

## \*\*\*\*\* Hei-Cast 8434 \*\*\*\*\*

## 1. Description

Hei-Cast 8434 and 8434N are 3 component type polyurethane elastomers used for vacuum molding applications which have the following characteristics:

- (1) Through the use of "C component" in the formulation, any hardness in the range of Shore A-10~90 can be obtained/selected.
- (2) Hei-Cast 8434 and 8434N are low in viscosity and show excellent flow property.
- (3) Hei-Cast 8434 and 8434N cure very well and exhibit excellent rebound elasticity.

## 2. Basic Properties

Item	Value		Remarks
Product	8434	8434N	
Appearance	A Comp.	Black	Polyol(Freezes below 15°C)
	B Comp.	Clear, pale yellow	Isocyanate
	C Comp.	Clear, pale yellow	Polyol
Color of article	Black	Milky white	Standard color is black
Viscosity (mPa.s 25°C)	A Comp.	630	Viscometer Type BM
	B Comp.	160	
	C Comp.	890	
Specific gravity (25°C)	A Comp.	1.00	Standard Hydrometer
	B Comp.	1.17	
	C Comp.	0.98	
Pot life	25°C	5 min. and 30 sec.	Resin 100g

Remarks:A component freezes at temperatures below 15°C. Melt by heating and use after shaking it well.

## 3. Basic physical properties

Mixing ratio	A:B:C	100:100:0	100:100:30	100:100:50	100:100:80
Hardness	Type A	90	85	80	75
Tensile strength	MPa	22	14	11	10
Elongation	%	260	240	220	230
100%modulus	MPa	9.2	6.0	5.7	3.8
200%modulus	MPa	16	11	10	7.1
300%modulus	MPa	—	—	—	—
Tear strength	N/mm	71	67	52	37
Rebound Elasticity	%	46	44	53	49
Shrinkage	%	0.8	0.8	0.8	0.8
Density of final product	g/cm <sup>3</sup>	1.14	1.11	1.10	1.09

Mixing ratio	A:B:C	100:100:100	100:100:130	100:100:160	100:100:200
Hardness	Type A	70	65	60	55
Tensile strength	MPa	7.8	6.3	5.3	4.8
Elongation	%	230	240	240	260
100%modulus	MPa	3.7	2.7	2.6	1.9
200%modulus	MPa	6.9	5.3	3.8	3.5
300%modulus	MPa	—	—	—	—
Tear strength	N/mm	33	27	20	19
Rebound Elasticity	%	57	56	61	57
Shrinkage	%	0.8	0.8	0.8	0.8
Density of final product	g/cm <sup>3</sup>	1.08	1.07	1.07	1.06

Mixing ratio	A:B:C	100:100:240	100:100:290	100:100:360	100:100:390
Hardness	Type A	50	45	40	35
Tensile strength	MPa	3.4	2.8	2.5	2.2
Elongation	%	260	260	290	290
100%modulus	MPa	1.4	1.3	1.1	0.8
200%modulus	MPa	2.7	2.6	1.9	1.6
300%modulus	MPa	—	—	—	—
Tear strength	N/mm	18	13	11	9.0
Rebound Elasticity	%	60	57	59	56
Shrinkage	%	0.8	0.8	0.8	0.8
Density of final product	g/cm <sup>3</sup>	1.05	1.04	1.04	1.03

Mixing ratio	A:B:C	100:100:440	100:100:500	100:100:600	100:100:700
Hardness	Type A	30	25	20	10
Tensile strength	MPa	2.0	1.6	1.1	0.9
Elongation	%	320	320	350	380
100%modulus	MPa	0.7	0.7	0.5	0.3
200%modulus	MPa	1.2	0.8	0.8	0.5
300%modulus	MPa	1.9	1.0	0.9	0.7
Tear strength	N/mm	8.6	6.8	4.9	5.2
Rebound Elasticity	%	54	47	44	—
Shrinkage	%	0.8	0.8	0.8	0.8
Density of final product	g/cm <sup>3</sup>	1.03	1.03	1.02	1.02

Remarks: Mechanical properties:JIS K-7312. Shrinkage:Inhouse specification.

Curing condition: Mold temperature:60°C 60°C x 60 min.+ 60°C x 24hrs. + 25°C x 24 hrs.

