200	
HCl _x -AVG	tbd	114	95	200	
HCl _x -MAX	tbd	115	95	200	
Clean Air				95	200
NO _x -MIN	tbd	116	95	200	
NO _x -AVG	tbd	117	95	200	
NO _x -MAX	tbd	118	95	200	
Clean Air				95	200
SO _x -MIN	tbd	119	95	200	
SO _x -AVG	tbd	120	95	200	
SO _x -MAX	tbd	121	95	200	

SELECTIVITY TEST 14: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 200°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				100	200
HCl _x -MIN	tbd	122	100	200	
HCl _x -AVG	tbd	123	100	200	
HCl _x -MAX	tbd	124	100	200	
Clean Air				100	200
NO _x -MIN	tbd	125	100	200	
NO _x -AVG	tbd	126	100	200	
NO _x -MAX	tbd	127	100	200	
Clean Air				100	200
SO _x -MIN	tbd	128	100	200	
SO _x -AVG	tbd	129	100	200	
SO _x -MAX	tbd	130	100	200	

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 15: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 300°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	300
HCl _x -MIN	tbd	131	50	300	
HCl _x -AVG	tbd	132	50	300	
HCl _x -MAX	tbd	133	50	300	
Clean Air				50	300
NO _x -MIN	tbd	134	50	300	
NO _x -AVG	tbd	135	50	300	
NO _x -MAX	tbd	136	50	300	
Clean Air				50	300
SO _x -MIN	tbd	137	50	300	
SO _x -AVG	tbd	138	50	300	
SO _x -MAX	tbd	139	50	300	

SELECTIVITY TEST 16: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 300°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	300
HCl _x -MIN	tbd	140	75	300	
HCl _x -AVG	tbd	141	75	300	
HCl _x -MAX	tbd	142	75	300	
Clean Air				75	300
NO _x -MIN	tbd	143	75	300	
NO _x -AVG	tbd	144	75	300	
NO _x -MAX	tbd	145	75	300	
Clean Air				75	300
SO _x -MIN	tbd	146	75	300	
SO _x -AVG	tbd	147	75	300	
SO _x -MAX	tbd	148	75	300	

SELECTIVITY TEST 17: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 300°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	300
HCl _x -MIN	tbd	149	95	300	
HCl _x -AVG	tbd	150	95	300	
HCl _x -MAX	tbd	151	95	300	
Clean Air				95	300
NO _x -MIN	tbd	152	95	300	
NO _x -AVG	tbd	153	95	300	
NO _x -MAX	tbd	154	95	300	
Clean Air				95	300
SO _x -MIN	tbd	155	95	300	
SO _x -AVG	tbd	156	95	300	
SO _x -MAX	tbd	157	95	300	

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 18: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 300°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			100	300	
HCl _x -MIN	tbd	158	100	300	
HCl _x -AVG	tbd	159	100	300	
HCl _x -MAX	tbd	160	100	300	
Clean Air			100	300	
NO _x -MIN	tbd	161	100	300	
NO _x -AVG	tbd	162	100	300	
NO _x -MAX	tbd	163	100	300	
Clean Air			100	300	
SO _x -MIN	tbd	164	100	300	
SO _x -AVG	tbd	165	100	300	
SO _x -MAX	tbd	166	100	300	

SELECTIVITY TEST 19: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 400°F					
Target Gas: Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			50	400	
HCl _x -MIN	tbd	167	50	400	
HCl _x -AVG	tbd	168	50	400	
HCl _x -MAX	tbd	169	50	400	
Clean Air			50	400	
NO _x -MIN	tbd	170	50	400	
NO _x -AVG	tbd	171	50	400	
NO _x -MAX	tbd	172	50	400	
Clean Air			50	400	
SO _x -MIN	tbd	173	50	400	
SO _x -AVG	tbd	174	50	400	
SO _x -MAX	tbd	175	50	400	

SELECTIVITY TEST 20: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 400°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			75	400	
HCl _x -MIN	tbd	176	75	400	
HCl _x -AVG	tbd	177	75	400	
HCl _x -MAX	tbd	178	75	400	
Clean Air			75	400	
NO _x -MIN	tbd	179	75	400	
NO _x -AVG	tbd	180	75	400	
NO _x -MAX	tbd	181	75	400	
Clean Air			75	400	
SO _x -MIN	tbd	182	75	400	
SO _x -AVG	tbd	183	75	400	
SO _x -MAX	tbd	184	75	400	

