

Date	28 February 2019
Time	14:45:44
Test Number	HRSG Test 54
Mixture Composition	100% CH4
Ambient Temperature	6.9 °C
Ambient Pressure	965 mbar
Wind Speed	4 m/s
Wind direction	NNW
Relative Humidity	90.00%
Mass Flow	9.7040 kg/s
Equivalence Ratio	0.51

**General Comments: (weather, rig configuration)**

Weather: Cloudy with occasional shower.

Rig configuration: 4 x 3m circular duct; expansion section and HRSG attached. End Plate attached. Igniter 258mm from beginning of 2nd circular duct section

Engine Speed: 12%; 8,100 rpm

Test on 100% CH4 at an intended EQR of 0.50  
LOW TEMPERATURE TESTS (NOMINAL 320 oC).

Test gave a weak combustion event with most sensors providing a good response albeit weak after HE.

**Ionisation Probes**

**Ionisation Rakes**

**Optical Probes**

Max overpressure  
102 mbar

Max. gas temperature  
929 °C

Max. flame speed  
94 m/s

Max. flame speed  
82 m/s

Max. flame speed  
124 m/s

Initial gas temperature  
250 °C

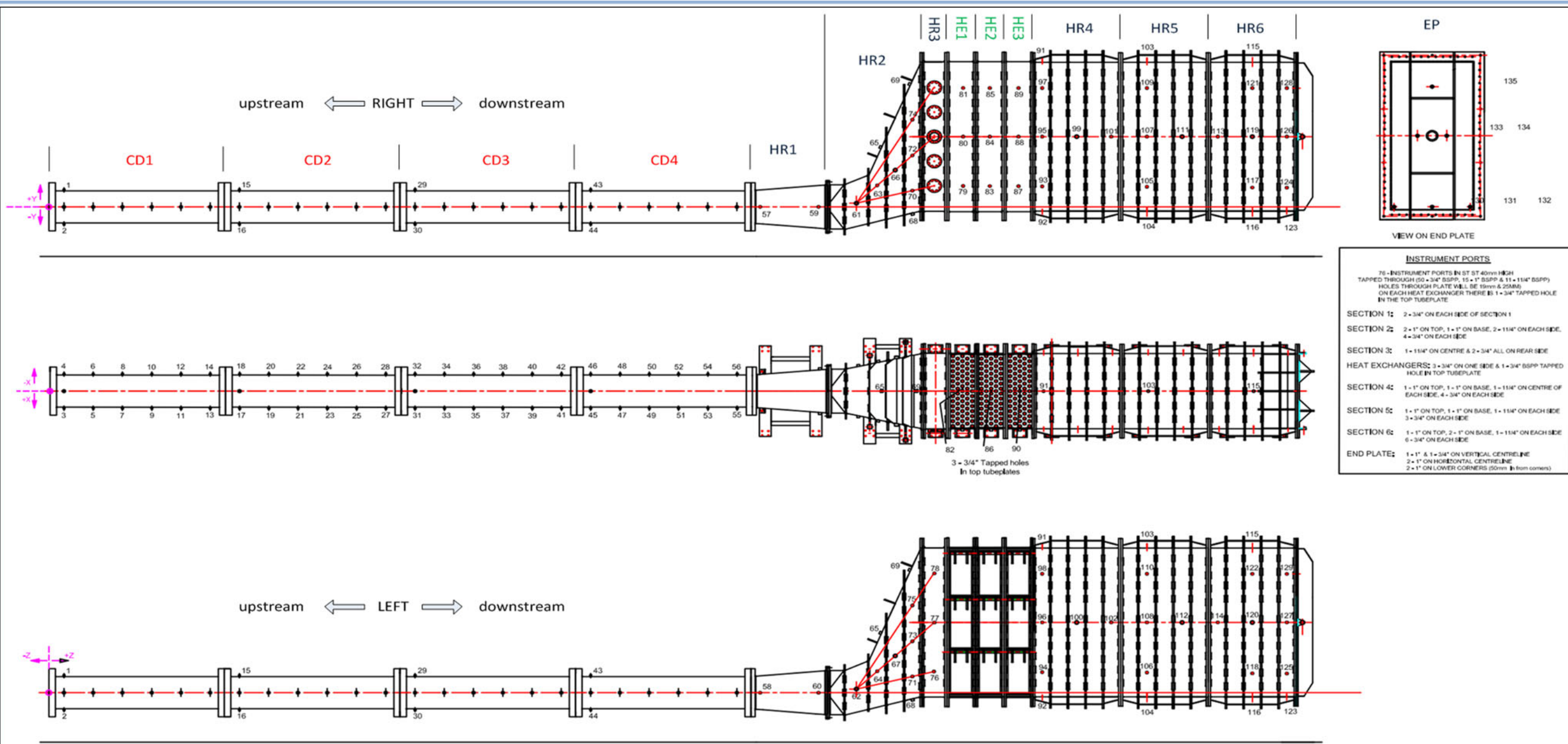
Location of Max. Overpressure  
sensor KU9  
label HR6-R3L  
distance 20575 mm

Location of Max. Temperature  
sensor TC19  
label HR3-L1M  
distance 15140 mm

Location of Max. Flame Speed  
sensor IP8  
label HR3-L1U  
distance 15140 mm

Location of Max. Flame Speed  
sensor RA1  
label HR2-R2M  
distance 13785 mm

Location of Max. Flame Speed  
sensor OP1  
label CD4-R6  
distance 11758 mm



**Naming Convention**

Section Identifier  
i.e. HE, HR, CD or EP

Section Number (1-6)  
Numbered from downstream to upstream

Vertical position in section (sides only) i.e. U, M or L.  
Absence of letter denotes centreline

Longitudinal position in section (numbered from 1)

Side  
i.e. R, L, T or B

**Key**

CD	Circular duct	U	Upper
HR	HRSG	M	Middle
HE	Heat Exchanger	L	Lower
EP	End Plate	R	Right Side (when viewed downstream from engine)
		L	Left Side
		T	Top
		B	Bottom

There are 13 sections on the rig

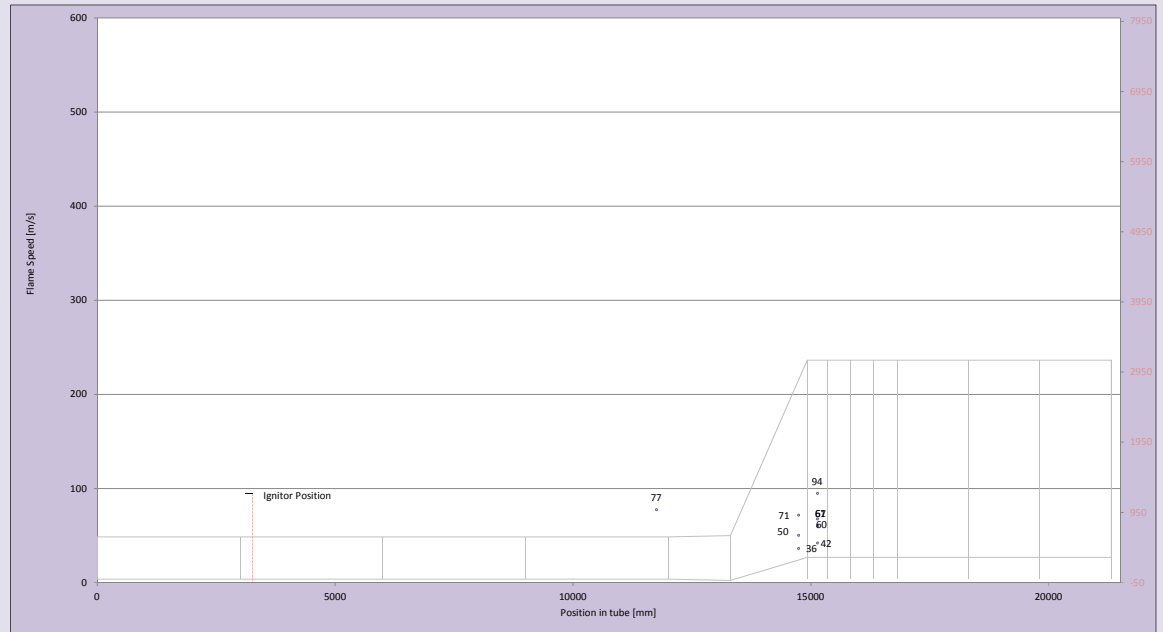
- 4 circular duct sections (CD1 to CD4)
- 6 HRSG sections (HR1 to HR6)
- 3 heat exchanger sections (HE1 to HE3) located between HR3 and HR4