Physical properties listed above are typical values measured in our laboratory and not the values for specification. When using our product, it must be noted that physical properties of final product may differ depending on the contour of article and the molding condition.

## 4. Change of the hardness

Mixing ratio (A : B : C)	1day later	2days later	3days later	10days later
100:100:0	90	91	91	91
100:100:50	80	80	81	81
100:100:100	69	70	70	71
100:100:160	58	59	60	61
100:100:240	46	48	49	51
100:100:360	34	35	36	39
100:100:440	25	27	29	31
100:100:600	14	16	17	19
100:100:700	7	9	9	10

Curing condition: Mold temperature:60°C 60°C x 60 min.+ 25°C x days

Physical properties listed above are typical values measured in our laboratory and not the values for specification. When using our product, it must be noted that physical properties of final product may differ depending on the contour of article and the molding condition.

## 5. Resistance against heat, hot water and oil «A90・A60・A30»

(1) Heat resistance 【kept in 80°C thermostatic oven with circulating warm air】

A90	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	90	90	91	91
	Tensile strength	MPa	21	26	26	32
	Elongation	%	260	290	260	270
	Tear resistance	N/mm	71	97	102	109
	Surface condition			No change	←	←

A60	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	60	62	62	62
	Tensile strength	MPa	5.1	5.7	6.3	7.2
	Elongation	%	230	240	260	310
	Tear resistance	N/mm	20	26	23	31
	Surface condition			No change	←	←

A30	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	30	32	28	28
	Tensile strength	MPa	1.6	2.3	1.9	2.0
	Elongation	%	270	350	310	330
	Tear resistance	N/mm	8.9	11	11	14
	Surface condition			No change	←	←

Remarks:Curing condition: Mold temperature:60°C 60°C x 60 min.+ 60°C x 24hrs. + 25°C x 24 hrs.

Physical properties are measured after leaving exposed samples at 25°C for 24 hrs.

## (2) Heat resistance [kept in 120°C thermostatic oven with circulating warm air]

A90	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	90	89	89	89
	Tensile strength	MPa	21	28	27	21
	Elongation	%	260	300	350	370
	Tear resistance	N/mm	71	83	87	88
	Surface condition			No change	←	←

A60	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	60	54	50	45
	Tensile strength	MPa	5.1	7.4	6.7	4.7
	Elongation	%	230	370	460	490
	Tear resistance	N/mm	20	28	27	19
	Surface condition			No change	←	←

A30	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	30	23	19	10
	Tensile strength	MPa	1.6	3.3	3.0	1.8
	Elongation	%	270	540	730	690
	Tear resistance	N/mm	8.9	9.8	8.9	8.4
	Surface condition			No change	Tack	←

## (3) Hot water resistance [immersed in 80°C tap water]

A90	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	90	88	86	84
	Tensile strength	MPa	21	21	16	18
	Elongation	%	260	300	300	330
	Tear resistance	N/mm	71	62	60	61
	Surface condition			No change	←	←

A60	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	60	58	54	50
	Tensile strength	MPa	5.1	4.5	6.1	6.1
	Elongation	%	230	270	360	350
	Tear resistance	N/mm	20	21	21	21
	Surface condition			No change	←	←

A30	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	30	28	26	22
	Tensile strength	MPa	1.6	1.3	2.4	2.0
	Elongation	%	270	300	460	420
	Tear resistance	N/mm	8.9	11	10	10
	Surface condition			No change	←	←

## (4) Oil resistance 【Immersed in 80°C engine oil】

A90	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	90	92	92	91
	Tensile strength	MPa	21	21	33	30
	Elongation	%	260	290	390	440
	Tear resistance	N/mm	71	106	115	116
	Surface condition			No change	←	←

A60	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	60	61	58	58
	Tensile strength	MPa	5.1	6.5	7.6	8.2
	Elongation	%	230	200	380	420
	Tear resistance	N/mm	20	28	32	33
	Surface condition			No change	←	←

A30	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	30	32	29	27
	Tensile strength	MPa	1.6	3.4	2.6	4.1
	Elongation	%	270	480	460	670
	Tear resistance	N/mm	8.9	7.5	13	14
	Surface condition			No change	←	←

