

DEVELOPMENT OF AS6826/4: POWERPLANT FIRE TEST BOUNDARY CONDITIONS

SAE A-22 Group D

Co-Chairs: Palmer Booth and Gregg Wozniak

Background

- For type certification, Applicants must show that each component, having a fire protection requirement, can withstand the effects of fire.
 - Certain intended functions that must be maintained include (but not limited to) fire containment, load carrying, and conveyance of flammable fluids.
- During fire testing, boundary conditions other than the standard flame often need to be applied to the component being tested.
 - Currently, limited guidance exists regarding requirements for the application of boundary conditions during fire testing.
 - FAA AC 20-135 Change 1 contains limited instructions to vibrate composite/bonded firewalls during testing.
- Consequently, inconsistencies exist amongst Applicants regarding the manner by which boundary conditions are determined for powerplant fire test plans.

- The SAE A-22 Committee formed the 'Working Group D' subgroup to author guidance material to standardize both the Applicant approach to and Administrator expectations for the determination of boundary condition values that are to be prescribed in powerplant fire test plans.
- Group D is proposing for Administrator consideration, via AS6826/4, a series of clarifications/recommendations intended to supplement the guidance already provided by the existing governing literature for powerplant fire testing, FAA AC 20-135 Change 1.
 - *“This Aerospace Standard is intended to provide supplemental guidance beyond that provided in FAA AC 20-135 for a methodology to determine the appropriate test article boundary condition values to apply during a powerplant fire test and to encourage that a consistent compliance approach be applied across industry.”*

SAE A-22 Guidelines

- Group D is NOT proposing new requirements for Administrator consideration.
 - SAE A-22 is a recommendation-making body based upon industry test experience and best practices, to satisfy the current requirements.
 - As such, SAE A-22 is NOT a rule-making body, and we appreciate the input of our Administrator participants in this regard.

Participants

- Group D roster: ~20 international industry participants representing aircraft manufacturers, nacelle manufacturers, engine manufacturers, component manufacturers, and test facilities.
- Special thanks to Administrator representatives Philip Haberlen (FAA), Scott Johnson (FAA), Robert Bowden (TC), Roop Dhaliwal (TC), and Khalid Iqbal (TC) for consistently committing their time, effort, and expertise.
- Special thanks to SAE representative Maureen Lemankiewicz for her guidance and governance throughout.

AS6826/4 Presently

- AS6826/4, while still in draft form as of today, is considered as being mature.
- Document content:
 - Discusses reasoning for the need for fire test boundary conditions and the need for standardization amongst Applicants and Administrators,
 - Addresses ground and flight regimes for both 5- and 15-minute tests,
 - Establishes design element categories as 'structure' and 'system',
 - Identifies typical boundary conditions for structures and systems, and
 - Prescribes methodology for quantifying boundary condition values.
- Document scope:
 - Not practical to prescriptively address every conceivable scenario.
 - Focuses on the typical/majority of design configurations and operational conditions; accommodations are included for unique circumstances.

Boundary Conditions – Structures

- Structures:
 - Induced vibration,
 - Mechanical load,
 - Delta-pressure (differential pressure), and
 - Backside cooling.

Note: all might not apply to each test article.