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 21: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 400°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	400
HCl _x -MIN	tbd	185		95	400
HCl _x -AVG	tbd	186		95	400
HCl _x -MAX	tbd	187		95	400
Clean Air				95	400
NO _x -MIN	tbd	188		95	400
NO _x -AVG	tbd	189		95	400
NO _x -MAX	tbd	190		95	400
Clean Air				95	400
SO _x -MIN	tbd	191		95	400
SO _x -AVG	tbd	192		95	400
SO _x -MAX	tbd	193		95	400

SELECTIVITY TEST 22: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 400°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				100	400
HCl _x -MIN	tbd	194		100	400
HCl _x -AVG	tbd	195		100	400
HCl _x -MAX	tbd	196		100	400
Clean Air				100	400
NO _x -MIN	tbd	197		100	400
NO _x -AVG	tbd	198		100	400
NO _x -MAX	tbd	199		100	400
Clean Air				100	400
SO _x -MIN	tbd	200		100	400
SO _x -AVG	tbd	201		100	400
SO _x -MAX	tbd	202		100	400

SELECTIVITY TEST 23: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 500°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	500
HCl _x -MIN	tbd	203		50	500
HCl _x -AVG	tbd	204		50	500
HCl _x -MAX	tbd	205		50	500
Clean Air				50	500
NO _x -MIN	tbd	206		50	500
NO _x -AVG	tbd	207		50	500
NO _x -MAX	tbd	208		50	500
Clean Air				50	500
SO _x -MIN	tbd	209		50	500
SO _x -AVG	tbd	210		50	500
SO _x -MAX	tbd	211		50	500

SELECTIVITY TESTS (Appliance Operating Conditions/Individual Combustion Products)

SELECTIVITY TEST 24: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 500°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	500
HCl _x -MIN	tbd	212		75	500
HCl _x -AVG	tbd	213		75	500
HCl _x -MAX	tbd	214		75	500
Clean Air				75	500
NO _x -MIN	tbd	215		75	500
NO _x -AVG	tbd	216		75	500
NO _x -MAX	tbd	217		75	500
Clean Air				75	500
SO _x -MIN	tbd	218		75	500
SO _x -AVG	tbd	219		75	500
SO _x -MAX	tbd	220		75	500

SELECTIVITY TEST 25: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 500°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	500
HCl _x -MIN	tbd	221		95	500
HCl _x -AVG	tbd	222		95	500
HCl _x -MAX	tbd	223		95	500
Clean Air				95	500
NO _x -MIN	tbd	224		95	500
NO _x -AVG	tbd	225		95	500
NO _x -MAX	tbd	226		95	500
Clean Air				95	500
SO _x -MIN	tbd	227		95	500
SO _x -AVG	tbd	228		95	500
SO _x -MAX	tbd	229		95	500

SELECTIVITY TEST 26: RESPONSE TO INDIVIDUAL COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 500°F					
Gas or Combustion Product	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				100	500
HCl _x -MIN	tbd	230		100	500
HCl _x -AVG	tbd	231		100	500
HCl _x -MAX	tbd	232		100	500
Clean Air				100	500
NO _x -MIN	tbd	233		100	500
NO _x -AVG	tbd	234		100	500
NO _x -MAX	tbd	235		100	500
Clean Air				100	500
SO _x -MIN	tbd	236		100	500
SO _x -AVG	tbd	237		100	500
SO _x -MAX	tbd	238		100	500

SELECTIVITY TESTS (Appliance Operating Conditions/All Combustion Products)

SELECTIVITY TEST 27: RESPONSE TO COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 100°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			50	100	
Comb. Prods. _{MIN}	tbd	239	50	100	
Comb. Prods. _{AVG}	tbd	240	50	100	
Comb. Prods. _{MAX}	tbd	241	50	100	

SELECTIVITY TEST 28: RESPONSE TO COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 100°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			75	100	
Comb. Prods. _{MIN}	tbd	242	75	100	
Comb. Prods. _{AVG}	tbd	243	75	100	
Comb. Prods. _{MAX}	tbd	244	75	100	

