

July 15, 2024

Michael Walker, CEO  
STAX Engineering, Inc.  
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Dear Michael Walker:

California Air Resources Board (CARB) staff have reviewed the "Addendum to February 28, 2023 Test Plan" submitted June 21, 2024, and request for Executive Order (EO) for container vessels for the STAXbox 2-1 capture and control system for auxiliary marine diesel engines on container vessels.

The purpose of the "Addendum to February 28, 2023 Test Plan" was to verify and attest that STAXbox 2-1 is a duplicate of STAXbox 1-1, the system approved under EO G-23-294. Since STAXbox 2-1 is a duplicate of the already approved STAXbox 1-1, STAXbox 2-1 is eligible for EO approval and can be added to an approved equipment list.

For duplicate systems (once they are confirmed as duplicates) that are identical to one that CARB previously approved through an EO, the CARB Approved Emission Control Strategy (CAECS) operator may request that the duplicate system be added to an approved equipment list attached to the previously issued EO. Once an updated EO is issued, the duplicate system may operate as a CAECS to comply with the 2020 At Berth Regulation. Each duplicate system will be required to complete in-use compliance testing, confirming the performance of the duplicate equipment per section 93130.5(j) of the 2020 At Berth Regulation, and must submit test data to CARB within six months of operation or 30 vessel visits, whichever comes first. If the CAECS operator fails to submit test results for the new system within the specified timeframe, or if the new system fails to perform equivalently to the original approved system, the Executive Officer may revoke its approval of the duplicate system and remove it from the EO.

The following in-use compliance tests must be conducted on duplicate equipment within 6 months or 30 vessel visits, whichever comes first after the duplicate equipment is approved and added to the Executive Order.

1. Third-party source testing for all pollutants listed in section 93130.5 (g) at one load point following the requirements and test methods listed in section 93130.5(g) with Relative Accuracy Test Audit (RATA) testing.
2. Third-party capture efficiency testing at one load point.
3. Durability testing on a minimum of 5 vessels and a minimum of 200 hours.

STAX must conduct the above in-use compliance testing on the duplicate equipment (STAXbox 2-1) within 6 months (by January 15, 2025) or 30 vessel visits, whichever comes first.

CARB staff’s review of STAX’s “Addendum to February 28, 2023 Test Plan” for container vessels was based on the requirements in the 2020 At Berth Regulation and STAX’s Test Plan for container vessels, submitted on February 28, 2023.

We are pleased to inform you that we have approved STAXbox 2-1 to be a duplicate of STAXbox 1-1 and are issuing the enclosed Executive Order G-23-294-001. Executive Order EO G-23-294 is hereby superseded and is of no further force and effect.

Executive Order G-23-294-001 identifies the monitoring, reporting, and recordkeeping requirements for the STAXbox systems (STAXbox 1-1 and STAXbox 2-1) and stipulates the approved operating conditions for the use of the STAXbox systems, which are identified in the table below.

Parameter	Value
Ocean-going vessel engine type	One auxiliary engine
Ocean-going vessel type	Container vessel
Ocean-going vessel fuel composition limitation	Marine distillate fuel meeting 0.1% sulfur content limit (0.1% sulfur marine gas oil (MGO) or marine diesel oil (MDO)), or R99/R100 renewable diesel fuels that meet the specifications of MGO/MDO
Selective catalytic reduction inlet operating temperature range in degrees Fahrenheit (°F)	600 - 720°F
Ocean-going vessel engine maximum continuous rating (MCR) in kilowatts (kW)	3,500 kW
Ocean-going vessel allowable operating range (kW)	266 kW to 890 kW
Allowable exhaust flow rate in standard cubic feet per minute (scfm)	3,642 to 6,330 scfm of engine exhaust
Maximum engine exhaust temperature requirements	1,000°F
Static Pressure	Differential pressure between -2 to -20 inches of water across the diesel particulate filter
Other parameters that affect performance	1-2 inches of water back pressure at the capture system inlet
GRID Neutral Target - CA CO <sub>2</sub> e state output emission rate from eGRID2021 in pounds per megawatt hour (lb/MWh)	480.5 lb/MWh
Maximum CAECS auxiliary generator operating load (kW)	320 kW

Parameter	Value
CAECS auxiliary generator renewable diesel carbon intensity limit in grams of carbon dioxide equivalent per megajoule of fuel (g CO <sub>2</sub> e/MJ)	20.1 g CO <sub>2</sub> e/MJ fuel
Maximum ammonia slip emissions in parts per million by volume, dry basis (ppmdv)	5 ppmdv averaged over 60 minutes

Executive Order G-23-294-001 identifies the approved STAXbox systems and the vessel and engine types for which the STAXbox systems are approved to control in the approved equipment list (Attachment 1 of Executive Order G-23-294-001) and identified below.

Approved Equipment List

Barge	STAXbox	Ocean-going Vessel Type	Ocean-going Vessel Engine Type	Capture Hood Type	In-Use Compliance Testing
Xcraft-1	STAXbox 1-1	Container vessel	One auxiliary engine	Flex duct	Original STAXbox system approved, and not a duplicate. No Requirement.
Xcraft-2	STAXbox 2-1	Container vessel	One auxiliary engine	Flex duct	Test data must be submitted to CARB within 30 vessel visits or by January 15, 2025, whichever comes first.

STAXbox 2-1 has been granted Executive Order G-23-294-001 under the 2020 At Berth Regulation, California Code of Regulations, title 17, section 93130.5(e)(3) and the approved equipment (STAXbox 1-1 and STAXbox 2-1) may operate under the terms specified in the Executive Order as a CAECS for five years from the date when STAXbox1-1 was approved (December 4, 2023) before needing to apply for an extension, as specified in section 93130.5(i)(1).

If you have any questions, please contact Angela Csondes, Manager, Marine Strategies Section, at [angela.csondes@arb.ca.gov](mailto:angela.csondes@arb.ca.gov).

Sincerely,



Bonnie Soriano, Chief, Freight Activity Branch, Transportation and Toxics Division

Attachment: Executive Order G-23-294-001

cc: Angela Csondes, Section Manager, Marine Strategies Section