CONTINENTAL MOTORS® AIRCRAFT ENGINE

SERVICE INFORMATION DIRECTIVE

Compliance Will Enhance Safety, Maintenance or Economy of Operation

CATEGORY 4

SID97-4D

Supersedes SID97-4C
Technical Portions
FAA Approved

SUBJECT: Cylinder Bore and Piston Fit Specifications

PURPOSE: Provide dimensional fits and limits for cylinders paired with coated and uncoated pistons

COMPLIANCE: At cylinder repair, replacement or engine major overhaul

MODELS AFFECTED: New and Rebuilt: All inclusive models and specifications, C75, C85, C90, C115, C125, C145, O-200, O-300, GO-300, IO-240, IOF-240, IO-346, IO-360, LTSIO-360, TSIO-360, O-470, IO-470, TSIO-470, GTSIO-520, IO-520, LIO-520, LTSIO-520, TSIO-520, IO-550, IOF-550, TSIO-550, TSIOF-550 and TSIOL-550

REASON FOR REVISION: Incorporated Gold Standard cylinder dimensions and piston ring gaps

BACKGROUND INFORMATION

This service bulletin provides the following information:

1. Cylinder bore dimensions - New minimum/maximum, service limits (for continuing cylinders in service between major overhaul(s)) and Oversize Service Limits.
2. Piston to cylinder clearance specifications for coated and non-coated pistons.
3. Piston ring gaps and designated location in cylinder to measure ring gaps.
4. Piston diameters, piston skirt diameters and pin to dome height dimensions.

The Gold Standard project streamlined many of the unique cylinder dimensional characteristics established through generations of product improvements to a common design specification shared with all engine models sharing the same cylinder bore size. Engine serial numbers 1006000 and subsequent and engine cylinder assemblies with part number 658*XXX* and later shall conform to the Gold Standard design specifications. In-service engines with earlier cylinder assembly part numbers may continue to use the pre-Gold standard specifications, where applicable, until cylinder replacement.

For consistency, measure cylinder bore D, X & Y dimensions in the plane through the spark plug holes; repeat at a right angle (90°) to the first measurement and then average the two results. To determine out of round, 1) measure first in the plane through the spark plug holes; repeat the measurement at a right angle (90°) to the first measurement and 2) subtract the smaller dimension from the larger; the difference must not exceed the out of round limit specified.

The **"New Limits MIN & MAX"** dimensions for **D, X and Y** diameters identify cylinder barrel machining characteristics of new and authorized oversize (AO) dimension cylinders.

Only the **D** and the **X** diameters are used to determine the serviceability of the cylinder barrel. No wear limit is given for **Y** diameter because it is used as a machining reference only.

New or authorized oversize cylinder bore dimensions must be used at engine overhaul. Service limits may be used to return cylinders to service on engines that have not reached their published TBO. Do not return any cylinder to service that cannot be machined to conform to the dimensional limits specified in this service bulletin.

Piston ring gaps and cylinder dimensions must be maintained within the specifications provided in this bulletin. If the cylinder is machined to the next larger AO size, piston rings of the same AO size must be installed in the machined cylinder.

Piston specifications are presented in tabular form, (Table 17). Columns from left to right are: Engine Model, Manganese Phosphate Coated Piston P/N, Uncoated Piston P/N, Piston Diameter, Skirt Diameter, and Pin to Dome Height.

CAUTION: Verify cylinder, piston and piston ring part numbers are the specified part number for the installation. Installation of incorrect parts will cause engine damage and engine malfunction.

