

# **Katon<sup>®</sup>**



**KATON<sup>®</sup> PF92T**

**High Performance TPF- fluoroelastomer**

---

## KATON<sup>®</sup> TPF Series-PF92T

### TPF- fluoroelastomer

**KATON<sup>®</sup> PF92T** is TPF fluoroelastomers (thermoplastic TPF fluoroelastomer) designed for high performance applications where both purity and chemical resistance are required, mainly for semiconductor manufacturing applications.

**KATON<sup>®</sup> PF92T** Para-bridging structure filler: it reinforces the materials without the use of conventional contaminating fillers, such as carbon black or minerals. Mineral fillers such as BaSO<sub>4</sub>, TiO<sub>2</sub>, SiO<sub>2</sub>, aluminum oxide and aluminum silicate exhibit high plasma resistance: they can therefore shield the polymer, but may contaminate the chamber by leaving discrete particles as soon as the polymer is etched by plasma. On the other hand, thermoplastic and fluoroelastomer have similar etching rates, so that polymeric filled compounds can be completely etched to form volatiles, significantly reducing the potential for particle generation.

They are suitable for applications at temperatures ranging from -10 °C to 230°C. Their extreme cleanliness along with their good plasma and chemical resistance make **KATON<sup>®</sup> PF92T** and PF92T the suitable sealing materials for most dry (plasma etching, PECVD, LPCVD, metal CVD, PVD, ALD, plasma cleans) and wet semiconductor processes (wafer cleaning, polymer removal, wet etching, polishing).

The primary use for **KATON<sup>®</sup> PF92T** is the manufacturing of any kind of elastomeric sealing element such as chamber seals, lid seals, window seals, gas inlet seals, fitting seals, slit valve gates, lip seals, wafer handling parts, etc. used in the semiconductor industry.

**KATON<sup>®</sup> PF92T** can be combined with the cure system and other typical fluoroelastomer compounding ingredients; their mixing can be accomplished with two roll mills or internal mixers. Finished goods may be produced by a variety of rubber processing methods. If only liquid peroxide is added to the polymers during the compounding stage, translucent items are produced.

The main properties of **KATON<sup>®</sup> PF92T** Series are as follows:

- High purity (low amount of extractables)
- Very good oxygen and fluorine plasma resistance
- Very low particle generation
- Low out gassing
- Low friction
- High abrasion resistance
- Low modulus
- Excellent mechanical and sealing properties.



The properties (colour and physical properties) of a translucent **KATON<sup>®</sup> PF92T** were studied as a function of the post curing cycle, performed in an air circulating oven with a reduced number of air changes (7 to 14 complete air changes per hour).

The colour is measured as white and yellow index following the ASTM E313 norm. A brownish colour is usually developed at higher temperatures, because of the impurities and of the decomposition products of 2,5 bis (t butyl peroxy) 2,5 dimethylhexane initiator.

#### Properties

|                          |             |
|--------------------------|-------------|
| Color                    | Translucent |
| Hardness, Shore A        | 57          |
| Tensile strength, MPa    | 227         |
| Elongation % change, MPa | 351         |

#### Physical

| Physical                          | Typical value unit | Test method |
|-----------------------------------|--------------------|-------------|
| Mooney Viscosity (ML 1+10, 121°C) | 25                 | No Standard |
| Fluorine Content                  | 65%                | No Standard |
| Working Temperature               | -10°C~230°C        | ASTM D573   |

#### Notes

Typical properties: these are not to be construed as specifications.

