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 Polymer-Alloy Type Permanent Antistatic Agent for Styrene Resins
 

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# PELESTAT NC7530

## Preface

PELESTAT NC7530 is a permanent antistatic agent for styrene resins which was developed by using an original Sanyo Chemical compatibilization technique.

This product imparts a permanent antistatic property when blended with styrene resins while causing practically no lowering of their physical properties and moldability. It minimally affects the transparency of styrene-acrylic copolymer (MS resin) with a refractive index of approx. 1.53.

## Typical Properties

Property	Value	Remarks
Appearance	Pale yellow pellet	-
Melting point	Approx. 176 °C (349 °F)	DSC, ASTM D 3418
Reduced viscosity	Approx. 1.3	0.5 wt % formic acid solution at 25 °C (77 °F)
Melt flow rate	Approx. 10 g	10 min, ASTM D 1238 [190 °C (374 °F), 21.18 N]
Refractive Index	Approx. 1.53	23 °C (73 °F), ASTM D 542
Surface resistivity	Approx. $2 \times 10^9 \Omega$	ASTM D 257
Thermal degradation temperature	Approx. 280 °C (536 °F)	*

\* The lowest temperature at which PELESTAT NC7530 begins to thermally decompose.  
(Measured using a thermal gravimeter in air)

## Features

PELESTAT NC7530 has the following features:

- Imparts an excellent antistatic property to styrene resins when the amount added is between 10 and 15 wt %.
- Exhibits a permanent antistatic property immediately after molding. The antistatic property in the resulting plastic minimally changes even after washing with water because it is a high-molecular-weight antistatic agent. In addition, it works even in low humidity due to its low dependency on humidity. It also minimally affects the mechanical and surface properties of the styrene resins themselves.
- Minimally affects the transparency of the MS resin with a refractive index of 1.53.
- Does not impair the heat resistance of resulting plastic because this product is thermally stable.
- Applicable to electric and electronic parts due to its low-content of halogenated compounds.

## Application Methods

### 1. General Procedure

As shown in Figure 1, PELESTAT NC7530 and styrene resins such as MS resins are dry-blended using a blender, and are kneaded using a twin-screw extruder and pelletized. Pigments can be added during the dry-blending or the kneading process if necessary. The pelletized material is then molded into the final product using an appropriate molder (e.g., injection molding machine).

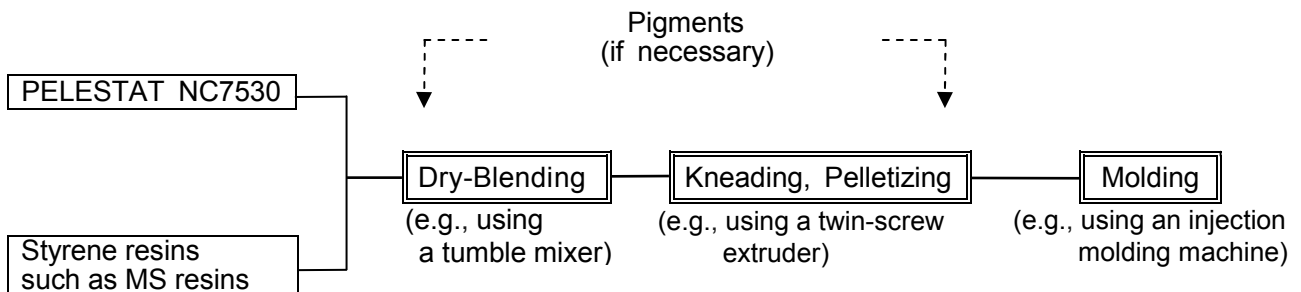


Figure 1. General Procedure for Application of PELESTAT NC7530

### 2. Amount to be Used

The standard amount of PELESTAT NC7530 is between 10 and 15 wt %. Determine the optimal amount by referring to the results of its performance tests.

