



World Best Metal Bellows



KSM Corporation



World Best Welded Metal Bellows

KSM Corporation has successfully developed manufacturing of welded metal bellows, a field that was designated as a critical development area by South Korea's Department of Science and Technology, and has localized the production of this key commodity which previously was entirely dependent on foreign imports, KSM Corporation has expanded its expertise and reputation to become a world leader in welded metal bellows, obtaining top level quality certifications in numerous industries, and becoming a key strategic OEM supplier to major semiconductor tool manufacturers around the world,

We, at KSM Corporation, will always set customer satisfaction as our #1 priority, with the latest in technological developments, and outstanding reliability and quality of our products. KSM Corporation will continue to lead the way into the future as the world's best welded metal bellows manufacturer.



KSM HISTORY

- 1979. 02 Founded KSM, Started Mechanical Seal business
- 1983. 10 Built a Factory in Gimpo
- 1986. 12 Q-Class II certificate from KEPCO
- 1990. 01 Established Joint-venture with Durametallic USA
- 1999. 05 ISO 9001 Certificate
- 2000. 02 Established KSM USA Office
- 2001. 08 AMAT "Preferred Supplier", Novellus/ Brooks Automation/ Varian approved supplier Certificates
- 2002. 08 Built new Factory in Songmari (latest building)
- 2004. 05 Established KSM Component
- 2007. 06 Established KSM Japan Co., Ltd
- 2008. 09 AS9100 & TS 16949 Certificate



KSM 2nd Factor



KSM 3rd Factor

KSM Bellows Advantage

KSM Bellows Advantage On-line manufacturing system control Bellows design considering desired life, operating conditions, temperature, corrosion, pressure, and size restrictions. Proprietary engineering program based on extensive experience and knowledge. Abundant manufacturing capacity for mass production items with short lead times.

“ The manufacturing system implemented at KSM is highly productive and lean, allowing us to provide outstanding quality, cost, and delivery to our valued customers ”

KSM Welded Metal Bellows are used in the following diverse fields.

- Semiconductor Tools
- FPD Manufacturing Tools
- Aerospace
- Automotive
- UHV Components
- Vacuum valves
- Medical
- Armaments
- Rapid Transit Rail systems



