Approved Model List For

ETX900-TSO Battery Installation
EarthX

STC No. SA01005DE

Revision: J
Dated: May 1, 2025

FAA APPROVED MODEL LIST
ETX900-TSO Battery Installation Airworthiness Approval

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1. Revision Log

Revision	Pages	Description	FAA Approval	Date
IR	ALL	Initial Release	See previous revision for signature	Original Issue April 8, 2021
A	ALL	Cessna Adds models 182E, 182F, 182G, 182H, 182J, 182K, 182L, 182M, 182Q Piper Adds models PA-28-140, PA-28-150, PA-28-151, PA-28-160, PA-28-161, PA-28-180, PA-28-181, PA-28-201T, PA-28-235, PA-28-236, PA-28R-180, PA-28R-200, PA-28R-201, PA-28R-201T, PA-28RT-201, PA-28RT-201T, PA-28S-160, PA-28S-180.	See previous revision for signature	May 4,2022
B	4 ALL	Corrections to AML approved models listed in Section 4. Added Cessna 182N and revised Model 182Q to include serial numbers up to 18265965 only. Corrected page numbering.	See previous revision for signature	August 1, 2022
C	4 6	Added Mooney M20 Series Models to Approved Model List in Section 4. Minor grammatical corrections to Appendix A Issue Paper.	See previous revision for signature	September 29, 2022
D	Page 4 Sect 4	Adds Aviat A-1 series models	See previous revision for signature	March 17, 2023

E	Page 5	Added Textron (Cessna) models 177, 177A, 177B, 177RG, 180A, 180B, 180C, 180D, 180E, 180F, 180G, 180H, 180J, 180K, 182, 182A, 182B, 182C, 182D, 185, 185A, 185B, 185C, 185D, 185E, A185E, A185F to Section 4, Approved Model List.	See previous revision for signature	June 9, 2023
F	Page 6	Added Textron (Cessna) models 120, 140, 150, 150A, 150B, 150C, 175, 175A, 175B, & 175C to Section 4, Approved Model List.	See previous revision for signature	July 10, 2023
G	Page 6 Page 6 Page 6	Added Piper PA-12 Series, PA-18 Series, PA-20 Series, PA-22 Series, PA-24 Series, PA-32 Series to Section 4, Approved Model List. Added Cessna 180 from TCDS 5A6 to Item 6. Added Cessna P172D from TCDS 3A17 to Item 7.	See previous revision for signature	July 14, 2023
H	All Page 2 Page 7	Reformatted footer with addition page number Added model specific limitation for Cub Crafters model CC19-180 in Section 2.2. Added Cub Crafters CC19-180, CC19-215, and Top Cub CC18-180, CC18-180A to Section 4, Approved Model List.	See previous revision for signature	February 08, 2024

I	All Page 6 Page 8 Page 8 Page 9	Reformatted footer with addition page number Added model specific limitation for Utility and Acrobatic airplane to Section 2.2. Corrected Regulation 23.867 Amendment from 23-49 to 23-62. Corrected Piper Model identified as PA-23-301FT to model PA-32-301FT. Added Normal Category Hawker Beechcraft Corporation Models from TCDS A1CE, and Normal Category Luscombe Models from TCDS A-694, and Normal Category Commander Aircraft Corporation Models from TCDS A12SO, and Normal Category Sierra Hotel Aero, Inc. Models from TCDS A-694 to Section 4, Approved Model List.	See previous revision for signature	July 24, 2024
J		Updated document to remove installation limitations and added additional models to the Approved Model Listed in Section 4. Updated list of 14 CFR compliance and new S-2 Issue Paper requirements.	*for* Gregory S. DiLibero Manager, West Certification Branch Compliance & Airworthiness Division Aircraft Certification Service JERRY RAMOS Digitally signed by JERRY RAMOS Date: 2025.05.13 11:53:02 -07'00' Date: _____	May 1, 2025

2. Introduction

This document is the Federal Aviation Administration (FAA) Approved Model List (AML) for Supplemental Type Certificate (STC) Number SA01005DE, for installing the EarthX Inc. ETX900-TSO Battery into eligible aircraft.

