HAZARDOUS AREA CLASSIFICATION: CL.1, DIV.2, GR. C&D

THIS SYSTEM DESIGN BASED ON FLINT HILLS PROVIDED GAS CONCENTRATION AND FLOW RATES

FLINT HILL MAY DETERMINE OPTIONS SHOWN FROM CALCULATIONS REF.: DWG.-1000
SA SUGGESTS OPTION #2 (SHALL REQUIRE ONE ADDITIONAL CATALYTIC DEVICE ELEMENT [MTI])

OPTION #1 CLIENT SPECIFIED: 820 BTU/HR SINGLE CATALYTIC DEVICE SYSTEM.
FLOW SETTINGS SEE DWG.-1001
INCLUDES:
1) CONTROL SYSTEM ENCLOSURE, NEMA TYPE 4X 316 SS
2) CUSTOM VENT GAS TEST CHAMBER (ONE REQD. FOR EA. MTI)

CLIENT TO INSTALL CUSTOM VENT GAS CHAMBER ON
EXISTING CATALYTIC DEVICE ELEMENT [MTI]

OPTION #2
RECOMMENDED: 2 X 410 BTU/HR DUAL CATALYTIC DEVICE SYSTEM.
FLOW SETTINGS SEE DWG.-1002

INCLUDES:
1) CONTROL SYSTEM ENCLOSURE, NEMA TYPE 4X 316 SS
2) CUSTOM VENT GAS TEST CHAMBER (ONE REQD. FOR EA. MTI)

CLIENT TO INSTALL CUSTOM VENT GAS TEST CHAMBER ON
EXISTING CATALYTIC DEVICE ELEMENT [MTI]

INSTALL CUSTOM VENT GAS TEST CHAMBER ON ADDITIONAL
CATALYTIC DEVICE ELEMENT [MTI] (CLIENT PROVIDED)

WARNING
SYSTEM MUST BE OPERATED WITH GAS MIXTURE BELOW THE LEL. THE CATALYST WILL AUTO IGNITE A MIXTURE THAT IS ABOVE THE LEL. EXCEEDING VENT GAS FLOWS COULD RESULT IN FIRE OR INJURY.

THE BOM QUANTITIES ARE FOR THE CONSTRUCTION OF (1) BASIC TRACERACE CONTROL PANEL
CAPABLE OF SUPPORTING (1) 0R (2) CATALYTIC DEVICES WITHOUT ANY MODIFICATIONS TO THE CONTROL PANEL.

DWG.-1001 REPRESENTS A MODEL TECP-750-2 SET UP AS A MODEL TECP-750-1 (OPTION #1) A SINGLE CATALYTIC DEVICE.
DWG.-1002 REPRESENTS A MODEL TECP-750-2 SET UP FOR (OPTION #2) DUAL CATALYTIC DEVICES

QUANTITY OF (2) VENT GAS TEST CHAMBERS ARE INCLUDED WITH THIS SYSTEM.

DRAWING INDEX

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EXAMPLE: SEE DWG. -0001
(08-020-09252025)-0001

				REF.					
ISSUED FOR CONSTRUCTION	RMC	1/28/25	0	ENG. JLH	DATE 1/2/25	CHK. JLH	DATE 1/7/25	TITLE: BASIC TRACERASE® CONTROL PANEL MODEL TECP-BP-750-2 SPECIFICATIONS & DRAWING INDEX	
REVISION DESCRIPTION	ISSUED	DATE	REV.	DRN. RMC	DATE 1/3/25	APP. JLH	DATE 1/7/25		
ALL DIMENSIONS IN INCHES / IF IN DOUBT, ASK.	JOB# 08-020-09252024			DWG. 08-020-09252024-0001				SIZE B	SCALE NTS SH. 1

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PIPING AND TUBING NOTES:
UNLESS OTHERWISE SPECIFIED

1. ALL TUBING SHALL BE 316SS SEAMLESS BRIGHT ANNEALED.
   WALL THICKNESS: 1/8" = 0.028", 1/4" = 0.035"
   1/2" = 0.049", 3/8" = 0.049"
2. NPT CONNECTIONS TO COMPONENTS SHALL BE MADE WITH TEFLON TAPE AND NO TAPE APPLIED TO THE FIRST THREAD ON FITTINGS.
3. ALL TUBE FITTINGS SHALL BE SWAGELOK DOUBLE FERRULE, TYPE 316 STAINLESS STEEL.
4. PIPE FITTINGS SHALL BE 150 LB. MINIMUM.
5. TUBING SHALL TERMINATE AT BULKHEAD FITTINGS.
6. PIPE THAT PENETRATES WALL SHALL TERMINATE WITH BULKHEAD FITTINGS.
7. ALL SPARE VALVES SHALL BE CAPPED OR PLUGGED.
8. ALL PIPE SHALL BE SOLVENT CLEANED INSIDE AND OUT TO REMOVE GREASE, CUTTING OIL RESIDUE AND THREADING DEBRIS . WIRE BRUSHED AS REQD.
9. DRAINS SHALL BE LOCATED AT LOW POINTS WITH LINES SLOPING TO OUTLET.
10. ALL TUBING AND PIPE SHALL BE RUN PLUM, LEVEL AND ALLOW CONVENIENT ACCESS FOR REMOVAL OF COMPONENTS.
11. TUBING BENDS AND BE SQUARE 90° OR OFFSET, KICKS ARE ALLOWED AS REQD.
12. PIPE AND TUBING SHALL BE CUT SQUARE. CUT ENDS SHALL BE REAMED TO MATCH THE INSIDE DIAMETER AND BE FREE OF BURRS AND SHARP EDGES.
13. PIPE AND TUBING SHALL BE SUPPORTED AT MAX. SPAN 6' PIPE & 3' TUBING AS APPLICABLE.
14. ALL FASTENERS SHALL BE 316 SS

