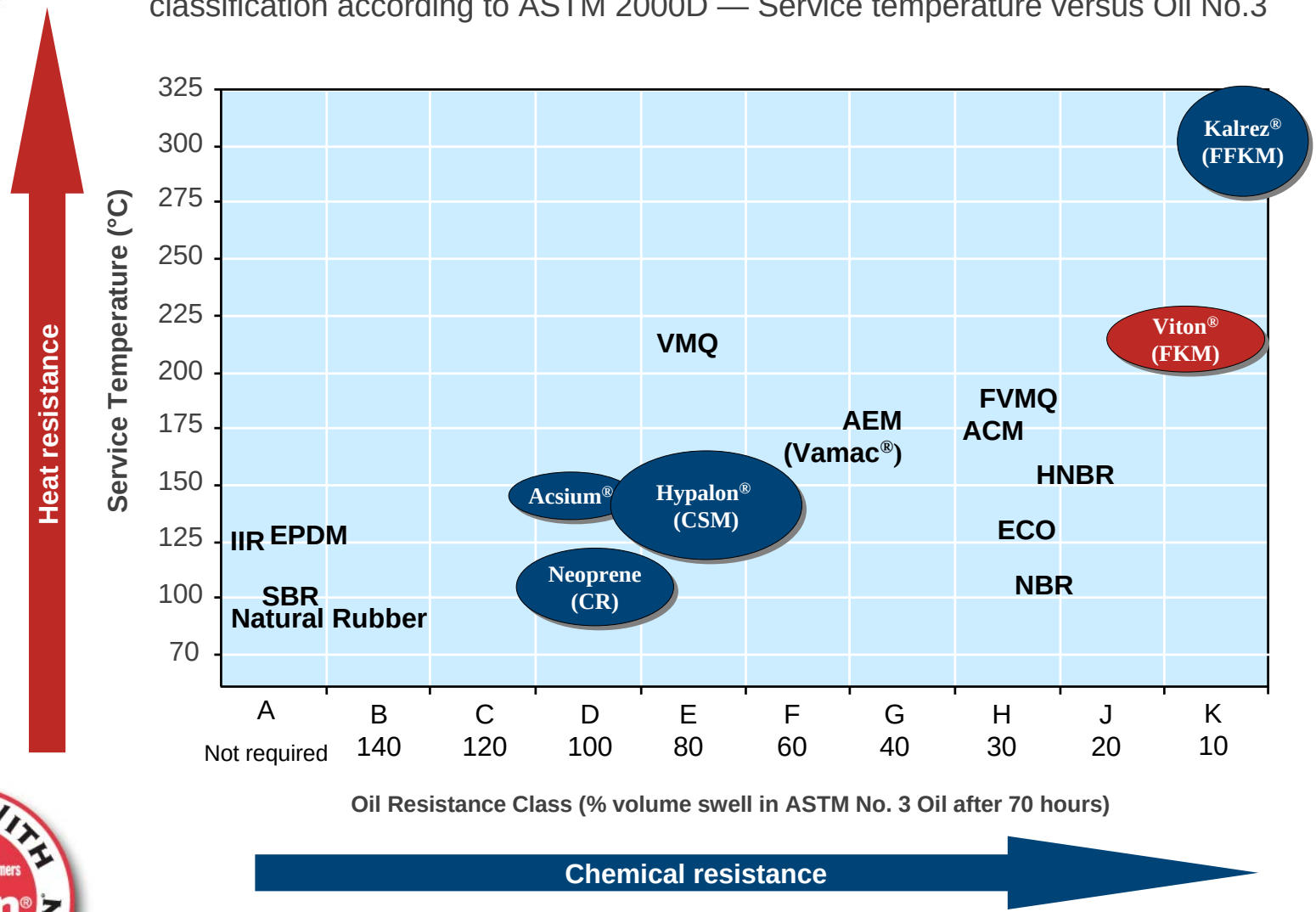
Module 6:
Chemical Resistance

Viton® fluoroelastomer
From DuPont Performance Elastomers

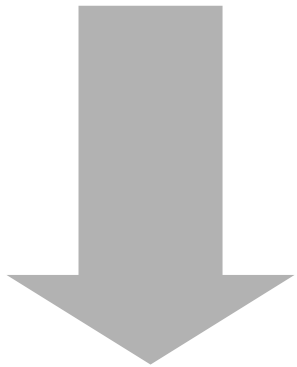
Viton® versus Other Elastomers

classification according to ASTM 2000D — Service temperature versus Oil No.3



Uniqueness of FKM Fluoroelastomers

High ratio of fluorine-to-hydrogen
Very strong carbon-fluorine bond
Absence of unsaturation (i.e., double bonds)
Specialty monomers



