

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

$$y = -7.30870070E-14x^6 - 6.61990388E-12x^5 + 9.19871548E-10x^4 - 5.19650168E-08x^3 + 1.05012666E-04x^2 + 5.01820142E-03x + 8.64145162E+01$$

Please enter below Polynomial Coefficients

Order no	Coeff
6	-7.30870070E-14
5	-6.61990388E-12
4	9.19871548E-10
3	-5.19650168E-08
2	1.05012666E-04
1	5.01820142E-03
0	8.64145162E+01

9.077170872 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	8.650314075 [Kg/s]	Integrated Mass flow	9.50402767 [Kg/s]

Polynomial curve (dP vs position)

Please do NOT alter any of the figures below

position [mm]	Velocity [m/s]
0	86.414516
1	86.419639
2	86.424972
3	86.430515
4	86.436266
5	86.442227
6	86.448396
7	86.454773
8	86.461360
9	86.468154
10	86.475156
11	86.482366
12	86.489784
13	86.497409
14	86.505242
15	86.513282
16	86.521530
17	86.529985
18	86.538646
19	86.547515
20	86.556591
21	86.565873
22	86.575363
23	86.585058
24	86.594960
25	86.605069
26	86.615384
27	86.625905
28	86.636631
29	86.647564
30	86.658702
31	86.670045
32	86.681593
33	86.693346
34	86.705303
35	86.717464
36	86.729829
37	86.742397
38	86.755168
39	86.768141
40	86.781316
41	86.794692
42	86.808269
43	86.822045
44	86.836021
45	86.850194
46	86.864565
47	86.879132
48	86.893895

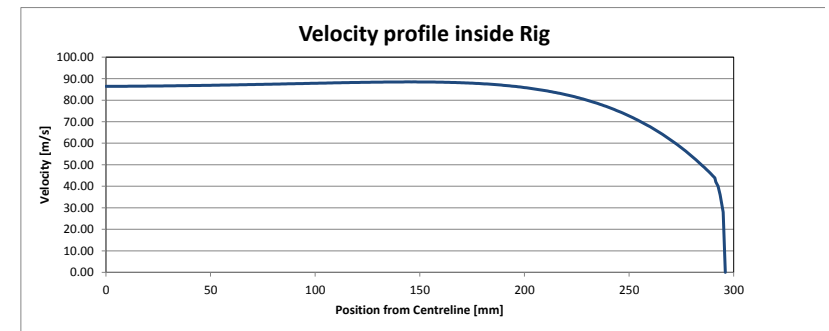
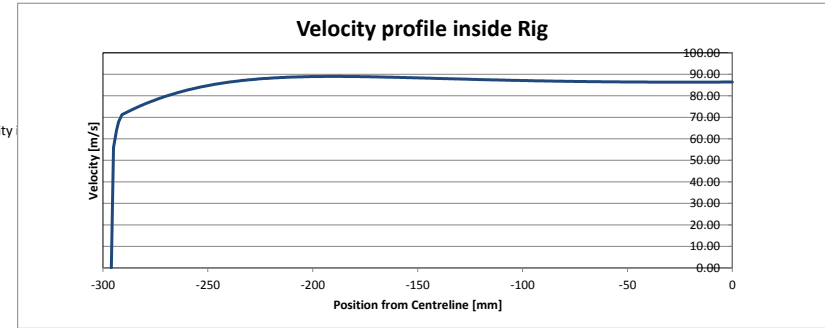
position [mm]	Velocity [m/s]
0	86.414516
-1	86.409603
-2	86.404900
-3	86.400408
-4	86.396127
-5	86.392058
-6	86.388200
-7	86.384555
-8	86.381122
-9	86.377903
-10	86.374897
-11	86.372106
-12	86.369530
-13	86.367169
-14	86.365025
-15	86.363097
-16	86.361387
-17	86.359895
-18	86.358622
-19	86.357569
-20	86.356737
-21	86.356125
-22	86.355737
-23	86.355571
-24	86.355629
-25	86.355912
-26	86.356421
-27	86.357157
-28	86.358121
-29	86.359314
-30	86.360737
-31	86.362391
-32	86.364278
-33	86.366397
-34	86.368752
-35	86.371341
-36	86.374168
-37	86.377233
-38	86.380537
-39	86.384081
-40	86.387868
-41	86.391897
-42	86.396170
-43	86.400690
-44	86.405456
-45	86.410470
-46	86.415733
-47	86.421248
-48	86.427015

