



*AFLAS<sup>®</sup> applications*

# AFLAS<sup>®</sup> 200P Automotive Application

## Low temperature Flexible Base Resistant Elastomer

### DESCRIPTION

AFLAS<sup>®</sup> 200P (SPL-FKM) is a peroxide-curable specialty fluoroelastomer offering improved performance over conventional FKM-type fluoroelastomers in demanding applications found in automotive industries. AFLAS 200P is classified by ASTM D 1418-01 as TYPE IV FKM which is called base resistant elastomer. AFLAS 200P offers base resistance as well as low temperature flexibility for automotive sealing.

### MATERIAL FEATURES

- Improved cold temperature performance ( $T_g = -13^{\circ}\text{C}$ ,  $TR-10 = -8^{\circ}\text{C}$ )
- Retains good base resistance and heat tolerance
- Can be solvated and applied as a coating

### END USER BENEFITS

- Longer life of seals
- Resists aggressive oils which contain anti-oxidants
- Improved sealing for cold application environments

### TYPICAL APPLICATIONS

- Axle shaft seals
- Radial shaft seals
- Pinion shaft seals
- O-rings for alkaline/acid chemicals
- Rubber coated metal gaskets

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### CURE AND CONDITIONS

AFLAS 200P (SPL-FKM) is not cured in the same manner as standard AFLAS “FEPM” products (100 and 150 series). The best performing peroxide is Perkadox<sup>®</sup> P-14Sfl or Vul-Cup<sup>®</sup> 40KE. TAIC\* is the recommended co-agent and is required for the cure. Hydrotalcite is recommended for acid scavenger.

Press cure is accomplished at 170°C for 10 minutes. Press cure conditions (temperature and time) should be decided in consideration of various factors, such as the size of parts, required properties, scorch safety and mold release. Post cure should be conducted at 230°C for 24 hours.

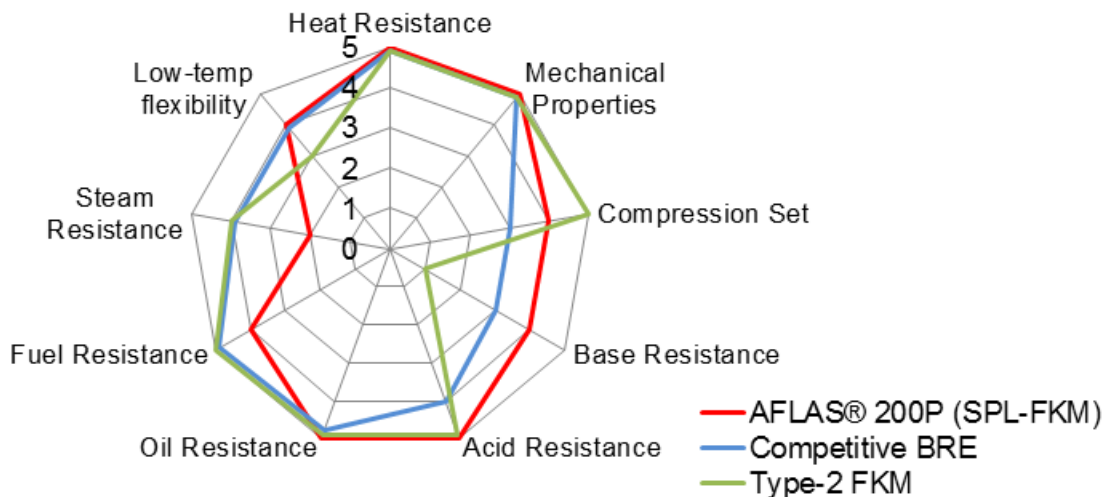
Unlike other AFLAS “FEPM” grades (100 and 150 series), AFLAS 200P (SPL-FKM) is not recommended for steam resistant use. Insufficient curing tends to adversely affect the mold release properties. Complete post curing optimizes the compression set.

If at any time you have questions or concerns about a specific application, please contact your account manager for assistance.

\*Triallylisocyanurate

Perkadox<sup>®</sup> is a registered trademark of Akzo Nobel Chemicals, B.V.  
Vul-Cup<sup>®</sup> is a registered trademark of Arkema, Inc.

