

AURUM®

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Caution: Japanese Export Control

1. In order to prevent proliferation of arms, there are some international regimes, for example the Nonproliferation Treaty, the Chemical Weapon Convention, the Missile Technology Control Regime, the Wassenaar Arrangement and so on. Countries which have ratified such international regimes establish respective restrictions for export control of the goods which are usable for military use ("Goods").
2. In accordance with such international regimes, the Japanese Government controls the export of Goods to prevent Goods from being used for military use under the Foreign Exchange and Foreign Trade Law. The Law provides the list of Goods.
3. In the event that Goods are exported, the Law requires exporters to obtain the export license from the Japanese Government. To obtain the export license, it is necessary for exporters to confirm that Goods will not be used for military use.
4. According to the Law, AURUM® is one of Goods. Therefore, we have to confirm that AURUM® will not be used for military use.
5. This export control has been effective since 1996.



MITSUI CHEMICALS, INC.

HEAD OFFICE

Engineering Plastics Dept. Performance Compound Div.
Functional Polymeric Materials Business Sector
Shiodome City Center, 1-5-2, Higashi-Shimbashi,
Minato-ku, Tokyo 105-7117, Japan
Telephone: +81-3-6253-3498
Facsimile: +81-3-6253-4219
Website: http://jp.mitsuichem.com/info/aurum_e/
E-mail: aurum@mitsui-chem.co.jp



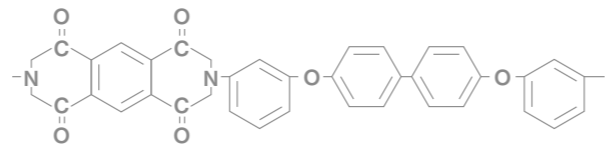
Mitsui Chemicals

AURUM®

Thermoplastic Polyimide Resin

AURUM®





AURUM[®], a super high-grade engineering plastic sustaining the state-of-the-art of the 21st century

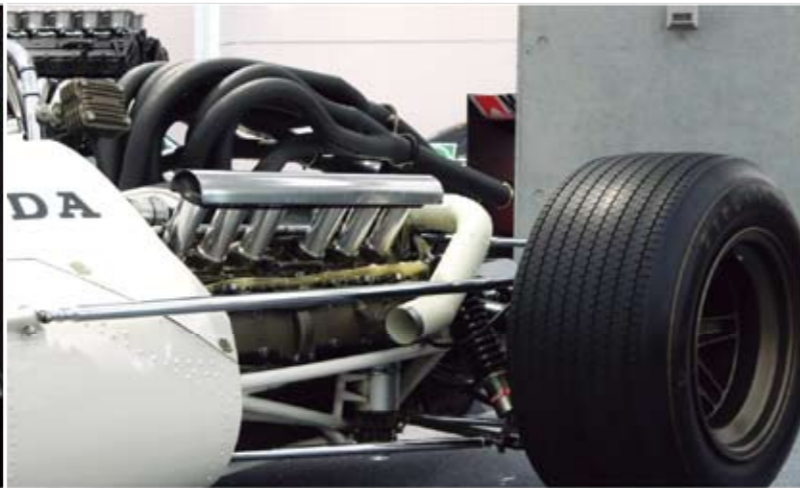
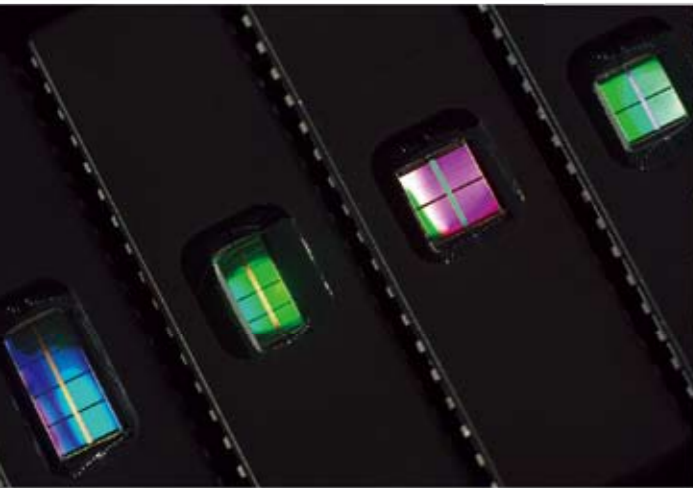


In recent years, AURUM[®] is a polyimide resin attracting increasing attention because of its outstanding properties. Its application range is expanding into various area, going beyond the boundary of the electronics industry.