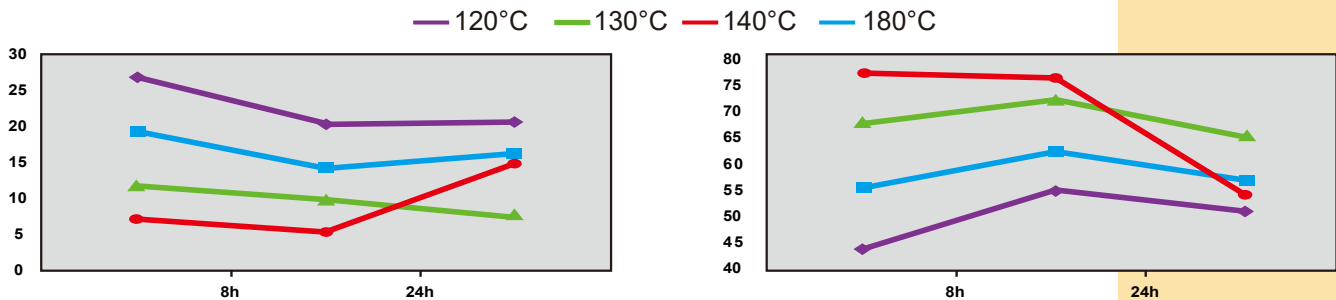
| Condition           | KATON® PF92T |
|---------------------|--------------|
| Inorganic acids     | A            |
| Organic acids       | C            |
| Alkalis             | B            |
| Amines (RT)         | D            |
| Hot amines (> 70°C) | D            |
| Water / Steam       | A            |
| Ketones             | D            |
| Esters              | B            |
| Ethers              | A            |
| Aldehydes           | A            |
| Alcohols            | A            |
| Hydrocarbons        | A            |
| Sour gas            | A            |
| Lubricants          | A            |
| Fluorinated fluids  | C            |

| Symbol | Volume swell (%) |
|--------|------------------|
| A      | < 10%            |
| B      | 10 30%           |
| C      | 30 50%           |
| D      | > 50 %           |

| Grade        | 4<br>< (10 1/K) |
|--------------|-----------------|
| KATON® PF92T | 4.2             |

| T(°C) | Specific heat (J/g)<br>KATON® PF92T |
|-------|-------------------------------------|
| 50    | 1.00                                |
| 100   | 1.05                                |
| 150   | 1.11                                |

## Post curing time (h)



A lower post curing temperature (i.e. 150°C) leads to a lighter colour.

## Total metal content

The raw gum and 3 translucent #214 O-rings (moulded, post cured, finished and washed in ISO 7 clean room) were submitted to the digestion by dry ashing test with the following results, expressed as actual metal content:

| Metal | Metal | Raw gum | Finished O rings |
|-------|-------|---------|------------------|
| Al    | ppm*  | 0.070   | 0.40             |
| Ba    | ppm   | 0.005   | 0.008            |
| Ca    | ppm   | 1.7     | 3.7              |
| Cd    | ppm   | 0.001   | 0.0014           |
| Co    | ppm   | <0.002  | 0.0094           |
| Cr    | ppm   | 0.02    | 0.23             |
| Cu    | ppm   | <0.02   | 0.022            |
| Fe    | ppm   | 1.0     | 0.8              |
| K     | ppm   | 0.09    | 0.23             |
| Li    | ppm   | <0.001  | <0.001           |
| Mg    | ppm   | 0.05    | 0.30             |
| Mn    | ppm   | 0.014   | 0.015            |
| Mo    | ppm   | <0.0001 | <0.001           |
| Na    | ppm   | 0.25    | 0.27             |
| Ni    | ppm   | 0.04    | 0.06             |
| Pb    | ppm   | 0.007   | 0.008            |
| Ti    | ppm   | 0.002   | 0.01             |
| Zn    | ppm   | 0.29    | 1.3              |
| Total | ppm   | 3.6     | 7.3              |

\* ppm stands for mg of metal content per kg of polymer

## Extractable

Extraction of translucent #214 O-rings, produced in ISO 7 clean room as described above, was performed in some selected semicon fluids. The surface extractable cations were measured by high resolution ICP MS; all the tests were conducted twice and the results reported below derive from the average of these tests.

