



Rig Mass Flow Rate Calculations

Please Enter Parameters in highlighted boxes below

Engine Data File		
Ambient Conditions		
Air Temperature	8	[C]
Atmospheric Pressure	979	[mBar]
Air Humidity	55	[%]
Viper Engine Parameters		
Engine Air Intake Mass Flow	18.6	[Kg/s]
Butane Flow Rate	1700	[Ltr/h]
Engine Speed	12154	[RPM]
ETC	650	[C]
Gas Delivery System Data File		
Gas Delivery System		
Mixed Gas (Fuel) Mass Flow rate	0.23	[Kg/s]
Oxygen Mass Flow rate	0.152	[Kg/s]

Please do not change anything in this box

Test Date and Time = 02.10.2014 14:44:58.9

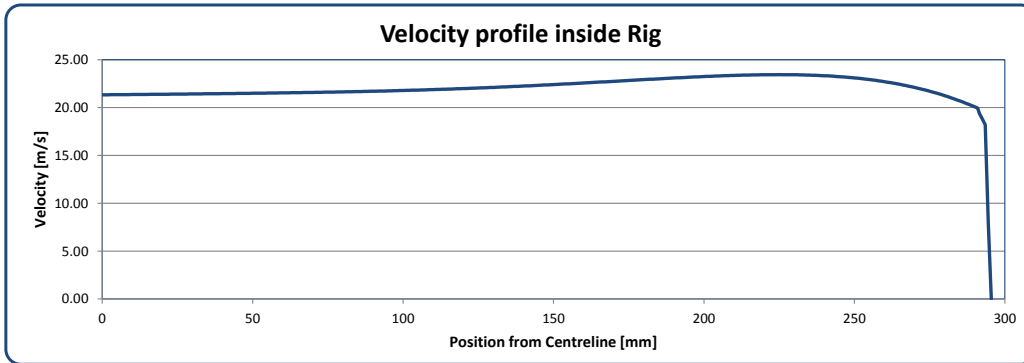
Calculated Parameters		
Air density	1.210973	[Kg/m3]
Liquid Butane density	584	[Kg/m3]
Butane mass Flow rate	0.275778	[Kg/s]
Air Fuel Ratio	80.29239	[]
Calculated Exhaust gas properties (Reaction Engines)		
Exhaust products density	0.389	[Kg/m3]
Pitot Traverse Results		
Rig Gas flow rate - Integrated	2.362439	[Kg/s]
Total Rig Mass flow	2.744439	[Kg/s]
Rig Gas Temperature as read from TC 8?		
Gas Temperature	514	[C]

Bruce Ewan to fill in

Note

Manual for viper 201 gives figures for fuel flow rate to be as follows at maximum power

Fuel Flow	2035	lb/hr	to	2920	lb/hr
	925	Kg/hr		1327.273	Kg/hr
	1156.25	ltr/hr		1659.091	ltr/hr



Data Acquisition Parameters

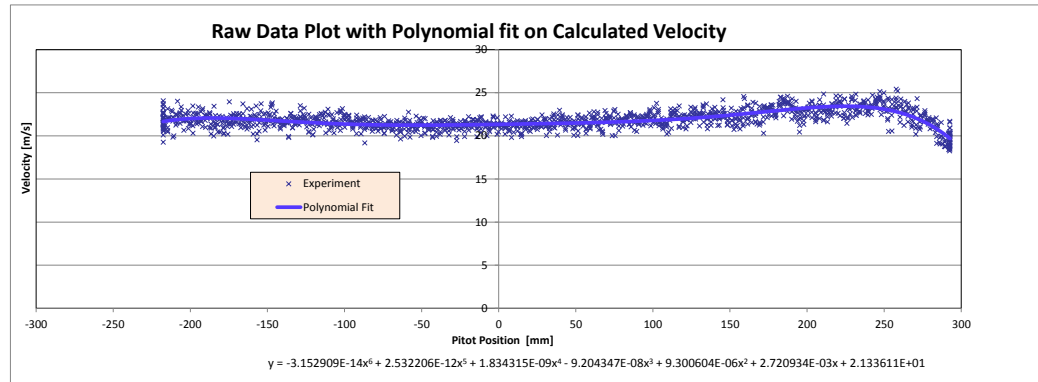
Sampling Rate	1000	[Hz]	
No of samples recorded	100	Samples	
Averaged samples sampling rate	10	[Hz]	
Pitot Traverse speed	7	[mm/s]	Averaged Pitot dp
Distance Travelled every 0.1sec	0.7	[mm]	0.932285505
			Average Vel 21.8660913 [m/s]

Raw Data from CSV File

Date and time [dd:mm:yyyy hh:mm:ss.ms]	Pitot Position from rig centre [mm]	TC11 - Pitot [deg C]	Pitot dP [mBar]	O2 %
02.10.2014 14:44:58.9	-217.48	513.4	0.8594	16.43
02.10.2014 14:44:59.0	-217.48	513.2	0.8781	16.39
02.10.2014 14:44:59.1	-217.56	513.3	1.0083	16.36
02.10.2014 14:44:59.2	-217.51	513.5	0.8887	16.39
02.10.2014 14:44:59.3	-217.5	513.5	0.9591	16.41
02.10.2014 14:44:59.4	-217.55	513.4	0.8392	16.4
02.10.2014 14:44:59.5	-217.54	513.4	0.7866	16.29
02.10.2014 14:44:59.6	-217.48	513.5	0.7224	16.41
02.10.2014 14:44:59.7	-217.51	513.3	0.8591	16.46
02.10.2014 14:44:59.8	-217.54	513.2	1.0496	16.33
02.10.2014 14:44:59.9	-217.5	513.2	1.1267	16.3
02.10.2014 14:45:00.0	-217.52	513.1	0.9981	16.41
02.10.2014 14:45:00.1	-217.54	513	0.9933	16.47
02.10.2014 14:45:00.2	-217.52	512.9	0.9422	16.32
02.10.2014 14:45:00.3	-217.5	513.1	0.8825	16.28
02.10.2014 14:45:00.4	-217.51	513.1	0.8442	16.43
02.10.2014 14:45:00.5	-217.49	513	0.9036	16.44
02.10.2014 14:45:00.6	-217.36	512.9	0.8416	16.36
02.10.2014 14:45:00.7	-217.29	513	0.8252	16.31
02.10.2014 14:45:00.8	-217.27	513	0.8215	16.42
02.10.2014 14:45:00.9	-216.05	512.8	0.8787	16.41
02.10.2014 14:45:01.0	-214.65	512.7	0.8267	16.37
02.10.2014 14:45:01.1	-214.72	512.9	0.8534	16.35
02.10.2014 14:45:01.2	-214.7	512.8	0.8145	16.41
02.10.2014 14:45:01.3	-213.24	512.6	0.9518	16.41
02.10.2014 14:45:01.4	-212.1	512.5	1.026	16.32
02.10.2014 14:45:01.5	-212.17	512.6	0.9398	16.42
02.10.2014 14:45:01.6	-211.36	512.5	0.9174	16.44
02.10.2014 14:45:01.7	-209.04	512.4	0.9119	16.36
02.10.2014 14:45:01.8	-209.28	512.4	0.8786	16.32
02.10.2014 14:45:01.9	-209.21	512.5	0.9869	16.44
02.10.2014 14:45:02.0	-208.28	512.3	1.1227	16.47
02.10.2014 14:45:02.1	-206.54	512.2	1.0014	16.35
02.10.2014 14:45:02.2	-206.7	512.3	0.9932	16.32
02.10.2014 14:45:02.3	-206.68	512.3	0.8956	16.46
02.10.2014 14:45:02.4	-204.59	512.2	0.9742	16.47
02.10.2014 14:45:02.5	-204.16	512.1	0.9207	16.35
02.10.2014 14:45:02.6	-204.12	512.3	0.8298	16.34
02.10.2014 14:45:02.7	-204.14	512.3	0.9176	16.43
02.10.2014 14:45:02.8	-201.38	512.1	1.0214	16.48
02.10.2014 14:45:02.9	-201.2	512.1	0.991	16.33
02.10.2014 14:45:03.0	-201.24	512.2	0.846	16.37
02.10.2014 14:45:03.1	-199.38	512.2	0.8931	16.42
02.10.2014 14:45:03.2	-198.24	512.1	0.8017	16.41
02.10.2014 14:45:03.3	-198.34	512.1	0.8715	16.35
02.10.2014 14:45:03.4	-198.3	512.3	1.0719	16.4
02.10.2014 14:45:03.5	-196.36	512.2	0.9947	16.43
02.10.2014 14:45:03.6	-195.72	512.1	0.9127	16.37
02.10.2014 14:45:03.7	-195.75	512.2	0.8901	16.36
02.10.2014 14:45:03.8	-195.47	512.3	0.9191	16.4
02.10.2014 14:45:03.9	-193.04	512.3	1.0108	16.45
02.10.2014 14:45:04.0	-193.25	512.1	0.9377	16.35
02.10.2014 14:45:04.1	-193.15	512.3	0.9156	16.32
02.10.2014 14:45:04.2	-192.66	512.3	0.912	16.43
02.10.2014 14:45:04.3	-190.09	512.2	0.8571	16.48
02.10.2014 14:45:04.4	-190.3	512.1	0.9235	16.34
02.10.2014 14:45:04.5	-190.28	512.2	0.9705	16.28
02.10.2014 14:45:04.6	-187.41	512.3	0.9565	16.47
02.10.2014 14:45:04.7	-187.38	512.2	0.9852	16.44
02.10.2014 14:45:04.8	-187.41	512.2	1.0026	16.34

