

ASAFLEX for medical application



**Performance Polymers SBU
Thermoplastic Elastomer Division
TPE Sales & Marketing Department**

Founded in 1922, the Asahi Kasei Group provides innovative solutions based on chemistry and material science to a diverse range of markets.

Asahi Kasei Corp. [holding company function]

Material



Homes



Health Care



Trade name

Asahi Kasei Corp.

Head office

Tokyo, Japan

Founding

1922

President

Hideki Kobori

Paid-in capital*

¥103.3 billion

Employees*

34,670

Fiscal 2017 results

Net sales

¥2,042.2 billion \approx US\$20.4 billion

Operating income

¥198.5 billion \approx US\$2.0 billion

* As of March 31, 2018

Asahi Kasei Corp. [Holding company function]

[Operating function]

- Fibers & Textiles SBU
- Petrochemicals SBU
- Performance Polymers SBU**
- Performance Materials SBU
- Consumables SBU
- Separators SBU

Asahi Kasei Microdevices Corp.
Electronic Devices

Asahi Kasei Homes Corp.
Homes

Asahi Kasei Construction Materials Corp.
Construction Materials

Asahi Kasei Pharma Corp.
Pharmaceuticals

Asahi Kasei Medical Co., Ltd.
Medical Care











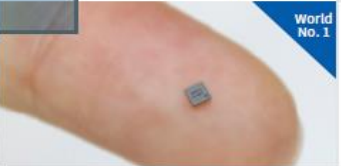





ZOLL Medical Corporation
Acute Critical Care

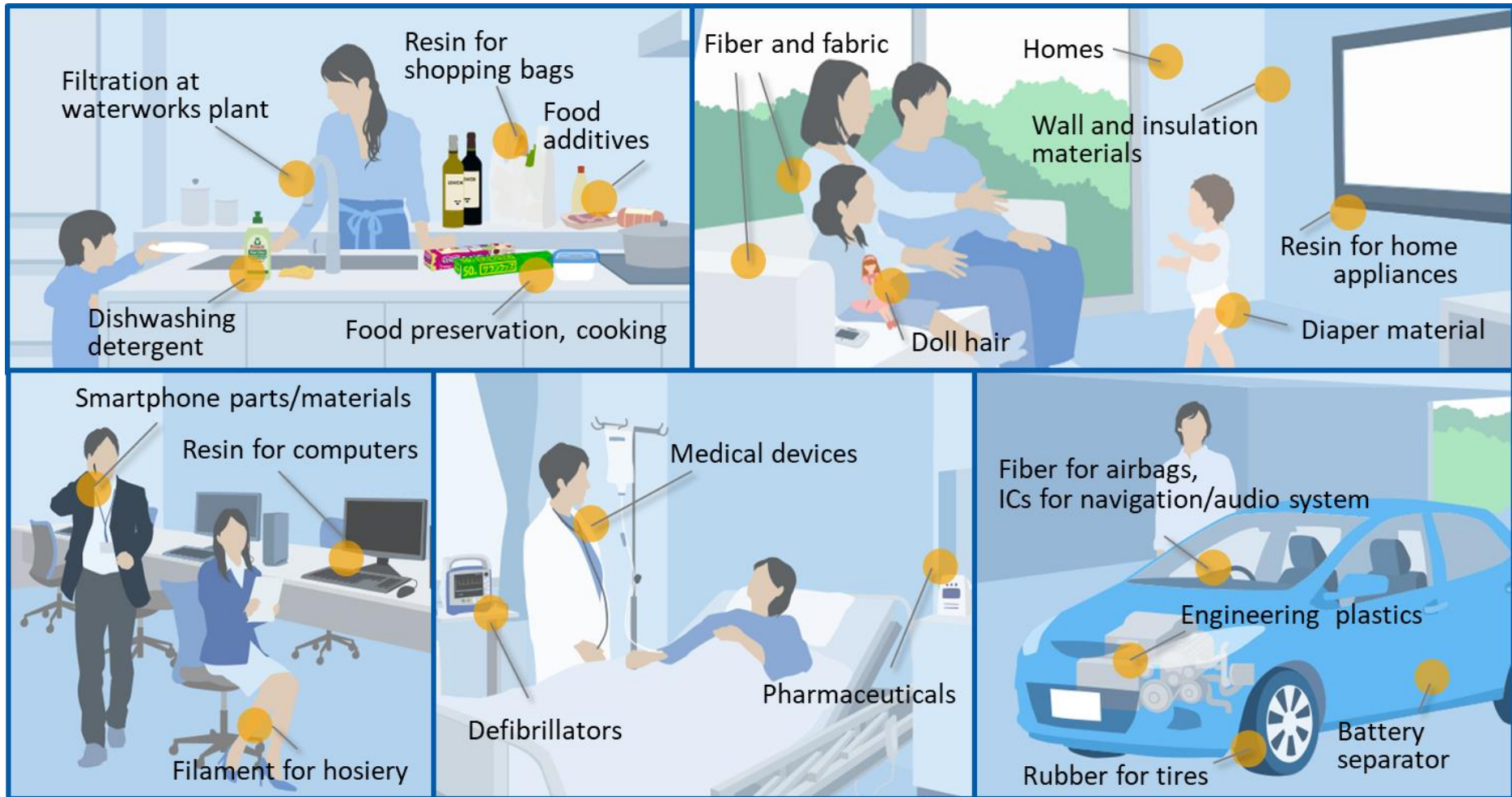
Material 

Homes 

Health Care 



 <p>World No. 2</p> <p> Acrylonitrile for synthetic resin and fiber</p>	 <p>Asia No. 1</p> <p> S-SBR synthetic rubber for fuel-efficient tires</p>	 <p>World No. 1</p> <p> Bemberg™ cupro fiber</p>	 <p> Spunbond nonwoven for diapers</p>
 <p>World No. 1</p> <p> Hipore™ lithium-ion battery separator</p>	 <p>World No. 1</p> <p> Electronic compass electronic device</p>	 <p> UVC LEDs for disinfection and sterilization</p>	 <p>Japan No. 1</p> <p> Saran Wrap™ food wrapping film</p>



Asahi Kasei's products and technologies are used in various ways all around us every day—materials and devices, which make life more comfortable and convenient, as well as healthcare products that help to sustain lives

ASAFLEX™ Key Features

- ✓ High clarity
- ✓ Lower density (1020 kg/m³) than PC or ABS
- ✓ Ease in processing for Injection, Extrusion, Blow moulding
- ✓ Availability for solvent bonding