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	0.000111313
9.42478E-06	0.000333822
1.5708E-05	0.000556442
2.19911E-05	0.00077898
2.82743E-05	0.00100208
3.45575E-05	0.001224851
4.08407E-05	0.001447658
4.71239E-05	0.001670502
5.34071E-05	0.001893385
5.96903E-05	0.002116307
6.59734E-05	0.002339271
7.22566E-05	0.002562279
7.85398E-05	0.002785331
8.4823E-05	0.00300843
9.11062E-05	0.003231577
9.73894E-05	0.003454774
0.000103673	0.003678022
0.000109956	0.003901323
0.000116239	0.004124678
0.000122522	0.00434809
0.000128805	0.004571559
0.000135088	0.004795087
0.000141372	0.005018676
0.000147655	0.005242328
0.000153938	0.005466044
0.000160221	0.005689825
0.000166504	0.005913674
0.000172788	0.006137591
0.000179071	0.006361579
0.000185354	0.006585639
0.000191637	0.006809772
0.00019792	0.007033981
0.000204204	0.007258265
0.000210487	0.007482629
0.00021677	0.007707072
0.000223053	0.007931596
0.000229336	0.008156203
0.000235619	0.008380894
0.000241903	0.008605671
0.000248186	0.008830536
0.000254469	0.009055489
0.000260752	0.009280533
0.000267035	0.009505669
0.000273319	0.009730897
0.000279602	0.009956221
0.000285885	0.010181641
0.000292168	0.010407158
0.000298451	0.010632774

Based on

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	0.000111313
9.42478E-06	0.000333822
1.5708E-05	0.000556442
2.19911E-05	0.00077898
2.82743E-05	0.001001498
3.45575E-05	0.001223998
4.08407E-05	0.001446482
4.71239E-05	0.001668952
5.34071E-05	0.001891408
5.96903E-05	0.002113853
6.59734E-05	0.002336289
7.22566E-05	0.002558716
7.85398E-05	0.002781137
8.4823E-05	0.003003554
9.11062E-05	0.003225967
9.73894E-05	0.003448379
0.000103673	0.003670792
0.000109956	0.003893207
0.000116239	0.004115626
0.000122522	0.00433805
0.000128805	0.004560482
0.000135088	0.004782923
0.000141372	0.005005375
0.000147655	0.005227839
0.000153938	0.005450319
0.000160221	0.005672814
0.000166504	0.005895328
0.000172788	0.006117861
0.000179071	0.006340416
0.000185354	0.006562995
0.000191637	0.0067856
0.00019792	0.007008231
0.000204204	0.007230892
0.000210487	0.007453584
0.00021677	0.00767631
0.000223053	0.00789907
0.000229336	0.008121867
0.000235619	0.008344703
0.000241903	0.00856758
0.000248186	0.0087905
0.000254469	0.009013465
0.000260752	0.009236476
0.000267035	0.009459537
0.000273319	0.009682648
0.000279602	0.009905812
0.000285885	0.010129032
0.000292168	0.010352309
0.000298451	0.010575645

Based on density



49	86.908851
50	86.924001
51	86.939342
52	86.954874
53	86.970595
54	86.986503
55	87.002598
56	87.018876
57	87.035337
58	87.051978
59	87.068797
60	87.085793
61	87.102963
62	87.120305
63	87.137816
64	87.155493
65	87.173334
66	87.191336
67	87.209496
68	87.227810
69	87.246276
70	87.264890
71	87.283648
72	87.302546
73	87.321581
74	87.340748
75	87.360043
76	87.379461
77	87.398999
78	87.418650
79	87.438410
80	87.458274
81	87.478236
82	87.498290
83	87.518431
84	87.538652
85	87.558947
86	87.579310
87	87.599733
88	87.620210
89	87.640734
90	87.661296
91	87.681889
92	87.702505
93	87.723136
94	87.743772
95	87.764406
96	87.785028
97	87.805628
98	87.826196
99	87.846724
100	87.867199
101	87.887612
102	87.907952
103	87.928207
104	87.948365
105	87.968415
106	87.988344
107	88.008139
108	88.027788
109	88.047277
110	88.066592
111	88.085719
112	88.104644
113	88.123351
114	88.141825

