

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 [m ²]	Actual Area	0.274324656 [m ²]
Integrated area	0.275253782 [m ²]	Integrated area	0.275253782 [m ²]
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

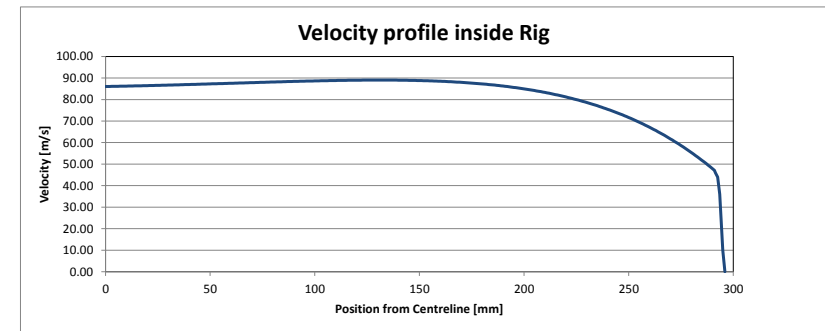
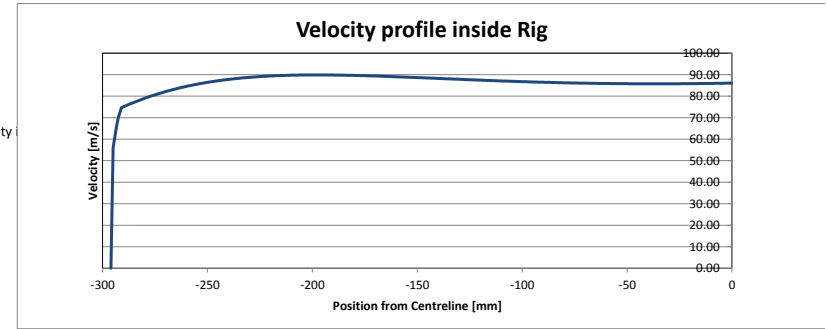
position [mm]	Velocity [m/s]
0	86.073872
-1	86.057628
-2	86.041769
-3	86.026298
-4	86.011221
-5	85.996541
-6	85.982262
-7	85.968387
-8	85.954921
-9	85.941867
-10	85.929228
-11	85.917009
-12	85.905213
-13	85.893843
-14	85.882903
-15	85.872396
-16	85.862326
-17	85.852695
-18	85.843507
-19	85.834766
-20	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 [m ²]	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	0.000776694
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	0.002110958
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 [m ²]	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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0.000355	0.012732238
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0.000380133	0.013652123
0.000386416	0.013882483
0.000392699	0.014112995
0.000398982	0.014343366
0.000405265	0.014574473
0.000411549	0.014805435
0.000417832	0.015036544
0.000424115	0.015267796
0.000430398	0.015499191
0.000436681	0.015730727
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0.000480664	0.01735519
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0.000568628	0.020620104
0.000574911	0.020853902
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0.000587478	0.021321645
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0.000606327	0.022023543
0.000612611	0.022257559
0.000618894	0.022491589
0.000625177	0.022725626
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
0.000681726	0.024831025
0.000688009	0.025064703
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0.000317301	0.011162813
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0.00033615	0.011829195
0.000342434	0.012051548
0.000348717	0.012274021
0.000355	0.012496617
0.000361283	0.01271934
0.000367566	0.012942195
0.00037385	0.013165186
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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	0.018340209
0.000524646	0.018567674
0.000530929	0.018795284
0.000537212	0.019023125
0.000543496	0.019251197
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
0.000694292	0.024800958
0.000700575	0.025035555
0.000706858	0.025270429
0.000713142	0.02550558