- ✓ Can be a modifier to GPPS, HIPS and SMMA
- ✓ Good retention after gamma, E-Beam, NO₂, EtO sterilization
- ✓ Low risk to yellowish after gamma and E-beam sterilization.
- ✓ USP Class VI

Comparison between ASAFLEX™ and the other Transparent Resins

	ASAFLEX™ (SBC)	GPPS	SAN	ABS	PET-G	PC	PMMA	PP	
Transparency	○	○	○	○	○	○	◎	△	
Impact strength	23°C	○	×	△	◎	○	◎	△	○
	-20°C	◎	×	×	◎	○	◎	×	△
Stiffness property	○	◎	◎	○	○	○	◎	○	
Hinge property	○	×	×	△	△	×	×	◎	
Heat resistance	×	△	△	△	△	◎	○	×	
Weather resistance	×	○	○	△	○	○	◎	△	
γ-ray resistance	◎	◎	○	○	△	△	△	×	
Specific gravity	◎ 1.02	○ 1.05	△ 1.08	△ 1.09	× 1.3	× 1.2	× 1.2	◎ 0.9	
Refractive index	1.57-58	1.59	1.56-1.58	1.54	1.57	1.59	1.49	1.48	

Feature of ASAFLEX™ compared to the other resin

- ASAFLEX™ is not an engineering plastic, but has a good processability and balanced properties mentioned above.
 - Good impact strength at low temperature (against PET-G, PP)
 - Specific gravity is about 1.02, contributing to weight saving
 - After irradiating γ-ray, ASAFLEX™ is stable comparatively
- So it is suitable for health-care applications.

CAUTION

- ▲The product must not be used in any medical device or other medical application which may involve:
 - Implantation in the human body.
 - Continuous contact for 30 days or longer with the human body or with human blood or body fluids.
- Regarding use of the product in any medical devices or medical applications other than the above, please contact us.

Representative Application

✓ Drip chamber



Asaflex grade	Hard type : Compound grade
	Soft type : Compound grade
Processing	Injection
Risk class	II
Features	Softness, Clarity, Availability for solvent bonding

✓ Drainage bottle



Asaflex grade	A840
Processing	Blow, Injection
Risk class	II
Features	Softness, Clarity, Good printing

✓ Stopcock



Asaflex grade	A805
Processing	Injection
Risk class	I
Features	Toughness, Clarity, Availability for solvent bonding

✓ Mouthpiece



Asaflex grade	A805
Processing	Injection
Risk class	II
Features	Softness, Clarity

Representative application

✓ Suction device



Asaflex grade	A805, A825
Processing	Injection
Risk class	II
Features	Softness, Clarity