Calculated Velocity [m/s]
21.0202498
21.2477127
22.7685346
21.3755741
22.2060924
20.7717427
20.110236
19.2721011
21.0165806
23.230155
24.0682406
22.6530782
22.5985417
22.0095796
21.3008804
20.8335304
21.5540213
20.8014237
20.5977511
20.5515216
21.2549707
20.6164633
20.9467436
20.4637745
22.1214223
22.9675081
21.98153
21.7179868
21.6527871
21.2537612
22.5256209
24.0254792
22.6904961
22.5974041
21.4583952
22.3802153
21.7570129
20.6550815
21.720354
22.9159636
22.5723629
20.8557292
21.4284245
20.302342
21.1677108
23.4756341
22.6144618
21.6622829
21.3924043
21.7380999
22.7967436
21.9569572
21.6966703
21.6539743
20.9921028
21.7900711
22.337675
22.175973
22.5062117
22.7040873

Raw Data Plot with Polynomial fit on Calculated Velocity



02.10.2014 14:45:04.9	-187.3	512.3	0.9922	16.34	22.5860252
02.10.2014 14:45:05.0	-184.61	512.4	1.0681	16.42	23.4339854
02.10.2014 14:45:05.1	-184.81	512.2	0.9071	16.41	21.5957246
02.10.2014 14:45:05.2	-184.8	512.2	0.7768	16.35	19.9845699
02.10.2014 14:45:05.3	-183.75	512.4	0.9719	16.35	22.3537808
02.10.2014 14:45:05.4	-182.09	512.4	0.8144	16.43	20.4625182
02.10.2014 14:45:05.5	-182.27	512.2	0.887	16.39	21.3551196
02.10.2014 14:45:05.6	-182.25	512.2	0.8837	16.34	21.3153577
02.10.2014 14:45:05.7	-180.74	512.4	0.8136	16.37	20.4524654
02.10.2014 14:45:05.8	-179.16	512.3	0.8933	16.46	21.4308237
02.10.2014 14:45:05.9	-179.34	512.2	0.9633	16.35	22.2546607
02.10.2014 14:45:06.0	-178.69	512.3	0.8507	16.31	20.9135815
02.10.2014 14:45:06.1	-176.18	512.3	0.916	16.44	21.7014091
02.10.2014 14:45:06.2	-176.43	512.2	0.9538	16.44	22.1446518
02.10.2014 14:45:06.3	-176.44	512.1	0.9085	16.35	21.6123834
02.10.2014 14:45:06.4	-174.66	512.1	1.1163	16.29	23.9569022
02.10.2014 14:45:06.5	-173.75	512.1	0.9753	16.39	22.3928468
02.10.2014 14:45:06.6	-173.86	511.8	0.9021	16.49	21.5361238
02.10.2014 14:45:06.7	-173.86	511.7	0.8891	16.3	21.3803841
02.10.2014 14:45:06.8	-171.86	511.8	0.9898	16.32	22.5586924
02.10.2014 14:45:06.9	-171.27	511.8	0.9608	16.4	22.2257638
02.10.2014 14:45:07.0	-171.28	511.5	0.9088	16.44	21.6159515
02.10.2014 14:45:07.1	-169.91	511.4	0.9621	16.36	22.2407949
02.10.2014 14:45:07.2	-168.2	511.5	0.9857	16.34	22.511922
02.10.2014 14:45:07.3	-168.38	511.5	0.9891	16.42	22.5507141
02.10.2014 14:45:07.4	-168.35	511.3	0.8907	16.42	21.3996132
02.10.2014 14:45:07.5	-166.02	511.3	0.9357	16.34	21.9335289
02.10.2014 14:45:07.6	-165.84	511.4	0.942	16.4	22.0072435
02.10.2014 14:45:07.7	-165.79	511.4	0.9916	16.42	22.5791951
02.10.2014 14:45:07.8	-165.84	511.3	1.094	16.41	23.716405
02.10.2014 14:45:07.9	-163.23	511.3	1.0439	16.32	23.1669919
02.10.2014 14:45:08.0	-163.22	511.5	0.8402	16.39	20.784115
02.10.2014 14:45:08.1	-163.27	511.4	0.9391	16.5	21.9733421
02.10.2014 14:45:08.2	-161.16	511.3	0.9662	16.33	22.2881342
02.10.2014 14:45:08.3	-160.31	511.5	0.8639	16.31	21.0752111
02.10.2014 14:45:08.4	-160.35	511.6	0.9619	16.45	22.2384831
02.10.2014 14:45:08.5	-160.37	511.6	1.0369	16.48	23.0891866
02.10.2014 14:45:08.6	-158.24	511.6	0.9801	16.32	22.4478831
02.10.2014 14:45:08.7	-157.76	511.7	0.9642	16.33	22.2650544
02.10.2014 14:45:08.8	-157.78	511.8	0.9379	16.45	21.9592986
02.10.2014 14:45:08.9	-157.28	511.6	1.0719	16.46	23.4756341
02.10.2014 14:45:09.0	-155.1	511.6	0.9418	16.34	22.0049071
02.10.2014 14:45:09.1	-155.27	511.9	0.9833	16.36	22.4844991
02.10.2014 14:45:09.2	-155.22	511.9	0.9024	16.42	21.5397045
02.10.2014 14:45:09.3	-152.35	511.8	0.9315	16.43	21.884248
02.10.2014 14:45:09.4	-152.38	511.8	0.9841	16.39	22.4936438
02.10.2014 14:45:09.5	-152.27	512	0.8782	16.36	21.2489225
02.10.2014 14:45:09.6	-151.5	512	0.8307	16.45	20.6662797
02.10.2014 14:45:09.7	-149.55	511.9	0.8665	16.39	21.1069014
02.10.2014 14:45:09.8	-149.78	511.9	0.9318	16.38	21.8877717
02.10.2014 14:45:09.9	-149.76	512	0.9228	16.4	21.7818112
02.10.2014 14:45:10.0	-147.75	512	1.057	16.45	23.311901
02.10.2014 14:45:10.1	-147.17	511.8	1.092	16.38	23.6947165
02.10.2014 14:45:10.2	-147.21	511.9	1.0803	16.34	23.5674387
02.10.2014 14:45:10.3	-146.75	512.1	1.1048	16.43	23.833182
02.10.2014 14:45:10.4	-144.06	512	0.9165	16.49	21.7073312
02.10.2014 14:45:10.5	-144.34	512	0.9159	16.36	21.7002245
02.10.2014 14:45:10.6	-144.27	512.1	1.0182	16.32	22.8800381
02.10.2014 14:45:10.7	-143.73	512.2	0.9366	16.47	21.9440747
02.10.2014 14:45:10.8	-141.53	512.1	0.8417	16.48	20.8026595
02.10.2014 14:45:10.9	-141.73	512	0.8877	16.37	21.3635444
02.10.2014 14:45:11.0	-141.71	512.2	0.8554	16.35	20.9712743
02.10.2014 14:45:11.1	-139.99	512.2	0.8826	16.46	21.3020872
02.10.2014 14:45:11.2	-139.11	512.1	0.8721	16.48	21.1749962
02.10.2014 14:45:11.3	-139.2	512	0.8871	16.36	21.3563233
02.10.2014 14:45:11.4	-139.03	512.3	0.9016	16.39	21.5301546
02.10.2014 14:45:11.5	-136.07	512.3	0.7637	16.43	19.8153429
02.10.2014 14:45:11.6	-136.24	512.2	0.7726	16.41	19.9304704
02.10.2014 14:45:11.7	-136.27	512.2	0.9013	16.43	21.5265723
02.10.2014 14:45:11.8	-134.1	512.4	0.9184	16.37	21.7298203
02.10.2014 14:45:11.9	-133.64	512.4	0.8517	16.5	20.9258699
02.10.2014 14:45:12.0	-133.7	512.2	0.8541	16.4	20.9553326

