

TEXTRON Lycoming

Reciprocating Engine Division/
Subsidiary of Textron Inc.
652 Oliver Street
Williamsport PA 17701 USA

SERVICE INSTRUCTION

DATE: January 20, 1995

Service Instruction No. 1070L
(Supersedes Service Instruction No. 1070K)
Engineering Aspects are
FAA Approved

SUBJECT: Specified Fuels

MODELS AFFECTED: Textron Lycoming opposed series aircraft engines.

TIME OF COMPLIANCE: When refueling aircraft.

During the past several years significant changes have occurred in the grade designations and tetraethyl lead content of some of the commercial aviation fuels available on the world markets. These changes included the discontinuance of leaded commercial grades 91/96 and 115/145 fuels and the limited availability of 80/87 grade in U.S. as well as over seas countries. A low lead content fuel, currently designated "100LL" has been available. Also, a new unleaded, colorless AVGAS fuel, currently designated 91/96 UL has been introduced for use in a limited area of Europe. A summary of the current grades as well as the previous fuel designations are shown in the following chart.

FUEL GRADE COMPARISON CHART

Previous Commercial Fuel Grades (ASTM-D910)			Current Commercial Fuel Grades (ASTM-D910-75)			Current Military Fuel Grades (MIL-G-5572F)		
Grade	Color	Max. TEL ml/ U.S. gal.	Grade	Color	Max. TEL ml/ U.S. gal.	Grade	Color	Max. TEL ml/ U.S. gal.
80/87	red	0.5	80	red	0.5	80/87	red	0.5
91/96	blue	2.0	91/96 UL	none	0			
			*100LL	blue	2.0			
100/130	green	3.0	100	green	**3.0	100/130	blue	2.00
115/145	purple	4.6	none	none	none	115/145	purple	4.6

* - Grade 100LL fuel in some over seas countries is colored green and designated as "100L".

** - Commercial fuel grade 100 and grade 100/130 having TEL content of up to 4ml/U.S. gallons are approved for use in all engines certificated for use with grade 100/130 fuel.

The importance of using the fuel specified for a specific model Textron Lycoming engine has always been stressed in Textron Lycoming service publications. However, if the specified fuel is not available, a higher grade fuel may be used, subject in some instances to the restrictions described in the footnotes to the following Table of Specified Fuels. The chart showing specified and alternate fuels that can be safely used in no instance permits use of fuels of lower grade than that which is specified. Also, it is not permissible in any instance to use automotive fuel in aircraft engines, regardless of its octane or advertised features because of the corrosive effect of its chlorine content and because of vapor lock that could result from its high vapor pressure. Any fuel used in Textron Lycoming engines must conform with Specifications ASTM-D910 or MIL-G-5572F.

NOTE

Isopropyl alcohol in amounts not to exceed 1% by volume may be added to the fuel to prevent ice formation in fuel lines and tanks. Although approved for use in Textron Lycoming engines, isopropyl alcohol should not be used in the aircraft fuel systems unless recommended by the aircraft manufacturer.

TABLE OF SPECIFIED FUELS

Engine Models	SPECIFIED FUELS		Alternate Military and Commercial Grades
	Certificated For Use With Grade	Commercial Grade Designation	
O-235-C,-E,-H; O-290-D; O-435-A,-C	80	80	91/96 UL or ①⑤100LL or ⑤②③100 or ⑤④100/130 ②③
O-290-D2; O-320-A,-C, -E; IO-320-A,-E; AEIO- 320-E; O-340-B; O-360- B,-D; GO-435-C2*; VO- 435-A; GO-480-B,-D,-F; O-540-B; VO-540-A,-B	80/87		

* - GO-435-C2 engines with Marvel-Schebler carburetor no. 10-3991 are certificated to use 91/96 fuel.

TABLE OF SPECIFIED FUELS (CONT.)