Boundary Conditions – Systems

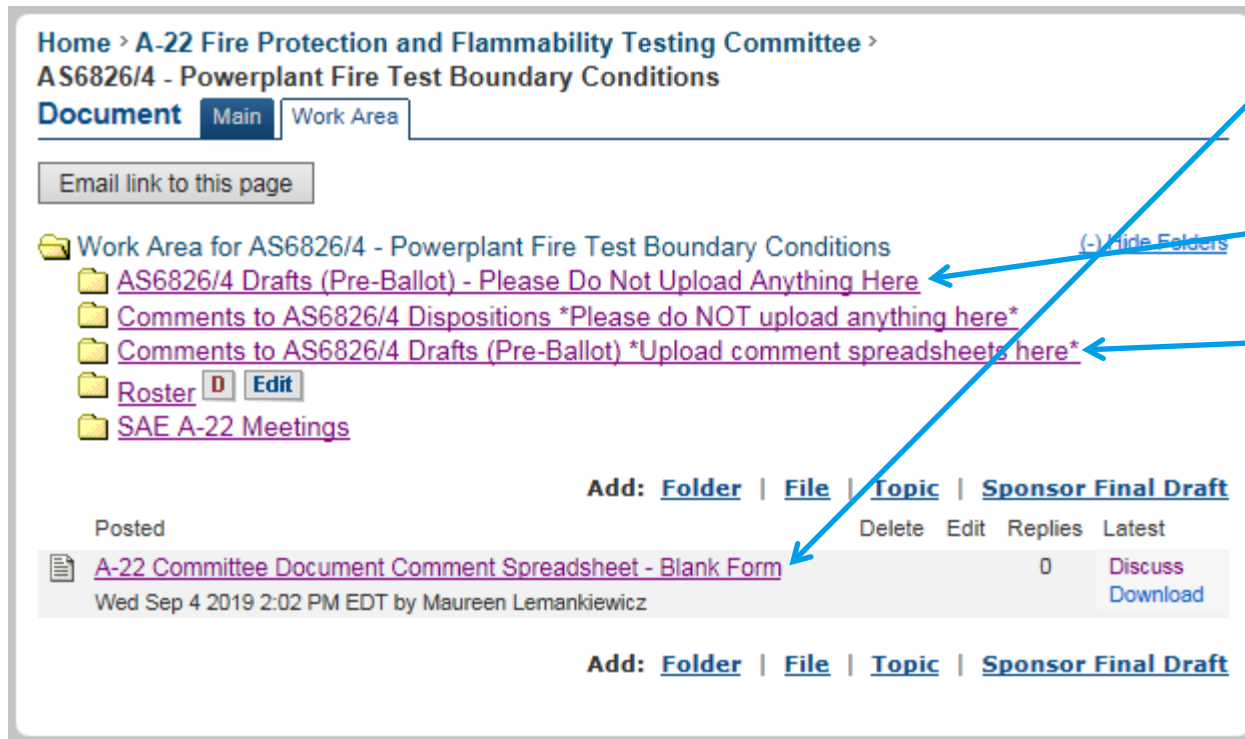
- Systems:
 - Induced vibration,
 - Function,
 - Pressure,
 - Flow,
 - Test fluid,
 - Fluid temperature,
 - Fluid reservoir quantity, and
 - Component rotational speed.

Note: all might not apply to each test article.

- Presently, AS6826/4 is in pre-ballot review.
 - Standardized comment form is available in the A-22 Group D work area.
 - Thank you to those reviewers that have already provided comments.
 - All comments received are being catalogued and dispositioned by the document authors:
 - Agree, and incorporate, or
 - Disagree, and document rationale.
 - Comment dispositioning is transparent:
 - Document authors are dispositioning what's obvious/noncontroversial; group discussion if/when/as required.
 - Comments, comment logs, and comment dispositions are all available to and accessible by committee members.

Group D Work Area

- Files and folders used during commenting (three easy steps):



1. Standardized comment form
2. Current draft of AS6826/4
3. Comment repository

Note: for ease of use, file names are uniquely titled by date.

Group D File Naming Convention

- For ease of use and traceability, every filename includes the date:










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Document **Main** Work Area

Email link to this page

Work Area for AS6826/4 - Powerplant Fire Test Boundary Conditions

AS6826/4 Drafts (Pre-Ballot) - Please Do Not Upload Anything Here

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1. 11 Oct 2019
 2. 04 Oct 2019
 3. 19 Sep 2019
- etc.

- SAE A-22 Working Group D will continue weekly meetings to bring AS6826/4 to completion:
 - Need to keep ‘pushing the ball forward’.
 - Incremental document updates will continue to be made available to committee members.
- Timetable for document maturation will be a function of comment type/quantity:
 - Finalized draft: ~ November 2019.
 - Submittal for balloting: ~ November 2019.
 - SAE balloting: ~ November 2019 – March 2020.
 - Publication: ~ March 2020 – June 2020.

Summary

- Inconsistencies exist amongst Applicants regarding the manner by which boundary conditions are determined for powerplant fire test plans.
- SAE A-22 Group D is authoring AS6826/4, Powerplant Fire Test Boundary Conditions, to standardize both the Applicant approach to and Administrator expectations for the determination of boundary condition values that are to be prescribed in powerplant fire test plans.
- Industry participation has been open, honest, and collaborative; we thank the contributions from the Administrator representatives.
- Document is presently in review and a formalized comment disposition process is in place.
- Additional membership is always welcome.

Thank You

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