Excellent oil and fluids resistance
Excellent heat (200°C+) resistance
Low temperature flexibility

Viton® - Chemical Resistance

Excellent

- hydrocarbons (solvents, fuels…)

Very good

- chlorinated solvents
- mineral acids
- aromatic solvents
- oxidizing fluids

Fair to good

- hot aqueous fluids like acids and steam

Critical

- chemical attack
  - strong bases
  - strong organic acids, aldehydes
  - ammonia and amines
- high volume swell
  - low molecular weight ether, ester and ketones

Viton® Extreme™ or Kalrez® preferred

Viton® - Relative Performance

	Standard Products					Specialty Products				
Viton® product	**A**	**B**	**F**	**GBL-S***	**GF-S ***	**GLT-S ***	**GBLT-S ***	**GFLT-S ***	**TBR-S ***	**ETP-S ***
									Extreme ™	**Extreme ™**
Curing system	bisphenol	bisphenol	bisphenol	peroxide	peroxide	peroxide	peroxide	peroxide	bisphenol	peroxide
Fluorine content	66%	68.5%	69.5%	68%	70%	64%	66%	67%	60%	67%
Heat resistance	All Viton® products have outstanding thermal properties									
Chemical resistance* *	O	✪	✪✪	✪	✪✪	O	✪	✪✪	O	BEST
Base resistance	✗	✗	✗	O	O	✪	✪	✪	BEST	BEST
Low temperature properties	✪	✪	O	✪	O	BEST	✪✪	✪✪	✗	O
Compression set resistance	BEST	✪✪	✪	✪✪	✪✪	✪✪	✪✪	✪✪	✪	✪
Relative cost of polymer	low	low	low	low	low	medium	medium	medium	low	high

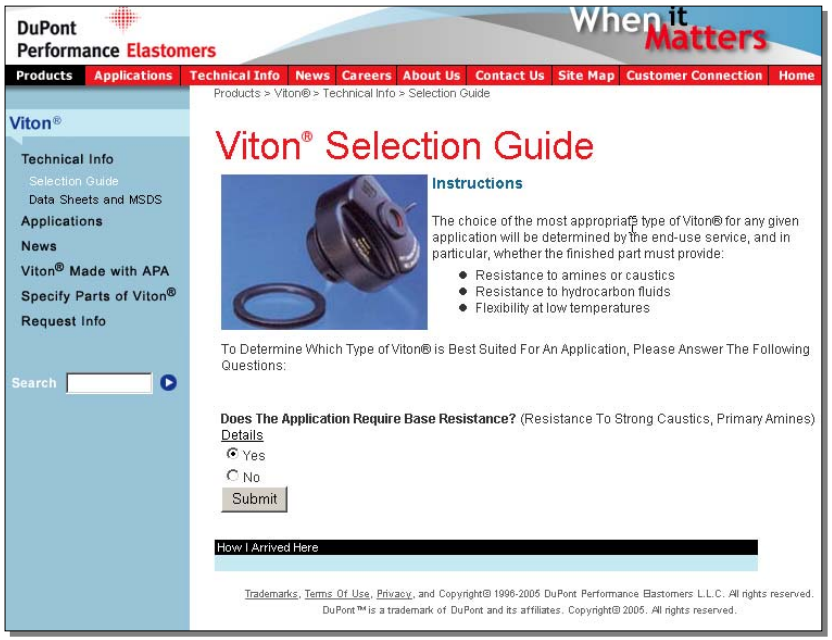
BEST Excellent ✪✪ **Very good** ✪ **Good** O Fair ✗ **poor**

