CHEMISTRY THAT MATTERS™

OPTIMIZING PERFORMANCE IN SEMICONDUCTOR PRODUCTION

Specialty materials to help meet quality and efficiency requirements



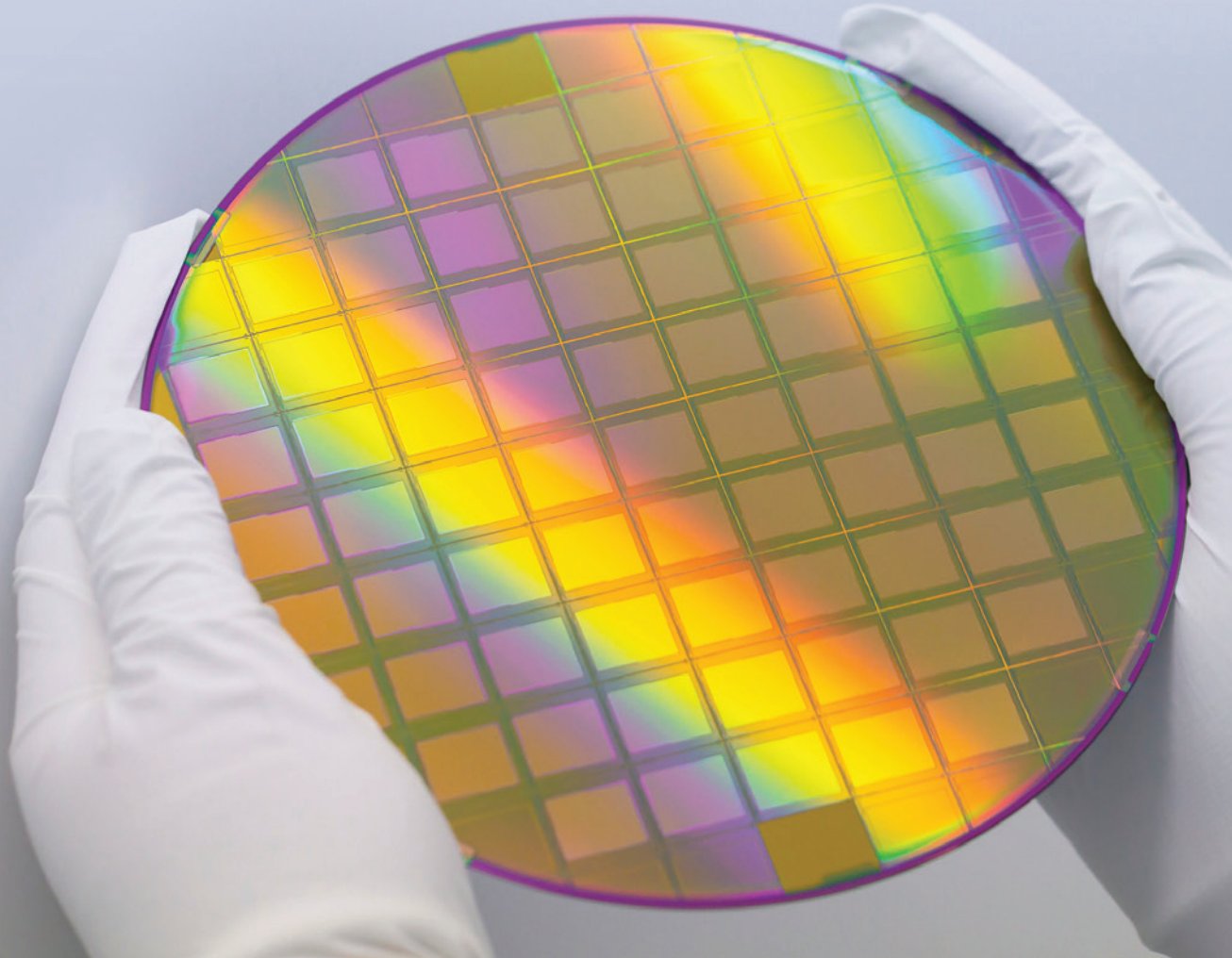
LEVERAGE OUR DECADES OF EXPERIENCE IN THE SEMICONDUCTOR INDUSTRY

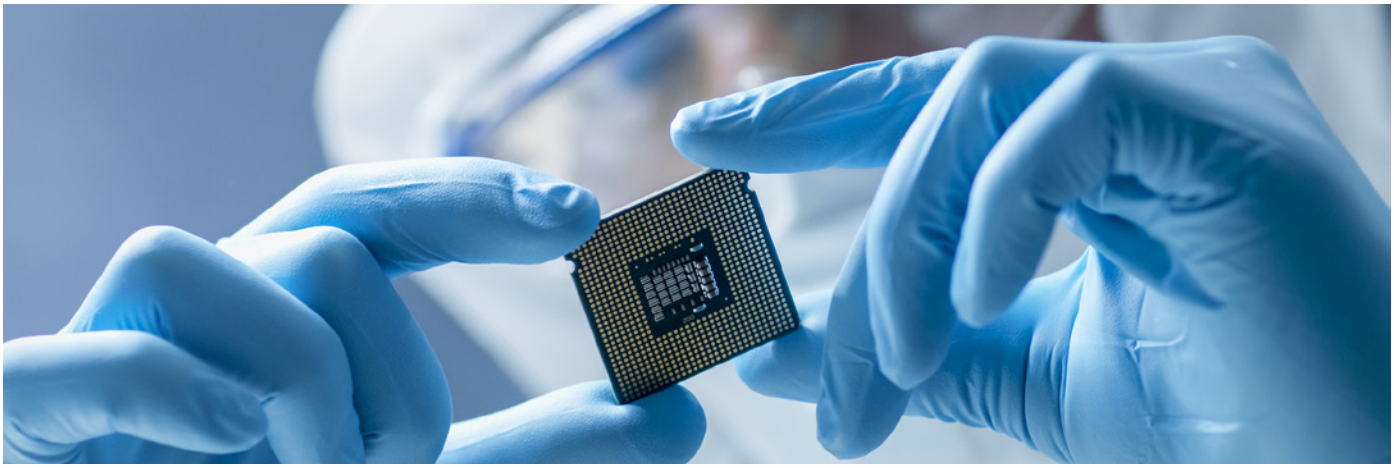
As a global leader in specialty thermoplastic materials, SABIC has decades of experience working with producers of semiconductor equipment and components, and suppliers of stock polymer shapes used in these applications.

Our resins, compounds and copolymers are well suited to meet rigorous standards of cleanliness and purity, and can help deliver excellent thermal, chemical, mechanical and electrical performance.

SABIC invites you to collaborate with us. We are well equipped to support your product development team with expertise in materials, design, application development, prototyping, process optimization and testing.

Contact us today to learn more.
Email us at Specialties@sabic-hpp.com
Scan the code to visit our **MaterialFinder** website.





Specialty materials can help enhance cleanliness, performance and durability of semiconductor tools and components.

The semiconductor industry plays a pivotal role in powering the technological advancements of the future. Manufacturers of semiconductor tools and equipment need materials they can rely on to ensure maximum throughput and minimal yield loss. These materials must be high purity and maintain their properties and dimensional stability even after exposure to high temperatures and aggressive chemicals.

MEET RIGOROUS QUALITY AND EFFICIENCY REQUIREMENTS WITH SPECIALTY MATERIALS

SABIC's specialty thermoplastic materials can help to meet critical component performance requirements in complex and precise semiconductor chip manufacturing processes.

PURITY

SABIC LNP™ Clean Compounding Solutions (CCS) are produced using a highly controlled compounding process to minimize organic, ionic and particulate contamination. LNP Clean Compounding Solutions are available in a variety of base resins.

The CCS methodology includes:

- Strict raw material selection
- Clean formula design
- Specialized compounding process control
- ICCS packaging, molding, sampling, and testing

CHEMICAL RESISTANCE

SABIC's LNP™ compounds and copolymers, ULTEM™ resins and NORYL™ resins can offer excellent resistance to harsh and aggressive chemicals. They can retain strength and resist stress cracking when exposed to acids and weak aqueous solutions.