### 3. Kneading Conditions

Use a high share rate kneader (e.g., twin-screw extruder) when this product is kneaded. The standard kneading temperature is between 200 and 250 °C (392 – 482 °F). Determine the kneading temperature according to the resin applied.

#### 4. Control Usage of PELESTAT NC7530

- This product can be immediately used after the sealed package is opened because this product is packaged under moisture-proof conditions.
- Drying is necessary when the sealed package is kept unsealed for a long time or when small bubbles form in the molding processes because this product has some hygroscopic properties as described in Figure 2.

The following are examples of the conditions for drying.

##### Drying under reduced pressure

Vacuum : Below 1300 Pa (0.2 psi)  
Temperature: 70 – 80 °C (158 – 176 °F)  
Duration : 2 – 4 hours

##### Hot-air drying

Temperature : 85 – 95 °C (185 – 203 °F)  
Duration : 4 – 6 hours

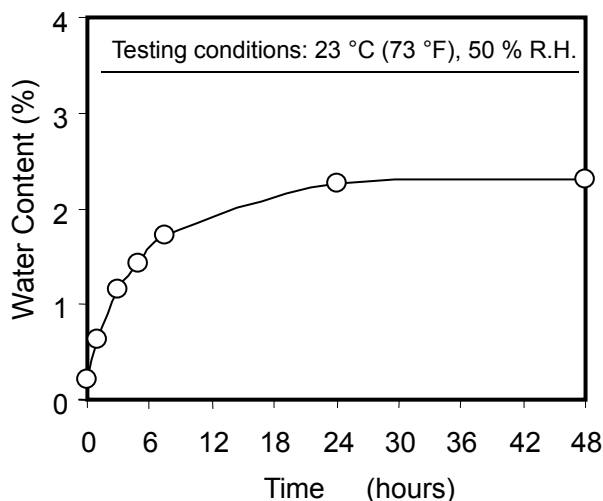


Figure 2. Hygroscopic Properties of PELESTAT NC7530

#### Precaution Against Mishandling

- In the case of using resins at molding temperatures at 200 °C (392 °F) or lower, PELESTAT NC7530 may not fuse, possibly resulting in poor effectiveness. Furthermore, in case of using resins at molding temperatures above 280 °C (536 °F), this product may thermally decompose, possibly resulting in poor effectiveness. The recommended molding temperature is between 200 and 250 °C (392 – 482 °F).
- Depending on the kind of resin, this product may have an influence on the resin's physical properties such as mechanical properties. Test their influence on each other's physical properties beforehand to ensure that there are no problems.

## Performance Tests

The examples on pages 4 to 7 are the results of performance tests using MS resins mixed with PELESTAT NC7530.

This product imparts a permanent antistatic property to MS resins that cannot be attained by any other conventional blend-type, low-molecular-weight antistatic agents. Furthermore, this product minimally affects the physical properties of MS resins because this product is highly compatible with them.

### 1. Application to MS Resins

#### A. Relationship Between Amount of PELESTAT NC7530 and Resulting Surface Resistivity

The MS resin containing PELESTAT NC7530 is highly antistatic when the amount of this product added is between 10 and 15 wt %. Refer to Figure 3 and determine the optimal amount according to the desired surface resistivity.

