

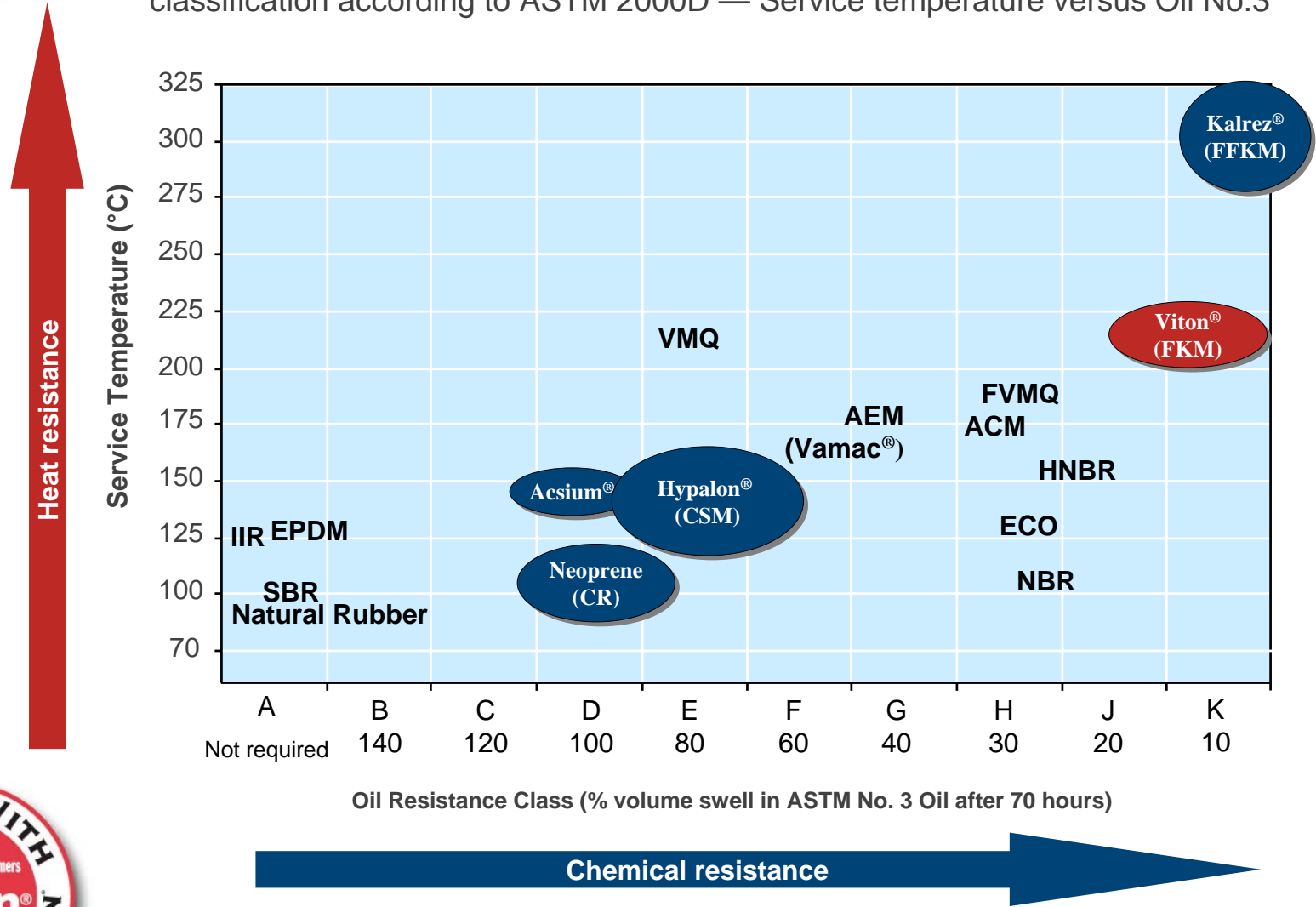


# Module 6: Chemical Resistance



# Viton® versus Other Elastomers

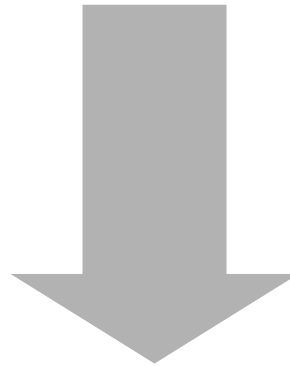
classification according to ASTM 2000D — Service temperature versus Oil No.3