Revisions to the AML must be coordinated between the STC holder and the responsible ACO Branch and require FAA approval. This AML is only applicable to the aircraft listed in paragraph 4.

2.1 Prerequisites

For an approved model (see paragraph 4) to be eligible for this STC installation, specific conditions must be met (paragraph 2.2.1) and meet the specific serial number limitations of paragraph 2.2.2.

2.2 LIMITATIONS

2.2.1 Limitations - ALL models:

Limitation Number	Limitations for ALL models
1	To prevent battery overcharging, Over Voltage Protection (OVP) means/ equipment in the battery charging system is required.
2	The installer must determine if this design change is compatible with previously approved modifications.
3	The modified airplane must be maintained in accordance with the Instructions for Continued Airworthiness (ICA) document.
4	A copy of this certificate must be maintained as part of the permanent records for the modified aircraft.
5	If the holder agrees to permit another person to use this certificate, the holder shall give the other person written evidence of that permission.
6	Installation limited to 14 DC volts electrical systems.

2.2.2 Limitations - Model Specific:

The following airplanes models certified in Categories other than Normal are not eligible for installation of the EarthX ETX900-TSO battery.

1. **Textron 172N up to serial number 17269309,**
2. **Textron R172K serial numbers R1722000-R1722724**

3. Certification Basis

The certification basis for each qualified model listed in paragraph 4 is as specified in its Type Certificate Datasheet (TCDS) and as modified by this STC's type design at the amendment levels noted in the appendix A.

4. Approved Model List

Item	Aircraft Make	Aircraft Model	TC Data Sheet	Certification Basis	Master Document List/Date	Instructions for Continued Airworthiness	Airplane Flight Manual Supplement	Notes	Initial Approval / Amendment Date
1	Textron Aviation Inc.	182P	3A13	CAR 3 with amendments as noted in Appendix A, Table 1.	EarthX Doc. No. D18120 Rev. B, dated April 8, 2021 or later FAA approved revision.	EarthX Doc. No. 180426 Rev. B, dated July 31, 2020 or later FAA approved revision.	N/A	None	Initial Approval April 8, 2021
2	Textron Aviation Inc.	182E, 182F, 182G, 182H, 182J, 182K, 182L, 182M, 182N, 182Q to Serial Number 18265965.	3A13	CAR 3 with amendments as noted in Appendix A, Table 1.	EarthX Doc. No. D18120 Rev. C, dated February 15, 2022 or later FAA approved revision.	EarthX Doc. No. 180426 Rev. C, dated September 11, 2021 or later FAA approved revision.	N/A	(1) (2)	May 5, 2022/ August 1, 2022
3	Piper Aircraft Inc.	PA-28-140, PA-28-150, PA-28-151, PA-28-160, PA-28-161, PA-28-180, PA-28-181, PA-28-201T, PA-28-235, PA-28-236, PA-28R-180, PA-28R-200, PA-28R-201, PA-28R-201T, PA-28RT-201, PA-28RT-201T, PA-28S-160, PA-28S-180	2A13	CAR 3 with amendments as noted in Appendix C, Table 1.	EarthX Doc. No. D18120 Rev. D, dated March 17, 2022 or later FAA approved revision.	EarthX Doc. No. 180426 Rev. C, dated September 11, 2021 or later FAA approved revision.	N/A	(1) (2)	May 5, 2022
4	Mooney International Corporation	M20 Series Models: M20E (SN 24-470 and on), M20F (SN: All), M20J (SN 0001-02999), M20K (SN: 0001-0999)	2A3	CAR 3 with amendments as noted in Appendix A, Table 1.	EarthX Doc. No. D18120 Rev. E2, dated September 9, 2022 or later FAA approved revision.	EarthX Doc. No. 180426 Rev. C, dated September 11, 2021 or later FAA approved revision.	N/A	(1) (2)	September 29, 2022
5	Aviat Aircraft Inc.	A-1 Series Models: A-1, A-1A, A-1B, A-1C-180, A-1C-200	A22NM	CAR 3 with amendments as noted in Appendix A, Table 1.	EarthX Doc. No. D18120 Rev. F, dated September 18, 2022 or later FAA approved revision.	EarthX Doc. No. 180426 Rev. C, dated September 11, 2021 or later FAA approved revision.	N/A	(1) (2)	March 17, 2023