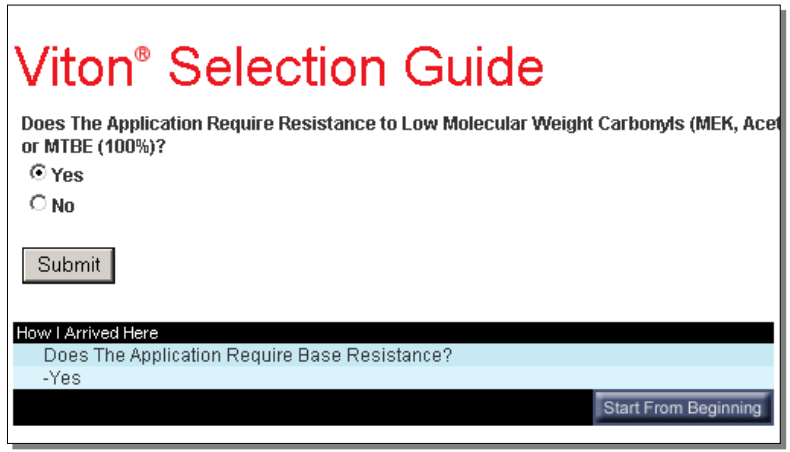
***** "S" indicates products made with Advanced Polymer Architecture

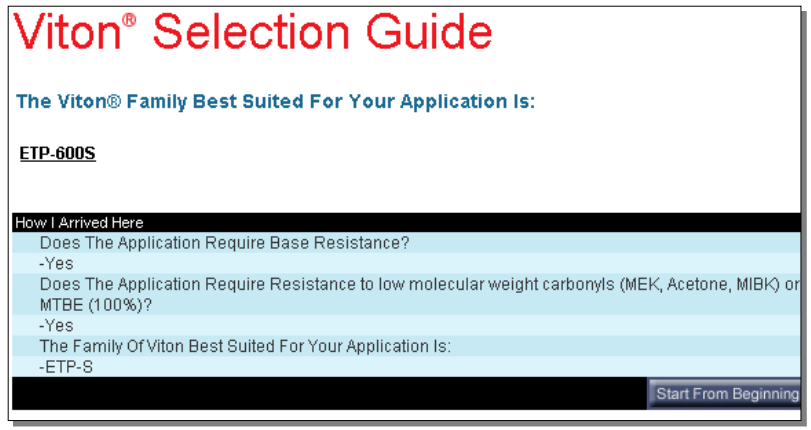
** Consult the Chemical Resistance Guide at www.dupontelastomers.com or contact your Viton® specialist.