AURUM[®] is an entirely new type of thermoplastic polyimide resin developed by Mitsui Chemicals on its own, making full use of its technology. An expansion of the application range of AURUM[®] has been made possible because of its thermoplasticity suitable for injection molding and extrusion as well as its unparalleled high heat resistance and mechanical and electrical properties. AURUM[®] is a super engineering plastic that opens up a new dimension in the development of the new generation of engineering plastics.

Features of AURUM[®]

- 1 Super-higt heat resistance** Usable at up to 240°C (glass transition temperature: 250°C)
- 2 Satisfactory sliding properties** A low, stable coefficient of friction and low friction wear
- 3 Exceptionally clean properties** Trace amounts of outgas and metallic impurities
- 4 Stable in any environment** Excellent plasma and radiation resistance, electrical properties, etc.
- 5 Outstanding dimensional stability** Stable coefficient of expansion and satisfactory creep characteristics



Typical Grade & Application

Classification	Grade	Main Feature	Applications
Natural	PL450C	Heat resistance, clean, Transparency (Brown color), Toughness, plasma resistance	Tube, Fiber, Wire coating, Film, Semiconductor mfg. part
Filled Reinforcement	JCN3030	Carbon fiber reinforce · High strength, High modulus	Structural material (Aircraft, Automobile, Industrial machine)
	JGN3030	Glass fiber reinforce · High modulus	OA machine parts (Insulator, Bush, Gear), Electric / Electronic parts (Socket, Connector)
Wear-Friction	JCL3030	Vs. steel high PV (Dry/Oil)	Automotive ATF parts (Trust Washer, Bush, etc.), CVT parts, Turbo charger parts OA machine parts (Insulator, Coupling, etc.), Industrial parts
	JCF3030	Vs. steel high velocity (Dry/Oil)	Automotive ATF parts (Sealing, Bush, etc), Industrial parts (Seal parts, etc.)
	J-3124	Vs. Aluminum (Oil)	Automotive ATF parts (Sealing, <vs. ADC>)
	JNF3020	Vs. Aluminum (Dry)	OA machine parts, Industrial parts
	JCR3030F	Special Grade	Electric / Electronic parts (HDD parts, etc.)

AURUM[®] Injection Molding Conditions

- Specifications for the Molding Machine: Since the molding temperature exceeds 400°C, a molding machine of high-temperature specifications is needed. Furthermore, for the GF and CF Filler grades, a molding machine of wear-resistant specifications is required. As a rule of thumb, resistance time should be within 15 minutes as lengthy resistance would cause gelation, and the injection shot volume of the molding machine. A shut-off nozzle should not be used because resin tends to remain there.
- For molding temperature and mold temperature, please refer to the Table of General Molding Conditions below.
- Pellets have to be dried at 200°C for 3 hours or longer. It is recommended that pellets be dried and dehumidified.
- Please use PEI (ULTEM[®]) as the purging material to be used before and after molding.
- The gate and runner should be designed to be as thick as possible. A tunnel gate should not be used.

Typical Molding Condition

Grade	Cylinder Temp. (°C)		Mold Temp. (°C)
	Hopper side	Center, Nozzle	
Natural	390	400	170~180
GF, CF Filled	400	420	190~210

