

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

$$y = -4.12193026E-14x^6 - 7.98380070E-13x^5 - 2.27353512E-09x^4 - 6.85354878E-07x^3 + 1.90476726E-04x^2 + 1.64354259E-02x + 8.60738721E+01$$

Please enter below Polynomial Coefficients

Order no	Coeff
6	-4.12193026E-14
5	-7.98380070E-13
4	-2.27353512E-09
3	-6.85354878E-07
2	1.90476726E-04
1	1.64354259E-02
0	8.60738721E+01

9.124687807 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	8.627388335 [Kg/s]	Integrated Mass flow	9.621987279 [Kg/s]

Polynomial curve (dp vs position)

Please do NOT alter any of the figures below

position [mm]	Velocity [m/s]
0	86.073872
1	86.090497
2	86.107499
3	86.124874
4	86.142617
5	86.160724
6	86.179191
7	86.198013
8	86.217186
9	86.236705
10	86.256566
11	86.276764
12	86.297294
13	86.318152
14	86.339333
15	86.360832
16	86.382643
17	86.404763
18	86.427186
19	86.449906
20	86.472920
21	86.496220
22	86.519803
23	86.543663
24	86.567794
25	86.592191
26	86.616848
27	86.641761
28	86.666922
29	86.692326
30	86.717968
31	86.743842
32	86.769941
33	86.796260
34	86.822792
35	86.849532
36	86.876473
37	86.903608
38	86.930932
39	86.958437
40	86.986118
41	87.013968
42	87.041979
43	87.070146
44	87.098460
45	87.126916
46	87.155506
47	87.184223
48	87.213060

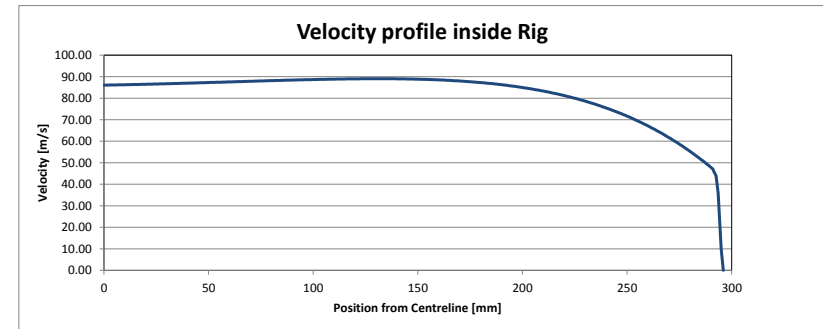
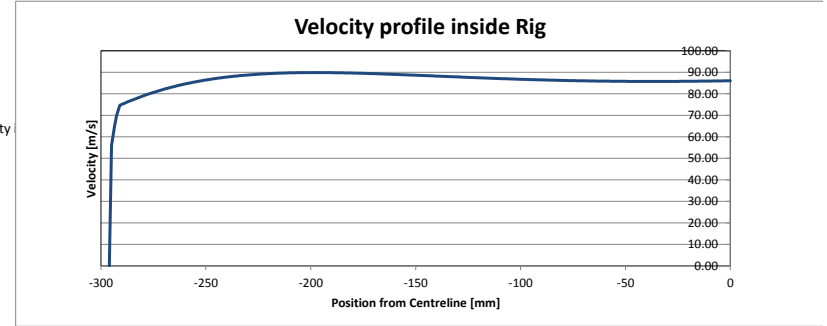
position [mm]	Velocity [m/s]
0	86.073872
-1	86.057628
-2	86.041769
-3	86.026298
-4	86.011221
-5	85.996541
-6	85.982262
-7	85.968387
-8	85.954921
-9	85.941867
-10	85.929228
-11	85.917009
-12	85.905213
-13	85.893843
-14	85.882903
-15	85.872396
-16	85.862326
-17	85.852695
-18	85.843507
-19	85.834766
-20	85.826473
-21	85.818633
-22	85.811248
-23	85.804321
-24	85.797855
-25	85.791853
-26	85.786317
-27	85.781250
-28	85.776655
-29	85.772535
-30	85.768891
-31	85.765726
-32	85.763043
-33	85.760844
-34	85.759130
-35	85.757905
-36	85.757170
-37	85.756928
-38	85.757180
-39	85.757927
-40	85.759173
-41	85.760919
-42	85.763165
-43	85.765915
-44	85.769169
-45	85.772928
-46	85.777195
-47	85.781970
-48	85.787255