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6	Textron Aviation Inc	177, 177A, 177B	A13CE	CAR 3 with amendments as noted in Appendix A, Table 1.	EarthX Doc. No. D18120 Rev. G1, dated April 20, 2023 or later FAA approved revision.	EarthX Doc. No. 180426 Rev. C, dated September 11, 2021 or later FAA approved revision.	N/A	(1) (2)	June 9, 2023
		177RG	A20CE						
		180, 180A, 180B, 180C, 180D, 180E, 180F, 180G, 180H, 180J, 180K	5A6						
		182, 182A, 182B, 182C, 182D	3A13						
		185, 185A, 185B, 185C, 185D, 185E, A185E, 185F	3A24						
7	Textron Aviation Inc	120, 140	A-768	CAR 3 with amendments as noted in Appendix A, Table 1.	EarthX Doc. No. D18120 Rev. H1, dated June 30, 2023 or later FAA approved revision.	EarthX Doc. No. 180426 Rev. C, dated September 11, 2021 or later FAA approved revision.	N/A	(1) (2)	July 10, 2023
		150, 150A, 150B., 150C	3A19						
		175, 175A, 175B., 175C, P172D	3A17						
8	Piper Aircraft Inc.	Models: PA-12, PA-12S	A780	CAR 3 with amendments as noted in Appendix A, Table 1.	EarthX Doc. No. D18120 Rev. I1, dated June 30, 2023 or later FAA approved revision.	EarthX Doc. No. 180426 Rev. C, dated September 11, 2021 or later FAA approved revision.	N/A	(1) (2)	July 13, 2023
		Models: PA-18, PA-18A, PA-18S, PA-18AS	1A2						
		Models: PA-20, PA-20S	1A4						
		Models: PA-22, PA-22-108, PA-22-135, PA-22-150, PA-22S-150, PA-22-160, PA-22S-160	1A6						
		Models: PA-24, PA-24-250, PA-24-260, PA-24-400	1A15						
		Models: PA-32-260, PA-32-300, PA-32S-300, PA-32R-300, PA-32RT-300, PA-32RT-300T, PA-32-301FT, PA-32-301XTC, PA-32R-301, PA-32R-301T, PA-32-301, PA-32-301T	A3SO						

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9	Cub Crafters, Inc.	CC19-180, CC19-215	A00053SE	14 CFR Part 23 with amendments as noted in Appendix A, Table 1.	EarthX Doc. No. D18120 Rev. J2, dated 01/15/2024, or later FAA approved revision.	EarthX Doc. No. 180426 Rev. C, dated September 11, 2021 or later FAA approved revision.	N/A	(1) (2)	February 08, 2024
	Topcub Aircraft, Inc.	CC18-180, CC18-180A	A00006SE						
10	Textron Aviation Inc.	19A, B19, 23, A23, A23A, A23-19, A23-24, B23, C23, A24, A24R, B24R, C24R	A1CE	14 CFR Part 23 with amendments as noted in Appendix A, Table 1.	EarthX Doc. No. D18120 Rev. K3, dated 07/22/2024, or later FAA approved revision.	EarthX Doc. No. 180426 Rev. C, dated September 11, 2021 or later FAA approved revision.	N/A	(1) (2)	July 24, 2024
	Luscombe Aircraft Corporation	LUSCOMBE 8, 8A, 8B, 8C, 8D, 8E, 8F	A-694						
	Commander Aircraft Corporation	COMMANDER 112TC, 112B, 112TCA, 114, 114A	A12SO						
	Sierra Hotel Aero, Inc.	NAVION (Army L-17A.), Navion A (Army L-17B and L-17C), Navion B, Navion D, Navion E, Navion F, Navion G, Navion H	A-782						
11	Textron Aviation Inc.	172, 172A, 172B, 172C, 172D, 172E, 172F, 17G2, 172H, 172I, 172K, 172L, 172M, 172N*, R172E, R172F, R172G, R172H, R172J, and R172K*	3A12	14 CFR Part 23 with amendments as noted in Appendix A, Table 1.	EarthX Doc. No. D18120 Rev. M, dated 3/18/2025, or later FAA approved revision.	EarthX Doc. No. 180426 Rev. G, dated 2/15/2025 or later FAA approved revision.	EarthX Doc. No. ETX-900-TSO-AFMS Rev IR., dated 3/27/2025 or later FAA approved revision.	(1) (2)	May 1, 2025
	Aviat Aircraft Inc.	S-1S, S-1T, S-2, S-2A, S-2S, S-2B, S-2C	A8SO						

