

International Aircraft Materials and Fire Test Working Group

Aging/Contamination Task Group - London, June 05

Presented by

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Fire Safety – BCRVB4
Materials & Processes
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Study on Aging and Contamination

of Thermal/Acoustic Insulation Materials



AIRBUS

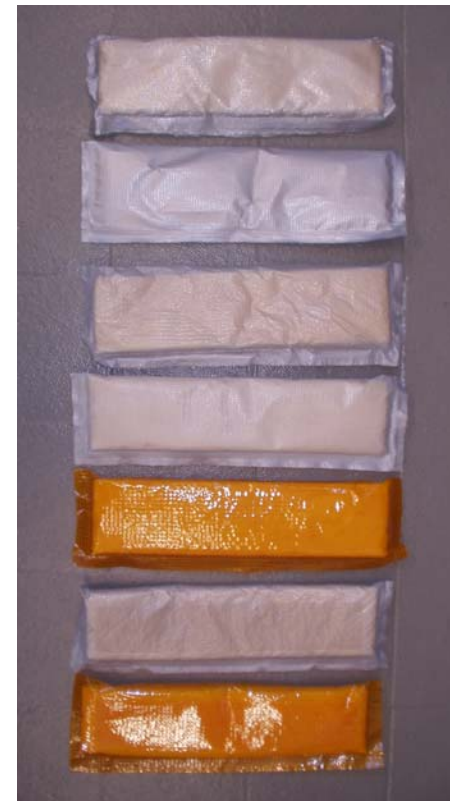
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 - ▶ Results

Design of experiments

Materials selection:

- Glass wool: 1 Layer of Microlite AA902 0.42 pcf
- Covering films
 - ▶ old films
 - PET
 - PVF
 - ▶ new films
 - PVF1
 - PVF2
 - PI
 - ▶ new films with new tapes
 - PVF1 + T1
 - PI + T2



Design of experiments

Test method selection:

- Flammability:

- ▶ Type: Determination of Resistance of Material to Flame
- ▶ Method: Vertical Bunsen Burner Test, 12s Ignition Time
- ▶ Standard: JAR/FAR 25, App. F, part I / AITM 2.0002 B

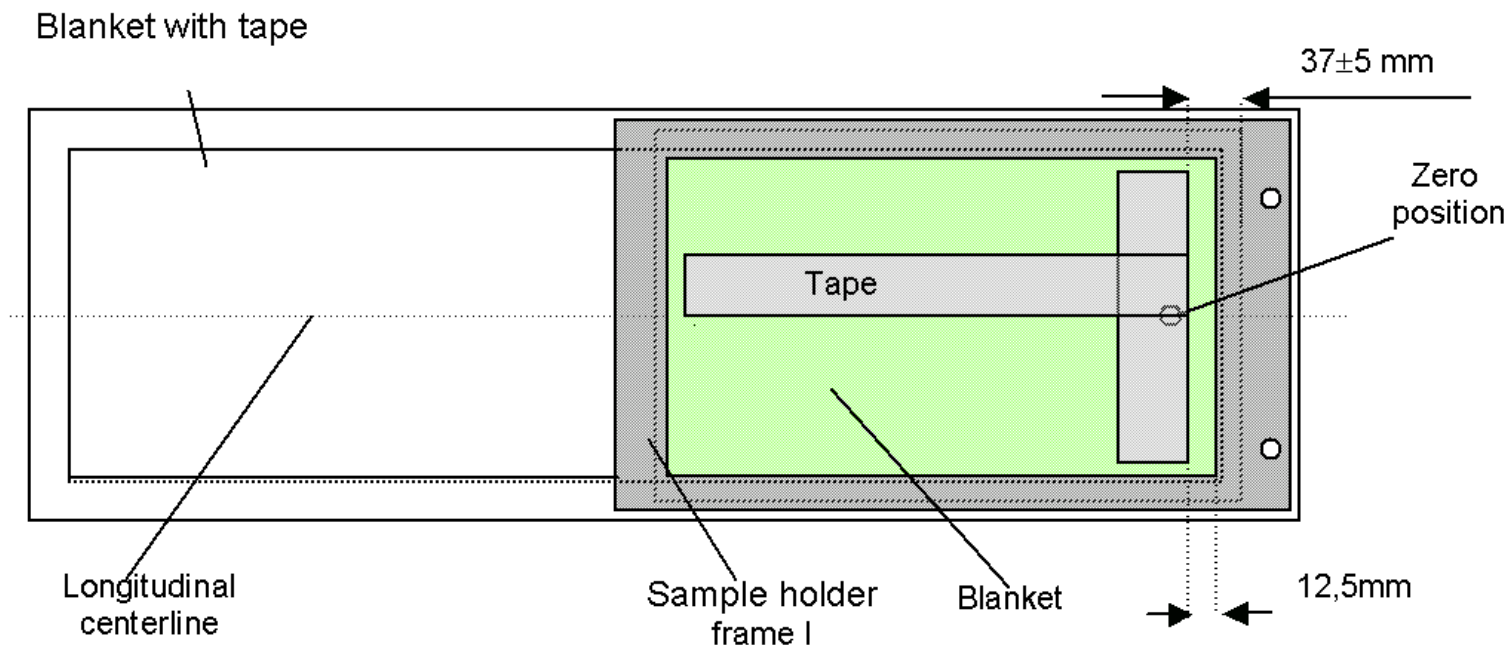
- Flame propagation:

- ▶ Type: Determination of Flammability and Flame Propagation of Thermal/Acoustic Insulation Materials
- ▶ Method: Radiant Panel Test
- ▶ Standard: FAR 25, App. F, part VI / AITM 2.0053

Design of experiments

Specimen definition:

- For Vertical Bunsen Burner Test: 75 x 300mm
- For Radiant Panel Test: 320 x 270 mm (half blanket)



The tape will be fixed on the blankets as described in AIM 2.0053 – Annex A (Material configuration for Radiant Panel Test method):

Design of experiments

Definition of artificial Aging/Contamination conditions:

- **Focus of this investigation is the OEM-Status of the Airplane**
- Possible Contaminations for Thermal/Acoustic Insulation Materials during assembly:
 - ▶ Temporary corrosion inhibitors like Dinitrols
 - ▶ Hydraulic fluids based on organic phosphoric acid esters (like Skydrol or HyJet)
 - ▶ Cleaning agents based on organic solvents

Design of experiments

Aging/Contamination with Dinitrol (AV30):

- Blankets were stored on 30 µm thick AV30-films in two ways:
 - ▶ 1000 hours at 70°C in dry atmosphere (hot/dry)
 - ▶ 1000 hours at 70°C in water saturated air (hot/wet)

(Films were applied onto aluminum plates according to the relevant **AIRBUS** procedures)

- Blankets were left at ambient atmosphere for one week between storing and testing
- No cleaning of blankets was performed at any stage

Design of experiments

Contamination with Cleaning Agent:

- About 100 ml per sqm of Acetone based Cleaning Agent was sprayed onto the testface of the blanket
- Blankets were left at ambient atmosphere till cleaning agent has evaporated
- Blankets were left at ambient atmosphere for one week prior to testing
- No cleaning of blankets was performed at any stage

Additional Comment:

- ▶ This is a worst case scenario! This heavy contamination is unlikely to happen during assembly.
- ▶ Test regarding more realistic ways of contamination are in progress.