Engine Models	SPECIFIED FUELS		Alternate Military and Commercial Grades
	Certificated For Use With Grade	Commercial Grade Designation	
O-320-B,-D; IO-320-B,-D; LIO-320-B1A; AEIO-320-D; AIO-320-A,-B,-C; O-480-A; O-360-A,-C; IO-360-B,-E; AEIO-360-B,-H; VO-360-A,-B; IVO-360-A; HO-360-A,-B; HIO-360-B; O-435-A2; GO-435-C2*; O-540-A,-D,-E,-F,-G,-H; IO-540-C,-D,-N,-T; AEIO-540-D	91/96	100LL or 100	91/96 UL or ④100/130 or ④115/145
O-235-F,-G,-J,-K,-L; IO-320-C,-F; LIO-320-C1A; IO-360-A,-C,-D,-F; LIO-360-C; AEIO-360-A; AIO-360-A,-B; HIO-360-A,-C,-D,-E; TO-360-A,-C; LIO-360-A; TIO-360-A; VO-435-A,-B; TVO-435-A,-B,-C,-D,-E,-F,-G; GO-480-C,-G; IGO-480-A; GSO-480-A,-B; IGSO-480-A; IO-540-A,-B,-E,-G,-J,-K,-L,-M,-P,-R,-S,-U; HIO-540-A; TIO-540-A,-C,-E,-F,-G,-H,-J,-N,-R,-S; LTIO-540-F,-J,-N,-R; TIO-541-A,-E; VO-540-C; IVO-540-A; TIVO-540-A; IGO-540-A,-B; IGSO-540-A,-B; TIGO-541-B,-C,-D,-E,-G; IO-720-A,-B,-C,-D	100/130	100LL or 100	④100/130 or ④115/145
O-320-H; O-360-E; LO-360-E; O-540-J,-L	100LL or 100		

* - GO-435-C2 engines with Marvel-Schebler carburetor no. 10-3991 are certificated to use 91/96 fuel.

1 - Grade 100LL or 100L in which the lead content is limited to 2 ml. of TEL per gallon are approved for continuous use in all Textron Lycoming engines listed herein. Inspection procedures described in the following footnotes are not required for engines using this fuel.

2 - O-235-C, O-290-D, -D2 and O-435-A2, -K1 (O-435-4) engines are built with solid stem exhaust valves. The use of fuels with higher lead content of more than 2 ml. of TEL per U.S. gallon must be limited to 25% of the operating time. If used for longer periods of time the same 150 hour inspection requirement, described in the following note is applicable. O-235-C and O-290-D models can be converted to use sodium cooled exhaust valves. See latest edition of Service Instruction No. 1246 for procedure.

3 - Early production O-320-A, -C, -E; GO-435; VO-435-A; and GO-480-B, -D, -F were built with solid stem exhaust valves and their use with fuels having lead content of more than 2 ml. of TEL per U.S. gallon is limited to 25% of operating time. If specified fuel is not available and usage with high leaded fuel exceeds 25% of the operating time, the valve stems should be inspected at 150 hour intervals for erosion, or "necking". This inspection is accomplished by removing the exhaust manifold and visually inspecting the valves through exhaust ports. To determine if an engine has solid stem exhaust valves, remove the rocker cover and look for valve rotor caps which are used with sodium cooled valves but not with solid stem valve in these particular engines.

4 - Continuous use of military grade 100/130 or 115/145 fuel with 4.6 milliliters of TEL per U.S. gallon can result in increased lead deposits both in combustion chambers and spark plugs causing engine roughness and scored cylinder walls. It is recommended that the use of this fuel be limited wherever possible; however, when 115/145 fuel is used, periodic inspections of combustion chambers, valves and valve ports should be conducted more frequently and spark plugs rotated or cleaned whenever lead fouling is experienced.

5 - See latest edition of Service Letter No. L185 for operating recommendations.

NOTE: Revision "L" adds new 91/96 unleaded AVGAS fuel for use in a limited area of Europe.