

25Sep2024



Powerplant Halon Replacement

Sodium Bicarbonate [NaHCO₃/KSA] Solid Aerosol, 2024



**Federal Aviation
Administration**

Presented to:

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Materials Fire Test & International Aircraft
Systems Fire Protection Forum Meetings

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...Brief/distant history, NaHCO₃/KSA

2007-2008 : incomplete MPSHRe/rev03^[03a] generic testing

- NaHCO₃ solid-aerosol firex^[03b] agent & a *new* concentration analyzer
- its characterization relative to CF₃Br not possible via MPSHRe/rev03
- ...subsequently increment MPSHRe/rev03 to /rev04

2010-2012 : MPSHRe/rev04 generic & full-scale/fire-demonstration [FS/FD] testing

- successfully complete MPSHRe/rev04 generic testing
- spray & pool fire threats do not extinguish during FS/FD testing...

[03a] known in short-hand as "MPSHRe", the "Minimum Performance Standards for Halon 1301 Replacement in the Fire Extinguishing Agents/Systems of Civil Aircraft Engine and Auxiliary Power Unit Compartments"; referencing revision 03 [/rev03] here, but process is now at /rev04...

[03b] firex = fire-extinguisher or fire-extinguishing.

...MPSHRe/rev04 accessible at :

https://www.fire.tc.faa.gov/pdf/systems/MPSErev04_MPSeRev04doc-02submtd.pdf

...Brief/recent history, NaHCO₃/KSA

2018-2019 : repeat 2012 MPSHRe/rev04 FS/FD testing

- spray fire threat extinguishes, pool fire not...
- create CF3Br firex system configuration, test it, & show fire threats are not too severe [spray & pool fire threats extinguish]

2019-2022 : corporate internal investigations identify issues

- modify & better control processes relating to firex bottle servicing
- notably modify solid-aerosol, concentration analyzer
- ...these changes spawn the need to revisit the 2010-2012 MPSHRe/rev04 testing