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	MFG.	P/N
1	1	GAUGE, SS ,0 - 60 PSIG, 2.5 " DIAL, 1/4" T, BTM	SWAGELOK	PGI-63B-PG15-LAQX
2	1	GAUGE, SS,-30 IN HG - 15 PSIG, 2.5 " DIAL, 1/4" T, BTM	SWAGELOK	PGI-63B-PC15-LAQX
3	1	GAUGE, SS, 0 -15 PSIG, 2.5 " DIAL, 1/4" T, BTM	SWAGELOK	PGI-63B-PG60-LAQX
4	1	FLOWMETER, VARIABLE AREA, SS VALVE, BACK CONNECTIONS, 1/8" NPT-F, 100 - 1000 CC/MIN AIR, ACRYLIC, ,100 PSIG, 150 F, VITON	DWYER	VFB-60-SSV-VIT
5	1	FLOWMETER, VARIABLE AREA, BRASS VALVE, BACK CONNECTIONS, 1/8" NPT-F, 2 - 20 SCFH AIR, ACRYLIC, ,100 PSIG, 150 F, BUNA N	DWYER	VFB-51BV
6	2	FLOWMETER, VARIABLE AREA, NO VALVE, BACK CONNECTIONS, 1/8" NPT-F, 1 - 10 SCFH AIR, ACRYLIC, 100 PSIG, 150 F, VITON	DWYER	VFB-91-SS-VIT
7	2	VALVE, REGULATING STEM, 1/4" TF (SS), INTEGRAL BONNET, C = .37, PFA PACKING	SWAGELOK	SS-1RS4
8	1	FLAME ARRESTOR, ALUMINUM, KB SERIES, MALE/FEMALE, EXTERNAL 1/2 "NPT-F, INTERNAL 1/4" NPT-F	KILLARK	KB1AF25
9	1	TEE TYPE ASPIRATOR, SS, 1/4" UNION TEE	JACOBS	ASP-520-S-4
10	1	REGULATOR, SUBATMOSPHERIC, BACK PRESSURE, HIGH SENSITIVITY, 1/4" NPT-F, -27.7 IN. H2O - 15.3 PSIG, CV = .2 , SS, PTFE SEAL	GO	SBPR-1A11I5A111
11	1	REGULATOR, 1/4" NPT-F, 250 PSIG INLET, 0 - 125 PSIG OUTLET, W/GAUGE	FISHER	67CFR-239
12	1	CHECK VALVE, 1/4" TF (SS), VITON, 1/3 PSIG	SWAGELOK	SS-4C-1/3
13	1	CONTROL ENCLOSURE , 24"H X 24"W X 12"D, NEMA TYPE 4X, 316SS	HOFFMAN	A24H2412SS6LP
14	1	MOUNTING PANEL, 21" X 21" (ALUM.)	HOFFMAN	A24P24-AL
15	1	WINDOW KIT, TYPE NEMA 4X, 17"X11" VIEWING WINDOW, 14GA, 304SS, CUTOUT 18.69x12.69	HOFFMAN	APWK1711NFSS
16	1	BREATHER DRAIN, 316SS, IP 66, NEMA 4X, EXE, O-RING	HLS	BE .20 .S .NT
17	2	CUSTOM VENT GAS TEST CHAMBER SEE DWG.-1004	SA	CUSTOM

REF. DWG.-1001

CALCULATION WORKSHEET					Conc Enter						
		O2	AIR	BTU	Mol %	Air	BTU%	CF	CF%	LEL	LEL%
Hydrogen	H2	0.5	2.39	324	0.00%	0	0	3.78	0	4	0
Oxygen	O2	0	0	0	0.00%	0	0	0.95	0	0	0
Nitrogen	N2	0	0	0	0.00%	0	0	1.02	0	0	0
Methane Carbon	CH4	2	9.56	1010	0.00%	0	0	1.34	0	2.5	0
Monoxide	CO	0.5	2.39	321	0.00%	0	0	0.81	0	12.5	0
Carbon Dioxide	CO2	0	0	0	0.00%	0	0	0.81	0	0	0
Ethylene	C2H4	3	14.34	1599	0.00%	0	0	0.97	0	2.75	0
Ethane	C2H6	3.5	16.73	1769	0.00%	0	0	1.02	0	2.4	0
Acetylene	C2H2	2.5	11.95	1470	0.00%	0	0	1.05	0	2.3	0
Propane	C3H8	5	23.9	2516	3.84%	0.91776	96.6144	0.81	0.031104	2.1	0.08064
Propylene	C3H6	4.5	21.51	2333	8.23%	1.770273	192.0059	0.83	0.068309	2	0.1646
Butane	C4H10	6.5	31.07	3262	44.40%	13.79508	1448.328	0.71	0.31524	1.9	0.8436
Butene-1	C4H8	6	28.68	3080	38.96%	11.17373	1199.968	0.72	0.280512	1.6	0.62336
Pentane	C5H12	8	38.24	4009	3.37%	1.288688	135.1033	0.63	0.021231	1.5	0.05055
Pentene	C5H10	7.5	35.85	3827	0.00%	0	0	0.64	0	1.4	0
Hexane	C6H14	9.5	45.41	4756	1.20%	0.54492	57.072	0.58	0.00696	1.1	0.0132
					100.00%	**29.49**	**3129.09**		**0.723356**		**1.78**

