

ISO 3601 Metric Size O-Rings

Quick Reference Chart



General Applications

Apple o-rings are available in a choice of six basic materials, each in a range of optional durometer (Shore A) hardnesses. Other materials available upon request.

Buna-N/Nitrile: Buna N/Nitrile rubber is a copolymer of butadiene and acrylonitrile. You will find compounds that are ideally suited for oil and fuel-resistant applications of all types.

Ethylene-Propylene: In the Ethylene-Propylene family, you will find compounds that are used extensively for outdoor, weather-resistant uses and water applications. The first choice for low torque drive belts.

Silicone: In the Silicone family, you will find compounds that are excellent as static seals in extreme temperature conditions.

Neoprene®: In the Neoprene family, you will find compounds which are the superior sealing materials for the refrigeration industry featuring resistance to ammonia and Freon®.

Fluorocarbon: In the Fluorocarbon family, you will find compounds that make up the preferred seals for aircraft engines, automotive fuel handling systems and hard vacuum service.

Fluorosilicone: In the Fluorosilicone family, you will find compounds that make up seals that are unparalleled for aerospace fuel systems and auto fuel emission control systems.

All materials are compounded under stringent quality control for uniformity of physical property, and to meet or exceed government, military, space program, automotive, F.D.A., industrial and commercial specifications.

To Determine Material:

1. Determine end use: static (stationary) or dynamic (moving).
2. List the substance that the seal will be exposed to and check o-ring material resistances in Chemical Compatibility Table(s) listed in the Apple Seal Design Guide.

3. List ALL factors of seal application and check material performance.

A. Pressure: determines material hardness and selection.

B. Heat/Cold: check material temperature range(s).

C. Friction: determines material hardness and selection.

D. Permeability: important for pneumatic and vacuum applications.

4. Medical applications: make sure an Apple representative is aware if medical grade materials are required.

The most commonly used durometer is 70. Although other durometers are offered, availability may be limited due to processing or shrinkage factors.

Materials	Apple Material Designation	Durometers (Shore A)	Temperature Range** (Dry Heat Only)	Description
Buna-N/Nitrile (NBR)	BN	40 thru 90	-40 to +257° F -40 to +125° C	Presently the seal industry's most widely used elastomer. Nitrile combines excellent resistance to petroleum-based oils and fuels, silicone greases, hydraulic fluids, water and alcohols. It has a good balance of such desirable working properties as low compression set, high tensile strength and high abrasion resistance.
Ethylene-Propylene (EPM/EPDM)	EP	40 thru 90	-40 to +275° F -40 to +135° C	Features good resistance to such polar solvents as ketones (MEK and Acetone). EPM/EPDM is also highly recommended for effective resistance to steam (to 400° F), hot water, silicone oils and greases, dilute acids and alkalies, alcohols and automotive brake fluids. Properly compounded, Ethylene Propylene can provide extended temperature range of -76°F to +350°F.
Silicone (Mq; Pmq; Vmq; Pvmq)	SL	25 thru 80	-85 to +400° F -65 to +230° C	Especially resistant to high, dry heat in primarily static applications. Silicones are fungus resistant, odorless, tasteless, non-toxic elastomers and possess high-resistance to the aging effects of both sunlight and ozone attack.
Neoprene® (Chloroprene) (CR)	CR	40 thru 90	-40 to +250° F -40 to +121° C	An early developed, oil-resistant substitute for natural rubber, Neoprene features moderate resistance to petroleum oils, good resistance to ozone, sunlight and oxygen aging, relatively low compression set, good resilience, reasonable cost and high resistance to attack by Freon® and Ammonia.
Fluorocarbon (Viton®) (Fluorel®) (FKM)	VT	55 thru 95	-13 to +446° F -25 to +230° C	Combines high-temperature toughness with wide chemical agent compatibility, Fluorocarbon compounds feature excellent resistance to petroleum products and solvents and good high-temperature compression set characteristics.
Fluorosilicone (Fvmq)	FS	40 thru 80	-75 to +400° F -60 to +200° C	Combines the good high and low temperature stability of Silicones with the fuel, oil and solvent resistance of fluorocarbons. FS compounds feature good compression set and resilience properties. FS compounds are suitable for exposure to air, sunlight, ozone, chlorinated and aromatic hydrocarbons.

*Please check the latest standard for current version. **The temperatures listed are general operating range.

