

CoatOSil* T-Cure Silane Oligomer



MARKETING BULLETIN

SILANES - COATINGS ADDITIVES

CoatOSil T-Cure silane oligomer may be useful in the development of coating formulations where reactivity with a mercapto silane is desired. This patented oligomer is low in odor compared to standard mercapto silanes and can display a trio of reactive chemistries. In addition to thiol groups, silanol and diols are generated upon the hydrolysis of the silane.

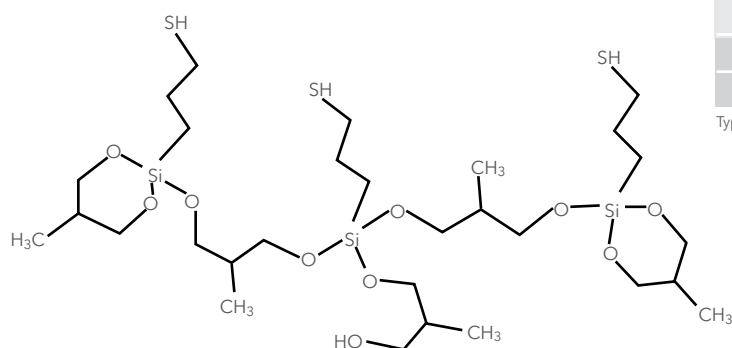
Key Features and Typical Benefits

- Less than 1%wt releasable ethanol
- Low odor
- Low viscosity
- Behaves as reactive diluent within a coating formulation
- Can be used in virtually all coating chemistries where mercapto groups can react, e.g.;
 - Isocyanates
 - Epoxies
 - Acrylates

Potential Applications

- Coatings for industrial maintenance applications including storage tanks, bridges and exterior steel structures
- Coatings requiring curing at elevated temperatures (heat cured formulations), such as coatings for automotive, appliance or coil applications
- Epoxy primers for metals and flooring
- Room temperature cure coatings for applications such as aerospace and automotive re-finishing

Chemical Structure



Typical Physical Properties

Property	Value
Density (gm/cm ³) at 25 °C	1.105
Viscosity at 25 °C (cPs)	~400
Refractive Index at 25 °C	~1.4745
Surface Tension at 25 °C (dyne/cm)	~34.65

Typical properties are average data and are not to be used as or to develop specifications.

General Considerations for Use

Typical dosage levels in coating formulations where mercaptos can react are between 1%wt to 10%wt in existing formulations on a total resin solids basis. Higher levels of CoatOSil T-Cure silane oligomer may also be incorporated into formulations as necessary.

Example 1: Use in Isocyanate and Acrylate Based Formulations

When formulated into an isocyanate based coating formulation, CoatOSil T-Cure silane can improve a number of physical properties. To explore these effects, CoatOSil T-Cure silane was tested at addition levels of 3% and 10% by weight in Part A of the Clearcoat formulation (Ex#1 and Ex#2). In order to clarify the role of the silane portion of the molecule, the representative amount of glycol that would be contributed by the 3% and 10% additions of silane was tested in stoichiometrically adjusted formulations (Ex#3 and Ex#4 respectively) similar to the control.

