SAE A-22 AND AC20-135 REVISION – STATUS
INTERNATIONAL AIRCRAFT SYSTEMS FIRE PROTECTION
FORUM

August 5th 2020

Phil Dang (Honeywell), John Ostic (Boeing) - Co-chairs
In an effort to work with Industry on accepting the Next Gen Burner the FAA requested SAE to form the A-22 committee. While working on AC 20-135 the FAA agreed to revise the AC to address several concerns Industry has for improvement.
The objectives of the committee are to:

- Develop and publish SAE Technical Reports for testing of fire protection systems, components and structure
- Define test requirements for aircraft and propulsion systems
- Develop performance standards for certification testing of aircraft and propulsion systems
- Define the sensitivities and accuracy of equipment used to conduct fire and flammability testing
- Harmonize global testing methodologies

INITIAL PROGRAM OF WORK

Develop SAE standards or recommended practices to address the FAA Tasking Request to develop industry standards to update AC20-135, *Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards and Criteria*. The proposed standards will be used to demonstrate compliance with powerplant fire protection requirements. In addition, methods to calibrate and setup a new sonic burner as an optional replacement for existing fire test burners will be developed.

The new AS6826 fire test standards are intended to provide acceptable means of compliance to be recognized in a revision to the FAA AC20-135.*

*similar example as AC20-155A for Lightning Protection*
SAE A-22 Committee Basics – Growing from 50+ in May 2018 to 140+ as of August 2020

Current SAE roster lists 140+ participants from across the entire industry

### Airplane Manufacturers
- Airbus
- Boeing
- Bombardier
- COMAC
- Dassault
- Embraer
- Gulfstream
- Mitsubishi
- Textron/Cessna

### Certification Authorities
- Brazil (ANAC)
- Canada (TCCA)
- China (CAAC)
- Europe (EASA)
- Israel (CAAI)
- United States (FAA)

### Government Institutions
- FAA Tech Center
- Naval Air Systems Command (NAVAIR)
- National Research Council (Canada)
- ONERA (France)

### Academia/Research
- Concordia Univ. Montreal
- Rescoll (Bordeaux Univ.)
- University of Cincinnati
- Wichita State University

### Engine Manufacturers
- GE
- Honeywell
- Pratt & Whitney
- Rolls-Royce
- SAFRAN

### Components Manufacturers
- Air Liquide Tech
- Akro Fire
- Eaton
- JPR Hutchinson
- Meggitt
- Luxfer MEL Tech.
- Parker
- Titeflex
- Trelleborg
- Triumph
- Unison Industries

### Helicopter Manufacturers
- Airbus
- Bell/Textron
- Sikorsky/Lockheed

### Industry Consultants
- Danker Associates
- GE Aviation
- Marlin Engineering
- Nacelle Engineering
- Waldron Aerospace

### Testing Facilities
- ACES
- Accufleet
- Aeroblaze
- CTA
- DGA
- Element
- Govmark
- Lefae-Emitech
- NIAR
- NTS
- Resonate

### Commodity Manufacturers
- Air Liquide Tech
- Akro Fire
- Eaton
- JPR Hutchinson
- Meggitt
- Luxfer MEL Tech.
- Parker
- Titeflex
- Trelleborg
- Triumph
- Unison Industries

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### Standards Org.
- NACE
- SAE
In addition to the original task of developing a fire test standard, the FAA has requested that the Committee take on several new tasks beginning in 2020:

- Combustor burn-through
- Fire size for analysis of structure and components
- Fireproof requirements for engine mounts

New working groups have been formed for these tasks. The scope for the tasks is still being negotiated with the FAA.

