

# Data Sheet: FEP Encapsulated Viton O-Rings

## MATERIAL ANALYSIS

**COLOUR:** BLACK

**TEMPERATURE RANGE:** FEP ENCAPSULATION: - 20°C TO +205°C (-4°F TO +400°F)  
SHORT DURATION TO +260°C (+500°F)

**ENCAPSULATION MATERIAL:** DUPONT TEFLON® FEP 160 FLUOROPOLYMER RESIN OR EQUIVALENT

**CORE MATERIAL:** GENUINE DUPONT A-361C VITON® OR EQUIVALENT

### PHYSICAL PROPERTIES:

#### TENSILE STRENGTH

DUPONT FEP 160	ASTM D-1708: 5000 PSI
DUPONT VITON® A-361C	ASTM D412 (PULLED AT 8.5MM/S): 2050 PSI
DUPONT A-361C VITON®	
ELONGATION AT BREAK	ASTM D412 (PULLED AT 8.5MM/S): 213%
DUPONT A-361C VITON® DUROMETER	ASTM D2240: 77 SHORE A
DUPONT A-361C VITON® DENSITY	ASTM D792: 1.82 +/- 0.03

**COMPRESSION SET TEST:** DUPONT VITON® A-361C

#### TEST ONE, AIR - ASTM D395-2003:

AMOUNT OF COMPRESSION = 25%, COMPRESSION CONDITION = 200°C, 24 HR: RESULT = 17%

#### TEST TWO - STEAM - ASTM D1414:

AMOUNT OF COMPRESSION = 25%, COMPRESSION CONDITION = 160°C, 16 HR: RESULT = 32%

#### DUROMETER

FEP ENCAPSULATED SOLID CORE VITON 85 – 90 SHORE A

## MATERIAL TEST DATA – FEP

### GAS PERMEABILITY (GM/2540MM<sup>2</sup>/24HRS BASED ON 40MU FEP):

	23°C	35°C	50°C
CARBON DIOXIDE	NONE	NONE	NONE
HELIUM	NONE	NONE	NONE
HYDROGEN CHLORIDE	NONE	NONE	NONE
NITROGEN	0.18	NONE	NONE
OXYGEN	NONE	NONE	NONE

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## VAPOUR PERMEABILITY (GM/2540MM<sup>2</sup>/24HRS BASED ON 40MU FEP):

	23°C	35°C	50°C
ACETIC ACID (ETHANOIC ACID)	NONE	0.42	NONE
ACETONE (ETHANONE)	NONE	0.42	NONE
BENZENE	0.15	0.64	NONE
N-BUTYL ETHER	0.08	NONE	0.65
DECANE	0.72	NONE	1.03
ETHANOL	0.11	0.69	NONE
ETHYL ACETATE (ETHYL ETHANOATE)	0.06	0.77	2.90
HEXANE	NONE	0.57	NONE
HYDROCHLORIC ACID 20%	NONE	NONE	NONE
METHANOL	NONE	NONE	5.61
PIPERIDINE (PENTAMETHYLENEAMINE)	0.04	NONE	NONE
SODIUM HYDROXIDE 50%	NONE	NONE	NONE
SULPHURIC ACID	NONE	NONE	NONE
TETRACHLOROMETHANE	0.11	0.31	NONE
TOLUENE	0.37	NONE	2.93
WATER	0.09	0.45	0.89

## ABSORPTION (168HRS AT TEMPERATURE STATED, PFA & FEP):

	TEST TEMP °C	RANGE OF WEIGHT GAIN
ANILINE	185	0.3 TO 0.4%
ACETOPHENONE	201	0.6 TO 0.8%
BENZALDEHYDE	179	0.4 TO 0.5%
BROMINE	22	0.5% (PFA ONLY)
CHLORINE	120	0.5 TO 0.6%
CHLOROSULPHONIC ACID	150	0.7 TO 0.8%
CHROMIC ACID 50%	120	0.01% BOTH
DIMETHYL SULPHOXIDE	190	0.1 TO 0.2%
FERRIC CHLORIDE 25%	100	0.01% BOTH
FREON 113	47	1.2% (PFA ONLY)
HYDROCHLORIC ACID 37%	120	0.01 TO 0.03%
ISO-OCTANE	99	0.7 TO 0.8%
NITROBENZENE	210	0.7 TO 0.9%
PERCHLOROETHYLENE	121	2.0 TO 2.3%
PHOSPHORIC ACID	100	0.01% BOTH
SULPHURYL CHLORIDE	68	1.7 TO 2.7%
TETRACHLOROMETHANE	78	2.3 TO 2.4%
TOLUENE	110	0.7 TO 0.8%
TRIBUTYL PHOSPHATE	200	1.8 TO 2.0%
ZINC CHLORIDE	100	0.01% TO 0.03%

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## ABSORPTION (LONG TERM AT TEMPERATURE STATED, PFA & FEP):