TS 16949



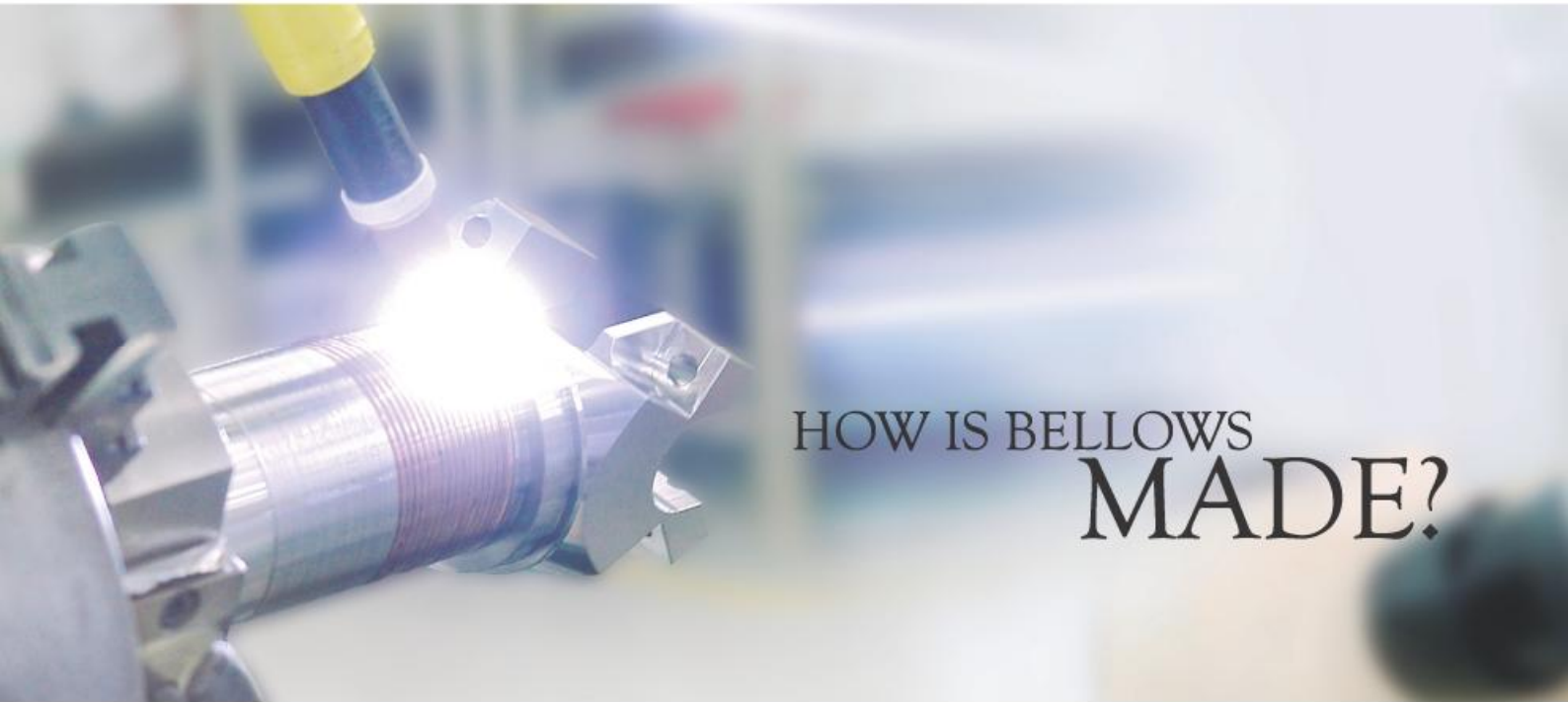
AS 9100



ISO 9001



AMAT Quality QFM Certification



HOW IS BELLOWS MADE?

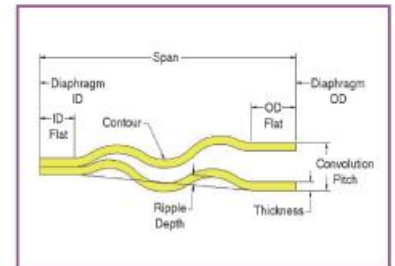
1. Technology : Bellows Design

Finite Element Analysis software using proprietary developed models generate S-N curves which allows accurate prediction of expected bellows cycle life.

KSM has developed a design program that leverages the lexicon of knowledge and experience gained by our engineers over the years. This design program allows us to arrive at a reliable design for most applications very quickly.