-49	86.433035
-50	86.439309
-51	86.445840
-52	86.452628
-53	86.459675
-54	86.466982
-55	86.474550
-56	86.482381
-57	86.490475
-58	86.498835
-59	86.507460
-60	86.516353
-61	86.525515
-62	86.534947
-63	86.544649
-64	86.554624
-65	86.564872
-66	86.575394
-67	86.586191
-68	86.597264
-69	86.608614
-70	86.620242
-71	86.632148
-72	86.644335
-73	86.656801
-74	86.669548
-75	86.682577
-76	86.695887
-77	86.709480
-78	86.723356
-79	86.737515
-80	86.751958
-81	86.766684
-82	86.781694
-83	86.796987
-84	86.812564
-85	86.828425
-86	86.844568
-87	86.860994
-88	86.877703
-89	86.894693
-90	86.911964
-91	86.929516
-92	86.947346
-93	86.965455
-94	86.983841
-95	87.002502
-96	87.021437
-97	87.040645
-98	87.060124
-99	87.079872
-100	87.099887
-101	87.120166
-102	87.140708
-103	87.161510
-104	87.182569
-105	87.203882
-106	87.225446
-107	87.247258
-108	87.269315
-109	87.291613
-110	87.314147
-111	87.336915
-112	87.359912
-113	87.383133
-114	87.406574

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0.000348717	0.012441426
0.000355	0.012667992
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0.000380133	0.013575381
0.000386416	0.013802515
0.000392699	0.014029765
0.000398982	0.014257133
0.000405265	0.01448462
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0.000417832	0.014939995
0.000424115	0.015167796
0.000430398	0.015395762
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0.000442965	0.015852061
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0.00047438	0.016994956
0.000480664	0.017223905
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0.00049323	0.017682173
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0.000518363	0.018600182
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0.000543496	0.019520126
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0.000568628	0.020441944
0.000574911	0.020672682
0.000581195	0.020903529
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0.000612611	0.022059335
0.000618894	0.022290793
0.000625177	0.022522344
0.00063146	0.022753984
0.000637743	0.02298571
0.000644026	0.023217519
0.00065031	0.023449406
0.000656593	0.023681368
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0.000380133	0.013485383
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0.000392699	0.013934262
0.000398982	0.014158842
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0.000424115	0.015058152
0.000430398	0.015283238
0.000436681	0.015508433
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0.000449248	0.015959157
0.000455531	0.01618469
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0.000468097	0.016636111
0.00047438	0.016862003
0.000480664	0.01708802
0.000486947	0.017314163
0.00049323	0.017540435
0.000499513	0.017766838
0.000505796	0.017993374
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0.000524646	0.018673804
0.000530929	0.018900894
0.000537212	0.019128129
0.000543496	0.01935551
0.000549779	0.01958304
0.000556062	0.01981072
0.000562345	0.020038552
0.000568628	0.020266538
0.000574911	0.02049468
0.000581195	0.020722981
0.000587478	0.020951442
0.000593761	0.021180064
0.000600044	0.02140885
0.000606327	0.021637802
0.000612611	0.02186692
0.000618894	0.022096207
0.000625177	0.022325665
0.00063146	0.022555294
0.000637743	0.022785095
0.000644026	0.023015072
0.00065031	0.023245224
0.000656593	0.023475553
0.000662876	0.02370606
0.000669159	0.023936746
0.000675442	0.024167613
0.000681726	0.02439866
0.000688009	0.024629889
0.000694292	0.024861301
0.000700575	0.025092896
0.000706858	0.025324674
0.000713142	0.025556636