SELECTIVITY TEST 29: RESPONSE TO COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 100°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			95	100	
Comb. Prods. _{MIN}	tbd	245	95	100	
Comb. Prods. _{AVG}	tbd	246	95	100	
Comb. Prods. _{MAX}	tbd	247	95	100	

SELECTIVITY TEST 30: RESPONSE TO COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 100°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			100	100	
Comb. Prods. _{MIN}	tbd	248	100	100	
Comb. Prods. _{AVG}	tbd	249	100	100	
Comb. Prods. _{MAX}	tbd	250	100	100	

SELECTIVITY TEST 31: RESPONSE TO COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 130°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			50	130	
Comb. Prods. _{MIN}	tbd	251	50	130	
Comb. Prods. _{AVG}	tbd	252	50	130	
Comb. Prods. _{MAX}	tbd	253	50	130	

SELECTIVITY TEST 32: RESPONSE TO COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 130°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			75	130	
Comb. Prods. _{MIN}	tbd	254	75	130	
Comb. Prods. _{AVG}	tbd	255	75	130	
Comb. Prods. _{MAX}	tbd	256	75	130	

SELECTIVITY TESTS (Appliance Operating Conditions/All Combustion Products)

SELECTIVITY TEST 33: RESPONSE TO COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 130°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			95	130	
Comb. Prods. _{MIN}	tbd	257	95	130	
Comb. Prods. _{AVG}	tbd	258	95	130	
Comb. Prods. _{MAX}	tbd	259	95	130	

SELECTIVITY TEST 34: RESPONSE TO COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 130°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			100	130	
Comb. Prods. _{MIN}	tbd	260	100	130	
Comb. Prods. _{AVG}	tbd	261	100	130	
Comb. Prods. _{MAX}	tbd	262	100	130	

SELECTIVITY TEST 35: RESPONSE TO COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 200°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			50	200	
Comb. Prods. _{MIN}	tbd	239	50	200	
Comb. Prods. _{AVG}	tbd	240	50	200	
Comb. Prods. _{MAX}	tbd	241	50	200	

SELECTIVITY TEST 36: RESPONSE TO COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 200°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			75	200	
Comb. Prods. _{MIN}	tbd	242	75	200	
Comb. Prods. _{AVG}	tbd	243	75	200	
Comb. Prods. _{MAX}	tbd	244	75	200	

SELECTIVITY TEST 37: RESPONSE TO COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 200°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			95	200	
Comb. Prods. _{MIN}	tbd	245	95	200	
Comb. Prods. _{AVG}	tbd	246	95	200	
Comb. Prods. _{MAX}	tbd	247	95	200	

SELECTIVITY TEST 38: RESPONSE TO COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 200°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air			100	200	
Comb. Prods. _{MIN}	tbd	248	100	200	
Comb. Prods. _{AVG}	tbd	249	100	200	
Comb. Prods. _{MAX}	tbd	250	100	200	

SELECTIVITY TESTS (Appliance Operating Conditions/All Combustion Products)

SELECTIVITY TEST 39: RESPONSE TO COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 300°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	300
Comb. Prods. _{MIN}	tbd	251		50	300
Comb. Prods. _{AVG}	tbd	252		50	300
Comb. Prods. _{MAX}	tbd	253		50	300

SELECTIVITY TEST 40: RESPONSE TO COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 300°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	300
Comb. Prods. _{MIN}	tbd	254		75	300
Comb. Prods. _{AVG}	tbd	255		75	300
Comb. Prods. _{MAX}	tbd	256		75	300

SELECTIVITY TEST 41: RESPONSE TO COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 300°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				95	300
Comb. Prods. _{MIN}	tbd	257		95	300
Comb. Prods. _{AVG}	tbd	258		95	300
Comb. Prods. _{MAX}	tbd	259		95	300

SELECTIVITY TEST 42: RESPONSE TO COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 300°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				100	300
Comb. Prods. _{MIN}	tbd	260		100	300
Comb. Prods. _{AVG}	tbd	261		100	300
Comb. Prods. _{MAX}	tbd	262		100	300

SELECTIVITY TEST 43: RESPONSE TO COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 400°F					
Target Gas: All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				50	400
Comb. Prods. _{MIN}	tbd	263		50	400
Comb. Prods. _{AVG}	tbd	264		50	400
Comb. Prods. _{MAX}	tbd	265		50	400

