

# **Daikin Industries Fluoroplastics**

## **NEOFLON™ FEP Pellets**

### **Introduction**

NEOFLON FEP is a copolymer of tetrafluoroethylene and hexafluoropropylene. NEOFLON FEP consists of carbon atoms and fluorine atoms, as does PTFE, and has the following molecular structure in which one of the fluorine atoms bonded to the carbon atoms on the main chain is replaced by a trifluoromethyl radical ( $-\text{CF}_3$ ), as compared with the structure of PTFE.



NEOFLON FEP has a lower melt viscosity than PTFE and can be processed like other thermoplastic resins by the melt flow processes of extrusion, transfer, injection, and compression molding. Because the bonding energy between its carbon and fluorine atoms is so high, and the molecule is completely filled with fluorine atoms, NEOFLON FEP fluorocarbon polymer has excellent thermal, electrical, and chemical stability. Therefore, it shows high performance in electrical, chemical, and medical applications in temperatures ranging from extremely low to extremely high. ( $-200^{\circ}\text{C} \sim +200^{\circ}\text{C}$ )

TM: DAIKIN INDUSTRIES trademark for its Fluoroplastics  
**DAIKIN INDUSTRIES, LTD.**



## 1. NEOFロン FEP Grades

NEOFロン FEP molding materials are supplied as pellets, melt flow processes of extrusion, transfer, and compression moldings. Table 1 shows NEOFロン FEP grades. Table 2 shows the colors of NEOFロン FEP pellets.

**Table 1 Grades of NEOFロン FEP**

Property	NP-101	NP-12X	NP-20	NP-30	NP-40
Apparent density (g/ml)	approx.1.2	approx.1.2	approx.1.2	approx.1.2	approx.1.2
Melt viscosity* (poise) (380°C)	$(1.6\sim2.0)\times10^4$	$(2.1\sim2.6)\times10^4$	$(5.0\sim10.0)\times10^4$	$(12\sim22)\times10^4$	$(25\sim50)\times10^4$
Melt flow rate (g/10min) (372°C, 5000g load)	21~27	approx.18	approx.6.5	approx.2.9	approx.1.3
Processing methods	Extrusion	Extrusion	Extrusion	Extrusion	Extrusion Transfer Compression
Uses		Wire and cable coating	Wire and cable coatings, films, tubes, small parts	Wire and cable coating, tubes	Film and sheets, tubes, pipe and valve linings, sleeves

Note: \*Measured by flow tester at 380°C, under a load of 0.7 MPa (Nozzle size 2 mm in dia., 8 mm in length)

NP-20,30,40 are registered by UL specifications.(UL E 52460)

**Table 2 Colors of NEOFロン FEP Colored Pellets**

Color	Product No.	Color	Product No.
Black	NP-20BK	Green	NP-20GN
White	NP-20WH	Gray	NP-20GY
Yellow	NP-20YL	Dark brown	NP-20CL
Red	NP-20RD	Violet	NP-20VL
Blue	NP-20BU	Orange	NP-20OR

## 2. NEOFロン FEP Features

NEOFロン FEP fluorocarbon polymer is a high performance material and is almost equally comparable with PTFE in both chemical and electrical properties.

In addition, it possesses excellent melt flow processability.

### a) Thermal stability

Superior reliability and retention of its properties in a wide thermal range from cryogenic temperature to high temperature.

(-200~+200°C)

### b) Chemical inertness

Most exposure conditions including heat, weather, light and moisture.

### c) Non-sticking property

The lowest critical surface energy of any plastics; an excellent water and oil repellent for non-stick and mold release use.

### d) Electrical reliability

A low dielectric constant and dissipation factor and high dielectric strength over a wide range of frequencies and temperatures.

### e) Long-term weather resistance

Excellent resistance to ozone, sunlight and weather.

### f) High transparency

Transparent with good transmittance of ultraviolet rays and visible rays; the lowest refractive index of any plastics; characterized by very low light reflection.

### g) Flame resistance

Will not burn in atmosphere.

(Oxygen index > 95%)

## 3. NEOFロン FEP Properties

### 3-1 Physical properties

Table 3 NEOFロン FEP Physical Properties

Property	Test method	NEOFロン FEP	PTFE
Specific gravity	ASTM D 792	2.12~2.17	2.13~2.22
Refractive index	ASTM D 542	1.338	1.35
Water absorption (%)	ASTM D 570	<0.01	<0.00
Contact angle (for water, in degrees)		114	110

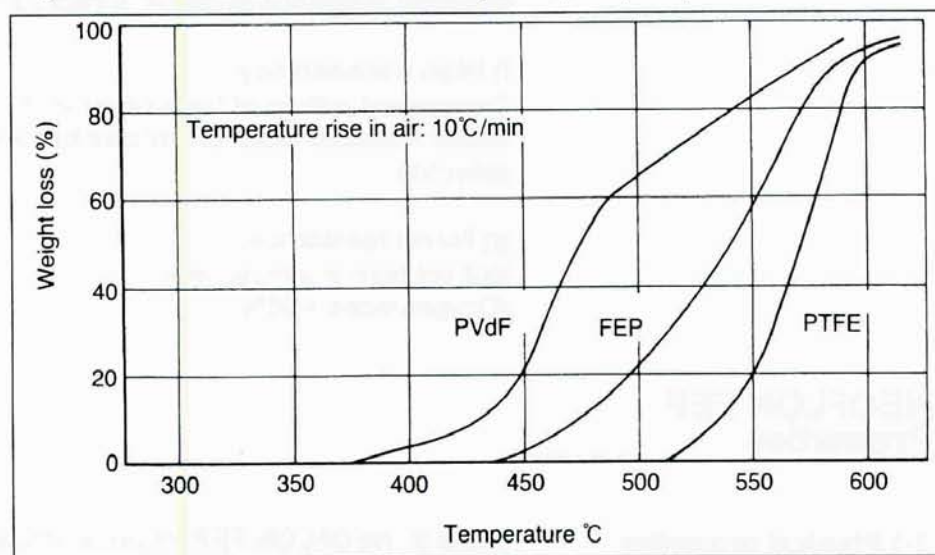
### 3-2 Thermal properties

**Table 4 NEOFLON FEP Thermal Properties**

Property	Test method	NEOFLON FEP	PTFE
Melt viscosity at 380°C (poise)		$(5\sim60)\times 10^4$	$10^{11}\sim 10^{12}$
Specific heat (cal/g/°C)		0.28	0.25
Melting point (°C)	D. S. C	265~275	327
Thermal conductivity (cal·cm/sec·cm <sup>2</sup> ·°C)	ASTM C 177	$6\times 10^{-4}$	$6\times 10^{-4}$
Thermal expansion (cm/cm/°C)	ASTM D 696	$(8\sim15)\times 10^{-5}$	$(11\sim14)\times 10^{-5}$
( +20~+100°C)			

Figure 1 shows the results of thermal gravity analysis (TGA) comparing NEOFLON FEP with PTFE and NEOFLON VDF (PVdF).

**Figure 1 Results of Thermal Gravity Analysis (TGA)**



NEOFLON FEP does not show a weight loss due to pyrolysis until the temperature reaches 420°C.

### 3-3 Flame resistance

NEOFLON FEP is incombustible (as is PTFE). It produces less smoke than NEOFLON ETFE or NEOFLON VDF.