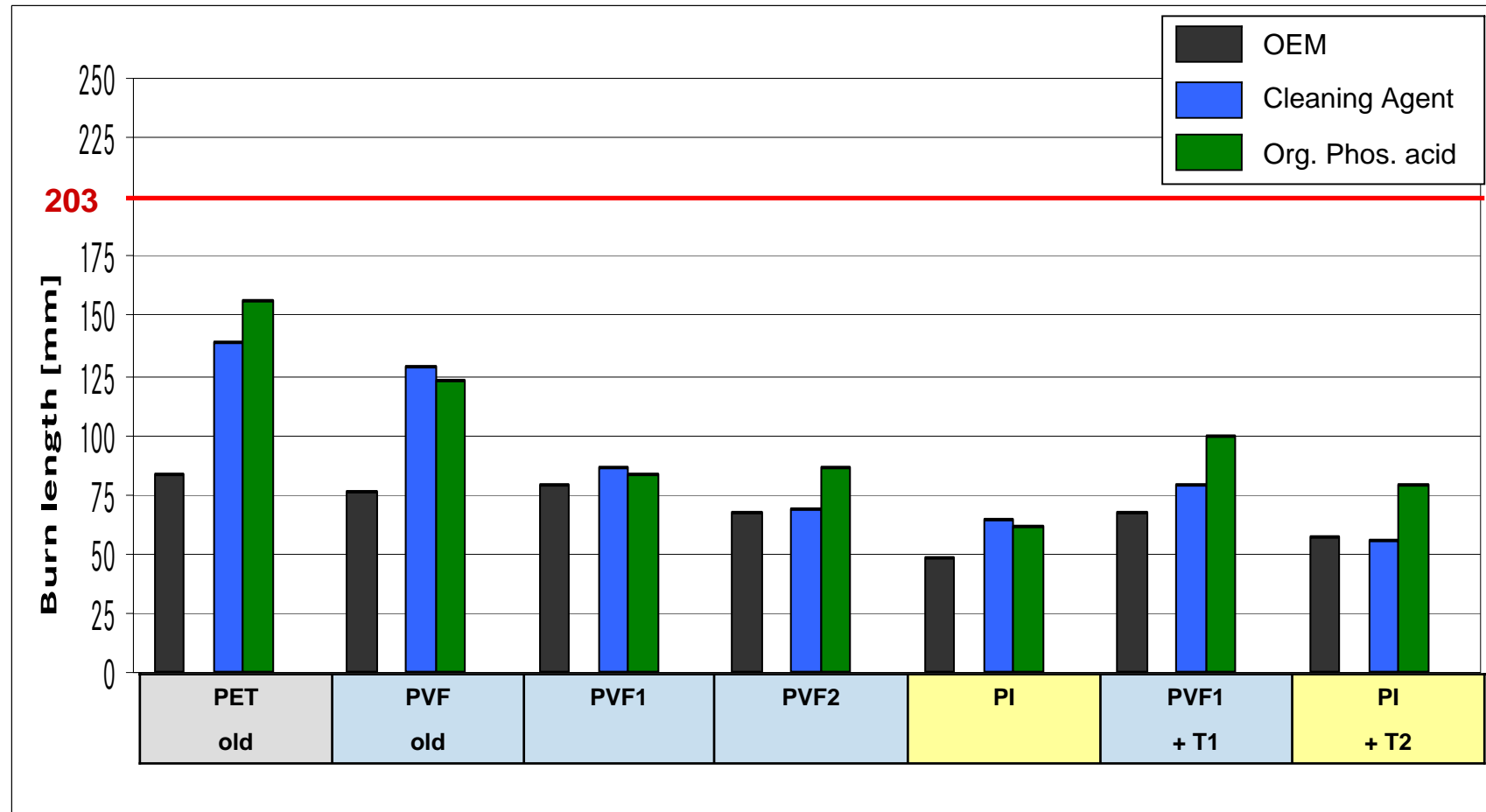
Design of experiments

Contamination with org. phosphoric acid ester:

- About 100 ml per sqm of tri-n-butyl phosphate was sprayed onto coated aluminum plates. Blankets were put into the fluid film with testface towards the plates
- Blankets were left at ambient atmosphere on the plates for 1000 hours
- Blankets were wiped superficially with cotton towels
- Blankets were left at ambient atmosphere for one week prior to testing

