

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

$$y = -6.23539797E-14x^6 - 7.65851547E-12x^5 - 4.69552176E-10x^4 - 6.81965962E-08x^3 + 1.48905790E-04x^2 + 8.00263979E-03x + 8.78610570E+01$$

Please enter below Polynomial Coefficients

Order no	Coeff
6	-6.23539797E-14
5	-7.65851547E-12
4	-4.69552176E-10
3	-6.81965962E-08
2	1.48905790E-04
1	8.00263979E-03
0	8.78610570E+01

9.250675374 average integrated mass flow

Actual Area	0.274324656 [m2]	Actual Area	0.274324656 [m2]
Integrated area	0.275253782 [m2]	Integrated area	0.275253782 [m2]
Area Error	0.338695778 [%]	Area Error	0.338695778 [%]
Integrated Mass flow	8.800773587 [Kg/s]	Integrated Mass flow	9.700577162 [Kg/s]

Polynomial curve (dP vs position)

Please do NOT alter any of the figures below

position [mm]	Velocity [m/s]
0	87.861057
1	87.869208
2	87.877657
3	87.886403
4	87.895446
5	87.904784
6	87.914418
7	87.924347
8	87.934571
9	87.945089
10	87.955900
11	87.967005
12	87.978401
13	87.990090
14	88.002070
15	88.014340
16	88.026900
17	88.039749
18	88.052886
19	88.066311
20	88.080023
21	88.094020
22	88.108303
23	88.122869
24	88.137719
25	88.152850
26	88.168262
27	88.183955
28	88.199926
29	88.216174
30	88.232698
31	88.249497
32	88.266570
33	88.283915
34	88.301530
35	88.319414
36	88.337565
37	88.355981
38	88.374662
39	88.393604
40	88.412806
41	88.432265
42	88.451981
43	88.471950
44	88.492170
45	88.512639
46	88.533355
47	88.554314
48	88.575514

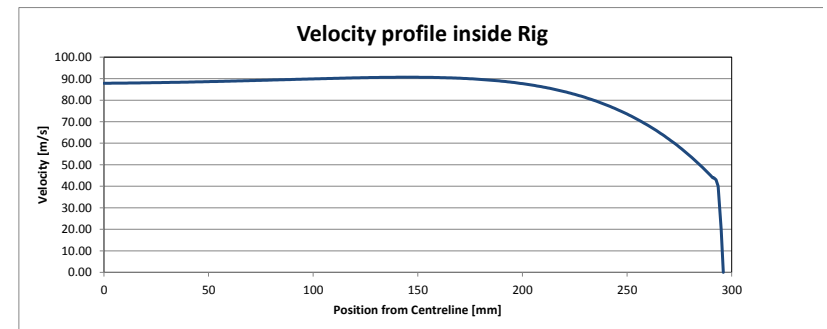
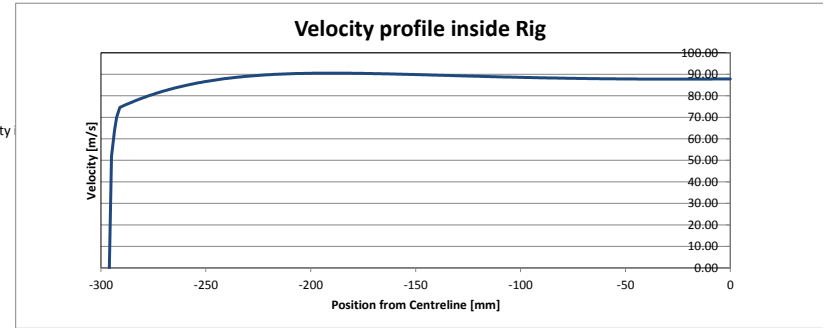
position [mm]	Velocity [m/s]
0	87.861057
-1	87.853203
-2	87.845648
-3	87.838391
-4	87.831433
-5	87.824775
-6	87.818416
-7	87.812357
-8	87.806599
-9	87.801142
-10	87.795985
-11	87.791131
-12	87.786578
-13	87.782327
-14	87.778378
-15	87.774733
-16	87.771390
-17	87.768351
-18	87.765616
-19	87.763184
-20	87.761057
-21	87.759235
-22	87.757718
-23	87.756506
-24	87.755599
-25	87.754999
-26	87.754704
-27	87.754717
-28	87.755035
-29	87.755661
-30	87.756595
-31	87.757836
-32	87.759384
-33	87.761241
-34	87.763407
-35	87.765881
-36	87.768664
-37	87.771757
-38	87.775159
-39	87.778870
-40	87.782892
-41	87.787224
-42	87.791866
-43	87.796819
-44	87.802082
-45	87.807657
-46	87.813542
-47	87.819739
-48	87.826247

