



MATERIAL

System Seals' unique PTFE-filled compounds provide ultra-low friction and high-speed performance with minimal wear. The standard compounds are PTFE-filled with Bronze filler, or PTFE-filled with Glass-Moly. The temperature range of the seal can be increased by selecting a FPM O-ring in place of the standard NBR O-ring.

Material	Code
PTFE-Bronze compound + NBR o-ring (shown in photo)	MT02 + MN61
PTFE-Bronze compound + FPM o-ring	MT02 + MF63
PTFE-Glass/MoS2 compound + NBR o-ring	MT08 + MN61
PTFE-Glass/MoS2 compound + FPM o-ring	MT08 + MF63

OPERATING PARAMETERS

Temperature	MT02 + MN61		MT08 + MN61	
	°C	°F	°C	°F
hydraulic oil	-30... +100	-22... +212	-30... +100	-22... +212
water oil emulsions (HFA)	-	-	+5... +60	+40... +140
water-glycol fluids (HFC)	-	-	-30... +60	-22... +140
polyol esters (HFD)	-	-	-	-
water	-	-	-5... +100	+40... +212
speed	5 m/s (16.5 ft/sec)			
pressure	400 bar (6,000 psi)			

Note: for other materials or fluids please contact our engineering department.

DESCRIPTION

The 109 Series rod seal is a low-friction design, consisting of a PTFE-filled seal and an O-ring energizer. The sealing lip design is optimized to ensure maximum sealing performance at both low and high pressures. The lip design features a "pump-back" capability, which eliminates pressure trapping when used as a buffer seal in a Zero-Leak Technology configuration.

PRODUCT BENEFITS

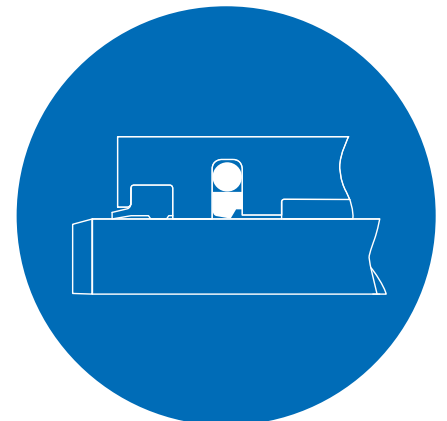
- Low friction
- High-speed applications
- High-temperature resistance
- Low wear
- Extrusion resistant
- Compatible with a wide range of media
- Available in diameters up to 2100 mm

APPLICATIONS

The 109 Series Rod Seal is ideal for high-pressure sealing applications, offering low-friction performance and high-speed capability.

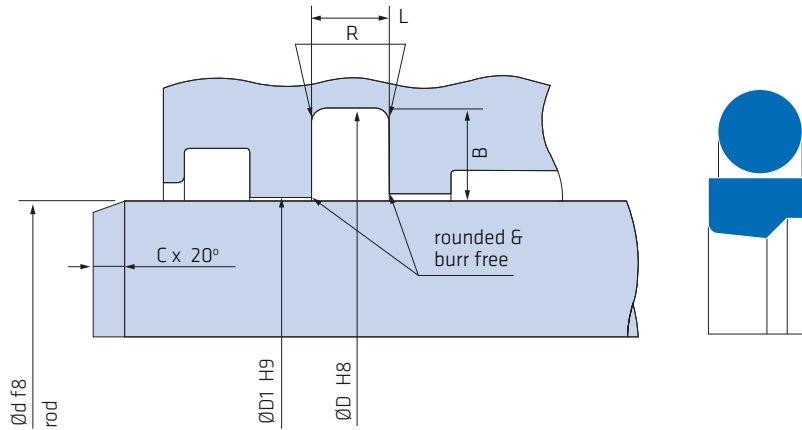
Typical applications include:

- Injection Molding
- Mobile Hydraulics
- Hydraulic Presses
- Used as a buffer seal in a Zero-Leak Technology System



Above: Installation Drawing

DESIGN GUIDELINES



METRIC SERIES

	B	ØD	L ^{+0.20}	ØD1 <200bar	ØD1 <400bar	R
Series 1	2.45 mm	d + 4.90	2.20	d + 0.40	d + 0.30	0.30
Series 2	3.65 mm	d + 7.30	3.20	d + 0.50	d + 0.30	0.50
Series 3	5.35 mm	d + 10.70	4.20	d + 0.50	d + 0.40	0.80
Series 4	7.55 mm	d + 15.10	6.30	d + 0.50	d + 0.40	1.20
Series 5	10.25 mm	d + 20.50	8.10	d + 0.60	d + 0.50	2.00
Series 6	12.00 mm	d + 24.00	8.10	d + 0.60	d + 0.50	2.00
Series 7	13.65 mm	d + 27.30	9.50	d + 0.70	d + 0.50	2.00
Series 8	19.00 mm	d + 38.00	13.80	d + 0.80	d + 0.60	2.00