Viton® - Selection Guide

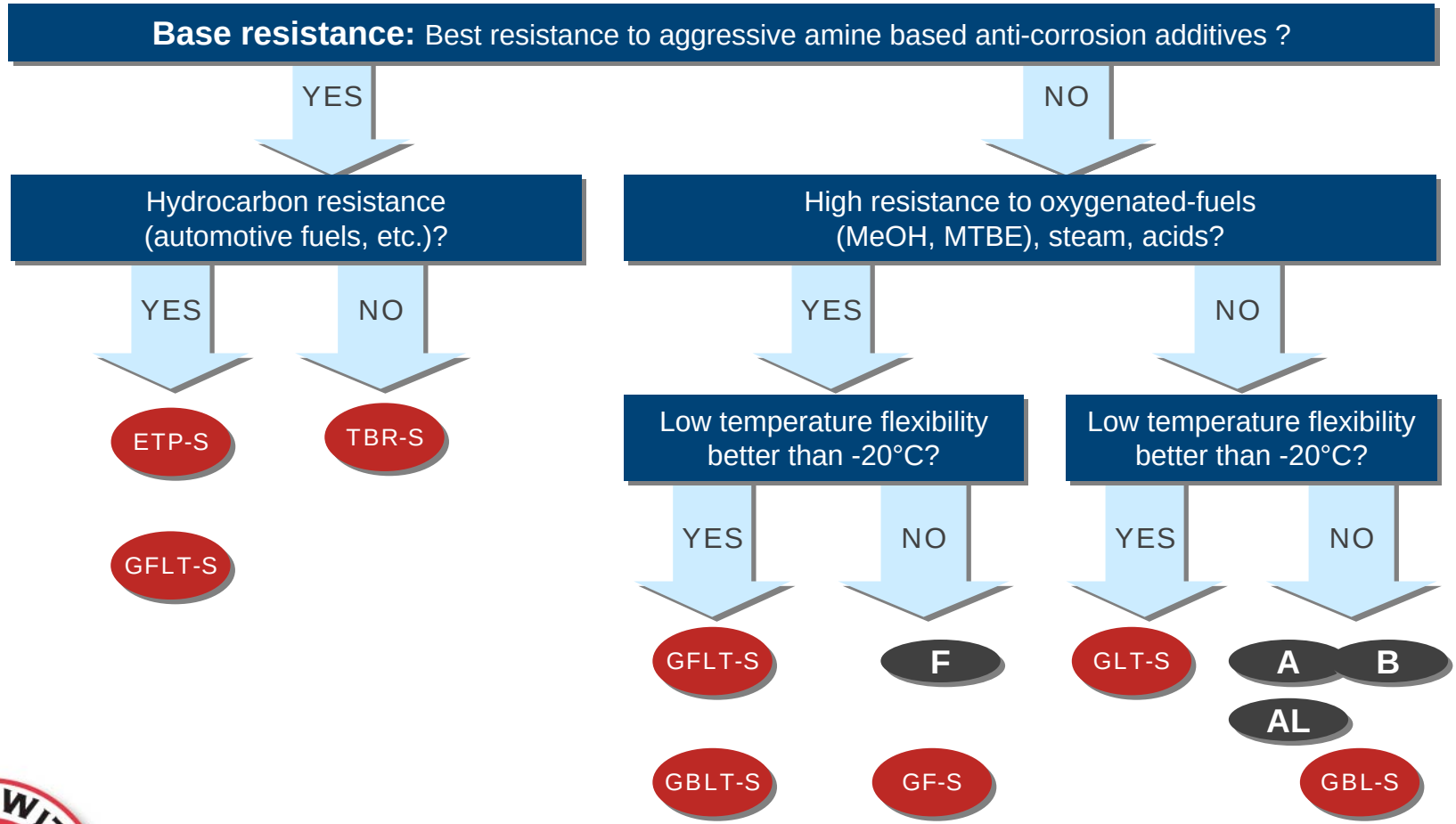
is available on Internet