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	0.00011316
9.42478E-06	0.000339573
1.5708E-05	0.000565703
2.19911E-05	0.000792498
2.82743E-05	0.001019034
3.45575E-05	0.001245623
4.08407E-05	0.001472266
4.71239E-05	0.001698966
5.34071E-05	0.001925725
5.96903E-05	0.002152545
6.59734E-05	0.002379429
7.22566E-05	0.002606379
7.85398E-05	0.002833397
8.4823E-05	0.003060486
9.11062E-05	0.003287647
9.73894E-05	0.003514883
0.000103673	0.003742195
0.000109956	0.003969587
0.000116239	0.004197061
0.000122522	0.004424618
0.000128805	0.00465226
0.000135088	0.004880573
0.000141372	0.00510812
0.000147655	0.005335724
0.000153938	0.005563732
0.000160221	0.005791835
0.000166504	0.006020037
0.000172788	0.00624834
0.000179071	0.006476745
0.000185354	0.006705255
0.000191637	0.006933872
0.00019792	0.007162597
0.000204204	0.007391433
0.000210487	0.007620382
0.00021677	0.007849446
0.000223053	0.008078626
0.000229336	0.008307925
0.000235619	0.008537344
0.000241903	0.008766885
0.000248186	0.00899655
0.000254469	0.009226341
0.000260752	0.00945626
0.000267035	0.009686308
0.000273319	0.009916487
0.000279602	0.010146798
0.000285885	0.010377244
0.000292168	0.010607826
0.000298451	0.010838546

Based on

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	0.00011316
9.42478E-06	0.00033945
1.5708E-05	0.000565703
2.19911E-05	0.000791921
2.82743E-05	0.001018107
3.45575E-05	0.001244263
4.08407E-05	0.001470391
4.71239E-05	0.001696493
5.34071E-05	0.001922573
5.96903E-05	0.002148632
6.59734E-05	0.002374672
7.22566E-05	0.002600697
7.85398E-05	0.002826707
8.4823E-05	0.003052706
9.11062E-05	0.003278697
9.73894E-05	0.00350468
0.000103673	0.003730659
0.000109956	0.003956637
0.000116239	0.004182614
0.000122522	0.004408595
0.000128805	0.00463458
0.000135088	0.004860573
0.000141372	0.005086576
0.000147655	0.005312592
0.000153938	0.005538621
0.000160221	0.005764668
0.000166504	0.005990734
0.000172788	0.006216822
0.000179071	0.006442935
0.000185354	0.006669073
0.000191637	0.006895241
0.00019792	0.007121444
0.000204204	0.007347673
0.000210487	0.007573943
0.00021677	0.00780025
0.000223053	0.008026599
0.000229336	0.008252991
0.000235619	0.008479429
0.000241903	0.008705915
0.000248186	0.008932452
0.000254469	0.009159042
0.000260752	0.009385688
0.000267035	0.009612391
0.000273319	0.009839155
0.000279602	0.010065981
0.000285885	0.010292873
0.000292168	0.010519832
0.000298451	0.010746862