Location of igniter  mm Time of ignition  seconds

IP Number	Location label	Data Name	Position in tube (mm)	Flame arrival time (s)	Avg Flame speed from last sensor (m/s)
IP0	CD4-L6	Ionisation probe 0	11758	1.43889	77
IP1	HR2-L5L	Ionisation probe 1	14745	1.48075	71
IP2	HR2-L5M	Ionisation probe 2	14745	1.49838	50
IP3	HR2-L5U	Ionisation probe 3	14745	1.52197	36
IP4	HR3-R1L	Ionisation probe 4	15140	1.49465	61
IP5	HR3-R1LM	Ionisation probe 5	15140	1.48918	67
IP6	HR3-R1M	Ionisation probe 6	15140	1.49551	60
IP7	HR3-R1U	Ionisation probe 7	15140	1.51965	42
IP8	HR3-L1U	Ionisation probe 8	15140	1.52615	94
IP9	HE2-R1M	Ionisation probe 9	16090	1.47714	
IP10	HR4-L1L	Ionisation probe 10	16985	1.48116	
IP11	HR4-L1M	Ionisation probe 11	16985	1.48377	
IP12	HR4-L1U	Ionisation probe 12	16985	1.48877	
IP13	HR4-R1U	Ionisation probe 13	16985		
IP14	HR4-R3U	Ionisation probe 14	17575		
IP15	HR4-L5L	Ionisation probe 15	18165		
IP16	HR4-L5M	Ionisation probe 16	18165		
IP17	HR4-L5U	Ionisation probe 17	18165	2.02332	
IP18	HR4-R5M	Ionisation probe 18	18165		
IP19	HR5-L2L	Ionisation probe 19	18775		
IP20	HR5-L2M	Ionisation probe 20	18775	2.26544	
IP21	HR5-L2U	Ionisation probe 21	18775	2.11812	
IP22	HR5-R2U	Ionisation probe 22	18775	2.22115	
IP23	HR6-L1M	Ionisation probe 23	19985		

KEY: ND - not detected - sensor working but flame too weak to be picked up  
 NW - not working - sensor not

Most sensors did give a response to the combustion event albeit weaker after th HE - precise flame arrival time was not easily identified in these cases. Further analysis required

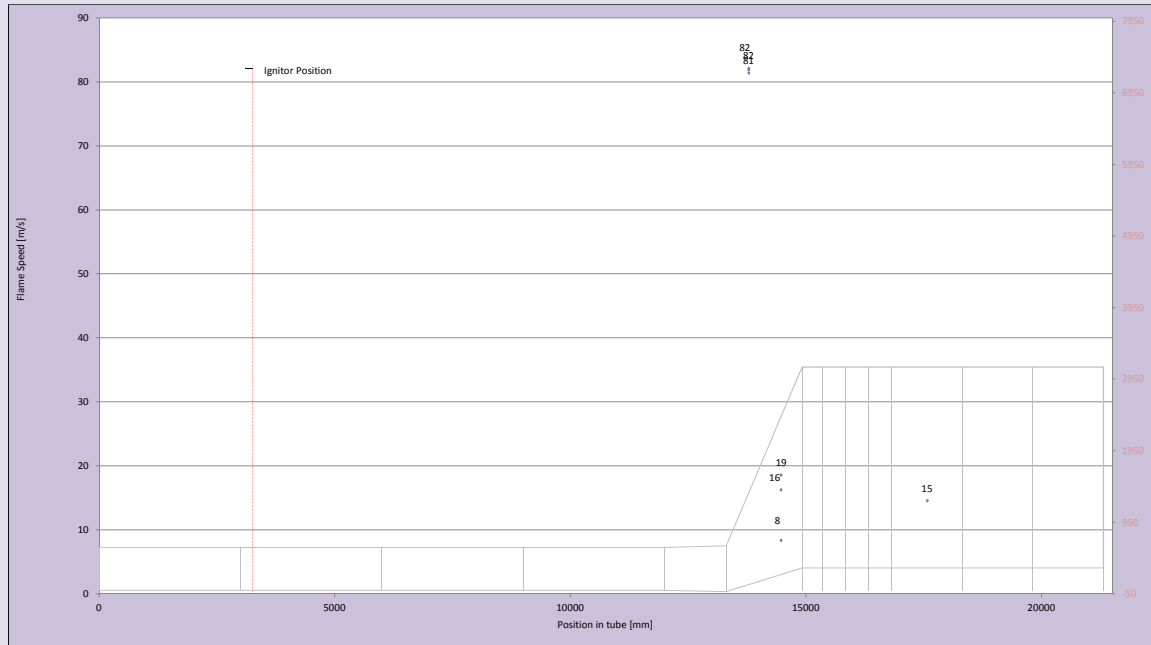


Location of igniter 3258 mm Time of ignition 1.32902 seconds

Rake Number	IP Number	Location label	Data Name	Position in tube (mm)	Flame arrival time (s)	Avg Flame speed from last sensor (m/s)
RA1	IP24	HR2-R2M	IP24	13785	1.4572	82
RA1	IP25	HR2-R2M	IP25	13785	1.4575	82
RA1	IP26	HR2-R2M	IP26	13785	1.4583	81
RA2	IP27	HR2-R4M	IP27	14475	1.4943	19
RA2	IP28	HR2-R4M	IP28	14475	1.5399	8
RA2	IP29	HR2-R4M	IP29	14475	1.5007	16
RA3	IP30	HR4-R3M	IP30	17575	NW	
RA3	IP31	HR4-R3M	IP31	17575	NW	
RA3	IP32	HR4-R3M	IP32	17575	NW	
RA4	IP33	HR4-R3L	IP33	17575	NW	
RA4	IP34	HR4-R3L	IP34	17575	NW	
RA4	IP35	HR4-R3L	IP35	17575	1.7131	15

