Jiangsu Yoke Technology

雅 克

PhireGuard HF-1

Marketing Presentation

PhireGuard HF-1 Characterictics

- Halogen-free for Flexible PU Foam
- Clear, low viscosity
- Compatible with slabstock and molded foams
- No impact on reaction profile and processability
- Miscible in polyol blends
- Enhanced fire properties over wide range of foam density
- Remarkable scorch performance

PhireGuard HF-1 Key Properties

- Appearance: Clear Liquid
- Viscosity: 140 mPa.s
- Phosphorus Content: 9.6 wt%
- Acidity: < 1 mgKOH/g
- Water Content: < 0.1 wt%
- Colour APHA: < 100
- OH value (Water and Acid excluded): 0 mgKOH/g
- Non Reactive

PhireGuard HF-1 ‘s answers to Foamer Demands

- Superior FR performance
- Low viscosity
- Miscible with polyols
- No impact on foam processing
- Limited impact on foam final physical properties
- No Regulatory issues vs final foam destination:
  - No TDCP: US market
  - No Bromine: EU market
- Coat in use effective

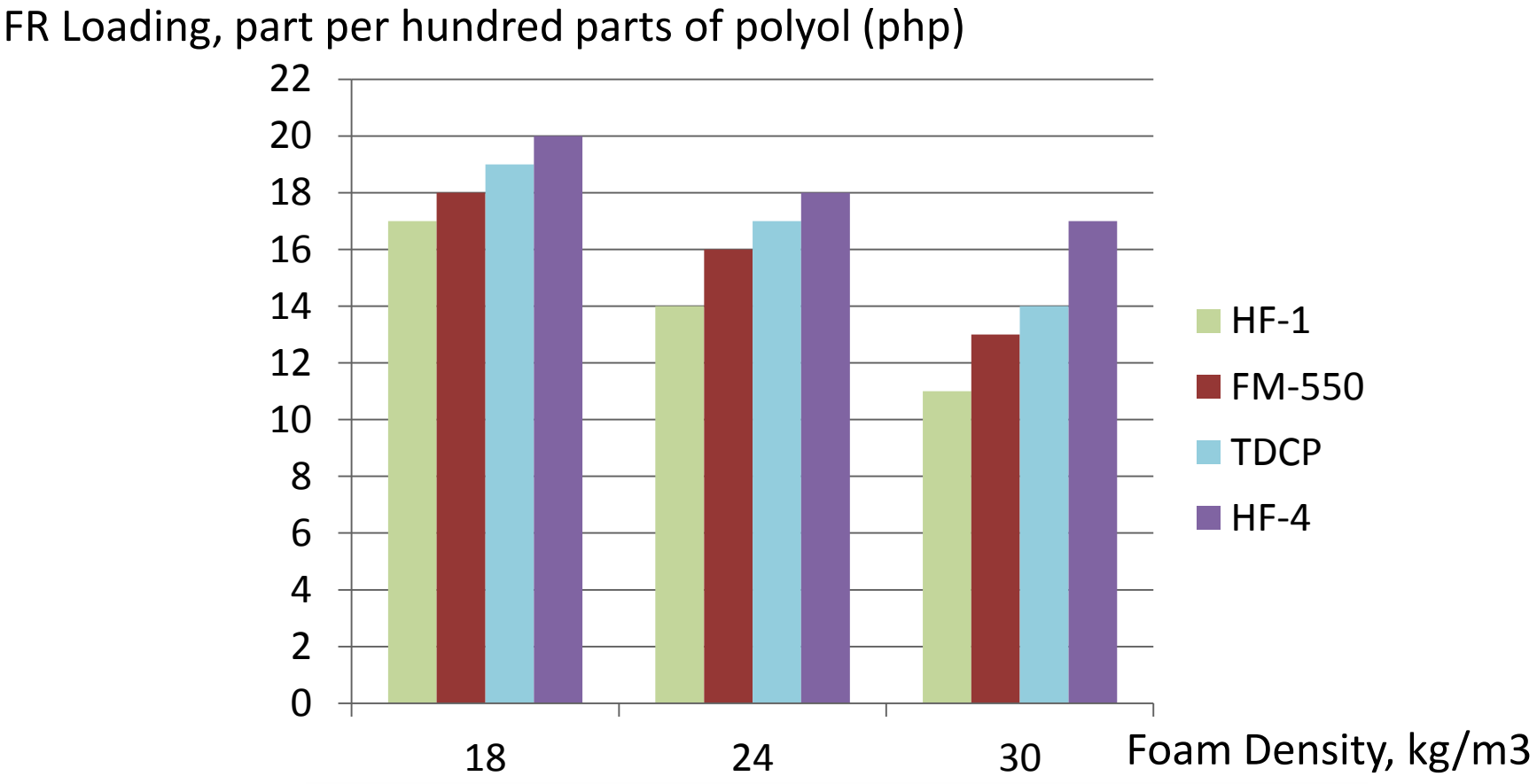
Typical formulations used in study

Density (kg/m3 / pcf)	18 / 1.1	24 / 1.5	30 / 1.85
Polyol, 3000 g/mol, 56 OH v	100	100	100
Water	4.7	4.4	3.4
M.C.	10	0	0
A1	0.06	0.06	0.08
33-LV	0.09	0.09	0.11
T9	0.31	0.22	0.21
Silicone (580)	1.52	1.0	0.85
TDI (Index, php)	110 / 58.5	110 / 56.3	110 / 45.7
Flame Retardant (PhireGuard HF-1)	17	14	10