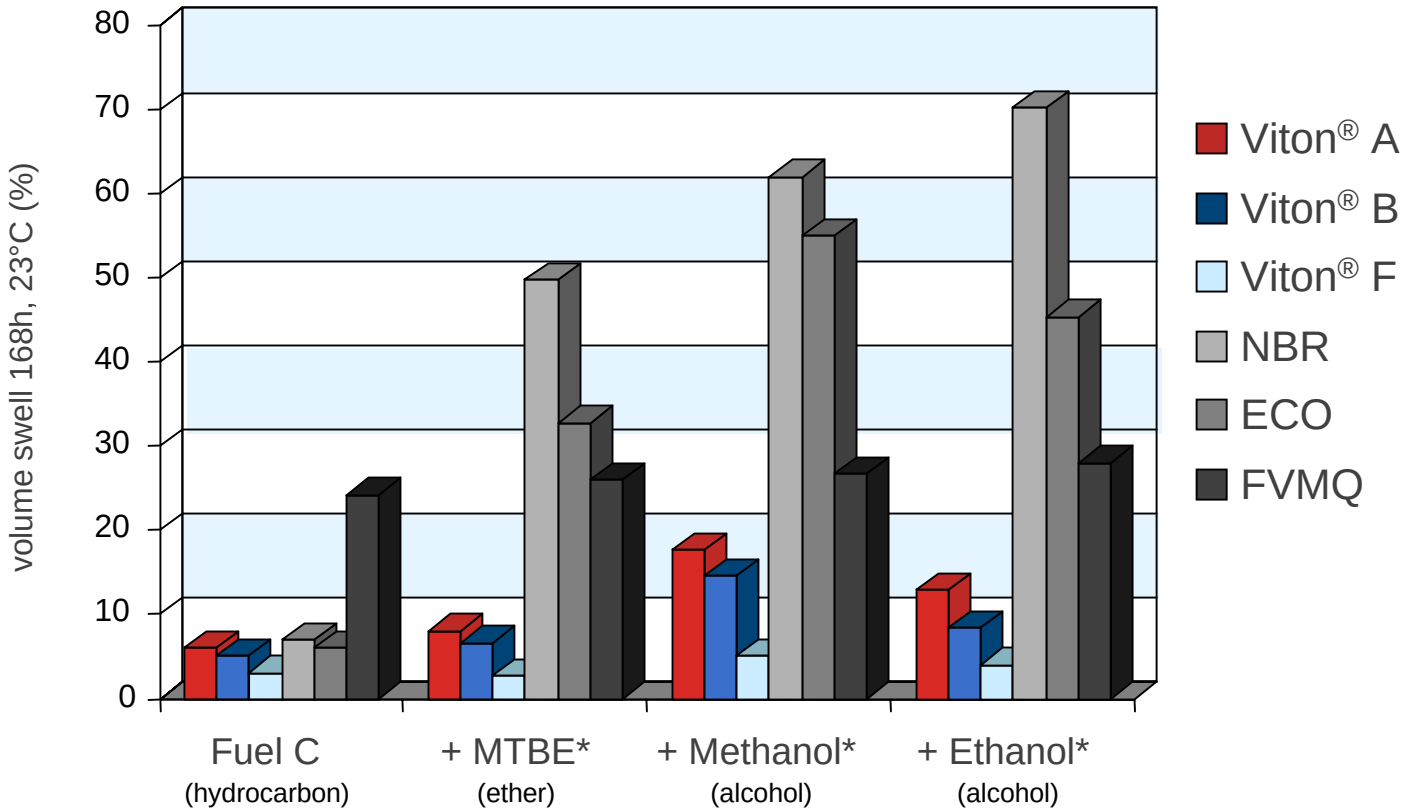
Selection Based on Application Needs



red for Viton® made with APA (« -S » for APA technology)