**Table 5 Combustibility of NEOFLON FEP**

	NEOFLON FEP	NEOFLON ETFE	NEOFLON VDF
Oxygen index (% by vol.)	>95	31	43
UL 94 flame class	94V-0	94V-0	94V-0
Heat of combustion (cal/g)	1,840	3,730	4,390

Note: NEOFLON FEP NP-20, 30, and 40 are recognized by Underwriters Laboratories Inc.

### 3-4 Mechanical properties

**Table 6 NEOFLON FEP Mechanical Properties**

Property	Test method	NEOFLON FEP	PTFE
Tensile strength (MPa)	JIS K 6891	19.6~34.3	24.5~49.0
Elongation (%)	JIS K 6891	300~400	300~500
Tensile modulus (MPa)	ASTM D 638	$(4.4\sim5.4)\times10^2$	$(4.9\sim5.9)\times10^2$
Flexural strength	ASTM D 790	No break	No break
Flexural modulus (MPa)	ASTM D 790	$(5.4\sim6.4)\times10^2$	$(4.9\sim5.9)\times10^2$
Compressive strength			
1% deformation (MPa)	ASTM D 695	3.9~4.9	4.9~5.9
25% deformation (MPa)	ASTM D 695	27.5~30.4	29.4
Compressive modulus (MPa)	ASTM D 695	$(4.4\sim5.4)\times10^2$	$(4.9\sim5.9)\times10^2$
Hardness (shore)	Durometer	D55~D65	D50~D60
Deformation under load* (%)	ASTM D 621		
Creep	25°C, 13.7MPa	2.5~3.5	9.0~10.0
	100°C, 6.9MPa	4.5~5.5	4.5~5.5
Total deformation	25°C, 13.7MPa	8.0~9.0	14.5~15.5
	100°C, 6.9MPa	12.0~14.0	14.0~15.0

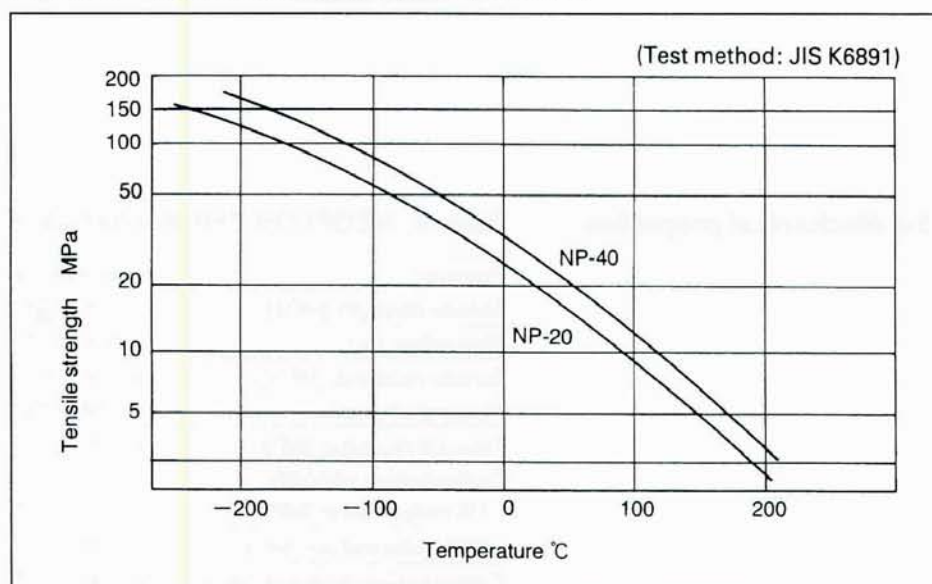
Note: \*shows the loading time of 24 hours.



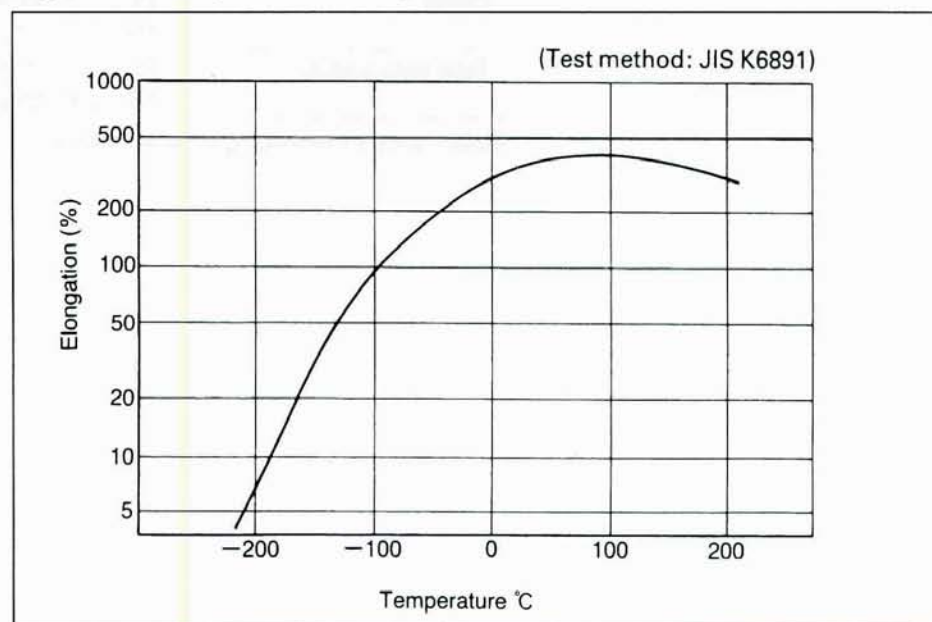
The mechanical properties of NEOFロン FEP are basically the same as those of PTFE. Being a thermoplastic, NEOFロン FEP shows changes in its mechanical properties depending upon temperature, but can be used in temperatures ranging from 200°C to -200°C. (However, it is recommended that you check before using at high temperatures, as this material may not perform well under certain environmental conditions.)

Figures 2, 3 and 4 show the relationship between tensile strength and temperature; elongation and temperature; and tensile modulus and temperature.

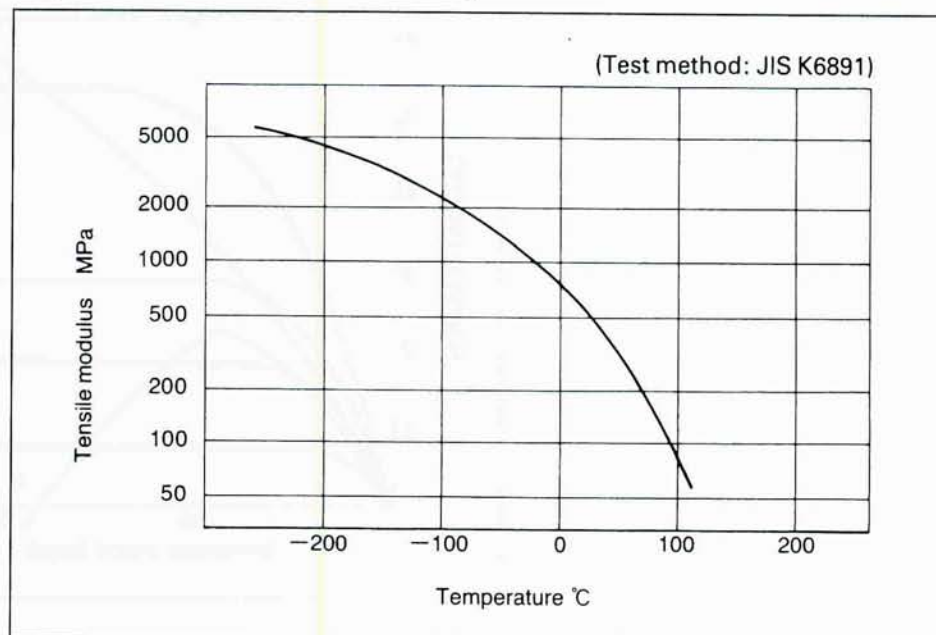
**Figure 2 Tensile Strength vs. Temperature**



**Figure 3 Elongation vs. Temperature**



**Figure 4 Tensile Modulus vs. Temperature**



### 3-5 Chemical properties

NEOFロン FEP was immersed in the following chemicals, and the results of chemical absorption are shown in Figure 5 and Table 7.