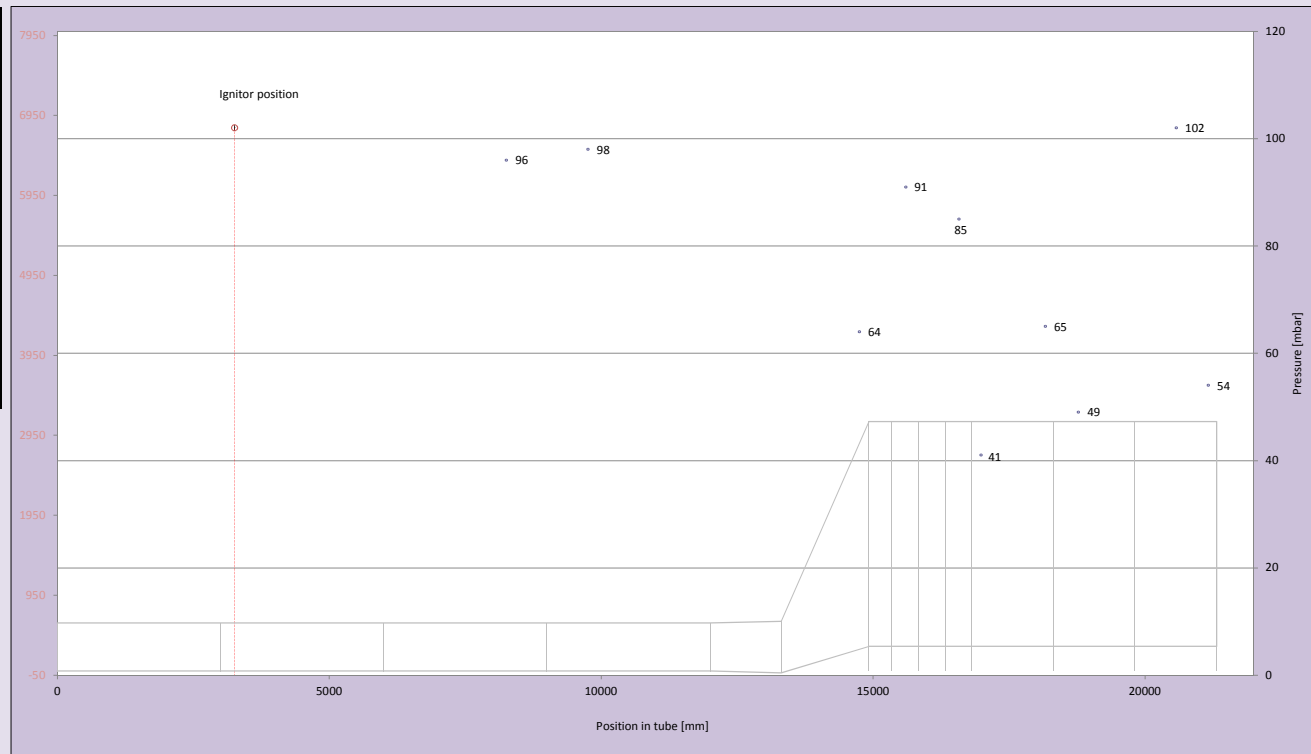
KEY: ND - not detected - sensor working but flame too weak to be picked up  
 NW - not working - sensor not working.

A very weak combustion event.



Location of igniter  mm

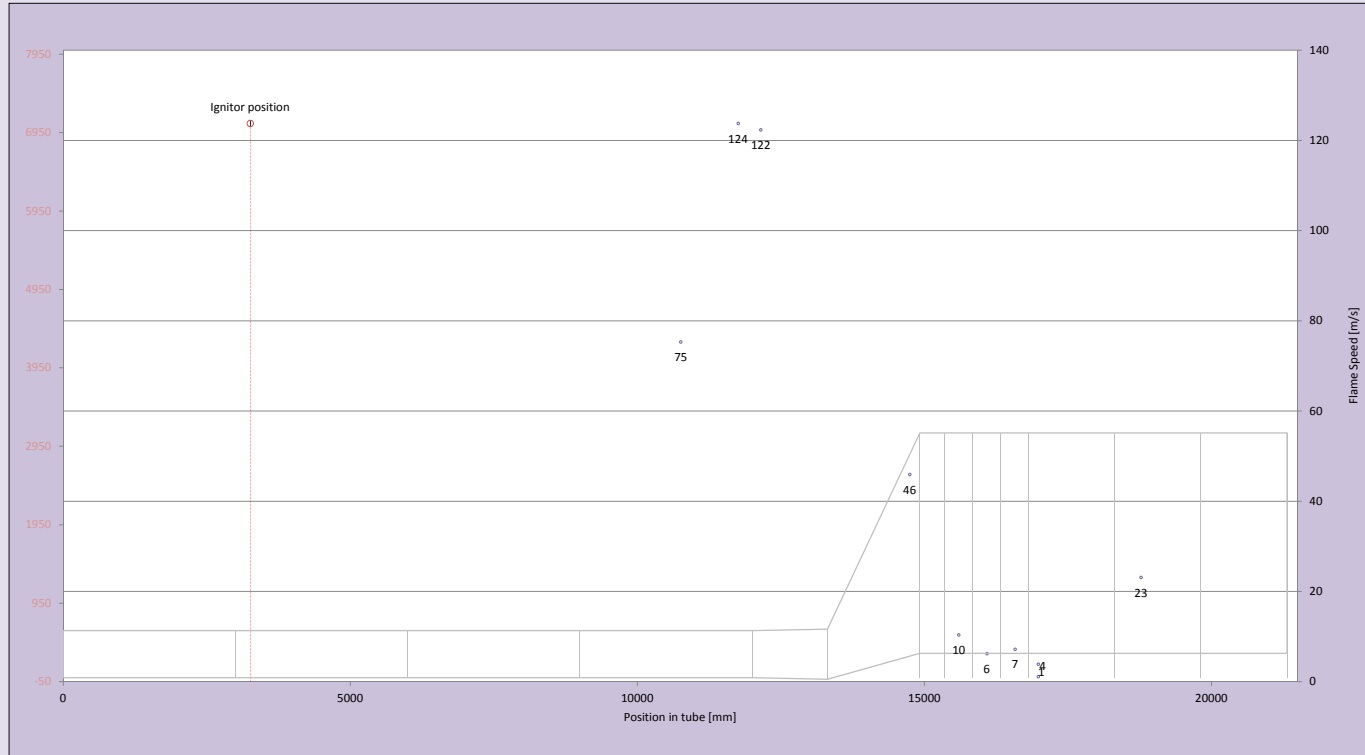
Transducer number	Location	Position in tube [mm]	$\Delta P_{max}$ [mbar]	Time $\Delta P_{max}$ [sec]
KU0	CD3-R5	8258	96	1.4947
KU1	CD4-R2	9758	98	1.4858
KU2	HR2-T5	14745	64	1.4859
KU3	HR3-L1L	15140		
KU4	HE1-R1U	15600	91	1.4913
KU5	HE3-R1L	16580	85	1.4854
KU6	HR4-R1L	16985	41	1.4943
KU7	HR4-R5U	18165	65	1.5059
KU8	HR5-R2L	18775	49	1.4952
KU9	HR6-R3L	20575	102	1.5005
KU10	HR6-L5L	21165	54	1.5002



Location of igniter 3258 mm Time of ignition 1.32902 seconds

OP Number	Location label	Position in tube (mm)	Flame arrival time (s)	Average flame speed (m/s)
OP0	CD4-L4	10758	1.4286	75
OP1	CD4-R6	11758	1.4367	124
OP2	HR1-R1	12152	1.4399	122
OP3	HR2-R5M	14745	1.4963	46
OP4	HE1-T1	15600	1.5789	10
OP5	HE2-T1	16090	1.6577	6
OP6	HE3-T1	16580	1.7261	7
OP7	HR4-T1	16985	1.8303	4
OP8	HR4-R1M	16985	2.0922	1
OP9	HR4-R5L	18165		
OP10	HR5-T2	18775		
OP11	HR5-R2M	18775	2.1697	23

KEY: ND - not detected - sensor working but flame too weak to be picked up  
 NW - not working - sensor not working