NOTE (1): All models added have been evaluated on a specific Model Evaluation Summary (MES) report that substantiates each model addition per the STC's Model Qualification Process (MQP) document D18114

(2): See paragraph 2 for Limitations for all Models and any Model Specific Limitations

Appendix A: STC Certification Basis

All models shown in paragraph 4 fall within the STC's certification basis shown below

Based on §§ 21.115 and 21.101, and the FAA policy for significant changes in FAA Order 8110.48, the certification basis is as follows:

a. As determined by the Type Certificate Data Sheet (TCDS) for the aircraft for parts **not changed or not affected** by this STC.
b. Regulations at the amendment levels listed in Table 1 below for parts **changed or affected** by the STC since the reference date of application, March 31, 2021.
c. Means of Compliance Issue Paper, SE-1, dated January 9, 2020 approved and closed on January 28, 2020, Installation of Rechargeable Lithium Batteries and Battery Systems on Aircraft is applicable to this modification.

Table 1: Certification Basis Including Amendments and Issue Paper Requirements

Regulations	Amdt.
CAR 3	
3.381(a)	3-0
3.382	3-0
14 CFR part 23	
§ 23.301(a)(b)(c)	23-48
§ 23.303	23-0
§ 23.305(a)(b)	23-45
§ 23.307(a)	23-0
§ 23.561(e)	23-62
§ 23.601	23-0
§ 23.603	23-23
§ 23.605(a)	23-23
§ 23.607(b)	23-48
§ 23.609	23-0
§ 23.611	23-48
§ 23.613	23-45
§ 23.619	23-7
§ 23.625(a)(b)(c)	23-7
§ 23.771(a)	23-14
§ 23.773(a)(1)(2)	23-63
§ 23.853(a)	23-62
§ 23.863	23-34
§ 23.867	23-49
§ 23.1183(a)	23-51
§ 23.1301	23-62
§ 23.1309(a)(c)(d)	23-62

Regulations	Amdt.
§ 23.1322	23-43
§ 23.1351(a)(1)(2)(i)(b)(1)(i)(ii)(2)(3)	23-49
§ 23.1357(a)(b)	23-43
§ 23.1359(a)(c)	23-49
§ 23.1365(a)(d)(e)	23-49
§ 23.1367	23-0
§ 23.1431(b)	23-62
§ 23.1529	23-26
§ 23.1541(a)(2)(b)	23-21
§ 23.1581(a)(b)(c)(f)	23-50
§ 23.1585(a)(j)	23-21
§ 23.2005	23-64
§ 23.2325(g)	23-64
§23.2410	23-64
§23.2440(c)(1)	23-64
§ 23.2500	23-64
§ 23.2505	23-64
§ 23.2510	23-64
§ 23.2520	23-64
§ 23.2525(a)(b)(c)	23-64
§ 23.2605	23-64
§ 23.2610	23-64

Stage 4 Method of Compliance Issue Paper (IP) SE-2, dated 5/23/2023 identifies the following requirements.

Safety Objectives:

SO 1: Be designed to maintain safe cell temperatures and pressures under all foreseeable operating conditions to prevent fire and explosion.

SO 2: Be designed to prevent the occurrence of self-sustaining, uncontrollable increases in temperature or pressure, and automatically control the charge rate of each cell to protect against adverse operating conditions, such as cell imbalance, back charging, overcharging, and overheating.

SO 3: Not emit explosive or toxic gases, either in normal operation or as a result of its failure that may accumulate in hazardous quantities within the airplane.

SO 4: Meet the requirements of §23.2325(g).