| Sample          |      | KATON® PF92T O rings |   |               |
|-----------------|------|----------------------|---|---------------|
| Test Fluid      |      | Ultrapure Water      | Piranha Fluid<br>(H2SO4 96% /HF 49%<br>H2O2 30%, 5:1) | HF 49%        |
| Test conditions |      | 1 month @ 80°C       | 1 month @ 80°C  | 1 week @ 23°C |
| Cations         |      |                      |   |               |
| Al              | ppb* | 35                   | 135   | 165           |
| B               | ppb  | 1.4                  | <10   | <2            |
| Ba              | ppb  | 0.8                  | <2  | <2            |
| Ca              | ppb  | 95                   | 80  | 70            |
| Cr              | ppb  | 0.2                  | 13.5  | <30           |
| Cu              | ppb  | 0.8                  | 1.4   | <10           |
| Fe              | ppb  | 16                   | 150   | 150           |
| K               | ppb  | 16                   | 28  | 50            |
| Li              | ppb  | 0.09                 | 0.09  | 0.15          |
| Mg              | ppb  | 17                   | 55  | 50            |
| Mn              | ppb  | 0.6                  | 1.9   | <2            |
| Na              | ppb  | 16                   | 17  | <20           |
| Ni              | ppb  | 2.3                  | 6.0   | <15           |
| Pb              | ppb  | 0.2                  | <2  | <1            |
| Sr              | ppb  | 0.19                 | <5  | <1            |
| Zn              | ppb  | 16                   | <50   | <25           |
| Total           | ppb  | 216                  | 488   | 485           |

\* ppb stands for g of extractable per kg of polymer

**Spec FKM ASTM D1418**  
**D2240 Designation: TPF fluoroelastomer**  
**ISO 1629 Designation: FKM**  
**ASTM D2000/SAE J200**  
**Type Class: HK**



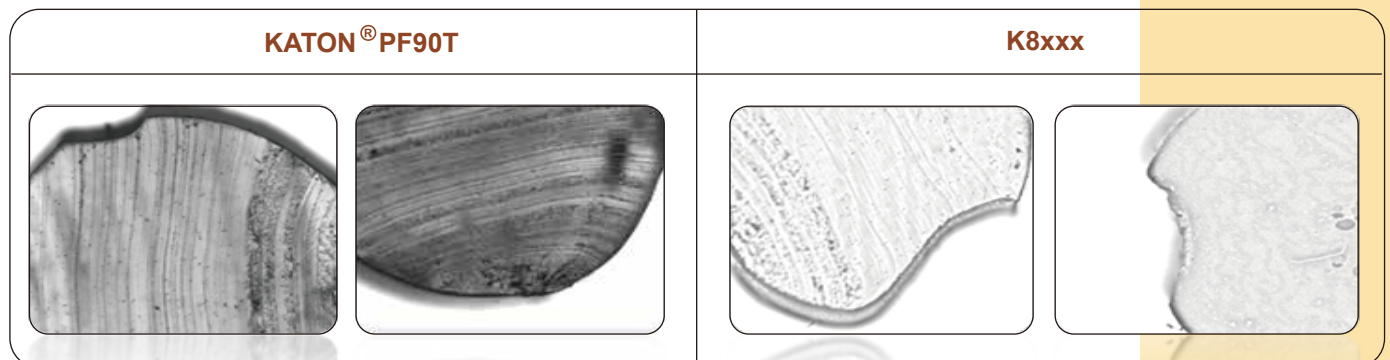


KATON® PF92T series contain Teflon PVDF nano-particles like organic filling materials. Therefore, no traditional filling materials are used such as, carbon black or inorganic minerals, white inorganic fillers, e.g. barium sulfate, titanium dioxide, silicon dioxide, alumina and aluminum silicate. They can allow polymers to produce anti-ionicity. Being hit by electric ions, polymers will immediately separate those non-continuous molecules, thus may be polluting the operating environment. PVDF and fluorine rubbers also have same protective effects, but they do not produce polluting particles.