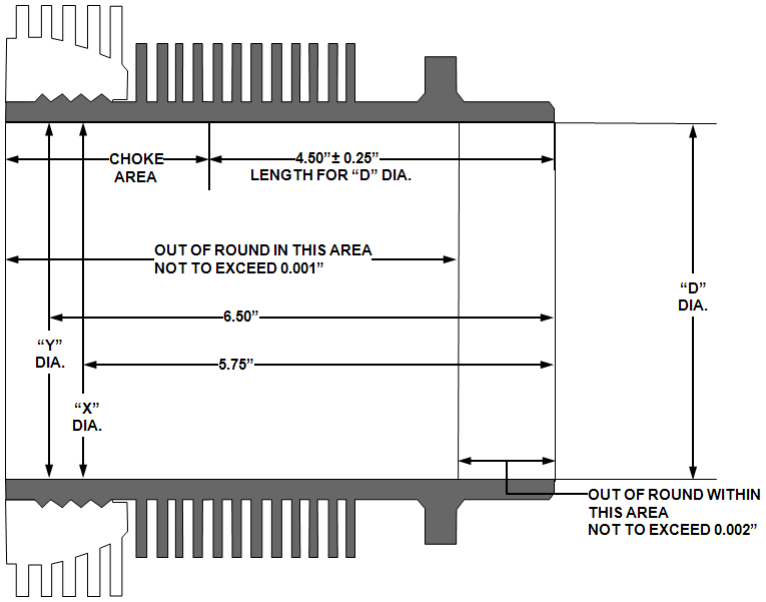

Figure 1. 5.25 Inch Cylinder Measurement Locations

Table 1. 5.25 Inch Cylinder Barrel Dimensions
Applicable to Pre - Gold Standard GTSIO-520, IO-520, IO-550, IOF-550- B, C, G, N, P, R, TSIO-520, TSIOL-550 and Post - Gold Standard GTSIO-520, IO-346, IO-520, IO-550, IOF-550, LIO-520, LTSIO-520, TSIO-520, TSIO-550, TSIOF-550, and TSIOL-550

Size	"D" Diameter (inches)			"X" Diameter (inches)			"Y" Diameter (inches)		
	Minimum	Maximum	Service Limit	Minimum	Maximum	Service Limit	Minimum	Maximum	Service Limit
STD.	5.251	5.253	5.256	5.247	5.250	5.257	5.244	5.247	N/A
.005	5.256	5.258	5.261	5.252	5.255	5.262	5.249	5.252	N/A
.010	5.261	5.263	5.266	5.257	5.260	5.267	5.254	5.257	N/A
.015	5.266	5.268	5.271	5.262	5.265	5.272	5.259	5.262	N/A
Cylinder bore out of round: new cylinder must not exceed 0.001" in barrel above flange; service limit must not exceed 0.003" at measured diameters.									

Table 2. 5.25 Inch Cylinder Barrel Dimensions
Applicable to Pre - Gold Standard IO-346, TSIO-550-B, C, E, G and K and TSIOF-550

Size	"D" Diameter (inches)			"X" Diameter (inches)			"Y" Diameter (inches)		
	Minimum	Maximum	Service Limit	Minimum	Maximum	Service Limit	Minimum	Maximum	Service Limit
STD.	5.252	5.254	5.257	5.248	5.251	5.258	5.245	5.248	N/A
.005	5.257	5.259	5.262	5.253	5.256	5.263	5.250	5.253	N/A
.010	5.262	5.264	5.267	5.258	5.261	5.268	5.255	5.258	N/A
.015	5.267	5.269	5.272	5.263	5.266	5.273	5.260	5.263	N/A
Cylinder bore out of round: new cylinder must not exceed 0.001" in barrel above flange; service limit must not exceed 0.003" at measured diameters.									

Table 3. Piston to Cylinder Clearance
IO-520, IO-550, IOF-550, TSIO-520, GTSIO-520, TSIO-550, TSIOF-550

5.25 Inch Piston	Piston in Cylinder Measured Below Fourth Ring Groove
All Non-Coated	0.008 - 0.011 LOOSE
Manganese Phosphate Coated	0.006 - 0.010 LOOSE
Measure clearance perpendicular to piston pin bore at "D" diameter	

Table 4. Piston to Cylinder Clearance
TSIOL-550

5.25 Inch Piston	Piston in Cylinder Measured Below Fourth Ring Groove	
	Pre - Gold Standard	Post - Gold Standard
All Non-Coated	0.007 - 0.010 LOOSE	N/A
Manganese Phosphate Coated	0.005 - 0.009 LOOSE	0.008 - 0.011 LOOSE
Measure clearance perpendicular to piston pin bore at "D" diameter		

Table 5. Ring Gap Specifications
5.25 Inch Cylinder - All IO-520, GTSIO-520, LIO-520, LTSIO-520, TSIO-520
IO-550, IOF-550, TSIO-550, TSIOF-550, TSIOL-550

RING	Part Number	GAPS	
		Pre - Gold Standard[1]	Post - Gold Standard
Ring Set	654716A1	N/A	N/A
Top Ring	658005	0.032 -0.046	0.029 - 0.043
Second Ring[2]	654719	0.038 - 0.052[2]	0.035 -0.049[2]
Oil Control Ring	654717[3]	0.018 - 0.034	0.015 -0.031
Fourth Ring / Skirt	648008	0.018 - 0.034	0.015 -0.031