## (5) Oil resistance 【Immersed in gasoline】

A90	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	90	88	87	87
	Tensile strength	MPa	21	14	13	12
	Elongation	%	260	200	190	170
	Tear resistance	N/mm	71	69	58	64
	Surface condition			Swelling	←	←

A60	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	60	62	60	60
	Tensile strength	MPa	5.1	5.8	4.6	5.0
	Elongation	%	230	280	230	230
	Tear resistance	N/mm	20	23	19	23
	Surface condition			Swelling	←	←

A30	Item	Unit	Blank	100 hrs	200 hrs	500 hrs
	Hardness	Type A	30	33	32	29
	Tensile strength	MPa	1.6	1.8	1.0	1.3
	Elongation	%	270	260	180	180
	Tear resistance	N/mm	8.9	8.6	6.4	6.7

	Surface condition			Swelling	←	←
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## (6) Chemical resistance

Chemicals	Hardness	Loss of gloss	Discoloration	Crack	Warping	Swelling	Degradation	Dissolution
Distilled water	A90	○	○	○	○	○	○	○
	A60	○	○	○	○	○	○	○
	A30	○	○	○	○	○	○	○
10% Sulfuric acid	A90	○	○	○	○	○	○	○
	A60	○	○	○	○	○	○	○
	A30	○	○	○	○	○	○	○
10% Hydrochloric acid	A90	○	○	○	○	○	○	○
	A60	○	○	○	○	○	○	○
	A30	○	○	○	○	○	○	○
10% Sodium hydroxide	A90	○	○	○	○	○	○	○
	A60	△	○	○	○	○	○	○
	A30	△	○	○	○	○	○	○
10% Ammonia water	A90	○	○	○	○	○	○	○
	A60	○	○	○	○	○	○	○
	A30	○	○	○	○	○	○	○
Acetone*1	A90	○	○	○	△	○	○	○
	A60	△	○	○	×	△	○	○
	A30	△	○	○	×	×	○	○
Ethanol	A90	△	○	○	○	△	○	○
	A60	△	○	○	△	×	○	○
	A30	△	○	○	×	×	○	○
Ethyl acetate*1	A90	○	○	○	△	○	○	○
	A60	△	○	○	×	△	○	○
	A30	△	○	○	×	×	○	○
Toluene	A90	△	○	○	△	×	○	○
	A60	△	○	○	×	×	○	○
	A30	△	○	○	×	×	○	○
Methylene chloride*1	A90	○	○	○	△	△	○	○
	A60	△	○	○	×	×	○	○
	A30	△	○	○	×	×	○	○

Remarks: Changes after 24 hrs. immersion in each chemicals were observed. Those marked with \*1

mark were immersed for 15 min. respectively.

○:Good, △:Slightly No good, ×: Bad

## 6. Electrical properties

A90	Measurement	Unit/Condition		Value
	Surface resistivity	$\Omega$		$5.00 \times 10^{12}$
Volume resistivity	$\Omega \cdot \text{cm}$		$1.47 \times 10^{11}$	
Dielectric constant $\epsilon$	25°C	60Hz	7.36	
		1MHz	4.81	
	60°C	60Hz	7.82	
		1MHz	5.59	
Dielectric loss tangent $\tan\delta$	25°C	60Hz	0.0709	
		1MHz	0.115	
	60°C	60Hz	0.849	
		1MHz	0.0859	
Thermal conductivity	$\text{W/m} \cdot \text{k}$		0.227	

A30	Measurement	Unit/Condition		Value
	Surface resistivity	$\Omega$		$4.10 \times 10^{11}$
Volume resistivity	$\Omega \cdot \text{cm}$		$2.89 \times 10^{10}$	
Dielectric constant $\epsilon$	25°C	60Hz	5.94	
		1MHz	5.18	
	60°C	60Hz	5.72	
		1MHz	4.85	
Dielectric loss tangent $\tan\delta$	25°C	60Hz	0.199	
		1MHz	0.0466	
	60°C	60Hz	0.9<	
		1MHz	0.0252	
Thermal conductivity	$\text{W/m} \cdot \text{k}$		0.180	

Remarks: The measurement temperature of surface resistivity, volume resistivity, and thermal conductivity is 25 °C.