Usually, the durability of a substance can be largely determined by observing its weight change due to chemical absorption, as is shown in Figure 5.

Figure 5 and Table 7 indicate that NEOFロン FEP can be used with all of these chemicals as its absorption is less than  $3\text{mg}/\text{cm}^2$ .

Table 8 shows the weight change of NEOFロン FEP measured while immersed in various chemicals in comparison with those of PTFE and NEOFロン VDF. NEOFロン FEP was found to be slightly influenced by chlorinated solvents, but unaffected by other organic solvents,

(Immersion chemicals)

Sulfuric acid (98%), Hydrochloric acid (36%), Nitric acid (60%), Caustic soda (50%), Aqueous ammonia (28%) Toluene, Diethyl amine, Chloroform, and Acetone.

(Immersion conditions)

50 days at  $95^\circ\text{C}$ .

Figure 5 Chemical Absorption Curves

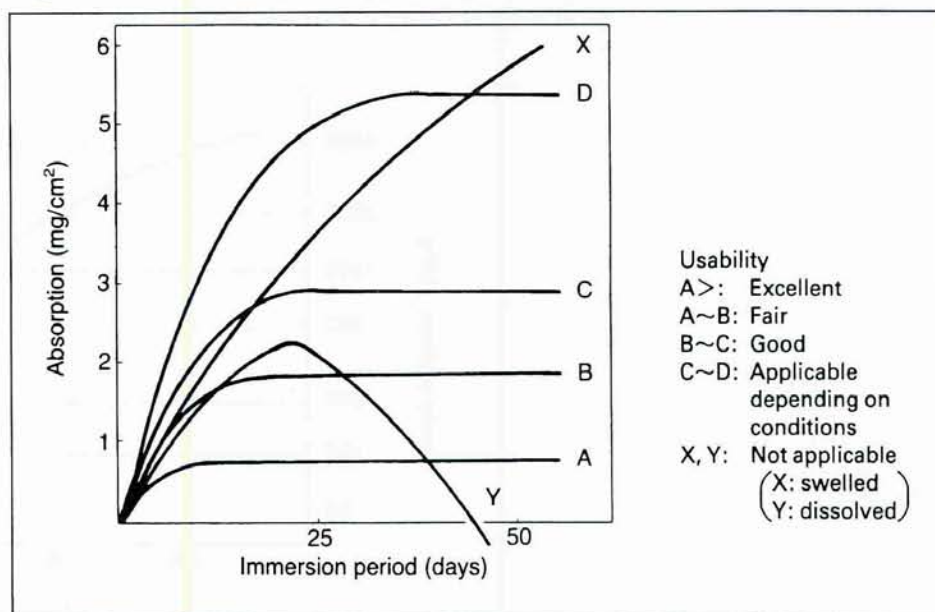


Table 7 Practical Usage Based on Chemical Absorption

	NEOFLON FEP	NEOFLON ETFE	NEOFLON VDF
A>	Sulfuric acid,	Sulfuric acid,	Hydrochloric acid
A~B	Hydrochloric acid, Nitric acid, Caustic soda, Aqueous ammonia, Toluene, Diethylamine, and Acetone.	Hydrochloric acid, Caustic soda	
B~C	Chloroform		
C~D		Aqueous ammonia, Acetone, Toluene, Diethyl amine	Chloroform
X, Y		Nitric acid, Chloroform	Sulfuric acid, Nitric acid, Caustic soda, Aqueous ammonia, Toluene, Diethyl amine and Acetone.



**Table 8 Weight Change of NEOFロン FEP**

Chemicals	Weight change(%)		
	NEOFロン FEP	PTFE	NEOFロン VDF
Hydrochloric acid (35%)	0.0	0.0	+0.3
Sulfuric acid (98%)	0.0	0.0	+0.2
Nitric acid (60%)	-0.1	0.0	+1.4
Hydrofluoric acid (50%)	0.0	0.0	0.0
Chromic acid (50%)	0.0	0.0	0.0
Acetic acid (50%)	0.0	0.0	0.0
Acetic anhydride	+0.1	+0.1	Partly dissolved
Caustic soda (50%)	0.0	0.0	0.0
Aqueous ammonia (28%)	0.0	0.0	-0.1
Sodium chloride (30%)	0.0	0.0	0.0
Potash bichromate (10%)	0.0	0.0	0.0
Methyl alcohol	0.0	0.0	+2.2
Ethyl alcohol	0.0	0.0	+1.7
Acetone	+0.2	+0.2	Dissolved
Carbon tetrachloride	+2.2	+2.3	+1.7
Chloroform	+1.1	+0.9	+4.0
Trichloroethylene	+1.1	+0.8	+3.4
Toluene	+0.3	+0.3	+2.2
Xylene	+0.3	+0.4	+1.8
Benzene	+0.4	+0.3	+2.5
n-Hexane	+0.5	+0.6	0.0
Methyl ethyl Ketone	+0.3	+0.2	Dissolved
Aniline	0.0	0.0	+4.0
Ethyl acetic acid	+0.3	+0.2	Dissolved
Ether	+0.3	+0.1	+1.6
Dioxan	+0.3	+0.4	Dissolved
Diethyl amine	+0.6	+0.4	Decomposed
Formaldehyde	0.0	0.0	0.7
Phenol	0.0	0.0	+1.3

Test conditions: Immersed in chemicals at 80~90°C for one week, with the exception of hydrochloric acid which was maintained at room temperature.

### 3-6 Electrical properties

NEOFロン FEP shows excellent dielectrical properties over a wide range of frequencies and temperatures.

NEOFロン FEP produces no electroconductive track, even if its surface is damaged due to arcing.

