

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

$$y = -1.29821197E-13x^6 - 1.32318334E-11x^5 + 5.98222511E-09x^4 - 5.37887785E-08x^3 - 1.29674371E-05x^2 + 1.17866616E-02x + 8.52109985E+01$$

Please enter below Polynomial Coefficients

Order no	Coeff
6	-1.29821197E-13
5	-1.32318334E-11
4	5.98222511E-09
3	-5.37887785E-08
2	-1.29674371E-05
1	1.17866616E-02
0	8.52109985E+01

8.743313695 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	7.985318854 [Kg/s]	Integrated Mass flow	9.501308535 [Kg/s]

Polynomial curve (dP vs position)

Please do NOT alter any of the figures below

position [mm]	Velocity [m/s]
0	85.210999
1	85.222772
2	85.234520
3	85.246241
4	85.257936
5	85.269605
6	85.281248
7	85.292865
8	85.304458
9	85.316027
10	85.327573
11	85.339096
12	85.350599
13	85.362081
14	85.373544
15	85.384991
16	85.396421
17	85.407838
18	85.419242
19	85.430636
20	85.442021
21	85.453400
22	85.464775
23	85.476147
24	85.487520
25	85.498896
26	85.510277
27	85.521665
28	85.533065
29	85.544477
30	85.555905
31	85.567352
32	85.578820
33	85.590313
34	85.601833
35	85.613384
36	85.624968
37	85.636589
38	85.648250
39	85.659953
40	85.671702
41	85.683501
42	85.695352
43	85.707258
44	85.719222
45	85.731249
46	85.743340
47	85.755499
48	85.767729

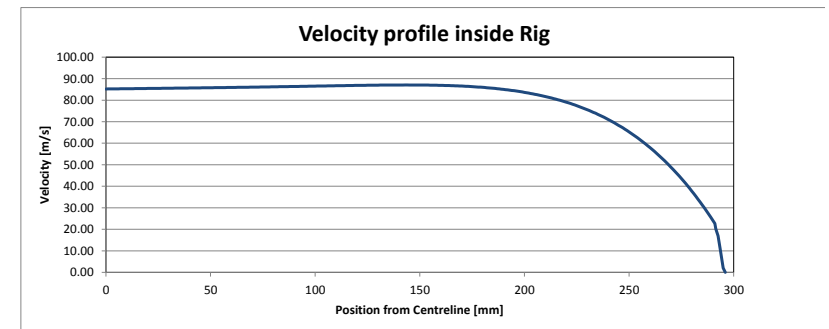
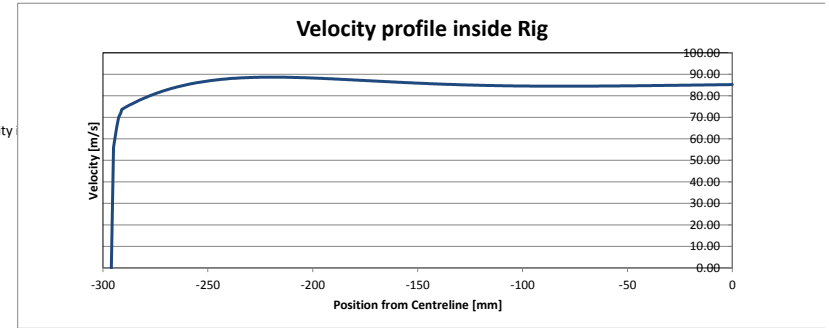
position [mm]	Velocity [m/s]
0	85.210999
-1	85.199199
-2	85.187374
-3	85.175524
-4	85.163649
-5	85.151752
-6	85.139831
-7	85.127889
-8	85.115928
-9	85.103947
-10	85.091950
-11	85.079937
-12	85.067911
-13	85.055874
-14	85.043827
-15	85.031774
-16	85.019716
-17	85.007657
-18	84.995599
-19	84.983546
-20	84.971500
-21	84.959464
-22	84.947443
-23	84.935440
-24	84.923458
-25	84.911502
-26	84.899576
-27	84.887683
-28	84.875828
-29	84.864017
-30	84.852253
-31	84.840541
-32	84.828887
-33	84.817295
-34	84.805771
-35	84.794320
-36	84.782948
-37	84.771660
-38	84.760463
-39	84.749362
-40	84.738364
-41	84.727475
-42	84.716701
-43	84.706048
-44	84.695524
-45	84.685136
-46	84.674889
-47	84.664791
-48	84.654850