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	0.000110889
9.42478E-06	0.000332733
1.5708E-05	0.000554667
2.19911E-05	0.000775694
2.82743E-05	0.000998816
3.45575E-05	0.001221037
4.08407E-05	0.001443359
4.71239E-05	0.001665785
5.34071E-05	0.001888317
5.96903E-05	0.00210958
6.59734E-05	0.00233371
7.22566E-05	0.002556576
7.85398E-05	0.002779559
8.4823E-05	0.00300266
9.11062E-05	0.003225882
9.73894E-05	0.003449228
0.000103673	0.003672699
0.000109956	0.003896298
0.000116239	0.004120026
0.000122522	0.004343886
0.000128805	0.00456788
0.000135088	0.00479201
0.000141372	0.005016277
0.000147655	0.005240684
0.000153938	0.005465231
0.000160221	0.005689922
0.000166504	0.005914756
0.000172788	0.006139737
0.000179071	0.006364866
0.000185354	0.006590143
0.000191637	0.006815571
0.00019792	0.00704115
0.000204204	0.007266882
0.000210487	0.007492768
0.00021677	0.007718809
0.000223053	0.007945007
0.000229336	0.008171361
0.000235619	0.008397873
0.000241903	0.008624545
0.000248186	0.008851376
0.000254469	0.009078367
0.000260752	0.009305519
0.000267035	0.009532832
0.000273319	0.009760307
0.000279602	0.009987944
0.000285885	0.010215743
0.000292168	0.010443705
0.000298451	0.010671829

Based on

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	0.000110847
9.42478E-06	0.000332479
1.5708E-05	0.000554032
2.19911E-05	0.000775509
2.82743E-05	0.000996913
3.45575E-05	0.001218247
4.08407E-05	0.001439514
4.71239E-05	0.001660717
5.34071E-05	0.001881861
5.96903E-05	0.002102947
6.59734E-05	0.002323979
7.22566E-05	0.002544961
7.85398E-05	0.002765896
8.4823E-05	0.002986787
9.11062E-05	0.003207638
9.73894E-05	0.003428452
0.000103673	0.003649233
0.000109956	0.003869985
0.000116239	0.00409071
0.000122522	0.004311413
0.000128805	0.004532097
0.000135088	0.004752766
0.000141372	0.004973423
0.000147655	0.005194073
0.000153938	0.005414718
0.000160221	0.005635363
0.000166504	0.005856012
0.000172788	0.006076668
0.000179071	0.006297335
0.000185354	0.006518018
0.000191637	0.006738719
0.00019792	0.006959443
0.000204204	0.007180193
0.000210487	0.007400974
0.00021677	0.00762179
0.000223053	0.007842644
0.000229336	0.008063541
0.000235619	0.008284484
0.000241903	0.008505478
0.000248186	0.008726526
0.000254469	0.008947633
0.000260752	0.009168803
0.000267035	0.009390039
0.000273319	0.009611345
0.000279602	0.009832727
0.000285885	0.010054187
0.000292168	0.01027573
0.000298451	0.01049736

Based on density



49	87.242009
50	87.271063
51	87.300214
52	87.329455
53	87.358778
54	87.388176
55	87.417640
56	87.447162
57	87.476734
58	87.506348
59	87.535996
60	87.565668
61	87.595357
62	87.625055
63	87.654751
64	87.684437
65	87.714104
66	87.743744
67	87.773345
68	87.802901
69	87.832399
70	87.861832
71	87.891189
72	87.920461
73	87.949637
74	87.978706
75	88.007660
76	88.036486
77	88.065176
78	88.093717
79	88.122098
80	88.150310
81	88.178340
82	88.206177
83	88.233810
84	88.261227
85	88.288416
86	88.315365
87	88.342061
88	88.368493
89	88.394647
90	88.420512
91	88.446073
92	88.471319
93	88.496235
94	88.520808
95	88.545025
96	88.568872
97	88.592334
98	88.615398
99	88.638048
100	88.660270
101	88.682050
102	88.703372
103	88.724221
104	88.744581
105	88.764437
106	88.783772
107	88.802571
108	88.820816
109	88.838492
110	88.855581
111	88.872067
112	88.887931
113	88.903156
114	88.917724