Figure 6 Dielectric Constant vs. Temperature

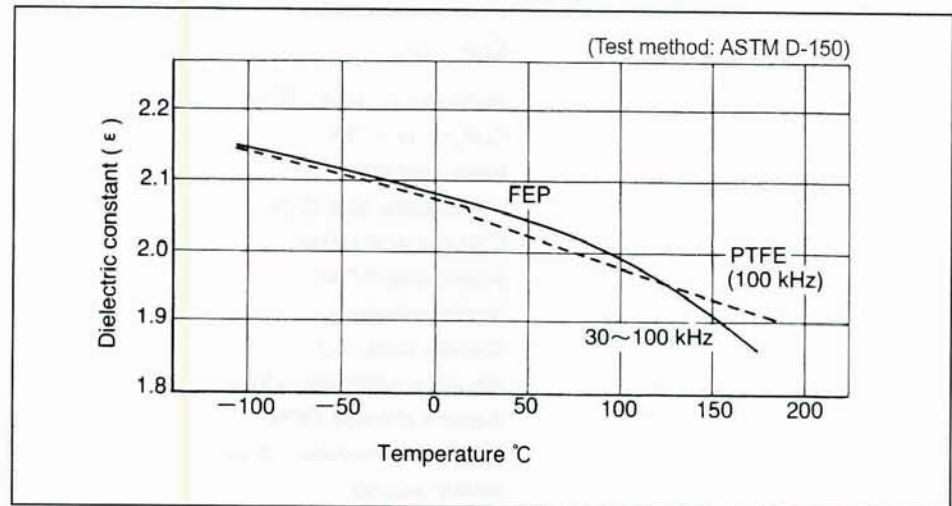


Figure 7 Dissipation Factor vs. Temperature

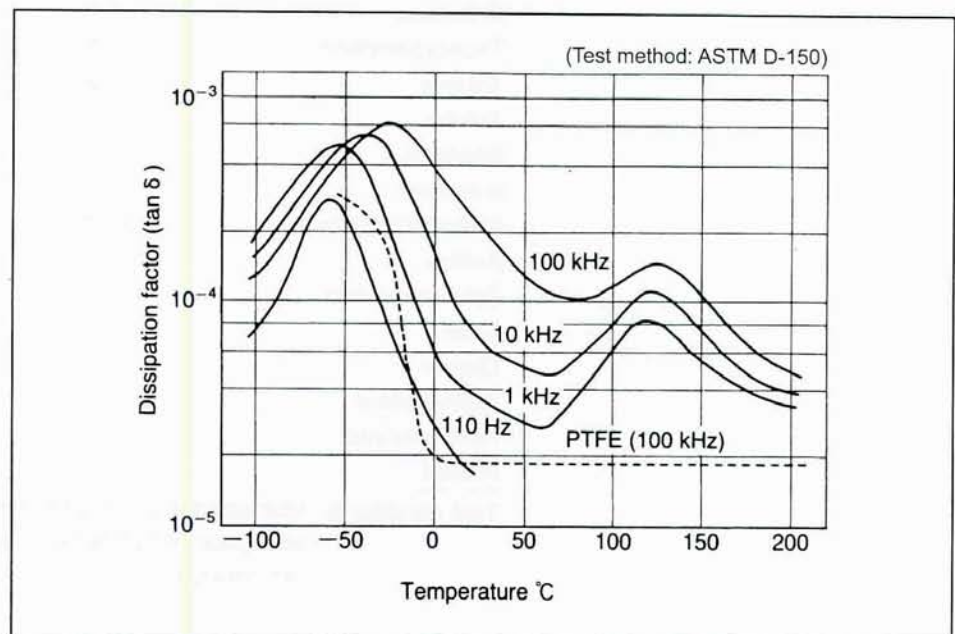


Figure 8 Volume Resistivity vs. Temperature

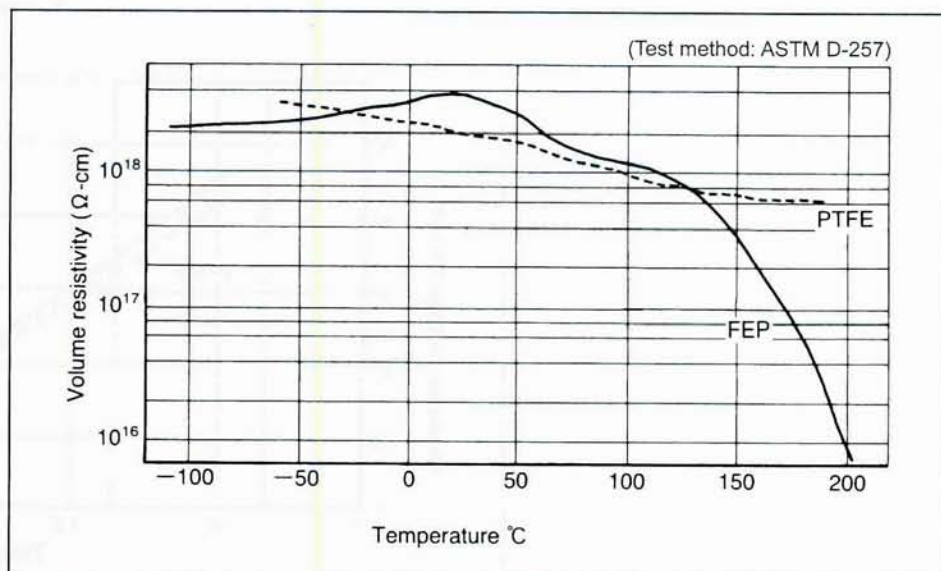
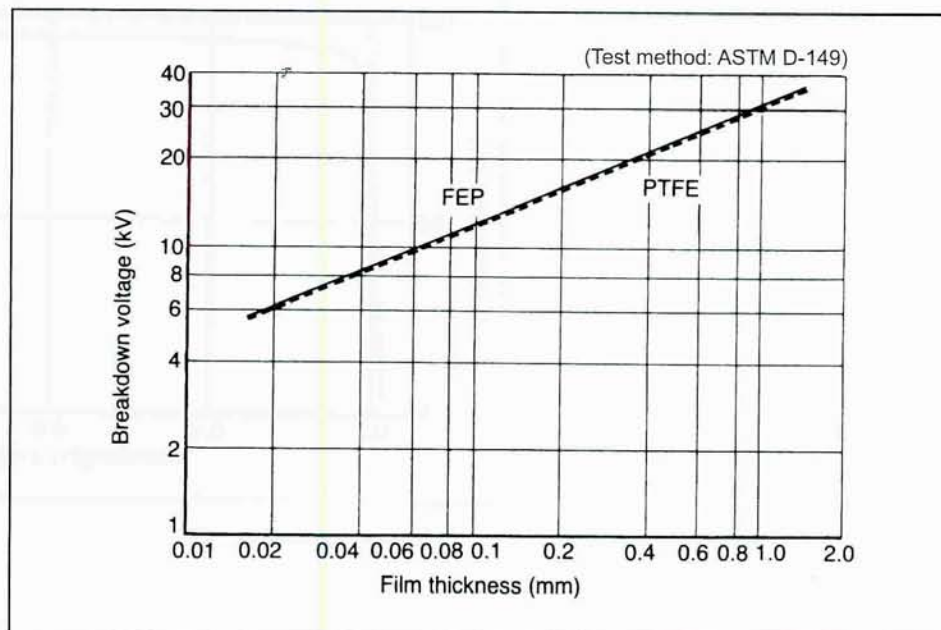


