Certification-Qualification Breakout

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COMMERCIAL AVIATION ALTERNATIVE FUELS INITIATIVE

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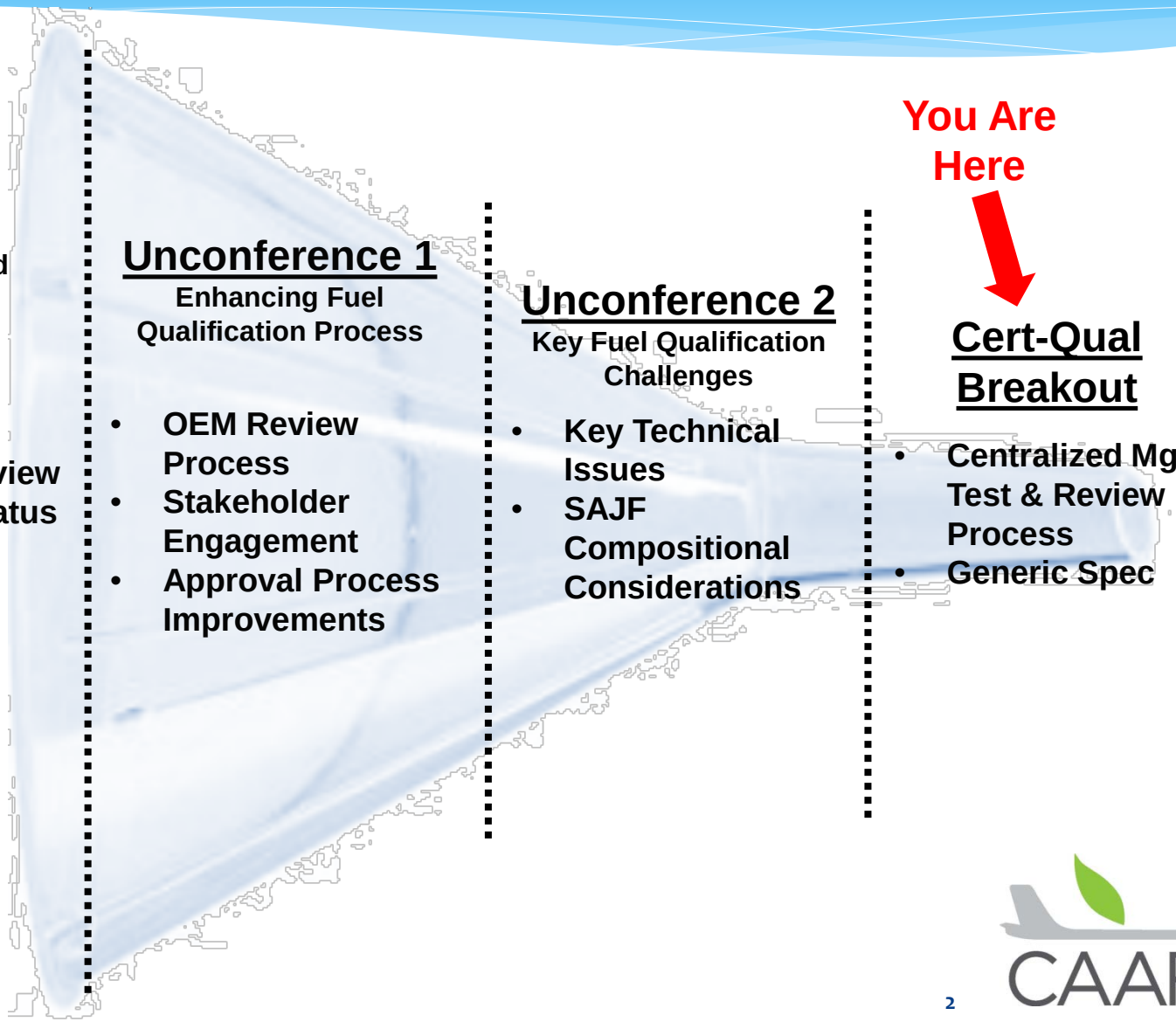
Cert-Qual Sessions Overview