>> FEA



>> Convolution Geomethy

>> Material

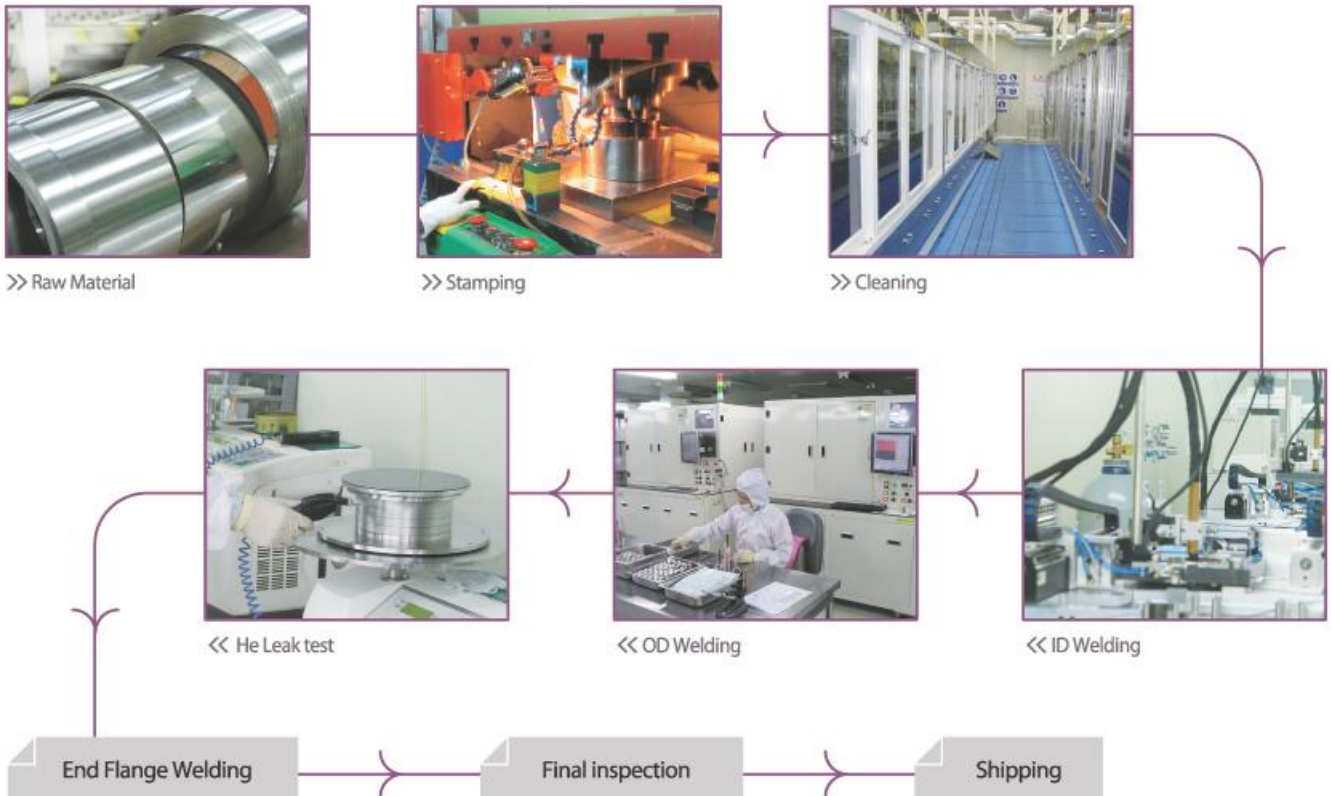
Material	Temperature (Celsius)	Feature	Heat Resistance	Strength	Corrosion Resistance
Austenitic Stainless Steel					
SUS316L	-251~426	Widely common material widely used under relatively high temperatures. The addition of molybdenum increases the resistance to attack by most chemicals	B	B	B+
Precipitation Stainless Steel					
AM-350	-73~426	High strength and excellent weldability along with corrosion resistance. Two times the strength of 304S.S. or 316S.S	B	A+	B
Nickel Base Corrosion Resistance Alloys					
Hastelloy C-276	-251~537	Widely used in the severest environment encountered in the chemical process. Good high temperature strength and moderate oxidation resistance.	A	A	A
Inconel 625	-251~815	Excellent resistance to oxidation and corrosion over a broad range of corrosive conditions including chemical process application. High tensile, creep and rupture strength	A	A	A
Haynes 242	-251~698	Resistance to high temperature fluorine and fluoride environments and good oxidation resistance	A	A+	A+

A+: Excellent A: Good B+: Far B: Acceptable C: Poor

2. Manufacturing

KSM boasts the most advanced and largest capacity in the world for welded metal bellows manufacturing.

- In house stamping and die cutting with comprehensive list of existing dies for stamping of bellows diaphragms.
- Fully automated welding machines
: Reliability and repeatability afforded by fully maintained state of the art equipment yields superior quality and productivity.
- All manufacturing processes from cleaning and welding through final inspection is contained within a class 1000 certified clean room.
- On-line manufacturing system control minimizes operator errors.
- Real-time visibility and communication between operators and management allows for utmost in productivity.