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# 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 *
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* *	○	★	★★	★	★★	○	★	★★	○	<b>BEST</b>
Base resistance	✘	✘	✘	○	○	★	★	★	<b>BEST</b>	<b>BEST</b>
Low temperature properties	★	★	○	★	○	<b>BEST</b>	★★	★★	✘	○
Compression set resistance	<b>BEST</b>	★★	★	★★	★★	★★	★★	★★	★	★
Relative cost of polymer	low	low	low	low	low	medium	medium	medium	low	high

**BEST** Excellent    ★★ Very good    ★ Good    ○ Fair    ✘ poor

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

\*\* Consult the Chemical Resistance Guide at [www.dupontelastomers.com](http://www.dupontelastomers.com) or contact your Viton® specialist.



# Viton® - Selection Guide

is available on Internet

**DuPont Performance Elastomers** When it Matters

Products Applications **Technical Info** News Careers About Us Contact Us Site Map Customer Connection Home

Products > Viton® > Technical Info > Selection Guide

**Viton®**

Technical Info  
Selection Guide  
Data Sheets and MSDS  
Applications  
News  
Viton® Made with APA  
Specify Parts of Viton®  
Request Info

Search

## Viton® Selection Guide

**Instructions**

The choice of the most appropriate type of Viton® for any given application will be determined by the end-use service, and in particular, whether the finished part must provide:

- Resistance to amines or caustics
- Resistance to hydrocarbon fluids
- Flexibility at low temperatures

To Determine Which Type of Viton® is Best Suited For An Application, Please Answer The Following Questions:

**Does The Application Require Base Resistance?** (Resistance To Strong Caustics, Primary Amines)  
[Details](#)

Yes  
 No

How I Arrived Here

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## Viton® Selection Guide

Does The Application Require Resistance to Low Molecular Weight Carbonyls (MEK, Acetone or MTBE (100%))?

- Yes  
 No

How I Arrived Here

Does The Application Require Base Resistance?  
-Yes

## Viton® Selection Guide

The Viton® Family Best Suited For Your Application Is:

**ETP-600S**

How I Arrived Here

Does The Application Require Base Resistance?  
-Yes

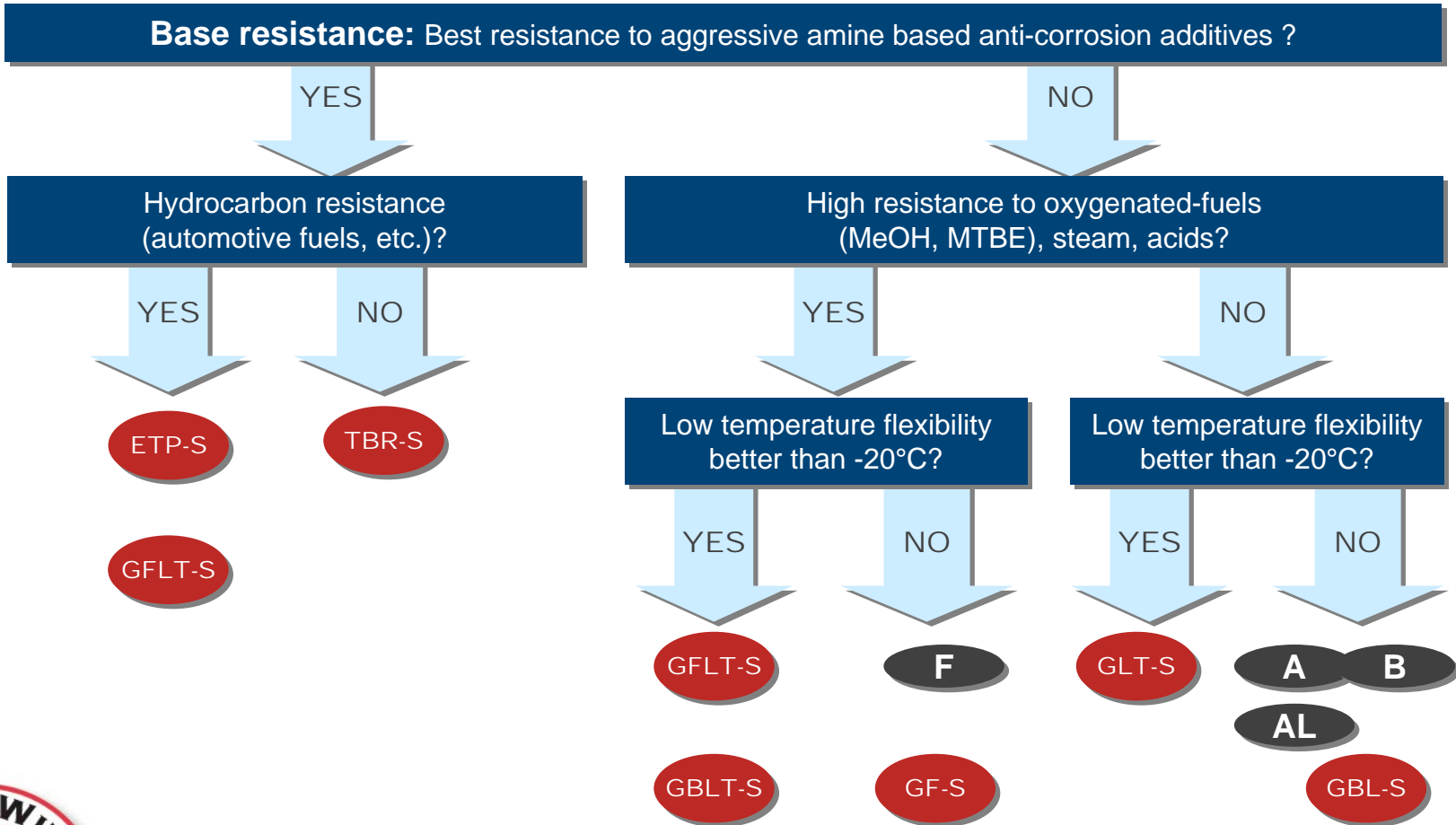
Does The Application Require Resistance to low molecular weight carbonyls (MEK, Acetone, MIBK) or MTBE (100%)?  
-Yes

The Family Of Viton Best Suited For Your Application Is:  
-ETP-S



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# Selection Based on Application Needs