SELECTIVITY TEST 44: RESPONSE TO COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 400°F					
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)
Clean Air				75	400
Comb. Prods. _{MIN}	tbd	266		75	400
Comb. Prods. _{AVG}	tbd	267		75	400
Comb. Prods. _{MAX}	tbd	268		75	400

SELECTIVITY TESTS (Appliance Operating Conditions/All Combustion Products)

SELECTIVITY TEST 45: RESPONSE TO COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 400°F						
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)	
Clean Air				95	400	
Comb. Prods. _{-MIN}	tbd	269		95	400	
Comb. Prods. _{-AVG}	tbd	270		95	400	
Comb. Prods. _{-MAX}	tbd	271		95	400	

SELECTIVITY TEST 46: RESPONSE TO COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 400°F						
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)	
Clean Air				100	400	
Comb. Prods. _{-MIN}	tbd	272		100	400	
Comb. Prods. _{-AVG}	tbd	273		100	400	
Comb. Prods. _{-MAX}	tbd	274		100	400	

SELECTIVITY TEST 47: RESPONSE TO COMBUSTION PRODUCTS AT 50 % RELATIVE HUMIDITY AND 500°F						
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)	
Clean Air				50	500	
Comb. Prods. _{-MIN}	tbd	275		50	500	
Comb. Prods. _{-AVG}	tbd	276		50	500	
Comb. Prods. _{-MAX}	tbd	277		50	500	

SELECTIVITY TEST 48: RESPONSE TO COMBUSTION PRODUCTS AT 75 % RELATIVE HUMIDITY AND 500°F						
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)	
Clean Air				75	500	
Comb. Prods. _{-MIN}	tbd	278		75	500	
Comb. Prods. _{-AVG}	tbd	279		75	500	
Comb. Prods. _{-MAX}	tbd	280		75	500	

SELECTIVITY TEST 49: RESPONSE TO COMBUSTION PRODUCTS AT 95 % RELATIVE HUMIDITY AND 500°F						
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)	
Clean Air				95	500	
Comb. Prods. _{-MIN}	tbd	281		95	500	
Comb. Prods. _{-AVG}	tbd	282		95	500	
Comb. Prods. _{-MAX}	tbd	283		95	500	

SELECTIVITY TEST 50: RESPONSE TO COMBUSTION PRODUCTS AT 100 % RELATIVE HUMIDITY AND 500°F						
All Combustion Products	Concentration (ppm or %)	Overall Test Number	Constant Chamber Relative Humidity (% R.H. +/- 5% R.H.)	Constant Chamber Temperature (°F +/- 5°F)	Response to Interferent Gas All Gas Sensor Output (voltage, amperage, resistance, or other)	
Clean Air				100	500	
Comb. Prods. _{-MIN}	tbd	284		100	500	
Comb. Prods. _{-AVG}	tbd	285		100	500	
Comb. Prods. _{-MAX}	tbd	286		100	500	

EXISTING STANDARDS TO BE CONSIDERED FOR TEST AND EVALUATION OF CO/COMBUSTION SENSORS FOR VENTED GAS HEATING APPLIANCES

CSA 6.19-01, RESIDENTIAL CARBON MONOXIDE ALARMING DEVICES

Section	Performance Tests
7.2	Normal Operation Test
7.8	Stability Tests
7.9	Temperature Test
7.11	Endurance Test
7.13	Humidity Test
7.19	Dust Test

Manufacturing and Production Tests

9.1	Required Time-of-Manufacture Reliability
9.2	Measurement of In-service Reliability
9.3	Sensitivity Calibration Tests

GRI-02/0112, EVALUATING THE PERFORMANCE OF RESIDENTIAL CO ALARMS

Sensitivity Test A	50 and 70 ppm CO
Sensitivity Test B	150 and 400 ppm CO
Sensitivity Test C	Progressively Increasing CO Concentration
Sensitivity Test H	70, 150 and 400 ppm CO
Sensitivity Test D	30 ppm CO
Sensitivity Tests E and F	Varying Relative Humidity

ADDITIONAL CHAMBER TEST SCENARIOS TO CONSIDER

Progressively Increasing Target Gas Concentration at Varying Relative Humidities and Temperatures
 Multigas Interference Tests at Varying Relative Humidities and Temperatures
 In-Situ appliance endurance testing