Title: **PISTONS FOR LYCOMING IO/TIO-360, GO/GSO/IGSO-480 AND IO/TIO-540 ENGINES, INCLUDING OVERSIZE**

Technical Portions are FAA DER Approved.

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Revision: **0**

1.0 **SUBJECT:** This service data documents the installation eligibility and continuing airworthiness data for replacement pistons designed and tested for use in Lycoming 360, 480 and 540 cubic inch engines using angle valve cylinders.

2.0 **BACKGROUND**: Engine Components, Inc. has obtained FAA Engineering Design and Parts Manufacturing Approval for replacement pistons designed for use in most of the Lycoming 5-1/8 inch bore angle valve engines. These pistons were tested in accordance with FAR Part 33.49 and include plus .010 inch diameter oversizes. However, the use of oversize pistons should be evaluated using the criteria listed below.

3.0 **USE OF OVERSIZE PISTONS**: Consideration for the use of oversize pistons should always include an evaluation of the cylinder bore configuration, length of expected service life, balance with opposed pistons, etc. Most cylinders produced by the original equipment manufacturers (Lycoming in this case) use a nitrided (case hardened) bore. This bore provides a good wear surface so long as the case depth is sufficient. However, boring to .010 oversize (P010) removes a considerable amount of the nitride case, and operation through a complete overhaul cycle should not be expected. However, there may be a valid consideration that the cylinder can be ground oversize and oversize pistons and rings installed to enable the engine to operate a few hundred hours to complete an operating cycle to TBO. Generally the difference in weight in opposing pistons is not sufficient to produce objectionable vibrations, but the possibility should be considered in determining the use of oversize pistons.

If the cylinder barrel has been through hardened, which is the configuration produced by ECi and at least one other production approval holder, then the cylinder bores can be oversized and operation through a complete TBO cycle can be expected.

4.0 INSTALLATION ELIGIBILITY:

Part Number	Installation Eligibility
AEL10207	**IO-360**-A1A, A1B, A1B6, A1B6D, A1C, A1C6, A1D, A1D6, A1D6D, A2A, A2B, A2C, A3B6D, A3D6D, C1A, C1B, C1C, C1C6, C1D6, C1E6, C1E6D, C1F, D1A, J1A6D, J1AD, K2D **(T)IO-360**-A3B6D, C1F **AIO-360**-A1A, A1B, A2A, A2B, B1B **HIO-360**-A1A, C1A, C1B **LIO-360**-C1E, C1E6, C1E6D **TIO-360**-A1A, A1B, A3B6 **AEIO-360**-A1A, A1B, A1B6, A1C, A1D, A1E, A2A, A2B, A2C, A2E **LHIO-360**-C1A, C1B **GO-480**-C1B6, C1D6, C2'S, G1A6, G1B6, G1D6, G1E6, G1F6, G1G6, G1H6, G1J6, G2D6, G2F6

Corporate Office • 9503 Middlex • San Antonio, TX 78217 • Tel (210) 820-8100 • Fax (210) 820-8103 • 800-ECi-2FLY (800-324-2359)
www.eci2fly.com • sales-service@eci2fly.com • FAA Repair Station #AG2R689K

Part Number	Installation Eligibility
AEL10207 (continued..)	**IO-540**-A1A5, B1A5, B1B5, B1C5, E1A5, E1B5, E1C5, G1A5, G1B5, G1C5, G1D5, G1E5, G1F5, K1A5, K1A5D, K1B5, K1B5D, K1C5, K1D5, K1E5, K1E5D, K1F5, K1F5D, K1G5, K1G5D, K1H5, K1J5, K1J5D, K1K5, L1A5, L1A5D, L1B5D, L1C5, M1A5, M1A5D, M1B5, M1B5D, M2A5D, P1A5, S1A5, U1A5D, U1B5D, AC1A5 **(T)IO-540**-E1B5 **VO-540**-C1A, C1B, C1C3, C2A, C2B, C2C **HIO-540**-A1A **IGO-540**-A1A, A1B, A1C, B1A, B1B, B1C **IVO-540**-A1A **AEIO-540**-K1A5D, K1B5, K1D5, K1F5D, K1G5, K1G5d, K1H5, K1J5, K1J5D, L1B5, L1B5D **IO-720**-A1A, A1B, A1BD, B1A, B1B, B1BD, C1B, C1BD, D1B, D1BD, D1C, D1CD
AEL10208	**O-480**-3 **GO-480**-B, B1, B1A6, B1B, B1C, B1D, D1A, D1B, D1AD, F1A6, F2A6, F2D6, F3A6, F3B6, F4A6, F4B6, F6 **IGO-480**-A1A6, A1B6 **GSO-480**-A1A6, A1C6, A2A6, B1A6, B1B3, B1B6, B1C6, B1E6, B1F6, B1G6, B1J6, B2C6, B2D6, B2G6, B2H6 **IGSO-480**-A1A6, A1B6, A1C6, A1D6, A1E6, A1F3, A1F6, A1G6 **VO-540**-A1A, A2A, B1A, B1B, B1B3, B1C, B1D, B1E, B1F, B1G, B1H3, B2A, B2C, B2D, B2E, B2G **IGO-540**-B1A, B1B, B1C **TVO-540**-A1A **IGSO-540**-A1A, A1C, A1D, A1E, A1F, A1H, B1A, B1C **TIGO-541**-D1A , D1B, E1A, G1AD **TIVO-540**-A1A, A2A, A2B
AEL10545	**TIO-360**-A1A, A1B, A3B6, C1A6D **IO-540**-M1A5D, M1B5, M1B5D, AA1A5 **TIO-540**-A1A, A1B, A1C, A2A, A2B, A2C, E1B5, F2BD, J2B, J2BD, N2BD, R2AD, S1AD, S2AD, U2A, V2AD, AE2A, AH1A, AJ1A **LTIO-540**-F2BD, J2B, N2BD, R2AD, U2A, V2AD **TIO-541**-A1A, E1A4, E1B4, E1C4, E1D4

5.0 **PISTON ASSEMBLY:** Always check piston ring end gap at the flange area of the cylinder bore after squaring with a piston. Also, the ring end gap at the head end of the barrel should be checked to ensure the rings do not butt tightly due to cylinder bore choke.

Piston ring ends that are ground or filed to adjust the gap must have the edges rounded to insure proper ring rotation during operation. Piston rings are made from cast iron, and although they seem flexible, they can be easily cracked or

broken. This is especially true for the oil ring, which in addition to having thin sections, is the final ring to fit into the cylinder bore during installation. Because the expander creates a relatively high load on the oil ring, it is often difficult to get it to transition from the ring compressor to the cylinder bore. Even slight bumping during insertion can cause small cracks to form that do not propagate to failure for several hundred hours.

Always check piston side clearance with the cylinder bore by inserting feeler gages between the piston skirt and cylinder bore 90 ° from the piston pin centerline after the piston is pushed into the bore so the piston skirt is flush with the cylinder skirt. These pistons have a slight ovality to the skirt area, and the tightest points are orthogonal (90°) to the piston pin. The engine overhaul manual and table of limits provide instructions and tolerances.