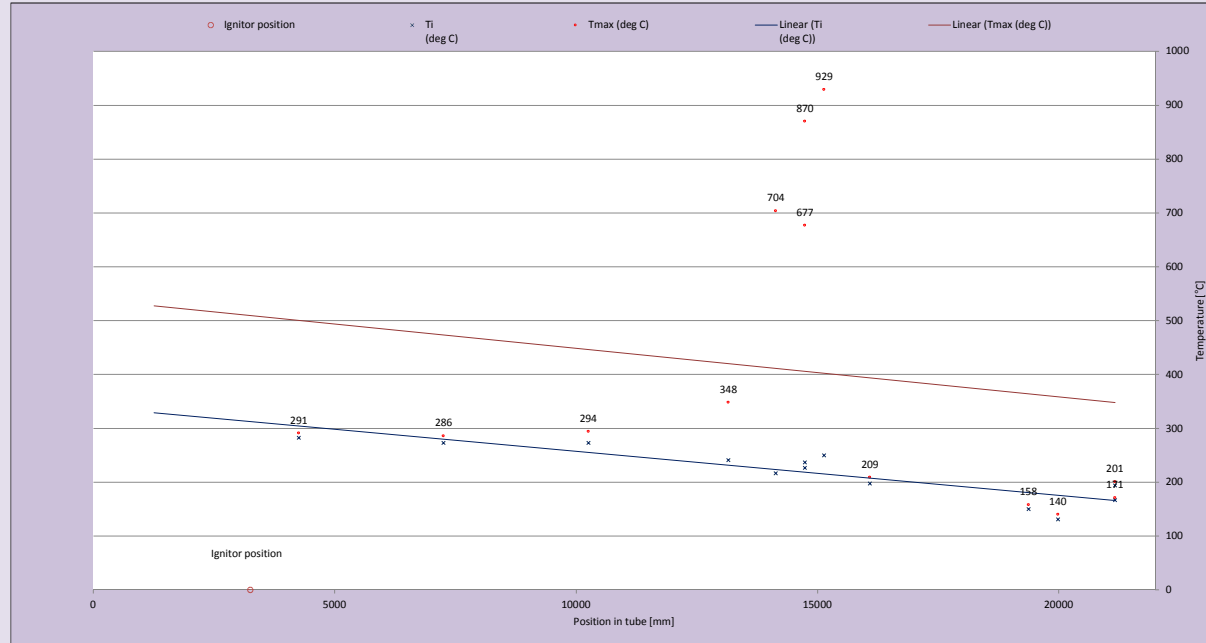


Location of igniter  mm Time of ignition  seconds

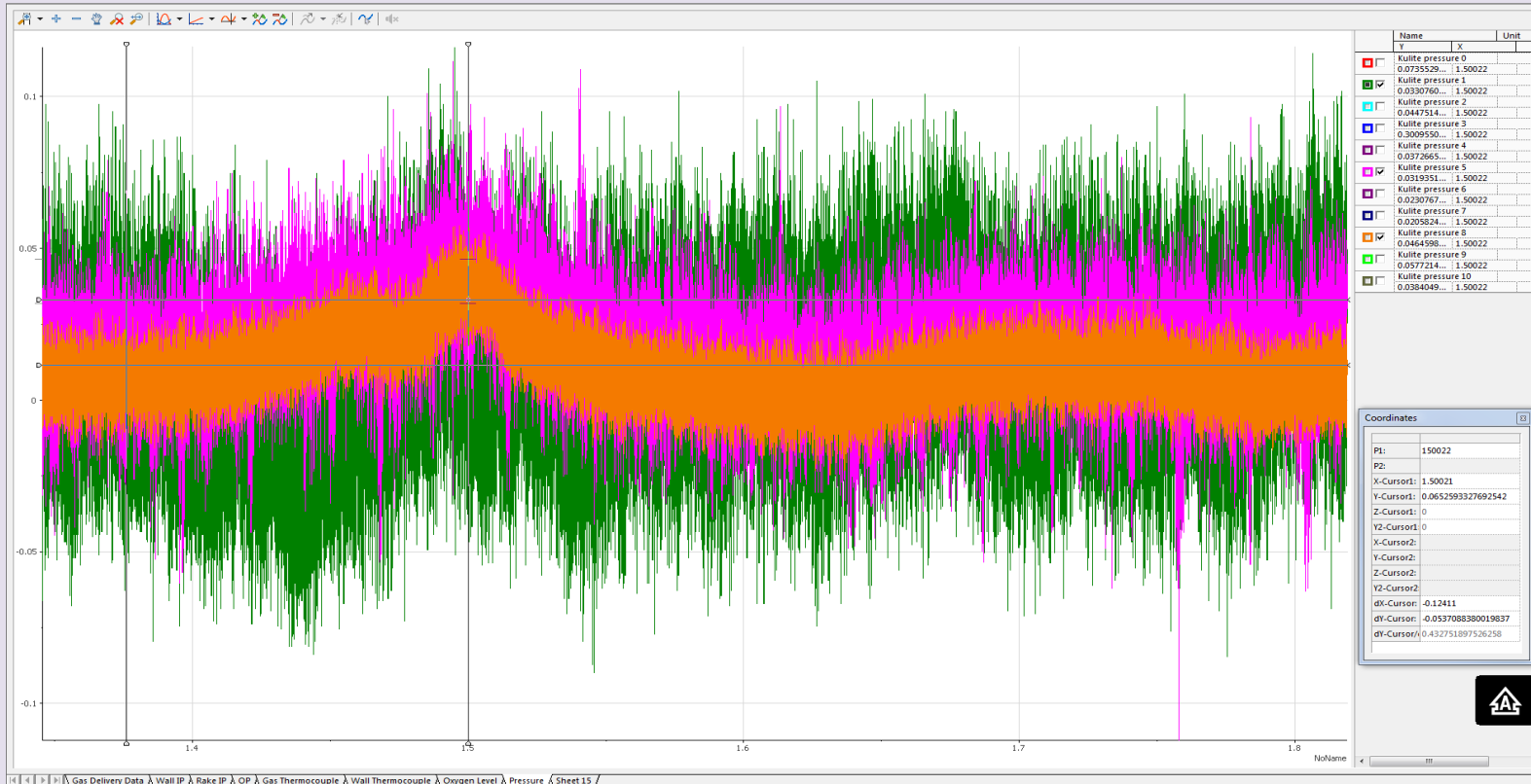
Thermocouple number	Location	Position in tube (mm)	T <sub>max</sub> (deg C)	T <sub>i</sub> (deg C)
TC0	CD1-R3	1258		
TC2	CD2-R3	4258	291	283
TC4	CD3-R3	7258	286	273
TC6	CD4-R3	10258	294	273
TC8	HR1-R2	13160	348	241
TC12	CD3-T1	6258	275	271
TC13	CD3-L1	6258	281	279
TC14	CD3-B1	6258		
TC15	CD3-R1	6258	289	288
TC16	HR2-R3M	14140	704	217
TC17	HR2-R5L	14745	870	237
TC18	HR2-R5U	14745	677	227
TC19	HR3-L1M	15140	929	250
TC20	HE2-R1L	16090		
TC21	HE2-R1U	16090	209	198
TC22	HR5-R4M	19375	158	150
TC23	HR6-R1M	19985	140	131
TC24	HR6-R5L	21165	171	167
TC25	HR6-R5U	21165	201	194

surface thermocouples [not plotted]