DIMENSIONAL STABILITY

Thermoplastics used in equipment and tools for wafer handling need to be dimensionally stable under exposure to heat, moisture, and chemicals.

ULTEM resins offer excellent dimensionally stable thanks to a lower CTE. SABIC's NORYL resins and LNP compounds portfolio also offer resins with good dimensional stability.

HIGH HEAT RESISTANCE

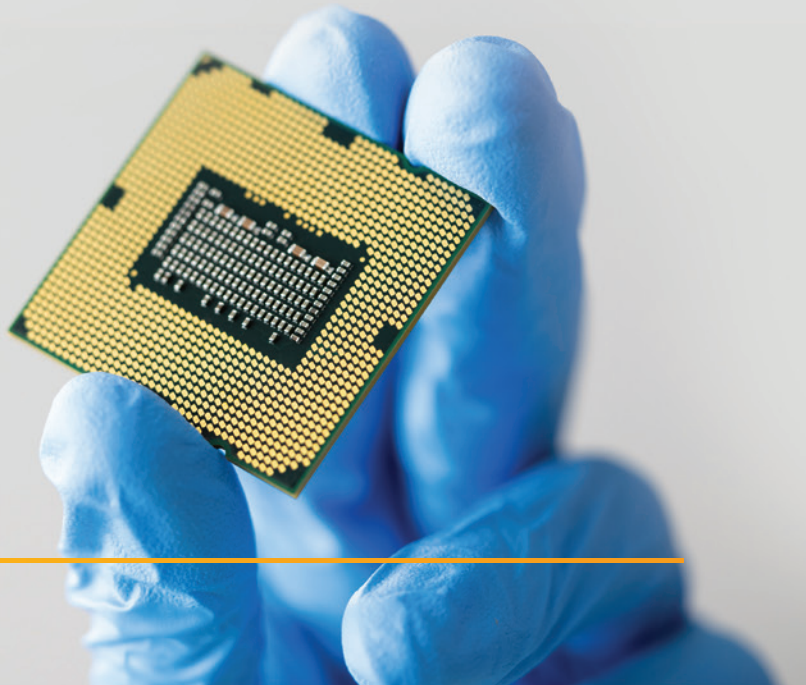
Semiconductors can be exposed to high temperatures during various processing operations. SABIC's portfolio of materials meet a wide operating temperature range with the maximum of up to 280°C with EXTEM resin, a thermoplastic polyimide.

FLAME RETARDANCE

SABIC's thermoplastics that meet the UL 94 V-0 standard for flame retardance produce less smoke and byproducts that could contaminate adjacent processes.

PFAS containing compounds and flame-retardant additives: SABIC's Specialties business offers over 1,300 product grades that do not contain PFAS intentionally added during SABIC's manufacturing process. Each user is responsible for evaluating the presence of unintentional PFAS impurities. Materials found to comply with **UL746G — an outline of investigation for non-fluorine and non-PFAS containing materials** are searchable on UL and have certificates published on their individual recognition cards (Yellow Cards).

Contact us for more information.
Specialties@sabic-hpp.com



ELECTRICAL PERFORMANCE

Silicon wafers can undergo hundreds of process steps and many robotic handling cycles per step, allowing static to build up and discharge. Electrostatic discharge can damage or destroy delicate wafers.

LNP STAT-KON™ compounds contain electrically conductive additives based on carbon black (CB), carbon fiber (CF), or carbon nanotubes (CNT) that provide surface resistivity from antistatic and conductive to electromagnetic interference (EMI) shielding.