Results: Vertical Bunsen Burner Test

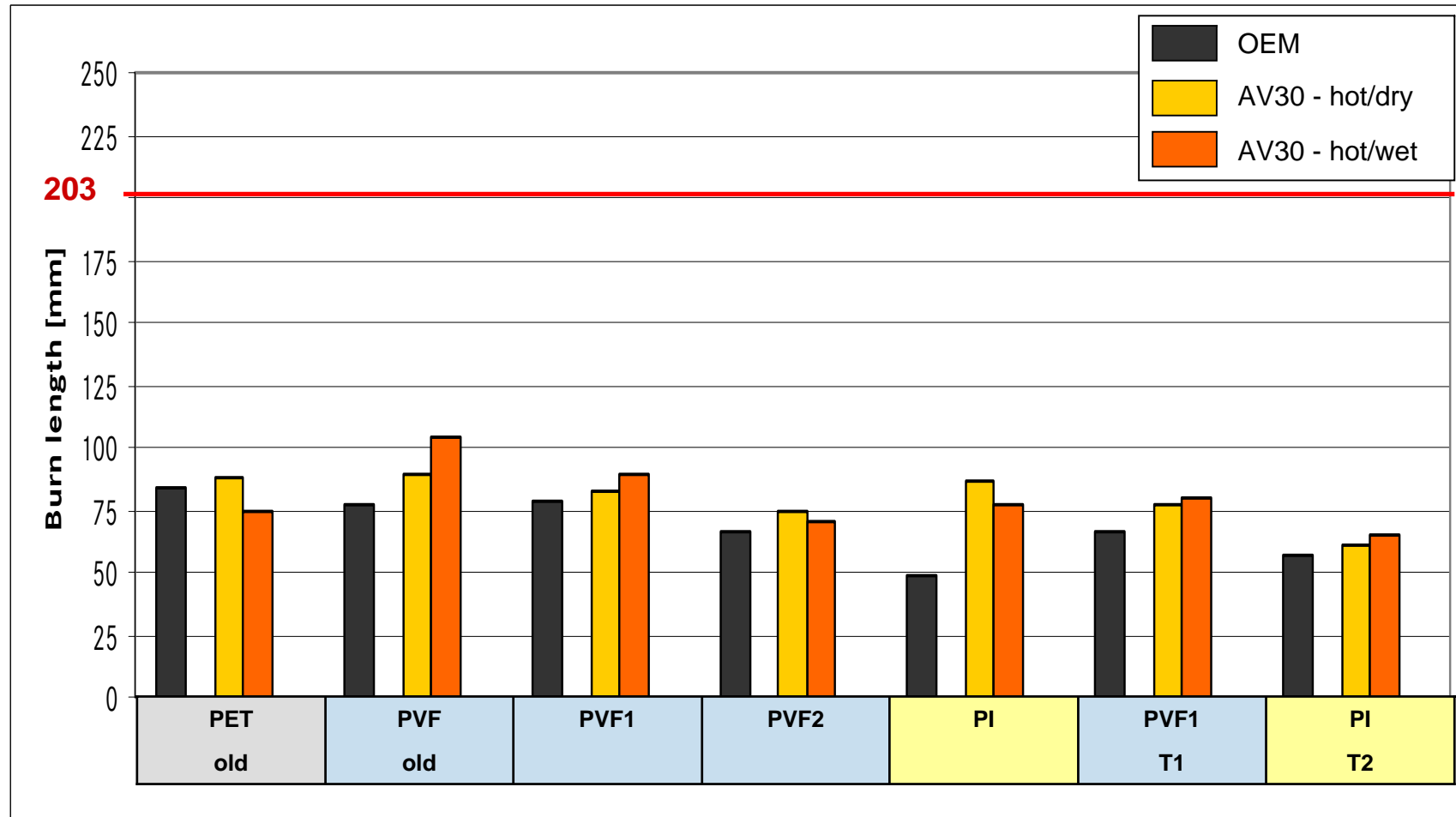
OEM versus Contamination with Aceton based cleaning agent / org. phosphoric acid ester