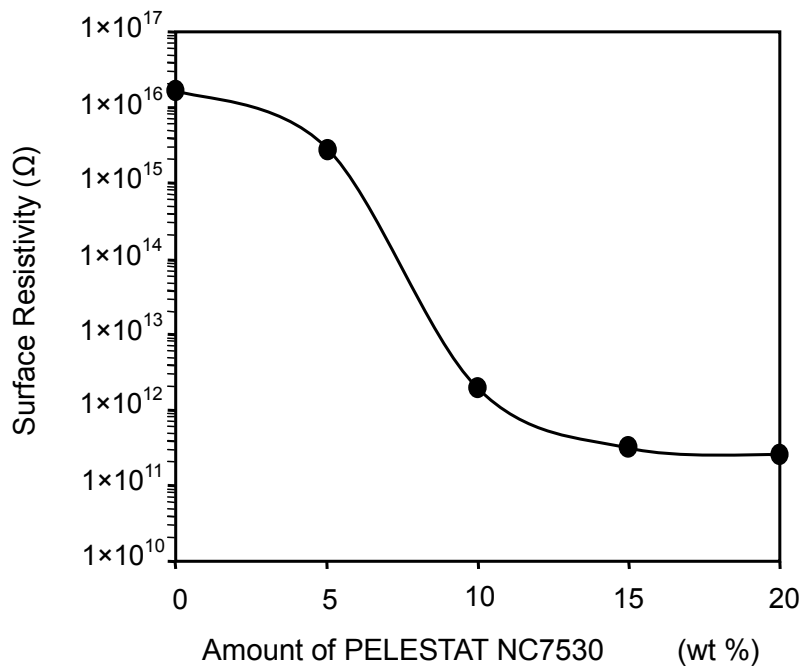


Figure 3. Relationship Between Amount of PELESTAT NC7530 and Surface Resistivity

#### Materials and Methods:

##### Materials:

A predetermined amount of PELESTAT NC7530 was dry-blended with the MS resin and the mixture was kneaded using a twin-screw extruder at approx. 220 °C (428 °F). The kneaded compound was then molded using an injection molding machine [nozzle temperature: approx. 210 °C (410 °F), mold temperature: approx. 60 °C (140 °F)] into samples 2 mm (approx. 0.08 inches) in thickness.

##### Method:

Each sample was kept at 23 °C (73 °F), 50 % R.H. for 24 hours. Then, the surface resistivity of each was measured using a megohmmeter according to ASTM D 257.

B. Effect on Surface Resistivity When Repeatedly Washed with Water  
(Evaluation of Durability of Antistatic Effect)

The surface resistivity of the MS resin blended with PELESTAT NC7530 minimally changes, remaining antistatic even when washed with water. This product imparts a permanent antistatic property that cannot be attained by any other conventional blend-type, low-molecular-weight antistatic agents, which loses its antistatic property after being washed with water approximately three times.