Based on density



49	88.596953
50	88.618627
51	88.640533
52	88.662669
53	88.685031
54	88.707615
55	88.730419
56	88.753438
57	88.776670
58	88.800109
59	88.823753
60	88.847596
61	88.871635
62	88.895865
63	88.920282
64	88.944881
65	88.969656
66	88.994604
67	89.019719
68	89.044994
69	89.070426
70	89.096007
71	89.121733
72	89.147596
73	89.173592
74	89.199712
75	89.225951
76	89.252302
77	89.278757
78	89.305309
79	89.331951
80	89.358675
81	89.385472
82	89.412336
83	89.439257
84	89.466226
85	89.493236
86	89.520275
87	89.547336
88	89.574409
89	89.601483
90	89.628549
91	89.655595
92	89.682612
93	89.709588
94	89.736511
95	89.763371
96	89.790155
97	89.816852
98	89.843448
99	89.869931
100	89.896288
101	89.922505
102	89.948569
103	89.974465
104	90.000178
105	90.025696
106	90.051001
107	90.076078
108	90.100912
109	90.125487
110	90.149786
111	90.173791
112	90.197486
113	90.220852
114	90.243872

-49	87.833067
-50	87.840198
-51	87.847641
-52	87.855396
-53	87.863462
-54	87.871840
-55	87.880530
-56	87.889531
-57	87.898844
-58	87.908468
-59	87.918404
-60	87.928651
-61	87.939208
-62	87.950077
-63	87.961255
-64	87.972744
-65	87.984543
-66	87.996650
-67	88.009067
-68	88.021792
-69	88.034824
-70	88.048164
-71	88.061810
-72	88.075762
-73	88.090019
-74	88.104580
-75	88.119444
-76	88.134610
-77	88.150078
-78	88.165846
-79	88.181912
-80	88.198276
-81	88.214937
-82	88.231892
-83	88.249141
-84	88.266681
-85	88.284512
-86	88.302631
-87	88.321036
-88	88.339725
-89	88.358697
-90	88.377950
-91	88.397480
-92	88.417285
-93	88.437364
-94	88.457713
-95	88.478330
-96	88.499211
-97	88.520355
-98	88.541757
-99	88.563414
-100	88.585323
-101	88.607481
-102	88.629884
-103	88.652528
-104	88.675408
-105	88.698522
-106	88.721864
-107	88.745430
-108	88.769216
-109	88.793216
-110	88.817426
-111	88.841841
-112	88.866455
-113	88.891263
-114	88.916259

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0.000348717	0.012689424
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0.000380133	0.013851036
0.000386416	0.014083818
0.000392699	0.014316754
0.000398982	0.014549846
0.000405265	0.014783095
0.000411549	0.015016499
0.000417832	0.015250061
0.000424115	0.015483781
0.000430398	0.015717658
0.000436681	0.015951693
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0.000461814	0.016889411
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0.000574911	0.02113942
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0.000587478	0.021614466
0.000593761	0.021852176
0.000600044	0.022090005
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0.000612611	0.022566009
0.000618894	0.022804175
0.000625177	0.023042445
0.00063146	0.023280815
0.000637743	0.02351928
0.000644026	0.023757835
0.00065031	0.023996475
0.000656593	0.024235194
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0.000392699	0.014162345
0.000398982	0.014390822
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0.000411549	0.01484811
0.000417832	0.015076925
0.000424115	0.015305859
0.000430398	0.015534912
0.000436681	0.015764087
0.000442965	0.015993387
0.000449248	0.016222814
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0.000468097	0.016911874
0.00047438	0.017141829
0.000480664	0.017371922
0.000486947	0.017602154
0.00049323	0.017832527
0.000499513	0.018063044
0.000505796	0.018293708
0.00051208	0.018524518
0.000518363	0.018755479
0.000524646	0.018986591
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0.000537212	0.019449278
0.000543496	0.019680856
0.000549779	0.019912593
0.000556062	0.020144491
0.000562345	0.020376551
0.000568628	0.020608775
0.000574911	0.020841165
0.000581195	0.021073722
0.000587478	0.021306447
0.000593761	0.021539343
0.000600044	0.02177241
0.000606327	0.022005649
0.000612611	0.022239062
0.000618894	0.022472651
0.000625177	0.022706416
0.00063146	0.022940357
0.000637743	0.023174477
0.000644026	0.023408776
0.00065031	0.023643255
0.000656593	0.023877915
0.000662876	0.024112755
0.000669159	0.024347778
0.000675442	0.024582983
0.000681726	0.02481837
0.000688009	0.02505394
0.000694292	0.025289693
0.000700575	0.025525629
0.000706858	0.025761748
0.000713142	0.02599805