Plenary

SAJF Certification and Qualification

- Certification Overview
- SAJF Approval Status
- The Path Forward

Unconference 1

Enhancing Fuel Qualification Process

- OEM Review Process
- Stakeholder Engagement
- Approval Process Improvements

Unconference 2

Key Fuel Qualification Challenges

- Key Technical Issues
- SAJF Compositional Considerations

You Are Here

Cert-Qual Breakout

- Centralized Mgt of Test & Review Process
- Generic Spec

Discussion Topics

* D4054 Clearinghouse Concept
* D7566 Generic Annex

D4054 Clearinghouse Concept

D4054 Qualification Process

Tier 1

Specification Properties

Tier 2

Fit-For-Purpose Properties

Phase 1 ASTM Research Report

SAFRAN, BOEING, Honeywell, Rolls-Royce, AIRBUS

OEM Review & Tier 3 & 4 Requirements

Tier 3

Component/Rig Testing

Tier 4

Engine/APU Testing

Phase 2 ASTM Research Report

SAFRAN, BOEING, Honeywell, Rolls-Royce, AIRBUS

OEM Review & Approval

ASTM Balloting Process

ASTM Review & Ballot

Accept

Reject

Re-Eval As Required

ASTM Specification

ASTM Specification

ASTM INTERNATIONAL Standards Worldwide

FAA Review

FEDERAL AVIATION ADMINISTRATION

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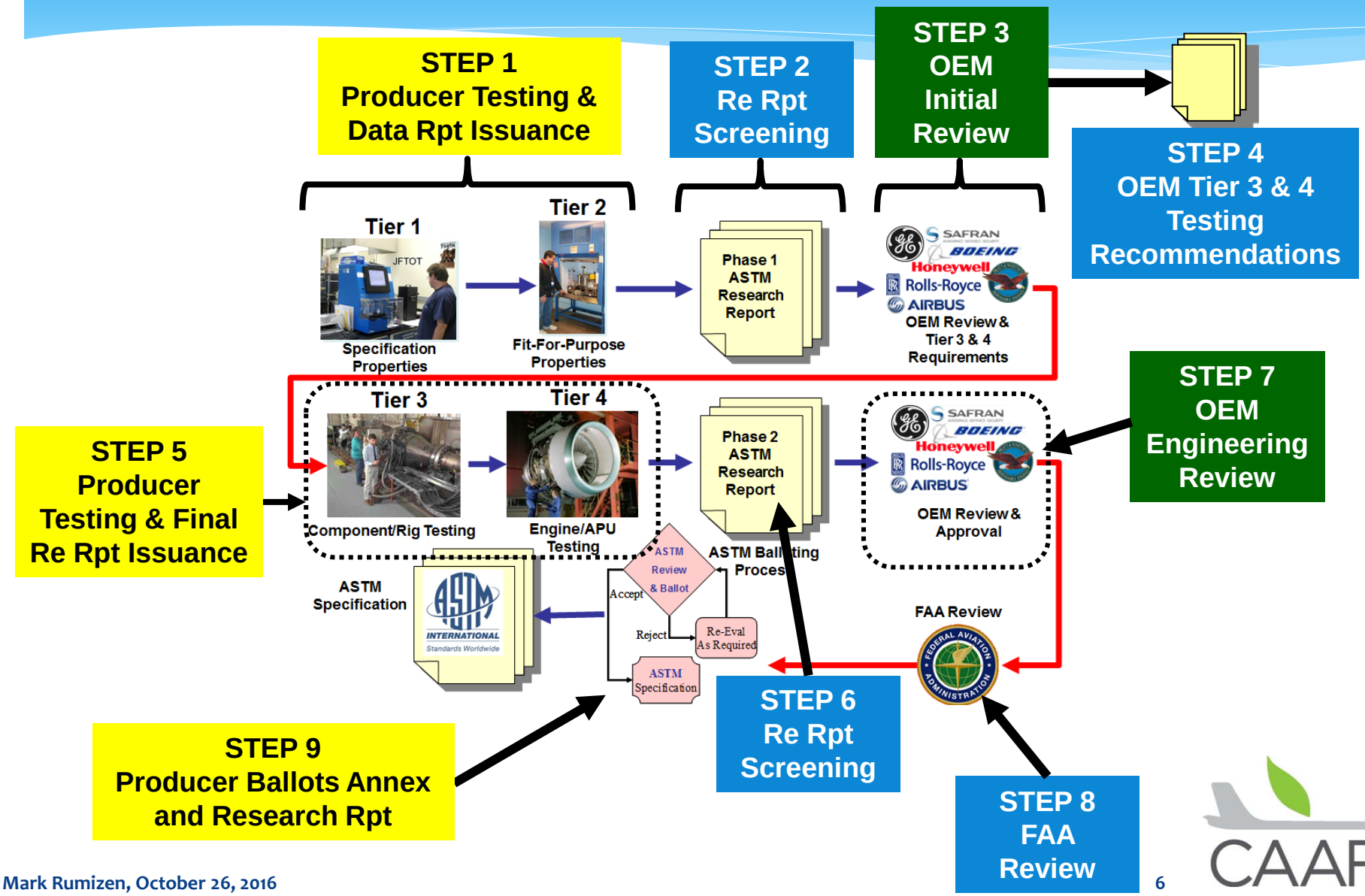
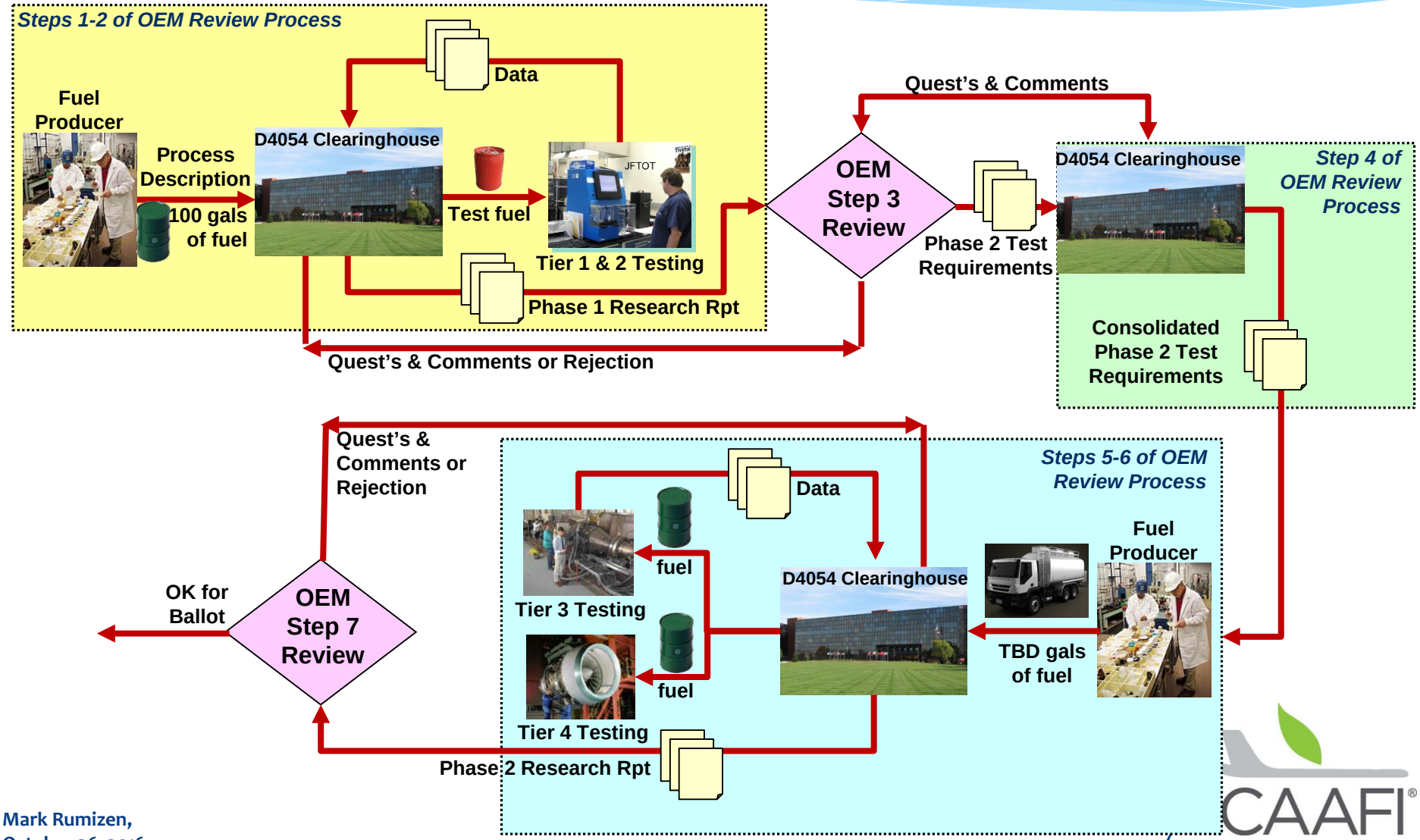
OEM Approval Process