### COMPARISON CHART



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# AGC

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### AFLAS 200P (SPL-FKM) RPA (CURE) COMPOUND DATA

177°C, 100CPM, 3° Strain, 12 minutes

Curability	Units	AFLAS 200P (SPL- FKM)	Competitive BRE	Type-1 FKM (Copolymer) (Polyol Cure)	Type-2 FKM (Terpolymer) (Peroxide)
Min S'	dNm	7.7	5.6	4.6	0.8
Max S'	dNm	61.4	88.9	77.2	102.9
90% Cure	min	6.5	1.6	2.9	0.9

### AFLAS 200P (SPL-FKM) COMPOUND COMPARATIVE PROPERTIES

Property	Units	AFLAS 200P (SPL- FKM)	Competitive BRE	Type-1 FKM (Copolymer) (Polyol Cure)	Type-2 FKM (Terpolymer) (Peroxide)
Mooney (ML1+10)		90 (100°C) 65 (121°C)	48 (121°C)	52 (100°C)	50 (100°C)
Fluorine Content	%	60	65	66	71
Tg (Glass transition temperature)	°C	-13		-19	-13
TR-10	°C	-8	-7		
Compression Set (70hrs @ 200°C)*	%	23	43	14	11
Compression Set (22hrs @ 200°C)*	%	17			
Compression Set (22hrs @ 175°C)*	%	13			
Hardness	Shore A	68	73	70	70
Tensile Strength, Yield	MPa/psi	18/2610	18/2610	15/2176	23/3336
M100	MPa/psi	5/725	5/725	6/870	4/580
Elongation	%	270	300	200	320

\*ASTM D-395 Method B, Type-1 button specimen

#### Formulation(PHR):

AFLAS 200P SPL-FKM	100
MT 990 Carbon	25
TAIC*	5
Peroxide**	1
Sodium Stearate	1
Hydrotalcite	3

#### Cure Conditions:

Press cure: 170°C / 10 minutes

Post cure: 230°C / 24 hours

\* Triallylisocyanurate

\*\* 1,3-bis(t-butylperoxy)-diisopropylbenzene

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**AFLAS 200P (SPL-FKM) COMPATIBILITY DATA**

**Standard Oil**

<b>IRM 903 Resistance 150°C for 70 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change in Hardness	(Points)	-4	-6
Volume Change	(%)	6.3	2.3
<b>IRM 903 Resistance 150°C for 168 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	+8	+32
Change of Tensile Elongation	(%)	-9	-32
Change in Hardness	(Points)	-5	-1
<b>IRM 903 Resistance 150°C for 336 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	+7	+33
Change of Tensile Elongation	(%)	-9	-33
Change in Hardness	(Points)	-5	-1
<b>IRM 903 Resistance 150°C for 1000 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	0	+24
Change of Tensile Elongation	(%)	-13	-37
Change in Hardness	(Points)	-5	-3

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**Service Fluid**

<b>SF105 Resistance 150°C for 70 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change in Hardness	(Points)	0	NA
Volume Change	(%)	1.6	+1.0
<b>SF105 Resistance 150°C for 168 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	-13	+11
Change of Tensile Elongation	(%)	-37	-44
Change in Hardness	(Points)	-4	0
<b>SF105 Resistance 150°C for 336 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	-19	+5
Change of Tensile Elongation	(%)	-42	-49
Change in Hardness	(Points)	-3	-1
<b>SF105 Resistance 150°C for 1000 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	-29	+24
Change of Tensile Elongation	(%)	-51	-37
Change in Hardness	(Points)	-2	-4

**Commercial Engine Oil**

<b>Engine Oil (SM class) Resistance 175°C for 720 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>	<b>Type-1 FKM (Copolymer) (Polyol Cure)</b>	<b>Type-2 FKM (Terpolymer) (Peroxide)</b>
Change of Tensile Strength	(%)	-5	NA	-27	-4
Change of Tensile Elongation	(%)	-28	NA	-35	+7
Change in Hardness	(Points)	-2	NA	+2	-2
Volume Change	(%)	+3	NA	0	-1

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**Automotive Transmission Fluid**

<b>ATF DexronVI Resistance 150°C for 70 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change in Hardness	(Points)	-5	-1
Volume Change	(%)	+3.7	+1.3
<b>ATF DexronVI Resistance 150°C for 168 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	+8	+40
Change of Tensile Elongation	(%)	-12	-29
Change in Hardness	(Points)	-5	-4
<b>ATF DexronVI Resistance 150°C for 336 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	+8	+27
Change of Tensile Elongation	(%)	-13	-35
Change in Hardness	(Points)	-4	-3
<b>ATF DexronVI Resistance 150°C for 1000 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	+8	+13
Change of Tensile Elongation	(%)	-15	-7
Change in Hardness	(Points)	-3	-4