1. Applies to Pre - Gold Standard piston ring gaps on IO-346, TSIO-550-C, E, G, K and TSIOF-550-D, J and K
2. Gap for second ring is nominally 0.006" larger than the top ring
3. Part No. 654717 consists of Part No. 654718 Expander and Part No. 649250-1 Ring

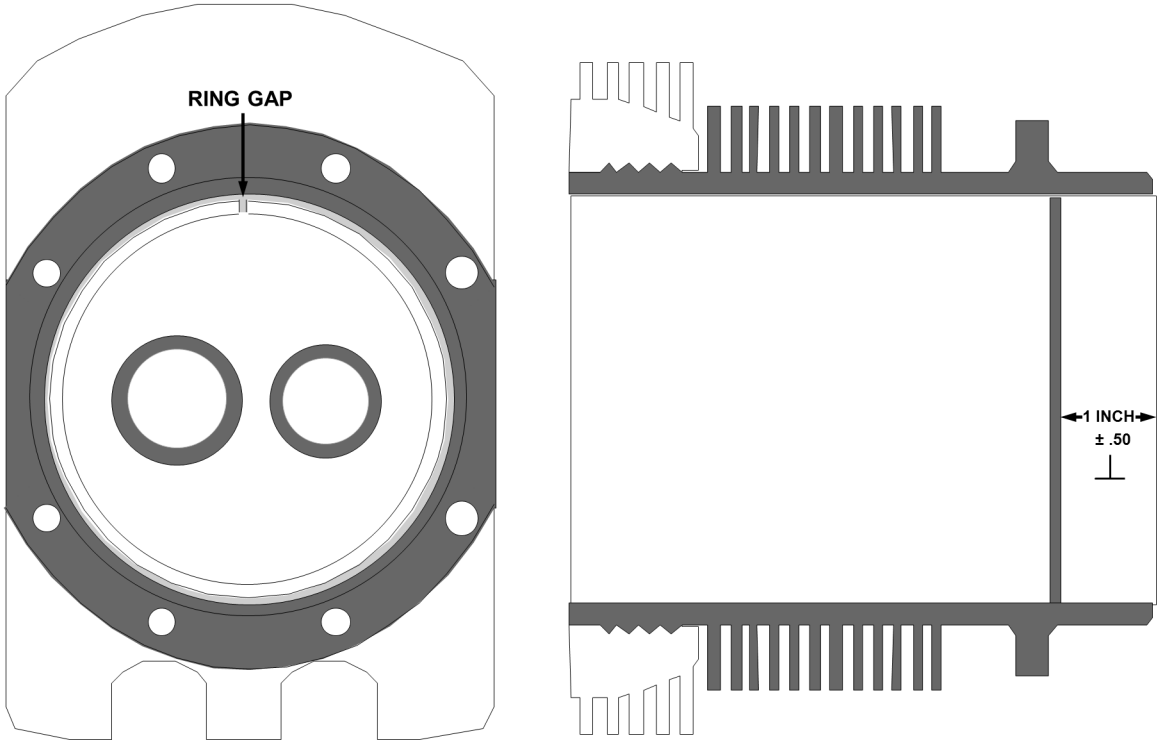

Figure 2. Ring Gap Measurement Location

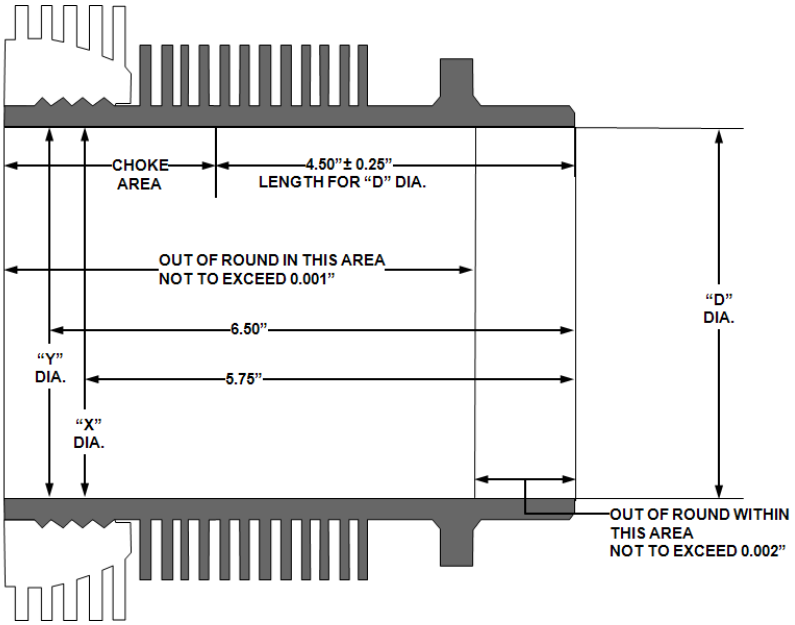

Figure 3. 5.00 Inch Cylinder Measurement Locations

Table 6. 5.00 Inch Cylinder Barrel Dimensions
Applicable to E-Series, O-470, IO-470 and TSIO-470