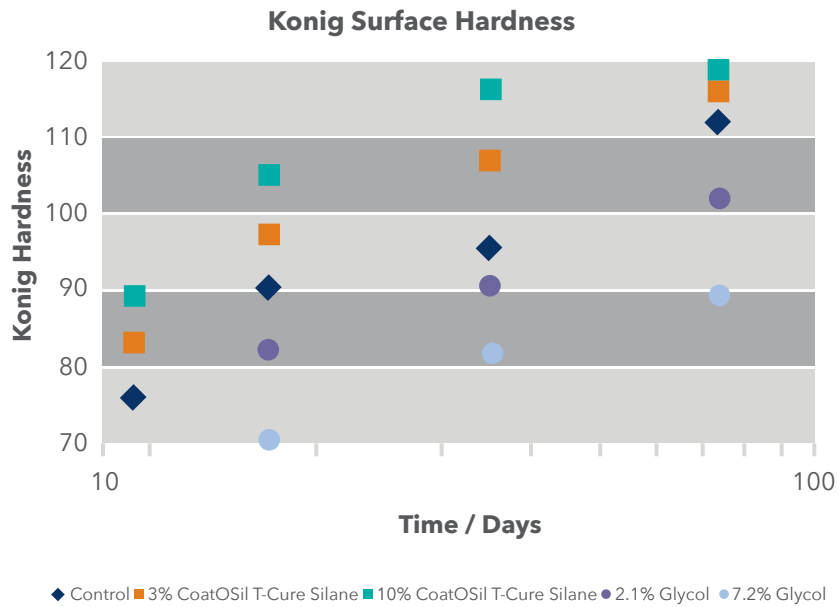
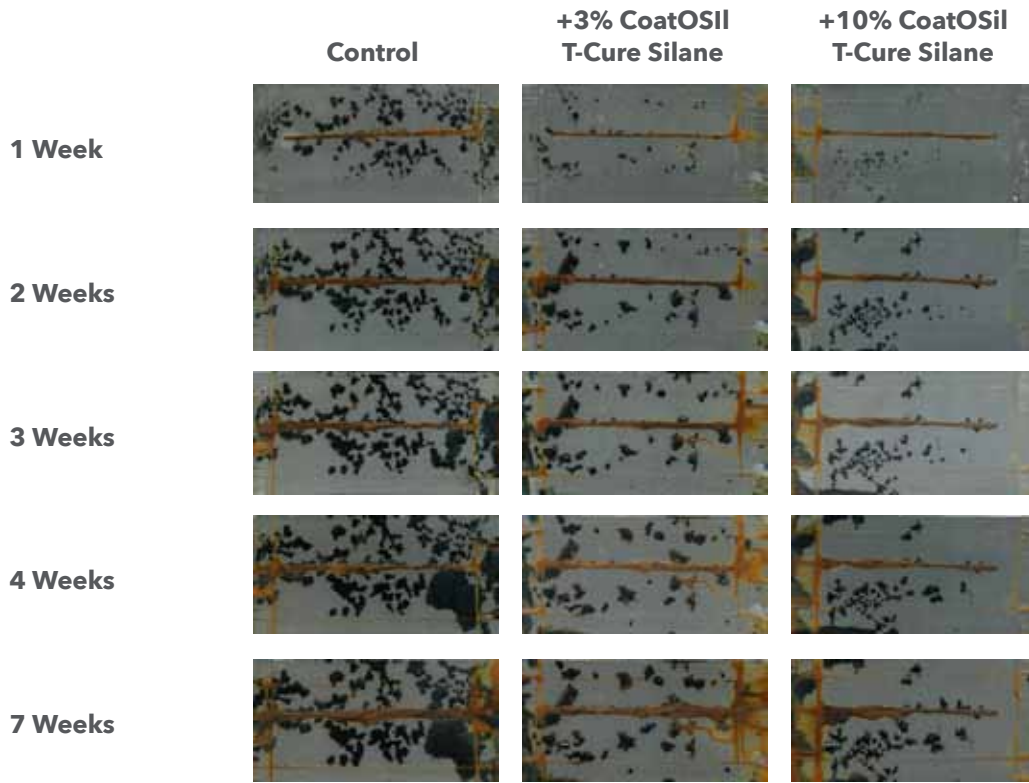
In polyurethane systems CoatOSil T-Cure has an approximate equivalent weight of 60 grams/eq.

