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

SAE INTERNATIONAL

SAE A-22 Powerplant Fire Test and Flammability Committee formed in March 2018 to support FAA AC20-135 Update and Next Gen Burner

WARRENDALE, Pa. (PRWEB) June 08, 2018 -- SAE International, the leading global association for aerospace, automotive and commercial-vehicle engineers, has been tasked by the Federal Aviation Administration (FAA) to develop industry aerospace standards to demonstrate compliance with FAA powerplant fire protection requirements.

SAE International is forming a new technical committee, A-22 Fire Protection and Flammability Testing to develop industry standards for the testing of systems and components to assist with the design and certification of fire protection systems. The initial program of work includes the development of a suite of standards to assist with the update of FAA Advisory Circular AC 20-135 Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards and Criteria. Methods to calibrate and setup a new sonic burner as an optional replacement for existing fire test burners will also be created.

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.

SAE A-22 Committee objectives and Initial Program of Work

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

Engine Manufacturers
GE
Honeywell
Pratt & Whitney
Rolls-Royce
SAFRAN

Helicopter Manufacturers
Airbus
Bell/Textron
Sikorsky/Lockheed

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

Transport Canada

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

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

Industry Consultants
Danker Associates
GE Aviation
Marlin Engineering
Nacelle Group
Waldron Aerosystems

Commodity Manufacturers
AIM Altitude
Collins Aerospace
GKN
Safran Nacelles
Spirit AeroSystems
UTC
Zodiac Aerospace

Standards Org.
NACE
SAE

FEDERAL AVIATION ADMINISTRATION

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

EASA European Aviation Safety Agency

SAE A-22 Committee New Tasks and Objectives in 2020

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

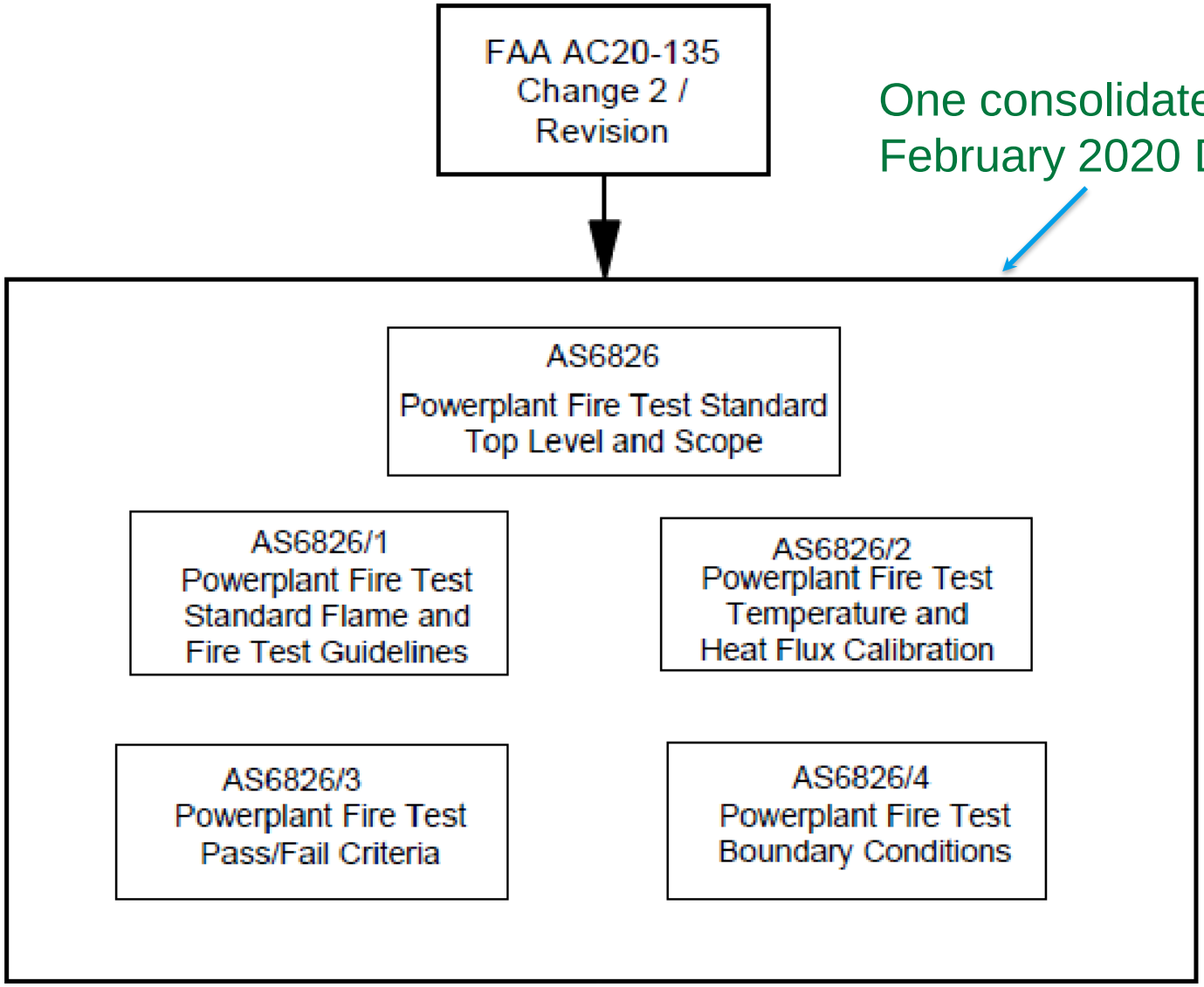
FAA (T. Salter, R. Ochs, A. Brown) + GE, Resonate,

- 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



SAE A-22 Poweprlant 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***