	TEST TEMP °C	RANGE OF WEIGHT GAIN
ACETONE (ETHANONE)	50	0.4% ON 12 MONTHS
AMMONIUM HYDROXIDE	70	0.1% ON 12 MONTHS
ETHANOL 95%	50	0.01% ON 12 MONTHS
ETHANOL 95%	70	0.01% ON 2 WEEKS
ETHYL ACETATE (ETHYL ETHANOATE)	50	0.7% ON 12 MONTHS
HYDROCHLORIC ACID 10%	70	0.01% ON 12 MONTHS
NITRIC ACID 10%	70	0.1% ON 12 MONTHS
SODIUM HYDROXIDE 10%	70	0.1% ON 12 MONTHS
SULPHURIC ACID 30%	70	0.01% ON 12 MONTHS
TETRACHLOROMETHANE	50	1.6% ON 12 MONTHS
TETRACHLOROMETHANE	70	1.9% ON 2 WEEKS
TOLUENE	50	0.6% ON 12 MONTHS
TOLUENE	70	0.6% ON 2 WEEKS

## MATERIAL TEST DATA – DUPONT VITON® A-361C

### ASTM D412, PULLED AT 8.5MM/S

#### STRESS/STRAIN @ 23°C (73°F) - AFTER AGING 70 hrs @ 200°C (392°F)

100% MODULUS	730 psi
TENSILE STRENGTH	1,810 psi
ELONGATION AT BREAK	208%
HARDNESS	76 SHORE A

### ASTM D412, PULLED AT 8.5MM/S

#### STRESS/STRAIN @ 23°C (73°F) - AFTER AGING 168 hrs @ 200°C (392°F)

100% MODULUS	815 psi
TENSILE STRENGTH	1,850 psi
ELONGATION AT BREAK	205%
HARDNESS	79 SHORE A

### ASTM D412, PULLED AT 8.5MM/S

#### STRESS/STRAIN @ 23°C (73°F) - AFTER AGING 70 hrs @ 232°C (450°F)

100% MODULUS	760 psi
TENSILE STRENGTH	1,905 psi
ELONGATION AT BREAK	208%
HARDNESS	76 SHORE A

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## SPECIFICATIONS

Manufactured to meet the requirements of; AS568/BS1806 tolerance specifications.

## RESTRICTION OF HAZARDOUS SUBSTANCES (ROHS)

The restrictions of the use of certain Hazardous Substances (ROHS) Directives 2002/95/EC and 2002/96/EG came into force on 1st July 2006.

We recognise these requirements and declare that all products sold by us do comply with the European Directives.

## REGISTRATION, EVALUATION, AUTHORISATION AND RESTRICTION OF CHEMICALS (REACH)

The EU Regulations (EC 1907/2006) came into force on 1st June 2007. We are familiar with the European Regulation on chemicals being the producer of products from raw materials. The elements of our product that could be considered chemical based are in actual fact rubber, being Viton® and is classified in the Regulations as polymers and is therefore exempt.

## COMPLIANCES - FEP/PFA ENCAPSULATION

### FDA

The clear TEFLON FEP/PFA Encapsulation of our Encapsulated 'O' Ring complies with Part 177 of Title 21 of the Food and Drug Administration regulations for safe use as articles or components of articles for producing, manufacturing, processing, preparing, treating, packing, transporting or holding food in accordance with FDA regulation 21.CFR.177.1550.

We confirm that we do not use any part of the *Jatropha* plant in the manufacture of our FEP/PFA Encapsulated 'O'-Rings.

### 3A® SANITARY STANDARD

Further, we can advise that Table One (attached) of number 20-22 3A® Sanitary Standard documents that FEP and PFA materials, to the previously mentioned FDA 21.CFR.177.1550 Compliance standard, is also compliant to this 3A® Sanitary Standard Number 20-22.

### USP CLASS VI

Teflon® FEP/PFA fluoropolymers have been tested in accordance with USP Protocol and meet the requirements of a USP Class VI plastic.

### EU VO 1935/2004

We have researched and evaluated BFR documentation especially "Recommendations of the Federal Institute for Risk Assessment on Plastics intended to come in to contact with Food".

The principle underlying this Regulation is that any material or article intended to come into contact directly or indirectly with food must be sufficiently inert to preclude substances from being transferred to food in quantities large enough to endanger human health or to bring about an unacceptable change in the composition of the food or a deterioration in its organoleptic properties.

On our Encapsulated 'O' Rings, the outer encapsulate is an FEP or PFA melt processable polymer of P.T.F.E. (Otherwise known as the brand Teflon®). These material P.T.F.E polymers are highly inert and are utilised intensively in industrial Food Processing, and Domestic Food cooking equipment.

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FEP / PFA Encapsulated 'O' Rings Encapsulate materials and their manufacture are compliant with all relevant sections 1 to 21 of the E.C Regulation Number 1935/2004 and the subsequent Articles.  
FEP/PFA Encapsulated 'O' rings are compliant to EU VO 1935/2004 certification.

## COMPLIANCES – VITON CORE

The Viton core (DuPont Viton A-361C) of our CHEM-RING Encapsulated 'O' Ring complies with Part 177 of Title 21 of the Food and Drug Administration regulations for safe use as articles or components of articles for producing, manufacturing, processing, preparing, treating, packing, transporting or holding food in accordance with FDA regulation 21.CFR.177.2600. Chem-Rings with an FDA compliant Viton core are supplied from stock as standard and at no extra charge.

We confirm that we do not use any part of the *Jatropha* plant in the manufacture of our FEP/PFA Encapsulated 'O'-Rings.

*The above test results are based on test slabs / buttons. The results from the actual parts may be different.*

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