02.10.2014 14:45:12.1	-132.38	512.2	0.8897	16.37	21.387597
02.10.2014 14:45:12.2	-131.02	512.3	0.8914	16.45	21.4080205
02.10.2014 14:45:12.3	-131.16	512.2	0.9297	16.47	21.8630935
02.10.2014 14:45:12.4	-131.16	512.1	0.951	16.37	22.1121237
02.10.2014 14:45:12.5	-128.59	512.1	1.0752	16.37	23.511743
02.10.2014 14:45:12.6	-128.6	512.1	0.9611	16.46	22.2292334
02.10.2014 14:45:12.7	-128.58	512	1.0213	16.5	22.9148418
02.10.2014 14:45:12.8	-128.5	511.9	0.9592	16.36	22.20725
02.10.2014 14:45:12.9	-125.94	512	0.9711	16.37	22.3445789
02.10.2014 14:45:13.0	-126.07	512.1	1.0479	16.47	23.2113349
02.10.2014 14:45:13.1	-125.99	511.9	0.9667	16.5	22.2939004
02.10.2014 14:45:13.2	-123.76	511.8	0.8965	16.37	21.4691744
02.10.2014 14:45:13.3	-123.09	511.9	0.9855	16.37	22.509638
02.10.2014 14:45:13.4	-123.06	511.9	0.8103	16.5	20.4109452
02.10.2014 14:45:13.5	-123.12	511.6	0.8179	16.46	20.5064414
02.10.2014 14:45:13.6	-120.85	511.5	0.8841	16.39	21.3201813
02.10.2014 14:45:13.7	-120.56	511.5	0.7892	16.4	20.1434445
02.10.2014 14:45:13.8	-120.55	511.4	0.7873	16.46	20.1191822
02.10.2014 14:45:13.9	-119.96	511.2	0.8388	16.44	20.7667918
02.10.2014 14:45:14.0	-117.8	511	0.8829	16.41	21.3057073
02.10.2014 14:45:14.1	-118.04	511.1	0.9484	16.43	22.0818762
02.10.2014 14:45:14.2	-117.99	510.9	0.9315	16.49	21.884248
02.10.2014 14:45:14.3	-114.94	510.7	0.9922	16.43	22.5860252
02.10.2014 14:45:14.4	-115.15	510.7	0.9021	16.36	21.5361238
02.10.2014 14:45:14.5	-115.07	510.8	0.9896	16.48	22.5564131
02.10.2014 14:45:14.6	-114.09	510.7	0.9723	16.52	22.3583804
02.10.2014 14:45:14.7	-112.35	510.7	0.9028	16.4	21.5444778
02.10.2014 14:45:14.8	-112.54	510.8	1.0075	16.34	22.7595004
02.10.2014 14:45:14.9	-112.16	511	0.8051	16.46	20.3453474
02.10.2014 14:45:15.0	-109.82	510.8	0.8276	16.56	20.6276825
02.10.2014 14:45:15.1	-110.03	510.8	0.897	16.33	21.4751605
02.10.2014 14:45:15.2	-109.98	511	0.9748	16.37	22.3871061
02.10.2014 14:45:15.3	-108.57	511	0.8639	16.48	21.0752111
02.10.2014 14:45:15.4	-107.29	510.8	0.9398	16.48	21.98153
02.10.2014 14:45:15.5	-107.44	510.7	0.9276	16.41	21.8383875
02.10.2014 14:45:15.6	-106.8	510.8	0.8057	16.39	20.3529272
02.10.2014 14:45:15.7	-104.6	510.8	0.8561	16.47	20.9798532
02.10.2014 14:45:15.8	-104.89	510.6	1.0019	16.46	22.6961601
02.10.2014 14:45:15.9	-104.94	510.6	0.88	16.42	21.2706878
02.10.2014 14:45:16.0	-103.06	510.8	0.8715	16.42	21.1677108
02.10.2014 14:45:16.1	-102.24	510.7	0.9332	16.47	21.9042084
02.10.2014 14:45:16.2	-102.29	510.6	1.0231	16.43	22.9350261
02.10.2014 14:45:16.3	-101.28	510.7	1.0441	16.37	23.169211
02.10.2014 14:45:16.4	-99.56	510.8	0.9806	16.47	22.4536083
02.10.2014 14:45:16.5	-99.78	510.7	0.9278	16.5	21.8407416
02.10.2014 14:45:16.6	-99.76	510.6	0.8575	16.4	20.9970006
02.10.2014 14:45:16.7	-97.54	510.7	0.8992	16.34	21.5014796
02.10.2014 14:45:16.8	-97.2	510.8	0.9752	16.48	22.3916988
02.10.2014 14:45:16.9	-97.2	510.7	0.9639	16.53	22.2615904
02.10.2014 14:45:17.0	-95.69	510.6	0.9074	16.4	21.5992954
02.10.2014 14:45:17.1	-94.58	510.8	0.8701	16.34	21.1507018
02.10.2014 14:45:17.2	-94.66	510.9	0.8404	16.47	20.7865885
02.10.2014 14:45:17.3	-94.63	510.7	0.9091	16.54	21.6195189
02.10.2014 14:45:17.4	-92.04	510.6	0.9773	16.36	22.415795
02.10.2014 14:45:17.5	-92.18	510.7	0.9478	16.37	22.0748901
02.10.2014 14:45:17.6	-92.09	510.7	0.9197	16.46	21.7451942
02.10.2014 14:45:17.7	-90.17	510.5	0.9214	16.47	21.7652821
02.10.2014 14:45:17.8	-89.51	510.4	0.8707	16.41	21.157993
02.10.2014 14:45:17.9	-89.54	510.5	0.8566	16.41	20.9859789
02.10.2014 14:45:18.0	-89.22	510.5	0.7975	16.47	20.2490915
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02.10.2014 14:45:39.8	73.66	510.3	0.7797	16.49	20.021839
02.10.2014 14:45:39.9	75.59	510.2	0.7804	16.4	20.0308246
02.10.2014 14:45:40.0	75.4	510.4	0.8958	16.34	21.4607911
02.10.2014 14:45:40.1	75.37	510.5	1.0351	16.47	23.0691372
02.10.2014 14:45:40.2	77.64	510.4	0.9083	16.52	21.6100043
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02.10.2014 14:45:40.4	77.96	510.6	0.8274	16.34	20.6251899
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02.10.2014 14:45:40.7	80.49	510.5	0.9311	16.41	21.8795487
02.10.2014 14:45:40.8	80.48	510.6	0.8689	16.37	21.1361117

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02.10.2014 14:45:41.0	83.01	510.5	0.9373	16.45	21.9522735
02.10.2014 14:45:41.1	83.09	510.5	0.9326	16.37	21.8971656
02.10.2014 14:45:41.2	84.99	510.6	0.8852	16.43	21.3334404
02.10.2014 14:45:41.3	85.65	510.6	0.9877	16.46	22.5347489
02.10.2014 14:45:41.4	85.61	510.4	0.9588	16.44	22.2026192
02.10.2014 14:45:41.5	85.92	510.4	0.8619	16.36	21.0508016
02.10.2014 14:45:41.6	88.31	510.4	0.9132	16.43	21.6682156
02.10.2014 14:45:41.7	88.13	510.4	0.8293	16.49	20.6488576
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02.10.2014 14:45:41.9	89.56	510.4	0.8183	16.37	20.5114552
02.10.2014 14:45:42.0	90.86	510.4	0.8844	16.44	21.3237982
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02.10.2014 14:45:43.6	101.88	510.5	0.8932	16.48	21.4296242
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02.10.2014 14:45:44.3	106.56	510.9	0.8906	16.5	21.3984119
02.10.2014 14:45:44.4	109.1	510.8	0.7958	16.48	20.2274979
02.10.2014 14:45:44.5	108.95	510.9	0.8609	16.35	21.0385862
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02.10.2014 14:45:46.4	122.49	511.2	0.9643	16.34	22.266209
02.10.2014 14:45:46.5	124.89	511.4	0.9683	16.37	22.3123423
02.10.2014 14:45:46.6	124.63	511.4	1.0595	16.45	23.3394532
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02.10.2014 14:45:47.3	130.11	511.4	0.9561	16.36	22.1713356
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02.10.2014 14:45:48.6	140.6	511.2	1.011	16.51	22.7989988
02.10.2014 14:45:48.7	140.33	511.2	0.9648	16.37	22.2719809
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02.10.2014 14:45:51.0	157.22	510.4	1.0432	16.4	23.1592231
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02.10.2014 14:45:53.6	176.82	510.2	1.0555	16.44	23.2953541
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02.10.2014 14:45:54.3	181.89	510.1	1.088	16.5	23.6512797
02.10.2014 14:45:54.4	181.92	510.1	1.121	16.36	24.0072825
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02.10.2014 14:45:55.1	187.43	510.2	1.0127	16.49	22.818159
02.10.2014 14:45:55.2	189.23	510.2	1.0954	16.39	23.7315752

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02.10.2014 14:45:55.5	190.21	510.2	1.0108	16.48	22.7967436
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02.10.2014 14:45:57.3	205.25	510.3	1.0731	16.49	23.488771
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02.10.2014 14:45:57.8	208.17	510.1	1.0265	16.44	22.9731038
02.10.2014 14:45:57.9	208.21	510.2	1.1378	16.41	24.1865075
02.10.2014 14:45:58.0	210.79	510.3	1.2013	16.43	24.8522627
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02.10.2014 14:45:58.3	211.62	510.4	1.0072	16.38	22.7561116
02.10.2014 14:45:58.4	213.56	510.5	1.0477	16.46	23.2091197
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02.10.2014 14:45:58.6	213.3	510.4	1.0145	16.39	22.8384288
02.10.2014 14:45:58.7	215.36	510.6	1.0371	16.35	23.0914133
02.10.2014 14:45:58.8	215.92	510.7	1.002	16.48	22.6972927
02.10.2014 14:45:58.9	215.85	510.6	0.9671	16.51	22.2985123
02.10.2014 14:45:59.0	216.29	510.6	1.0062	16.38	22.7448121
02.10.2014 14:45:59.1	218.64	510.8	1.0585	16.36	23.3284363
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02.10.2014 14:45:59.3	218.42	510.7	0.9986	16.5	22.6587516
02.10.2014 14:45:59.4	220.16	510.7	0.9956	16.38	22.6246902
02.10.2014 14:45:59.5	221.45	511	1.1775	16.41	24.6048462
02.10.2014 14:45:59.6	221.33	511.1	1.1259	16.47	24.0596944
02.10.2014 14:45:59.7	221.42	511	0.9709	16.47	22.3422778
02.10.2014 14:45:59.8	224	511.1	0.9755	16.39	22.3951427
02.10.2014 14:45:59.9	223.9	511.3	0.9442	16.4	22.032927
02.10.2014 14:46:00.0	223.91	511.3	0.9445	16.5	22.036427
02.10.2014 14:46:00.1	225.84	511.2	0.8949	16.42	21.4500076
02.10.2014 14:46:00.2	226.51	511.3	0.9416	16.36	22.0025705
02.10.2014 14:46:00.3	226.47	511.4	0.9547	16.48	22.1550971
02.10.2014 14:46:00.4	227.61	511.4	1.0342	16.52	23.0591059
02.10.2014 14:46:00.5	229.19	511.3	1.1395	16.37	24.2045695
02.10.2014 14:46:00.6	228.98	511.4	1.1389	16.36	24.1981962
02.10.2014 14:46:00.7	229.01	511.4	1.1755	16.48	24.5839415
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02.10.2014 14:46:01.2	234.34	511.2	1.0933	16.5	23.7088163
02.10.2014 14:46:01.3	234.07	511.2	1.0079	16.4	22.764018
02.10.2014 14:46:01.4	234.12	511.4	1.0174	16.36	22.8710479
02.10.2014 14:46:01.5	235.93	511.5	1.0838	16.46	23.6055852
02.10.2014 14:46:01.6	236.72	511.3	1.1181	16.51	23.9762093
02.10.2014 14:46:01.7	236.67	511.3	1.0622	16.37	23.3691731
02.10.2014 14:46:01.8	237.89	511.4	0.9936	16.39	22.6019541
02.10.2014 14:46:01.9	239.82	511.3	1.0078	16.47	22.7628887
02.10.2014 14:46:02.0	239.58	511.1	0.9783	16.42	22.4272603
02.10.2014 14:46:02.1	239.57	511.1	1.0144	16.4	22.8373032
02.10.2014 14:46:02.2	240.73	511.2	1.0597	16.45	23.341656
02.10.2014 14:46:02.3	241.89	511.2	1.086	16.48	23.6295314
02.10.2014 14:46:02.4	241.72	511.1	0.9844	16.42	22.4970721