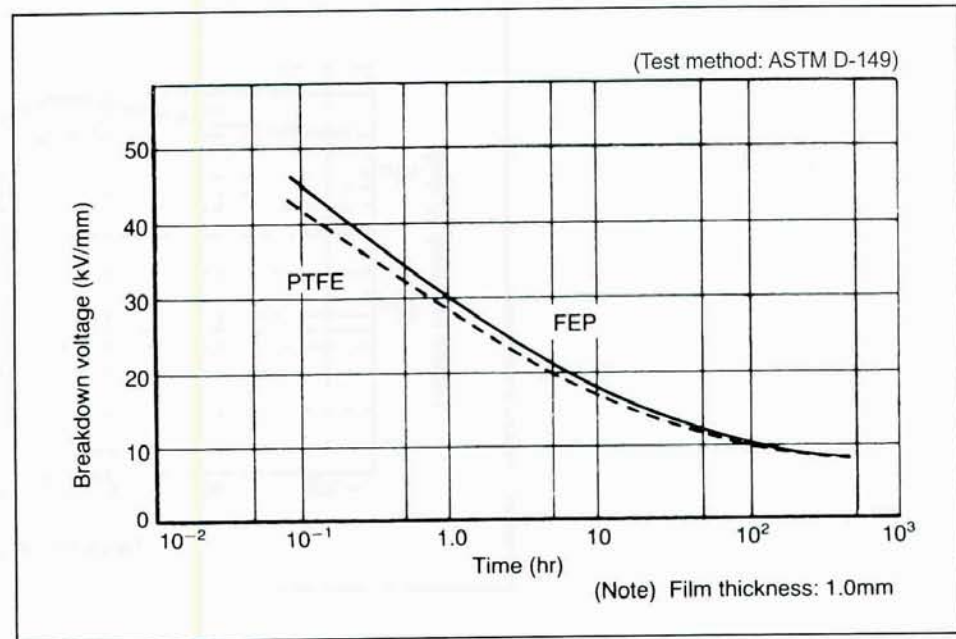
Figure 9 Breakdown Voltage vs. Film Thickness



(Note) Conditions of measurement: 2 pieces of 25 mm dia. flat plate electrode, in silicone oil,  $25 \pm 1^\circ\text{C}$ , 60 Hz



Figure 10 Breakdown Voltage vs. Time



### 3-7 Optical properties

Figure 11 NEOFLON FEP Light Transmittance

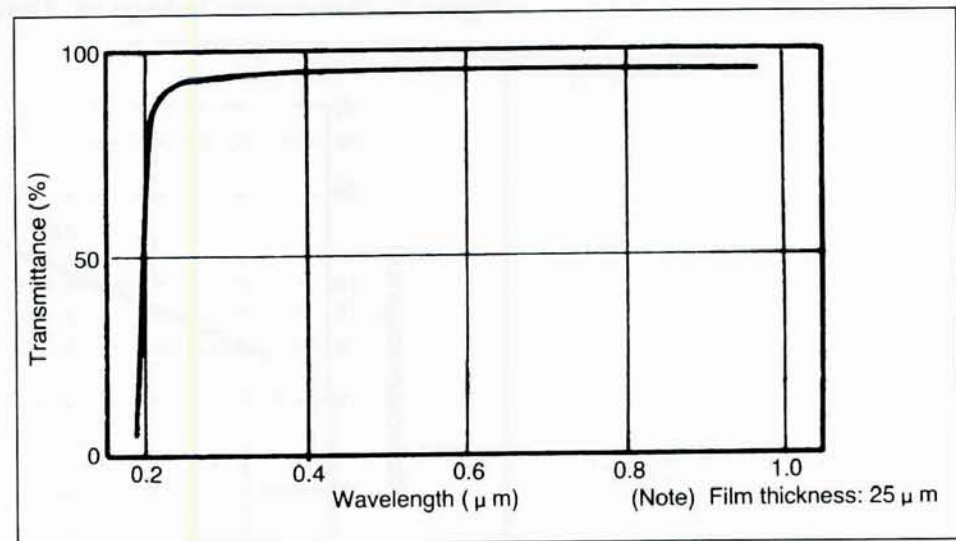
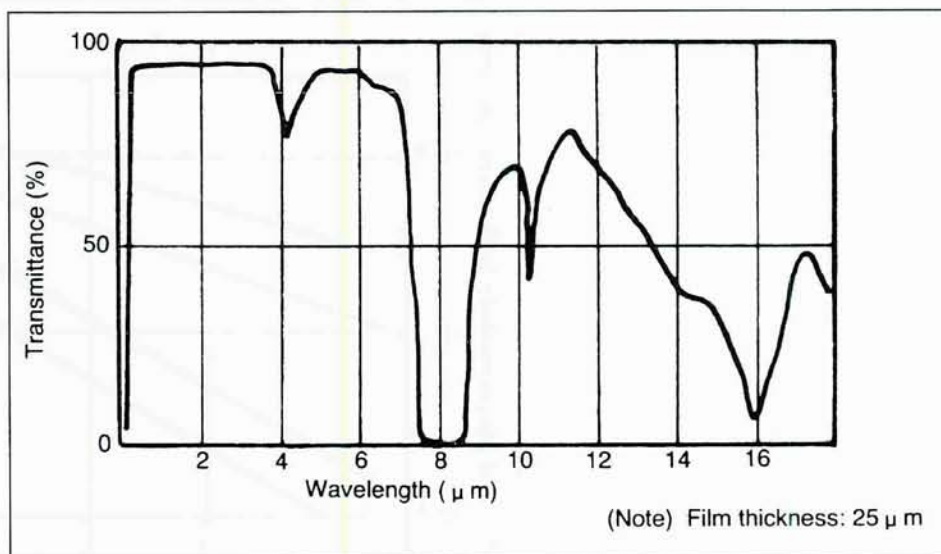


Figure 12 NEOFロン FEP Light Transmittance



### 3-8 Gas permeability

Gas permeability of NEOFロン FEP film is shown in Figure 13 and Table 9, and is compared with other plastic films in Figure 14.

Table 9 Gas Permeability of NEOFロン FEP Film

(Test method: ASTM D-1434, JIS Z0208)

Gas	Gas permeability*		
	NEOFロン FEP	PTFE	Low density polyethylene
Nitrogen	$1.2 \times 10^{-8}$	$1.1 \times 10^{-8}$	$0.74 \times 10^{-8}$
Oxygen	$3.7 \times 10^{-8}$	$3.2 \times 10^{-8}$	$2.2 \times 10^{-8}$
Carbon dioxide	$9.7 \times 10^{-8}$	$8.9 \times 10^{-8}$	$9.6 \times 10^{-8}$
Methane	$0.66 \times 10^{-8}$	—	$2.2 \times 10^{-8}$
Ethane	$0.33 \times 10^{-8}$	—	$5.2 \times 10^{-8}$
Propane	$0.11 \times 10^{-8}$	—	$7.2 \times 10^{-8}$
Ethylene	$0.48 \times 10^{-8}$	—	—

\*Temperature: 25°C

Unit:  $\text{cm}^3(\text{STP}), \text{cm}/\text{cm}^2 \cdot \text{sec} \cdot \text{atm}$