INCH SERIES

	B	ØD	L ^{+0.008}	ØD1 <3000 psi	ØD1 <6000 psi	R
Series 1	0.096 in	d + 0.192	0.087	d + 0.016	d + 0.012	0.012
Series 2	0.144 in	d + 0.288	0.126	d + 0.020	d + 0.012	0.020
Series 3	0.211 in	d + 0.422	0.165	d + 0.020	d + 0.016	0.031
Series 4	0.297 in	d + 0.594	0.248	d + 0.020	d + 0.016	0.047
Series 5	0.404 in	d + 0.808	0.319	d + 0.024	d + 0.020	0.079
Series 6	0.472 in	d + 0.944	0.319	d + 0.024	d + 0.020	0.079
Series 7	0.537 in	d + 1.074	0.374	d + 0.028	d + 0.020	0.079
Series 8	0.748 in	d + 1.496	0.543	d + 0.031	d + 0.024	0.079

Note: the extrusion gap "E" is suitable for pressure up to 400 bar (6,000 psi) and temperatures up to 80° C (176° F). For higher pressures or temperatures, please consult our engineering department for guidance.

SURFACE FINISH

Surface roughness	Ra	Rt	RMS
Sliding surface	≤0.3 µm	≤3 µm	8 RMS
Surface of groove I.D.	≤1.8 µm	≤10 µm	64 RMS
Sides of groove	≤3 µm	≤16 µm	125 RMS

LEAD-IN CHAMFERS

Ød	C
≤50.00 mm	3.00
50 mm < 120 mm	4.00
120 mm < 200 mm	6.00
200 mm < 650 mm	8.00
650 mm < 950 mm	11.00

Ød	C
<2.0 in	0.120
2.0 in < 4.7 in	0.160
4.7 in < 7.9 in	0.240
7.9 in < 25.6 in	0.320
25.6 in < 37.4 in	0.450

METRIC SERIES

ød	ØD	L	T02 PTFE/ Bz w/ NBR O-Ring	T08 PTFE/ Glass-Moly w/ NBR O-Ring
3.00	7.90	2.20	109.90399	109.90608
4.00	8.90	2.20	109.47926	109.47925
5.00	9.90	2.20	109.90283	109.39100
6.00	10.90	2.20	109.47712	109.39101
6.40	11.30	2.20	109.90358	109.90623
7.00	11.90	2.20	109.90270	109.90681
7.50	12.40	2.20	109.90342	109.90645
8.00	12.90	2.20	109.39104	109.90677
8.00	15.30	3.20	109.47702	109.47910
9.53	16.83	3.20	109.90001	109.90631
10.00	14.90	2.20	109.39105	109.90723
10.00	17.30	3.20	109.39090	109.47911
11.10	18.40	3.20	109.39152	109.90617
12.00	16.90	2.20	109.39106	109.90559
12.00	19.30	3.20	109.46538	109.47912
12.60	17.50	2.20	109.90331	109.90692
12.70	20.00	3.20	109.90470	109.90690
14.00	18.90	2.20	109.90065	109.47899
14.00	21.30	3.20	109.39091	109.90713
14.27	21.57	3.20	109.90411	109.90708
15.00	19.90	2.20	109.39107	109.47900
15.00	22.30	3.20	109.44849	109.90514
15.88	23.18	3.20	109.90033	109.90575
16.00	20.90	2.20	109.39108	109.47924
16.00	23.30	3.20	109.39092	109.39083
17.45	24.75	3.20	109.90293	109.90657
18.00	22.90	2.20	109.47715	109.47901
18.00	25.30	3.20	109.47919	109.47898
19.05	26.35	3.20	109.90079	109.90562
20.00	27.30	3.20	109.47716	109.38138
20.00	30.70	4.20	109.05289	109.47897
20.62	27.92	3.20	109.90128	109.90539
22.00	29.30	3.20	109.47717	109.90619
22.00	32.70	4.20	109.39093	109.90689
22.23	29.53	3.20	109.90134	109.90528
23.80	31.10	3.20	109.90042	109.90615
25.00	32.30	3.20	109.39109	109.47902
25.00	35.70	4.20	109.39094	109.47913
25.40	32.70	3.20	109.90213	109.90611
25.40	40.50	6.30	109.90136	109.90736
26.00	36.70	4.20	109.90373	109.90732
26.97	34.27	3.20	109.90026	109.90526