## 7. Low-temperature behavior 【-20°C x 12hrs】

A90	Item	Unit	Blank(25°C)	-20°C
	Hardness	Type A		90
Tensile strength	MPa		21	30
Elongation	%		260	250
Tear resistance	N/mm		71	138

A60	Item	Unit	Blank(25°C)	-20°C
	Hardness	Type A		60
Tensile strength	MPa		5.1	7.0
Elongation	%		230	260
Tear resistance	N/mm		20	42

	Item	Unit	Blank(25°C)	-20°C
A30	Hardness	Type A	30	39
	Tensile strength	MPa	1.6	2.4
	Elongation	%	270	340
	Tear resistance	N/mm	8.9	11

#### 8. Poisson's ratio

Hardness	Poisson's ratio
A90	0.48
A50	0.46

#### 9. Vacuum Molding Process

##### (1) Weighing

Decide the amount of "C component" according to the hardness you desire and add it to A component.

Weigh the same amount by weight of B component as A component in a separate cup taking into account the amount which may remain in the cup.

##### (2) Pre-degassing

Perform pre-degassing in degassing chamber for about 5 minutes.

Degass as much as you need.

We recommend to degass after heating material to a liquid temperature of 25~35°C.

##### (3) Temperature of resin

Keep temperature of 25 ~ 35°C for both A (containing C component) and B component.

When the temperature of material is high, the pot life of mixture will become short and when the temperature of material is low, the pot life of mixture will become long.

##### (4) Mold temperature

Keep temperature of silicone mold pre-heated to 60 ~ 70°C.

Too low mold temperatures may cause improper curing to result in lower physical properties. Mold temperatures should be controlled precisely as they will affect the dimensional accuracy of the article.

##### (5) Casting

Containers are set in such a way that B component is added to A component (containing C component).

Apply vacuum to the chamber and de-gass A component for 5 ~ 10 minutes while it is stirred from time to time.

Add B component to A component (containing C component) and stir for 30 ~ 40 seconds and then cast the mixture speedily into the silicone mold.

Release vacuum in 1 and half a minute after commencement of the mixing.