115	88.931618	-115	87.268265	0.000719425	0.026231638	0.000719425	0.025741008
116	88.944818	-116	87.304872	0.000725708	0.026464663	0.000725708	0.025976713
117	88.957306	-117	87.341771	0.000731991	0.026697542	0.000731991	0.026212693
118	88.969064	-118	87.378953	0.000738274	0.026930264	0.000738274	0.02644895
119	88.980071	-119	87.416408	0.000744557	0.027162188	0.000744557	0.026685481
120	88.990308	-120	87.454125	0.000750841	0.027395192	0.000750841	0.026922286
121	88.999756	-121	87.492095	0.000757124	0.027627373	0.000757124	0.027159363
122	89.008395	-122	87.530307	0.000763407	0.02785935	0.000763407	0.027396713
123	89.016204	-123	87.568751	0.00076969	0.028091109	0.00076969	0.027634332
124	89.023162	-124	87.607416	0.000775973	0.028322638	0.000775973	0.027872219
125	89.029249	-125	87.646290	0.000782257	0.028553923	0.000782257	0.028110373
126	89.034444	-126	87.685362	0.00078854	0.028784952	0.00078854	0.028348791
127	89.038725	-127	87.724620	0.000794823	0.029015709	0.000794823	0.028584741
128	89.042070	-128	87.764052	0.000801106	0.02924611	0.000801106	0.028826411
129	89.044457	-129	87.803646	0.000807389	0.029476353	0.000807389	0.029065607
130	89.045864	-130	87.843389	0.000813672	0.02970621	0.000813672	0.029305057
131	89.046268	-131	87.883269	0.000819956	0.029935737	0.000819956	0.029544758
132	89.045646	-132	87.923272	0.000826239	0.030164919	0.000826239	0.029784706
133	89.043975	-133	87.963384	0.000832522	0.030393974	0.000832522	0.030024897
134	89.041230	-134	88.003593	0.000838805	0.030622183	0.000838805	0.030265329
135	89.037388	-135	88.043883	0.000845088	0.030850231	0.000845088	0.030505995
136	89.032425	-136	88.084240	0.000851372	0.031077868	0.000851372	0.030746893
137	89.026316	-137	88.124650	0.000857655	0.031305077	0.000857655	0.030988017
138	89.019036	-138	88.165098	0.000863938	0.03153184	0.000863938	0.031229363
139	89.010559	-139	88.205569	0.000870221	0.031758138	0.000870221	0.031470925
140	89.000859	-140	88.246045	0.000876504	0.031983953	0.000876504	0.031712698
141	88.989912	-141	88.286513	0.000882788	0.032209266	0.000882788	0.031954676
142	88.977689	-142	88.326955	0.000889071	0.032434058	0.000889071	0.032196853
143	88.964165	-143	88.367354	0.000895354	0.032658309	0.000895354	0.032439223
144	88.949313	-144	88.407695	0.000901637	0.032882	0.000901637	0.032681779
145	88.933103	-145	88.447958	0.00090792	0.033105109	0.00090792	0.032924515
146	88.915510	-146	88.488127	0.000914203	0.033327616	0.000914203	0.033167422
147	88.896504	-147	88.528184	0.000920487	0.033549498	0.000920487	0.033410495
148	88.876057	-148	88.568110	0.00092677	0.033770736	0.00092677	0.033653723
149	88.854139	-149	88.607886	0.000933053	0.033991305	0.000933053	0.033897101
150	88.830722	-150	88.647493	0.000939336	0.034211184	0.000939336	0.034140618
151	88.805775	-151	88.686913	0.000945619	0.03443035	0.000945619	0.034384266
152	88.779268	-152	88.726124	0.000951903	0.034648778	0.000951903	0.034628037
153	88.751170	-153	88.765107	0.000958186	0.034866444	0.000958186	0.034871919
154	88.721451	-154	88.803840	0.000964469	0.035083325	0.000964469	0.035115904
155	88.690079	-155	88.842304	0.000970752	0.035299394	0.000970752	0.035359981
156	88.657021	-156	88.880476	0.000977035	0.035514627	0.000977035	0.035604139
157	88.622246	-157	88.918336	0.000983319	0.035728996	0.000983319	0.035848368
158	88.585720	-158	88.955859	0.000989602	0.035942477	0.000989602	0.036092656
159	88.547412	-159	88.993025	0.000995885	0.036155041	0.000995885	0.036336991
160	88.507286	-160	89.029809	0.001002168	0.036366661	0.001002168	0.03658136
161	88.465308	-161	89.066189	0.001008451	0.036577309	0.001008451	0.036825752
162	88.421445	-162	89.102140	0.001014734	0.036786957	0.001014734	0.037070154
163	88.375661	-163	89.137638	0.001021018	0.036995574	0.001021018	0.037314551
164	88.327921	-164	89.172660	0.001027301	0.037203131	0.001027301	0.037558929
165	88.278188	-165	89.207178	0.001033584	0.037409598	0.001033584	0.037803275
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169	88.058601	-169	89.339708	0.001058717	0.038223937	0.001058717	0.038780032
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