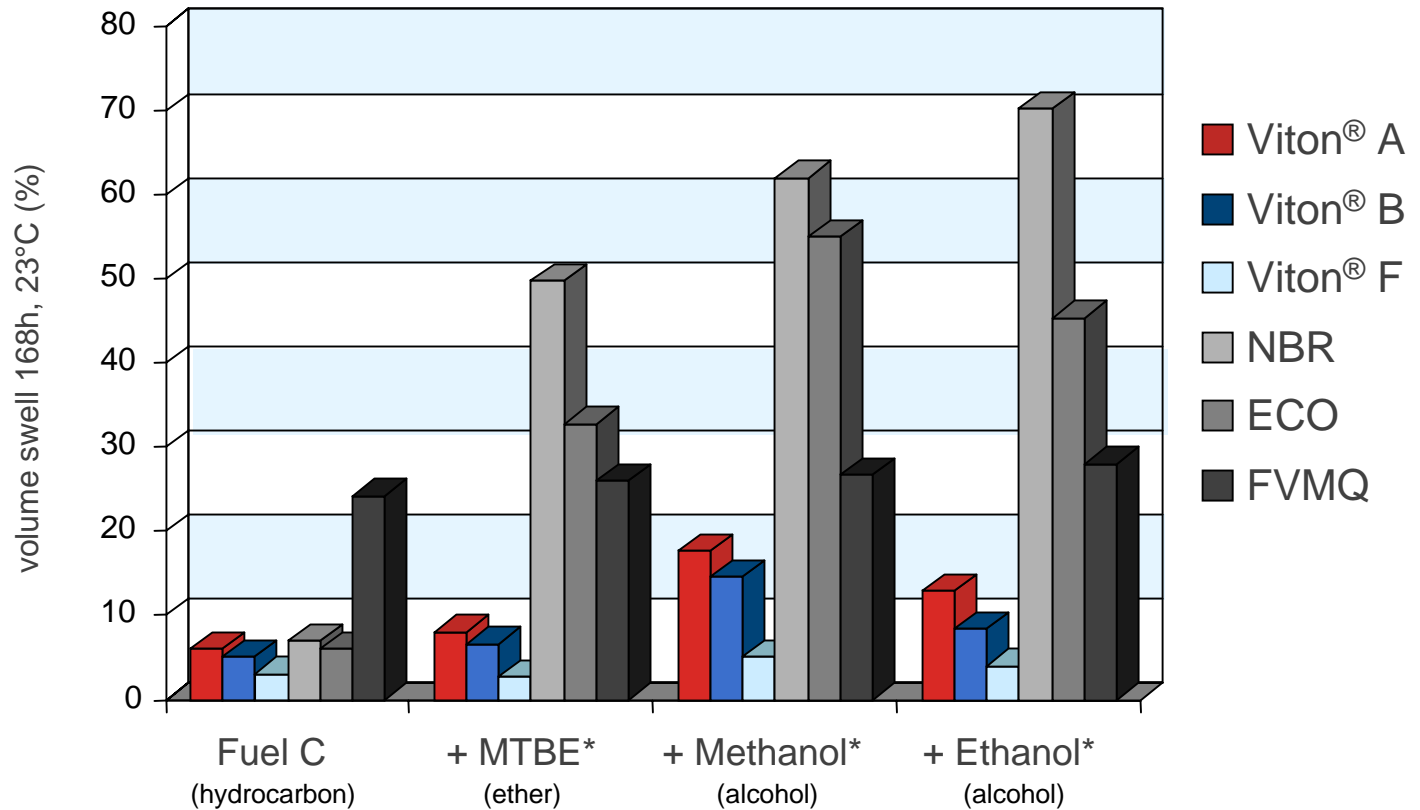


red for Viton® made with APA (« -S » for APA technology)