Size	"D" Diameter (inches)			"X" Diameter (inches)			"Y" Diameter (inches)		
	Minimum	Maximum	Service Limit	Minimum	Maximum	Service Limit	Minimum	Maximum	Service Limit
STD.	5.001	5.003	5.006	4.997	5.000	5.007	4.994	4.997	N/A
.005	5.006	5.008	5.011	5.002	5.005	5.012	4.999	5.002	N/A
.010	5.011	5.013	5.016	5.007	5.010	5.017	5.004	5.007	N/A
.015	5.016	5.018	5.021	5.012	5.015	5.022	5.009	5.012	N/A
Cylinder bore out of round: new cylinder must not exceed 0.001" in barrel above flange; service limit must not exceed 0.003" at measured diameters									

Table 7. Piston to Cylinder Clearance
All 470 Series except O-470-K, L, R & S and TSIO-470-B, C & D

5.00 Inch Piston	Piston in Cylinder Measured at the Bottom of the Piston Skirt
All Non-Coated	0.008 - 0.012 LOOSE
Manganese Phosphate Coated	0.006 - 0.011 LOOSE
Measure clearance perpendicular to piston pin bore at "D" diameter	

Table 8. Piston to Cylinder Clearance
E-Series, O-470-K, L, R & S and TSIO-470-B, C & D

5.00 Inch Piston	Piston in Cylinder Measured at the Bottom of the Piston Skirt
All Non-Coated	0.009 - 0.012 LOOSE
Manganese Phosphate Coated	0.007 - 0.011 LOOSE
Measure clearance perpendicular to piston pin bore at "D" diameter	

Table 9. Ring Gap Specifications
5.00 Inch Cylinder - All O-470, IO-470, TSIO-470

RING	Part Number	GAPS
Ring Set	649226A1	N/A
Top Ring	648009	0.027 -0.041
Second Ring[1]	648010	0.033 - 0.047[1]
Oil Control Ring	648011	0.015 - 0.031
Fourth Ring / Skirt	648012	0.015 - 0.031