02.10.2014 14:46:02.5	242.48	511.2	1.189	16.37	24.7247053
02.10.2014 14:46:02.6	244.98	511.3	1.0871	16.45	23.6414955
02.10.2014 14:46:02.7	244.63	511.2	1.0755	16.52	23.5150228
02.10.2014 14:46:02.8	244.72	511.2	1.1034	16.41	23.8180766
02.10.2014 14:46:02.9	247.35	511.3	1.0316	16.33	23.0301021
02.10.2014 14:46:03.0	247.22	511.4	1.124	16.49	24.039385
02.10.2014 14:46:03.1	247.2	511.3	1.1448	16.51	24.2607939
02.10.2014 14:46:03.2	248.2	511.3	0.9815	16.41	22.4639099
02.10.2014 14:46:03.3	250.03	511.5	1.0299	16.34	23.0111184
02.10.2014 14:46:03.4	249.8	511.5	1.0731	16.5	23.488771
02.10.2014 14:46:03.5	249.78	511.3	1.0546	16.5	23.2854203
02.10.2014 14:46:03.6	251.99	511.3	1.0162	16.39	22.857556
02.10.2014 14:46:03.7	252.37	511.4	0.9409	16.41	21.9943905
02.10.2014 14:46:03.8	252.33	511.4	0.9275	16.48	21.8372103
02.10.2014 14:46:03.9	252.86	511.1	0.819	16.44	20.5202264
02.10.2014 14:46:04.0	255.14	511.1	0.8228	16.38	20.5677762
02.10.2014 14:46:04.1	254.87	511.3	0.9753	16.46	22.3928468
02.10.2014 14:46:04.2	254.92	511.2	1.0443	16.47	23.17143
02.10.2014 14:46:04.3	257.86	511.1	1.2567	16.4	25.4188562
02.10.2014 14:46:04.4	257.75	511.1	1.1573	16.41	24.3928853
02.10.2014 14:46:04.5	257.85	511.2	1.0608	16.43	23.3537675
02.10.2014 14:46:04.6	257.92	511.1	1.0451	16.51	23.1803037
02.10.2014 14:46:04.7	260.5	511	1.0608	16.41	23.3537675
02.10.2014 14:46:04.8	260.39	511.1	0.9048	16.38	21.5683287
02.10.2014 14:46:04.9	260.38	511.2	0.9566	16.49	22.1771322
02.10.2014 14:46:05.0	262.43	511.1	1.0465	16.51	23.1958245
02.10.2014 14:46:05.1	262.94	511.1	0.8758	16.38	21.2198675
02.10.2014 14:46:05.2	262.92	511.3	1.0023	16.36	22.7006902
02.10.2014 14:46:05.3	264.21	511.4	1.0056	16.51	22.7380297
02.10.2014 14:46:05.4	265.64	511.2	0.9935	16.52	22.6008167
02.10.2014 14:46:05.5	265.47	511.2	0.9651	16.38	22.2754433
02.10.2014 14:46:05.6	265.5	511.5	0.9097	16.41	21.6266521
02.10.2014 14:46:05.7	267.98	511.5	0.9261	16.47	21.8207232
02.10.2014 14:46:05.8	267.99	511.3	0.8588	16.47	21.0129107
02.10.2014 14:46:05.9	268.05	511.3	0.8779	16.42	21.2452928
02.10.2014 14:46:06.0	268.78	511.6	0.9138	16.42	21.6753328
02.10.2014 14:46:06.1	270.87	511.5	0.8805	16.49	21.2767297
02.10.2014 14:46:06.2	270.55	511.4	0.8486	16.43	20.8877524
02.10.2014 14:46:06.3	270.61	511.5	0.7927	16.42	20.1880618
02.10.2014 14:46:06.4	272.56	511.7	0.8526	16.45	20.9369233
02.10.2014 14:46:06.5	273.19	511.6	0.909	16.49	21.6183298
02.10.2014 14:46:06.6	273.12	511.6	0.8379	16.44	20.7556478
02.10.2014 14:46:06.7	273.52	511.7	0.8618	16.36	21.0495803
02.10.2014 14:46:06.8	276.31	511.7	0.9807	16.49	22.4547531
02.10.2014 14:46:06.9	276.01	511.6	0.9109	16.54	21.6409115
02.10.2014 14:46:07.0	276.08	511.6	0.9155	16.37	21.6954854
02.10.2014 14:46:07.1	277.51	511.7	0.9306	16.37	21.8736733
02.10.2014 14:46:07.2	278.72	511.7	0.927	16.5	21.8313235
02.10.2014 14:46:07.3	278.57	511.6	0.8875	16.53	21.3611376
02.10.2014 14:46:07.4	278.6	511.5	0.9014	16.37	21.5277665
02.10.2014 14:46:07.5	281.23	511.8	0.934	16.38	21.9135952
02.10.2014 14:46:07.6	281.14	511.8	0.8611	16.5	21.0410298
02.10.2014 14:46:07.7	281.2	511.6	0.9231	16.46	21.7853516
02.10.2014 14:46:07.8	283.3	511.6	0.8085	16.44	20.3882622
02.10.2014 14:46:07.9	284.17	511.9	0.7125	16.39	19.1395901
02.10.2014 14:46:08.0	284.08	511.9	0.8343	16.51	20.7110119
02.10.2014 14:46:08.1	284.1	511.8	0.7721	16.45	19.9240202
02.10.2014 14:46:08.2	285.87	511.8	0.7208	16.4	19.250747
02.10.2014 14:46:08.3	286.33	512	0.7064	16.46	19.0574831
02.10.2014 14:46:08.4	286.26	512	0.7631	16.47	19.8075574
02.10.2014 14:46:08.5	287.82	511.8	0.7063	16.43	19.0561341
02.10.2014 14:46:08.6	289.36	511.9	0.7247	16.39	19.3027563
02.10.2014 14:46:08.7	289.17	512	0.685	16.45	18.7665951
02.10.2014 14:46:08.8	289.76	511.9	0.6917	16.53	18.85815
02.10.2014 14:46:08.9	291.96	511.9	0.7279	16.38	19.3453262
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02.10.2014 14:46:09.1	291.8	512.1	0.8035	16.52	20.3251209
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02.10.2014 14:46:09.3	292.68	512	0.7159	16.36	19.1852021
02.10.2014 14:46:09.4	292.7	512.2	0.8018	16.37	20.3036081
02.10.2014 14:46:09.5	292.62	512.3	0.749	16.46	19.6237095
02.10.2014 14:46:09.6	292.63	512	0.6871	16.52	18.7953394

02.10.2014 14:46:09.7	292.64	512	0.6935	16.37	18.8826712
02.10.2014 14:46:09.8	292.62	512.2	0.8518	16.39	20.9270983
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02.10.2014 14:46:10.1	292.59	511.9	0.798	16.39	20.2554382
02.10.2014 14:46:10.2	292.65	512.1	0.7991	16.42	20.2693939
02.10.2014 14:46:10.3	292.64	512	0.8039	16.48	20.3301794
02.10.2014 14:46:10.4	292.62	511.9	0.7586	16.42	19.7490685
02.10.2014 14:46:10.5	292.68	512	0.8502	16.39	20.9074346
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02.10.2014 14:46:10.7	292.63	512.1	0.9064	16.49	21.5873904
02.10.2014 14:46:10.8	292.63	512	0.9159	16.4	21.7002245
02.10.2014 14:46:10.9	292.62	512.1	0.7914	16.35	20.1715012
02.10.2014 14:46:11.0	292.62	512.2	0.7444	16.49	19.563357
02.10.2014 14:46:11.1	292.63	512.1	0.7493	16.5	19.6276391
02.10.2014 14:46:11.2	292.62	512.1	0.7241	16.37	19.294764
02.10.2014 14:46:11.3	292.65	512.2	0.6988	16.35	18.9546882
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02.10.2014 14:46:11.6	292.61	512.1	0.7738	16.36	19.9459424
02.10.2014 14:46:11.7	292.56	512.2	0.648	16.37	18.2527246
02.10.2014 14:46:11.8	292.54	512.3	0.6781	16.48	18.6718379
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02.10.2014 14:46:12.3	292.41	512.3	0.6739	16.42	18.6139235
02.10.2014 14:46:12.4	292.08	512.4	0.6977	16.38	18.9397638
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02.10.2014 14:46:12.6	291.97	512.5	0.6598	16.48	18.4181647
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02.10.2014 14:46:13.1	286.89	512.8	0.7736	16.37	19.9433645
02.10.2014 14:46:13.2	287.08	512.9	0.7754	16.34	19.966553
02.10.2014 14:46:13.3	287.05	513	0.9042	16.48	21.5611762
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02.10.2014 14:46:14.5	276.29	512.7	0.9708	16.45	22.3411272
02.10.2014 14:46:14.6	276.52	512.6	1.0007	16.41	22.6825641
02.10.2014 14:46:14.7	276.46	512.8	1.0223	16.36	22.9260575
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02.10.2014 14:46:15.2	271.14	513	1.0182	16.47	22.8800381
02.10.2014 14:46:15.3	271.35	512.9	1.0592	16.49	23.3361487
02.10.2014 14:46:15.4	271.39	512.9	1.1502	16.37	24.3179454
02.10.2014 14:46:15.5	269.58	513	1.0453	16.33	23.1825216
02.10.2014 14:46:15.6	268.77	513	0.9884	16.45	22.5427329
02.10.2014 14:46:15.7	268.85	512.8	1.0286	16.48	22.9965908
02.10.2014 14:46:15.8	268.57	512.7	1.0449	16.35	23.1780856
02.10.2014 14:46:15.9	265.76	512.9	1.1036	16.37	23.8202351
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02.10.2014 14:46:16.1	265.89	512.8	1.0419	16.42	23.1447885
02.10.2014 14:46:16.2	264.65	512.8	1.087	16.41	23.6404081
02.10.2014 14:46:16.3	263.22	513	1.0028	16.36	22.7063517
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02.10.2014 14:46:16.6	260.9	512.9	1.0667	16.35	23.4186224
02.10.2014 14:46:16.7	260.8	513.1	1.0979	16.43	23.7586407
02.10.2014 14:46:16.8	260.79	513.1	1.1468	16.46	24.2819768