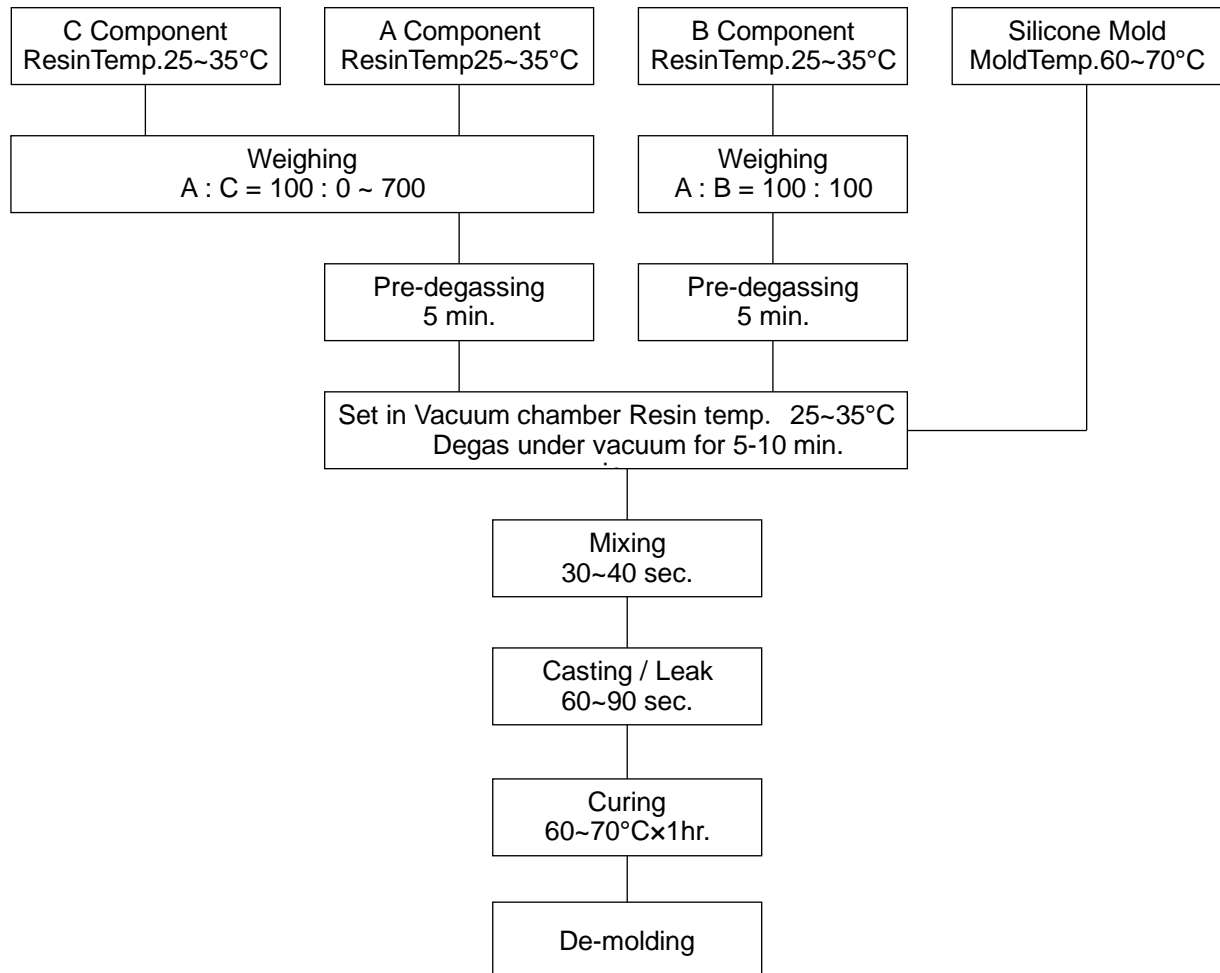
##### (6) Curing condition

Place filled mold in thermostatic oven of 60-70°C for 60 min. and then de-mold.

Perform post curing at 60°C for 2 ~ 3 hours depending on the requirements.



## 10. Flow chart of vacuum casting



## 11. Precautions in handling

- (1) As all A, B and C component are sensitive to water, never allow water get into the material. Also refrain from material coming long contact with moisture. Close container tight after each use.
- (2) Penetration of water into A or C component may lead to generation of much air bubbles in the cured product and if this should happen, we recommend to heat A or C component to 80°C and degass under vacuum for about 10 minutes.
- (3) A component will freeze at temperatures below 15°C. Heat to 40~50°C and use after shaking it well.
- (4) B component will react with moisture to become turbid or to cure into a solid material. Do not use the material when it has lost the transparency or it has shown any hardening as these materials will lead to much lower physical properties.
- (5) B component in part or in whole may freeze when it is stored for longer period of time at temperatures below 5°C. Frozen material can be used after melting. Warm up container to 60 ~70°C for 1~2 hours and use the material after stirring it well.

- (6) B component is prone to deteriorate by the prolonged heating at temperatures over 50°C and the cans can be inflated by the increased inner pressure.
- (7) When B component is stored in a frozen state, it deteriorates more quickly on age than a liquid material. We recommend to melt it completely and store at 20~25°C.

#### 12. Precautions in Safety and Hygiene

- (1) B component contains more than 1% of 4,4'-Diphenylmethane diisocyanate. Install local exhaust within the work shop to secure good ventilation of the air.
- (2) Take care that hands or skin are not coming in direct contact with raw materials. In case of contact, wash with soap and water immediately. It may irritate hands or skin if they are left in contact with raw materials for longer period of time.
- (3) If raw materials get into eyes, rinse with flowing water for 15 minutes and call a doctor.
- (4) Install duct for vacuum pump to ensure that air is exhausted to the outside of the work shop.

#### 13. Dangerous Materials Classification according to the Fire Services Act

- A Component: Dangerous Class III, No.3 Petroleum Group, Dangerous Materials No.4 Group.  
B Component: Dangerous Class III, No.4 Petroleum Group, Dangerous Materials No.4 Group.  
C Component: Dangerous Class III, No.4 Petroleum Group, Dangerous Materials No.4 Group.

#### 14. Delivery Form

- A Component: 1 kg Royal can.  
B Component: 1 kg Royal can.  
C Component: 1 kg Royal can.

In using our products based on the technical information contained herein, you are requested to thoroughly test our products as to their suitability for your intended application and determine their validity with your own responsibility. As the applications and processing conditions of our products to be applied by users are beyond our control, we can not bear any responsibility for this technical information in terms of accuracy, the results obtained from their use and the possible infringement of patent rights of any third parties.