# Swell in Fuel Mixtures

## Influence of oxygenated additives

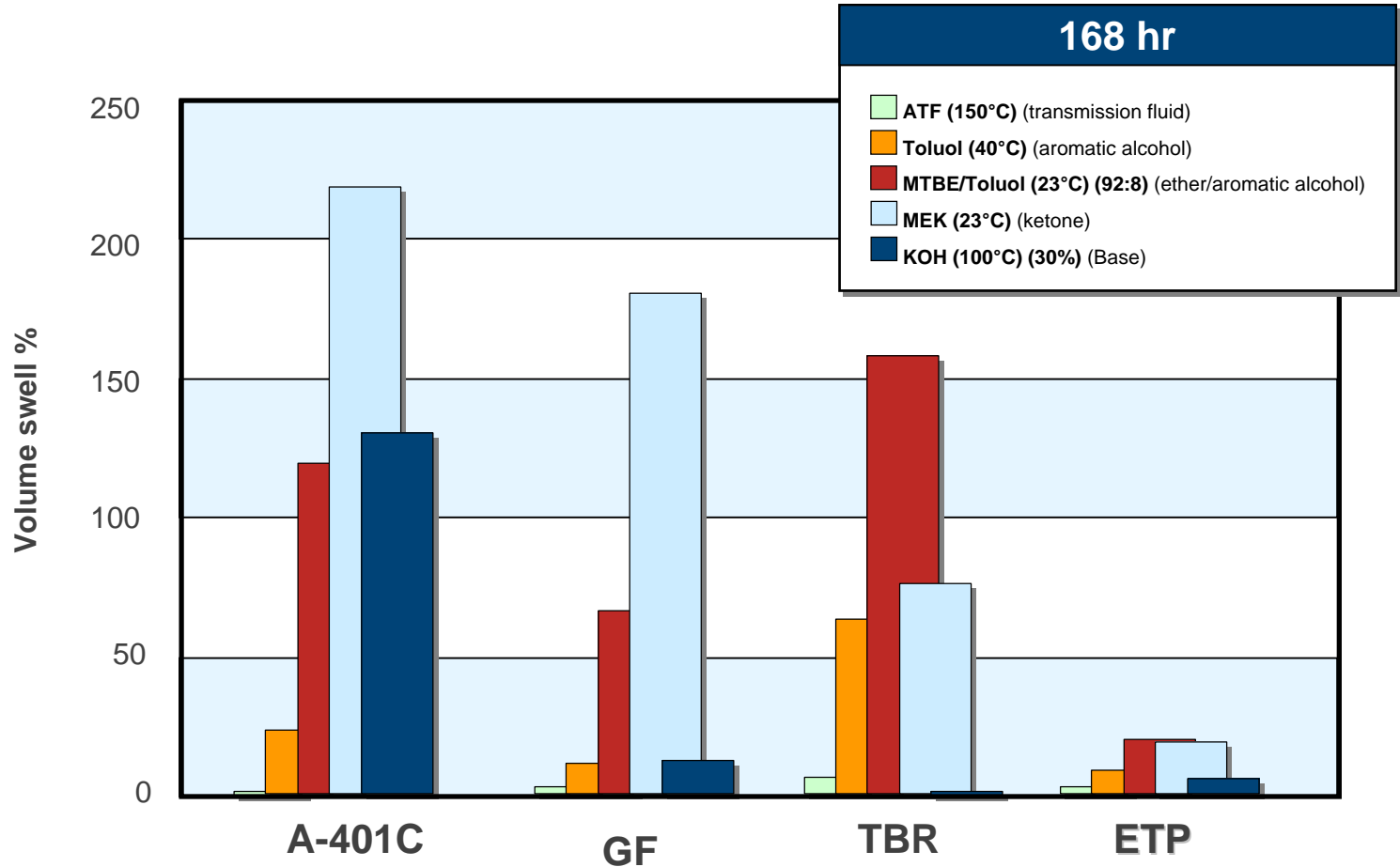


\* 10% level blended with reference ASTM Fuel C



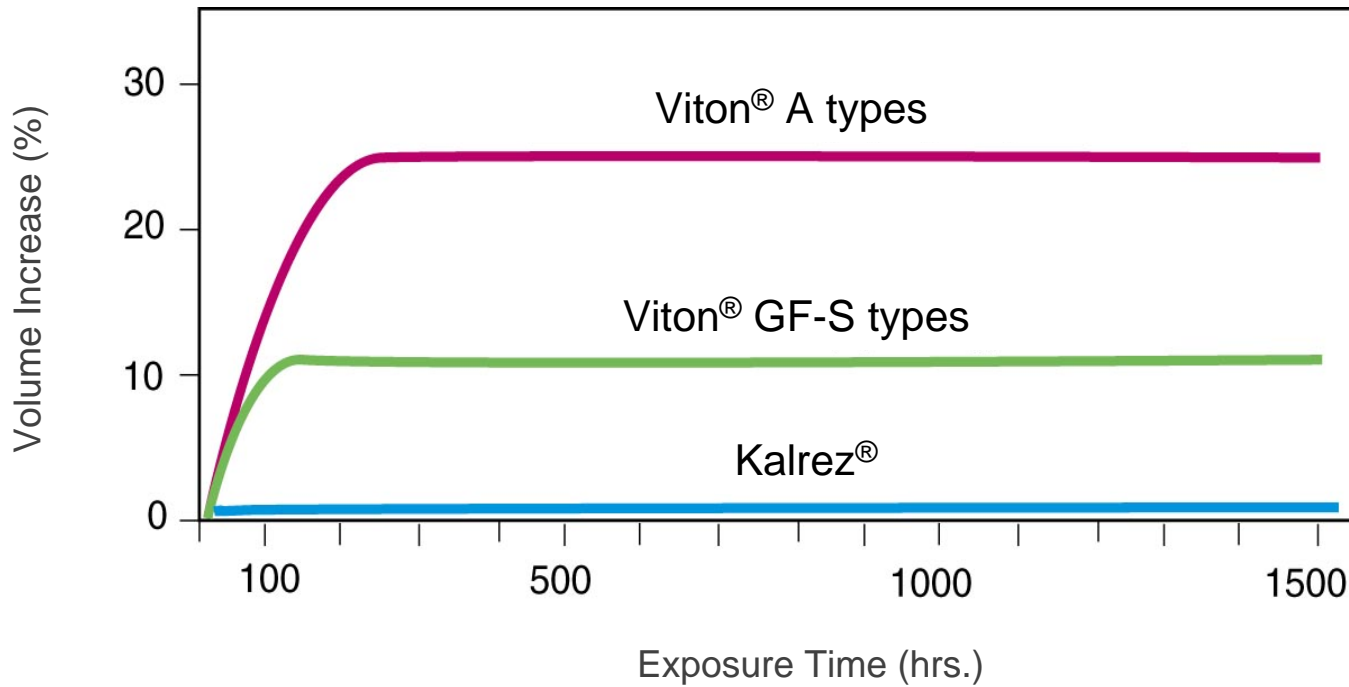