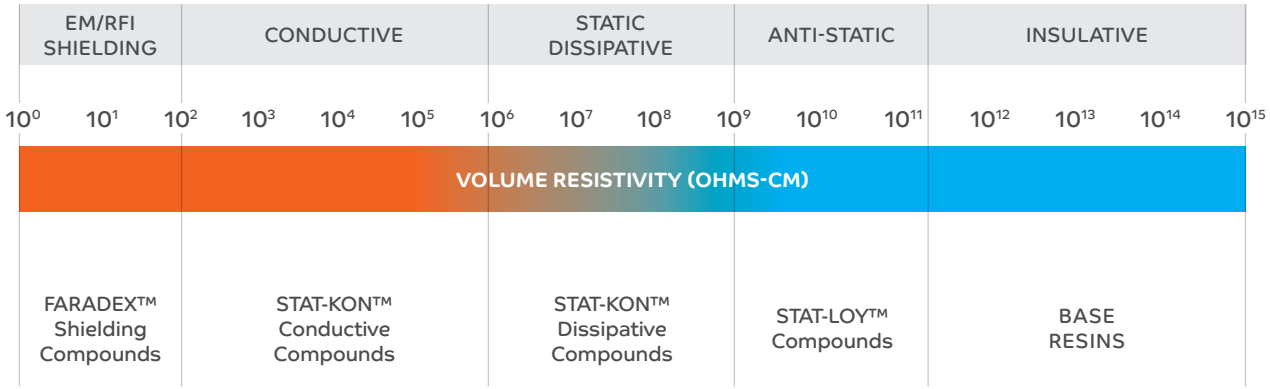


Figure 2. Volume resistivity range of LNP™ Compounds

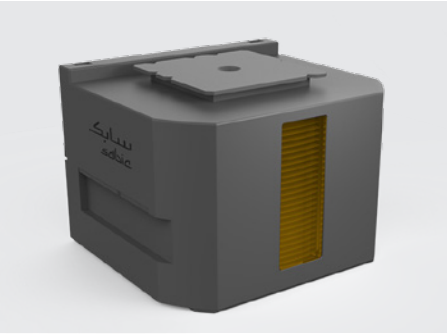
DISCOVER BENEFITS OF CARBON NANOTUBES-BASED COMPOUNDS

LNP STAT-KON conductive compounds based on carbon nanotubes (CNT) provide an excellent balance of processing, electrical conductivity, mechanical strength, surface aesthetics, and cleanliness at favorable costs versus incumbent solutions based on carbon black and carbon fibers. Potential benefits of CNT-based compounds include exceptionally low sloughing, low loadings, and good property retention.

KEY PROPERTY	CNT-BASED	CB-BASED	CF-BASED
Homogeneity of conductivity	+	+	–
Cleanliness	+ +	– –	+
Sloughing	+ +	–	–
Surface quality	+	–	–
Ductility	+	–	–
Equivalent shrinkage to neat resin	+ +	+	–
Potential for recyclability	+ +	–	–
Processing ease for thin-wall molding	+	–	–

Figure 3. Key properties of LNP STAT-KON CNT-based compounds vs CB- and CF-based compounds

EXAMPLE SEMICONDUCTOR APPLICATIONS
Discover the potential to benefit from Specialty Materials



FRONT OPENING UNIFIED POD (FOUP)

Materials used in FOUPs must deliver exceptional cleanliness, and strength.

SABIC's low ion-leaching, low outgassing, chemical resistant, dimensionally stable resins may be further enhanced to deliver high air impermeability using double shot molding.

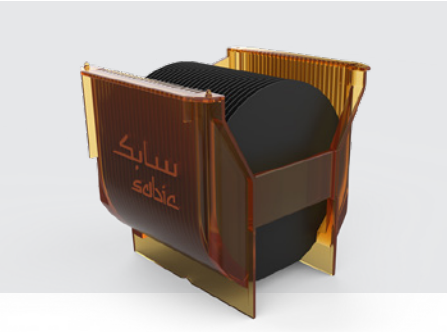
ULTEM resins | LNP STAT-KON, COLORCOMP compounds | NORYL resins

ULTRASONIC TEST PROBE

ULTEM resin is well suited for use in ultrasonic equipment to help enable consistent accurate detection and localization of defects.

ULTEM resins





WAFER HANDLING

Wafer cassettes (or carriers) require materials with chemical and heat resistance, strength, anti-static and dimensional stability.