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	0.000109771
9.42478E-06	0.00032936
1.5708E-05	0.000549008
2.19911E-05	0.000768717
2.82743E-05	0.000988486
3.45575E-05	0.001208314
4.08407E-05	0.001428202
4.71239E-05	0.00164815
5.34071E-05	0.001868157
5.96903E-05	0.002088222
6.59734E-05	0.002308347
7.22566E-05	0.00252853
7.85398E-05	0.002748772
8.4823E-05	0.002969073
9.11062E-05	0.003189431
9.73894E-05	0.003394807
0.000103673	0.003630324
0.000109956	0.003850858
0.000116239	0.00407145
0.000122522	0.0042921
0.000128805	0.004512809
0.000135088	0.004733576
0.000141372	0.004954401
0.000147655	0.005175285
0.000153938	0.005396228
0.000160221	0.00561723
0.000166504	0.005838291
0.000172788	0.006059412
0.000179071	0.006280592
0.000185354	0.006501832
0.000191637	0.006723132
0.00019792	0.006944493
0.000204204	0.007165916
0.000210487	0.0073874
0.00021677	0.007608946
0.000223053	0.007830554
0.000229336	0.008052226
0.000235619	0.008273961
0.000241903	0.008495761
0.000248186	0.008717626
0.000254469	0.008939556
0.000260752	0.009161553
0.000267035	0.009383617
0.000273319	0.009605748
0.000279602	0.009827949
0.000285885	0.010050219
0.000292168	0.010272559
0.000298451	0.010494971

Based on

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	0.000109771
9.42478E-06	0.000329178
1.5708E-05	0.000548553
2.19911E-05	0.000767867
2.82743E-05	0.00098712
3.45575E-05	0.001206311
4.08407E-05	0.00142544
4.71239E-05	0.001644507
5.34071E-05	0.001863513
5.96903E-05	0.002082456
6.59734E-05	0.002301337
7.22566E-05	0.002520155
7.85398E-05	0.002738912
8.4823E-05	0.002957606
9.11062E-05	0.003176237
9.73894E-05	0.003394807
0.000103673	0.003613314
0.000109956	0.003831759
0.000116239	0.004050142
0.000122522	0.004268464
0.000128805	0.004486724
0.000135088	0.004704923
0.000141372	0.004923061
0.000147655	0.005141138
0.000153938	0.005359155
0.000160221	0.005577113
0.000166504	0.005795011
0.000172788	0.006012851
0.000179071	0.006230633
0.000185354	0.006448358
0.000191637	0.006666026
0.00019792	0.006883638
0.000204204	0.007101196
0.000210487	0.0073187
0.00021677	0.007536151
0.000223053	0.00775355
0.000229336	0.007970898
0.000235619	0.008188198
0.000241903	0.008405449
0.000248186	0.008622653
0.000254469	0.008839812
0.000260752	0.009056927
0.000267035	0.009274
0.000273319	0.009491032
0.000279602	0.009708026
0.000285885	0.009924983
0.000292168	0.010141905
0.000298451	0.010358794

Based on density



49	85.780034
50	85.792415
51	85.804876
52	85.817420
53	85.830050
54	85.842768
55	85.855577
56	85.868481
57	85.881480
58	85.894578
59	85.907778
60	85.921081
61	85.934489
62	85.948005
63	85.961630
64	85.975366
65	85.989215
66	86.003178
67	86.017257
68	86.031452
69	86.045765
70	86.060196
71	86.074746
72	86.089415
73	86.104204
74	86.119113
75	86.134140
76	86.149287
77	86.164551
78	86.179933
79	86.195430
80	86.211042
81	86.226766
82	86.242602
83	86.258545
84	86.274594
85	86.290746
86	86.306997
87	86.323344
88	86.339783
89	86.356309
90	86.372919
91	86.389606
92	86.406366
93	86.423193
94	86.440081
95	86.457023
96	86.474012
97	86.491041
98	86.508101
99	86.525186
100	86.542284
101	86.559389
102	86.576489
103	86.593575
104	86.610635
105	86.627660
106	86.644636
107	86.661551
108	86.678394
109	86.695149
110	86.711804
111	86.728343
112	86.744752
113	86.761015
114	86.777115