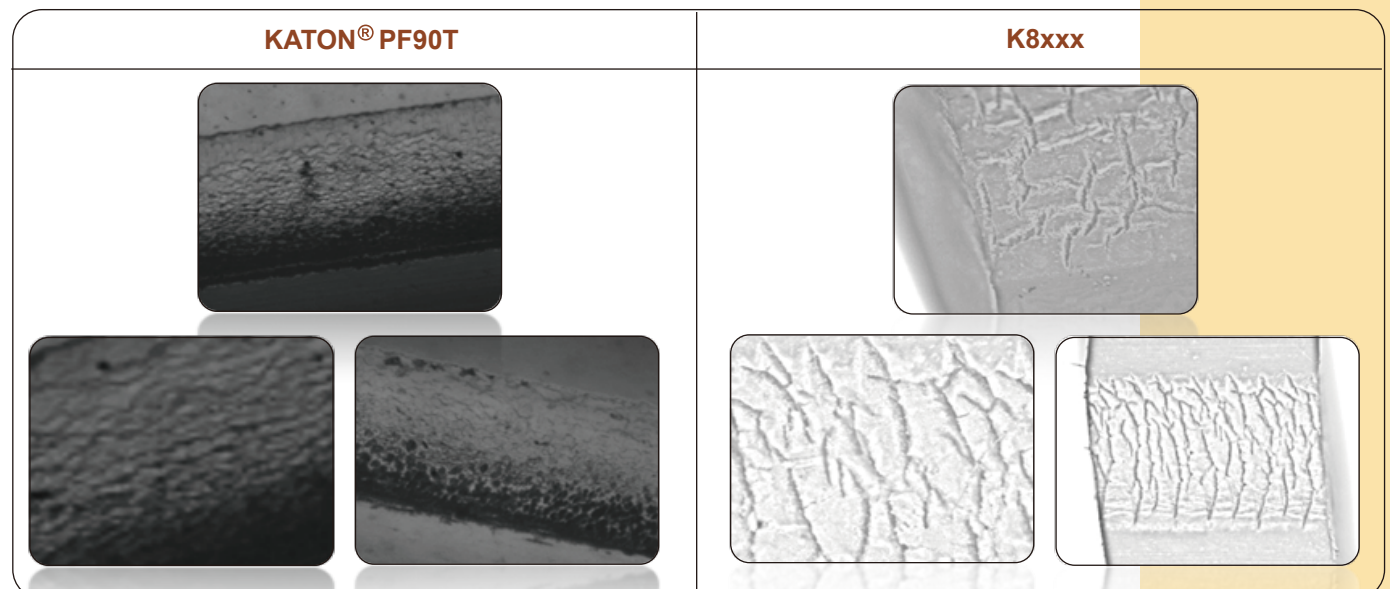
## Used O-Ring Microscope

| Compound                                 | KATON® PF92T      | K8xxx          |
|--|-------------------|----------------|
| STANDARD SPEC                            | AS568-284         | AS568-284      |
| Working hours                            | 1028kw/hrs        | 1028kw/hrs     |
| Enviroment                               | Plasma testing    | Plasma testing |
| Color                                    | Translucent Amber | Clear          |
| Weigt (before)                           | 27.615            | 25             |
| Weigt (after)                            | 27.222            | 23.92          |
| weight loss                              | -1.42%            | -4.32%         |
| Tensile Strength (Tensile, MPa) (before) | 15.5              | 15             |
| Tensile Strength (Tensile, MPa)(after)   | 15.43             | 13.88          |

## Cross section



## Surface corrosion



# Katon®

---

**Maxmold Polymer Co., LTD**

ADD No. 18, Ln. 434, Sec. 4, Zhonghua Rd., Xiangshan Dist., Hsinchu City 30094, Taiwan  
TEL 886-3-538-0817  
FAX 886-3-538-0827  
E-mail [service@maxmold.com](mailto:service@maxmold.com)  
Web [www.maxmold.com](http://www.maxmold.com)

---

Material Safety Data Sheets (MSDS) are available by emailing us or contacting your sales representative. Always consult the appropriate MSDS before using any of our products. Neither Maxmold® Specialty Polymers nor any of its affiliates makes any warranty, express or implied, including merchantability or fitness for use, or accepts any liability in connection with this product, related information or its use. Some applications of which Maxmold's products may be proposed to be used are regulated or restricted by applicable laws and regulations or by national or international standards and in some cases by Maxmold's recommendation, including applications of food/feed, water treatment, medical, pharmaceuticals, and personal care. Only products designated as part of the Maxmold® family of biomaterials may be considered as candidates for use in implantable medical devices. The user alone must finally determine suitability of any information or products for any contemplated use in compliance with applicable law, the manner of use and whether any patents are infringed. The information and the products are for use by technically skilled persons at their own discretion and risk and does not relate to the use of this product in combination with any other substance or any other process. This is not a license under any patent or other proprietary right.

All trademarks and registered trademarks are property of the companies that comprise the Maxmold® Group or their respective owners.  
© 2021 Maxmold Specialty Polymers. All rights reserved.