Antistatic ULTEM resins or LNP compounds can maintain excellent mechanical strength and color retention in high-temperature environments up to 150 °C

ULTEM resin | LNP STAT-KON, COLORCOMP compounds

IC MATRIX TRAY

The design of integrated circuit (IC) trays often conforms to the JEDEC Matrix Tray standard. Material requirements include the ability to withstand 180°C baking temperatures and provide long-term antistatic performance with low ionic content and low outgassing.

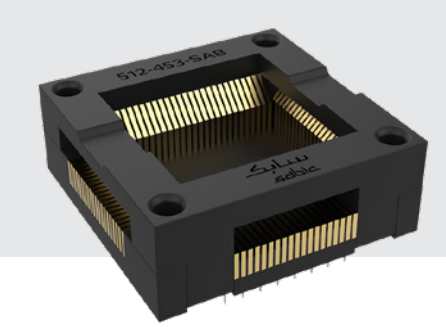
NORYL resins | LNP STAT-KON compounds

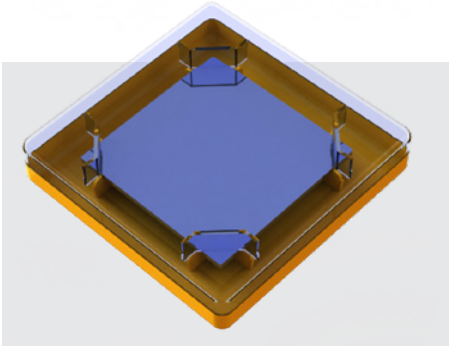


BURN-IN TEST SOCKET (BITS)

SABIC's portfolio includes materials that can help deliver the fine-pitch and thin-wall designs, stemming from electronic component miniaturization, while offering high modulus, dimensional stability, and high temperature performance.

ULTEM resins | LNP STAT-KON, LUBRICOMP compounds





MASK/ BLANKS HANDLING

Masks/blanks require materials offering low ionic content, low outgassing, stable electrical conductivity and high heat performance.

LNP STAT-LOY, STAT-KON, COLORCOMP compounds | NORYL resins

CARRIER TAPE

Material requirements include good dimensional stability, high heat performance, low ionic leaching and outgassing, electrical dissipation, and stable surface resistance.

LNP STAT-KON compounds | NORYL resins





CMP RETAINER RING

Material requirements include chemical resistance combined with dimensional stability over a wide temperature range.

ULTEM resins can help deliver good abrasion and chemical resistance. They can help to ensure stable operation of rollers and extend the life of grinding equipment.

ULTEM resins

SPECIALTY MATERIALS FOR SEMICONDUCTOR MANUFACTURING

The distinctive properties of SABIC's specialty thermoplastics can enhance the design, performance and durability of wafer handling, storage and packaging tools and equipment. Properties can be optimized through formulation of copolymers and blends and incorporation of additives and reinforcements.

ULTEM™ RESIN FAMILY OF HIGH HEAT SOLUTIONS

When selecting materials for high-performance components, the ULTEM resin family may offer a solution to your design and manufacturing challenges.

Download introductory guide
bit.ly/ULTEM_Portfolio

ULTEM RESINS

Amorphous transparent polyetherimide (PEI)

- Long-term high heat capability (Tg of 217°C; RTI of 170°C-180°C)
- Dimensional stability
- Strength and modulus at high temperatures
- Inherent low flame, smoke, and toxicity (FST)
- Intrinsic FR – no added flame retardants
- Hydrolytic and chemical stability
- Stable dielectric properties
- IR transparent

EXTEM RESINS

Amorphous, thermoplastic polyimide (TPI)

Everything that ULTEM resin offers plus:

- Extreme high temperature performance (Tg up to 280°C; RTI of 160°C-170°C)
- Withstands lead-free solder reflow temperatures

SILTEM RESINS

Copolymer of ULTEM resin and siloxane soft blocks

Everything that ULTEM resin offers plus:

- Low temperature performance
- Good elongation
- Tailorable combination of strength, flexibility, heat and chemical resistance





NORYL RESINS

The NORYL resin family consists of SABIC's polyphenylene ether (PPE) blended with: HIPS, PP, PA, or TPE, select additives and fillers.