Standard O-Rings

Every Metric ISO 3601 Size in Stock:

Listed in millimeters. Includes all standard Inside Diameters from 0.74mm to 658.88mm, Outer Diameters from 2.78mm to 672.86mm and cross sections (widths) from 1.02 to 6.99mm. Constantly restocked to assure immediate delivery of any size in small and large quantities.

Simplified Reference Easy to Order:

All the information you need at a glance. All sizes listed by ascending inside diameter (I.D.) in decimal sizes. Standard ISO 3601 Uniform Numbering System (order by a single number).

Choice of Six Materials as Standard:

Rubber compounds and options of Durometer hardness to satisfy practically any service condition. Check with our sales staff for other material needs.

Fastest Delivery on O-Rings:

Most likely the size and compound you require is in our stock of over 300,000,000 o-rings. Immediate shipments with no intermediate delays. (Remember – with Apple you can buy direct.)

How to Order: The temperatures listed are general operating ranges for the entire family of each compound.

These will vary with specific compounds and/or length of exposure to temperature extremes. For example, silicone may still be serviceable with limited exposure to 300°C.

We highly recommend that in all cases, samples of a specific size and compound should be tested in the application before use in production.

Apple Catalog Numbers are identical to the ISO 3601 Numbering System, indicating precise I.D. and Width dimensions of o-rings in one ordering number.

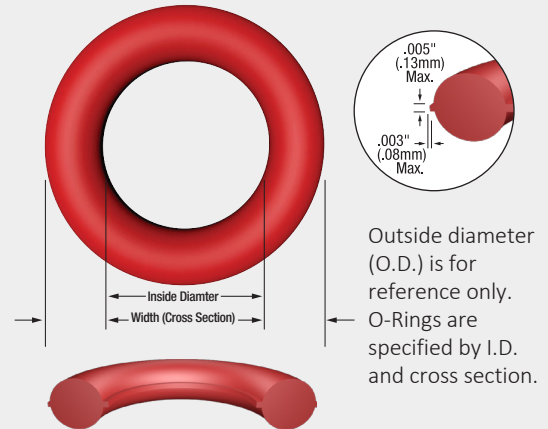
How to Determine O-Ring Size*

For Sequence in Ordering:

- 1 Size (catalog number)
- 2 Durometer and material
- 3 Quantity

Example:

110 – 70SLR – 10,000
(size – durometer, material and color – quantity)



* Shrinkage Size Adjustment: Various o-ring compounds exhibit different shrinkage rates during molding. The normal o-ring sizes herein shown are based upon a 70 Durometer Nitrile standard. For other o-ring materials, be sure to consult your Apple representative.

Seal Types and Gland Design

O-Ring Gland Design for Dynamic Seals

O-Ring Cross Section	Gland Depth	Squeeze		Diametrical Clearance Max.	Groove Width. ±.13			Groove Radius	Eccentricity Max.
		Millimeter	%		No Backup Rings	One Backup Ring	Two Backup Rings		
1.02	.79/.84	.10/.30	11-28	0.10	1.60	–	–	.013-0.20	0.05
1.27	.99/1.04	.15/.36	13-26	0.10	1.85	–	–	.013-0.20	0.05
1.52	1.19/1.24	.20/.41	14-25	0.10	2.13	–	–	.013-0.20	0.05
1.78	1.40/1.45	.25/.46	15-25	0.10	2.41	3.81	5.28	.013-0.38	0.05
2.62	2.21/2.29	.25/.48	10-18	0.13	3.68	4.75	6.32	.013-0.51	0.08
3.53	3.02/3.12	.30/.06	9-17	0.15	4.70	5.64	7.65	.013-0.76	0.10
5.33	4.65/4.78	.43/.81	8.5-15	0.15	7.24	8.59	10.87	.013-1.27	0.15
6.99	5.94/6.10	.074/1.19	10.5-17	0.18	9.52	11.18	14.71	.013-1.52	0.20