TC1	CD1-T2	1508	171	170
TC3	CD2-T2	4508	148	117
TC5	CD3-T2	7508	151	149
TC7	CD4-T2	10508	134	129

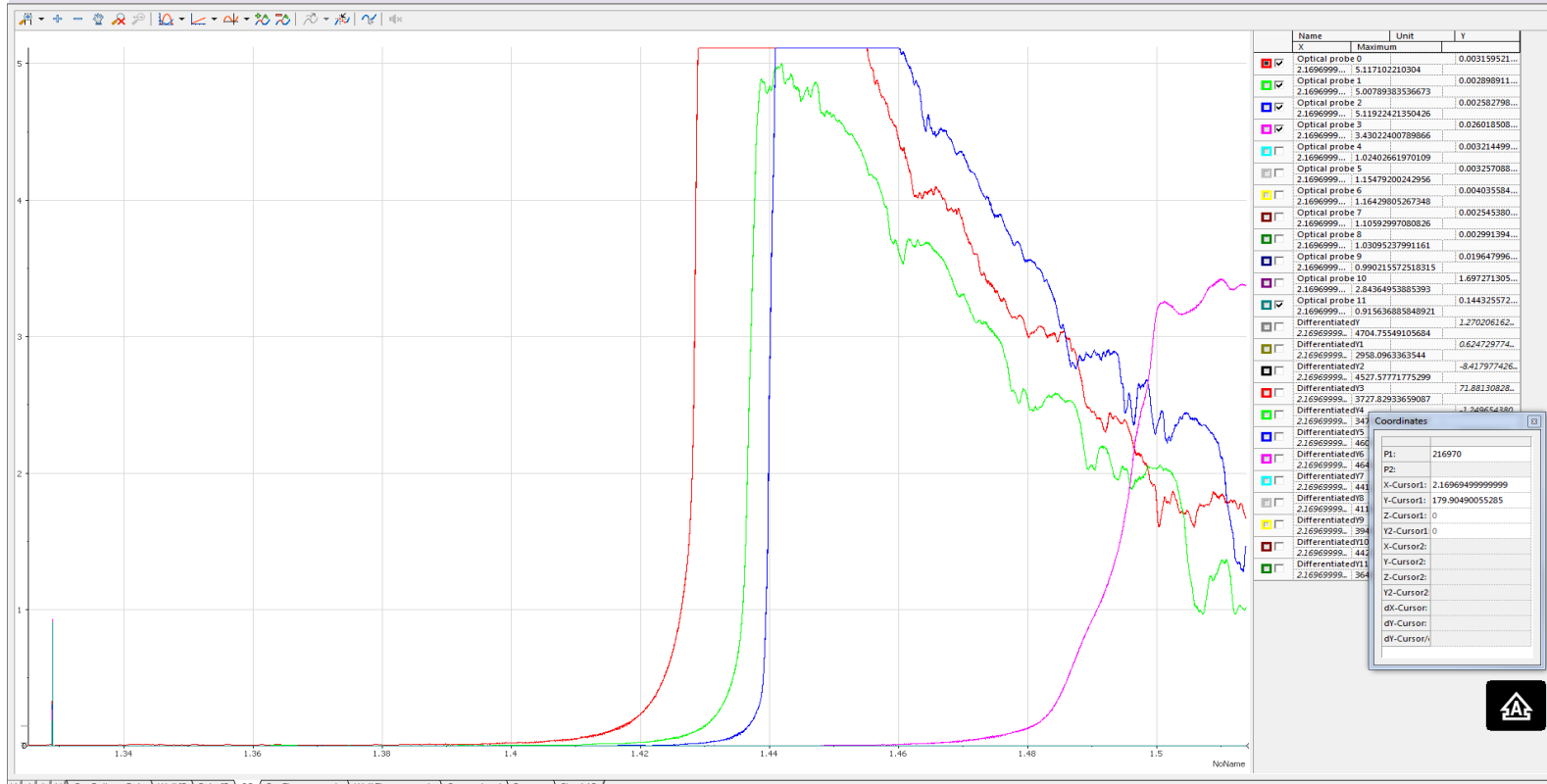


# Pressure





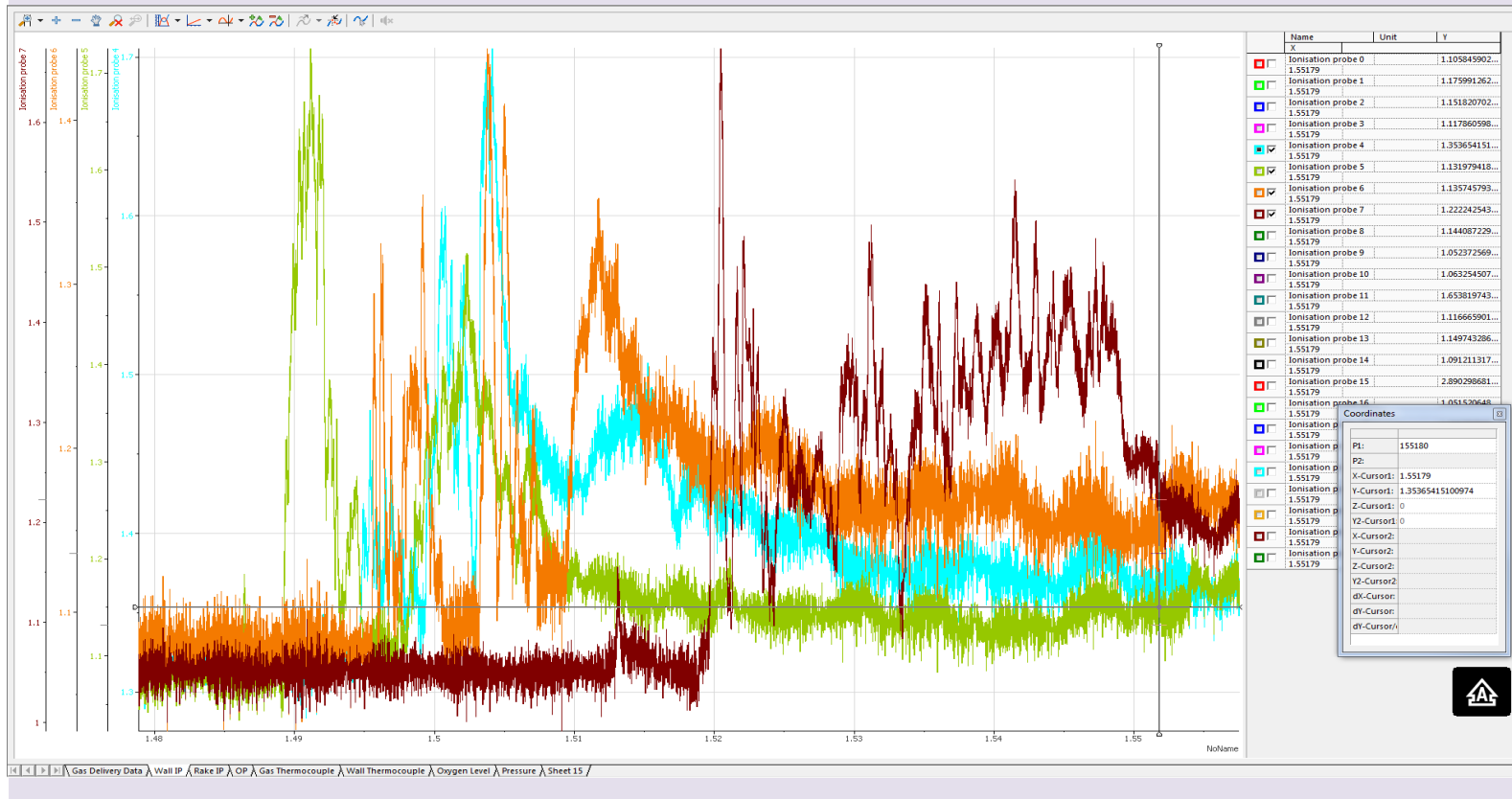
# Optical Probes



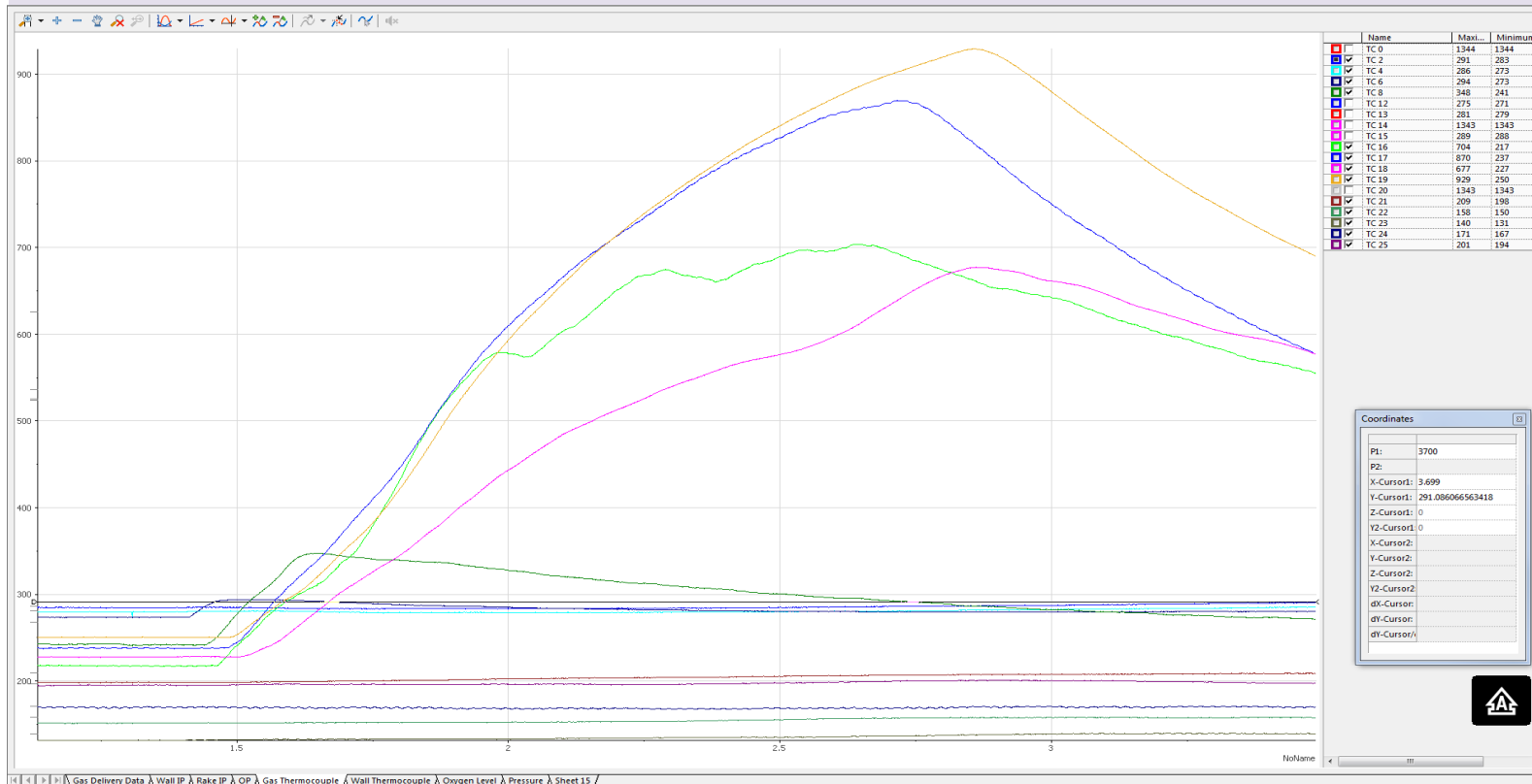
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Y-Cursor1:	179.90490055285
Z-Cursor1:	0
Y2-Cursor1:	0
X-Cursor2:	
Y-Cursor2:	
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Y2-Cursor2:	
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dY-Cursor:	
dZ-Cursor:	