- High heat capability: Tg up to 180°C; RTI up to 125°C
- Long term dimensional stability
- Good chemical resistance, especially to acids
- Stable surface resistance

LNP COMPOUNDS AND PC COPOLYMERS

SABIC's LNP compounds and PC copolymers portfolio offers a wide range of products for wafer handling, storage, and packaging.

- Clean compounding solution technology to minimize organic, ionic, and particulate contaminates
- High heat performance and dimensional stability
- PC Copolymers with good ductility and chemical resistance

CONDUCTIVE

ESD, EMI, Thermal Dissipation

- LNP™ STAT-KON™ compounds
- LNP™ STAT-LOY™ compounds
- LNP™ FARADEX™ compounds
- LNP™ KONDUIT™ compounds

STRUCTURAL

High Modulus Ductile, Super Structural & Dimensional Stability

- LNP™ THERMOTUF™ compounds
- LNP™ THERMOCOMP™ compounds

AESTHETICS & COLORS

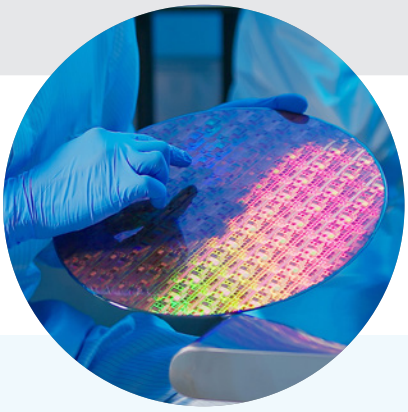
Custom Colors, Visual Effects

- LNP™ COLORCOMP™ compounds

WEAR & FRICTION

Wear Resistance, Friction Reduction

- LNP™ LUBRICOMP™ compounds
- LNP™ LUBRILOY™ compounds



SEEKING SUSTAINABLE MATERIAL OPTIONS?

SABIC's TRUCIRCLE™ portfolio and services for circular solutions span: design for recyclability, mechanically recycled products, certified circular products from advanced recycling of used plastics, certified bio-renewable products from bio-based feedstock, and closed loop initiatives to recycle plastic back into high quality applications.

Learn more on our sustainability page on sabic.com

Selection of Properties*	Standard	Unit	ULTEM 1000 resin	ULTEM 2300 resin	EXTEM VH1003 resin	STAT-KON EJ000C compound
			PEI resin	PEI resin, glass filled	TPI resin	PEI resin, carbon nanotubes
PHYSICAL						
Flexural Modulus[a]	ASTM D790	MPa	3400	9400	3170	3970
Flexural Strength[a]	ASTM D790	MPa	165	230	155	176
Tensile Strength, Yield[a]	ASTM D638	MPa	115	175	96	110
THERMAL						
HDT, 1.8MPa, 3.2mm	ASTM D648	°C	207	211	228[b]	211
HDT, 0.45MPa, 3.2mm	ASTM D648	°C	190	215	217	201
CTE, Flow[c]	ISO 11359-2	1/°C	5.2 E-05	1.8 E-05	5.0 E-05	4.0 E-05
CTE, Crossflow[c]	ISO 11359-2	1/°C	5.2 E-05	4.8 E-05	5.0 E-05	4.0 E-05
IMPACT						
Izod Impact, notched, 23°C	ASTM D256	J/m	53	90	69	41
Izod Impact, unnotched, 23°C	ASTM D4812	J/m	1800	600	NB	645
ELECTRICAL						
Surface Resistivity	ASTM D257	Ω	> 1.0 E+15[d]	>1E+15	–	1.0 E+04 – 1.0 E+07
Volume Resistivity	ASTM D257	Ω.cm	> 1.0 E+15[d]	1.0 E+00	> 1.0 E+16[d]	1.0 E+00 – 1.0 E+02[e]

a Span and rate may vary by material, review material TDS
b ISO 75/Af Standard
c Temperature range varies by material, review material TDS
d IEC 60093 test method
e SABIC test method

* The information stated on this property table and in Technical Datasheets should be used as indicative only for material selection purposes and not be utilized as specification or used for part or tool design.

