

The Schebler Co.

DATE: 6/26/2007
 PROJECT NAME: Scott Co Government Center
 PROJECT NUMBER:
 DUCT PRESSURE LOSS

RUN1	BOILER 1	
BAROMETRIC PRESSURE	29.92	in. Hg.
VOLUME FLOW RATE	1148.00	CFM
GAS TEMPERATURE	300.00	F.
AMBIENT TEMPERATURE	65.00	F.
FLUE DIAMETER	14.00	in.
VERT. DUCT LENGTH	6.00	ft.
HOR. DUCT LENGTH	9.00	ft.
LENGTH OF DUCT	15.00	ft.
KINEMATIC VISCOCITY	0.000306	ft ² /sec.
AREA OF DUCT	1.06901	ft ²
VELOCITY OF GAS	1073.89	ft./min.
DENSITY OF GAS	0.05216	lb./ft ³
VELOCITY PRESSURE	0.04999	in. W.C.
REYNOLDS NUMBER	68228.00	
FLUE AVE. ROUGHNESS	0.00015	ft.
ROUGHNESS/DIAMETER	0.000128571	
FRICTION FACTOR		
ITERATIONS	0.02006	
	0.02005	
FRICTION FACTOR	0.02005	
FRICTION LOSS	0.01289	in. W.C.
NATURAL DRAFT	0.027004037	in. W.C.

RUN2	BOILER 2	
BAROMETRIC PRESSURE	29.92	in. Hg.
VOLUME FLOW RATE	1148.00	CFM
GAS TEMPERATURE	300.00	F.
AMBIENT TEMPERATURE	65.00	F.
FLUE DIAMETER	14.00	in.
VERT. DUCT LENGTH	6.00	ft.
HOR. DUCT LENGTH	3.00	ft.
LENGTH OF DUCT	9.00	ft.
KINEMATIC VISCOCITY	0.000306	ft ² /sec.
AREA OF DUCT	1.06901	ft ²
VELOCITY OF GAS	1073.89	ft./min.
DENSITY OF GAS	0.05216	lb./ft ³
VELOCITY PRESSURE	0.04999	in. W.C.
REYNOLDS NUMBER	68228.00	
FLUE AVE. ROUGHNESS	0.00015	ft.
ROUGHNESS/DIAMETER	0.000128571	
FRICTION FACTOR		
ITERATIONS	0.02006	
	0.02005	
FRICTION FACTOR	0.02005	
FRICTION LOSS	0.00773	in. W.C.
NATURAL DRAFT	0.027004037	in. W.C.

PRESSURE LOSSES THIS RUN		
DESCRIPTION	QT'Y	in. W.C.
ELBOW, 90 DEGREE	1	0.02100
TEE, 90 DEGREE	0	0.00000
ELBOW, 45 DEGREE	2	0.02100
LAT, JUNCTION TO RUN 2	1	-0.00395
TEE, JUNCTION TO RUN 2	0	0.00000
FRICTION LOSS	15.00	0.01289
MISC. LOSS		0.00000
TOTAL LOSS		0.05093

PRESSURE LOSSES THIS RUN		
DESCRIPTION	QT'Y	in. W.C.
ELBOW, 90 DEGREE	1	0.02100
TEE, 90 DEGREE	0	0.00000
ELBOW, 45 DEGREE	1	0.01050
LAT, JUNCTION TO RUN 1	1	0.02081
TEE, JUNCTION TO RUN 1	0	0.00000
FRICTION LOSS	9.00	0.00773
MISC. LOSS		0.00000
TOTAL LOSS		0.06004

A= 0.55

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RUN3	JUNCTION OF 1&2	
BAROMETRIC PRESSURE	29.92	in. Hg.
VOLUME FLOW RATE	2296.00	CFM
GAS TEMPERATURE	300.00	F.
AMBIENT TEMPERATURE	65.00	F.
FLUE DIAMETER	22.00	in.
VER.DUCT LENGTH	0.00	ft.
HOR. DUCT LENGTH	6.00	ft.
LENGTH OF DUCT	6.00	ft.
KINEMATIC VISCOCITY	0.000306	ft ² /sec.
AREA OF DUCT	2.63981	ft ²
VELOCITY OF GAS	869.76	ft./min.
DENSITY OF GAS	0.052163158	lb./ft ³
VELOCITY PRESSURE	0.03279	in. W.C.
REYNOLDS NUMBER	86835.64	
FLUE AVE. ROUGHNESS	0.00015	ft.
ROUGHNESS/DIAMETER	8.18182E-05	
FRICITION FACTOR		
ITERATIONS	0.01882	
	0.01894	
FRICITION FACTOR	0.01893	
FRICITION LOSS	0.00203	in. W.C.
NATURAL DRAFT	0	in. W.C.