02.10.2014 14:46:16.9	258.87	513	1.237	16.39	25.2188366
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02.10.2014 14:46:17.3	255.95	513	1.0276	16.38	22.9854095
02.10.2014 14:46:17.4	255.28	513.1	1.0335	16.31	23.0513008
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02.10.2014 14:46:17.6	254.98	513	1.1417	16.53	24.2279237
02.10.2014 14:46:17.7	252.61	513	1.1565	16.33	24.3844529
02.10.2014 14:46:17.8	252.82	513.2	1.0483	16.34	23.2157645
02.10.2014 14:46:17.9	252.78	513.2	1.1324	16.45	24.1290447
02.10.2014 14:46:18.0	251.18	513	1.0149	16.48	22.8429308
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02.10.2014 14:46:18.2	249.88	513.2	1.1083	16.34	23.8709039
02.10.2014 14:46:18.3	249.84	513.1	1.2141	16.47	24.9843138
02.10.2014 14:46:18.4	247.26	513	1.1773	16.41	24.6027565
02.10.2014 14:46:18.5	247.35	512.9	1.1565	16.39	24.3844529
02.10.2014 14:46:18.6	247.32	513.1	1.2304	16.4	25.1514692
02.10.2014 14:46:18.7	245.48	513	1.167	16.45	24.4948974
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02.10.2014 14:46:19.0	244.51	512.9	1.1453	16.45	24.2660913
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02.10.2014 14:46:19.2	242.22	512.7	1.0443	16.37	23.17143
02.10.2014 14:46:19.3	242.23	512.8	1.0726	16.34	23.4832982
02.10.2014 14:46:19.4	239.98	512.9	1.0771	16.44	23.5325077
02.10.2014 14:46:19.5	239.59	512.8	1.0298	16.51	23.0100012
02.10.2014 14:46:19.6	239.65	512.8	1.1361	16.33	24.1684321
02.10.2014 14:46:19.7	238.18	513	1.0458	16.34	23.1880654
02.10.2014 14:46:19.8	236.96	513	1.1274	16.45	24.075716
02.10.2014 14:46:19.9	237.11	512.9	1.0853	16.49	23.6219148
02.10.2014 14:46:20.0	237.12	512.9	1.1052	16.37	23.8374961
02.10.2014 14:46:20.1	234.45	513.2	1.0722	16.35	23.4789191
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02.10.2014 14:46:20.3	234.49	513.1	0.9963	16.45	22.6326424
02.10.2014 14:46:20.4	232.62	513.1	1.0719	16.38	23.4756341
02.10.2014 14:46:20.5	231.95	513.4	1.0392	16.39	23.1147801
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02.10.2014 14:46:20.8	229.28	513.3	1.1505	16.38	24.3211165
02.10.2014 14:46:20.9	229.48	513.5	1.0505	16.41	23.2401125
02.10.2014 14:46:21.0	229.41	513.5	0.9526	16.49	22.1307171
02.10.2014 14:46:21.1	228.04	513.4	0.9906	16.38	22.567807
02.10.2014 14:46:21.2	226.75	513.5	1.0489	16.35	23.2224074
02.10.2014 14:46:21.3	226.93	513.6	1.0518	16.44	23.2544879
02.10.2014 14:46:21.4	226.89	513.6	1.0837	16.5	23.6044961
02.10.2014 14:46:21.5	224.31	513.5	1.0028	16.37	22.7063517
02.10.2014 14:46:21.6	224.43	513.7	1.1463	16.3	24.2766828
02.10.2014 14:46:21.7	224.29	513.8	1.1466	16.52	24.2798593
02.10.2014 14:46:21.8	222.23	513.6	1.1058	16.49	23.8439658
02.10.2014 14:46:21.9	221.34	513.6	1.0718	16.37	23.4745391
02.10.2014 14:46:22.0	221.41	513.7	1.1089	16.35	23.8773645
02.10.2014 14:46:22.1	221.39	513.8	1.0681	16.46	23.4339854
02.10.2014 14:46:22.2	219.39	513.5	1.0981	16.49	23.7608046
02.10.2014 14:46:22.3	218.8	513.5	1.1317	16.36	24.1215858
02.10.2014 14:46:22.4	218.84	513.7	1.1805	16.4	24.63617
02.10.2014 14:46:22.5	218.46	513.7	1.0885	16.45	23.6567137
02.10.2014 14:46:22.6	216.08	513.5	1.094	16.45	23.716405
02.10.2014 14:46:22.7	216.34	513.6	1.0911	16.39	23.6849502
02.10.2014 14:46:22.8	216.32	513.8	1.0571	16.42	23.3130038
02.10.2014 14:46:22.9	214.56	513.8	1.0024	16.47	22.7018226
02.10.2014 14:46:23.0	213.25	513.8	0.9611	16.42	22.2292334
02.10.2014 14:46:23.1	213.39	513.8	1.0399	16.37	23.1225638
02.10.2014 14:46:23.2	213.33	513.9	0.9099	16.43	21.6290293
02.10.2014 14:46:23.3	210.71	513.9	1.0185	16.53	22.8834085
02.10.2014 14:46:23.4	210.85	513.7	0.9282	16.36	21.8454492
02.10.2014 14:46:23.5	210.83	513.9	0.922	16.34	21.7723676
02.10.2014 14:46:23.6	208.95	513.9	1.0045	16.46	22.72559
02.10.2014 14:46:23.7	208.19	513.7	0.9431	16.48	22.020089
02.10.2014 14:46:23.8	208.27	513.7	1.0782	16.37	23.5445211
02.10.2014 14:46:23.9	207.98	513.8	1.0811	16.33	23.5761633
02.10.2014 14:46:24.0	205.54	513.8	1.0019	16.45	22.6961601

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02.10.2014 14:46:24.2	205.76	513.5	0.9549	16.38	22.1574176
02.10.2014 14:46:24.3	203.36	513.7	1.1152	16.36	23.9450957
02.10.2014 14:46:24.4	203.19	513.8	1.1253	16.45	24.0532828
02.10.2014 14:46:24.5	203.21	513.6	1.0671	16.48	23.4230129
02.10.2014 14:46:24.6	201.51	513.6	1.1019	16.38	23.8018815
02.10.2014 14:46:24.7	200.54	513.8	1.0502	16.41	23.2367938
02.10.2014 14:46:24.8	200.61	513.8	1.0511	16.46	23.2467484
02.10.2014 14:46:24.9	200.55	513.6	1.0408	16.41	23.1325675
02.10.2014 14:46:25.0	197.96	513.7	1.0169	16.38	22.8654273
02.10.2014 14:46:25.1	198.12	513.8	1.0442	16.41	23.1703205
02.10.2014 14:46:25.2	198.05	513.7	1.0354	16.48	23.07248
02.10.2014 14:46:25.3	196.04	513.6	1.0123	16.39	22.8136522
02.10.2014 14:46:25.4	195.46	513.7	0.9816	16.34	22.4650543
02.10.2014 14:46:25.5	195.53	513.8	0.9491	16.44	22.0900238
02.10.2014 14:46:25.6	195.13	513.7	1.0184	16.49	22.8822851
02.10.2014 14:46:25.7	192.78	513.7	1.0264	16.37	22.9719847
02.10.2014 14:46:25.8	193.01	513.9	1.0082	16.33	22.7674056
02.10.2014 14:46:25.9	192.97	514	1.1224	16.46	24.022269
02.10.2014 14:46:26.0	191.42	513.9	1.0453	16.5	23.1825216
02.10.2014 14:46:26.1	190.32	513.9	1.0609	16.35	23.3548683
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02.10.2014 14:46:26.3	190.39	514.2	1.0397	16.44	23.1203401
02.10.2014 14:46:26.4	187.78	514	1.1196	16.46	23.9922867
02.10.2014 14:46:26.5	187.89	514.1	1.1145	16.38	23.9375795
02.10.2014 14:46:26.6	187.85	514.3	1.0963	16.39	23.7413223
02.10.2014 14:46:26.7	185.65	514.3	1.0984	16.45	23.7640501
02.10.2014 14:46:26.8	184.84	514.2	1.1312	16.42	24.1162566
02.10.2014 14:46:26.9	184.9	514.3	1.133	16.37	24.1354362
02.10.2014 14:46:27.0	184.96	514.4	1.1154	16.4	23.9472428
02.10.2014 14:46:27.1	183.08	514.4	1.164	16.46	24.4633927
02.10.2014 14:46:27.2	182.73	514.3	1.1672	16.39	24.4969963
02.10.2014 14:46:27.3	182.79	514.4	1.0784	16.33	23.5467047
02.10.2014 14:46:27.4	182.17	514.4	1.0691	16.46	23.4449528
02.10.2014 14:46:27.5	179.57	514.2	0.9995	16.48	22.66896
02.10.2014 14:46:27.6	179.83	514.1	0.9492	16.37	22.0911875
02.10.2014 14:46:27.7	179.84	514.2	0.9806	16.32	22.4536083
02.10.2014 14:46:27.8	177.97	514.1	1.0799	16.47	23.5630751
02.10.2014 14:46:27.9	176.84	513.9	1.0833	16.49	23.6001394
02.10.2014 14:46:28.0	176.91	513.8	1.0514	16.36	23.2500656
02.10.2014 14:46:28.1	176.83	514	1.0801	16.33	23.565257
02.10.2014 14:46:28.2	174.21	514	1.0559	16.44	23.2997678
02.10.2014 14:46:28.3	174.36	513.8	1.042	16.51	23.1458992
02.10.2014 14:46:28.4	174.38	513.9	1.0307	16.33	23.0200538
02.10.2014 14:46:28.5	172.3	514.1	1.0724	16.37	23.4811087
02.10.2014 14:46:28.6	171.8	514.1	1.0669	16.46	23.4208178
02.10.2014 14:46:28.7	171.83	514	1.0491	16.44	23.2246213
02.10.2014 14:46:28.8	171.37	514	1.0236	16.38	22.9406298
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02.10.2014 14:46:29.0	169.26	514.1	1.0066	16.47	22.7493326
02.10.2014 14:46:29.1	169.23	513.9	1.067	16.42	23.4219153
02.10.2014 14:46:29.2	166.77	514	0.9056	16.37	21.5778616
02.10.2014 14:46:29.3	166.77	514	0.9958	16.43	22.6269626
02.10.2014 14:46:29.4	166.67	514	1.1006	16.49	23.7878369
02.10.2014 14:46:29.5	164.95	513.8	1.1102	16.38	23.8913565
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02.10.2014 14:46:29.7	164.11	513.9	1.0183	16.46	22.8811616
02.10.2014 14:46:29.8	163.95	513.9	1.0088	16.51	22.7741792
02.10.2014 14:46:29.9	161.47	513.9	0.9336	16.37	21.9089023
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02.10.2014 14:46:30.1	161.6	514.2	1.0821	16.46	23.5870646
02.10.2014 14:46:30.2	159.46	514.1	1.1501	16.51	24.3168882
02.10.2014 14:46:30.3	158.99	514.1	1.1734	16.36	24.5619724
02.10.2014 14:46:30.4	159.08	514.4	1.0551	16.38	23.2909396
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02.10.2014 14:46:31.1	153.91	514.2	1.0161	16.37	22.8564313
02.10.2014 14:46:31.2	153.85	514.3	0.8626	16.44	21.0593481