OPTION #1 OR OPTION #2

BTU/SCFH (HHV)	
820	Enter
Actual Flow SCFH	Actual Flow CC/MIN
0.26	123.69
Air SCFH	Air LPM
7.73	3.648
Indicated Flow SCFH	Indicated Flow CC/MIN
0.36	171.00

OPTION #3 MAX. BTU/HR

BTU/SCFH (HHV)	
1500	Enter
Actual Flow SCFH	Actual Flow CC/MIN
0.48	226.26
Air SCFH	Air LPM
14.14	6.673
Indicated Flow SCFH	Indicated Flow CC/MIN
0.66	312.80

THE BOM QUANTITIES ARE FOR THE CONSTRUCTION OF (1) BASIC TRACERACE CONTROL PANEL
CAPABLE OF SUPPORTING (1) 0R (2) CATALYTIC DEVICES WITHOUT ANY MODIFICATIONS TO THE CONTROL PANEL.

DWG.-1001 REPRESENTS A MODEL TECP-750-2 SET UP AS A MODEL TECP-750-1 (OPTION #1) A SINGLE CATALYTIC DEVICE.
DWG.-1002 REPRESENTS A MODEL TECP-750-2 SET UP FOR (OPTION #2) DUAL CATALYTIC DEVICES

QUANTITY OF (2) VENT GAS TEST CHAMBERS ARE INCLUDED WITH THIS SYSTEM.

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ISSUED FOR CONSTRUCTION	RMC	1/28/25	0

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JOB# 08-020-09252024

DWG. 08-020-09252024-1000

REF.

ENG.	DATE	CHK.	DATE
JLH	1/2/25	JLH	1/7/25
DRN.	DATE	APP.	DATE
RMC	1/3/25	JLH	1/7/25

TITLE: BASIC TRACERASE® CONTROL PANEL
MODEL TECP-BP-750-2
SYSTEM CALCULATION & BOM

SIZE B | SCALE NTS | SH. 1

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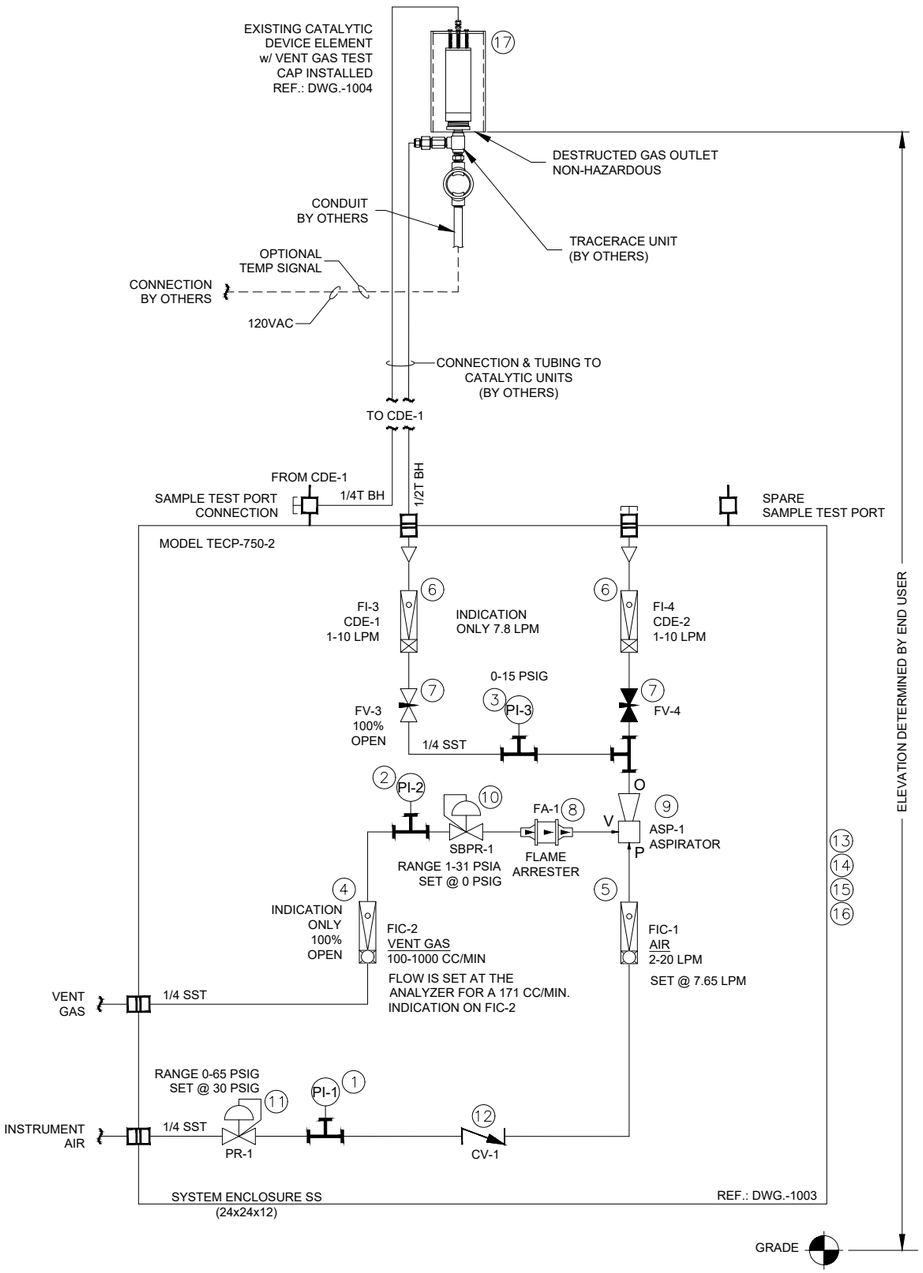