115	88.160051
116	88.178012
117	88.195692
118	88.213073
119	88.230139
120	88.246871
121	88.263251
122	88.279260
123	88.294880
124	88.310090
125	88.324870
126	88.339200
127	88.353058
128	88.366423
129	88.379273
130	88.391584
131	88.403335
132	88.414501
133	88.425058
134	88.434981
135	88.444245
136	88.452824
137	88.460691
138	88.467821
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140	88.479753
141	88.484499
142	88.488393
143	88.491404
144	88.493503
145	88.494657
146	88.494836
147	88.494006
148	88.492134
149	88.489186
150	88.485129
151	88.479926
152	88.473542
153	88.465940
154	88.457083
155	88.446934
156	88.435452
157	88.422599
158	88.408335
159	88.392618
160	88.375407
161	88.356660
162	88.336333
163	88.314381
164	88.290762
165	88.265427
166	88.238332
167	88.209429
168	88.178669
169	88.146004
170	88.111384
171	88.074758
172	88.036075
173	87.995282
174	87.952326
175	87.907152
176	87.859706
177	87.809931
178	87.757770
179	87.703166
180	87.646060

-115	87.430229
-116	87.454095
-117	87.478164
-118	87.502433
-119	87.526894
-120	87.551542
-121	87.576371
-122	87.601374
-123	87.626543
-124	87.651873
-125	87.677355
-126	87.702981
-127	87.728745
-128	87.754637
-129	87.780648
-130	87.806771
-131	87.832995
-132	87.859312
-133	87.885711
-134	87.912182
-135	87.938715
-136	87.965298
-137	87.991921
-138	88.018572
-139	88.045239
-140	88.071909
-141	88.098571
-142	88.125210
-143	88.151814
-144	88.178368
-145	88.204859
-146	88.231272
-147	88.257591
-148	88.283801
-149	88.309886
-150	88.335830
-151	88.361616
-152	88.387227
-153	88.412644
-154	88.437851
-155	88.462827
-156	88.487555
-157	88.512014
-158	88.536184
-159	88.560045
-160	88.583575
-161	88.606753
-162	88.629556
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-164	88.673949
-165	88.695491
-166	88.716564
-167	88.737145
-168	88.757206
-169	88.776722
-170	88.795667
-171	88.814013
-172	88.831732
-173	88.848796
-174	88.865176
-175	88.880842
-176	88.895764
-177	88.909911
-178	88.923250
-179	88.935751
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0.000750841	0.027166328
0.000757124	0.027398746
0.000763407	0.027631133
0.00076969	0.027863479
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0.000782257	0.028328011
0.00078854	0.028560178
0.000794823	0.028792265
0.000801106	0.029024262
0.000807389	0.029256157
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0.000819956	0.029719595
0.000826239	0.029951114
0.000832522	0.030182482
0.000838805	0.030413687
0.000845088	0.030644715
0.000851372	0.030875551
0.000857655	0.031106182
0.000863938	0.031336591
0.000870221	0.031566764
0.000876504	0.031796684
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0.000889071	0.0322557
0.000895354	0.032484761
0.000901637	0.0327135
0.00090792	0.032941898
0.000914203	0.033169937
0.000920487	0.033397596
0.00092677	0.033624854
0.000933053	0.033851692
0.000939336	0.034078087
0.000945619	0.034304017
0.000951903	0.034529459
0.000958186	0.03475439
0.000964469	0.034978785
0.000970752	0.03520262
0.000977035	0.035425869
0.000983319	0.035648507
0.000989602	0.035870505
0.000995885	0.036091837
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0.001008451	0.036532387
0.001014734	0.036751546
0.001021018	0.036969921
0.001027301	0.03718748
0.001033584	0.03740419
0.001039867	0.037620019
0.00104615	0.037834933
0.001052434	0.038048897
0.001058717	0.038261876
0.001065	0.038473833
0.001071283	0.03868473
0.001077566	0.038894529
0.001083849	0.039103192
0.001090133	0.039310678
0.001096416	0.039516945
0.001102699	0.039721953
0.001108982	0.039925657
0.001115265	0.040128014
0.001121549	0.040328978
0.001127832	0.040528504

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0.000725708	0.026021112
0.000731991	0.026253627
0.000738274	0.026486326
0.000744557	0.026719209
0.000750841	0.026952275
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