02.10.2014 14:46:31.3	151.25	514.2	0.9264	16.46	21.8242572
02.10.2014 14:46:31.4	151.38	514.1	0.872	16.4	21.1737821
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02.10.2014 14:46:32.5	143.39	514.6	0.9615	16.47	22.2338587
02.10.2014 14:46:32.6	143.33	514.7	0.9377	16.36	21.9569572
02.10.2014 14:46:32.7	141.36	514.9	1.0013	16.38	22.6893631
02.10.2014 14:46:32.8	140.37	514.9	0.9401	16.44	21.9850381
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02.10.2014 14:46:36.1	117.12	515.5	1.0707	16.31	23.4624899
02.10.2014 14:46:36.2	115.93	515.6	1.0216	16.46	22.9182071
02.10.2014 14:46:36.3	113.94	515.4	0.997	16.47	22.6405919
02.10.2014 14:46:36.4	114.2	515.4	0.9996	16.36	22.670094
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02.10.2014 14:46:37.1	109.11	515.4	0.8985	16.41	21.4931088
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02.10.2014 14:46:37.4	106.11	515.7	0.8802	16.47	21.2731048
02.10.2014 14:46:37.5	106.16	515.6	0.9242	16.38	21.7983278
02.10.2014 14:46:37.6	106.02	515.7	0.8864	16.36	21.3478956
02.10.2014 14:46:37.7	103.46	515.8	0.9945	16.42	22.6121882
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02.10.2014 14:46:38.1	100.9	515.8	1.0531	16.46	23.2688545
02.10.2014 14:46:38.2	101.07	515.6	0.9796	16.48	22.4421564
02.10.2014 14:46:38.3	100.52	515.6	0.9727	16.36	22.362979
02.10.2014 14:46:38.4	97.91	515.7	1.0201	16.32	22.9013757

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02.10.2014 14:46:38.6	98.13	515.5	1.0343	16.47	23.0602207
02.10.2014 14:46:38.7	97.59	515.5	0.9868	16.36	22.5244797
02.10.2014 14:46:38.8	95.8	515.7	0.9647	16.37	22.2708266
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02.10.2014 14:46:39.1	92.89	515.5	0.9299	16.4	21.865445
02.10.2014 14:46:39.2	93.05	515.7	0.9705	16.4	22.337675
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02.10.2014 14:46:40.7	82.81	516	0.9675	16.34	22.3031232
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02.10.2014 14:46:41.2	77.55	515.9	0.9856	16.44	22.5107801
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02.10.2014 14:46:41.9	72.27	515.7	0.9495	16.46	22.0946783
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02.10.2014 14:46:43.6	60.92	515.2	0.9553	16.37	22.1620579
02.10.2014 14:46:43.7	58.89	515.3	0.9985	16.36	22.657617
02.10.2014 14:46:43.8	59.13	515.4	0.884	16.44	21.3189755
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02.10.2014 14:46:45.7	44.32	515.7	0.954	16.4	22.1469734
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02.10.2014 14:47:07.4	-116.18	520.4	0.9813	16.32	22.4616211
02.10.2014 14:47:07.5	-117.16	520.4	0.9403	16.43	21.9873766
02.10.2014 14:47:07.6	-118.88	520.2	0.9501	16.41	22.1016581
02.10.2014 14:47:07.7	-118.74	520.2	0.9604	16.34	22.2211368
02.10.2014 14:47:07.8	-118.77	520.3	0.923	16.37	21.7841715
02.10.2014 14:47:07.9	-119.94	520.3	0.9443	16.44	22.0340937
02.10.2014 14:47:08.0	-121.4	520.2	0.8961	16.38	21.4643843
02.10.2014 14:47:08.1	-121.3	520.2	0.8917	16.33	21.4116226
02.10.2014 14:47:08.2	-121.87	520.2	0.9496	16.41	22.0958417
02.10.2014 14:47:08.3	-124.4	520.1	0.8616	16.44	21.0471377
02.10.2014 14:47:08.4	-124.21	520	0.9068	16.38	21.5921532
02.10.2014 14:47:08.5	-124.22	520	0.9328	16.31	21.8995134
02.10.2014 14:47:08.6	-125.88	520.1	0.9395	16.45	21.9780213
02.10.2014 14:47:08.7	-126.81	519.9	0.9375	16.45	21.9546155
02.10.2014 14:47:08.8	-126.75	519.9	0.9107	16.38	21.6385356
02.10.2014 14:47:08.9	-126.74	520.1	0.9831	16.28	22.4822123
02.10.2014 14:47:09.0	-128.67	520.1	0.9252	16.43	21.8101177
02.10.2014 14:47:09.1	-129.32	520	0.9365	16.48	21.9429032
02.10.2014 14:47:09.2	-129.31	520	0.8803	16.35	21.2743132
02.10.2014 14:47:09.3	-130.65	520.1	0.9317	16.33	21.8865972
02.10.2014 14:47:09.4	-132.35	520.2	0.8916	16.44	21.410422
02.10.2014 14:47:09.5	-132.19	520	0.9236	16.44	21.7912508
02.10.2014 14:47:09.6	-132.25	520	0.961	16.35	22.2280769
02.10.2014 14:47:09.7	-133.59	520.2	0.9543	16.38	22.1504554
02.10.2014 14:47:09.8	-134.85	520.2	0.9599	16.45	22.2153517
02.10.2014 14:47:09.9	-134.78	520.1	0.9897	16.4	22.5575528
02.10.2014 14:47:10.0	-134.8	520.1	0.9953	16.37	22.6212812
02.10.2014 14:47:10.1	-137.34	520.2	0.9436	16.38	22.0259254
02.10.2014 14:47:10.2	-137.27	520.1	0.8998	16.45	21.5086519
02.10.2014 14:47:10.3	-137.29	520	0.9011	16.38	21.5241838
02.10.2014 14:47:10.4	-137.42	520	0.9455	16.32	22.0480895
02.10.2014 14:47:10.5	-140.38	520	0.9397	16.45	21.9803605
02.10.2014 14:47:10.6	-140.2	519.9	0.9047	16.47	21.5671368
02.10.2014 14:47:10.7	-140.29	519.9	0.886	16.36	21.3430783
02.10.2014 14:47:10.8	-142.6	520	0.9292	16.3	21.8572137
02.10.2014 14:47:10.9	-143.14	520	0.9345	16.44	21.91946
02.10.2014 14:47:11.0	-143.13	519.8	0.9128	16.48	21.6634695
02.10.2014 14:47:11.1	-143.14	519.8	0.9265	16.34	21.825435
02.10.2014 14:47:11.2	-145.42	520	0.9893	16.33	22.5529939
02.10.2014 14:47:11.3	-145.67	520	0.8718	16.43	21.1713538
02.10.2014 14:47:11.4	-145.73	519.9	0.9508	16.45	22.1097985
02.10.2014 14:47:11.5	-146.39	519.9	0.8928	16.32	21.4248252
02.10.2014 14:47:11.6	-148.88	520.1	0.9178	16.37	21.722721
02.10.2014 14:47:11.7	-148.57	520.2	0.9698	16.4	22.3296177
02.10.2014 14:47:11.8	-148.57	520	0.9831	16.4	22.4822123
02.10.2014 14:47:11.9	-149.44	520	0.9989	16.34	22.6621549
02.10.2014 14:47:12.0	-151.36	520.2	0.9926	16.36	22.5905775
02.10.2014 14:47:12.1	-151.11	520.1	0.9112	16.41	21.6444748
02.10.2014 14:47:12.2	-151.41	520	0.8864	16.35	21.3478956
02.10.2014 14:47:12.3	-154.29	520	1.0199	16.3	22.8991306
02.10.2014 14:47:12.4	-154.02	520	1.0944	16.38	23.7207403
02.10.2014 14:47:12.5	-154.07	519.9	0.9245	16.44	21.8018654
02.10.2014 14:47:12.6	-155.35	519.8	0.8216	16.31	20.5527724
02.10.2014 14:47:12.7	-156.73	519.8	0.7431	16.29	19.546267
02.10.2014 14:47:12.8	-156.62	519.8	0.7968	16.38	20.2402028
02.10.2014 14:47:12.9	-156.65	519.7	0.8787	16.42	21.2549707
02.10.2014 14:47:13.0	-159.06	519.6	0.88	16.28	21.2706878
02.10.2014 14:47:13.1	-159.19	519.7	0.9356	16.25	21.9323569
02.10.2014 14:47:13.2	-159.18	519.7	0.7942	16.41	20.2071534
02.10.2014 14:47:13.3	-159.95	519.5	0.9233	16.38	21.7877114
02.10.2014 14:47:13.4	-162.35	519.5	0.8576	16.33	20.9982249
02.10.2014 14:47:13.5	-162.08	519.7	0.9173	16.27	21.7168031
02.10.2014 14:47:13.6	-162.08	519.7	0.8957	16.35	21.4595932
02.10.2014 14:47:13.7	-164.02	519.6	0.86	16.37	21.0275862
02.10.2014 14:47:13.8	-164.71	519.5	0.8986	16.27	21.4943049
02.10.2014 14:47:13.9	-164.65	519.7	0.8657	16.33	21.0971556
02.10.2014 14:47:14.0	-164.62	519.7	0.9349	16.36	21.9241506
02.10.2014 14:47:14.1	-166.81	519.5	0.8868	16.32	21.3527118
02.10.2014 14:47:14.2	-167.2	519.6	0.9703	16.29	22.3353732
02.10.2014 14:47:14.3	-167.2	519.7	0.93	16.33	21.8666207
02.10.2014 14:47:14.4	-167.22	519.7	0.8551	16.41	20.9675965