Figure 13 Coefficient of Gas Permeability vs. Temperature

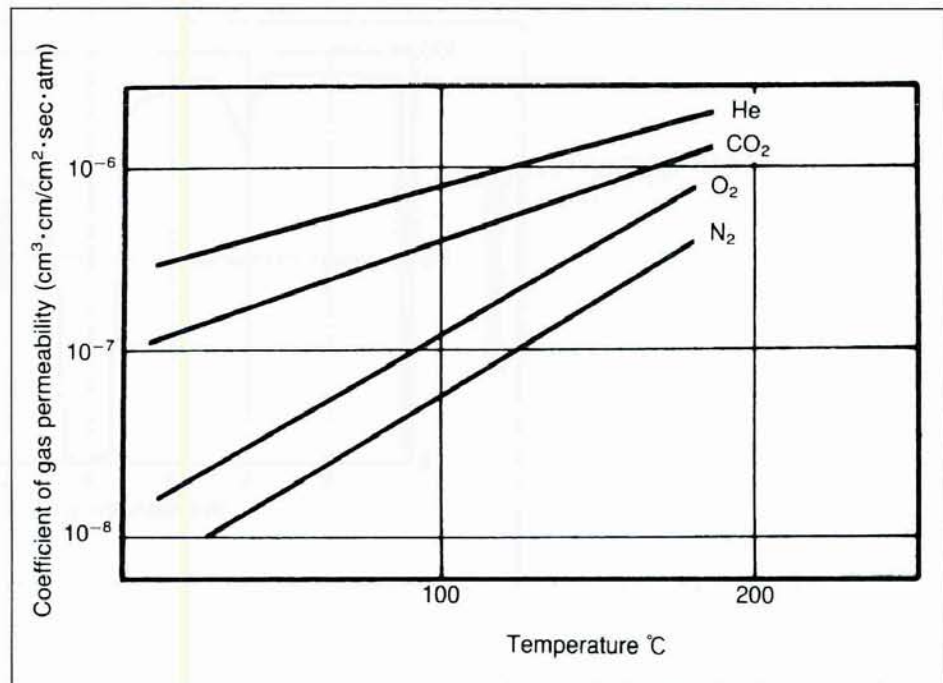
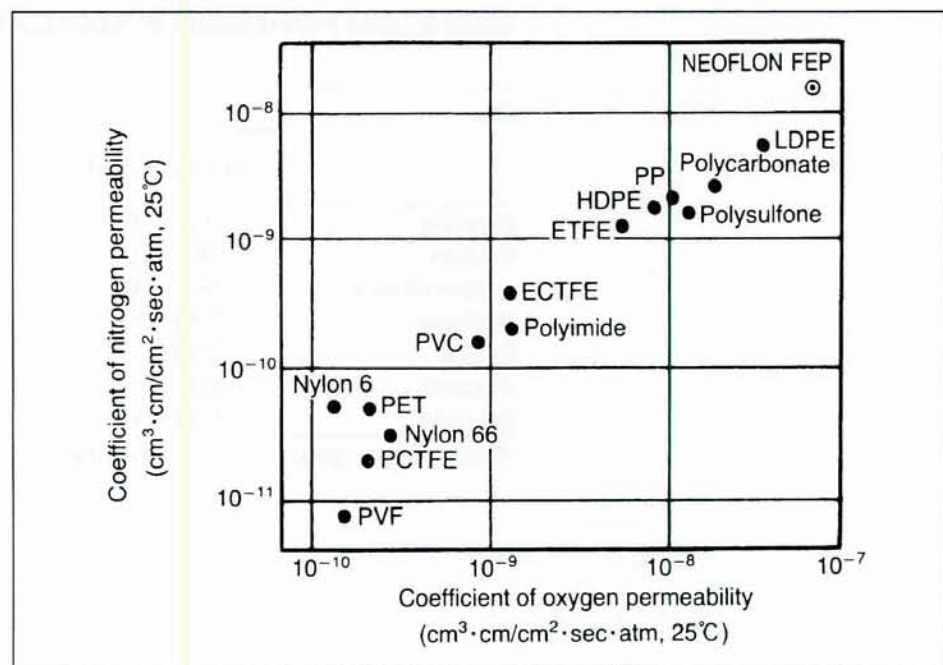


Figure 14 Oxygen and Nitrogen Permeability of Various Plastic Films





### 3-9 Non-stick property

NEOFLON FEP has small surface energy due to the close arrangement of fluorine atoms, and the same superior non-stick properties as PTFE.

**Table 10 Surface Characteristics of Various Plastics and Metals**

Surface tension of water = 72.7 mN/m(at 20°C)		
	Contact angle with water (degree)	Critical surface tension (dyne/cm)
FEP	114	17.8
PTFE	110	18.5
PCTFE	84	31
PVdF	81	25
PVF	81	28
Paraffin	103	25~31
Silicone resin	100	25~31
Polyethylene	88	31
PVC	—	39
PVdC	—	40
Nylon	77	46
Glass	15	—
Copper	9.6	—
Aluminium	4.6	—

(Note) Critical surface tension: Surface tension of an imaginary liquid whose contact angle with a solid surface is 0°

### 3-10 Surface lubricating property

**Table 11 NEOFLON FEP Coefficient of Static Friction**

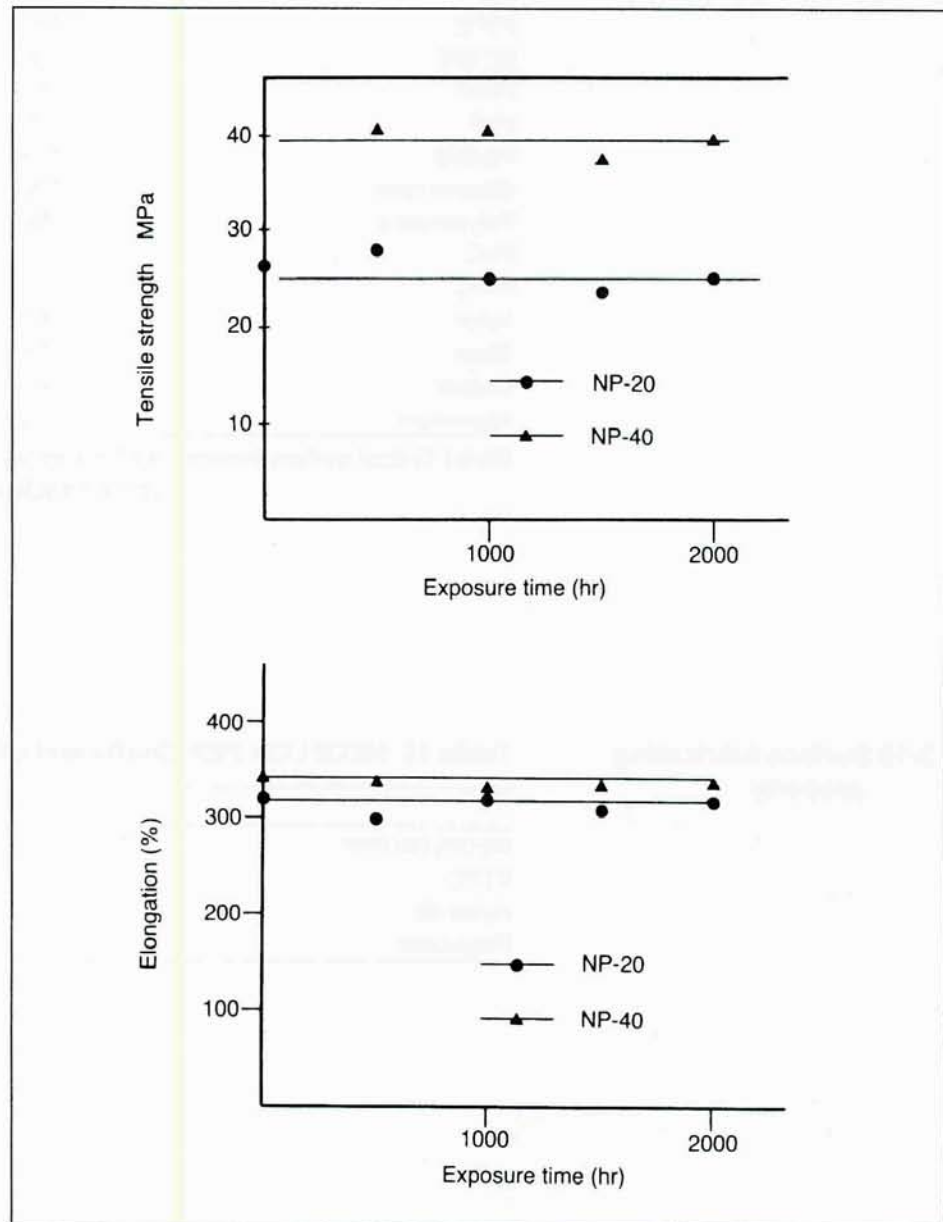
	Coefficient of static friction
NEOFLON FEP	0.05
PTFE	0.02
Nylon 66	0.20
Polyacetal	0.14