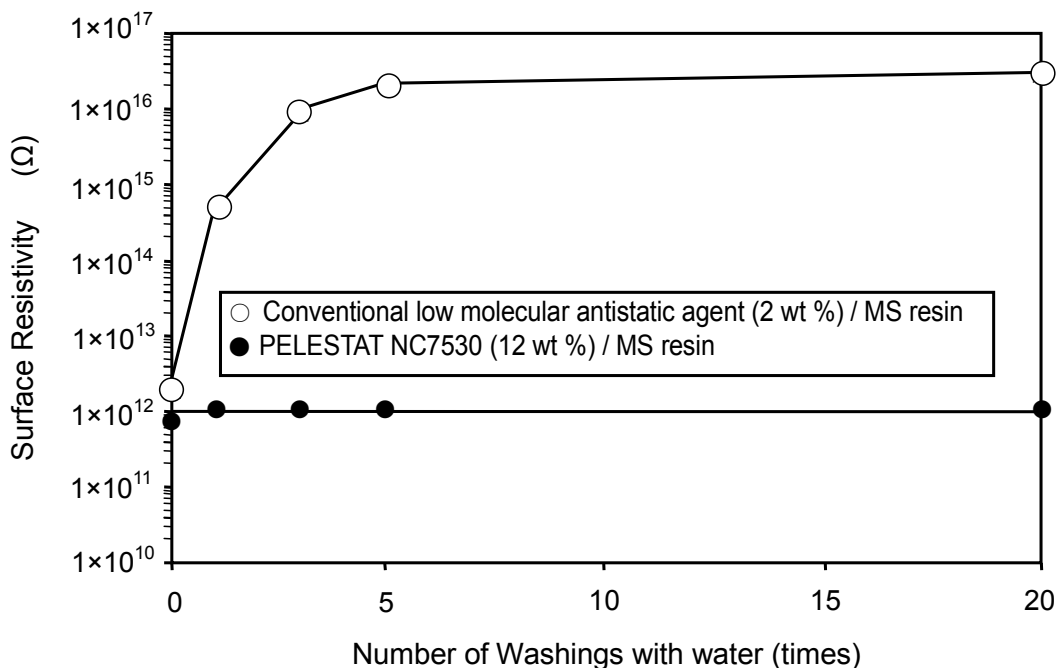


Figure 4. Effect on Surface Resistivity When Repeatedly Washed with Water

Materials and Methods:

Materials:

PELESTAT NC7530 (12 wt %) / MS resin

PELESTAT NC7530 (12 wt %) was dry-blended with the MS resin and the mixture was kneaded using a twin-screw extruder at approx. 220 °C (428 °F). The kneaded compound was then molded using an injection molding machine [nozzle temperature: approx. 210 °C (410 °F); mold temperature: approx. 60 °C (140 °F)] into samples 2 mm (approx. 0.08 inches) in thickness.

Conventional low-molecular-weight anionic antistatic agent (2 wt %) / MS resin

A conventional blend-type, low-molecular-weight antistatic agent, a Sanyo Chemical product, was applied. These samples were prepared by using the method described above.

Method:

Each sample was submerged in water and their surfaces were rubbed with cotton cloth. The samples were dried under reduced pressure [133 Pa (0.02 psi)] at 70 °C (158 °F) for 2 hours and were kept at 23 °C (73 °F), 50 % R.H. for 24 hours. The surface resistivity was measured using a megohmmeter according to ASTM D 257. This process was repeated according to the number of washing with water as described in Figure 4.

C. Effect on Resin Physical Properties

As shown in Table 1, PELESTAT NC7530 imparts a permanent antistatic property to the MS resin. The compatibility of this product with this resin is excellent, and the MS resin physical properties are minimally affected.

Table 1. Effect on MS Resin Physical Properties

Property	Method (ASTM No.)	PELESTAT NC7530 (10 wt %) / MS Resin	MS Resin
Surface resistivity $\Omega$	D257	$8 \times 10^{11}$	$> 10^{16}$
Melt flow rate (10 min, 230°C, 98.07 N) g	D1238	8	5
Tensile strength MPa (psi)	D638	67 (9,700)	69 (10,000)
Flexural modulus MPa (psi)	D790	2,700 (392,000)	2,900 (421,000)
Izod impact strength (notched) J/m (ft·lbf/in)	D256	30 (0.56)	30 (0.56)
Deflection temp. under load (1.82 MPa) °C (°F)	D648	89 (192)	90 (194)

Materials and Methods:

Materials:

Surface resistivity

PELESTAT NC7530 (12 wt %) was dry-blended with the MS resin and the mixture was kneaded using a twin-screw extruder at approx. 220 °C (428 °F). The kneaded compound was then molded using an injection molding machine [nozzle temperature: approx. 210 °C (410 °F); mold temperature: approx. 60 °C (140 °F)] into samples 2 mm (approx. 0.08 inches) in thickness.

Melt flow rate

PELESTAT NC7530 (12 wt %) was dry-blended with the MS resin and the mixture was kneaded using a twin-screw extruder at approx. 220 °C (428 °F), and used as samples.

Other mechanical properties

Samples were prepared under the same conditions described in Figure 4 except that the predetermined size described in ASTM was applied.

MS resin was also molded under the same conditions.

Methods:

See the ASTM No. described in Table 1.

(The testing method for surface resistivity is described in Figure 3.)

#### D. Relationship Between Amount of PELESTAT NC7530 and Resin Optical Property

PELESTAT NC7530 has a refractive index of approx. 1.53. When this product is added to MS resins (refractive index: 1.51 – 1.57), a MS resin with a refractive index of approx. 1.53 should be used so that this product minimally affects MS resin's transparency.

