Product Data

Silicone for Paint
TSR116/TSR117/TSR144/TSR145/YR3187

TSR116, TSR117, TSR144, TSR145 and YR3187 are pure silicone varnishes, and are used as the paint vehicle for purposes of thermoresistance, water resistance and weather resistance. The sequence of their paint film hardness is as follow;

Hard ---- YR3187>TSR144>TSR145>TSR117>TSR116-----Soft

KEY FEATURES

- TSR116; The most flexible and thermoresistant resin.
- TSR117; Paint film is hard and thermoresistant.
- TSR144; Can be dried at room temperature, but its paint film is slightly fragile and dissolved by solvent like xylene and toluene. A strong paint film can be obtained with heating at more than 200°C. Excellent thermoresistance.
- TSR145; Little change in color and gloss at high-temperature. Paint film is somewhat hard.
- YR3187; Paint film is hard, thermoresistant and slightly fragile. Smoke generation at high temperature is low.

TYPICAL PROPERTY DATA

PROPERTIES			TSR116	TSR117	TSR144	TSR145	YR3187
Appearance			Yellowish, transparent				
Specific gravity (25°C)			1.01	1.01	1.02	1.07	1.02
Viscosity (25°C)		Pa·s {P}	0.1 {1.0}	0.15 {1.5}	0.1 {1.0}	0.04 {0.4}	0.02 {0.2}
Solid content		%	50	50	50	60	50
Acid value			2.6	2.5	1.0	-	3.0
Curing time	200°C	h	within 1.5	-	within 1[*1]	-	-
	150°C	h	-	within 3	within 3[*2]	within 1	within 1
Bending (3mm)			250°C, 300h	250°C, 72h	-	-	-
Heating loss (250°C, 72h)		%	4.4	4.8	-	-	-
Diluent			xylene, toluene	xylene, toluene	xylene, toluene	xylene, toluene	xylene, toluene

Notes *1; 100°C *2; 25°C

THE PROPERTIES OF CLEAR FILM

PROPERTIES		TSR116		TSR117		TSR144		TSR145	YR3187	
Drying condition (1h)	°C	200	250	150	250	100	25 (24h)	150	150	200
Hardness (sword rocker)		38	42	34	50	57	36	55	55	57
Ericksen	mm	9	9	2	8	2	-	4	4	4
Drawing test		20/20	20/20	20/20	20/20	20/20	20/20	20/20	-	20/20
Cross cut		100/100	100/100	100/100	100/100	100/100	100/100	100/100	-	100/100
Impact test (300g 1/2", 40cm)		○	○	×	○	×	○	×	×	×
Bending (3mmϕ)		○	○	○	○	○	○	○	×	×

Note : Thickness of the paint films 30-40μm

HEAT RESISTANCE OF TSR145 PAINT FILM

Black enamel (semi-smoked), composed as described below, was made, and a heat resistance test was performed.

Test Conditions 16h	TSR145				Usual product (TSR117)			
	Gloss (60°)		Color differences		Gloss (60-60°)		Color differences	
	Initial	After test	Gloss retaining rate %	ΔE	Initial	After test	Gloss retaining rate %	ΔE
250°C	37.7	23.2	61.5	0.7	31.8	7.0	22.0	5.6
400°C	37.1	9.1	24.5	2.7	34.5	2.7	7.8	7.0

Note: Test panel A non-treated steel sheet (SPC-1 50□150×1.0 t)

Under paint 20μm (silicone aluminum paint) 150°C×1h baking

Over paint 25μm 150°C×1h baking

Composition of the paint

1. Silicone resin (solid component of resin) 140 parts
2. Mica powder *1 170 parts
3. Ceramic black *2 270 parts
4. Al-stearic acid 0.3 parts
5. Xylene 50 parts

*1: TAKARAMAIKA #103(Takara Kogyo Company)

*2: #2930 (Ferro Enamels (Japan) Limited)

METHOD OF CATALYST USE

♦ ROOM TEMPERATURE CURING

TSR116, TSR117 and TSR144 can be cured at room temperature with the use of curing catalyst CR15, The drying ability of the paint film and the pot life of a varnish with the addition of CR15 is shown in the following table.

Varnish (NV50%)	CR15	Diluent (xylene)	Curing time (25°C) h	Pot life (25°C) h
100 part	2 part	-	7	1-2
100 part	2 part	70 part	7	8-16

♦ DRYING AT LOW TEMPERATURE (100-150°C)

TSR116, TSR117 and TSR144 can be completely cured at 100~150°C, do not show thermo-adhesivness with the addition of CR12 or CR13.

20g of CR12 and 100g of n-butanol, or 10g of CR13 and 100g of n-butanol are added to 1kg of the varnish. The pot life of the varnish is about 2 months at room temperature after addition of CR12 or CR13.

The curing ability of TSR117 with the addition of CR12 or CR13*1

Drying temperature	°C	70	90	110	130	150
Drying time	min	150	40	15	5	<5
Drying time to give non-adhesiveness (200°C)*2	h	-	-	3	1	0.5

Note-1: TSR116 takes a little more time than TSR117

Note-2: A sheet of asbestos paper (0.3mm in thickness, 25.4□100mm) was placed on the dried film, loaded with 125g of weight using a piece of iron (25□25□25mm), left for 15mimutes at 200°C, and then the time that cured film did not adhere to the asbestos paper was measured and show in the table.

♦ OTHERS

As other effective catalysts, metal soap of Fe, Co, Mn, and Zn give the proper characteristics to the paint membrane at 150~200°C.

The sequence of catalytic activity is as below.

Strong Fe > Mn > Zn Week

Added amount of the metal to the resin is as below.

Fe	0.01~0.05%	Mn	0.1~0.5%
Co	0.1~0.5%	Zn	0.5%

In case of the aluminum paint, the use of 0.05~0.1% of Co or 0.01% of Fe is desirable; Zn cannot be used.

HANDLING AND SAFETY

- Wear eye protection, protective gloves and respiratory protection.
- Since it is flammable, strictly prohibit the use of any device that may cause fire.
- As an electrostatic prevention, have equipments and devices grounded.

PRECAUTIONS FOR STORAGE

- Avoid direct sunlight and store the product, after it has been tightly sealed, at a dark indoor area which has little moisture.
- Keep out of the reach of children.

PACKAGING

TSR116, TSR117, TSR144, TSR145	1kg can available in case of 10 18 kg can available by the can 200 kg drum available by the drum
YR3187	1kg can available in case of 10 18 kg can available by the can

TSR116, TSR117, TSR144, TSR145, YR3187 E Issued Feb. 2001

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