OPTION #1 CLIENT REQUESTED DESIGN

FLINT HILLS Gas Composition	**820 BTU/HR x 1**
Actual Flow Vent Gas Flow(MAX)	**123 CC/MIN**
Indicated Flow Vent Gas Flow (SET @)	**FIC-2 171 CC/MIN**
Calculated Aspirator Air Flow	**3.65 LPM**
Calculated Vent Gas % in Air	**3.26%**
Ignition Temperature(Butane Referenced)	**760 F**
LEL (Butane Referenced)	**1.78%**
Added Aspirator Air Flow	**4.0 LPM**
Aspirator Air (SET @)	**FIC-1 7.65 LPM**
Actual Vent Gas % in Air (< 1.78 %)	**1.58%**
Supplemental Air Flow	**N/A**
TRACERASE 1 Total Flow FV-3 (OPEN)	**FI-3 7.8 LPM**
TRACERASE 2 Total Flow FV-4 (CLOSED)	**FI-4 0.0 LPM**

REF.: DWG.1000 FOR 840 BTU/HR CALCULATIONS

OPTION #1
DRAWING IS FOR ONE VENT GAS TEST CHAMBER TO BE MOUNTED ON THE EXISTING TRACERACE ON SITE. THERE WILL BE ONE SPARE VENT GAS TEST CHAMBER NOT USED.

FOR BOM & NOTES REF.: DWG.1000

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JOB# 08-020-09252024

DWG. 08-020-09252024-1001

REF.