Typical Properties

Grade Name			PL450C	JGN3030	JCN3030	JCL3030	JCF3030	J-3124	JNF3020	JCR3030F
Filler				Glass Filler 30	Carbon Filler 30	Carbon Filler 30	Carbon Filler, PTFE 30	Special Filler, PTFE 30	PTFE 20	Carbon Filler, Graphite, PTFE 30
Filler Content (wt%)				30	30	30	30	30	20	30
Items	Test Method	Unit								
<Physical Properties>										
Specific Gravity	ASTM D-792		1.33	1.56	1.43	1.42	1.45	1.41	1.43	1.42
Water Absorption (24 Hrs)	ASTM D-570	%	0.34	0.23	0.23					
Molding Shrinkage	ASTM D-955	%	0.74/0.85	0.16/0.78	0.00/0.66	0.00/0.66	0.00/0.70		0.77/1.20	0.37/0.78
<Mechanical Properties>										
Tensile strength	ASTM D-638	MPa	92	165	252	234	195	64	65	75
Elongation	ASTM D-638	%	90	3	2	2	5	4	10	4
Flexural Strength	ASTM D-790	MPa	137	241	360	340	276	104	100	127
Flexural Modulus	ASTM D-790	GPa	2.9	9.5	22.5	21.5	14.2	3.0	2.4	3.9
Izod Impact Strength	ASTM D-256 ^{*1}	J/m	88	118	116	116	120	41	82	59
Rockwell Hardness (R Scale)	ASTM D-785		129	128	128					
(M Scale)			95	104	105					72
<Thermal Properties>										
HDT (Heat Distortion Temp.)	ASTM D-648	°C	230	245	246	246	246	233	224	235
Specific Heat		kJ/°C·kg	1.01	0.96	0.92					
Thermal Conductivity	ASTM C-177	W/m·°C	0.17	0.35	0.49					
Linear Thermal Expansion (MD/TD)	ASTM D-696	10 ⁻⁵ /K	5.5/5.5	1.7/5.3	0.6/4.7	0.6/4.7		4.3/4.7		2.6/4.4
<Electrical Properties>										
Dielectric Constant (1KHz)	ASTM D-150		3.2	3.8						
(1MHz)			3.1	3.7						
Dissipation Factor(1KHz)	ASTM D-150		0.0009	0.0012						
(1MHz)			0.0034	0.0036						
Surface Resistivity	ASTM D-257	Ω	10 ¹⁷ ~10 ¹⁸	10 ¹⁶	10 ⁴ ~10 ⁸					
Volume Resistivity	ASTM D-257	Ω·m	10 ¹⁹ ~10 ²⁰							
<Flammability and Combustion>										
LOI (Limiting Oxygen Index)	ASTM D-2863		47(3.2mm)							
Flame-Retardancy	UL-94		V-0	V-0	V-0					V-0
			(0.4mm)	(0.4mm)	(0.4mm)					(0.5mm)

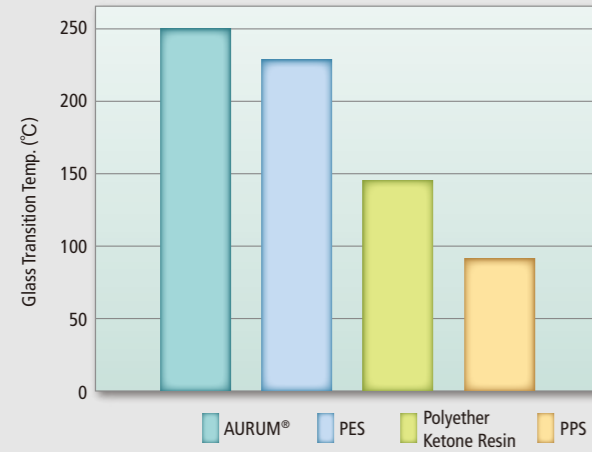
Notes: The above figures are just representative value, but not specification values.

*1 Test specimens were molded Notched types.

Heat Resistance Properties

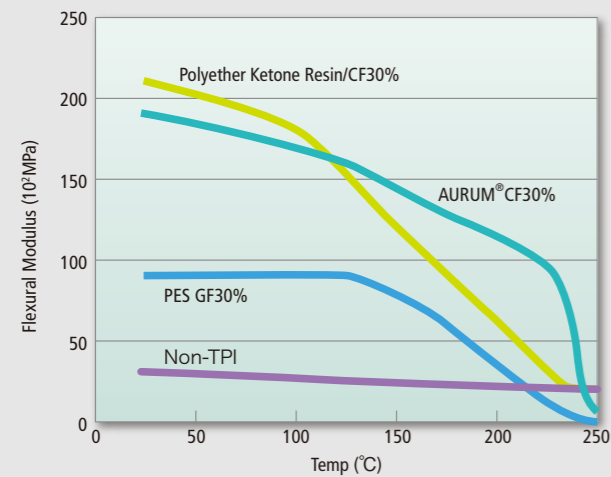
Comparison of Glass Transition Temperature

AURUM® has the highest glass transition temperature of 250°C in the world. Compared with other thermoplastic super engineering plastics, AURUM® is usable at higher temperatures. In other words, AURUM® shows excellent dimensional stability and creep resistance in a broad temperature range.