3. Quality Assurance

- Detailed design review ⇔ Process inspection for every manufacturing step
⇔ First article reliability test
- Bellows assembly 100% leak check
- KSM QA System keeps meticulous track of data from every manufacturing process, and allows for outstanding traceability of all types of parts, from prototypes through mass production, using our data management system



>> Poka-Yoke



>> Inspection



WHAT IS KSM PRODUCT?

Semiconductor Bellows

KSM has become a trusted strategic partner and a valued supplier (in many cases being a single source vendor) to all of the major semiconductor tool manufacturers in the US and around the world. By being our most critical reviewers ourselves, we are constantly improving our quality and manufacturing systems, while at the same time obtaining customer feedback through periodic audits and visits. Many of our customer's feedback and suggestions for improvement are directly implemented. KSM has thus been recognized as providing the highest quality products in the world.

- Supplies tens of thousands of different custom bellow parts that are used in a wide spectrum of semiconductor processes (CVD, PVD, Implanter, Etch etc).
- Highest quality bellows supplied at competitive prices.
- Mass production capability with rigorous inventory control allows us to meet customer's delivery goals.
- Over the years, KSM has been recognized as an Approved Supplier, a Preferred Supplier, and a Certified Supplier for Applied Materials.



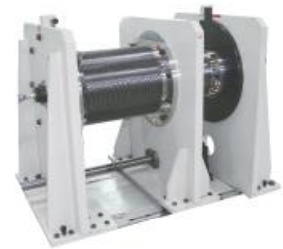
LCD Manufacturing Tools and UHV Large Bellows

Bellows for LCD manufacturing tools and large UHV applications require special consideration for installation and operating orientation. KSM takes into consideration all predictable movements, and worst case conditions that are specific to large size bellows to provide an ideal solution for our customers.

- Testing facilities matched to accurately reflect operating conditions.
- Sizes as large as 500 mm ID diameter.
- Vacuum Robot Bellows
OD=Ø500~Ø650, ID=Ø410~Ø530, Stroke=1100mm~600mm
with High cycle application
Develop pantograph for complementing bellows performance
Improve welding method for large size bellows.
- LCD Manufacturing Tool Bellows
Design for squirm and buckling that may occur due to lateral offsets
and external vacuum conditions typically seen in this application.



>> Vacuum Robot Bellows



>> LCD Manufacturing Tool Bellows

Valve Bellows

- High temperature
- Pressure variation
- High cycle life



>> Gate Valve Bellows



>> Angle Valve Bellows



>> Slit Door Valve

Special Bellows: Rapid Transit Rail Bellows

- Conservator
: Fluid Level Sensing Metal Bellows.

Special Bellows

Aerospace

Fuel control bellows, pressure sensing bellows (evacuated bellows), flexible couplings for aerospace applications are designed and manufactured according to each specific application's requirement.

Medical

Expansion reservoir bellows for CT scanners, and implantable drug delivery bellows.

Automotive

Damper bellows for fuel injection pump



>> Medical Bellows

Bellows Sub-Assembly

KSM Component, a subsidiary of KSM Corporation, manufactures bellows related sub-assemblies. Composed of specialists with great technical expertise and experience, KSM Component is able to provide our customers with new product development and refurbishment of heater assemblies, slit valve assemblies, lift assemblies etc.