ULTEM 1000 resin is an unreinforced amorphous polyetherimide (PEI) resin with Tg 217°C. Offers excellent mechanical, electrical and dimensional properties at high temperatures.

ULTEM 2300 resin is a standard flow 30% glass fiber reinforced PEI resin with Tg of 217°C. Offers excellent dimensional stability, strength, stiffness, creep resistance.

EXTEM VH1003 resin is a transparent, thermoplastic polyimide resin with Tg of 247°C. This product has thin wall FR capability.

LNP STAT-KON EJ000C static dissipative compound is based on PEI resin containing carbon nanotubes. LNP Clean Compounding technology.

LNP STAT-KON DJ000ICX4 static dissipative, electrically conductive compound based on PC and carbon nanotube. LNP Clean Compounding technology.

LNP STAT-KON DX03550 electrically conductive compound is based on polycarbonate (PC) resin containing conductive carbon powder.

Find Technical Data Sheets on our website
materialfinder.sabic-specialties.com

STAT-KON DJ000ICX4 compound	STAT-KON DX03550 compound	STAT-LOY A3000TC compound	STAT-KON DD200C compound	STAT-KON ZJK20I compound	STAT-LOY D3000EC compound	NORYL PX500 resin
PC resin, carbon nanotubes	PC resin, carbon powder	Conductive ABS alloy	PC resin, lubricant, carbon powder	PPE/PS resin, carbon nanotubes	Conductive PC alloy	Modified PPE resin
2550	2750	1800	2200	4320	1790	1590
95	96	55	87	133	72	–
60	58	–	53	85	–	71
134	–	79	138	164	105	169[b]
122	129	68	125	153	92	170
7.0 E-05	–	9.0 E-05	–	4.7 E-05	7.6 E-05	7.1 E-05
8.0 E-05	–	1.2 E-04	–	6.1 E-05	9.8 E-05	7.9 E-05
570	106	138	115	38	671	80
1710	NB	1610	1800	345	NB	–
1.0 E+03 – 1.0 E+06	1.0 E+04 – 1.0 E+07	> 6.3 E+09	1.0 E+05 – 1.0 E+09	1.0 E+05 – 1.0 E+08	> 2.2 E+09	> 1.0 E+15
1.0 E+01 – 1.0 E+03[e]	1.0 E+04 – 1.0 E+07	> 3.1 E+10	–	1.0 E+00 – 1.0 E+02[e]	> 5.2 E+09	–

LNP STAT-LOY A3000TC compound is an ABS resin based electrically conductive material with transparency, low surface resistivity and high cleanliness. LNP Clean Compounding Technology.

LNP STAT-KON DD200C electrically conductive compound is based on PC resin containing carbon powder and a proprietary lubricant. LNP Clean Compounding Technology. Low LPC, low Ionics, low outgassing.

LNP STAT-KON ZJK20I compound is a high heat, high-impact, dimensional stable, low-CTE static dissipative CNT compound based on PPE and PS offering low sloughing properties.

LNP STAT-LOY D3000EC compound is a PC resin based electrically conductive material with colorability, low surface resistivity, high flow. LNP Clean Compounding Technology.

NORYL PX500 resin is an unfilled modified PPE offering lower odor during conversion than many standard modified PPE resins. Offers exceptional balance of high heat performance, dimensional stability, flow.

WE'RE ALWAYS HERE FOR YOU

Did you know that SABIC can offer all these services?

- Material suggestions and samples
- Design and predictive engineering services
- COLORXPRESS™ color matching services
- Teardowns and prototyping
- Processing technical support
- Application testing guidance
- Industry-specific regulatory information

Reach out to us for one-on-one support to ensure you have all the information and insights you need to help select potential materials for your applications.

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SABIC MATERIAL FINDER
Find the right Specialties material for your application ▶

ELECTRICAL & ELECTRONICS

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