Committee effort now divided into 7 different working groups:

- Phase 1 - AS6826 Powerplant Fire Test Standard publication, end of 2020 or 1Q21
- Phase 2 - new tasks kick off in 3Q20 for 2021-2022 time frame

The Committee also anticipates additional tasks when the fire test standard is completed, including defining additional modification to the NextGen burner for powerplant use.
SAE A-22 Committee Structure – 4 established working groups since May 2018 to develop AS6826 Powerplant Fire Test Standard – Phase 1

**Group A - AS6826/2**
J. Ostic (Boeing), B. Ciero (Honeywell), M. Kelly (Resonate)
- Temperature Calibration Method
- Heat Flux Calibration Method
- Temperature and Heat Flux instrumentation recommendation

**Group B – AS6826/3**
D. Laborie (GE), P. Wittman (MRA Systems), A. Cirioli (Sikorsky)
- Prescriptive Test Pass/Fail Criteria
- Post Test Burning or Residual Flame prescriptive proposal – difficult topic with significant compliance variations

**Group C – AS6826/1**
S. Pugliese (Airbus), J. Barter (Bombardier)
- Standard Flame, Acceptable Burner
- Fire Test Guidelines, Panel Size, Material Thickness, Burner Position, Orientation, Applicable Regulations

**Group D – AS6826/4**
P. Booth (Dassault) & G. Wozniak (Gulfstream)
- Fire Test Boundary Conditions
- Vibration, Mechanical Loading, Pressure Differential, Backside Cooling, System Pressure/Temperature/Flow/Speed
SAE A-22 Committee Structure – New rotorcraft group and 2 New groups for Phase 2 tasks in 2020

Group E - Rotorcraft
T. Parsons (Bell)

• Objective: provide rotorcraft inputs to fire test pass/fail criteria (group B) and boundary conditions (group D); Phase 1

Group F – Combustor Burn Through
(D. Laborie - GE, P. Haberlen – FAA)

• Objective: review previous ARAC materials and provide update to AC20-135 Section 8
• Kickoff meeting held - June 2020
• SAE A-22 Phase 2 task

Group G – Fire Size/Engine Mounts
(S. Pugliese, S. Hariram, P. Haberlen, T. DeCaro)

• Objective: review engine mounts previous ARAC materials and fire size to develop compliance approach; Kickoff meeting – 3Q20, SAE A-22 Phase 2 task
SAE A-22 Committee Structure – Additional Phase 2 projects

**FAA Next Gen Burner Mods Review**
FAA (T. Salter, R. Ochs, A. Brown) + GE, Resonate,

- Develop FAA NG Burner modifications for powerplant certification fire tests
- Coordinate with GE, Resonate, other fire test labs

**Open / Other FAA/EASA Top Certification Issues**

- Address open or deferred Phase 1 major issues
- Review top issues from FAA/EASA leadership or EACWG (Engine Aircraft Certification Working Group)
AS6826 Powerplant Fire Test Standard to update AC20-135 – One consolidated document decision @ Feb 2020 meeting

One consolidated document February 2020 Decision
SAE A-22 Powerplant Fire Test Standard – Activities / Milestones as of August 5th 2020

- ✔ 1st Meeting - May 9th & 10th 2018 – Industry/FAA/EASA/TCCA Kick-off Meeting hosted by EASA (May 9th) and SAE / Hilton (May 10th) in Cologne, Germany
- ✔ 2nd Meeting - November 1st and 2nd 2018 - SAE A-22 meeting in Atlantic City, NJ hosted by FAA Tech Center
- ✔ 3rd and 4th Meetings - May 2019 at EASA, Cologne; September 2019 at Boeing (Arlington, VA) – SAE A-22 meetings
- ✔ 5th and 6th Meetings - Oct 30th-31st 2019 meeting New Jersey; February 24-27 2020, Lockheed, Arlington, VA);
- ✔ Due to COVID-19, SAE WebX May, June, July Monthly Virtual Meetings
- ✔ 5 Group Leaders working bi-weekly or monthly to finalize drafts ~ 80-90% done
  - SAE AS6826 Powerplant Fire Test Standard, Consolidated draft – Sep 30, 2020
  - AS6826 Document for final balloting: October 30, 2020
  - Phase 1 Completion, AS6826 publication: December 15th, 2020 or early 2021
  - Phase 2 tasks: Group F, Group G, Next Gen Burner Modifications, Open FAA / EASA Top Certification Issues