O-Ring Gland Design for Static Seals

O-Ring Cross Section	Gland Depth		Squeeze				Diametrical Clearance Max.	Groove Width. ±.13			Groove Radius	Eccentricity Max.
			Radial >◦<		Axial >◊<			No Backup Rings	One Backup Ring	Two Backup Rings		
	Radial	Axial	Millimeter	%	Millimeter	%						
1.02	.69-.76	.69-.76	.18-.41	19-37	.18-.41	19-37	0.08	1.52	–	–	0.13-0.20	0.05
1.27	.89-.99	.86-.97	.20-.46	17-34	.23-.48	19-36	0.10	1.91	–	–	0.13-0.20	0.05
1.52	1.07-1.19	1.07-1.17	.25-.53	18-33	.28-.53	19-33	0.10	2.29	–	–	0.13-0.20	0.05
1.78	1.27-1.40	1.24-1.37	.30-.58	18-32	.33-.61	19-33	0.10	2.41	3.81	5.28	0.13-0.38	0.05
2.62	2.03-2.18	1.91-2.06	.36-.66	14-25	.48-.79	19-29	0.13	3.56	4.62	6.20	0.13-0.51	0.08
3.53	2.79-2.95	2.54-2.74	.48-.84	14-23	.69-1.09	20-30	0.15	4.57	5.51	7.52	0.13-0.76	0.10
5.33	4.32-4.47	3.94-4.19	.74-1.14	14-21	1.02-1.52	20-28	0.15	7.11	8.46	10.74	0.13-1.27	0.15
6.99	5.72-5.97	5.21-5.42	.86-1.42	13-20	1.37-1.93	20-27	0.18	9.40	11.05	14.58	0.13-1.52	0.20

ISO No.	I.D.	Width	I.D. Tol.	W. Tol.
-001	0.74	1.02	± 0.100	± 0.080
-002	1.07	1.27	± 0.100	± 0.080
-003	1.42	1.52	± 0.100	± 0.080
-004	1.78	1.78	± 0.130	± 0.080
-005	2.57	1.78	± 0.130	± 0.080
-006	2.90	1.78	± 0.130	± 0.080
-007	3.68	1.78	± 0.130	± 0.080
-008	4.47	1.78	± 0.130	± 0.080
-009	5.28	1.78	± 0.130	± 0.080
-010	6.07	1.78	± 0.130	± 0.080
-011	7.65	1.78	± 0.130	± 0.080
-012	9.25	1.78	± 0.130	± 0.080
-013	10.82	1.78	± 0.130	± 0.080
-014	12.42	1.78	± 0.130	± 0.080
-015	14.00	1.78	± 0.180	± 0.080
-016	15.60	1.78	± 0.230	± 0.080
-017	17.17	1.78	± 0.230	± 0.080
-018	18.77	1.78	± 0.230	± 0.080
-019	20.35	1.78	± 0.230	± 0.080
-020	21.95	1.78	± 0.230	± 0.080
-021	23.52	1.78	± 0.230	± 0.080
-022	25.12	1.78	± 0.250	± 0.080
-023	26.70	1.78	± 0.250	± 0.080
-024	28.30	1.78	± 0.250	± 0.080
-025	29.87	1.78	± 0.280	± 0.080
-026	31.47	1.78	± 0.280	± 0.080
-027	33.05	1.78	± 0.280	± 0.080
-028	34.65	1.78	± 0.330	± 0.080
-029	37.82	1.78	± 0.330	± 0.080