Sample Clearcoat Formulations

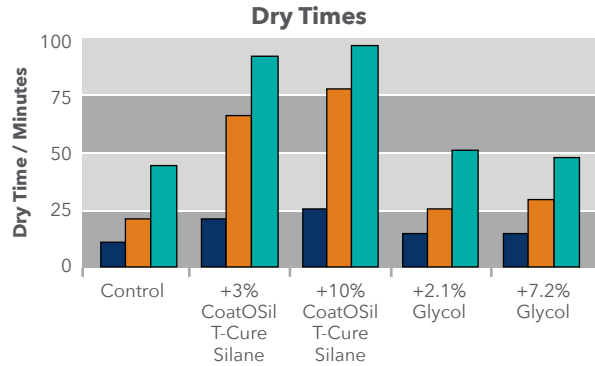
%wt CoatOSil T-Cure Silane Oligomer on Part A	0.0%	3%	10%	0.0%	0.0%
%wt Glycol ⁽¹⁾	0.0%	0.0%	0.0%	2.1%	7.2%
Part A	Control	Ex#1	Ex#2	Ex#3	Ex#4
Material	T.S.	T.S.	T.S.	T.S.	T.S.
Acrylamac 232-1375 [†] Resin	15.77	14.75	12.63	14.87	12.99
CoatOSil T-Cure Silane Oligomer	0.00	0.33	1.02	0.00	0.00
Glycol	0.00	0.00	0.00	0.24	0.73
Gel Paste Intermediate	1.62	1.57	1.45	1.56	1.44
<i>Acrylamac 232-1375[†] Resin</i>	0.49	0.47	0.44	0.47	0.43
<i>Fumed Silica</i>	0.07	0.07	0.06	0.07	0.06
<i>N-Butyl Acetate</i>	1.06	1.03	0.95	1.03	0.95
UVA	0.40	0.39	0.36	0.39	0.36
HAL	0.11	0.11	0.10	0.11	0.10
CoatOSil 2816 Additive	0.03	0.03	0.02	0.03	0.02
Catalyst Intermediate	0.57	0.55	0.51	0.55	0.51
<i>DBTDL</i>	0.03	0.03	0.03	0.03	0.03
<i>N-Butyl Acetate</i>	0.54	0.52	0.48	0.52	0.48
N-Butyl Acetate	4.55	4.39	4.07	4.39	4.05
Methyl Ethyl Ketone	2.84	2.75	2.54	2.74	2.53
	25.90	24.86	22.70	24.87	22.74
Part B	Control	Ex#1	Ex#2	Ex#3	Ex#4
Isocyanate Solution	9.12	10.16	12.32	10.14	12.27
<i>HDI Trimer</i>	6.38	7.11	8.62	7.10	8.59
<i>N-Butyl Acetate</i>	2.74	3.05	3.70	3.04	3.68
Total	35.02	35.02	35.01	35.02	35.01

Product formulations are included as illustrative examples only. Momentive makes no representation or warranty of any kind with regard to any such formulations, including, without limitation, concerning the efficacy or safety of any product manufactured using such formulations.

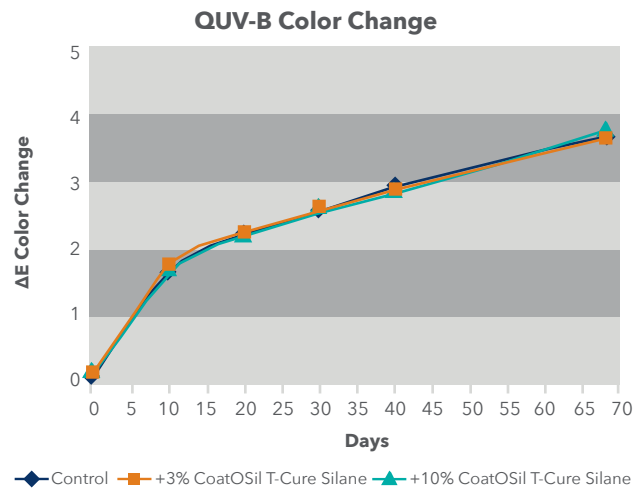
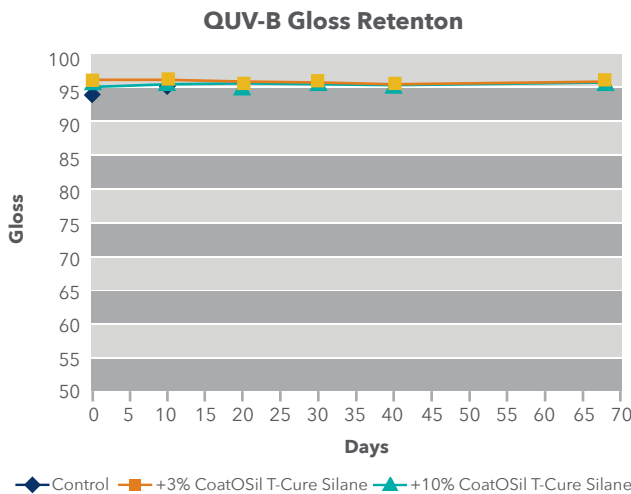
Neutral Salt Spray Results