ENG. JLH	DATE 1/2/25	CHK. JLH	DATE 1/7/25	
DRN. RMC	DATE 1/3/25	APP. JLH	DATE 1/7/25	

TITLE
BASIC TRACERASE® CONTROL PANEL
MODEL TECP-BP-750-2
SINGLE TRACERACE SCHEMATIC & FLOW SETTINGS

SIZE B | SCALE NTS | SH. 1

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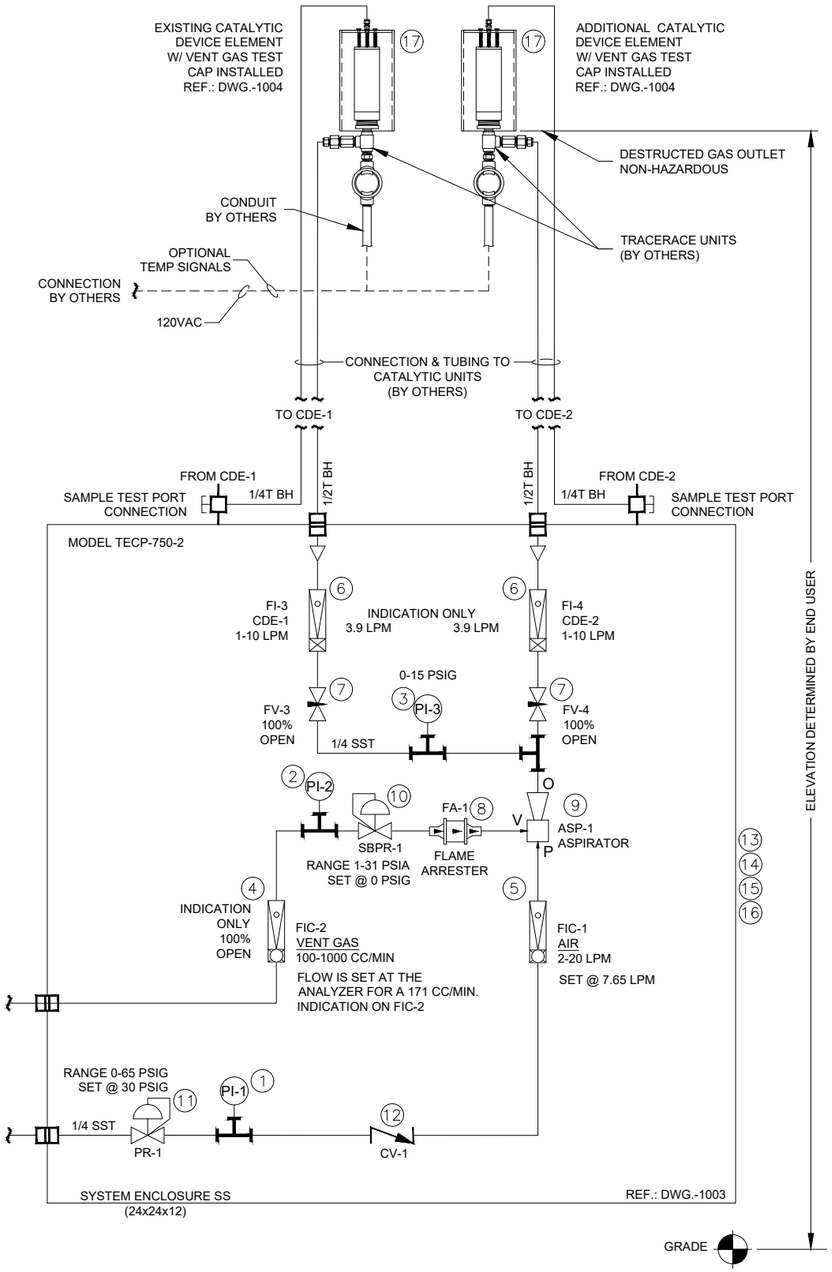

OPTION #2 RECOMMENDED BY SA

FLINT HILLS Gas Composition	410 BTU/HR x 2
Actual Flow Vent Gas Flow(MAX)	123 CC/MIN
Indicated Flow Vent Gas Flow (SET @)	FIC-2 171 CC/MIN
Calculated Aspirator Air Flow	3.65 LPM
Calculated Vent Gas % in Air	3.26%
Ignition Temperature(Butane Referenced)	760 F
LEL (Butane Referenced)	1.78%
Added Aspirator Air Flow	4.0 LPM
Aspirator Air Flow (SET @)	FIC-1 7.65 LPM
Actual Vent Gas % in Air (< 1.78 %)	1.58%
Supplemental Air Flow	N/A
TRACERASE 1 Total Flow FV-3 (OPEN)	FI-3 3.9 LPM
TRACERASE 2 Total Flow FV-4 (OPEN)	FI-4 3.9 LPM

REF.: DWG.1000 FOR 840 BTU/HR CALCULATIONS

OPTION #3 MAXUM BTU/HR

FLINT HILLS Gas Composition	750 BTU/HR x 2
Actual Flow Vent Gas Flow(MAX)	226 CC/MIN
Indicated Flow Vent Gas Flow (SET @)	FIC-2 313 CC/MIN
Calculated Aspirator Air Flow	6.67 LPM
Calculated Vent Gas % in Air	3.27%
Ignition Temperature(Butane Referenced)	760 F
LEL (Butane Referenced)	1.78%
Added Aspirator Air Flow	8.0 LPM
Aspirator Air Flow (SET @)	FIC-1 14.7 LPM
Actual Vent Gas % in Air (< 1.78 %)	1.52%
Supplemental Air Flow	N/A
TRACERASE 1 Total Flow FV-3 (OPEN)	FI-3 7.5 LPM
TRACERASE 2 Total Flow FV-4 (OPEN)	FI-4 7.5 LPM

REF.: DWG.1000 FOR 1500 BTU/HR CALCULATIONS

OPTION #2 RECOMMENDED
DRAWING ILLUSTRATES A SECOND TRACERACE PURCHASED BY OTHERS.
BOTH VENT GAS TEST CHAMBERS WILL BE USED.
THE GAS IS SPLIT BETWEEN BOTH TRACERASES.

BOM & NOTES REF.: DWG.1000

OPTION #3 MAX. BTU/HR
HAS THE SAME MECHANICAL INSTALLATION AS OPTION #2.
THE WASTE GAS FLOW CAN BE INCREASED TO ALLOW THE SYSTEM TO OPERATE AT MAX. BTU OF 1500 BTU/HR.

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ISSUED FOR CONSTRUCTION	RMC	1/28/25	0

REF.

ENG.	DATE	CHK.	DATE
JLH	1/2/25	JLH	1/7/25

DRN.	DATE	APP.	DATE
RMC	1/3/25	JLH	1/7/25

TITLE: BASIC TRACERASE® CONTROL PANEL
MODEL TECP-BP-750-2
DUAL TRACERACE SCHEMATIC & FLOW SETTINGS

ALL DIMENSIONS IN INCHES IF IN DOUBT, ASK.