-030	41.00	1.78	± 0.330	± 0.080
-031	44.17	1.78	± 0.380	± 0.080
-032	47.35	1.78	± 0.380	± 0.080
-033	50.52	1.78	± 0.460	± 0.080
-034	53.70	1.78	± 0.460	± 0.080
-035	56.87	1.78	± 0.460	± 0.080
-036	60.05	1.78	± 0.460	± 0.080
-037	63.22	1.78	± 0.460	± 0.080
-038	66.40	1.78	± 0.510	± 0.080
-039	69.57	1.78	± 0.510	± 0.080
-040	72.75	1.78	± 0.510	± 0.080
-041	75.92	1.78	± 0.610	± 0.080
-042	82.27	1.78	± 0.610	± 0.080
-043	88.62	1.78	± 0.610	± 0.080
-044	94.97	1.78	± 0.690	± 0.080
-045	101.32	1.78	± 0.690	± 0.080
-046	107.67	1.78	± 0.760	± 0.080
-047	114.02	1.78	± 0.760	± 0.080
-048	120.37	1.78	± 0.760	± 0.080
-049	126.72	1.78	± 0.940	± 0.080
-050	133.07	1.78	± 0.940	± 0.080
-102	1.24	2.62	± 0.130	± 0.080
-103	2.06	2.62	± 0.130	± 0.080
-104	2.84	2.62	± 0.130	± 0.080
-105	3.63	2.62	± 0.130	± 0.080
-106	4.42	2.62	± 0.130	± 0.080
-107	5.23	2.62	± 0.130	± 0.080
-108	6.02	2.62	± 0.130	± 0.080
-109	7.59	2.62	± 0.130	± 0.080
-110	9.19	2.62	± 0.130	± 0.080
-111	10.77	2.62	± 0.130	± 0.080
-112	12.37	2.62	± 0.130	± 0.080
-113	13.94	2.62	± 0.180	± 0.080
-114	15.54	2.62	± 0.230	± 0.080
-115	17.12	2.62	± 0.230	± 0.080
-116	18.72	2.62	± 0.230	± 0.080
-117	20.29	2.62	± 0.250	± 0.080
-118	21.89	2.62	± 0.250	± 0.080
-119	23.47	2.62	± 0.250	± 0.080
-120	25.07	2.62	± 0.250	± 0.080
-121	26.64	2.62	± 0.250	± 0.080
-122	28.24	2.62	± 0.250	± 0.080
-123	29.82	2.62	± 0.300	± 0.080
-124	31.42	2.62	± 0.300	± 0.080
-125	32.99	2.62	± 0.300	± 0.080
-126	34.59	2.62	± 0.300	± 0.080
-127	36.17	2.62	± 0.300	± 0.080
-128	37.77	2.62	± 0.300	± 0.080
-129	39.34	2.62	± 0.380	± 0.080
-130	40.94	2.62	± 0.380	± 0.080
-131	42.52	2.62	± 0.380	± 0.080
-132	44.12	2.62	± 0.380	± 0.080
-133	45.69	2.62	± 0.380	± 0.080
-134	47.29	2.62	± 0.380	± 0.080
-135	48.90	2.62	± 0.430	± 0.080
-136	50.47	2.62	± 0.430	± 0.080
-137	52.07	2.62	± 0.430	± 0.080
-138	53.64	2.62	± 0.430	± 0.080
-139	55.25	2.62	± 0.430	± 0.080
-140	56.82	2.62	± 0.430	± 0.080