### 3-11 Weather resistance

The change in the tensile property of NEOFロン FEP film resulting from the accelerated artificial exposure test is shown in Figure 15. This figure shows that there is absolutely no change after 2000 hours of exposure (equivalent to approximately ten years of outdoor exposure).

**Figure 15 Results of Accelerated Artificial Exposure of NEOFロン FEP Sheet**

(Sunshine carbon arc method)



#### 4. NEOFロン FEP Processing

Since NEOFロン FEP have a comparatively low melt viscosity and good thermal stability at over its melting point, they can be processed like a thermoplastic resin by extrusion, transfer, injection, or compression molding.

NP-20 is used mainly as a wire and cable coating material.

NP-30 is suitable for use with wires, cable coatings, and jackets requiring stress-crack resistance. NP-40 is suitable for use in high corrosive linings requiring stress-crack resistance. The selection guide for molding material is shown in Table 12.

**Table 12 Selection Guide for NEOFロン FEP Molding Materials**

Use	Grade				
	NP-101	NP-12X	NP-20	NP-30	NP-40
Extrusion molding					
Wires and cable coating					
Thin wall type (0.1~0.17mm)	Good	Good			
Thin wall type (0.17~0.3mm)			Good		
Heavy wall type (≥0.3mm)				Good	(Good)
Jacket				Good	
Tubing and pipes					
Spaghetti tube	Good	Good	Good		
General purpose tubes			Good	Good	
Heat shrinkable tubes					Good
Lined pipes					Good
Films and sheets					
≤250 μm thickness	Good	Good	Good		
250~2,400μm thickness					Good
Rods					Good
Mono-filaments	Good	Good	Good		
Transfer molding					
Pipe linings					Good
Valve linings					Good
Injection molding	Good	Good	Good		
Compression molding			Good	Good	Good

The molding temperature should be determined in accordance with the best suited molding method for the shape and size of the object. Desirable temperature for processing NEOFロン FEP molding material is approximately 330~400°C.



Figure 16 shows the relationship between melt viscosity and temperature. Table 13 shows the critical shear rate of FEP as 360~400°C; if the shear rate exceeds the critical shear rate while NEOFLOF FEP is being processed, melt fracture will result thus making the molding surface rough. Therefore, the molding method used must have a shear rate lower than the above mentioned critical shear rates.

**Table 13 Critical Shear Rate of NEOFLOF FEP**

(360~400°C)

Grade	Critical shear rate (sec <sup>-1</sup> )
NP-101	60~130
NP-12X	55~110
NP-20	20~40
NP-30	10~15
NP-40	1~5

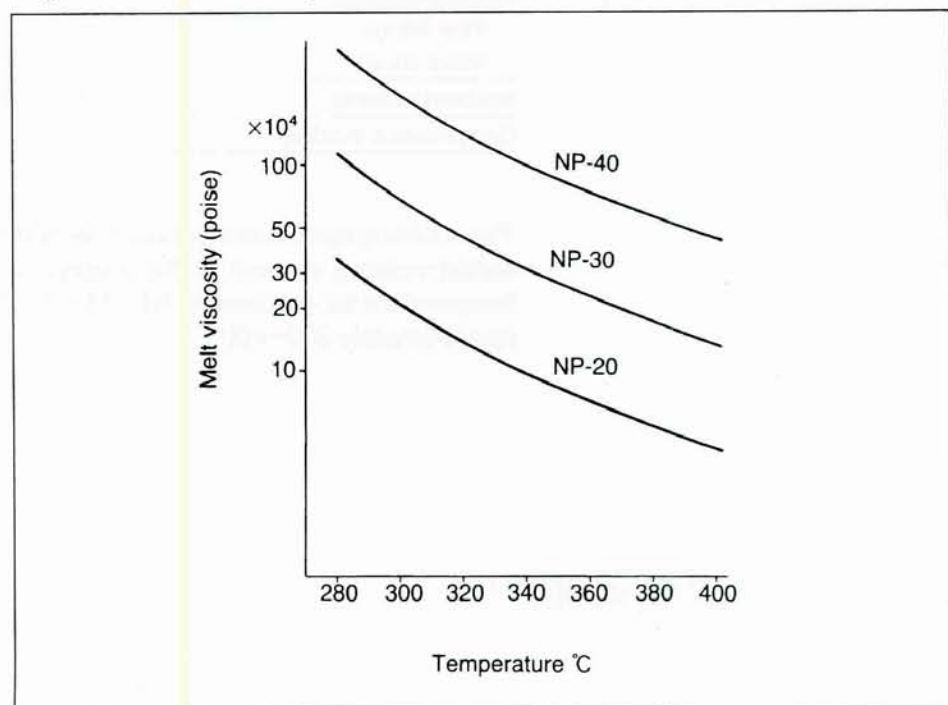
**[Caution]**

Studies have indicated that NEOFLOF FEP begins to degrade at 420°C and liberate HF, which is corrosive to metal surfaces.

Therefore, the resident time in extruders or other molding machines should be held to the minimum.

Care should be taken not to overheat NEOFLOF FEP molding pellets during processing. In addition, adequate mechanical ventilation should be provided and personnel should be cautioned against inhaling the fumes liberated during processing. All surfaces of the molding machine that come in contact with melting FEP resin should be made of corrosion resistant materials.