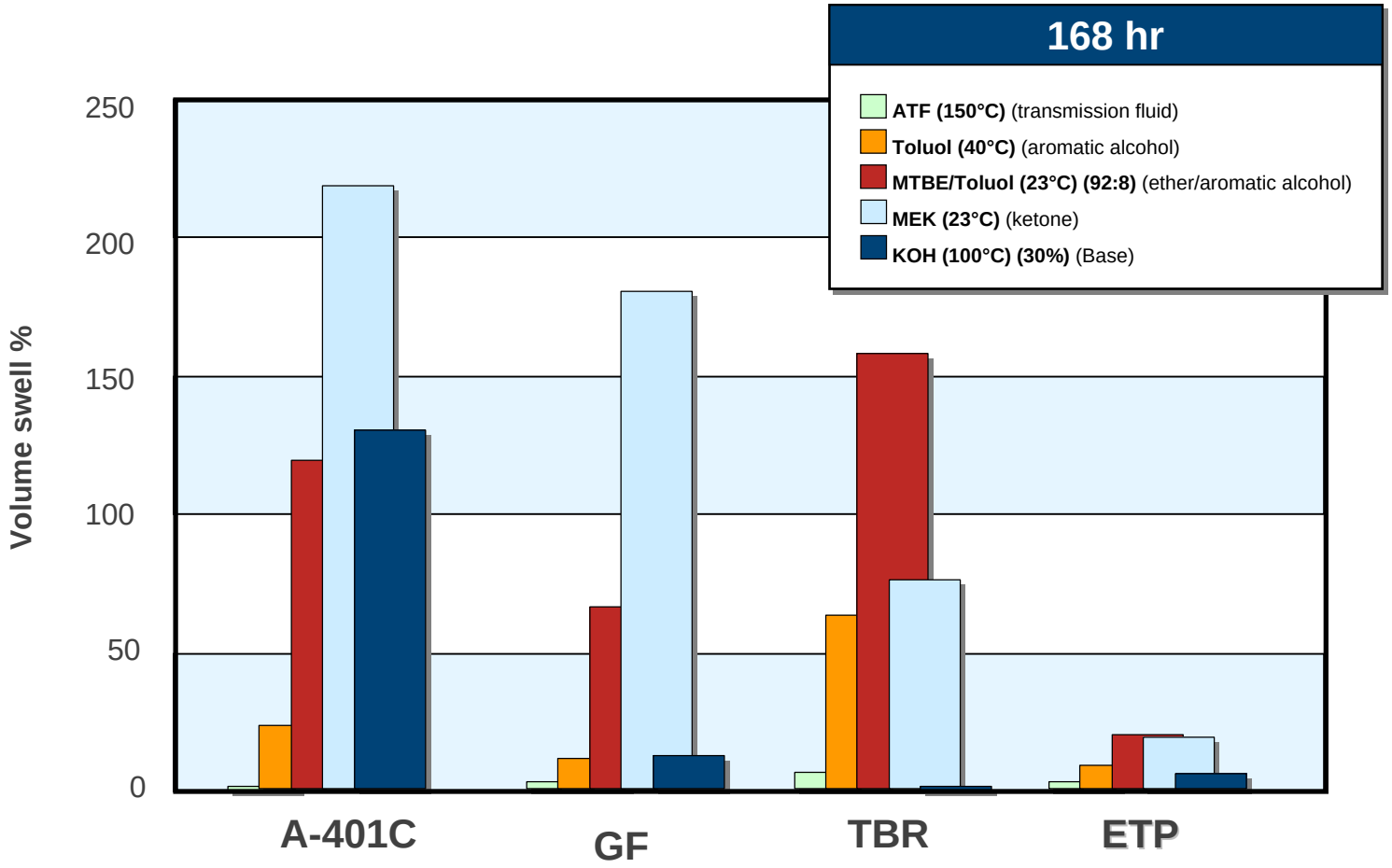
Swell in Fuel Mixtures

Influence of oxygenated additives

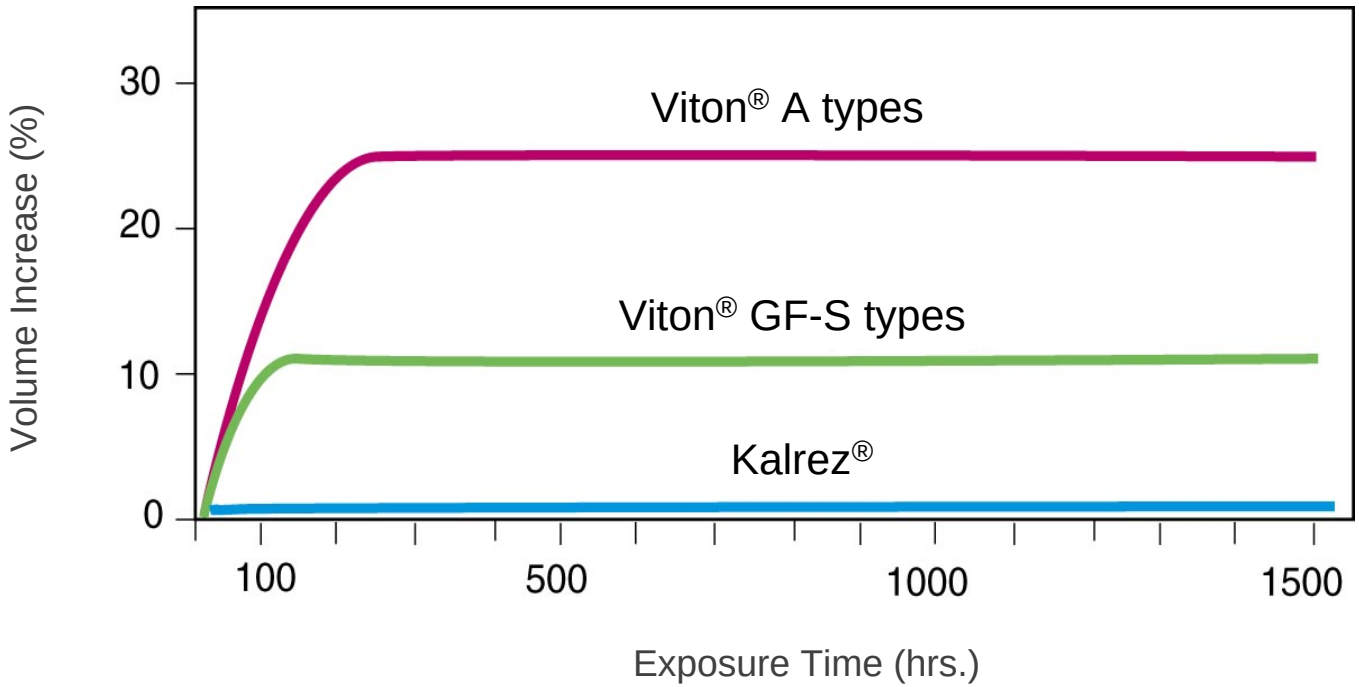


* 10% level blended with reference ASTM Fuel C

Superior Fluids Resistance