02.10.2014 14:47:14.5	-169.94	519.7	0.9932	16.3	22.5974041
02.10.2014 14:47:14.6	-170.12	519.8	0.9674	16.23	22.3019706
02.10.2014 14:47:14.7	-170.09	519.8	0.9063	16.38	21.5861995
02.10.2014 14:47:14.8	-171.95	519.7	0.8874	16.41	21.3599341
02.10.2014 14:47:14.9	-173.16	519.7	0.865	16.29	21.0886244
02.10.2014 14:47:15.0	-173	519.8	0.9186	16.25	21.7321862
02.10.2014 14:47:15.1	-173.02	519.9	0.9686	16.39	22.3157984
02.10.2014 14:47:15.2	-174.98	519.7	0.8944	16.41	21.4440145
02.10.2014 14:47:15.3	-175.65	519.8	0.7923	16.28	20.1829677
02.10.2014 14:47:15.4	-175.57	520	0.8899	16.29	21.3900008
02.10.2014 14:47:15.5	-175.86	520	0.8637	16.36	21.0727715
02.10.2014 14:47:15.6	-178.27	519.9	0.7957	16.39	20.226227
02.10.2014 14:47:15.7	-178.12	520	0.8042	16.31	20.3339725
02.10.2014 14:47:15.8	-178.18	520.1	0.8567	16.33	20.9872038
02.10.2014 14:47:15.9	-178.65	520	0.9201	16.38	21.7499224
02.10.2014 14:47:16.0	-181.26	519.9	0.9681	16.33	22.3100379
02.10.2014 14:47:16.1	-181.06	519.9	0.9331	16.33	21.9030347
02.10.2014 14:47:16.2	-181.03	520	0.933	16.34	21.901861
02.10.2014 14:47:16.3	-183.87	520	0.8638	16.4	21.0739913
02.10.2014 14:47:16.4	-183.96	519.8	0.8527	16.33	20.9381511
02.10.2014 14:47:16.5	-183.97	519.9	0.8909	16.28	21.4020156
02.10.2014 14:47:16.6	-184.01	519.9	0.9367	16.4	21.9452462
02.10.2014 14:47:16.7	-186.67	519.8	0.8901	16.43	21.3924043
02.10.2014 14:47:16.8	-186.51	519.7	0.8487	16.31	20.8889831
02.10.2014 14:47:16.9	-186.5	519.8	0.795	16.27	20.2173282
02.10.2014 14:47:17.0	-187.58	519.8	0.8527	16.41	20.9381511
02.10.2014 14:47:17.1	-189.19	519.6	0.9463	16.44	22.0574151
02.10.2014 14:47:17.2	-189.05	519.5	0.9769	16.3	22.4112073
02.10.2014 14:47:17.3	-189.09	519.6	0.9428	16.28	22.0165864
02.10.2014 14:47:17.4	-190.53	519.6	0.977	16.42	22.4123543
02.10.2014 14:47:17.5	-192.12	519.4	1.0275	16.41	22.984291
02.10.2014 14:47:17.6	-192.01	519.4	0.8641	16.34	21.0776505
02.10.2014 14:47:17.7	-191.97	519.6	1.0435	16.34	23.1625529
02.10.2014 14:47:17.8	-194.75	519.6	1.0613	16.38	23.3592707
02.10.2014 14:47:17.9	-194.86	519.5	0.9928	16.41	22.5928533
02.10.2014 14:47:18.0	-194.88	519.6	0.901	16.32	21.5229894
02.10.2014 14:47:18.1	-195.77	519.8	0.9791	16.35	22.4364283
02.10.2014 14:47:18.2	-198.04	519.8	0.9977	16.46	22.6485385
02.10.2014 14:47:18.3	-197.8	519.7	0.9594	16.35	22.2095651
02.10.2014 14:47:18.4	-197.83	519.7	0.9267	16.3	21.8277906
02.10.2014 14:47:18.5	-199.75	519.8	0.9234	16.38	21.7888913
02.10.2014 14:47:18.6	-200.37	519.7	0.9403	16.44	21.9873766
02.10.2014 14:47:18.7	-200.37	519.7	0.8972	16.35	21.4775545
02.10.2014 14:47:18.8	-200.36	519.8	0.8854	16.28	21.3358503
02.10.2014 14:47:18.9	-202.53	519.9	0.9185	16.43	21.7310033
02.10.2014 14:47:19.0	-202.94	519.8	0.9267	16.47	21.8277906
02.10.2014 14:47:19.1	-202.97	519.7	0.9302	16.32	21.8689718
02.10.2014 14:47:19.2	-202.84	519.8	0.9879	16.29	22.5370304
02.10.2014 14:47:19.3	-205.7	519.9	0.952	16.43	22.1237464
02.10.2014 14:47:19.4	-205.79	519.7	1.0247	16.45	22.9529529
02.10.2014 14:47:19.5	-205.83	519.7	1.0616	16.32	23.362572
02.10.2014 14:47:19.6	-207.79	519.9	0.9577	16.32	22.1898793
02.10.2014 14:47:19.7	-208.81	519.9	0.9818	16.43	22.4673428
02.10.2014 14:47:19.8	-208.72	519.7	0.974	16.4	22.3779179
02.10.2014 14:47:19.9	-208.76	519.7	0.8968	16.36	21.4727663
02.10.2014 14:47:20.0	-210.67	519.9	0.7788	16.36	20.0102801
02.10.2014 14:47:20.1	-211.27	519.9	0.7666	16.45	19.8529297
02.10.2014 14:47:20.2	-211.29	519.7	0.9569	16.38	22.1806094
02.10.2014 14:47:20.3	-211.7	519.8	1.0108	16.31	22.7967436
02.10.2014 14:47:20.4	-214.37	519.9	0.9501	16.41	22.1016581
02.10.2014 14:47:20.5	-214.16	519.9	0.9468	16.45	22.0632417
02.10.2014 14:47:20.6	-214.24	519.8	0.937	16.37	21.9487601
02.10.2014 14:47:20.7	-214.68	519.9	1.0414	16.3	23.1392343
02.10.2014 14:47:20.8	-216.92	520	0.9553	16.46	22.1620579
02.10.2014 14:47:20.9	-216.71	519.9	0.8969	16.48	21.4739634
02.10.2014 14:47:21.0	-216.76	519.8	0.922	16.35	21.7723676
02.10.2014 14:47:21.1	-217.27	520	0.9468	16.33	22.0632417
02.10.2014 14:47:21.2	-217.53	520	0.9553	16.42	22.1620579
02.10.2014 14:47:21.3	-217.52	519.9	0.8901	16.5	21.3924043
02.10.2014 14:47:21.4	-217.53	519.9	0.8956	16.36	21.4583952
02.10.2014 14:47:21.5	-217.51	520.1	0.928	16.34	21.8430955
02.10.2014 14:47:21.6	-217.48	520.1	0.9449	16.45	22.0410927

02.10.2014 14:47:21.7	-217.52	519.9	1.0972	16.45	23.7510655
02.10.2014 14:47:21.8	-217.52	519.9	0.9434	16.38	22.023591
02.10.2014 14:47:21.9	-217.53	520	1.083	16.37	23.5968714
02.10.2014 14:47:22.0	-217.52	520	1.049	16.44	23.2235144
02.10.2014 14:47:22.1	-217.51	519.9	0.9961	16.42	22.6303707
02.10.2014 14:47:22.2	-217.53	520	0.9986	16.36	22.6587516
02.10.2014 14:47:22.3	-217.51	520.1	0.9896	16.42	22.5564131

