

48072. Received year and date giving document number, 11 July, 1944

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SUBJECT: Grade 150 Aviation Fuel. - As with the preparation of fuel for aircraft engines, there are two types of aircraft which are available. However, these are to be found in Colonel J.F. Early, Chief, Supply Division, H.Q. AFHQ, ATC 149, U.S. Army.

Reference page 200 L.A. 1000 words. In addition, the following information is available:

For purpose of clarity, the questions listed by Colonel Early are repeated below and will be answered in the same order.

1. Availability of Fuel. - It is felt above will be discussed first.

(a) For Ninth Air Force. - At the present time Grade 150 aviation fuel is blended in U.K. refineries using normal aviation fuel components plus 3% Monomethyl Aniline and 5.0 per cent Tetra-Ethyl Lead per U.S. gallon. A similar fuel is prepared in the U.S.A. by substituting Xylylene for the Monomethyl Aniline.

This year approximately 10,000 tons of Grade 150 fuel will be required.

The total production of Monomethyl Aniline in the U.K. amounts to 15,000 tons per annum. This entire production is required to meet the requirements of the Eighth Fighter Command (approximately 10,000 tons per month of finished 150 Grade), and the RAF Fighter Command (RAF defence of Great Britain), (the former requirement of approximately 12,000 tons per month of finished Grade 150 fuel in 1943). Therefore, it is recommended that no more than 5,000 tons of Grade 150 fuel be imported to the U.K. in 1944.

Therefore, in order to provide an additional quantity of Grade 150 aviation fuel, it will be necessary to import the finished fuel from the U.S.A., either to the U.K. for trans-shipment or direct from the U.S.A. to the continent. There is no substitute about 150 Grade fuel being made available in the U.S.A. Therefore, the use of Xylylene for the 150 Grade merely replaces the 150 Grade without any corresponding loss in overall production. Since over 1000 aircraft now carry 150 Grade fuel, it is recommended that it be more necessary to

(b) For Far shore only. - It would not be sufficient to replace the present 150 Grade fuel now being used on the continent with the 150 Grade, but it is strongly recommended, that if such replacement is necessary, it be complete, since there would be some difficulty if it were necessary to carry two grades of aviation fuel. It might be mentioned that the grades are now being distributed in the U.K. but with static installations, and with the many years' experience in distributing fuel under conditions in the U.K. it is not too difficult a supply problem. It is thought it might be extremely difficult in a mobile air force.

2. AVAILABILITY OF 150 GRADE FUEL

(c) For fighters only and all far shore. Medium and Heavy bombers have not been cleared for using 150 Grade fuel. The 150 Grade fuel is essentially a fighter-grade fuel and there is very little improvement in performance to be gained by using same in either medium or heavy bombers. It should be noted

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degree of benefit over an engine running on usual gasoline. It would be noted that the gain is in rich mixture performance and there is no gain whatever in the lean mixture performance which in turn might give increased range.

(c) See 1(b) and note 5 of the table. Engine and usual gasoline used.

2. When Can It Be Obtained.

DATA FOR THIS PAGE

DISCUSSION (a) Far shore distribution problems, if any, it is estimated that 150 Grade fuel could be made available within a period of 45/60 days. This would allow for shipments either direct to the U.K. from the U.S.A. or direct to the continent. Until such time as there is deep water available on the continent it would appear that all shipments of this fuel would have to be made through the U.S.S.R. since it is now impossible to receive it at ports of entry due to the severe rules of the country which prohibit the importation of 150 Grade fuel.

(b) Any problems in change over. As stated before, the far shore distribution problem would definitely be complicated if it were necessary to carry two grades. If one grade of fuel were carried then the change over could be made relatively quickly, providing the continent is then entirely "on bulk" distribution, which is likely to be the case fairly soon. At the present time, except for the U.K. and some other nations of Europe, there is no bulk distribution.

(c) Technical aspects. In general, no appreciable advantage can be gained by the use of 150 Grade fuel except at altitudes above 20,000 ft. The following advantages are claimed:

- (a) What advantages. Tests to date in this theater indicate there is no appreciable increase in lead fouling of spark plugs and deleterious effect on synthetic rubber parts. However, it has been stated by the U.S.A.F. that kylidine fuels might have a tendency to affect the synthetic parts to some extent after a period of prolonged usage. An experimental 50/5000 blend has shown 10% 2000 rpm and 1000 ft. The engine block temperature is reduced by 3000 rpm 10%

The following limiting war emergency heating manifold pressures have been established by the Eighth Air Force for the different aircraft:

TEST TO HANDLING AIRCRAFT: 1. B-17E & B-17F W.E.R. 2000 ft
THERMOCOUPLE INDICATING P-51D 1000 rpm, 100° F. 100° C. 65° F. 65° C.
TESTS ON THE P-47D WITHOUT WATER: 1000 rpm 65° F. 65° C. 62° F. 62° C.
TESTS ON THE P-47D WITH WATER: 1000 rpm 57° F. 47° C. 67° F. 47° C.

P-51B

67°

72°

TESTS ON THE P-47D

It is thought that the above manifold pressures may even be increased to some extent using 150 Grade fuel, and roughly speaking the increase in speed of fighter aircraft at altitudes below 20,000 ft. is about approximately 25 miles per hour. The increase in the rate of climb is approximately 800 ft. per minute. In addition, manifold pressures can be used at the higher ratings without danger of reaching incipient detonation, thus a greater factor of safety.