ød	ØD	L	T02 PTFE/ Bz w/ NBR O-Ring	T08 PTFE/ Glass-Moly w/ NBR O-Ring
28.00	35.30	3.20	109.39110	109.90739
28.00	38.70	4.20	109.39095	109.47914
28.58	35.88	3.20	109.90319	109.90503
30.00	37.30	3.20	109.47718	109.47903
30.00	40.70	4.20	109.47703	109.39314
30.15	37.45	3.20	109.90221	109.90683
31.75	39.05	3.20	109.38135	109.90507
32.00	39.30	3.20	109.90104	109.47904
32.00	42.70	4.20	109.47704	109.47896
33.32	40.62	3.20	109.90249	109.90536
34.93	42.23	3.20	109.90113	109.90682
35.00	42.30	3.20	109.39111	109.47700
35.00	45.70	4.20	109.39096	109.90527
36.00	43.30	3.20	109.39112	109.47905
36.00	46.70	4.20	109.42072	109.90728
36.50	43.80	3.20	109.90179	109.90601
37.00	47.70	4.20	109.90273	109.90730
38.00	48.70	4.20	109.90437	109.47923
38.00	53.10	6.30	109.39113	109.47927
39.00	49.70	4.20	109.90037	109.90569
40.00	47.30	3.20	109.90196	109.90591
40.00	50.70	4.20	109.42345	109.47906
40.00	55.10	6.30	109.47705	109.03512
40.50	51.20	4.20	109.90409	109.90675
41.00	51.70	4.20	109.90017	109.90671
42.00	52.70	4.20	109.90498	109.47907
42.00	57.10	6.30	109.47920	109.47915
44.00	54.70	4.20	109.90162	109.90712
44.00	59.10	6.30	109.90159	109.90550
44.45	59.53	6.30	109.90173	109.90717
44.45	59.55	6.30	109.90389	109.90637
45.00	55.70	4.20	109.09317	109.90655
45.00	56.00	4.20	109.90405	109.90716
45.00	60.10	6.30	109.47706	109.04112
46.00	56.70	4.20	109.90308	109.90524
46.00	61.10	6.30	109.90137	109.90711
47.00	62.10	6.30	109.90350	109.90707
48.00	58.70	4.20	109.90475	109.90742
48.00	63.10	6.30	109.90016	109.90660
49.50	60.20	4.20	109.90339	109.90625
50.00	60.70	4.20	109.47728	109.39082
50.00	65.10	6.30	109.45719	109.39084

METRIC SERIES

ød	ØD	L	T02 PTFE/ Bz w/ NBR O-Ring	T08 PTFE/ Glass-Moly w/ NBR O-Ring
50.80	65.90	6.30	109.39157	109.90714
51.00	61.70	4.20	109.90214	109.90593
51.50	62.20	4.20	109.90302	109.90754
52.00	62.70	4.20	109.90280	109.90600
52.00	67.10	6.30	109.90344	109.90663
53.98	64.68	4.20	109.90420	109.90585
54.00	69.10	6.30	109.90170	109.90587
55.00	65.70	4.20	109.47722	109.90627
55.00	70.10	6.30	109.39097	109.90568
56.00	66.70	4.20	109.39114	109.47908
56.00	71.10	6.30	109.46585	109.04114
57.00	72.10	6.30	109.90258	109.90746
57.15	67.85	4.20	109.90103	109.90609
57.15	72.25	6.30	109.90153	109.90705
58.00	68.70	4.20	109.90493	109.90686
58.00	73.10	6.30	109.90155	109.90577
60.00	70.70	4.00	109.90265	109.90552
60.00	70.70	4.20	109.90352	109.47909
60.00	75.10	6.30	109.47707	109.47894
62.00	72.70	4.20	109.90318	109.90589
62.00	77.10	6.30	109.90125	109.90515
62.50	73.20	4.20	109.90245	109.90612
63.00	73.70	4.20	109.90082	109.90691
63.00	78.10	6.30	109.39099	109.39085
63.50	74.20	4.20	109.90479	109.90698
63.50	78.60	6.30	109.47726	109.90629
64.00	79.10	6.30	109.90254	109.90641
65.00	80.10	6.30	109.39202	109.39086
66.68	77.38	4.20	109.90108	109.90697
68.00	83.10	6.30	109.90368	109.90606
69.85	80.55	4.20	109.90307	109.90752
70.00	80.70	4.20	109.39186	109.90715
70.00	85.10	6.30	109.29671	109.04116
73.03	83.73	4.20	109.90090	109.90584
73.03	88.13	6.30	109.90208	109.90685
75.00	90.10	6.30	109.21675	109.39081
76.20	86.90	4.20	109.39156	109.39171
76.20	91.30	6.30	109.39160	109.90573
76.50	87.20	4.20	109.90076	109.90740
78.00	93.10	6.30	109.90494	109.90518
80.00	90.70	4.20	109.39187	109.90534
80.00	95.10	6.30	109.47708	109.39778