JOB# 08-020-09252024

DWG. 08-020-09252024-1002

SIZE B | SCALE NTS | SH. 1

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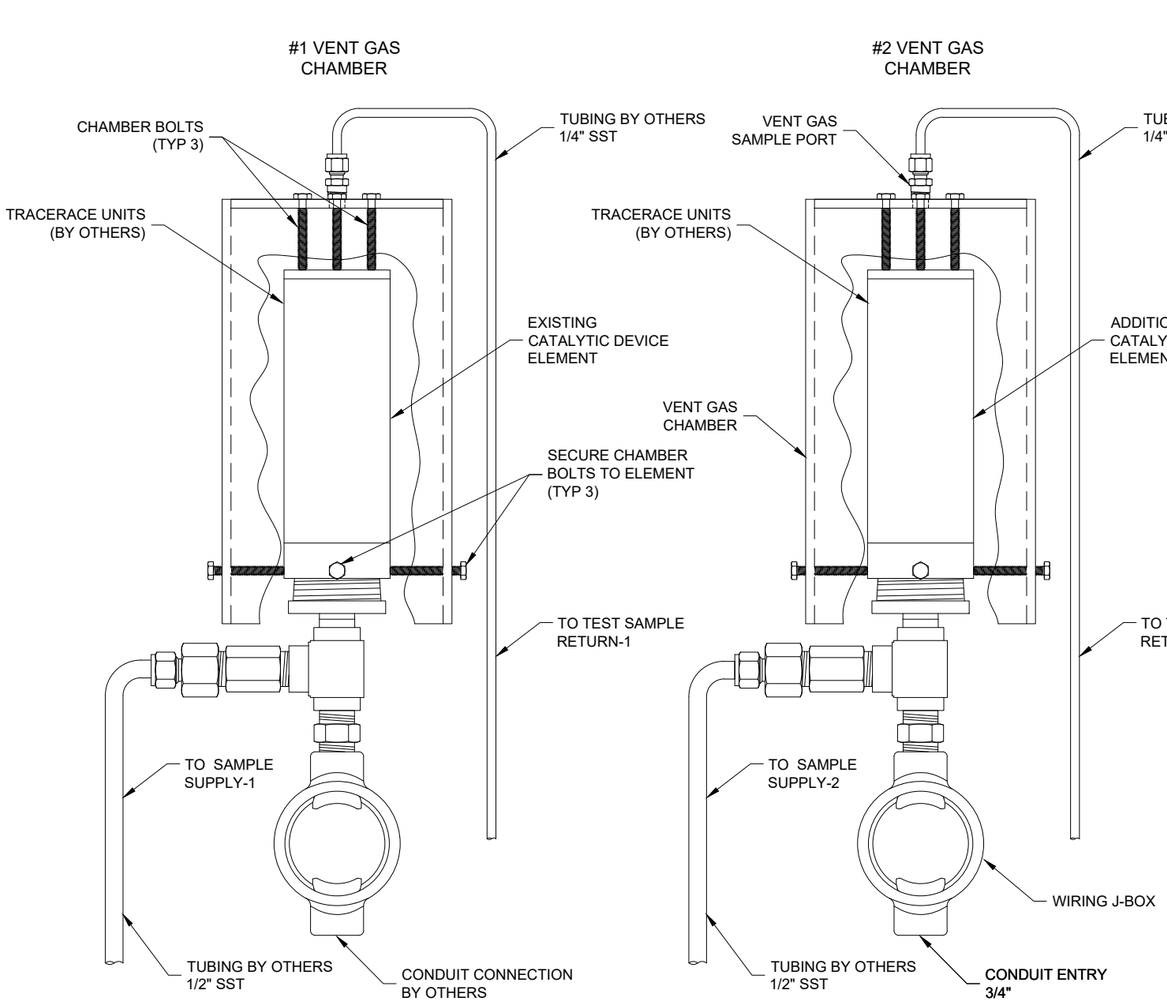