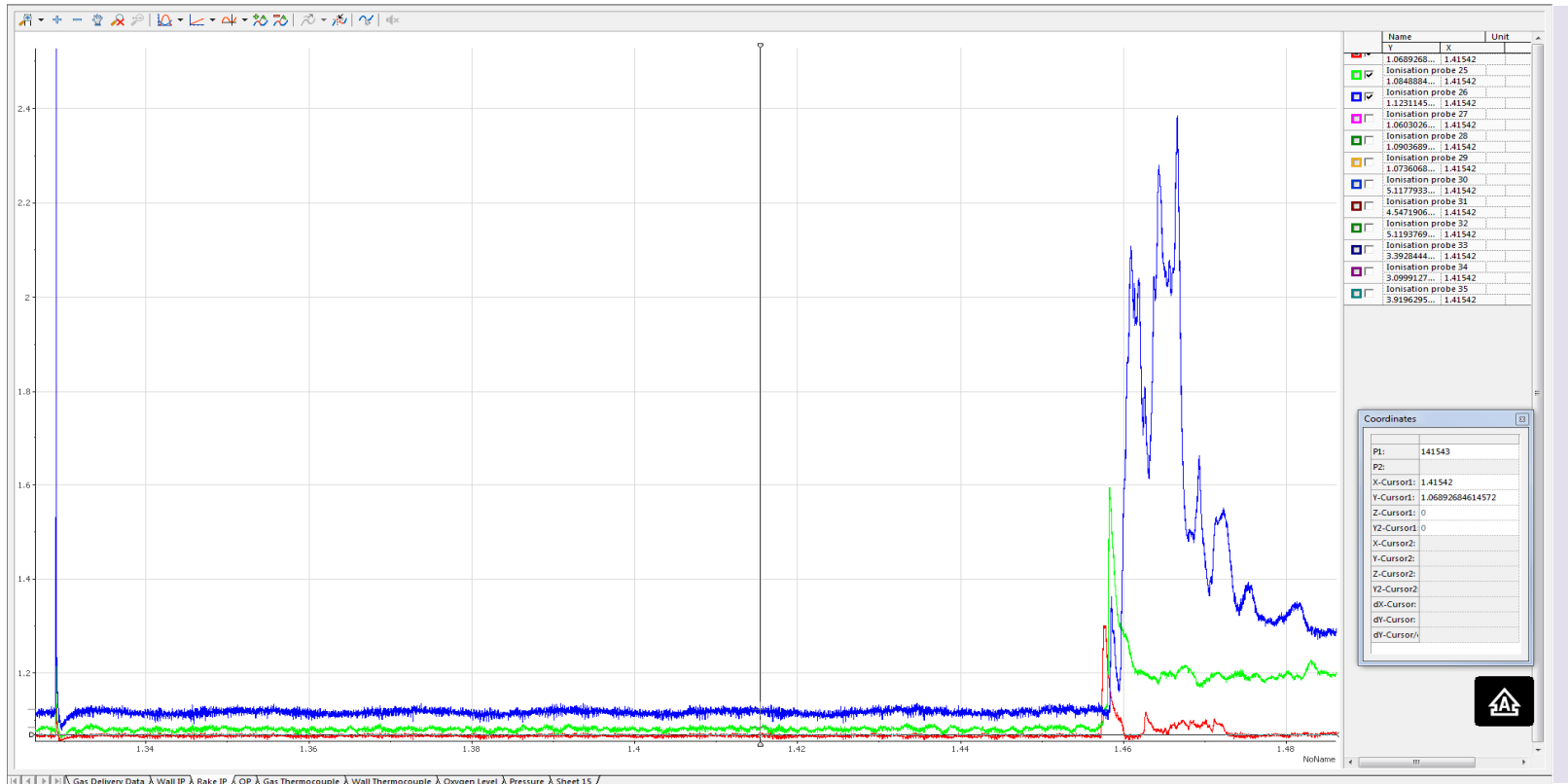


# Ionisation Probes



# Temperature





Sensor	OLD DESIGNATION	NEW DESIGNATION	Section	Section Number	Side	Horizontal Location	Vertical Location	PORT REF	SIZE	"X"	"Y"	"Z"
-		CD1-T1	CD	1	T	1		1	1" BSPP	0	298	258
TC1	TS1-1	CD1-T2	CD	1	T	2		NA	SURFACE	0	298	1508
-		CD1-B1	CD	1	B	1		2	1" BSPP	0	-298	258
-	NS1-1	CD1-R1	CD	1	R	1		3	3/4" BSPP	298	0	258
-	FS1-1	CD1-L1	CD	1	L	1		4	3/4" BSPP	-298	0	258
-	NS1-2	CD1-R2	CD	1	R	2		5	3/4" BSPP	298	0	758
-	FS1-2	CD1-L2	CD	1	L	2		6	3/4" BSPP	-298	0	758
TC0	NS1-3	CD1-R3	CD	1	R	3		7	3/4" BSPP	298	0	1258
-	FS1-3	CD1-L3	CD	1	L	3		8	3/4" BSPP	-298	0	1258
-	NS1-4	CD1-R4	CD	1	R	4		9	3/4" BSPP	298	0	1758
-	FS1-4	CD1-L4	CD	1	L	4		10	3/4" BSPP	-298	0	1758
-	NS1-5	CD1-R5	CD	1	R	5		11	3/4" BSPP	298	0	2258
-	FS1-5	CD1-L5	CD	1	L	5		12	3/4" BSPP	-298	0	2258
-	NS1-6	CD1-R6	CD	1	R	6		13	3/4" BSPP	298	0	2758
-	FS1-6	CD1-L6	CD	1	L	6		14	3/4" BSPP	-298	0	2758
IGN		CD2-T1	CD	2	T	1		15	1" BSPP	0	298	3258
TC3	TS2-1	CD2-T2	CD	2	T	2		NA	SURFACE	0	298	4508
-		CD2-B1	CD	2	B	1		16	1" BSPP	0	-298	2358
-	NS2-1	CD2-R1	CD	2	R	1		17	3/4" BSPP	298	0	3258
-	FS2-1	CD2-L1	CD	2	L	1		18	3/4" BSPP	-298	0	3258
-	NS2-2	CD2-R2	CD	2	R	2		19	3/4" BSPP	298	0	3758
-	FS2-2	CD2-L2	CD	2	L	2		20	3/4" BSPP	-298	0	3758
TC2	NS2-3	CD2-R3	CD	2	R	3		21	3/4" BSPP	298	0	4258
-	FS2-3	CD2-L3	CD	2	L	3		22	3/4" BSPP	-298	0	4258
-	NS2-4	CD2-R4	CD	2	R	4		23	3/4" BSPP	298	0	4758
-	FS2-4	CD2-L4	CD	2	L	4		24	3/4" BSPP	-298	0	4758
-	NS2-5	CD2-R5	CD	2	R	5		25	3/4" BSPP	298	0	5258
-	FS2-5	CD2-L5	CD	2	L	5		26	3/4" BSPP	-298	0	5258
-	NS2-6	CD2-R6	CD	2	R	6		27	3/4" BSPP	298	0	5758
-	FS2-6	CD2-L6	CD	3	L	6		28	3/4" BSPP	-298	0	5758
TC12		CD3-T1	CD	3	T	1		29	1" BSPP	0	298	6258
TC5	TS1-1	CD3-T2	CD	3	T	2		NA	SURFACE	0	298	7508
TC14		CD3-B1	CD	3	B	1		30	1" BSPP	0	-298	6258
TC15	NS3-1	CD3-R1	CD	3	R	1		31	3/4" BSPP	298	0	6258
TC13	FS3-1	CD3-L1	CD	3	L	1		32	3/4" BSPP	-298	0	6258
-	NS3-2	CD3-R2	CD	3	R	2		33	3/4" BSPP	298	0	6758
-	FS3-2	CD3-L2	CD	3	L	2		34	3/4" BSPP	-298	0	6758
TC4	NS3-3	CD3-R3	CD	3	R	3		35	3/4" BSPP	298	0	7258
-	FS3-3	CD3-L3	CD	3	L	3		36	3/4" BSPP	-298	0	7258
-	NS3-4	CD3-R4	CD	3	R	4		37	3/4" BSPP	298	0	7758
-	FS3-4	CD3-L4	CD	3	L	4		38	3/4" BSPP	-298	0	7758
KU0	NS3-5	CD3-R5	CD	3	R	5		39	3/4" BSPP	298	0	8258
-	FS3-5	CD3-L5	CD	3	L	5		40	3/4" BSPP	-298	0	8258
-	NS3-6	CD3-R6	CD	3	R	6		41	3/4" BSPP	298	0	8758
-	FS3-6	CD3-L6	CD	3	L	6		42	3/4" BSPP	-298	0	8758
-		CD4-T1	CD	4	T	1		43	1" BSPP	0	298	9258
TC7	TS1-1	CD4-T2	CD	4	T	2		NA	SURFACE	0	298	10508
-		CD4-B1	CD	4	B	1		44	1" BSPP	0	-298	9258
-	NS4-1	CD4-R1	CD	4	R	1		45	3/4" BSPP	298	0	9258
-	FS4-1	CD4-L1	CD	4	L	1		46	3/4" BSPP	-298	0	9258
KU1	NS4-2	CD4-R2	CD	4	R	2		47	3/4" BSPP	298	0	9758
-	FS4-2	CD4-L2	CD	4	L	2		48	3/4" BSPP	-298	0	9758
TC6	NS4-3	CD4-R3	CD	4	R	3		49	3/4" BSPP	298	0	10258
-	FS4-3	CD4-L3	CD	4	L	3		50	3/4" BSPP	-298	0	10258
-	NS4-4	CD4-R4	CD	4	R	4		51	3/4" BSPP	298	0	10758
OP0	FS4-4	CD4-L4	CD	4	L	4		52	3/4" BSPP	-298	0	10758
-	NS4-5	CD4-R5	CD	4	R	5		53	3/4" BSPP	298	0	11258
-	FS4-5	CD4-L5	CD	4	L	5		54	3/4" BSPP	-298	0	11258
OP1	NS4-6	CD4-R6	CD	4	R	6		55	3/4" BSPP	298	0	11758