Temperature Dependence of Flexural Modulus

AURUM® having a high glass transition temperature, retains a high flexural modulus at higher temperatures than other super engineering plastics. Because of this AURUM® is coming into use structural parts of automobiles, aircraft, industrial equipment, etc.



Sliding Properties

Comparison of Sliding Properties

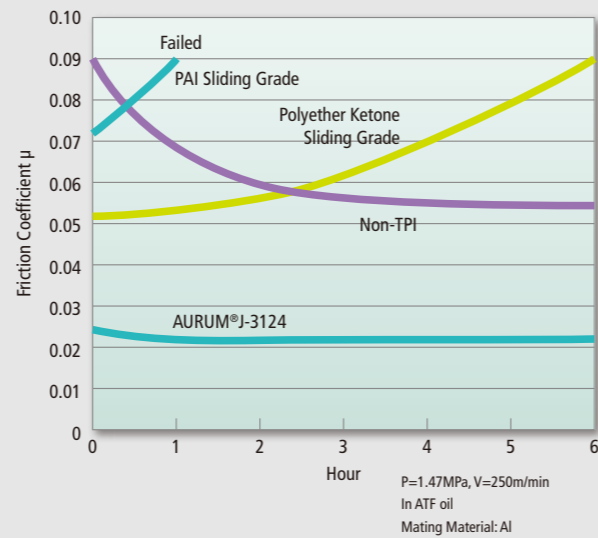
Having a high glass transition temperature, the AURUM® Sliding Grade has a higher critical PV value than other super engineering plastics. Because of this, AURUM® is coming into use for the thrust washers, seal rings, etc. that are used for the transmission of automobiles, etc.

Material and Grade	Critical PV Value (MPa · m/min)		
	Oil		Dry
	vs. SUS	vs. Al	vs. SUS
AURUM® JCL3030	735	-	196
JCF3030	735	-	118
J-3124	-	735	98
Polyether Ketone Sliding Grade	607	372	98
Non-TPI Sliding Grade	607	735	490
PAI Sliding Grade	607	98	58

* Thrust Typed Friction-Wear Test Method: V=250m/min Not circulated oil

Change with Time in Coefficient of Friction

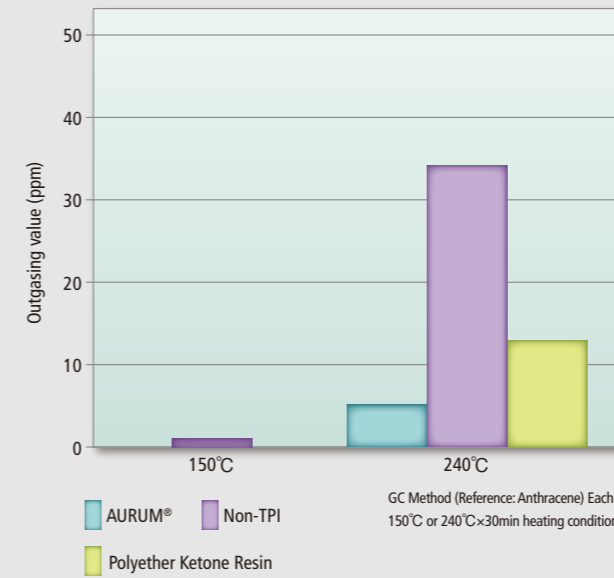
AURUM® has excellent sliding properties, showing a low and stable coefficient of dynamic friction in oil, compared with other super engineering plastics. Because of this, AURUM® is coming into use for automobiles, industrial equipment, etc.



Clean Properties

Outgassing Data

The amount of outgas from AURUM® at high temperatures is small, AURUM® is usable for clean applications such as semiconductors.



Analytical Data on Metallic Impurities

Compared with other engineering plastics, AURUM® contains smaller amounts of impurities such as alkaline metal and can be used for the semiconductor application.