# Superior Fluids Resistance



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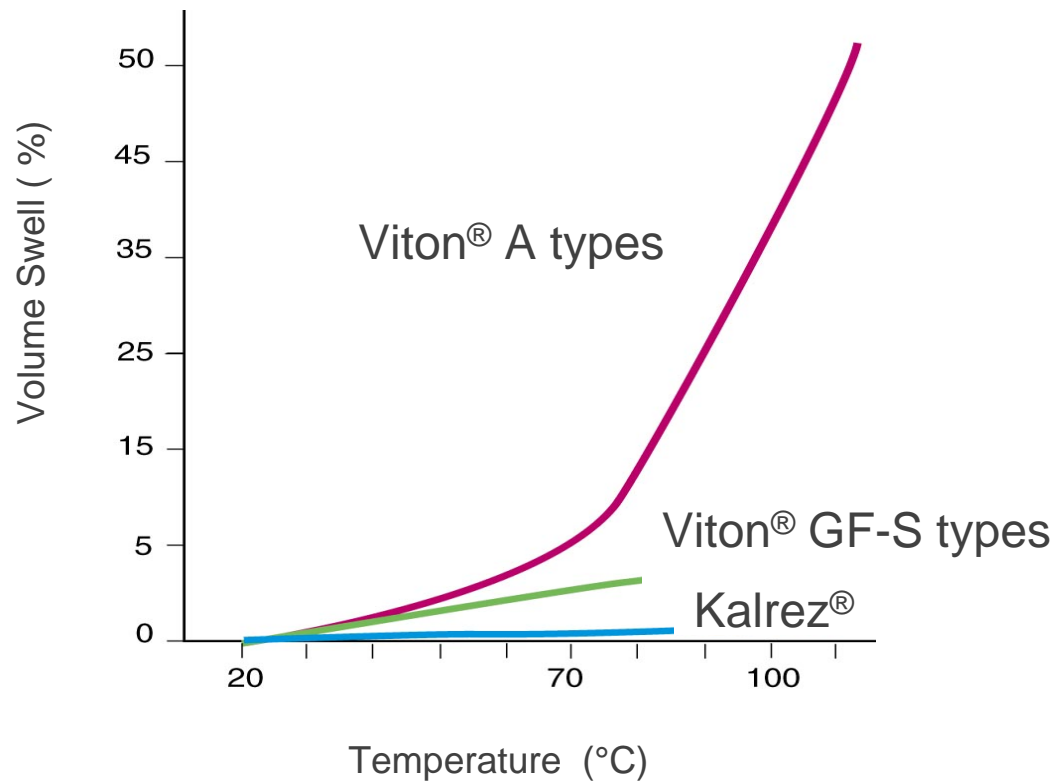
# Resistance to Methylene Chloride (23°C)