D4054 Clearinghouse Concept

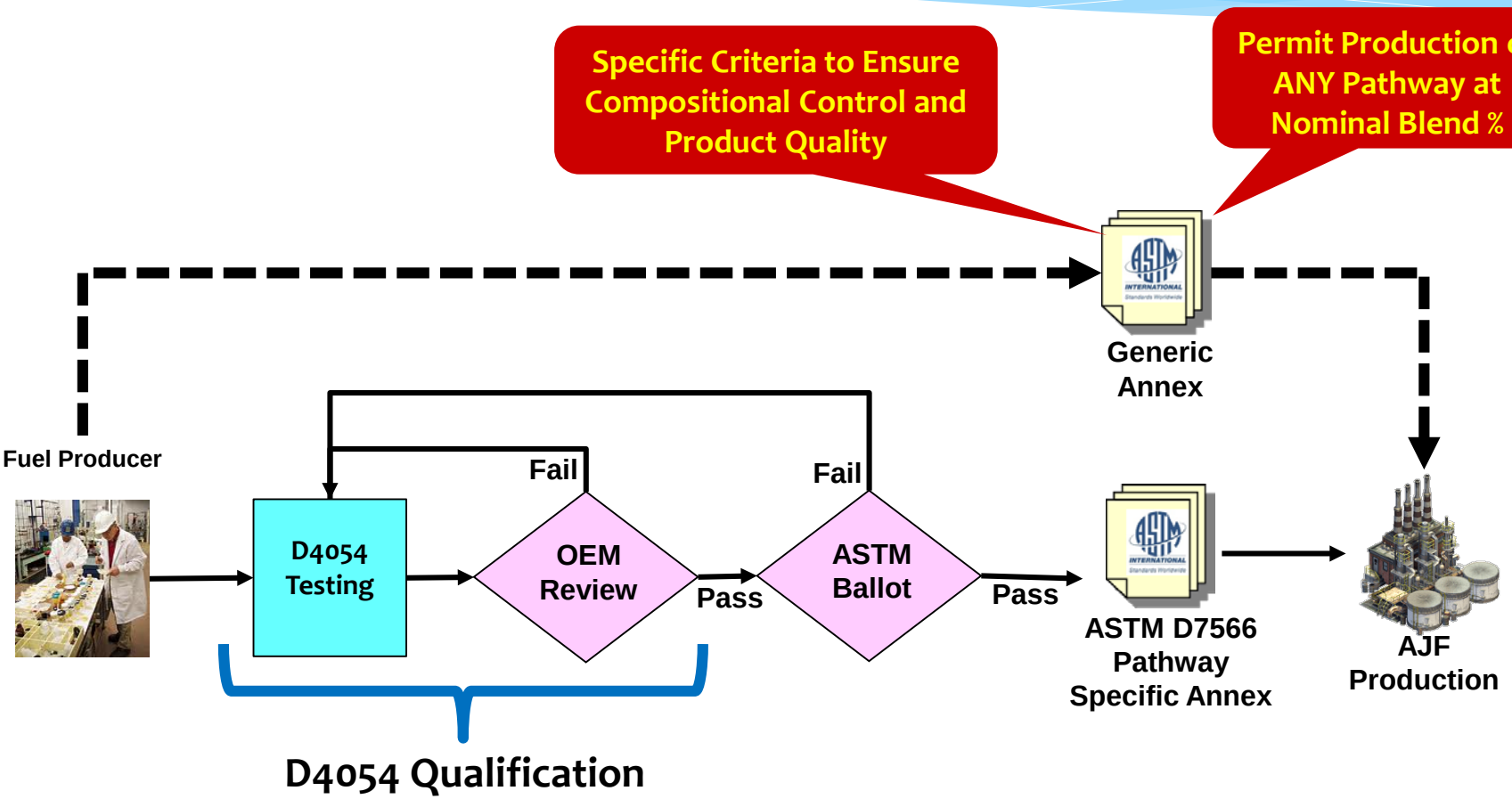


D4054 Clearinghouse

- Tasks:
  - D4054 Process Guide
  - OEM Review Meetings
  - Phase 1 Support:
    - Tier 1 & 2 Testing
    - Draft Phase 1 Research Report
    - Coordinate Resolution of OEM Comments
    - Tier 3 & 4 Testing Recommendations
  - Phase 2 Support:
    - Tier 3 & 4 Testing
      - Subcontract/Partner As Necessary
    - Draft Final Research Report
    - Coordinate Resolution of OEM Comments
- Funding:
  - FAA Seed Money Under ASCENT
    - Project 31 (UDRI)
    - Should Cover Admin and Tier 1 & 2 Testing
  - Additional Support will be Necessary
    - ASCENT is Structured as a Cost-Share Arrangement
      - In-kind Contributions
        - Testing Partners
      - Direct Contributions

D7566 Generic Annex

D7566 Generic Annex



D7566 Generic Annex Currently Under Consideration By ASTM

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D7566 Existing Annex Structure

Annex Ax

Ax.4 Materials and Manufacture

Defines and locks in conversion process

Table Ax.1

Detailed Batch Requirements

Table Ax.2

Other Detailed Requirements (MOC Requirements)

Existing Annexes are Limited to a Specific Conversion Pathway and Feedstock(s)

A1.4 Materials and Manufacture

A1.4.1 FT-SPK synthetic blending components shall be comprised of hydroprocessed synthesized paraffinic kerosine wholly derived from:

A1.4.1.1 Paraffins and olefins derived from synthesis gas via the Fischer-Tropsch (FT) process using Iron or Cobalt catalyst.

A1.4.1.2 Subsequent processing of the product shall include hydrotreating, hydrocracking, or hydroisomerization and is expected to include, but not be limited to, a combination of other conventional refinery processes such as polymerization, isomerization, and fractionation.[17]

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D7566 Existing Annex Structure

Annex Ax

Ax.4 Materials and Manufacture

Defines and locks in conversion process

Table Ax.1

Detailed Batch Requirements

Table Ax.2

Other Requirements (MOC)

Batch testing requirements are unique to each annex, and are more stringent than Table 1 properties for conventional jet

TABLE A1.1 Detailed Batch Requirements; Fischer–Tropsch Hydroprocessed SPK[A]