-49	84.645073
-50	84.635466
-51	84.626037
-52	84.616795
-53	84.607747
-54	84.598899
-55	84.590262
-56	84.581841
-57	84.573646
-58	84.565685
-59	84.557966
-60	84.550496
-61	84.543285
-62	84.536342
-63	84.529673
-64	84.523289
-65	84.517198
-66	84.511408
-67	84.505929
-68	84.500768
-69	84.495936
-70	84.491440
-71	84.487290
-72	84.483494
-73	84.480062
-74	84.477003
-75	84.474325
-76	84.472037
-77	84.470149
-78	84.468670
-79	84.467608
-80	84.466972
-81	84.466772
-82	84.467015
-83	84.467712
-84	84.468871
-85	84.470500
-86	84.472608
-87	84.475205
-88	84.478298
-89	84.481897
-90	84.486009
-91	84.490643
-92	84.495807
-93	84.501510
-94	84.507759
-95	84.514563
-96	84.521928
-97	84.529864
-98	84.538378
-99	84.547476
-100	84.557166
-101	84.567456
-102	84.578353
-103	84.589862
-104	84.601991
-105	84.614746
-106	84.628134
-107	84.642159
-108	84.656829
-109	84.672149
-110	84.688124
-111	84.704759
-112	84.722059
-113	84.740029
-114	84.758672

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0.000317301	0.011162644
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0.000329867	0.011608133
0.000336115	0.011830994
0.000342434	0.012053932
0.000348717	0.01227695
0.000355	0.012500048
0.000361283	0.012723228
0.000367566	0.012946491
0.00037385	0.013169838
0.000380133	0.013393269
0.000386416	0.013616787
0.000392699	0.013840392
0.000398982	0.014064085
0.000405265	0.014287868
0.000411549	0.014511741
0.000417832	0.014735706
0.000424115	0.014959764
0.000430398	0.015183916
0.000436681	0.015408163
0.000442965	0.015632506
0.000449248	0.015856945
0.000455531	0.016081483
0.000461814	0.016306119
0.000468097	0.016530855
0.00047438	0.016755692
0.000480664	0.01698063
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0.000505796	0.017881408
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0.000524646	0.018558083
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0.000537212	0.019009725
0.000543496	0.019235704
0.000549779	0.019461788
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0.000581195	0.020593766
0.000587478	0.020820469
0.000593761	0.021047272
0.000600044	0.021274174
0.000606327	0.021501173
0.000612611	0.021728269
0.000618894	0.021955458
0.000625177	0.022182739
0.00063146	0.022410109
0.000637743	0.022637566
0.000644026	0.022865108
0.00065031	0.023092731
0.000656593	0.023320432
0.000662876	0.023548208
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0.000392699	0.013609837
0.000398982	0.01382655
0.000405265	0.014043279
0.000411549	0.014260028
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0.000430398	0.014910428
0.000436681	0.015127294
0.000442965	0.015344199
0.000449248	0.015561148
0.000455531	0.015778146
0.000461814	0.015995196
0.000468097	0.016212304
0.00047438	0.016429473
0.000480664	0.01664671
0.000486947	0.016864019
0.00049323	0.017081404
0.000499513	0.017298872
0.000505796	0.017516426
0.00051208	0.017734073
0.000518363	0.017951817
0.000524646	0.018169664
0.000530929	0.018387619
0.000537212	0.018605688
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0.000549779	0.019042192
0.000556062	0.019260637
0.000562345	0.01947922
0.000568628	0.019697945
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0.000581195	0.020135848
0.000587478	0.020355038
0.000593761	0.020574395
0.000600044	0.020793926
0.000606327	0.021013636
0.000612611	0.021233532
0.000618894	0.021453621
0.000625177	0.021673908
0.00063146	0.0218944
0.000637743	0.022115104
0.000644026	0.022336026
0.00065031	0.022557172
0.000656593	0.02277855
0.000662876	0.023000165
0.000669159	0.023222024
0.000675442	0.023444134
0.000681726	0.023666501
0.000688009	0.023889131
0.000694292	0.024112032
0.000700575	0.02433521
0.000706858	0.024558671
0.000713142	0.024782421