ød	ØD	L	T02 PTFE/ Bz w/ NBR O-Ring	T08 PTFE/ Glass-Moly w/ NBR O-Ring
80.50	95.60	6.30	109.90333	109.90722
81.00	96.10	6.30	109.90004	109.90734
82.00	97.10	6.30	109.90248	109.90512
82.55	97.65	6.30	109.90097	109.90667
83.00	98.10	6.30	109.90032	109.90594
85.00	100.10	6.30	109.39098	109.47895
88.90	104.00	6.30	109.04023	109.39172
90.00	105.10	6.30	109.47709	109.39079
91.50	106.60	6.30	109.90275	109.90607
92.08	107.18	6.30	109.90287	109.90543
94.00	109.10	6.30	109.90216	109.90504
95.00	110.10	6.30	109.47711	109.90554
98.43	113.53	6.30	109.90231	109.90548
100.00	115.10	6.30	109.47921	109.47916
101.60	116.70	6.30	109.35875	109.90586
101.60	122.10	8.10	109.39164	109.90693
104.78	125.28	8.10	109.90363	109.90602
105.00	120.10	6.30	109.28675	109.47918
107.00	122.10	6.30	109.90106	109.90622
107.95	123.05	6.30	109.90381	109.90673
110.00	125.10	6.30	109.09356	109.3908
111.10	126.20	6.30	109.90296	109.90726
111.13	131.63	8.10	109.90362	109.90665
114.30	134.80	8.10	109.90260	109.90531
115.00	130.10	6.30	109.47710	109.90545
117.48	137.98	8.10	109.90380	109.9068
118.00	133.10	6.30	109.90444	109.90639
120.00	135.10	6.30	109.39103	109.41901
125.00	140.10	6.30	109.34483	109.90643
126.00	141.10	6.30	109.90300	109.90659
128.00	143.10	6.30	109.90177	109.90549
130.00	145.10	6.30	109.39200	109.47922
132.00	147.10	6.30	109.90317	109.90720
133.35	148.45	6.30	109.90089	109.90725
135.00	150.10	6.30	109.48091	109.90610
138.00	153.10	6.30	109.90132	109.90750
138.20	153.30	6.30	109.90195	109.90519
139.70	154.80	6.30	109.39163	109.90605
140.00	155.10	6.30	109.09368	109.90621
145.00	160.10	6.30	109.90035	109.90553
147.00	162.10	6.30	109.90243	109.90520
149.23	164.33	6.30	109.90285	109.90614