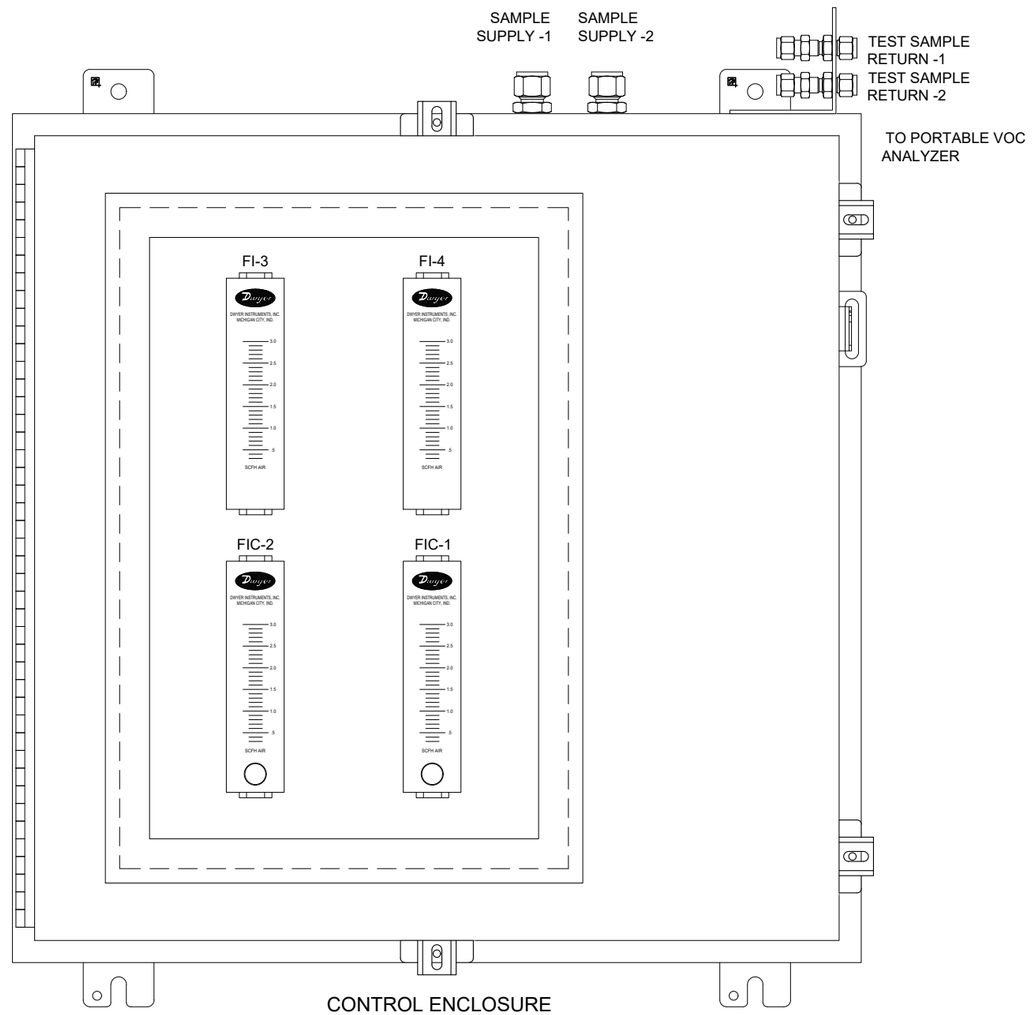

CONTROL ENCLOSURE
(24"Hx24"Wx12"D)

BULKHEAD LOCATION SHOWN FOR REFERENCE ONLY SHALL BE AS-BUILT
CONTROL ENCL. BOM REF:. DWG-1000
TEST CHAMBER BOM REF.: DWG-1004

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JOB# 08-020-09252024

DWG. 08-020-09252024-1003

REF.