>> Pin Lift Assembly



>> Pedestal Lift Assembly



>> Spindle Assembly



Heater Tester



CMM



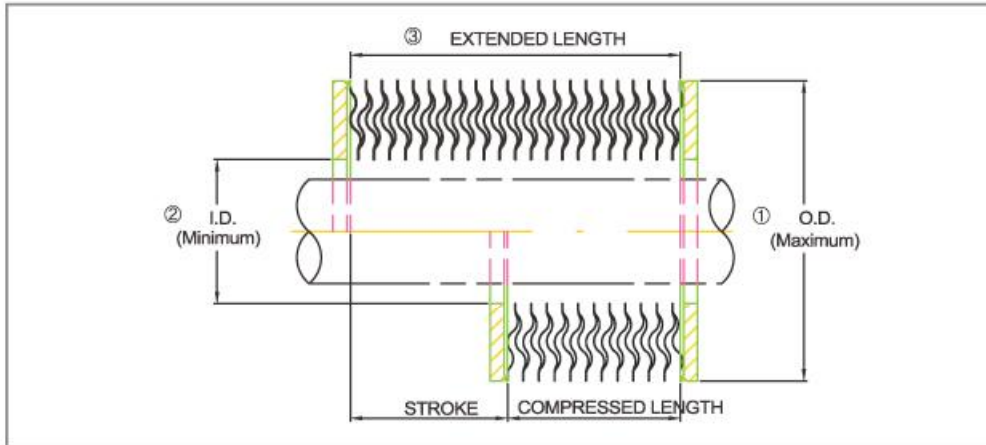
Cycle Test



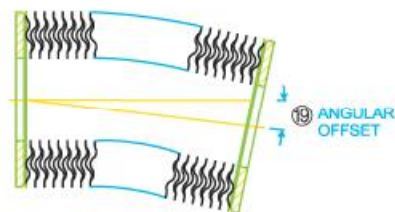
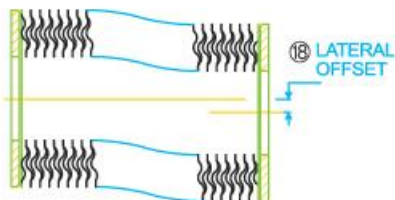
SEM & EDS

KSM has obtained AS 9100 and TS 16949 certification to fully support our customers in the aerospace and automotive industries. In addition, KSM's continued research in those fields will ensure the most advanced technological solutions for our customers.

KSM Bellows Design Request



- ① Bellows Capsule Maximum O.D. : _____ mm
- ② Bellows Capsule Minimum I.D. : _____ mm
- ③ Extended Length : _____ mm ④ Compressed Length : _____ mm
- ⑤ Stroke(EL~CL) : _____ mm ⑥ Install length : _____ mm
- ⑦ Life Cycle : _____ cycle
- ⑧ Vacuum Side : Inside _____ kg/cm² , Outside _____ kg/cm²
- ⑨ Temperature : _____ deg C
- ⑩ Gas or Fluid : _____
- ⑪ Leak Rate : _____ STD cc/sec He
- ⑫ Bellows Capsule Material : _____
- ⑬ Flange material : _____ ⑭ Spring rate : _____ /mm
- ⑮ Shaft size : _____
- ⑯ Installation : Vertical() Horizontal()
- ⑰ Process or equipment : _____



- ⑱ Lateral Offset : _____ mm
(or _____ °)
- ⑲ Angular Offset : _____ mm
(or _____ °)

