

Number: CTSO-2C705 Date of approval: Dec 25, 2020 Approved by: Xu Chaoqun

# China Civil Aviation Technical Standard Order

This China Civil Aviation Technical Standard Order (CTSO) is issued according to Part 37 of the China Civil Aviation Regulations (CCAR-37). Each CTSO is a criterion which the concerned aeronautical materials, parts or appliances used on civil aircraft must comply with when it is presented for airworthiness certification.

## **Aviation Gasoline**

#### 1. Purpose

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers applying for aviation gasoline CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards that aviation gasoline must first meet for approval and identification with the applicable CTSO marking.

#### 2. Applicability

This CTSO is applicable for new applications since CTSO goes into effect. Major design changes to aviation gasoline approved under this CTSO shall require a new authorization in accordance with CCAR-21.

#### 3. Requirements

a. Composition and process requirements of aviation gasolineAviation gasolines consist of blends of refined hydrocarbons derived

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from crude petroleum, natural gasoline, or blends, thereof, with synthetic hydrocarbons or aromatic hydrocarbons, or both. Additives include in anti-knock additives, dyes, oxidation inhibitors and electrical conductivity additives, etc. Aviation gasoline is blended by hydrocarbons and additives.

b. Minimum performance requirements

(1) Historically accepted aviation gasoline specifications

The aviation gasolines shall meet the requirements of GB 1787 Aviation Piston Engine Fuels, ASTM D910 Leaded Aviation Gasolines, ASTM D7547 Hydrocarbon Unleaded Aviation Gasoline or DEF STAN 91-090 Gasoline, Aviation, Grades UL91, 100/130 and 100/130 Low Lead, etc. Details see table 1.

No.	Aviation	Standard		
	gasoline			
1	UL91	ASTM D7547 or DEF STAN 91-090 or GB		
		1787		
2	UL94	ASTM D7547		
3	95	GB 1787		
4	100	ASTM D910 or DEF STAN 91-090 or GB 1787		
5	100LL	ASTM D910 or DEF STAN 91-090 or GB 1787		
6	100VLL	ASTM D910		

(2) Non-accepted aviation gasoline specifications

The non-accepted aviation gasolines, for example, high octane number unleaded aviation gasoline, coal-based aviation gasoline, biological aviation gasoline etc., shall meet the requirements of chapter c (2).

(3) Toluene content is not higher than 24 % (volume %) in aviation gasoline. Xylenes content is not higher than 10 % (volume %) and total aromatic content is not higher than 25 % (volume %) in aviation gasoline.

(4) The types and quantities of additives added to aviation gasoline shall conform to the relevant standards in chapter b (1), otherwise, it shall be approved by CAAC.

c. Other Requirements

In addition to meeting the relevant standards in chapter b (1), historically accepted aviation gasolines shall also meet the performance requirements of table 1 and table 2 in ASTM D7826, such as Fit-For-Purpose properties, fuel compatibility, metallic and non-metallic material compatibility, etc. Testing items are determined by CAAC.

(2) The non-accepted aviation gasolines shall meet all the performance requirements of table 1 and 2 in ASTM D7826, including in basic specification properties, Fit-For-Purpose properties, fuel compatibility, metallic and non-metallic material compatibility, rig test, engine test and flight test, etc. Testing items are determined by CAAC.

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d. Testing Laboratory

Testing laboratories shall be approved by CAAC.

e. Deviations

For using alternate or equivalent means of compliance to the criteria in this CTSO, the applicant must show that the product maintains an equivalent level of safety. The applicant must apply for a deviation under the provision of section 21.368(a) in CCAR-21.

4. Marking

The quality certificate and other applicable documents of aviation gasoline shall mark at least the following information:

a. Grade

b. CTSO or CTSOA number;

b. Manufacturer designation and address, manufacture date and batch number.

5. Application Data Requirements

The applicant shall furnish the responsible certification personnel with the related data to support design and production approval. Besides the data required by the China Technical Standard Order Authorization (CTSOA) in CCAR-21, the applicant shall also furnish the following technical data.

a. Standards or specifications involving CTSOA application;

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- b. Description of feedstock;
- c. Description of manufacturing process;
- d. Safety Data Sheet (SDS);
- e. Other data required by CAAC.

6. Application Note

Due to standards having been filled in TCDS, STC or other design approval documents, aviation gasoline is not essential for installation approval after getting this CTSOA.

7. Referenced Documents

a. ASTM standards are available from:

ASTM, 100 Barr Harbor Drive, West Conshohocken PA 19428-2959.

b. GB standards are available from:

Standard Press of China, No.16, North Sanlihe Street,

Fuxingmenwai, Beijing. Tel: 010-68523946.

c. DEF-STAN standards are available from:

Defence Standardization, 65 Brown Street, Kentigern House, UK, or

You may also order them online from www.dstan.mod.uk.

CAAC

#### Annex 1

## **Aviation Gasoline (Aviation Piston Engine Fuel)**

#### Brand name, grade number and specification: Grade 100LL low leaded Aviation Piston Engine Fuel (GB 1787-2018) CTSO: 2C705 **CTSOA** number: Designation and address of manufacturer: Product quantity and batch number: Manufacture date: Limits Results **Test Methods Property** Motor Octane Number 99.6 min Performance number min 130.0 Tetraethyl leadG<sup>a</sup> Pb/(g/L)0.56 max Net heat of combustion <sup>b</sup>/(MJ/kg) min 43.5 Dye Blue Density $^{c}(20^{\circ}C)/(kg/m^{3})$ report Distillation Initial boiling point/°C report Fuel Evaporated 10% volume percent/°C 75 max 40% volume percent /°C min 75 50% volume percent /°C 105 max 90% volume percent /°C max 135 Final boiling point / $^{\circ}\!\mathrm{C}$ 170 max Sum of 10 % + 50 % evaporated 135 min temperatures /°C Residue volume percent /% max 1.5 Loss volume percent /% 1.5 max

### **Quality Certificate (Example)**

# English Translation Version for Reference Only

CAAC

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Vapor pressure <sup>d</sup> /kPa	min	38.0~49.0					
Freezing point <sup>e</sup> /°C	max	-58.0					
Sulfur <sup>f</sup> (mass percent)/%	max	0.05					
Oxidation stability (5 h aging)							
Potential gum /(mg/100mL)	max	6					
Lead precipitate /(mg/100mL)	max	3					
Copper strip (100°C, 2h)/class	max	1					
Water-soluble acid or alkali		None					
Mechanical impurities and moisture		None					
Water reaction							
Volume change, mL	max	±2					
Note:							
a. Applies only when an electrical conductivity additive is used; when a customer specifies fuel							
containing conductivity additive, the following conductivity limits shall apply under the condition at							
point of use: Minimum 50 pS/m; Maximum 450 pS/m. The supplier shall report the amount of additive							
added.							
Conclusion:	Tested by:		Approved	Approved by:			
	Keviewed by:						

(The English version is for reference only. In case of any discrepancy

or ambiguity of meaning between this English translation and the

Chinese version, the latter shall prevail.)