After flame time in each case less than limit; no drips

Results: Vertical Bunsen Burner Test

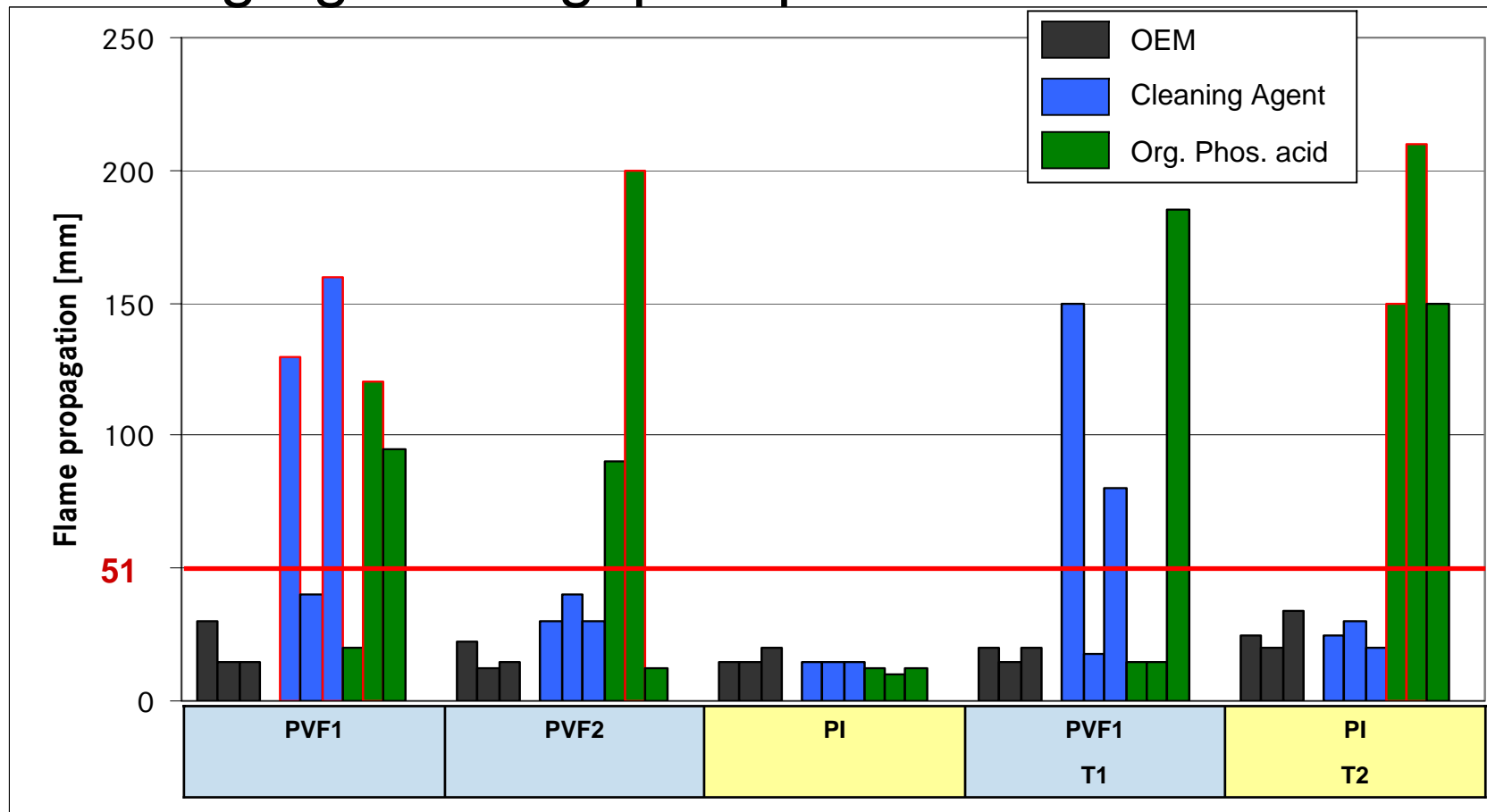
OEM versus Aging/Contamination with Dinitrol