RUN4	BOILER 3	
BAROMETRIC PRESSURE	29.92	in. Hg.
VOLUME FLOW RATE	1148.00	CFM
GAS TEMPERATURE	300.00	F.
AMBIENT TEMPERATURE	65.00	F.
FLUE DIAMETER	14.00	in.
VERT. DUCT LENGTH	6.00	ft.
HOR. DUCT LENGTH	3.00	ft.
LENGTH OF DUCT	9.00	ft.
KINEMATIC VISCOCITY	0.000306	ft ² /sec.
AREA OF DUCT	1.06901	ft ²
VELOCITY OF GAS	1073.89	ft./min.
DENSITY OF GAS	0.05216	lb./ft ³
VELOCITY PRESSURE	0.04999	in. W.C.
REYNOLDS NUMBER	68228.00	
FLUE AVE. ROUGHNESS	0.00015	ft.
ROUGHNESS/DIAMETER	0.000128571	
FRICITION FACTOR		
ITERATIONS	0.02006	
	0.02005	
FRICITION FACTOR	0.02005	
FRICITION LOSS	0.00773	in. W.C.
NATURAL DRAFT	0.027004037	in. W.C.

PRESSURE LOSSES THIS RUN		
DESCRIPTION	QT'Y	in. W.C.
ELBOW, 90 DEGREE	0	0.00000
TEE, 90 DEGREE	0	0.00000
ELBOW, 45 DEGREE	0	0.00000
LAT, JUNCTION TO RUN 4	1	0.01245
TEE, JUNCTION TO RUN 4	0	0.00000
FRICITION LOSS	6.00	0.00203
MISC. LOSS		0.00000
TOTAL LOSS		0.01448

PRESSURE LOSSES THIS RUN		
DESCRIPTION	QT'Y	in. W.C.
ELBOW, 90 DEGREE	1	0.02100
TEE, 90 DEGREE	0	0.00000
ELBOW, 45 DEGREE	1	0.01050
LAT, JUNCTION TO RUN 3	1	0.01779
TEE, JUNCTION TO RUN 3	0	0.00000
FRICITION LOSS	9.00	0.00773
MISC. LOSS		0.00000
TOTAL LOSS		0.05701

A=

0.6

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RUN5	JUNCTION OF 3&4	
BAROMETRIC PRESSURE	29.92	in. Hg.
VOLUME FLOW RATE	3444.00	CFM
GAS TEMPERATURE	300.00	F.
AMBIENT TEMPERATURE	65.00	F.
FLUE DIAMETER	22.00	in.
VER.DUCT LENGTH	0.00	ft.
HOR. DUCT LENGTH	6.00	ft.
LENGTH OF DUCT	6.00	ft.
KINEMATIC VISCOCITY	0.000306	ft ² /sec.
AREA OF DUCT	2.63981	ft ²
VELOCITY OF GAS	1304.64	ft./min.
DENSITY OF GAS	0.052163158	lb./ft ³
VELOCITY PRESSURE	0.07378	in. W.C.
REYNOLDS NUMBER	130253.46	
FLUE AVE. ROUGHNESS	0.00015	ft.
ROUGHNESS/DIAMETER	8.18182E-05	
FRICTION FACTOR		
ITERATIONS	0.01731	
	0.01756	
FRICTION FACTOR	0.01753	
FRICTION LOSS	0.00423	in. W.C.
NATURAL DRAFT	0	in. W.C.