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KSM Mold List _ I

DIE#	OD(mm)	ID(mm)	DIE#	OD(mm)	ID(mm)	DIE#	OD(mm)	ID(mm)
1018	9.420	3.400	1124	32.000	12.000	1579	48.006	35.306
2299	12.000	4.500	2088	33.325	21.209	1012	49.000	21.000
2370	12.500	5.000	1027	33.325	20.625	1710	49.200	36.500
2237	12.598	5.080	2200	34.000	23.000	1645	49.200	39.294
1033	12.700	6.604	2252	34.200	13.700	2358	49.200	29.997
1451	15.113	6.604	1093	34.417	13.716	2287	49.200	30.000
2324	15.113	6.731	1462	34.798	22.225	1057	50.800	31.750
2251	15.367	4.318	1119	34.925	21.082	2221	50.800	38.100
2331	16.200	6.600	2328	36.000	22.000	0418	50.800	36.000
1072	16.205	8.585	2346	36.000	23.000	2279	50.800	35.560
2203	17.000	7.000	1058	36.259	21.527	1122	50.800	27.178
2291	18.000	8.000	1116	36.322	23.876	1115	50.800	35.992
1038	19.050	6.604	1569	36.500	23.800	2345	50.800	31.000
1123	19.050	8.992	1051	36.500	16.500	2242	51.000	36.000
1082	19.990	8.992	2378	36.500	23.700	2354	51.000	31.000
2270	20.000	12.000	1065	36.830	19.050	2373	51.000	37.084
2317	20.000	10.000	2353	36.906	21.742	2280	52.370	32.370
2394	20.000	8.000	1013	37.000	19.000	2294	52.375	39.675
2289	21.000	12.000	2335	38.000	26.000	2347	52.600	31.000
2296	21.336	13.208	1021	38.100	19.050	1016	53.000	37.000
1095	23.012	12.700	1049	38.100	25.400	1140	53.800	41.200
2385	23.720	10.200	2284	38.100	13.716	2298	54.000	41.100
1005	23.724	10.211	2343	38.400	24.700	2357	54.000	40.999
2091	23.900	14.960	1524	39.624	24.384	2207	55.000	35.000
2290	24.000	10.000	1068	39.670	19.670	1487	55.550	42.850
2351	24.000	10.000	2308	39.675	26.975	1370	55.880	26.416
1028	25.400	7.950	2319	40.000	20.000	1089	55.880	35.560
1138	25.400	10.820	2342	41.000	21.000	2364	56.000	43.000
2303	25.400	10.160	1086	41.220	22.100	1017	57.150	38.100
2310	25.400	12.700	1105	41.275	19.050	2376	57.150	40.000
2309	25.400	8.400	2205	41.275	25.400	2269	58.674	44.500
2208	26.000	12.700	1114	41.275	23.800	1020	58.674	43.434
2277	26.000	13.000	2249	41.275	22.100	1490	58.725	46.025
2283	26.000	12.000	2316	41.910	31.750	1004	58.725	38.608
1034	26.035	12.243	1641	42.189	29.489	1094	59.000	39.000
2201	26.035	12.700	2384	42.189	23.489	1055	59.690	44.450
1008	26.035	12.243	1486	42.850	30.150	1139	60.000	40.000
1104	26.162	13.716	1644	42.621	32.944	1085	60.000	50.000
2286	26.162	13.970	2380	42.850	30.150	2332	60.000	40.000
1129	26.162	13.716	1430	44.196	30.988	1073	60.198	41.148
2233	26.416	13.208	1011	44.450	25.400	2218	60.960	44.450
1025	26.500	17.500	1045	44.450	19.050	1491	61.900	49.200
1083	28.500	12.700	1078	44.450	20.625	2365	62.000	49.000
2320	28.702	18.821	1075	44.704	19.304	1091	63.246	38.862
2326	29.000	14.000	2236	45.000	25.000	1023	63.500	44.450
1202	29.718	19.050	2374	45.000	30.734	2325	63.500	31.750
1092	29.997	19.837	2230	46.000	26.000	1069	64.000	34.000
1109	30.480	17.780	2333	46.000	33.000	2223	64.008	49.022
2202	31.000	11.000	1521	46.025	33.325	1067	64.770	44.450
1043	31.496	16.764	1640	47.244	34.544	1042	64.770	31.750
1003	31.547	16.866	1079	47.498	22.098	1035	64.897	52.400
1002	31.750	15.875	1010	47.625	24.765	2338	65.000	40.000
1061	31.750	16.002	2257	47.625	40.513	1492	65.075	52.375
1130	31.750	19.050	2297	47.625	28.575	2306	66.040	53.340