METRIC SERIES

ød	ØD	L	T02 PTFE/ Bz w/ NBR O-Ring	T08 PTFE/ Glass-Moly w/ NBR O-Ring
150.00	165.10	6.30	109.39198	109.47701
151.00	166.10	6.30	109.90474	109.90741
152.40	167.50	6.30	109.47930	109.47934
155.00	170.10	6.30	109.90013	109.90709
156.50	171.60	6.30	109.90066	109.90595
157.00	172.10	6.30	109.90272	109.90676
160.00	175.10	6.30	109.34399	109.90535
165.00	180.10	6.30	109.35211	109.90530
170.00	185.10	6.30	109.47713	109.47917
173.00	188.10	6.30	109.90098	109.90648
175.00	190.10	6.30	109.10711	109.90701
176.50	191.60	6.30	109.90027	109.90703
177.00	192.10	6.30	109.90149	109.90613
177.80	192.90	6.30	109.39208	109.90731
180.00	195.10	6.30	109.45439	109.39088
185.00	200.10	6.30	109.90442	109.90668
185.50	200.60	6.30	109.90094	109.90733
189.00	204.10	6.30	109.90070	109.90748
190.00	205.10	6.30	109.39115	109.90656
190.00	210.50	8.10	109.07317	109.90556
200.00	215.10	6.30	109.46408	109.90616
200.00	220.50	8.10	109.39199	109.39089
205.00	225.50	8.10	109.90441	109.90738
210.00	230.50	8.10	109.47719	109.90541
215.00	235.50	8.10	109.90164	109.90745
215.90	236.40	8.10	109.08527	109.90678
220.00	240.50	8.10	109.47714	109.90540
225.00	245.50	8.10	109.48971	109.90558
228.60	249.10	8.10	109.08646	109.90626
230.00	250.50	8.10	109.43001	109.90751
235.00	255.50	8.10	109.90364	109.90744
240.00	260.50	8.10	109.39204	109.90727
241.30	261.80	8.10	109.39167	109.90756
245.00	265.50	8.10	109.90465	109.90630
250.00	270.50	8.10	109.03466	109.90721
254.00	274.50	8.10	109.03287	109.90669
255.00	275.50	8.10	109.90391	109.90506
260.00	284.00	8.10	109.34441	109.90516
265.00	285.50	8.10	109.90176	109.90582
265.00	289.00	8.10	109.90425	109.90508
270.00	294.00	8.10	109.47720	109.90699
275.00	299.00	8.10	109.90477	109.90724

ød	ØD	L	T02 PTFE/ Bz w/ NBR O-Ring	T08 PTFE/ Glass-Moly w/ NBR O-Ring
280.00	304.00	8.10	109.03342	109.90647
285.00	309.00	8.10	109.90187	109.90580
290.00	314.00	8.10	109.90022	109.90651
295.00	319.00	8.10	109.90140	109.90567
300.00	324.00	8.10	109.09395	109.39102
307.00	331.00	8.10	109.90492	109.90564
310.00	334.00	8.10	109.34472	109.90666
315.00	339.00	8.10	109.90400	109.90566
320.00	344.00	8.10	109.43922	109.90533
320.00	347.30	9.50	109.90464	109.90729
325.00	349.00	8.10	109.90427	109.90658
330.00	354.00	8.10	109.39116	109.90547
330.20	354.20	8.10	109.39205	109.90560
335.00	359.00	8.10	109.90226	109.21117
340.00	364.00	8.10	109.39117	109.90581
345.00	369.00	8.10	109.90306	109.90542
350.00	374.00	8.10	109.07057	109.36583
350.00	377.30	9.50	109.90382	109.90710
355.00	379.00	8.10	109.39211	109.90696
360.00	384.00	8.10	109.35008	109.90670
370.00	394.00	7.60	109.90500	109.90650
370.00	394.00	8.10	109.34431	109.90654
373.00	397.00	8.10	109.90336	109.90525
375.00	399.00	8.10	109.90133	109.90561
380.00	404.00	8.10	109.39138	109.90513
390.00	414.00	8.10	109.90203	109.90557
395.00	419.00	8.10	109.90414	109.90743
400.00	424.00	8.10	109.39128	109.90662
400.00	427.30	9.50	109.90167	109.90735
410.00	434.00	7.60	109.90064	109.90747
410.00	434.00	8.10	109.47929	109.90737
415.00	439.00	8.10	109.90061	109.90646
420.00	444.00	8.10	109.42635	109.47724
425.00	449.00	8.10	109.90206	109.90753
430.00	454.00	8.10	109.90121	109.90588
431.80	455.80	8.10	109.47729	109.90652
435.00	459.00	8.10	109.90222	109.90596
440.00	464.00	8.10	109.39144	109.90505
445.00	469.00	8.10	109.90434	109.90583
450.00	474.00	8.10	109.39201	109.90719
460.00	484.00	8.10	109.44202	109.90649
470.00	494.00	8.10	109.34391	109.90702