**Figure 16 Relationship between Melt Viscosity and Temperature**



#### 4-1 Extrusion molding

**Table 14 NEOFロン FEP Processing Conditions for Wire and Cable Coating**

	NP-101	NP-12X	NP-20	NP-30
Insulated wire size (mm)	TA 1/0.51 0.51×0.86	TA 1/0.51 0.51×0.86 White	TA 1/0.7 0.7×1.4 White	TA 1/1.0 1.0×2.4 White
Extruder				
Barrel dia.(mm)	50	50	30	40
Screw L/D	32	30	22	20
Compression ratio	2.7	2.7	2.74	3.0
Aperture of die (mm)	4.7×7.9	4.7×7.9	7×13	11×24
Temperature (°C)				
Barrel (rear)	349	370	360	220
(center)	393	400	390	340
(front)	404	410	400	380
Adapter	404	410	400	380
Die head	404	420	410	380
Die	404	420	410	390
Screw speed (rpm)	25	25	30	12
Draw-down ratio(DDR)*	100	83	82	95.5
Insulating speed (m/min)	762	370	40	14

$$* DDR = \frac{Da^2 - Db^2}{da^2 - db^2}$$

**Table 15 NEOFロン FEP Processing Conditions for Tubing**

	NP-20	NP-30	NP-40
Tubing size (outside dia. × inside dia.)	8×10mm	16×19mm	16×19mm
Extruder			
Barrel diameter (mm)	25	25	25
Screw L/D	19	19	19
Compression ratio	2.85	2.85	2.85
Aperture of die (outside dia. × inside dia.)	4.5×8.5	13×17	13×17
Temperature (°C)			
Barrel (rear)	320	320	330
(front)	350	370	380
Die head	360	380	400
Die	370	390	410
Screw speed (rpm)	12	12	12
Tubing speed (m/min)	0.25	0.14	0.08

#### 4-2 Injection molding

NEOFLON FEP NP-12X and 20 has a high melt viscosity and requires a higher processing temperature compared to general thermoplastics. It is necessary to use a screw type injection molding machine with the shortest possible distance between the sprue and runner gate, and the temperature of the mold must reach 200~230°C. The following is an example of injection molding conditions:

- a) Shape of molding:  
110 (L) × 30 (W) × 2 (T) mm  
60 (L) × 40 (W) × 3 (T) mm  
1 pc. each
- b) Shape of gate:  
Sector (5 (L) × 8 (W) × 2 (T) mm
- c) Injection molding machine:  
N-65, 1.5 oz, product of the Japan Steel Works, Ltd.  
Cylinder: Type A, X alloy 306 30 mm in dia.  
Screw: 30 mm in dia., Cr plating
- d) Molding conditions:  
Table 16 shows the molding conditions.
- e) Shrinkage of molding: 4~6%

**Table 16 Molding Conditions**

	Conditions
Temperature of cylinder	
(under the hopper)	300°C
(center)	360~380°C
(front)	380~400°C
(nozzle)	380~400°C
Temperature of mold	200°C
Extrusion speed of screw	180rpm
Injection pressure	29.4~68.6 MPa
Back pressure	2.9 MPa
Holding time	20 sec
Injection rate	9.5(scale)
Period of cooling	60 sec
Cycle time	120 sec/cycle

#### 4-3 Compression molding

For compression molding of NEOFLON FEP pellets, the recommended wall thickness are:

Grade NP-20, 22 10mm or less

Grade NP-30, 40 10mm or more

Grades NP-20, NP-22, NP-30 and NP-40 can be processed at 330~350°C. If the temperature reaches higher than 350°C, it is difficult to remove moldings, or the surface of the mold becomes corroded. Desirable molding pressure is 4.9 to 7.8 MPa. During cooling, this pressure should be maintained until the temperature of the mold decreases to approximately 200°C; otherwise, sink marks or voids may remain in the moldings.



#### 4-4 Method of coloring

When it is necessary to color the FEP resin, use a colorant which is able to resist a temperature of 400°C or above. The dry-blend and master batch methods are available for coloring, and generally the master batch method provides an easier and better dispersion than the dry-blend method. Ten colors are available as master batch (color pellets), and the desired colored product may easily be obtained by the following rate of blending:

Color pellets	1
Natural pellets (NP-20)	5~10 (by weight)

## 5. Application

**Table 17 NEOFロン FEP Typical Applications**

Molding	Major applications	Properties utilized
Wires and cable	Cables for industrial use	Electrical properties flame resistance
Coatings	Wiring for electronic appliances	High temperature resistance
	Flat cables	Low temperature resistance
	Electric wires for aircraft	
Electronic parts	Bobbins	Electrical properties flame resistance
Electric parts	Terminals	High temperature resistance
	Sockets, connectors	High temperature resistance
Pipes	Piping material	High temperature resistance
Tubes	Heat exchangers	Low temperature resistance
Parts for chemical equipment	Automobile cable casings	Corrosion resistance
	Valves	Non-stick properties
	Parts for pumps, gaskets, linings, Scientific instruments	
	Instruments employing semiconductors	
Films	Adhesive agents of PTFE	High weather resistance
Sheets	Electrets	High temperature resistance
	Protective material for outdoors	Low temperature resistance
	Releasing agents	Non-stick properties
	Sheet linings	Heat seal properties
		Corrosion resistance
		Electrical properties
Shrinkable tubes	Roll covers	High temperature resistance
	Electric insulating material	Non-stick properties
		Corrosion resistance
		Electrical properties
		flame resistance
Monofilaments	Screens	High temperature resistance
	Filters	Corrosion resistance
	Demisters	Weatherability
		flame resistance

## 6. Packaging of NEOFLON FEP Molding Materials

**Table 18 Packaging of NEOFLON FEP Molding Materials**

Product No.	Color	Weight (kg/package)
NEOFLON FEP Molding Materials	Natural color	25 (Bag)
		50 (Drum)
NEOFLON FEP colored pellets (NP-20)	White, red, orange, yellow, green, blue, violet, brown gray, black	10

## 7. Safe Handling

NEOFLON FEP's safe handling points should be followed:

- **WARNING: VAPORS HARMFUL IF INHALED.**  
The work area should be adequately ventilated at all times because HF, COF<sub>2</sub> begin to be produced at approximately above 230°C and the volume increases at approximately 300°C. If FEP is incinerated, the acidic gases must be removed by alkaline scrubbing techniques.
- Personnel should be cautioned against inhaling the fumes liberated during processing and provided with suitable protective equipment.
- Do not smoke in the work areas as harmful vapors and gases can be produced if NEOFLON FEP becomes transferred onto tobacco.
- Avoid breathing dust and contact with eyes.
- Wash hands and face after handling.
- Waste generated during processing should be treated by waste treatment specialists and disposed of in accordance with federal, state and local waste disposal regulations.
- Read the "Material Safety Data Sheet" before beginning processing operations.



●DAIKIN INDUSTRIES, LTD. and DAIKIN AMERICA, INC. have obtained the ISO 14001(\*1) certification which is an International Standard concerning the environmental management system and ISO 9002 (\*2) concerning quality guaranteed in our factories.

\*1. ISO 14001 is a standard established by the ISO (International Organization for Standardization) which applies to environmental preservation activities. Activities, products and services of our fluorochemicals plant have been certified as being environmentally sound by an internationally recognized certification body.

\*2. ISO 9002 is a plant certification system for quality control established by the ISO which certifies our quality control system concerning manufacture and inspection of the products manufactured at our plant (division).

**IMPORTANT NOTICE:** The information contained herein is based on technical data and tests we believe to be reliable and is intended for use by persons having technical knowledge and skill, solely at their own discretion and risk. Since conditions of use are outside of control, we assume no responsibility for results obtained or damages incurred through application of the data given; and the publication of the information herein shall not be understood as permission or recommendation for the use of our fluorocarbon compounds in violation of any patent or otherwise. We only warrant that the product conforms to description and specification, and our only obligation shall be to replace goods shown to be defective or refund the original purchase price thereof.

**MEDICAL USE:** This product is not specifically designed or manufactured for use in implantable medical and/or dental devices. We have not tested it for such application and will only sell it for such use pursuant to contract containing specific terms and conditions required by us.

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