1. Gap for second ring is nominally 0.006 larger than the top ring

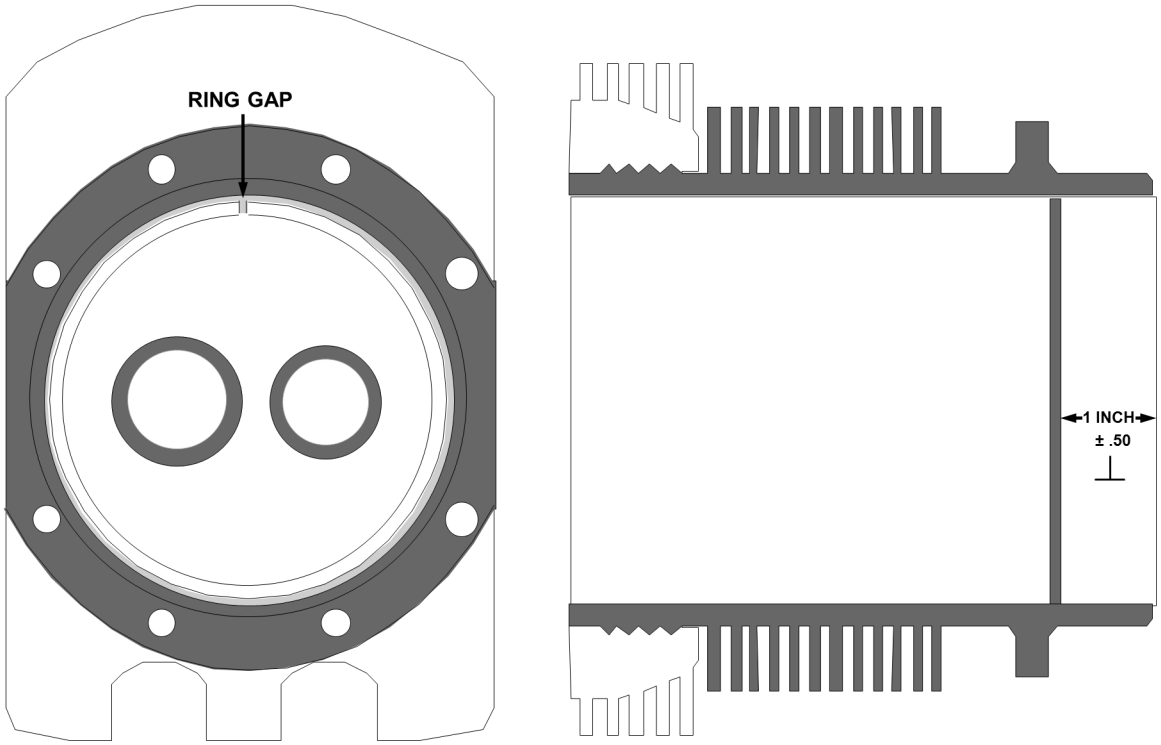

Figure 4. Ring Gap Measurement Location

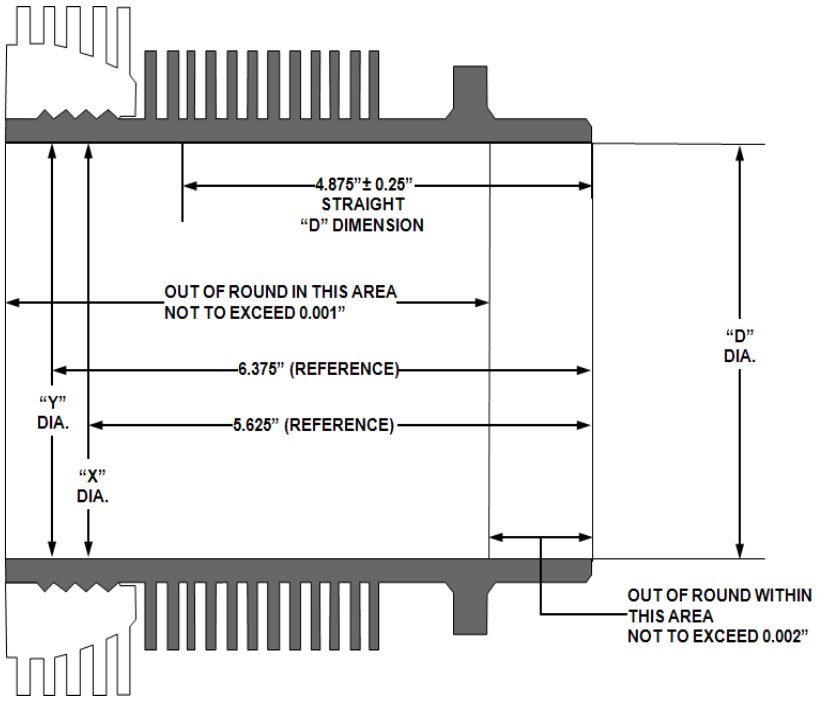

Figure 5. 4.44 Inch Cylinder Measurement Locations

Table 10. 4.44 Inch Cylinder Barrel Dimensions
Applicable to ALL IO-240, IOF-240, LTSIO-360, IO-360, and TSIO-360

Size	"D" Diameter (inches)			"X" Diameter (inches)			"Y" Diameter (inches)		
	Minimum	Maximum	Service Limit	Minimum	Maximum	Service Limit	Minimum	Maximum	Service Limit
STD.	4.437	4.439	4.442	4.434	4.437	4.444	4.431	4.434	N/A
.005	4.442	4.444	4.447	4.439	4.442	4.449	4.436	4.439	N/A
.010	4.447	4.449	4.452	4.444	4.447	4.454	4.441	4.444	N/A
.015	4.452	4.454	4.457	4.449	4.452	4.459	4.446	4.449	N/A
Cylinder bore out of round: new cylinder must not exceed 0.001" in barrel above flange; service limit must not exceed 0.003" at measured diameters									

Table 11. Piston to Cylinder Clearance
Applicable to ALL IO-240, IOF-240, LTSIO-360, IO-360, and TSIO-360

4.44 Inch Piston	Piston in Cylinder Measured at the Bottom of the Piston Skirt
All Non-Coated	0.006 - 0.010 LOOSE
Manganese Phosphate Coated	0.004 - 0.009 LOOSE
Measure clearance perpendicular to piston pin bore at "D" diameter	

Table 12. Ring Gap Specifications
ALL IO-240, IOF-240, LTSIO-360, IO-360, and TSIO-360