✓ Centrifuge tube



Asaflex grade	A805,
Processing	Injection
Risk class	-
Features	Softness, Clarity

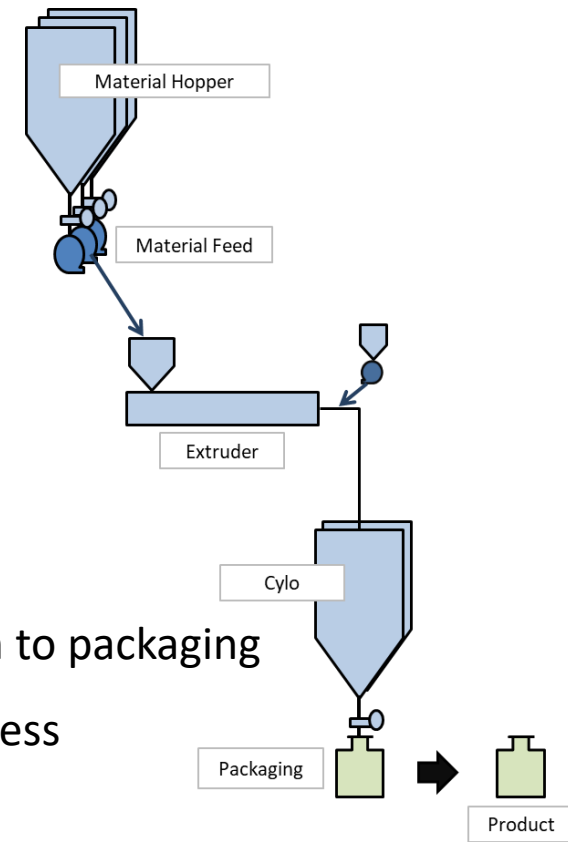
✓ Connector



Asaflex grade	A805,
Processing	Injection
Risk class	-
Features	Softness, Clarity, Availability for solvent bonding

Compound facility

- ✓ ASAFLEX™ plant has own compound facility
- ✓ Developing compound grade which achieves ideal properties for wide range in application.
- ✓ For Drip chamber application, we developed material Which has softness(shore A90) similar to PVC
- ✓ Compound facility makes us to able to complete from production to packaging thoroughly, with prioritized quality control and cost competitiveness



ASAFLEX™ Compound grade for Drip-chamber



- ✓ ASAFLEX™ compound grade has been developed specifically for drip chamber.
- ✓ Compound grade achieves ideal hardness which customer needs with excellent clarity.
- ✓ Available for solvent bonding with IV sets
- ✓ Good retention after gamma, E-Beam, NO₂, EtO sterilization

✓ Reference properties

	Test Method	Unit	Formulation A Soft	Formulation B Hard
Rheological properties				
Melt Flow Rate	ISO 1133 200°C · 5kg	g/10min.	14	12
Physical properties				
Tensile Strength	ISO527-1 50mm/min.	MPa	11	15
Elongation at break		%	350	294
Flexural strength	ISO178	MPa	13	18
Flexural modulus		MPa	730	975
Durometer Hardness	ISO868	A Scale	92	-
		D Scale	50	56
Thermal properties				
DTUL	ISO75-1	°C	52	54
Vicat softning temp.	ISO306	°C	58	66
Optical properties				
Total light transmittance	ISO 13468	%	94	89
Haze	ISO 14782	%	3.1	3.0

Asaflex Grade and Properties

Properties	Test Method	Unit	Asaflex					Tufprene
			805	810	825	830	840	125
Density	ISO1183	Kg/m ³	1.02x10 ³	1.01x10 ³	1.02x10 ³	1.01x10 ³	1.02x10 ³	0.95x10 ³
Water Absorption	ISO62	%	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
MFR 200°C, 5KG	ISO1133	g./10min	10	5	6	6	7	20
Mold shrinkage	—	%	0.3~0.7	0.2~0.8	0.4~0.8	0.3~1.0	0.2~1.0	0.3~1.0
Elongation *1)	ISO527-1	MPa	33	20	27	18	27	7
Flexural strength *1)		%	30	250	200	250	40	>490
Flexural strength	ISO178	MPa	50	24	37	21	34	7
Flexural modulus		MPa	1550	1400	1100	1100	1500	350
Rockwell hardness	ISO2039-2	Rスケール	68	20	55	10	20	14
Durometer hardness	ISO868	Dスケール	75	62	71	55	68	30
Charpy impact Strength *2)	ISO179	Unnotched	KJ/m ²	16	NB	NB	NB	NB
		V-notched	KJ/m ²	1.3	P	P	P	2
DTUL *3)	ISO75-1	°C	63	65	57	60	62	46
VICAT softening temperature *4)	ISO306	°C	91	83	76	72	81	48
Light Transmission *5)	ISO13468	%	90	89	90	89	88	92
(HAZE) *5)	ISO14782	%	0.5	1.2	0.5	2.0	1.2	4
Refractive index	ISO489	-	1.577	1.570	1.577	1.570	1.577	1.550

Note *1 : Test speed:50mm/min. *2:Value at fracture into two or more pieces NB: non-break at 15J P: Partial break at 15J
 *3: Non-annealed , Load:1.8MPa, 120K/h *4VICAT softening temperature : Load 10N, 50K/h *5 : 2mm plate