-49	85.793051
-50	85.799358
-51	85.806178
-52	85.813511
-53	85.821358
-54	85.829721
-55	85.838598
-56	85.847992
-57	85.857902
-58	85.868328
-59	85.879272
-60	85.890732
-61	85.902709
-62	85.915203
-63	85.928214
-64	85.941740
-65	85.955783
-66	85.970341
-67	85.985413
-68	86.000999
-69	86.017099
-70	86.033710
-71	86.050832
-72	86.068464
-73	86.086604
-74	86.105251
-75	86.124403
-76	86.144059
-77	86.164216
-78	86.184873
-79	86.206028
-80	86.227678
-81	86.249820
-82	86.272453
-83	86.295573
-84	86.319179
-85	86.343265
-86	86.367831
-87	86.392872
-88	86.418385
-89	86.444366
-90	86.470811
-91	86.497717
-92	86.525080
-93	86.552894
-94	86.581157
-95	86.609862
-96	86.639006
-97	86.668583
-98	86.698589
-99	86.729017
-100	86.759863
-101	86.791120
-102	86.822783
-103	86.854846
-104	86.887302
-105	86.920144
-106	86.953367
-107	86.986963
-108	87.020925
-109	87.055246
-110	87.089918
-111	87.124933
-112	87.160284
-113	87.195962
-114	87.231958

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0.00037385	0.013421917
0.000380133	0.013652123
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0.000392699	0.014112995
0.000398982	0.014343666
0.000405265	0.014574473
0.000411549	0.014805543
0.000417832	0.015036544
0.000424115	0.015267796
0.000430398	0.015499191
0.000436681	0.015730727
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0.000530929	0.019218707
0.000537212	0.019452083
0.000543496	0.019685541
0.000549779	0.019919078
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0.000568628	0.020620104
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0.000587478	0.021321645
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0.000612611	0.022257559
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0.00063146	0.022959663
0.000637743	0.023193693
0.000644026	0.023427707
0.00065031	0.023661699
0.000656593	0.023895659
0.000662876	0.024129581
0.000669159	0.024363455
0.000675442	0.024597272
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0.000317301	0.011162813
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0.00033615	0.011829195
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0.000380133	0.013388316
0.000386416	0.01361159
0.000392699	0.013835012
0.000398982	0.014058584
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0.000417832	0.014730251
0.000424115	0.014954469
0.000430398	0.015178858
0.000436681	0.015403421
0.000442965	0.015628162
0.000449248	0.015853086
0.000455531	0.016078196
0.000461814	0.016303494
0.000468097	0.016528986
0.00047438	0.016754675
0.000480664	0.016980564
0.000486947	0.017206656
0.00049323	0.017432955
0.000499513	0.017659465
0.000505796	0.017886188
0.00051208	0.018113129
0.000518363	0.01834029
0.000524646	0.018567674
0.000530929	0.018795284
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0.000549779	0.019479505
0.000556062	0.019708051
0.000562345	0.019936839
0.000568628	0.020165869
0.000574911	0.020395146
0.000581195	0.020624672
0.000587478	0.020854449
0.000593761	0.021084479
0.000600044	0.021314765
0.000606327	0.021545309
0.000612611	0.021776113
0.000618894	0.022007179
0.000625177	0.022238509
0.00063146	0.022470104
0.000637743	0.022701966
0.000644026	0.022934097
0.00065031	0.023166498
0.000656593	0.02339917
0.000662876	0.023632115
0.000669159	0.023865333
0.000675442	0.024098826
0.000681726	0.024332594
0.000688009	0.024566638
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0.000706858	0.025270429
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117	88.957306
118	88.969064
119	88.980071
120	88.990308
121	88.999756
122	89.008395
123	89.016204
124	89.023162
125	89.029249
126	89.034444
127	89.038725
128	89.042070
129	89.044457
130	89.045864
131	89.046268
132	89.046646
133	89.043975
134	89.041230
135	89.037388
136	89.032425
137	89.026316
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139	89.010559
140	89.000859
141	88.989912
142	88.977689
143	88.964165
144	88.949313
145	88.933103
146	88.915510
147	88.896504
148	88.876057
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150	88.830722
151	88.805775
152	88.779268
153	88.751170
154	88.721451
155	88.690079
156	88.657021
157	88.622246
158	88.585720
159	88.547412
160	88.507286
161	88.465308
162	88.421445
163	88.375661
164	88.327921
165	88.278188
166	88.226427
167	88.172601
168	88.116671
169	88.058601
170	87.998352
171	87.935885
172	87.871160
173	87.804139
174	87.734780
175	87.663044
176	87.588887
177	87.512269
178	87.433147
179	87.351478
180	87.267219