RING	Part Number	GAPS
Ring Set	649225A2	N/A
Top Ring	648039	0.022 -0.037
Second Ring[1]	648040	0.028 - 0.043[1]
Oil Control Ring	648041	0.008 - 0.025
Fourth Ring / Skirt	648042	0.010 - 0.027

1. Gap for second ring is nominally 0.006" larger than the top ring

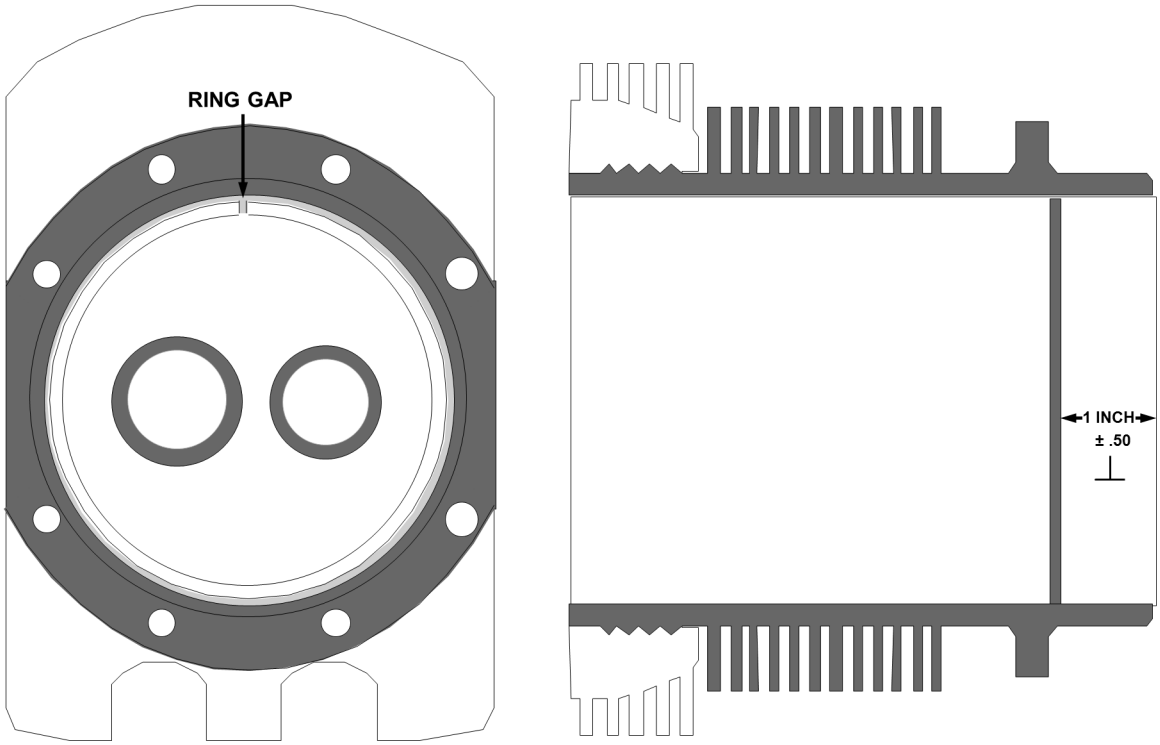

Figure 6. Ring Gap Measurement Location

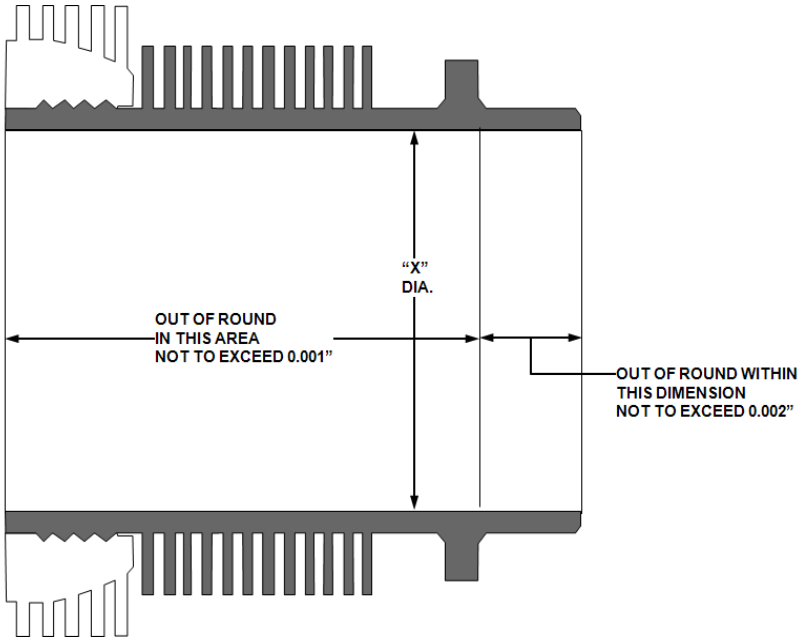

Figure 7. 4.06 Inch Cylinder Measurement Locations

Table 13. 4.06 Inch Cylinder Barrel Dimensions
Applicable to ALL C - Series, O-200, O-300, GO-300