ENG.	DATE	CHK.	DATE
JLH	1/2/25	JLH	1/7/25
DRN.	DATE	APP.	DATE
RMC	1/3/25	JLH	1/7/25

TITLE: BASIC TRACERASE® CONTROL PANEL
MODEL TECP-BP-750-2
FIELD INTERCONNECTION DETAIL

SIZE B | SCALE NTS | SH. 1

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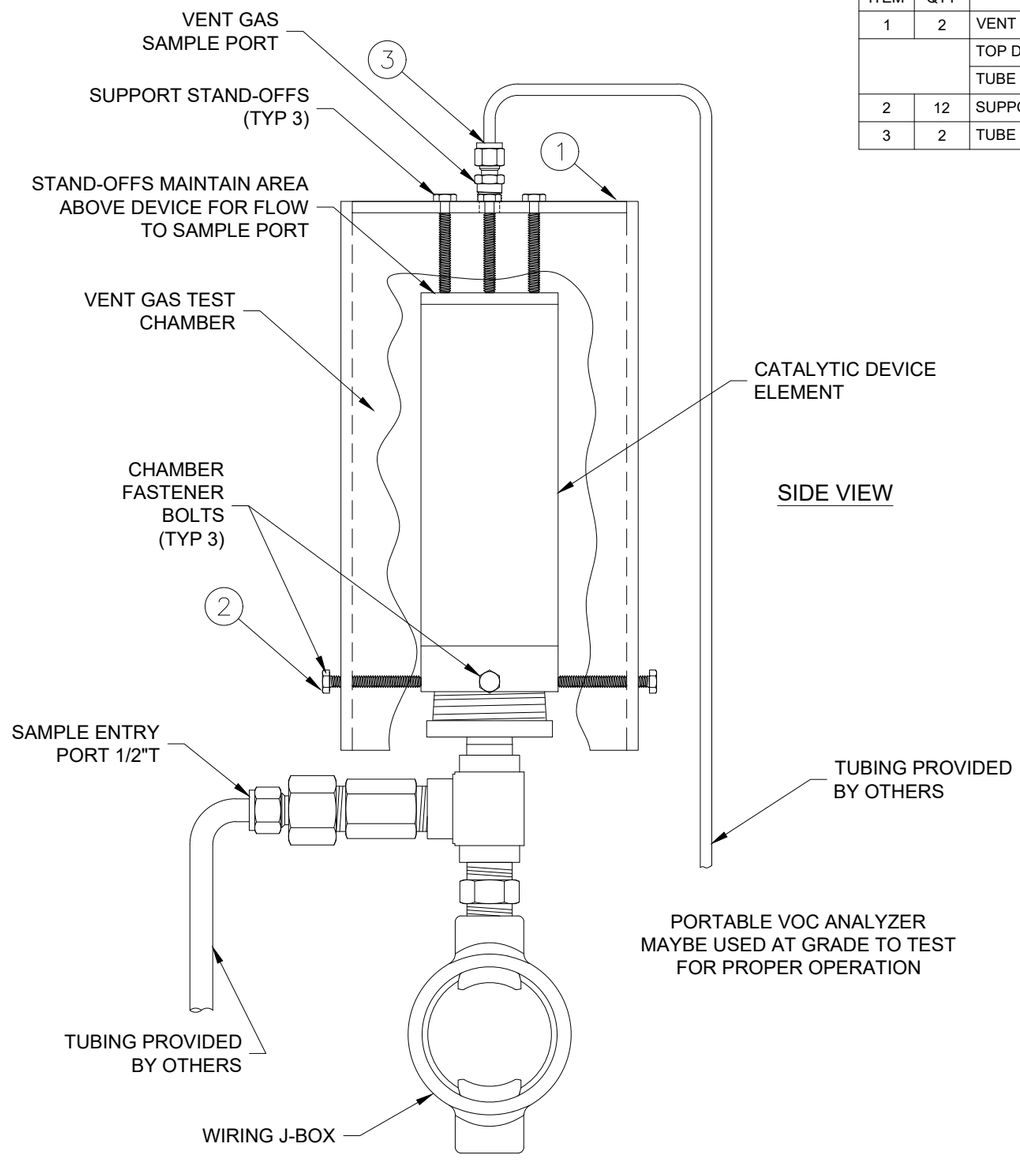
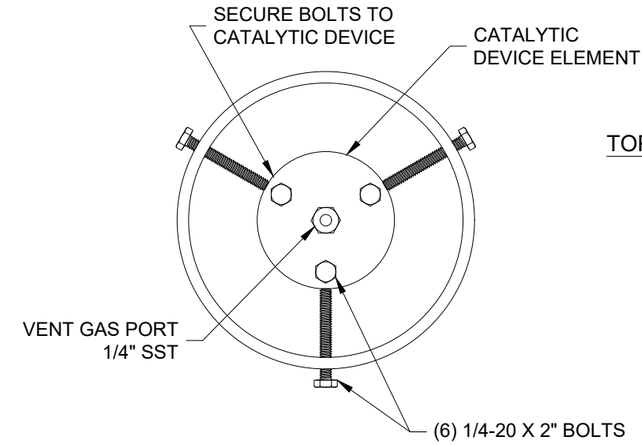
BILL OF MATERIAL				
ITEM	QTY	DESCRIPTION	MFG.	P/N
1	2	VENT GAS CHAMBER, 6.6" DIA X 12" L, ALUMINUM, w/ 6) 316SS FASTENERS	SA	CUSTOM-SA
		TOP DISK .250" THICK 6.000" DIA. 6061 ROUND BLANKS (0.72lb)	ONLINE METALS	MP-00000362
		TUBE BODY 6.5" OD X 0.25" WALL X 6" ID ALUM. TUBE 6061-T6-EXTRUDED (5.77lb)	ONLINE METALS	25691
2	12	SUPPORT BOLTS FULL THREAD, 1/4-20 x 2" HEX HD, 316SS	MCMASTER	93190A550
3	2	TUBE FITTING MALE CONN, 1/4" T x 1/4" MNPT,	SWAGELOK	SS-400-1-4



SIDE VIEW



TOP VIEW

PORTABLE VOC ANALYZER MAYBE USED AT GRADE TO TEST FOR PROPER OPERATION

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SMITH ANALYTICAL LLC

PATENT PENDING NOTICE

This product is protected by one or more of the following Patents.

U.S. PATENT PENDING: US 63/655,894

Patent Applied for in the U.S. and Abroad

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ISSUED FOR CONSTRUCTION

HAZARDOUS AREA CLASSIFICATION:
CL.1, DIV.2, GR. C&D

NOTE:
REFERENCE DRAWINGS & CONTINUATIONS, ONLY SUFFIX OF COMPLETE # MAY BE NOTED
EXAMPLE: SEE DWG. -0001
(08-020-09252025)-0001

REVISION DESCRIPTION	ISSUED	DATE	REV.
ISSUED FOR CONSTRUCTION	RMC	1/28/25	0

REF.					
ENG.	DATE	CHK.	DATE	TITLE	
JLH	1/2/25	JLH	1/7/25	BASIC TRACERASE® CONTROL PANEL MODEL TECP-BP-750-2 TEST CHAMBER DETAIL	
DRN.	DATE	APP.	DATE		
RMC	1/3/25	JLH	1/7/25		

ALL DIMENSIONS IN INCHES
IF IN DOUBT, ASK.

JOB# 08-020-09252024

DWG. 08-020-09252024-1004

SIZE	SCALE	SH.	
B	NTS	1	

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1/28/2025 12:17:03 PM

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