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**Diesel Fuel**

<b>Diesel Fuel Resistance 150°C for 70 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change in Hardness	(Points)	-3	-4
Volume Change	(%)	+7.0	+6.8
<b>Diesel Fuel Resistance 150°C for 168 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	-14	+17
Change of Tensile Elongation	(%)	-23	-33
Change in Hardness	(Points)	-11	-11
<b>Diesel Fuel Resistance 150°C for 336 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	-25	+8
Change of Tensile Elongation	(%)	-16	-34
Change in Hardness	(Points)	-13	-4
<b>Diesel Fuel Resistance 150°C for 1000 hours</b>	<b>Units</b>	<b>AFLAS 200P (SPL- FKM)</b>	<b>Competitive BRE</b>
Change of Tensile Strength	(%)	-40	+9
Change of Tensile Elongation	(%)	-24	-29
Change in Hardness	(Points)	-14	-8

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### Thermal Aging

Heat Resistance 200°C for 1000 hours	Units	AFLAS 200P (SPL- FKM)	Competitive BRE
Change of Tensile Strength	(%)	-10	NA
Change of Tensile Elongation	(%)	-28	NA
Change in Hardness	(Points)	+1	NA

Heat Resistance 250°C for 70 hours	Units	AFLAS 200P (SPL- FKM)	Competitive BRE
Change of Tensile Strength	(%)	-18	NA
Change of Tensile Elongation	(%)	-1	NA
Change in Hardness	(Points)	0	NA

Heat Resistance 275°C for 70 hours	Units	AFLAS 200P (SPL- FKM)	Competitive BRE
Change of Tensile Strength	(%)	-54	NA
Change of Tensile Elongation	(%)	-50	NA
Change in Hardness	(Points)	+3	NA

### Base Resistance

28% Aq Ammonia Resistance 70°C for 168 hours	Units	AFLAS 200P (SPL- FKM)	Competitive BRE	Type-1 FKM (2-FKM) (Polyol Cure)	Type-2 FKM (3-FKM) (Peroxide)
Retention of Tensile Strength	(%)	+6	-75	Disintegration	Disintegration
Retention of Tensile Elongation	(%)	-19	-90	Disintegration	Disintegration
Change in Hardness	(Points)	-1	-36	Disintegration	Disintegration
Volume Change	(%)	+7	+119	Disintegration	Disintegration

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50% NaOH aq Resistance 70°C for 720 hours	Units	AFLAS 200P (SPL- FKM)	Competitive BRE	Type-1 FKM (Copolymer) (Polyol Cure)
Retention of Tensile Strength	(%)	-2	NA	Disintegration
Retention of Tensile Elongation	(%)	-11	NA	Disintegration
Change in Hardness	(Points)	-1	NA	Disintegration
Volume Change	(%)	+1	NA	Disintegration

### HANDLING PRECAUTIONS

AFLAS Fluoroelastomers are stable at normal conditions and are not regulated by the U.S Department of Transportation. Avoid temperatures above 400°C. Fluoroelastomers can react with molten alkali metals and finely divided magnesium and aluminum at temperatures above 425°C. Thermal decomposition of this product at temperatures above 400°C will generate hydrogen fluoride, which is corrosive. No polymerization will occur under normal processing conditions.

The shelf life of AFLAS Fluoroelastomers can be guaranteed by AGC Chemicals for 6 months after date of delivery for unopened boxes. However the properties are not impacted by storage time. Storage and handling facilities should be designed to minimize exposure to extreme temperatures and dusty environments. Wear protective gear and avoid tobacco use at all times when handling fluoroelastomers. Consult your Material Safety Data Sheet for safe handling details or contact your AGC Chemicals Technical Representative for clarification.

NOTE: The data listed here represents typical values for the stated grades of AFLAS<sup>®</sup> fluoroelastomers. This information should be used as a guide only and not to establish specification limits or design criteria. AGC Chemicals Americas assumes no obligation or liability for any advice furnished by us or for results obtained with respect to this product. All such advice is provided free of charge and the buyer assumes sole responsibility for results obtained in reliance thereon.

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