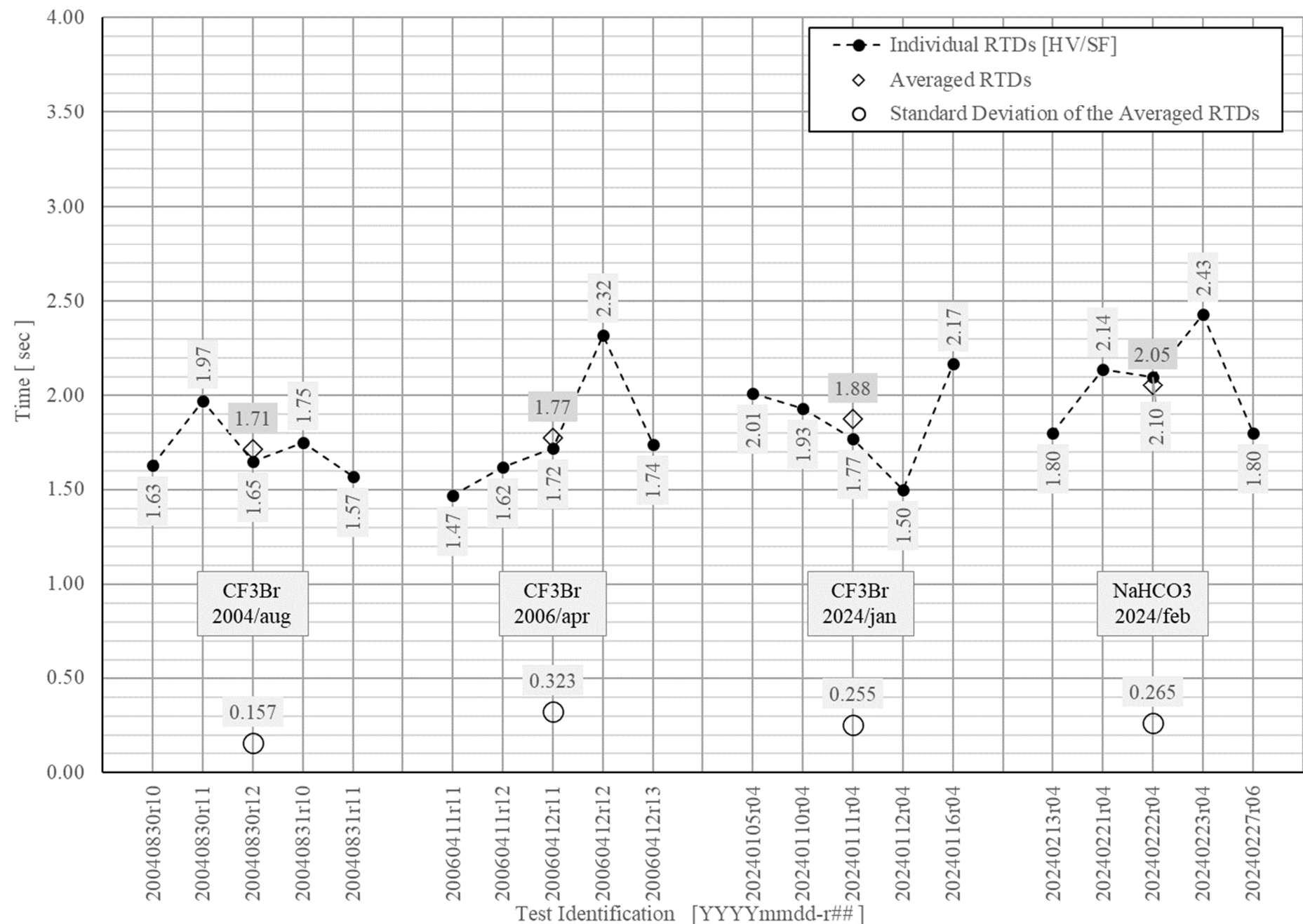
...Brief/recent history, NaHCO₃/KSA

2023-current : MPSHRe/rev04 generic & FS/FD testing

- generic testing
 - generic test matrix smaller; credit given for past testing & experience; 3 test conditions chosen
 - high-ventilation/spray-fire [HV/SF]
 - pool fire at high- & low-ventilation [HV/PF, LV/PF]
 - establish actual CF₃Br thresholds; notable time passage since last CF₃Br characterizations; no pentafluoroethane surrogate data for pool fire behaviors
 - 8feb2023; encounter contaminated CF₃Br following shift from pentafluoroethane surrogate testing; required substantial cleaning between equipment tear-down & re-assembly; swapped CF₃Br source & continued testing acceptably
 - observe peculiar HV/PF behavior never noticed before [no impact on prior work]
 - [1] HV/SF & [2] HV/PF complete; favorable comparison to CF₃Br; [3] LV/PF incomplete

...Brief/recent history, NaHCO3/KSA

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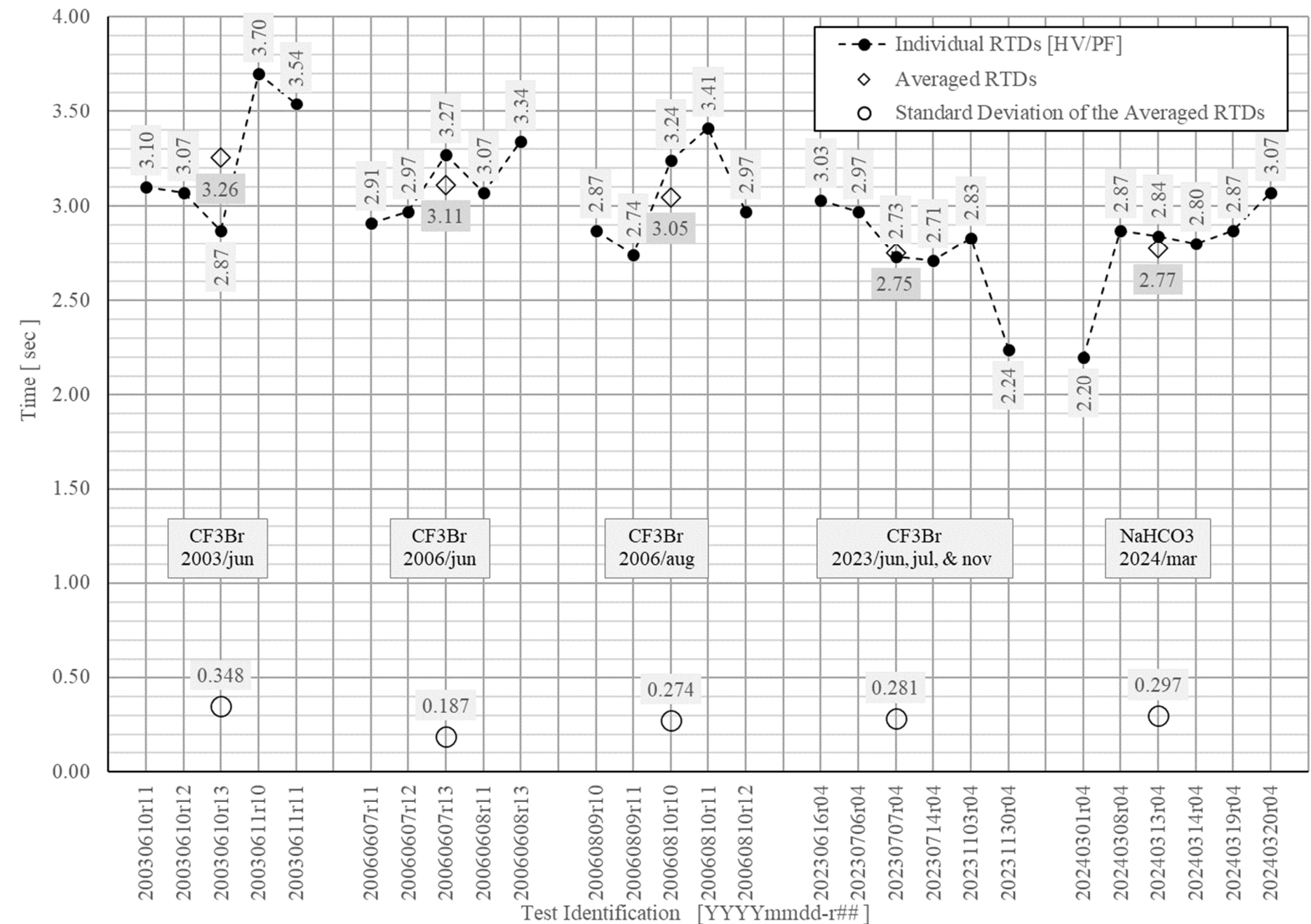
High-ventilation/spray-fire [HV/SF]



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...Brief/recent history, NaHCO3/KSA

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High-ventilation/pool-fire
[HV/PF]



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...Brief/current, NaHCO3/KSA

2023-current : MPSHRe/rev04 generic & FS/FD testing [continued]

- FS/FD testing now underway



End