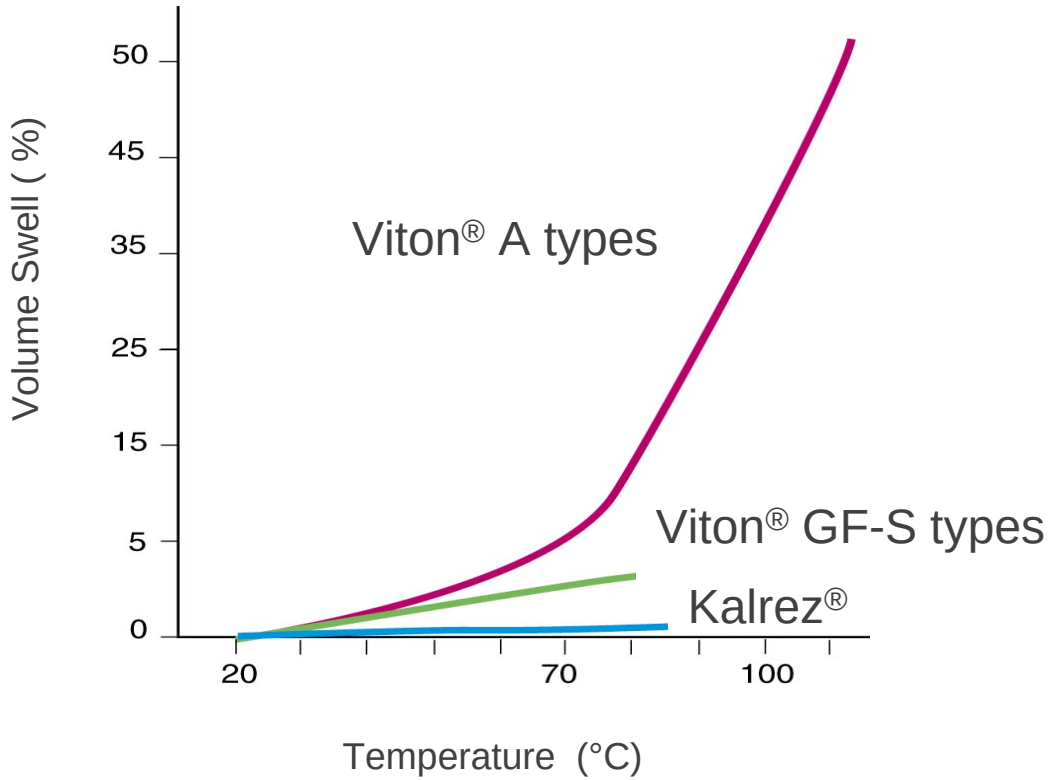


Resistance to Methylene Chloride (23°C)



Resistance to 95% Sulfuric Acid

2 Months Exposure



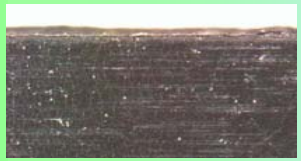
Degradation resulting from Oil Immersion which polymer to choose?

