

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

$$y = -5.06403837E-14x^6 + 5.20470195E-13x^5 - 5.94907579E-10x^4 - 7.64565241E-07x^3 + 1.32824693E-04x^2 + 1.68891599E-02x + 8.49124021E+01$$

Please enter below Polynomial Coefficients

Order no	Coeff
6	-5.06403837E-14
5	5.20470195E-13
4	-5.94907579E-10
3	-7.64565241E-07
2	1.32824693E-04
1	1.68891599E-02
0	8.49124021E+01

9.013953495 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	8.527571689 [Kg/s]	Integrated Mass flow	9.500335302 [Kg/s]

Polynomial curve (dp vs position)

Please do NOT alter any of the figures below

position [mm]	Velocity [m/s]
0	84.912402
1	84.929423
2	84.946706
3	84.964244
4	84.982035
5	85.000073
6	85.018353
7	85.036871
8	85.055622
9	85.074602
10	85.093806
11	85.113228
12	85.132865
13	85.152712
14	85.172763
15	85.193014
16	85.213461
17	85.234098
18	85.254920
19	85.275923
20	85.297102
21	85.318452
22	85.339967
23	85.361644
24	85.383477
25	85.405461
26	85.427590
27	85.449861
28	85.472268
29	85.494806
30	85.517470
31	85.540254
32	85.563154
33	85.586164
34	85.609279
35	85.632494
36	85.655803
37	85.679202
38	85.702684
39	85.726245
40	85.749879
41	85.773580
42	85.797343
43	85.821163
44	85.845034
45	85.868949
46	85.892905
47	85.916893
48	85.940910

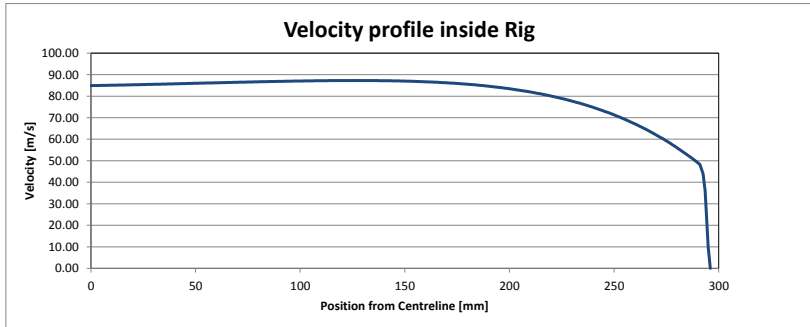
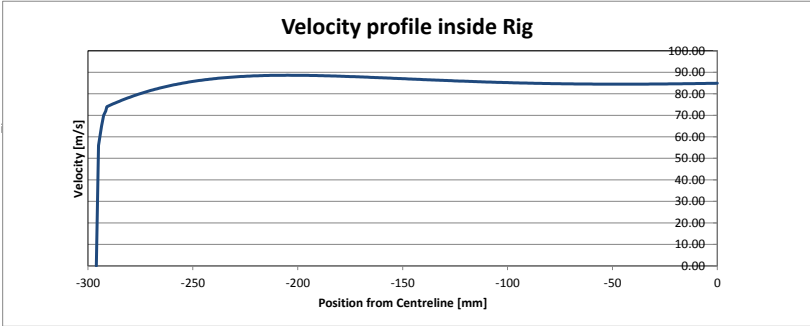
position [mm]	Velocity [m/s]
0	84.912402
-1	84.895647
-2	84.879161
-3	84.862951
-4	84.847019
-5	84.831372
-6	84.816013
-7	84.800947
-8	84.786179
-9	84.771712
-10	84.757551
-11	84.743702
-12	84.730167
-13	84.716953
-14	84.704062
-15	84.691500
-16	84.679270
-17	84.667377
-18	84.655826
-19	84.644621
-20	84.633765
-21	84.623264
-22	84.613121
-23	84.603341
-24	84.593927
-25	84.584885
-26	84.576218
-27	84.567930
-28	84.560025
-29	84.552507
-30	84.545381
-31	84.538651
-32	84.532319
-33	84.526391
-34	84.520870
-35	84.515759
-36	84.511064
-37	84.506787
-38	84.502932
-39	84.499503
-40	84.496504
-41	84.493938
-42	84.491808
-43	84.490119
-44	84.488873
-45	84.488075
-46	84.487727
-47	84.487833
-48	84.488395