Calculation of mass flow rate based on polynomial equation fitted to the experimental data

$$y = -3.152909E-14x^6 + 2.532206E-12x^5 + 1.834315E-09x^4 - 9.204347E-08x^3 + 9.300604E-06x^2 + 2.720934E-03x + 2.133611E+01$$

Please enter below Polynomial Coefficients

Order no	Coeff
6	-3.152909E-14
5	2.532206E-12
4	1.834315E-09
3	-9.204347E-08
2	9.300604E-06
1	2.720934E-03
0	2.133611E+01

Actual Area	0.274324656	[m ²]
Integrated area	0.274324656	[m ²]
Area Error	0	[%]
Integrated Mass flow	2.362438748	[Kg/s]

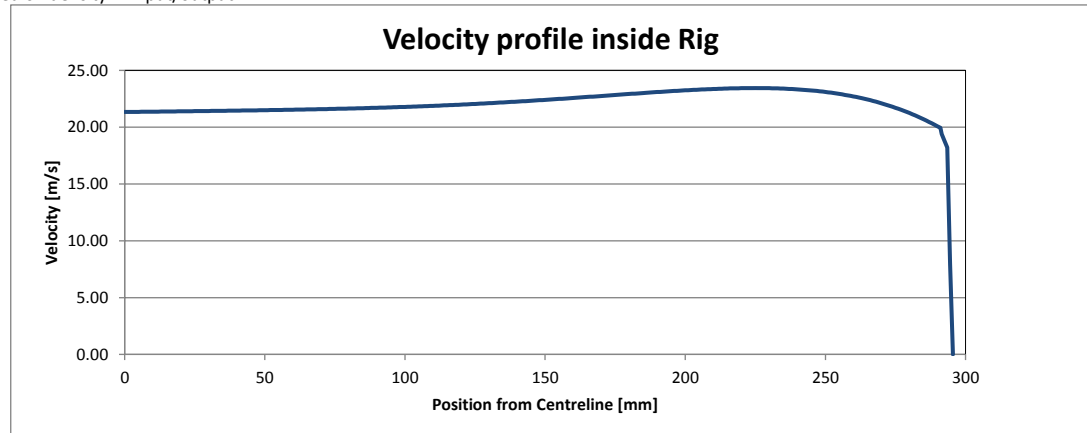
Polynomial curve (dP vs position)

Please do NOT alter any of the figures below

position [mm]	Velocity [m/s]
0	21.336110
1	21.338840
2	21.341588
3	21.344354
4	21.347137
5	21.349937
6	21.352753
7	21.355585
8	21.358433
9	21.361297
10	21.364176
11	21.367070
12	21.369980
13	21.372905
14	21.375845
15	21.378800
16	21.381771
17	21.384758
18	21.387760
19	21.390778
20	21.393812
21	21.396863
22	21.399931
23	21.403017
24	21.406120
25	21.409242
26	21.412382
27	21.415543
28	21.418723
29	21.421925
30	21.425148
31	21.428393
32	21.431662

Delta Area [m ²]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	2.60778E-05
9.42478E-06	7.82434E-05
1.5708E-05	0.000130422
2.19911E-05	0.000182615
2.82743E-05	0.000234822
3.45575E-05	0.000287042
4.08407E-05	0.000339277
4.71239E-05	0.000391526
5.34071E-05	0.000443788
5.96903E-05	0.000496066
6.59734E-05	0.000548357
7.22566E-05	0.000600664
7.85398E-05	0.000652985
8.4823E-05	0.000705321
9.11062E-05	0.000757671
9.73894E-05	0.000810037
0.000103673	0.000862418
0.000109956	0.000914814
0.000116239	0.000967226
0.000122522	0.001019653
0.000128805	0.001072095
0.000135088	0.001124554
0.000141372	0.001177028
0.000147655	0.001229519
0.000153938	0.001282026
0.000160221	0.001334549
0.000166504	0.001387089
0.000172788	0.001439646
0.000179071	0.00149222
0.000185354	0.001544811
0.000191637	0.001597419
0.00019792	0.001650045

Based on density in input/output



33	21.434955
34	21.438273
35	21.441617
36	21.444988
37	21.448387
38	21.451815
39	21.455274
40	21.458764
41	21.462286
42	21.465842
43	21.469433
44	21.473060
45	21.476726
46	21.480430
47	21.484174
48	21.487961
49	21.491791
50	21.495666
51	21.499587
52	21.503557
53	21.507576
54	21.511646
55	21.515769
56	21.519946
57	21.524180
58	21.528472
59	21.532824
60	21.537238
61	21.541714
62	21.546256
63	21.550865
64	21.555543
65	21.560292
66	21.565114
67	21.570010
68	21.574983
69	21.580034
70	21.585166
71	21.590380
72	21.595679
73	21.601064
74	21.606538
75	21.612102
76	21.617758
77	21.623509
78	21.629356
79	21.635302
80	21.641348
81	21.647497
82	21.653750

0.000204204	0.001702689
0.000210487	0.001755351
0.00021677	0.001808032
0.000223053	0.001860731
0.000229336	0.001913449
0.000235619	0.001966187
0.000241903	0.002018944
0.000248186	0.002071721
0.000254469	0.002124518
0.000260752	0.002177336
0.000267035	0.002230175
0.000273319	0.002283036
0.000279602	0.002335918
0.000285885	0.002388822
0.000292168	0.002441749
0.000298451	0.0024947
0.000304734	0.002547674
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0.000317301	0.002653695
0.000323584	0.002706743
0.000329867	0.002759817
0.00033615	0.002812917
0.000342434	0.002866044
0.000348717	0.002919199
0.000355	0.002972381
0.000361283	0.003025593
0.000367566	0.003078834
0.00037385	0.003132106
0.000380133	0.003185408
0.000386416	0.003238742
0.000392699	0.003292109
0.000398982	0.003345509
0.000405265	0.003398943
0.000411549	0.003452411
0.000417832	0.003505916
0.000424115	0.003559457
0.000430398	0.003613035
0.000436681	0.003666652
0.000442965	0.003720308
0.000449248	0.003774004
0.000455531	0.003827742
0.000461814	0.003881521
0.000468097	0.003935344
0.00047438	0.003989212
0.000480664	0.004043124
0.000486947	0.004097083
0.00049323	0.004151089
0.000499513	0.004205144
0.000505796	0.004259249
0.00051208	0.004313405

83	21.660110
84	21.666578
85	21.673157
86	21.679848
87	21.686653
88	21.693575
89	21.700615
90	21.707775
91	21.715057
92	21.722464
93	21.729996
94	21.737655
95	21.745444
96	21.753364
97	21.761417
98	21.769605
99	21.777929
100	21.786390
101	21.794992
102	21.803734
103	21.812620
104	21.821649
105	21.830824
106	21.840145
107	21.849615
108	21.859235
109	21.869006
110	21.878928
111	21.889004
112	21.899233
113	21.909618
114	21.920159
115	21.930857
116	21.941713
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119	21.975234
120	21.986727
121	21.998381
122	22.010196
123	22.022173
124	22.034311
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130	22.110525
131	22.123789
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225	23.441293
226	23.440734
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228	23.436993
229	23.433759
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231	23.424421
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275	21.710129
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279	21.344645
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0.001492257	0.01355936
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0.001517389	0.013750097
0.001523672	0.013795633
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285	20.703591
286	20.585144
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288	20.337738
289	20.208649
290	20.075882
291	19.939370
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293.5	18.200000
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295.5	0.000000

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0.000914989	0.006905055
0.00183469	0.013417456
0.001840973	0.013033723
0.001847256	0.005748662
0.00185354	0

Please do not change any of the values in this sheet

Patm	Atmpsheric air pressure - (As recorded from engine data)	979 [mBar]
Patm		97900 [Pa]
Tatm		8 [C]
Tatm		281 [K]
Relative Humidity		55 [%]

$$\rho_{\text{humid air}}^{[1]} = \frac{p_d}{R_d T} + \frac{p_v}{R_v T} = \frac{p_d M_d + p_v M_v}{RT}$$

where:

$\rho_{\text{humid air}}$	=	Density of the humid air (kg/m ³)
p_d	=	Partial pressure of dry air (Pa)
R_d	=	Specific gas constant for dry air, 287.058 J/(kg·K)
T	=	Temperature (K)
p_v	=	Pressure of water vapor (Pa)
R_v	=	Specific gas constant for water vapor, 461.495 J/(kg·K)
M_d	=	Molar mass of dry air, 0.028964 (kg/mol)
M_v	=	Molar mass of water vapor, 0.018016 (kg/mol)
R	=	Universal gas constant, 8.314 J/(K·mol)

$$\rho_{\text{humid air}} = 1.210973 \text{ Kg/m}^3$$

$$0.224118593$$

The vapor pressure of water may be calculated from the [saturation vapor pressure](#) and [relative humidity](#). It is found by:

$$p_v = \phi p_{\text{sat}}$$

$$p_u = 589.9918 \text{ [Pa]}$$

Where:

p_v	=	Vapor pressure of water
ϕ	=	Relative humidity
p_{sat}	=	Saturation vapor pressure

The [saturation vapor pressure of water](#) at any given temperature is the vapor pressure when relative humidity is 100%. One formula ^[1] used to find the saturation vapor pressure is:

$$p_{\text{sat}} = 6.1078 \times 10^{\frac{7.5T}{T+237.3}}$$

$$p_{\text{sat}} = 10.72712 \text{ hPa}$$

$$p_{\text{sat}} = 1072.712 \text{ [Pa]}$$

where T is in degrees C. Note:

$$\rho = \frac{p}{R_{\text{specific}} T} \quad 1.21369 \text{ [kg/m}^3\text{]}$$

$$R = 287.058 \text{ J/Kg K}$$

$$T = \text{Temperature in degrees Kelvin}$$

$$P = \text{Absolute Pressure in Pa}$$