Note: Test data. Actual results may vary.



	Control	+3% CoatOSil T-Cure Silane	+10% CoatOSil T-Cure Silane	+2.3% Glycol	+7.2% Glycol
■ Set-to-Touch	11	22	26	15	15
■ Tack-Free	22	67	78	26	30
■ Dry-Hard	45	94	97	52	49



Exhibited Benefits of CoatOSil T-Cure Silane Oligomer in NCO Coating Formulations:

- Higher initial surface hardness of coatings
- QUV-B gloss and color change was equal to the control. QUV-A results were similar when tested.
- NSST corrosion resistance appears to have been better than the control
- Greater open time during cure, which may potentially lead to a longer pot-life after mixing
- An excellent candidate to consider for both castable and RIM urethane and urea applications

Note: Test data. Actual results may vary.

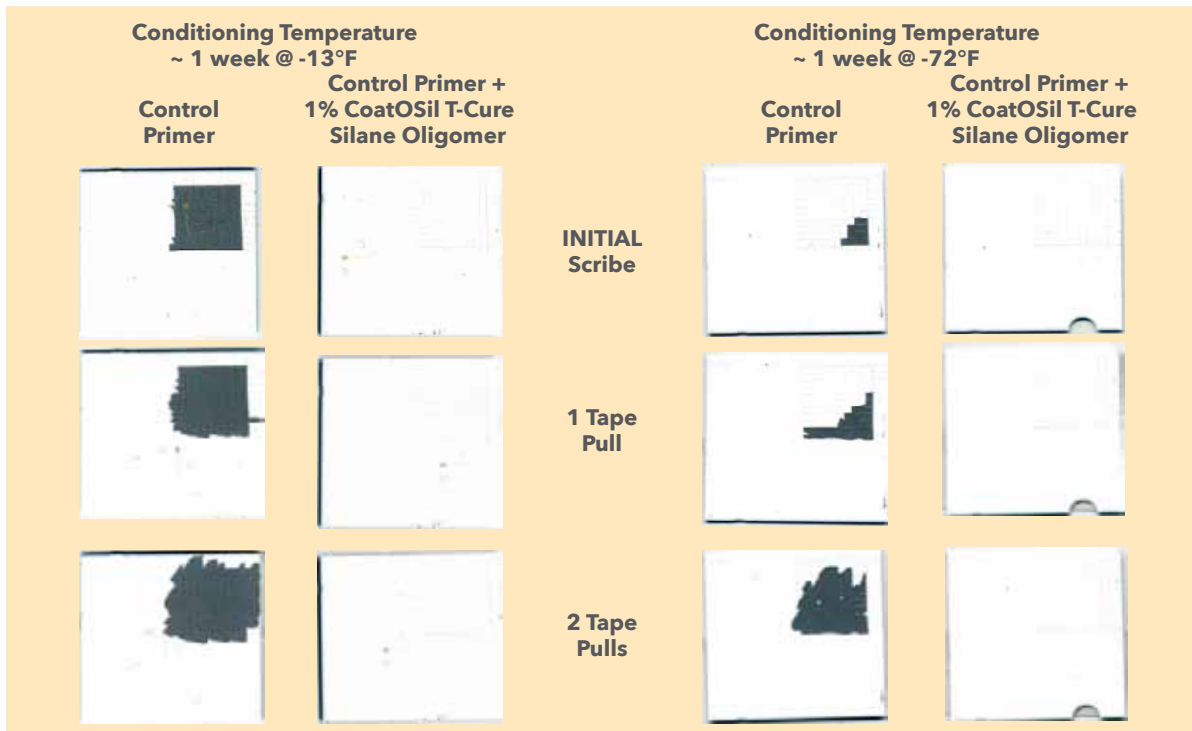
Example 2: Use in Epoxy Based Formulations