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	0.000109394
9.42478E-06	0.000328248
1.5708E-05	0.000547192
2.19911E-05	0.00076623
2.82743E-05	0.000985361
3.45575E-05	0.00120459
4.08407E-05	0.001423916
4.71239E-05	0.001643342
5.34071E-05	0.00186287
5.96903E-05	0.002082501
6.59734E-05	0.002292242
7.22566E-05	0.00252208
7.85398E-05	0.00274203
8.4823E-05	0.00294579
9.11062E-05	0.00318226
9.73894E-05	0.003402543
0.000103673	0.003622939
0.000109956	0.00384345
0.000116239	0.004064077
0.000122522	0.00428482
0.000128805	0.004505682
0.000135088	0.004726663
0.000141372	0.004947764
0.000147655	0.005168987
0.000153938	0.005390331
0.000160221	0.005611798
0.000166504	0.005833389
0.000172788	0.006055105
0.000179071	0.006276945
0.000185354	0.006498911
0.000191637	0.006721003
0.00019792	0.006943222
0.000204204	0.007165568
0.000210487	0.007388042
0.00021677	0.007610644
0.000223053	0.007833374
0.000229336	0.008056233
0.000235619	0.00827922
0.000241903	0.008502336
0.000248186	0.008725581
0.000254469	0.008948954
0.000260752	0.009172457
0.000267035	0.009396087
0.000273319	0.009619847
0.000279602	0.009843734
0.000285885	0.01006775
0.000292168	0.010291893
0.000298451	0.010516162

Based on

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	0.000109395
9.42478E-06	0.000327987
1.5708E-05	0.00054654
2.19911E-05	0.000765012
2.82743E-05	0.000983406
3.45575E-05	0.001201723
4.08407E-05	0.001419965
4.71239E-05	0.001638136
5.34071E-05	0.001856238
5.96903E-05	0.002074272
6.59734E-05	0.002292242
7.22566E-05	0.00251015
7.85398E-05	0.002727998
8.4823E-05	0.00294579
9.11062E-05	0.003163527
9.73894E-05	0.003381213
0.000103673	0.00359885
0.000109956	0.003816442
0.000116239	0.00403399
0.000122522	0.004251498
0.000128805	0.004468969
0.000135088	0.004686406
0.000141372	0.004903811
0.000147655	0.005121189
0.000153938	0.005338541
0.000160221	0.005555871
0.000166504	0.005773183
0.000172788	0.005990479
0.000179071	0.006207762
0.000185354	0.006425037
0.000191637	0.006642306
0.00019792	0.006859573
0.000204204	0.007076841
0.000210487	0.007294113
0.00021677	0.007511394
0.000223053	0.007728686
0.000229336	0.007945993
0.000235619	0.008163319
0.000241903	0.008380667
0.000248186	0.008598042
0.000254469	0.008815446
0.000260752	0.009032884
0.000267035	0.009250359
0.000273319	0.009467875
0.000279602	0.009685435
0.000285885	0.009903045
0.000292168	0.010120707
0.000298451	0.010338425

Based on density



49	85.964949
50	85.989004
51	86.013070
52	86.037139
53	86.061207
54	86.085267
55	86.109312
56	86.133338
57	86.157336
58	86.181301
59	86.205227
60	86.229107
61	86.252933
62	86.276701
63	86.300402
64	86.324030
65	86.347578
66	86.371040
67	86.394407
68	86.417673
69	86.440830
70	86.463872
71	86.486790
72	86.509577
73	86.532226
74	86.554728
75	86.577076
76	86.599262
77	86.621277
78	86.643114
79	86.664764
80	86.686219
81	86.707469
82	86.728507
83	86.749324
84	86.769910
85	86.790256
86	86.810354
87	86.830194
88	86.849766
89	86.869060
90	86.888068
91	86.906778
92	86.925181
93	86.943266
94	86.961024
95	86.978442
96	86.995512
97	87.012221
98	87.028558
99	87.044513
100	87.060073
101	87.075228
102	87.089964
103	87.104271
104	87.118135
105	87.131545
106	87.144487
107	87.156949
108	87.168918
109	87.180380
110	87.191321
111	87.201729
112	87.211589
113	87.220887
114	87.229608

-49	84.489418
-50	84.490904
-51	84.492857
-52	84.495279
-53	84.498173
-54	84.501543
-55	84.505390
-56	84.509718
-57	84.514530
-58	84.519827
-59	84.525613
-60	84.531890
-61	84.538660
-62	84.545926
-63	84.553689
-64	84.561952
-65	84.570717
-66	84.579986
-67	84.589760
-68	84.600041
-69	84.610831
-70	84.622132
-71	84.633944
-72	84.646269
-73	84.659108
-74	84.672463
-75	84.686334
-76	84.700722
-77	84.715627
-78	84.731052
-79	84.746995
-80	84.763457
-81	84.780438
-82	84.797939
-83	84.815960
-84	84.834499
-85	84.853558
-86	84.873134
-87	84.893229
-88	84.913840
-89	84.934967
-90	84.956608
-91	84.978763
-92	85.001430
-93	85.024608
-94	85.048293
-95	85.072486
-96	85.097182
-97	85.122381
-98	85.148079
-99	85.174274
-100	85.200962
-101	85.228142
-102	85.255808
-103	85.283959
-104	85.312589
-105	85.341695
-106	85.371274
-107	85.401320
-108	85.431828
-109	85.462795
-110	85.494214
-111	85.526082
-112	85.558391
-113	85.591136
-114	85.624312