115	90.266528
116	90.288799
117	90.310667
118	90.332112
119	90.353113
120	90.373651
121	90.393703
122	90.413249
123	90.432267
124	90.450733
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126	90.485921
127	90.502595
128	90.518624
129	90.533982
130	90.548645
131	90.562587
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142	90.660417
143	90.663494
144	90.665465
145	90.666297
146	90.665954
147	90.664403
148	90.661608
149	90.657532
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151	90.645393
152	90.637253
153	90.627683
154	90.616642
155	90.604091
156	90.589989
157	90.574294
158	90.556964
159	90.537957
160	90.517229
161	90.494735
162	90.470432
163	90.444272
164	90.416210
165	90.386198
166	90.354189
167	90.320132
168	90.283980
169	90.245682
170	90.205185
171	90.162440
172	90.117392
173	90.069988
174	90.020173
175	89.967893
176	89.913091
177	89.855711
178	89.795694
179	89.732981
180	89.667514

-115	88.941438
-116	88.966792
-117	88.992316
-118	89.018004
-119	89.043848
-120	89.069841
-121	89.095978
-122	89.122249
-123	89.148648
-124	89.175167
-125	89.201797
-126	89.228531
-127	89.255360
-128	89.282275
-129	89.309266
-130	89.336325
-131	89.363443
-132	89.390608
-133	89.417811
-134	89.445042
-135	89.472290
-136	89.499543
-137	89.526792
-138	89.554023
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-140	89.608386
-141	89.635493
-142	89.662534
-143	89.689495
-144	89.716363
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-147	89.796267
-148	89.822620
-149	89.848807
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-157	90.050368
-158	90.074311
-159	90.097914
-160	90.121158
-161	90.144022
-162	90.166486
-163	90.188529
-164	90.210130
-165	90.231266
-166	90.251916
-167	90.272057
-168	90.291664
-169	90.310716
-170	90.329187
-171	90.347053
-172	90.364288
-173	90.380866
-174	90.396762
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-176	90.426399
-177	90.440084
-178	90.452977
-179	90.465047
-180	90.476266

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0.000769669	0.02853798
0.000775973	0.028776818
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0.00078854	0.029254216
0.000794823	0.029492751
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0.000819956	0.030445496
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0.000832522	0.030920836
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0.000851372	0.031632217
0.000857655	0.031868844
0.000863938	0.032105193
0.000870221	0.032341247
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0.000882788	0.032812391
0.000889071	0.033047444
0.000895354	0.033282125
0.000901637	0.033516412
0.00090792	0.033750285
0.000914203	0.033983723
0.000920487	0.034216703
0.00092677	0.034449202
0.000933053	0.034681196
0.000939336	0.034912663
0.000945619	0.035143577
0.000951903	0.035373912
0.000958186	0.035603644
0.000964469	0.035833244
0.000970752	0.036061187
0.000977035	0.036288943
0.000983319	0.036515985
0.000989602	0.036742283
0.000995885	0.036967806
0.001002168	0.037192525
0.001008451	0.037416407
0.001014734	0.037639419
0.001021018	0.03786153
0.001027301	0.038082704
0.001033584	0.038302908
0.001039867	0.038522105
0.00104615	0.03874026
0.001052434	0.038957334
0.001058717	0.039173291
0.001065	0.039388091
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0.001077566	0.03981406
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0.001090133	0.040234911
0.001096416	0.040443311
0.001102699	0.040650302
0.001108982	0.040855838
0.001115265	0.041059872
0.001121549	0.041262358
0.001127832	0.041463247

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0.000725708	0.026471201
0.000731991	0.026708049
0.000738274	0.026945078
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