RUN6	BOILER 4	
BAROMETRIC PRESSURE	29.92	in. Hg.
VOLUME FLOW RATE	1148.00	CFM
GAS TEMPERATURE	300.00	F.
AMBIENT TEMPERATURE	65.00	F.
FLUE DIAMETER	14.00	in.
VERT. DUCT LENGTH	6.00	ft.
HOR. DUCT LENGTH	3.00	ft.
LENGTH OF DUCT	9.00	ft.
KINEMATIC VISCOCITY	0.000306	ft ² /sec.
AREA OF DUCT	1.06901	ft ²
VELOCITY OF GAS	1073.89	ft./min.
DENSITY OF GAS	0.05216	lb./ft ³
VELOCITY PRESSURE	0.04999	in. W.C.
REYNOLDS NUMBER	68228.00	
FLUE AVE. ROUGHNESS	0.00015	ft.
ROUGHNESS/DIAMETER	0.000128571	
FRICTION FACTOR		
ITERATIONS	0.02006	
	0.02005	
FRICTION FACTOR	0.02005	
FRICTION LOSS	0.00773	in. W.C.
NATURAL DRAFT	0.027004037	in. W.C.

PRESSURE LOSSES THIS RUN		
DESCRIPTION	QT'Y	in. W.C.
ELBOW, 90 DEGREE	0	0.00000
TEE, 90 DEGREE	0	0.00000
ELBOW, 45 DEGREE	0	0.00000
LAT, JUNCTION TO RUN 6	1	0.02884
TEE, JUNCTION TO RUN 6	0	0.00000
FRICTION LOSS	6.00	0.00423
MISC. LOSS		0.00000
TOTAL LOSS		0.03307

PRESSURE LOSSES THIS RUN		
DESCRIPTION	QT'Y	in. W.C.
ELBOW, 90 DEGREE	1	0.02100
TEE, 90 DEGREE	0	0.00000
ELBOW, 45 DEGREE	1	0.01050
LAT, JUNCTION TO RUN 5	1	0.00341
TEE, JUNCTION TO RUN 5	0	0.00000
FRICTION LOSS	9.00	0.00773
MISC. LOSS		0.00000
TOTAL LOSS		0.04263

A= 0.675

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RUN7	JUNCTION OF 5&6	
BAROMETRIC PRESSURE	29.92	in. Hg.
VOLUME FLOW RATE	4592.00	CFM
GAS TEMPERATURE	300.00	F.
AMBIENT TEMPERATURE	65.00	F.
FLUE DIAMETER	22.00	in.
VER.DUCT LENGTH	70.00	ft.
HOR. DUCT LENGTH	10.00	ft.
LENGTH OF DUCT	80.00	ft.
KINEMATIC VISCOCITY	0.000306	ft ² /sec.
AREA OF DUCT	2.63981	ft ²
VELOCITY OF GAS	1739.52	ft./min.
DENSITY OF GAS	0.052163158	lb./ft ³
VELOCITY PRESSURE	0.13116	in. W.C.
REYNOLDS NUMBER	173671.28	
FLUE AVE. ROUGHNESS	0.00015	ft.
ROUGHNESS/DIAMETER	8.18182E-05	
FRICITION FACTOR		
ITERATIONS	0.01639	
	0.01670	
FRICITION FACTOR	0.01667	
FRICITION LOSS	0.09539	in. W.C.
NATURAL DRAFT	0.315047102	in. W.C.

PRESSURE LOSSES THIS RUN		
DESCRIPTION	QT'Y	in. W.C.
ELBOW, 90 DEGREE	1	0.05509
TEE, 90 DEGREE	0	0.00000
ELBOW, 45 DEGREE	2	0.05509
STACK CAPS	1	0.02361
FRICITION LOSS	80.00	0.09539
MISC. LOSS		0.00000
TOTAL LOSS		0.22918

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RECOMENDED DIAMETERS			
RUN IDENTIFIER	DIAMETER	VELOCITY	LOSS
		in.	ft./min. in. W.C.
RUN 1	14.00	1073.89	0.05093
RUN 2	14.00	1073.89	0.06004
RUN 3	22.00	869.76	0.01448
RUN 4	14.00	1073.89	0.05701
RUN 5	22.00	1304.64	0.03307
RUN 6	14.00	1073.89	0.04263
RUN 7	22.00	1739.52	0.22918



APPLIANCE	TOTAL	TOTAL	OUTLET
No.	LOSS	DRAFT	PRESSURE
BOILER 1	0.327655	0.342051	-0.01440
BOILER 2	0.336765	0.342051	-0.00529
BOILER 3	0.319262	0.342051	-0.02279
BOILER 4	0.271810	0.342051	-0.07024