METRIC SERIES

ød	ØD	L	T02 PTFE/ Bz w/ NBR O-Ring	T08 PTFE/ Glass-Moly w/ NBR O-Ring
475.00	499.00	8.10	109.43992	109.90592
480.00	504.00	8.10	109.42525	109.90546
485.00	509.00	8.10	109.90321	109.90521
490.00	514.00	8.10	109.39130	109.90644
495.00	519.00	8.10	109.90485	109.90640
498.00	522.00	8.10	109.90338	109.90635
500.00	524.00	8.10	109.42634	109.9070
508.00	532.00	8.10	109.28697	109.90664
510.00	534.00	8.10	109.35137	109.90522
515.00	539.00	8.10	109.90278	109.90618
520.00	544.00	8.10	109.4349	109.90590
530.00	554.00	8.10	109.90449	109.90674
540.00	564.00	8.10	109.90071	109.90529
550.00	574.00	8.10	109.42388	109.90628
555.00	579.00	8.10	109.90095	109.90551
558.80	582.80	8.10	109.39206	109.90599
560.00	584.00	8.10	109.39132	109.90638
570.00	594.00	8.10	109.39135	109.90603
580.00	604.00	8.10	109.39139	109.90509
590.00	614.00	8.10	109.39137	109.90684
600.00	624.00	8.10	109.41678	109.90749
610.00	634.00	8.10	109.35419	109.90695
620.00	644.00	8.10	109.39134	109.90563
630.00	654.00	8.10	109.90261	109.90565
635.00	659.00	8.10	109.90450	109.90620
640.00	664.00	8.10	109.42632	109.90672
650.00	677.30	9.50	109.90223	109.90679
660.00	687.30	9.50	109.39133	109.90597
670.00	697.30	9.50	109.53178	109.90642
673.10	700.40	9.50	109.90297	109.90653
680.00	707.30	9.50	109.39131	109.39147
690.00	717.30	9.50	109.90194	109.90538
700.00	727.30	9.50	109.90041	109.90532
710.00	737.30	9.50	109.90472	109.90718
720.00	747.30	9.50	109.90451	109.90688
730.00	757.30	9.50	109.90372	109.90634
735.00	762.30	9.50	109.90130	109.90537
740.00	767.30	9.50	109.39143	109.90555
750.00	777.30	9.50	109.53179	109.90511
760.00	787.30	9.50	109.90394	109.90694
767.00	794.30	9.50	109.90182	109.90517
770.00	797.30	9.50	109.90009	109.90544

ød	ØD	L	T02 PTFE/ Bz w/ NBR O-Ring	T08 PTFE/ Glass-Moly w/ NBR O-Ring
780.00	807.30	9.50	109.90305	109.90578
787.40	814.70	9.50	109.47727	109.90574
790.00	817.30	9.50	109.39142	109.90572
790.00	828.00	13.80	109.42363	109.207721
795.00	822.30	9.50	109.90201	109.90755
800.00	827.30	9.50	109.29327	109.45543
810.00	837.30	9.50	109.90488	109.90571
820.00	847.30	9.50	109.39136	109.90523
830.00	857.30	9.50	109.90473	109.90510
840.00	867.30	9.50	109.90230	109.90704
850.00	877.30	9.50	109.39140	109.90636
850.00	888.00	13.80	109.147153	109.143924
860.00	887.30	9.50	109.42629	109.90570
870.00	897.30	9.50	109.90374	109.90661
880.00	907.30	9.50	109.90408	109.90576
890.00	917.30	9.50	109.29848	109.90687
890.00	928.00	13.80	109.146727	109.207722
900.00	927.30	9.50	109.49905	109.90632
910.00	937.30	9.50	109.90023	109.90598
920.00	947.30	9.50	109.90447	109.90604
930.00	957.30	9.50	109.90458	109.90624
940.00	967.30	9.50	109.90501	109.90633
950.00	977.30	9.50	109.44915	109.90579
970.00	1008.00	13.80	109.42365	109.68033
1000.00	1038.00	13.80	109.207708	109.78209
1035.00	1073.00	13.80	109.207709	109.207723
1040.00	1078.00	13.80	109.207710	109.207724
1050.00	1088.00	13.80	109.207711	109.207725
1100.00	1138.00	13.80	109.111472	109.111482
1120.00	1147.30	9.50	109.90502	109.90706
1120.00	1158.00	13.80	109.207712	109.207726
1150.00	1188.00	13.80	109.207713	109.207727
1200.00	1238.00	13.80	109.207714	109.207728
1250.00	1288.00	13.80	109.207715	109.207729
1330.00	1368.00	13.80	109.207716	109.207730
1350.00	1388.00	13.80	109.207717	109.85326
1500.00	1538.00	13.80	109.84325	109.207731
1600.00	1638.00	13.80	109.82974	109.207732
2000.00	2038.00	13.80	109.207718	109.207733
2500.00	2538.00	13.80	109.207720	109.207734
2600.00	2638.00	13.80	109.207719	109.207735