Property		FT–SPK	Test Method[B]
COMPOSITION			
Acidity, total mg KOH/g	Max	0.015	D3242/IP 354
VOLATILITY			
Distillation—both of the following requirements shall be met:			
1. Physical Distillation			D86[C] or IP 123[C]
Distillation temperature, °C:			
10 % recovered, temperature (T10)	Max	205	
50 % recovered, temperature (T50)		report	
90 % recovered, temperature (T90)		report	
Final boiling point, temperature	Max	300	
T90-T10, °C	Min	22	
Distillation residue, percent	Max	1.5	
Distillation loss, percent	Max	1.5	
2. Simulated Distillation			D2887/IP 406
Distillation temperature, °C:			
10 % recovered, temperature (T10)		report	
50 % recovered, temperature (T50)		report	
90 % recovered, temperature (T90)		report	
Final boiling point, temperature		report	
Flash point, °C	Min	38[D]	D56, D3828[E], IP 170[E] or IP 523[E]
Density at 15 °C, kg/m^3		730 to 770	D1298 / IP 160, D4052 or IP 365
Freezing point, °C	Max	–40	D5972 / IP 435, D7153/IP 529, D7154/IP 528, or D2386/IP 16

D7566 Existing Annex Structure

Other detailed testing requirements are intended for process start-up and MOC, but are applied for each batch for annexes A2-A5.

Annex Ax

Ax.4 Mat

Table Ax.2

Other Detailed Requirements (MOC Requirements)

TABLE A1.2 Other Detailed Requirements; Fischer-Tropsch Hydroprocessed SPK[A]

Property		FT–SPK	Test Method[B]
Hydrocarbon Composition			
Cycloparaffins, mass %	Max	15[C]	D2425
Aromatics, mass %	Max	0.5	D2425
Paraffins, mass %		report	D2425
Carbon and Hydrogen, mass %	Min	99.5	D5291
Non-hydrocarbon Composition			
Nitrogen, mg/kg	Max	2	D4629/IP 379
Water, mg/kg	Max	75	D6304 or IP 438
Sulfur, mg/kg	Max	15	D5453
Sulfur, mg/kg	Max	15	D2622
Metals (Al, Ca, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Pd, Pt, Sn, Sr, Ti, V, Zn), mg/kg	Max	0.1 per metal	D7111 or UOP 389
Halogens, mg/kg	Max	1	D7359

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D7566 Permits Blending Up to 50% with Existing Annexes

Each of these blend components underwent extensive D4054 testing and evaluation

6. Materials and Manufacture

6.1 Aviation turbine fuel, except as otherwise defined in this specification, shall consist of the following blends of components or fuels:

6.1.1 Conventional blending components or Jet A or Jet A-1 fuel certified to Specification D1655; with up to 50 % by volume of the synthetic blending component defined in Annex A1.

6.1.2 Conventional blending components or Jet A or Jet A-1 fuel certified to Specification D1655; with up to 50 % by volume of the synthetic blending component defined in Annex A2.

6.1.3 Conventional blending components or Jet A or Jet A-1 fuel certified to Specification D1655; with up to 10 % by volume of the synthetic blending component defined in Annex A3.

6.1.4 Conventional blending components or Jet A or Jet A-1 fuel certified to Specification D1655; with up to 50 % by volume of the synthetic blending component defined in Annex A4.

6.1.5 Conventional blending components or Jet A or Jet A-1 fuel certified to Specification D1655; with up to 30 % by volume of the synthetic blending component defined in Annex A5.

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Proposed D7566 Generic Annex

* Not Limited to Specific Conversion Pathway or Specific Feedstock
* Producer NOT Required to Negotiate D4054 Process
* But Blend % Limited to 5 – 10%
* True "commodity" Specification

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D7566 Generic Annex Concept

* Some Concerns:
  * Improved Test Methods Required
    * Hydrocarbon Composition (D2425)
    * Oxygenates (at very low detectability level)
    * Hydrocarbon Molecular Class Distribution/Limits
    * C Number Distribution
    * GC x GC Not Yet Standardized
    * Others?
  * Tracking/Monitoring of Producers?
    * Any Producer Can Make Fuel Provided it Meets Generic Annex

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Thank You

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