115	86.793035
116	86.808758
117	86.824266
118	86.839538
119	86.854556
120	86.869300
121	86.883747
122	86.897877
123	86.911666
124	86.925092
125	86.938131
126	86.950757
127	86.962945
128	86.974669
129	86.985901
130	86.996613
131	87.006777
132	87.016363
133	87.025340
134	87.033676
135	87.041340
136	87.048298
137	87.054516
138	87.059958
139	87.064589
140	87.068371
141	87.071267
142	87.073238
143	87.074243
144	87.074241
145	87.073190
146	87.071048
147	87.067769
148	87.063309
149	87.057621
150	87.050658
151	87.042370
152	87.032709
153	87.021623
154	87.009060
155	86.994967
156	86.979289
157	86.961970
158	86.942954
159	86.922181
160	86.899594
161	86.875130
162	86.848727
163	86.820323
164	86.789852
165	86.757248
166	86.722444
167	86.685370
168	86.645957
169	86.604132
170	86.559823
171	86.512954
172	86.463450
173	86.411233
174	86.356224
175	86.298342
176	86.237504
177	86.173628
178	86.106628
179	86.036416
180	85.962905

-115	84.777994
-116	84.797998
-117	84.818687
-118	84.840064
-119	84.862133
-120	84.884896
-121	84.908355
-122	84.932512
-123	84.957368
-124	84.982926
-125	85.009185
-126	85.036146
-127	85.063809
-128	85.092175
-129	85.121241
-130	85.151007
-131	85.181471
-132	85.212631
-133	85.244485
-134	85.277030
-135	85.310262
-136	85.344178
-137	85.378772
-138	85.414041
-139	85.449978
-140	85.486578
-141	85.523835
-142	85.561740
-143	85.600287
-144	85.639468
-145	85.679273
-146	85.719693
-147	85.760719
-148	85.802339
-149	85.844543
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-151	85.930653
-152	85.974533
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-154	86.063876
-155	86.109308
-156	86.155227
-157	86.201614
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-159	86.295728
-160	86.343416
-161	86.391499
-162	86.439957
-163	86.488768
-164	86.537909
-165	86.587358
-166	86.637090
-167	86.687082
-168	86.737307
-169	86.787738
-170	86.838349
-171	86.889110
-172	86.939993
-173	86.990967
-174	87.042001
-175	87.093063
-176	87.144119
-177	87.195136
-178	87.246077
-179	87.296907
-180	87.347589

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0.000750841	0.02674225
0.000757124	0.02697052
0.000763407	0.027198764
0.00076969	0.027426974
0.000775973	0.027655139
0.000782257	0.027883249
0.00078854	0.028111293
0.000794823	0.028339259
0.000801106	0.028567135
0.000807389	0.02879491
0.000813672	0.029022568
0.000819956	0.029250098
0.000826239	0.029477484
0.000832522	0.029704711
0.000838805	0.029931765
0.000845088	0.030158628
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0.000863938	0.030837906
0.000870221	0.031063834
0.000876504	0.031289481
0.000882788	0.031514826
0.000889071	0.031739849
0.000895354	0.031964528
0.000901637	0.03218884
0.00090792	0.032412761
0.000914203	0.032636268
0.000920487	0.032859335
0.00092677	0.033081936
0.000933053	0.033304044
0.000939336	0.033525632
0.000945619	0.033746671
0.000951903	0.033967131
0.000958186	0.034186991
0.000964469	0.03440619
0.000970752	0.034624725
0.000977035	0.034842553
0.000983319	0.035059639
0.000989602	0.035275946
0.000995885	0.035491439
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0.001008451	0.035919826
0.001014734	0.036132641
0.001021018	0.036344482
0.001027301	0.036555306
0.001033584	0.03676507
0.001039867	0.036973727
0.00104615	0.037181232
0.001052434	0.037387535
0.001058717	0.03759259
0.001065	0.037796343
0.001071283	0.037998745
0.001077566	0.03819974
0.001083849	0.038399275
0.001090133	0.038597293
0.001096416	0.038793736
0.001102699	0.038988545
0.001108982	0.039181658
0.001115265	0.039373014
0.001121549	0.039562548
0.001127832	0.039750195

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0.000731991	0.025455474
0.000738274	0.025680447
0.000744557	0.025905741
0.000750841	0.026131362
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