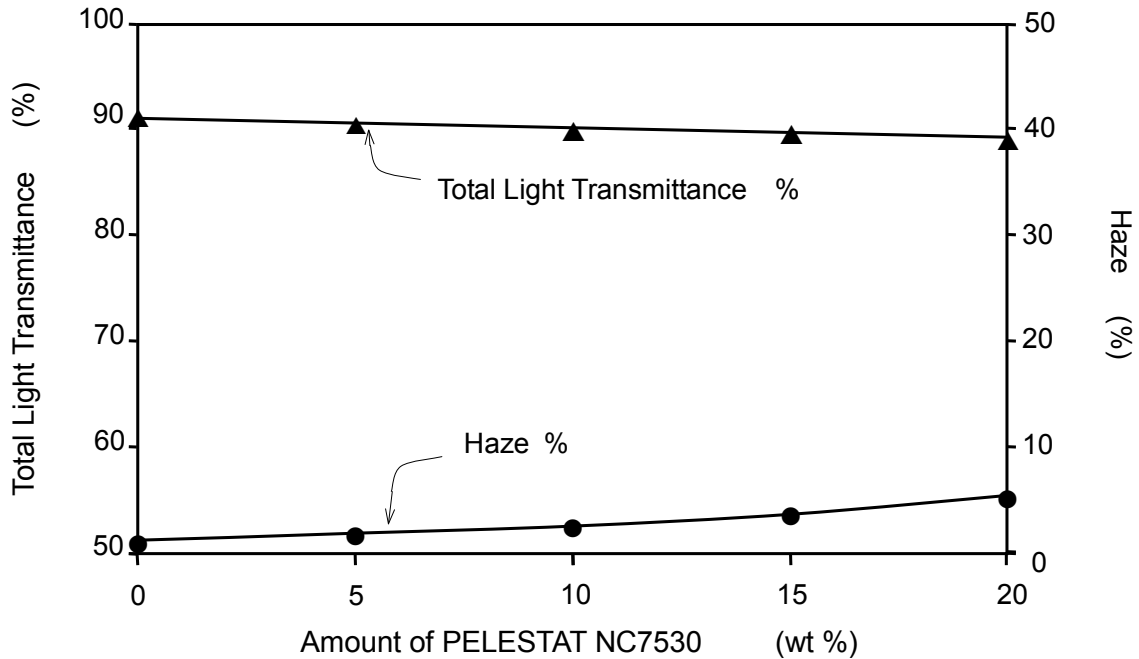


Figure 5. Relationship Between Amount of PELESTAT NC7530 and Resin Optical Property

#### Materials and Methods:

##### Materials:

A predetermined amount of PELESTAT NC7530 was dry-blended with the MS resin (refractive index: approx. 1.53) and the mixture was kneaded using a twin-screw extruder at approx. 220 °C (428 °F). The kneaded compound was then molded using an injection molding machine [(nozzle temperature: approx. 210 °C (410 °F); mold temperature: approx. 60 °C (140 °F)] into samples 2 mm (approx. 0.08 inches) in thickness.

##### Method:

The samples were kept at 23 °C (73 °F) and 50 % R.H. for 48 hours. Total light transmittance and haze were measured using a hazemeter according to ASTM D 1003.

### Examples of Applications

PELESTAT NC7530 has been used as a permanent antistatic agent in MS resins in the following applications:

- Trays and containers for electric and electronic parts, etc.
- Lighting fixture covers, meter panels, etc.
- Various storage cases, etc.

## Patent Registered

USP 5,652,326

EP 0,613,919

USP 5,886,098

TW NI - 83,929

USP 5,604,284

KR 300,273

## Hazards Description

PELESTAT NC7530 is a polyether-polyolefin block copolymer.

Vapor or fume from molten material causes eye and nose irritation.

This product is for industrial use only.

### Important :

Before handling this product, refer to the Material Safety Data Sheet for recommended protective equipment, and detailed precautionary and hazards information.

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