Degree of Base Resistance required

Engine | **Gear box and Transmission** | **Axle & Wheel bearing**

Suggested Polymer

bisphenol cured
B-651C un-aged



B-651C, 500 hrs
Shell Helix Ultra
0W40 engine oil

B-651C, 500 hrs
BP Cecilia 20
5W40 engine oil

B-651C, 500 hrs
ESSO Dexron III ATF

B-651C, 1000 hrs
Mobile Axle lube

GF-600S, 1000 hrs
BP Cecilia 20
5W40 engine oil

GF-600S, 1000 hrs
ESSO Dexron III ATF

GF-600S, 1000 hrs
Mobile Axle lube

TBR-605CS, 1000 hrs
ESSO Dexron III ATF

TBR-605CS, 1000 hrs
Mobile Axle lube

MADE WITH DuPont Performance Elastomers Viton® fluoroelastomer GENUINE VITON

Chemical Resistance of Elastomers

Chemical resistance of elastomers depends on **chemical structure.**

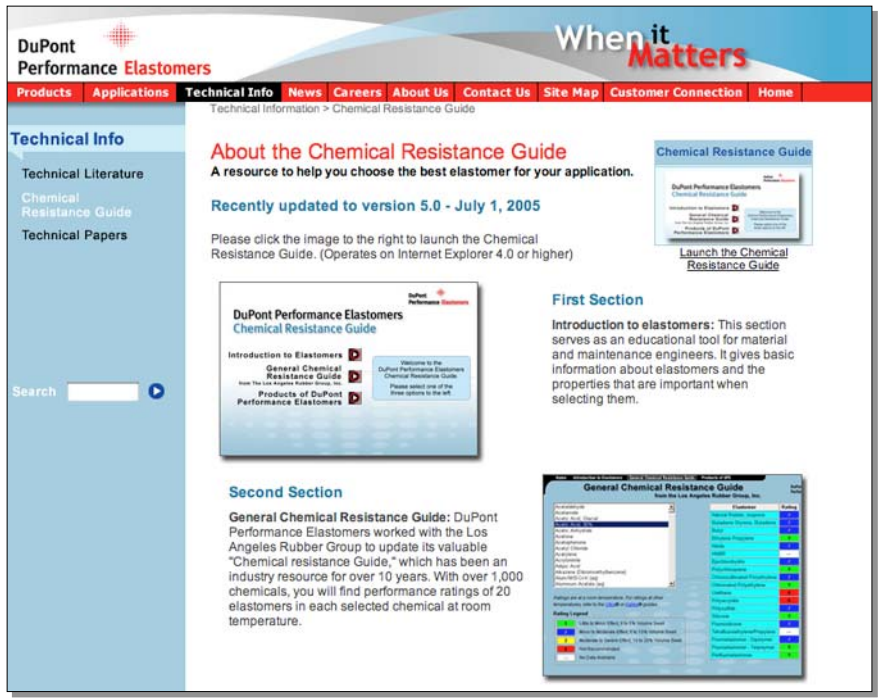
Within a class of elastomers such as Viton® fluoroelastomer, chemical resistance within different families will depend on **monomer composition**, **fluorine content** and **vulcanization system**

Several factors must be considered when selecting an elastomer for a **rubber part in service**:

- **Service temperature** (the higher the temperature the higher the effect of a given chemical on the polymer)
- **Service conditions** (static vs. dynamic application)
- **Polymer type** (within a class of polymers, several families with different chemical resistances are often available)
- **Compound formulation** (optimization of some properties may adversely affect others such as fluid resistance)
- **Curing system** (bis-phenol or peroxide)

Chemical Resistance Guide on-line

The CRG is a ressource to help you choose the best elastomer for your application. **Access to our on-line Chemical Resistance Guide** (CRG) is available through the DuPont Performance Elastomers web site at **www.dupontelastomers.com**,where detailed information about our product line may also be found.



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Caution: Do not use in medical applications involving permanent implantation in the human body.
For other medical applications, discuss with your DuPont Performance Elastomers customer service representative and read Medical Caution Statement H-69237.