Size	"X" Diameter (inches)			Straight Barrel
	Minimum	Maximum	Service Limit	No Choke
STD.	4.0615	4.0635	4.0665	N/A
.005	4.0665	4.0685	4.0715	
.015	4.0765	4.0785	4.0815	
Cylinder bore out of round: new cylinder must not exceed 0.001" in barrel above flange; service limit must not exceed 0.003" at measured diameters				

Table 14. Piston to Cylinder Clearance
Applicable to ALL C - Series, O-200, O-300, GO-300

4.06 Inch Piston	Piston in Cylinder Measured at the Bottom of the Piston Skirt
All Non-Coated	0.009 - 0.012 LOOSE
Manganese Phosphate Coated	0.007 - 0.011 LOOSE
Measure clearance perpendicular to piston pin bore at "D" diameter	

Table 15. Ring Gap Specifications
ALL C - Series, O-200-A, B & C, O-300, GO-300

RING	Part Number	GAPS
Ring Set	649632A2	N/A
Top Ring	649632	0.020 -0.034
Second Ring	638110	0.026 - 0.040
Third Ring	638110	0.026 - 0.040
Oil Control Ring	638111	0.012 - 0.028

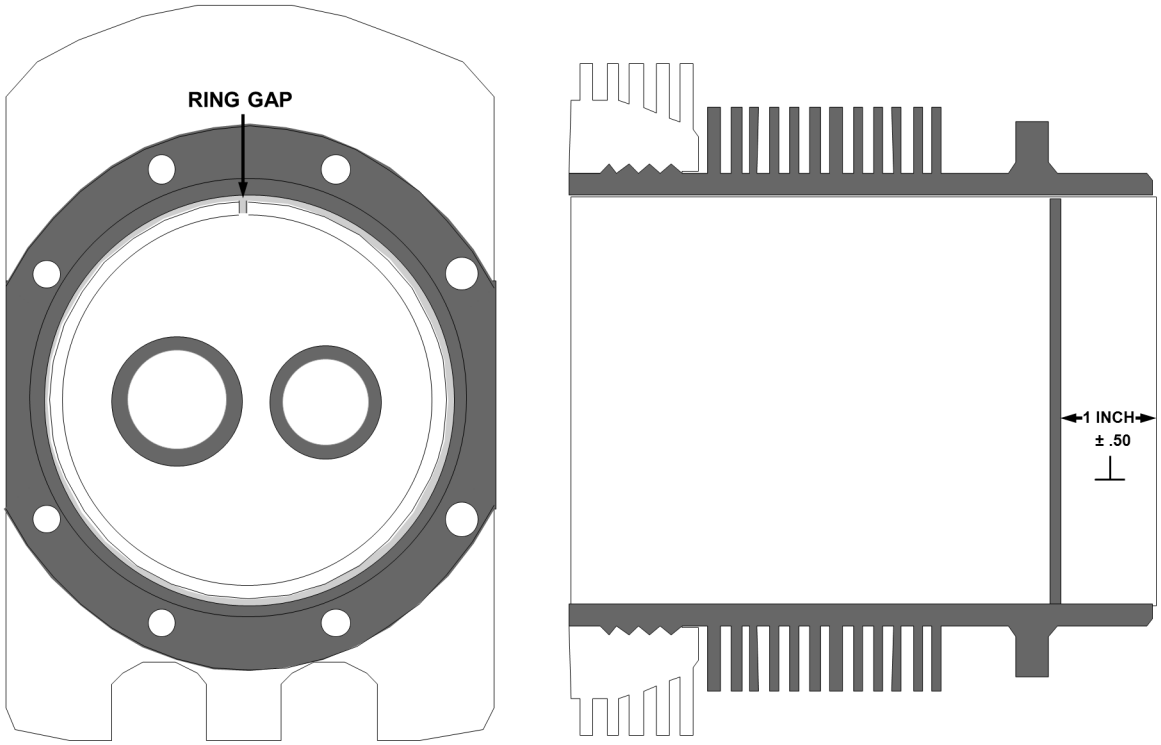

Figure 8. Ring Gap Measurement Location

Table 16. Ring Gap Specifications
O-200-D ONLY

RING	Part Number	GAPS
Ring Set	657480	N/A
Top Ring	657479	0.020 -0.034
Second Ring	638110	0.026 - 0.040
Third Ring	657548	0.012 - 0.028

Table 17. Piston to Engine Cross Reference

NOTE: Uncoated and graphite coated pistons were discontinued in 1998.