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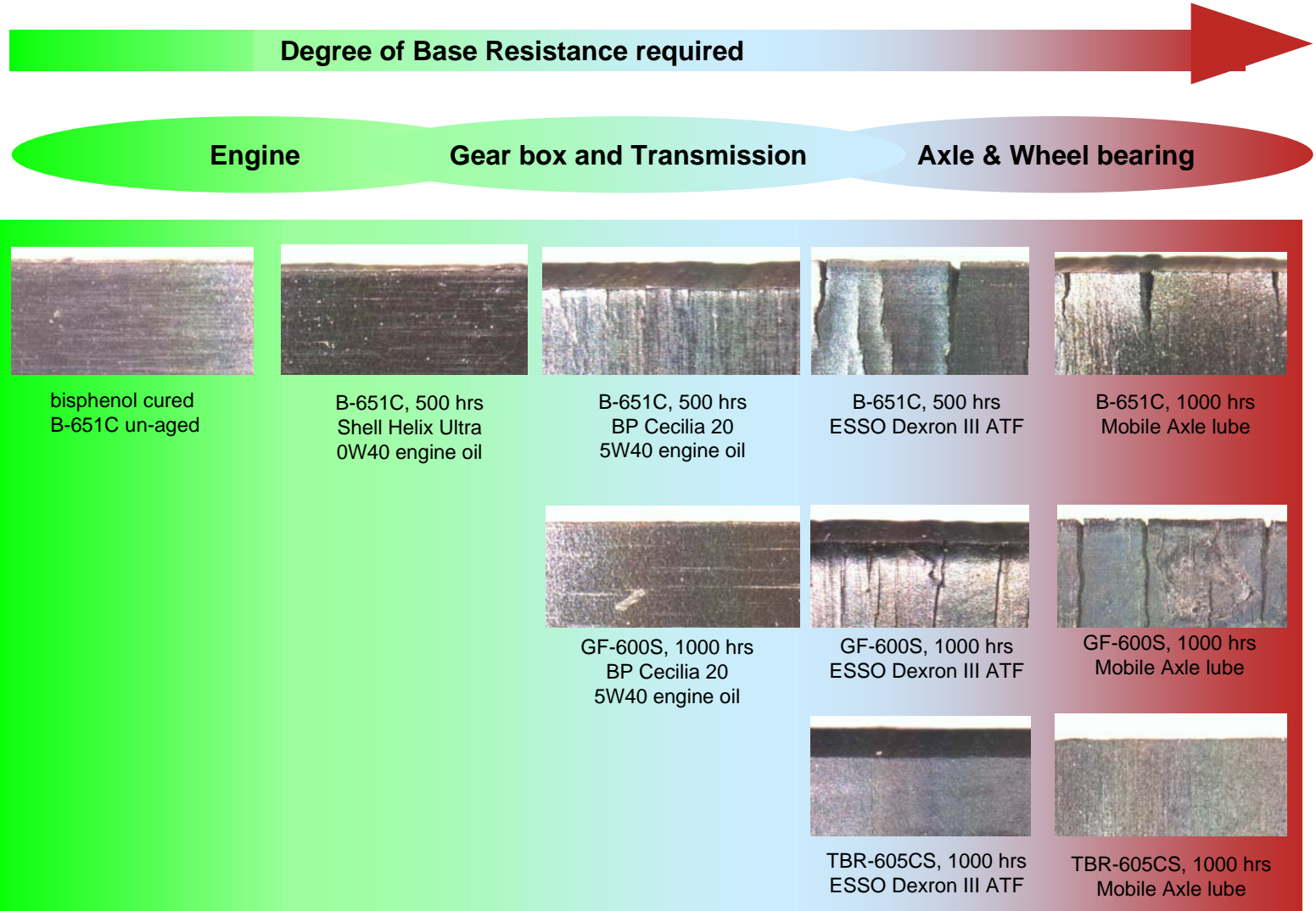
# Resistance to 95% Sulfuric Acid

## 2 Months Exposure



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# Degradation resulting from Oil Immersion which polymer to choose?



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# 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 resource 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](http://www.dupontelastomers.com), where detailed information about our product line may also be found.

The screenshot displays the DuPont Performance Elastomers website. The header includes the company logo and the slogan "When it Matters". A navigation menu contains links for Products, Applications, Technical Info, News, Careers, About Us, Contact Us, Site Map, Customer Connection, and Home. The "Technical Info" section is active, showing a sidebar with links to Technical Literature, Chemical Resistance Guide, and Technical Papers. The main content area is titled "About the Chemical Resistance Guide" and includes a sub-header "A resource to help you choose the best elastomer for your application." and a note "Recently updated to version 5.0 - July 1, 2005". Below this, there is a call to action: "Please click the image to the right to launch the Chemical Resistance Guide. (Operates on Internet Explorer 4.0 or higher)". A large image shows the "DuPont Performance Elastomers Chemical Resistance Guide" interface, which includes a search bar and a list of products. To the right, there is a "First Section" titled "Introduction to elastomers" and a "Second Section" titled "General Chemical Resistance Guide". A small inset image shows a detailed view of the "General Chemical Resistance Guide" interface, which features a table with columns for chemical names and performance ratings.



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