After flame time in each case less than limit; no drips

Results: Radiant Panel Test

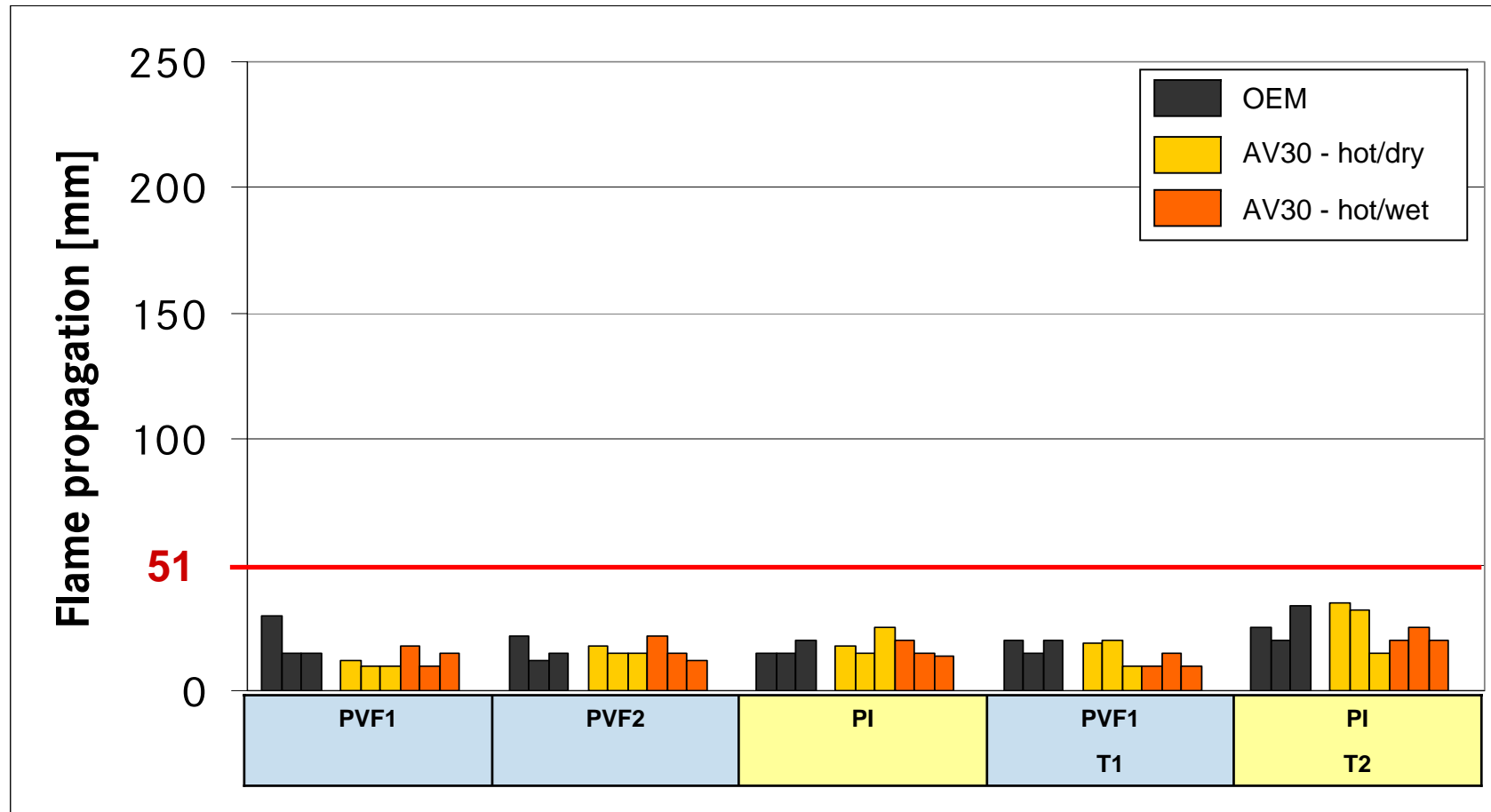
OEM versus Contamination with Aceton based cleaning agent / org. phosphoric acid ester



□ - After flame time longer than 3 seconds

Results: Radiant Panel Test

OEM versus Aging/Contamination with Dinitrol



No after flame time

“Out of Service” blankets

Sample preparation and evaluation:



As supplied



Cutouts



After testing



“Out of Service” blankets

Test method selection:

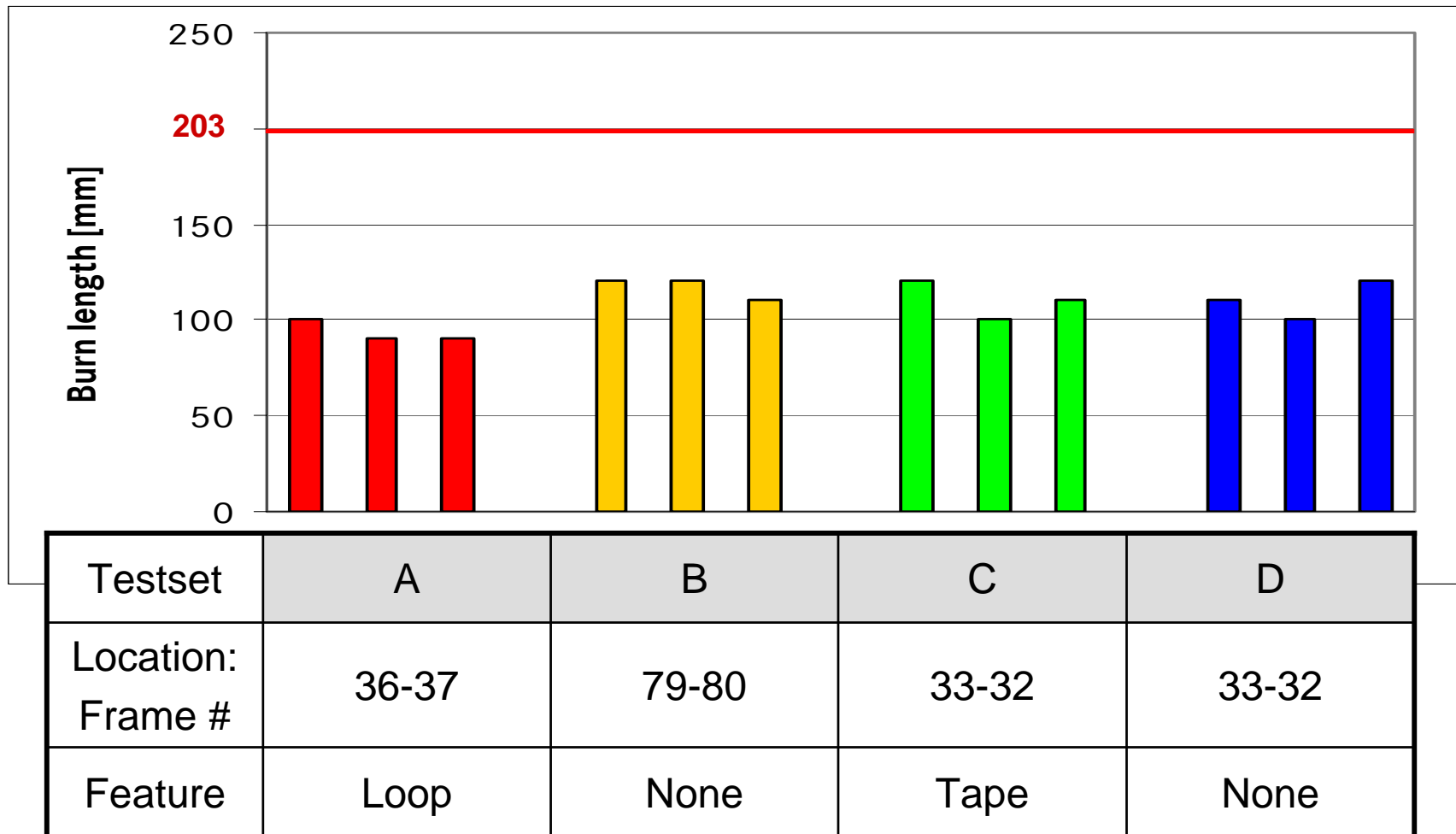
- Flammability:
 - ▶ Type: Determination of Resistance of Material to Flame
 - ▶ Method: Vertical Bunsen Burner Test, 12s Ignition Time
 - ▶ Standard: JAR/FAR 25, App. F, part I / AITM 2.0002 B

Materials description:

- ▶ PET-Folie
- ▶ Year of Production: Spring 1994

“Out of Service” blankets

Results:



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