CoatOSil T-Cure silane oligomer was tested in epoxy based coating formulations to determine its performance in primers. In epoxy curing applications, CoatOSil T-Cure silane has an approximate equivalent weight of 400 ± 50 gramseq.

Control		Control + 1%wt CoatOSil T-Cure Silane		White Topcoat	
Material	T.S.	Material	T.S.	PART A	CONTROL
EPOXY GRIND PASTE	154.38	EPOXY GRIND PASTE	153.47	Material	T.S.
Epon 828 [†] Epoxy	27.59	Epon 828 [†] Epoxy	27.42	Acrylamac 232-1375 ^{††} Resin	17.77
Epon 1001F [†] Epoxy	14.39	Epon 1001F [†] Epoxy	14.31	WHITE GRIND PASTE	26.34
TiO ₂ Pigment	29.99	TiO ₂ Pigment	29.81	Acrylamac 232-1375 [†] Resin	5.27
Barium Sulfate	7.50	Barium Sulfate	7.45	Fumed Silica	0.12
Carbon Black	1.50	Carbon Black	1.49	Titanium Dioxide	16.01
N-Butyl Acetate	35.64	N-Butyl Acetate	35.43	N-Butyl Acetate	4.95
Talc Powder	7.50	Talc Powder	7.45	UVA	0.57
Bentone	0.30	Bentone	0.30	HAL	0.16
Epon 828 [†] Epoxy	29.99	Epon 828 [†] Epoxy	29.81	CoatOSil 2816 Additive	0.02
AMINE BLEND	30.17	AMINE BLEND	30.57	CATALYST INTERMEDIATE	0.81
EpiKure 3115E-73 [†] Amine	7.68	EpiKure 3115E-73 [†] Amine	7.60	DBTDL	0.04
EpiKure 3200 [†] Amine	2.86	EpiKure 3200 [†] Amine	2.83	N-Butyl Acetate	0.77
EpiKure 3251 [†] Amine	19.62	CoatOSil T-Cure Silane Oligomer	0.72	N-Butyl Acetate	1.41
TOTAL	184.55	EpiKure 3251 [†] Amine	19.42		47.08
		TOTAL	184.49	NCO/OH = 1.05	
				PART B	
				ISOCYANATE SOLUTION	12.92
				HDI Trimer	9.04
				N-Butyl Acetate	3.88
					60.00

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Primers Coated with White Topcoat



3M 898 Mesh Tape Used

Exhibited Benefits of CoatOSil T-Cure Silane Oligomer in Epoxy Coating Formulations:

- Improved adhesion to metal substrates at low loading concentrations
- No adverse effect on epoxy cure time

Additional Considerations:

Hydrolysis of CoatOSil T-Cure silane oligomer may occur with water and alcohols resulting in a stronger mercapto smell.

CoatOSil T-Cure silane oligomer is not recommended for use with amines or epoxies containing alcohols.

Note: Test data. Actual results may vary.

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