PhireGuard HF-1's Competitive Landscape

- PhireGuard HF-1's performance have been compared with those of:
  - Firemaster FM-550: Brominated FR
  - HF-4: Halogen-free, Phosphorus FR
  - TDCP: Chorophosphate ester FR
  - DE-61: Polybrominated diphenyl ether FR, banned in the US since 2008.

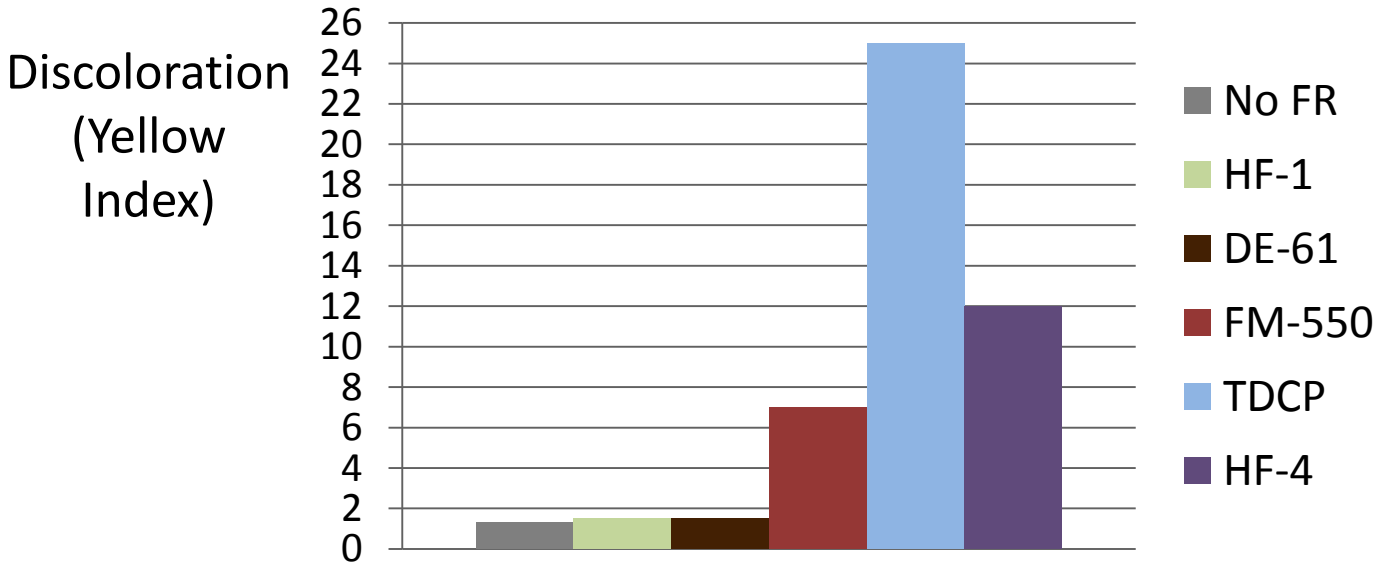
Loading needed to pass Cal TB 117 parts A and B.



Based on Yoke lab results, PhireGuard HF-1 yields the best FR performance in the Cal TB 117 test

Scorch Performance

- Scorch performance based on 1 m3 box foam using 20 php FR and 6.5 php water yielding an exotherm of approximately 180 deg C. This formulation is not a commercial one. The foam is cut after curing and the Yellow Index is measured at the foam center and compared with the YI at the foam edge.



Based on Yoke lab results, PhireGuard HF-1 yields Scorch performace matching that of Penta

Influence on Foam Properties

- Foam properties below are based on optimized FR loading to pass the Cal TB 117 fire test, parts A and B. Foam density 30 kg/m3, TDI Index 110

FR Type	PhireGuard HF-1	FM-550
FR loading, php	11	14
Tensile Strength, kPa	129	107
Elongation @ break, %	159	134
Tear Stength, kPa	16.5	14.5
CLD @ 40%, kPa	3.30	3.15
Sag Factor	1.88	1.85

Cal TB 117 quality foam based on PhireGuard HF-1 exhibit superior physical properties

PhireGuard HF-1 Summary

Non TDCP, Halogen - Free

Processability, Limited Impact on Foam Properties

Superior FR Performance

Best in Class Scorch Performance

Cost in Use Effective

One more thing…

- PhireGuard HF-1 is one of the new Flame Retardants that the Jiangsu Yoke Technology Corporation has recently launched on the market.
- The PhireGuard tradename is associated with Innovation, Quality Consistency and Cost in Use Efficiency

PhireGuard
by Yoke