Sensor	OLD DESIGNATION	NEW DESIGNATION	Section	Section Number	Side	Horizontal Location	Vertical Location	PORT REF	SIZE	"X"	"Y"	"Z"
IP0	FS4-6	CD4-L6	CD	4	L	6		56	3/4" BSPP	-298	0	11758
OP2		HR1-R1	HR	1	R	1		57	3/4" BSPP	308	0	12152
-		HR1-L1	HR	1	L	1		58	3/4" BSPP	-308	0	12152
TC8		HR1-R2	HR	1	R	2		59	3/4" BSPP	393	0	13160
-		HR1-L2	HR	1	L	2		60	3/4" BSPP	-393	0	13160
RA1		HR2-R2M	HR	2	R	2	M	61	11/4" BSPP	448	70	13785
RA1		HR2-L2M	HR	2	L	2	M	62	11/4" BSPP	-448	70	13785
TC16		HR2-R3M	HR	2	R	3	M	63	3/4" BSPP	528	410	14140
-		HR2-L3M	HR	2	L	3	M	64	3/4" BSPP	-528	410	14140
-		HR2-T3	HR	2	T	3		65	1" BSPP	0	1122	14215
RA2		HR2-R4M	HR	2	R	4	M	66	11/4" BSPP	598	700	14475
RA2		HR2-L4M	HR	2	L	4	M	67	11/4" BSPP	-598	700	14475
-		HR2-B5	HR	2	B	5		68	1" BSPP	0	-100	14745
KU2		HR2-T5	HR	2	T	5		69	1" BSPP	0	2315	14745
TC17		HR2-R5L	HR	2	R	5	L	70	3/4" BSPP	662	310	14745
IP1		HR2-L5L	HR	2	L	5	L	71	3/4" BSPP	-662	310	14745
OP3		HR2-R5M	HR	2	R	5	M	72	3/4" BSPP	662	975	14745
IP2		HR2-L5M	HR	2	L	5	M	73	3/4" BSPP	-662	975	14745
TC18		HR2-R5U	HR	2	R	5	U	74	3/4" BSPP	662	1660	14745
IP3		HR2-L5U	HR	2	L	5	U	75	3/4" BSPP	-662	1660	14745
KU3		HR3-L1L	HR	3	L	1	L	76	3/4" BSPP	-700	400	15140
TC19		HR3-L1M	HR	3	L	1	M	77	11/4" BSPP	-700	1335	15140
IP8		HR3-L1U	HR	3	L	1	U	78	3/4" BSPP	-700	2270	15140
IP4		HR3-R1L	HR	3	R	1	L	136	3/4" BSPP	700	400	15140
IP5		HR3-R1LM	HR	3	R	1	LM	137	3/4" BSPP	700	868	15140
IP6		HR3-R1M	HR	3	R	1	M	138	3/4" BSPP	700	1335	15140
-		HR3-R1UM	HR	3	R	1	UM	139	3/4" BSPP	700	1802	15140
IP7		HR3-R1U	HR	3	R	1	U	140	3/4" BSPP	700	2270	15140
-		HE1-R1L	HE	1	R	1	L	79	3/4" BSPP	700	400	15600
-		HE1-R1M	HE	1	R	1	M	80	3/4" BSPP	700	1335	15600
KU4		HE1-R1U	HE	1	R	1	U	81	3/4" BSPP	700	2270	15600
TC20		HE2-R1L	HE	2	R	1	L	83	3/4" BSPP	700	400	16090
IP9		HE2-R1M	HE	2	R	1	M	84	3/4" BSPP	700	1335	16090
TC21		HE2-R1U	HE	2	R	1	U	85	3/4" BSPP	700	2270	16090
KU5		HE3-R1L	HE	3	R	1	L	87	3/4" BSPP	700	400	16580
-		HE3-R1M	HE	3	R	1	M	88	3/4" BSPP	700	1335	16580
-		HE3-R1U	HE	3	R	1	U	89	3/4" BSPP	700	2270	16580
OP4		HE1-T1	HE	1	T	1		82	3/4" BSPP HOLE	-47	2735	15600
OP5		HE2-T1	HE	2	T	1		86	3/4" BSPP HOLE	0	2735	16090
OP6		HE3-T1	HE	3	T	1		90	3/4" BSPP HOLE	-47	2735	16580
OP7		HR4-T1	HR	4	T	1		91	1" BSPP	0	2735	16985
-		HR4-B1	HR	4	B	1		92	1" BSPP	0	-65	16985
KU6		HR4-R1L	HR	4	R	1	L	93	3/4" BSPP	700	400	16985
IP10		HR4-L1L	HR	4	L	1	L	94	3/4" BSPP	-700	400	16985
OP8		HR4-R1M	HR	4	R	1	M	95	3/4" BSPP	700	1335	16985
IP11		HR4-L1M	HR	4	L	1	M	96	3/4" BSPP	-700	1335	16985
IP13		HR4-R1U	HR	4	R	1	U	97	3/4" BSPP	700	2270	16985
IP12		HR4-L1U	HR	4	L	1	U	98	3/4" BSPP	-700	2270	16985
RA3		HR4-R3M	HR	4	R	3	M	99	11/4" BSPP	700	1335	17575
RA3		HR4-L3M	HR	4	L	3	M	100	11/4" BSPP	-700	1335	17575
RA4		HR4-R3L	HR	4	R	3	L	141	11/4" BSPP	700	400	17575
IP14		HR4-R3U	HR	4	R	3	U	142	3/4" BSPP	700	2270	17575
RA4		HR4-L3L	HR	4	L	3	L	143	11/4" BSPP	-700	400	17575
-		HR4-L3U	HR	4	L	3	U	144	3/4" BSPP	-700	2270	17575
IP18		HR4-R5M	HR	4	R	5	M	101	3/4" BSPP	700	1335	18165
IP16		HR4-L5M	HR	4	L	5	M	102	3/4" BSPP	-700	1335	18165
OP9		HR4-R5L	HR	4	R	5	L	145	3/4" BSPP	700	400	18165
KU7		HR4-R5U	HR	4	R	5	U	146	3/4" BSPP	700	2270	18165
IP15		HR4-L5L	HR	4	L	5	L	147	3/4" BSPP	-700	400	18165

Sensor	OLD DESIGNATION	NEW DESIGNATION	Section	Section Number	Side	Horizontal Location	Vertical Location	PORT REF	SIZE	"X"	"Y"	"Z"
IP17		HR4-L5U	HR	4	L	5	U	148	3/4" BSPP	-700	2270	18165
-		HR5-R1M	HR	5	R	1	M	NA	SURFACE	700	1200	18455
OP10		HR5-T2	HR	5	T	2		103	1" BSPP	0	2735	18775
-		HR5-B2	HR	5	B	2		104	1" BSPP	0	-65	18775
KU8		HR5-R2L	HR	5	R	2	L	105	3/4" BSPP	700	400	18775
IP19		HR5-L2L	HR	5	L	2	L	106	3/4" BSPP	-700	400	18775
OP11		HR5-R2M	HR	5	R	2	M	107	3/4" BSPP	700	1335	18775
IP20		HR5-L2M	HR	5	L	2	M	108	3/4" BSPP	-700	1335	18775
IP22		HR5-R2U	HR	5	R	2	U	109	3/4" BSPP	700	2270	18775
IP21		HR5-L2U	HR	5	L	2	U	110	3/4" BSPP	-700	2270	18775
TC22		HR5-R4M	HR	5	R	4	M	111	11/4" BSPP	700	1335	19375
-		HR5-L4M	HR	5	L	4	M	112	11/4" BSPP	-700	1335	19375
TC23		HR6-R1M	HR	6	R	1	M	113	3/4" BSPP	700	1335	19985
IP23		HR6-L1M	HR	6	L	1	M	114	3/4" BSPP	-700	1335	19985
-		HR6-T3	HR	6	T	3		115	1" BSPP	0	2735	20575
-		HR6-B3	HR	6	B	3		116	3/4" BSPP	0	-65	20575
KU9		HR6-R3L	HR	6	R	3	L	117	3/4" BSPP	700	400	20575
-		HR6-L3L	HR	6	L	3	L	118	3/4" BSPP	-700	400	20575
-		HR6-R3M	HR	6	R	3	M	119	11/4" BSPP	700	1335	20575
-		HR6-L3M	HR	6	L	3	M	120	11/4" BSPP	-700	1335	20575
-		HR6-R3U	HR	6	R	3	U	121	3/4" BSPP	700	2270	20575
-		HR6-L3U	HR	6	L	3	U	122	3/4" BSPP	-700	2270	20575
-		HR6-B5	HR	6	B	5		123	1" BSPP	0	-65	21165
TC24		HR6-R5L	HR	6	R	5	L	124	3/4" BSPP	700	400	21165
KU10		HR6-L5L	HR	6	L	5	L	125	3/4" BSPP	-700	400	21165
-		HR6-R5M	HR	6	R	5	M	126	3/4" BSPP	700	1335	21165
-		HR6-L5M	HR	6	L	5	M	127	3/4" BSPP	-700	1335	21165
TC25		HR6-R5U	HR	6	R	5	U	128	3/4" BSPP	700	2270	21165
-		HR6-L5U	HR	6	L	5	U	129	3/4" BSPP	-700	2270	21165
-		EP-1L	EP			1	L	130	1" BSPP	650	-15	21330
-		EP-2L	EP			2	L	131	1" BSPP	0	-15	21330
-		EP-3L	EP			3	L	132	1" BSPP	-650	-15	21330
-		EP-1M	EP			1	M	133	1" BSPP	250	1335	21330
-		EP-2M	EP			2	M	134	1" BSPP	-250	1335	21330
-		EP-1U	EP			1	U	135	3/4" BSPP	0	2270	21330