KSM Mold List _ II

DIE#	OD(mm)	ID(mm)	DIE#	OD(mm)	ID(mm)	DIE#	OD(mm)	ID(mm)
2206	68.072	52.832	1044	107.950	81.280	2302	174.625	149.225
1555	68.250	55.550	1062	107.950	91.694	2388	175.000	140.000
1052	69.850	44.450	1037	107.950	92.075	1103	177.292	126.492
1064	69.850	38.100	2219	107.950	88.900	2372	178.000	156.000
1141	69.850	41.910	2271	107.950	80.000	1100	185.000	134.900
2293	70.000	57.000	2214	107.950	76.200	2371	185.000	152.400
1070	70.000	50.000	2387	107.950	85.000	2391	185.000	150.000
2327	70.400	50.000	2273	110.000	80.000	9004	190.500	152.400
2383	71.000	46.000	1545	111.125	95.250	2087	191.262	152.654
1571	71.425	58.725	1550	114.300	98.425	0054	193.675	174.625
1036	71.755	48.514	1024	115.000	85.000	2217	196.850	158.750
1096	72.000	52.000	1066	115.400	90.000	9016	200.000	167.000
1060	73.000	43.000	1551	117.475	101.600	2282	200.000	170.000
2265	74.600	61.900	1071	120.000	90.000	2256	203.200	168.910
2261	75.000	50.000	2393	120.000	95.000	9023	203.200	160.020
2258	76.200	63.500	1543	120.650	104.775	2359	203.200	168.910
1001	76.200	50.800	1117	120.650	76.200	0056	209.550	190.500
1689	77.775	62.687	1538	120.904	95.504	2321	209.804	171.958
1074	79.375	66.675	2235	121.000	76.200	2301	210.000	190.000
1596	80.950	65.075	1546	123.825	107.950	9011	219.075	180.975
1126	80.950	65.862	9010	125.000	86.000	1108	220.980	195.580
2260	80.963	60.000	2239	126.238	101.600	1529	223.520	198.120
1006	82.550	57.150	1125	126.746	114.046	2243	230.000	190.000
1026	83.998	71.552	2086	127.000	111.125	0066	231.775	212.725
1500	84.125	68.250	2305	130.000	100.000	2248	248.920	198.120
1030	84.125	71.425	2295	130.048	107.950	2281	250.000	230.000
2213	84.138	64.000	2389	133.000	89.000	9005	250.000	217.000
2228	85.000	60.000	0035	133.350	114.300	9015	250.000	219.000
1522	87.300	71.425	2268	133.350	89.662	2304	257.000	217.000
2255	88.900	63.500	0036	136.525	117.475	2250	260.000	210.000
2263	88.900	69.977	2224	139.573	120.269	9020	262.850	244.000
1047	88.900	50.800	1133	139.700	120.300	9025	270.000	210.000
2337	88.900	60.325	2226	139.700	101.600	9026	270.000	230.000
2225	90.000	65.100	2061	141.275	120.650	2238	270.002	215.900
1059	91.000	61.000	0038	142.875	123.825	9030	275.000	235.000
1547	92.075	76.200	2313	145.000	125.000	1088	285.000	260.000
2329	94.000	70.000	2381	149.000	92.000	2390	290.000	250.000
1120	94.742	71.120	0040	149.225	130.175	2245	320.000	260.000
2232	95.000	73.000	2262	150.000	120.000	1136	330.200	298.450
1548	95.250	79.375	1029	150.000	110.000	2254	349.000	310.000
1087	95.250	74.930	0041	152.400	133.350	9029	349.000	310.000
2253	97.200	84.500	2231	152.400	101.600	2276	365.000	310.000
1549	98.425	82.550	2259	152.400	110.236	2278	430.000	385.000
2285	99.060	83.820	2362	157.000	127.000	2363	458.000	400.000
1134	101.346	68.326	2267	158.750	115.062	2375	490.000	400.000
1540	101.600	85.725	0044	161.925	142.875	2292	500.000	410.000
1040	101.600	68.326	2307	162.560	114.300	9024	600.000	500.000
1113	101.600	76.200	1132	165.100	139.700	2311	640.000	530.000
1541	104.775	88.900	2215	165.100	127.000	2392	640.000	530.000
2247	105.000	80.000	2227	167.640	119.380	9003	950.000	750.000
1111	106.680	69.088	2314	169.000	149.000			
2275	106.680	86.360	2244	170.000	140.000			
1683	107.950	88.900	1112	170.942	151.892			
1544	107.950	92.075	0048	174.625	155.575			

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