SO 5: Not damage surrounding structure or adjacent systems, equipment, components, or electrical wiring from corrosive or any other fluids or gases that may escape in such a way as to cause a major or more-severe failure condition.

SO 6: Have provisions to prevent any hazardous effect on airplane structure or systems caused by the maximum amount of heat it can generate due to any failure of it or its individual cells.

SO 7: Have a failure sensing and warning system to alert the flight crew if its failure affects safe operation of the airplane.

SO 8: Have a monitoring and warning feature that alerts the flight crew when its charge state falls below acceptable levels if its function is required for safe operation of the airplane.

SO 9: Have a means to disconnect from its charging source in the event of an over-temperature condition, cell failure or battery failure.

Additional IP Compliance Requirements:

The Instructions for Continued Airworthiness (ICA) required by Appendix A to 14 CFR part 23 must include the following;

1. Maintenance requirements to replace each rechargeable lithium battery within an interval that will ensure there is sufficient charge to power equipment.

2. A requirement to only replace rechargeable lithium batteries with batteries from the same manufacturer with the same part number or to obtain a new FAA approval for installing a different battery. Refer to the battery Original Equipment Manufacturer maintenance manual.

3. Procedures to ensure that each rechargeable lithium battery has not:
- Experienced degraded charge retention ability or other damage during storage.
- Been damaged from environmental or physical impacts such as mechanical shock, vibration, heat and possible abuses encountered during storage, transportation prior to their installation or maintenance activities on or around them.

4. Precautions to prevent mishandling of replacement rechargeable lithium batteries prior to their installation which could result in short-circuit or other unintentional damage.

For Lithium Battery installed in a Designated Fire Zone (DFZ)

Installation in a DFZ should be avoided but may be acceptable if the battery location does not create an additional hazard. The battery external fire threat when located in a DFZ is a 2000º F flame for 15 minutes per AC 20-135. The heat generated by this flame may cause multiple cells to enter thermal runaway along with damage to the battery containment system resulting in uncontrolled fire or explosion.

Compliance to §23.2440(c)(1) includes the following:

1. Exposing the battery installation to a 20000 F flame for 15 minutes will not result in a hazard to the airplane, and

2. Minimize the risk of fire in the DFZ by venting and directing any potential flammable material from the battery out of the fire zone in the event of a battery thermal runaway**.**

3. The vent system (if applicable) must function in the event of a fire in the DFZ unless it is shown that the failure of the vent does not create a hazard.

Uncontained Engine or APU Rotor Failures: Sections 23.2410 and 23.2510 at Amendment 23-64:
Not Applicable

Battery Thermal Runaway Containment Test (RTCA/DO-311A, Section 2.4.5.5)

Section 2.4.5.5 describes the test methods for battery thermal runaway containment, which intends to force the entire battery into a thermal runaway state. This may not be feasible for very large high capacity systems (e.g., systems used for propulsion applications). To address the feasibility of very large high capacity battery system testing, this section of the issue paper defines a module or sub-pack as a battery system divided into smaller configurations to help in testing and validating the safety implication of the battery system. The battery and battery system can be designed into several smaller modules or sub-packs. Each module has an assembly of cells electrically connected and enclosed in a single enclosure. Each sub-pack has an assembly of electrically connected modules that is enclosed by a single enclosure. The venting design of the sub-pack, module, and cells need to be considered in the mitigation strategy.

In order to successfully comply with the requirement of the RTCA DO-311A, section 2.4.5.5 test, it is acceptable to use a modularized/sub-pack battery system design.

Coordinate as soon as possible with the FAA on the proposed design methodology.

For Lithium Battery installed in Acrobatic and Utility Category Aircraft

Installation in acrobatic and utility category aircraft pose unique environmental conditions related to loading and orientation. These conditions cannot create additional hazards.

Thermal Runaway effects can be affected by the orientation of the battery. Acrobatic maneuvers involving high G loads may also impact battery performance. Both of these potential issues need to be addressed by the applicant and/or battery OEM via the operating and/or installation instructions.

All orientations not tested and validated by the OEM and documented in the installation manual need to be evaluated for any additional hazards to the aircraft and occupants.