Engine Model	Manganese Phosphate/ Graphite Coated	Uncoated	Graphite Coated	Piston Diameter	Skirt Diameter	Piston Pin to Dome Height
GTSIO520C, D, H, K, L, M, N; TSIOF520AF, B, BB, BE, C, CE, D, DB, E, EB, G, H, J, JB, K, KB, L, LB, M, N, NB, P, T, UB, VB, WB	654840	648044	654724	5.25”	5.2420-5.2430	1.835-1-839
	654840P010	648044P010	654724P010	5.26”	5.2520-5.2530	
	654840P015	648044P015	654724P015	5.265”	5.2570-5.2580	
IO520A, B, BA, BB, C, CB, D, E, F, J, K, L, M, MB, N, NB	654850	648045	N/A	5.25”	5.2420-5.2430	1.617-1.621
	654850P010	648045P010		5.26”	5.2520-5.2530	
	654850P015	648045P015		5.265”	5.2570-5.2580	
IO550A, B, C, D, E, F, G, L, N, P, R; IOF-550-G, N, P & R	654857	648046	654726	5.25”	5.2420-5.2430	1.775-1.779
	654857P010	648046P010	654726P010	5.26”	5.2520-5.2530	
	654857P015	648046P015	654726P015	5.265”	5.2570-5.2580	
IO346A; TSIO550A, B, C, E,G, K, N; TSIOF-550D, J, K; TSIOL550A, B, C	657989	649805	654731	5.25”	5.2422-5.2432	1.775-1.779
IO520P; LTSIO520AE; LIO520P; TSIO520AE	654836	648037	654723	5.25”	5.2420-5.2430	1.775-1.779
	654836P010	648037P010	654743P010	5.26”	5.2520-5.2530	
	654836P015	648037P015	654743P015	5.265”	5.2570-5.2580	
IO470C; O470G, M; O470GCI	654829	648028	654721	5.00”	4.9887-4.9897	2.0157-2.0197
IO470D, E, F, H, L, M, N, S, U, V; O-470U	654832	648029	654722	5.00”	4.9887-4.9897	2.0665-2.0705
	654832P015	648029P015		5.015”	5.0037-5.0047	
IO470K, J	654862	649044	654729	5.00”	4.9887-4.9897	1.7689-1.7729
	654832P015	648029P015	654729P015	5.015”	5.0037-5.0047	
O470K, L, R, S	654833	646263	654744	5.00”	4.9907-4.9922	1.977-1.981
	654833P015	646263P015	654744P015	5.015”	5.0057-5.0072	
LTSIO360E, EB, KB, RB; TSIO360A, AB, C, CB, D, DB, E, EB, F, FB, GB, H, HB, JB, KB, LB, MB, RB, SB	654859	648048	654747	4.44”	4.4270-4.4280	1.598-1.602
	654859P015	648048P015	654747P015	4.455”	4.4420-4.4430	
IO240A, B; IOF-240B; IO360A, AB, C, CB, D, DB, G, GB, H, HB, J, JB, K, KB, LB	654861	648049	654728	4.44”	4.4270-4.4280	1.591-1.595
	654861P015	648049P015	654728P015	4.455”	4.4420-4.4430	
O200A, B; O300A, C, D; C90, C145	654853	N/A	654749	4.06”	4.0517-4.0532	1.591-1.596
	654853P015		654749P015	4.075”	4.0667-4.0682	
O200D	657562	N/A	N/A	4.06”	4.0522-4.0532	1.745-1.750
GO300	654858	646279	N/A	4.06”	4.0517-4.0532	1.611-1.616
	654858P015	646279P015		4.075”	4.0667-4.0682	
C75, C85, C115, C125 (6.3:1 comp. ratio)	654841	646287	N/A	4.06”	4.0514-4.0524	1.698-1.708
	654841P015	646287P015		4.075”	4.0664-4.0674	

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