ISO No.	I.D.	Width	I.D. Tol.	W. Tol.
-141	58.42	2.62	± 0.510	± 0.080
-142	59.99	2.62	± 0.510	± 0.080
-143	61.60	2.62	± 0.510	± 0.080
-144	63.17	2.62	± 0.510	± 0.080
-145	64.77	2.62	± 0.510	± 0.080
-146	66.34	2.62	± 0.510	± 0.080
-147	67.95	2.62	± 0.560	± 0.080
-148	69.52	2.62	± 0.560	± 0.080
-149	71.12	2.62	± 0.560	± 0.080
-150	72.69	2.62	± 0.560	± 0.080
-151	75.87	2.62	± 0.610	± 0.080
-152	82.22	2.62	± 0.610	± 0.080
-153	88.57	2.62	± 0.610	± 0.080
-154	94.92	2.62	± 0.710	± 0.080
-155	101.27	2.62	± 0.710	± 0.080
-156	107.62	2.62	± 0.760	± 0.080
-157	113.97	2.62	± 0.760	± 0.080
-158	120.32	2.62	± 0.760	± 0.080
-159	126.67	2.62	± 0.890	± 0.080
-160	133.02	2.62	± 0.890	± 0.080
-161	139.37	2.62	± 0.890	± 0.080
-162	145.72	2.62	± 0.890	± 0.080
-163	152.07	2.62	± 0.890	± 0.080
-164	158.42	2.62	± 1.020	± 0.080
-165	164.77	2.62	± 1.020	± 0.080
-166	171.12	2.62	± 1.020	± 0.080
-167	177.47	2.62	± 1.020	± 0.080
-168	183.82	2.62	± 1.140	± 0.080
-169	190.17	2.62	± 1.140	± 0.080
-170	196.52	2.62	± 1.140	± 0.080
-171	202.87	2.62	± 1.140	± 0.080
-172	209.22	2.62	± 1.270	± 0.080
-173	215.57	2.62	± 1.270	± 0.080
-174	221.92	2.62	± 1.270	± 0.080
-175	228.27	2.62	± 1.270	± 0.080
-176	234.62	2.62	± 1.400	± 0.080
-177	240.97	2.62	± 1.400	± 0.080
-178	247.32	2.62	± 1.400	± 0.080
-201	4.34	3.53	± 0.130	± 0.100
-202	5.94	3.53	± 0.130	± 0.100
-203	7.52	3.53	± 0.130	± 0.100
-204	9.12	3.53	± 0.130	± 0.100
-205	10.69	3.53	± 0.130	± 0.100
-206	12.29	3.53	± 0.130	± 0.100
-207	13.87	3.53	± 0.180	± 0.100
-208	15.47	3.53	± 0.230	± 0.100
-209	17.04	3.53	± 0.230	± 0.100
-210	18.64	3.53	± 0.250	± 0.100
-211	20.22	3.53	± 0.250	± 0.100
-212	21.82	3.53	± 0.250	± 0.100
-213	23.39	3.53	± 0.250	± 0.100
-214	24.99	3.53	± 0.250	± 0.100
-215	26.57	3.53	± 0.250	± 0.100
-216	28.17	3.53	± 0.300	± 0.100
-217	29.74	3.53	± 0.300	± 0.100
-218	31.34	3.53	± 0.300	± 0.100
-219	32.92	3.53	± 0.300	± 0.100
-220	34.52	3.53	± 0.300	± 0.100
-221	36.09	3.53	± 0.300	± 0.100
-222	37.69	3.53	± 0.380	± 0.100
-223	40.87	3.53	± 0.380	± 0.100
-224	44.04	3.53	± 0.380	± 0.100
-225	47.22	3.53	± 0.460	± 0.100
-226	50.39	3.53	± 0.460	± 0.100
-227	53.57	3.53	± 0.460	± 0.100
-228	56.74	3.53	± 0.510	± 0.100
-229	59.92	3.53	± 0.510	± 0.100
-230	63.09	3.53	± 0.510	± 0.100
-231	66.27	3.53	± 0.510	± 0.100
-232	69.44	3.53	± 0.610	± 0.100
-233	72.62	3.53	± 0.610	± 0.100
-234	75.79	3.53	± 0.610	± 0.100
-235	78.97	3.53	± 0.610	± 0.100
-236	82.14	3.53	± 0.610	± 0.100
-237	85.32	3.53	± 0.610	± 0.100
-238	88.49	3.53	± 0.610	± 0.100
-239	91.67	3.53	± 0.710	± 0.100
-240	94.84	3.53	± 0.710	± 0.100
-241	98.02	3.53	± 0.710	± 0.100
-242	101.19	3.53	± 0.710	± 0.100
-243	104.37	3.53	± 0.710	± 0.100
-244	107.54	3.53	± 0.760	± 0.100
-245	110.72	3.53	± 0.760	± 0.100
-246	113.89	3.53	± 0.760	± 0.100
-247	117.07	3.53	± 0.760	± 0.100
-248	120.24	3.53	± 0.760	± 0.100
-249	123.42	3.53	± 0.890	± 0.100
-250	126.59	3.53	± 0.890	± 0.100
-251	129.77	3.53	± 0.890	± 0.100