-115	87.268265
-116	87.304872
-117	87.341771
-118	87.378953
-119	87.416408
-120	87.454125
-121	87.492095
-122	87.530307
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-126	87.685362
-127	87.724620
-128	87.764052
-129	87.803646
-130	87.843389
-131	87.883269
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-133	87.963384
-134	88.003593
-135	88.043883
-136	88.084240
-137	88.124650
-138	88.165098
-139	88.205569
-140	88.246045
-141	88.286513
-142	88.326955
-143	88.367354
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-145	88.447958
-146	88.488127
-147	88.528184
-148	88.568110
-149	88.607886
-150	88.647493
-151	88.686913
-152	88.726124
-153	88.765107
-154	88.803840
-155	88.842304
-156	88.880476
-157	88.918336
-158	88.955859
-159	88.993025
-160	89.029809
-161	89.066189
-162	89.102140
-163	89.137638
-164	89.172660
-165	89.207178
-166	89.241169
-167	89.274605
-168	89.307460
-169	89.339708
-170	89.371321
-171	89.402271
-172	89.432530
-173	89.462069
-174	89.490859
-175	89.518870
-176	89.546071
-177	89.572433
-178	89.597924
-179	89.622511
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0.000738274	0.026930264
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0.000750841	0.027395192
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0.000763407	0.02785935
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0.000775973	0.028322638
0.000782257	0.028553923
0.00078854	0.028784952
0.000794823	0.029015709
0.000801106	0.029246181
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0.000813672	0.02970621
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0.000826239	0.030164919
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0.000838805	0.030622183
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0.000851372	0.031077868
0.000857655	0.031305077
0.000863938	0.03153184
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0.000876504	0.031983953
0.000882788	0.032209266
0.000889071	0.032434058
0.000895354	0.032658309
0.000901637	0.032882
0.00090792	0.033105109
0.000914203	0.033327616
0.000920487	0.033549498
0.00092677	0.033770736
0.000933053	0.033991305
0.000939336	0.034211184
0.000945619	0.03443035
0.000951903	0.034648778
0.000958186	0.034866444
0.000964469	0.035083325
0.000970752	0.035299394
0.000977035	0.035514627
0.000983319	0.035728996
0.000989602	0.035942477
0.000995885	0.036155041
0.001002168	0.036366661
0.001008451	0.036577309
0.001014734	0.036786957
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0.001027301	0.037203131
0.001033584	0.037409598
0.001039867	0.037614944
0.00104615	0.037819137
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0.001058717	0.038223937
0.001065	0.038424477
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0.001077566	0.03882167
0.001083849	0.039018252
0.001090133	0.039213445
0.001096416	0.039407211
0.001102699	0.039599514
0.001108982	0.039790315
0.001115265	0.039979577
0.001121549	0.04016726
0.001127832	0.040353324

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0.000725708	0.025976713
0.000731991	0.026212693
0.000738274	0.02644895
0.000744557	0.026685481
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