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0.000355	0.012540199
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0.000380133	0.0134429
0.000386416	0.013668862
0.000392699	0.013894936
0.000398982	0.01412112
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0.000424115	0.015026923
0.000430398	0.015253631
0.000436681	0.015480437
0.000442965	0.015707339
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0.000455531	0.016161423
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0.000468097	0.016615863
0.00047438	0.01684321
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0.000574911	0.020489456
0.000581195	0.020717694
0.000587478	0.020945946
0.000593761	0.021174207
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0.000612611	0.021858992
0.000618894	0.022087235
0.000625177	0.02231546
0.00063146	0.022543659
0.000637743	0.022771827
0.000644026	0.022999958
0.00065031	0.023228044
0.000656593	0.02345608
0.000662876	0.023684057
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0.000398982	0.013832875
0.000405265	0.014052172
0.000411549	0.014271599
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0.000430398	0.014930703
0.000436681	0.015150693
0.000442965	0.015370834
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0.000455531	0.015811585
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0.00047438	0.016473952
0.000480664	0.016695087
0.000486947	0.016916403
0.00049323	0.017137903
0.000499513	0.017359592
0.000505796	0.017581473
0.00051208	0.017803551
0.000518363	0.018025829
0.000524646	0.018248312
0.000530929	0.018471003
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0.000543496	0.018917027
0.000549779	0.019140367
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0.000562345	0.019587722
0.000568628	0.019811744
0.000574911	0.020036001
0.000581195	0.020260497
0.000587478	0.020485234
0.000593761	0.020710217
0.000600044	0.020935449
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0.000612611	0.021386671
0.000618894	0.021612669
0.000625177	0.021838927
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0.000644026	0.022519303
0.00065031	0.022746637
0.000656593	0.022974247
0.000662876	0.023202135
0.000669159	0.023430303
0.000675442	0.023658755
0.000681726	0.023887492
0.000688009	0.024116516
0.000694292	0.024344583
0.000700575	0.024574534
0.000706858	0.024805332
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115	87.237738
116	87.245262
117	87.252165
118	87.258430
119	87.264043
120	87.268988
121	87.273248
122	87.276806
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127	87.283485
128	87.282475
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135	87.251242
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144	87.140626
145	87.122821
146	87.103826
147	87.083616
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151	86.990128
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153	86.935427
154	86.905992
155	86.875131
156	86.842814
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160	86.698413
161	86.658378
162	86.616708
163	86.573372
164	86.528336
165	86.481568
166	86.433035
167	86.382704
168	86.330540
169	86.276509
170	86.220575
171	86.162702
172	86.102856
173	86.040998
174	85.977091
175	85.911098
176	85.842980
177	85.772698
178	85.700213
179	85.625484
180	85.548471

-115	85.657911
-116	85.691927
-117	85.726354
-118	85.761185
-119	85.796411
-120	85.832025
-121	85.868019
-122	85.904386
-123	85.941116
-124	85.978201
-125	86.015632
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-127	86.091493
-128	86.129903
-129	86.168619
-130	86.207631
-131	86.246927
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-133	86.326328
-134	86.366409
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-136	86.447270
-137	86.488024
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-139	86.570113
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-141	86.652883
-142	86.694487
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-145	86.819988
-146	86.861999
-147	86.904070
-148	86.946184
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-153	87.156769
-154	87.198756
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-157	87.324094
-158	87.365596
-159	87.406922
-160	87.448049
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-166	87.689320
-167	87.728383
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-170	87.843080
-171	87.880388
-172	87.917186
-173	87.953445
-174	87.989135
-175	88.024225
-176	88.058684
-177	88.092481
-178	88.125583
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0.000750841	0.026865292
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0.000775973	0.02776861
0.000782257	0.027993891
0.00078854	0.02821893
0.000794823	0.028443716
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0.000889071	0.031776129
0.000895354	0.031995006
0.000901637	0.032213381
0.00090792	0.032431236
0.000914203	0.032648554
0.000920487	0.032865315
0.00092677	0.033081502
0.000933053	0.033297094
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0.000945619	0.033726416
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0.000964469	0.034365433
0.000970752	0.034577029
0.000977035	0.034787883
0.000983319	0.034997973
0.000989602	0.035207274
0.000995885	0.035415763
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0.01008451	0.035830207
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0.01033584	0.036648245
0.01039867	0.036850339
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0.01058717	0.037450377
0.01065	0.037648211
0.01071283	0.037844905
0.01077566	0.038040429
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0.01090133	0.038427838
0.01096416	0.038619658
0.01102699	0.038810178
0.01108982	0.038999362
0.01115265	0.039187177
0.01121549	0.039373587
0.01127832	0.039558556

0.000719425	0.025266012
0.000725708	0.025496797
0.000731991	0.02572788
0.000738274	0.025959263
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