ISO No.	I.D.	Width	I.D. Tol.	W. Tol.
-252	132.94	3.53	± 0.890	± 0.100
-253	136.12	3.53	± 0.890	± 0.100
-254	139.29	3.53	± 0.890	± 0.100
-255	142.47	3.53	± 0.890	± 0.100
-256	145.64	3.53	± 0.890	± 0.100
-257	148.82	3.53	± 0.890	± 0.100
-258	151.99	3.53	± 0.890	± 0.100
-259	158.34	3.53	± 1.020	± 0.100
-260	164.69	3.53	± 1.020	± 0.100
-261	171.04	3.53	± 1.020	± 0.100
-262	177.39	3.53	± 1.020	± 0.100
-263	183.74	3.53	± 1.140	± 0.100
-264	190.09	3.53	± 1.140	± 0.100
-265	196.44	3.53	± 1.140	± 0.100
-266	202.79	3.53	± 1.140	± 0.100
-267	209.14	3.53	± 1.270	± 0.100
-268	215.49	3.53	± 1.270	± 0.100
-269	221.84	3.53	± 1.270	± 0.100
-270	228.19	3.53	± 1.270	± 0.100
-271	234.54	3.53	± 1.400	± 0.100
-272	240.89	3.53	± 1.400	± 0.100
-273	247.24	3.53	± 1.400	± 0.100
-274	253.59	3.53	± 1.400	± 0.100
-275	266.29	3.53	± 1.400	± 0.100
-276	278.99	3.53	± 1.650	± 0.100
-277	291.69	3.53	± 1.650	± 0.100
-278	304.39	3.53	± 1.650	± 0.100
-279	329.79	3.53	± 1.650	± 0.100
-280	355.19	3.53	± 1.650	± 0.100
-281	380.59	3.53	± 1.650	± 0.100
-282	405.26	3.53	± 1.910	± 0.100
-283	430.66	3.53	± 2.030	± 0.100
-284	456.06	3.53	± 2.160	± 0.100
-309	10.46	5.33	± 0.130	± 0.130
-310	12.07	5.33	± 0.130	± 0.130
-311	13.64	5.33	± 0.180	± 0.130
-312	15.24	5.33	± 0.230	± 0.130
-313	16.81	5.33	± 0.230	± 0.130
-314	18.42	5.33	± 0.250	± 0.130
-315	19.99	5.33	± 0.250	± 0.130
-316	21.59	5.33	± 0.250	± 0.130
-317	23.16	5.33	± 0.250	± 0.130
-318	24.77	5.33	± 0.250	± 0.130
-319	26.34	5.33	± 0.250	± 0.130
-320	27.94	5.33	± 0.300	± 0.130
-321	29.51	5.33	± 0.300	± 0.130
-322	31.12	5.33	± 0.300	± 0.130
-323	32.69	5.33	± 0.300	± 0.130
-324	34.29	5.33	± 0.300	± 0.130
-325	37.47	5.33	± 0.380	± 0.130
-326	40.64	5.33	± 0.380	± 0.130
-327	43.82	5.33	± 0.380	± 0.130
-328	46.99	5.33	± 0.380	± 0.130
-329	50.17	5.33	± 0.460	± 0.130
-330	53.34	5.33	± 0.460	± 0.130
-331	56.52	5.33	± 0.460	± 0.130
-332	59.69	5.33	± 0.460	± 0.130
-333	62.87	5.33	± 0.510	± 0.130
-334	66.04	5.33	± 0.510	± 0.130
-335	69.22	5.33	± 0.510	± 0.130
-336	72.39	5.33	± 0.510	± 0.130
-337	75.57	5.33	± 0.610	± 0.130
-338	78.74	5.33	± 0.610	± 0.130
-339	81.92	5.33	± 0.610	± 0.130
-340	85.09	5.33	± 0.610	± 0.130
-341	88.27	5.33	± 0.610	± 0.130
-342	91.44	5.33	± 0.710	± 0.130
-343	94.62	5.33	± 0.710	± 0.130
-344	97.79	5.33	± 0.710	± 0.130
-345	100.97	5.33	± 0.710	± 0.130
-346	104.14	5.33	± 0.710	± 0.130
-347	107.32	5.33	± 0.760	± 0.130
-348	110.49	5.33	± 0.760	± 0.130
-349	113.67	5.33	± 0.760	± 0.130
-350	116.84	5.33	± 0.760	± 0.130
-351	120.02	5.33	± 0.760	± 0.130
-352	123.19	5.33	± 0.760	± 0.130
-353	126.37	5.33	± 0.940	± 0.130
-354	129.54	5.33	± 0.940	± 0.130
-355	132.72	5.33	± 0.940	± 0.130
-356	135.89	5.33	± 0.940	± 0.130
-357	139.07	5.33	± 0.940	± 0.130
-358	142.24	5.33	± 0.940	± 0.130
-359	145.42	5.33	± 0.940	± 0.130
-360	148.59	5.33	± 0.940	± 0.130
-361	151.77	5.33	± 0.940	± 0.130
-362	158.12	5.33	± 1.020	± 0.130
-363	164.47	5.33	± 1.020	± 0.130
-364	170.82	5.33	± 1.020	± 0.130

ISO No.	I.D.	Width	I.D. Tol.	W. Tol.
-365	177.17	5.33	± 1.020	± 0.130
-366	183.52	5.33	± 1.140	± 0.130
-367	189.87	5.33	± 1.140	± 0.130
-368	196.22	5.33	± 1.140	± 0.130
-369	202.57	5.33	± 1.140	± 0.130
-370	208.92	5.33	± 1.270	± 0.130
-371	215.27	5.33	± 1.270	± 0.130
-372	221.62	5.33	± 1.270	± 0.130
-373	227.97	5.33	± 1.270	± 0.130
-374	234.32	5.33	± 1.400	± 0.130
-375	240.67	5.33	± 1.400	± 0.130
-376	247.02	5.33	± 1.400	± 0.130
-377	253.37	5.33	± 1.400	± 0.130
-378	266.07	5.33	± 1.520	± 0.130
-379	278.77	5.33	± 1.520	± 0.130
-380	291.47	5.33	± 1.650	± 0.130
-381	304.17	5.33	± 1.650	± 0.130
-382	329.57	5.33	± 1.650	± 0.130
-383	354.97	5.33	± 1.780	± 0.130
-384	380.37	5.33	± 1.780	± 0.130
-385	405.26	5.33	± 1.910	± 0.130
-386	430.66	5.33	± 2.030	± 0.130
-387	456.06	5.33	± 2.160	± 0.130
-388	481.46	5.33	± 2.290	± 0.130
-389	506.86	5.33	± 2.410	± 0.130
-390	532.26	5.33	± 2.410	± 0.130
-391	557.66	5.33	± 2.540	± 0.130
-392	582.68	5.33	± 2.670	± 0.130
-393	608.08	5.33	± 2.790	± 0.130
-394	633.48	5.33	± 2.920	± 0.130
-395	658.88	5.33	± 3.050	± 0.130
-425	113.67	6.99	± 0.840	± 0.150
-426	116.84	6.99	± 0.840	± 0.150
-427	120.02	6.99	± 0.840	± 0.150
-428	123.19	6.99	± 0.840	± 0.150
-429	126.37	6.99	± 0.940	± 0.150
-430	129.54	6.99	± 0.940	± 0.150
-431	132.72	6.99	± 0.940	± 0.150
-432	135.89	6.99	± 0.940	± 0.150
-433	139.07	6.99	± 0.940	± 0.150
-434	142.24	6.99	± 0.940	± 0.150
-435	145.42	6.99	± 0.940	± 0.150
-436	148.59	6.99	± 0.940	± 0.150
-437	151.77	6.99	± 0.940	± 0.150
-438	158.12	6.99	± 1.020	± 0.150
-439	164.47	6.99	± 1.020	± 0.150
-440	170.82	6.99	± 1.020	± 0.150
-441	177.17	6.99	± 1.020	± 0.150
-442	183.52	6.99	± 1.140	± 0.150
-443	189.87	6.99	± 1.140	± 0.150
-444	196.22	6.99	± 1.140	± 0.150
-445	202.57	6.99	± 1.140	± 0.150
-446	215.27	6.99	± 1.400	± 0.150
-447	227.97	6.99	± 1.400	± 0.150
-448	240.67	6.99	± 1.400	± 0.150
-449	253.37	6.99	± 1.400	± 0.150
-450	266.07	6.99	± 1.520	± 0.150
-451	278.77	6.99	± 1.520	± 0.150
-452	291.47	6.99	± 1.520	± 0.150
-453	304.17	6.99	± 1.520	± 0.150
-454	316.87	6.99	± 1.520	± 0.150
-455	329.57	6.99	± 1.520	± 0.150
-456	342.27	6.99	± 1.780	± 0.150
-457	354.97	6.99	± 1.780	± 0.150
-458	367.67	6.99	± 1.780	± 0.150
-459	380.37	6.99	± 1.780	± 0.150
-460	393.07	6.99	± 1.780	± 0.150
-461	405.26	6.99	± 1.910	± 0.150
-462	417.96	6.99	± 1.910	± 0.150
-463	430.66	6.99	± 2.030	± 0.150
-464	443.36	6.99	± 2.160	± 0.150
-465	456.06	6.99	± 2.160	± 0.150
-466	468.76	6.99	± 2.160	± 0.150
-467	481.46	6.99	± 2.290	± 0.150
-468	494.16	6.99	± 2.290	± 0.150
-469	506.86	6.99	± 2.410	± 0.150
-470	532.26	6.99	± 2.410	± 0.150
-471	557.66	6.99	± 2.540	± 0.150
-472	582.68	6.99	± 2.670	± 0.150
-473	608.08	6.99	± 2.790	± 0.150
-474	633.48	6.99	± 2.920	± 0.150
-475	658.88	6.99	± 3.050	± 0.150

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