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## Technical Information

### THIOCURE® ETTMP

#### Description

THIOCURE® ETTMP 700 and ETTMP 1300 are polymeric, trifunctional thiols with low viscosity. They react with epoxy- and isocyanate groups as well as with unsaturated compounds.

The number at the end of the product name indicates the approximate molecular weight of the polythiol.

#### Chemical Description

Ethoxylated Trimethylolpropane tri(3-mercaptopropionate)

#### Applications

THIOCURE® ETTMP 700 and ETTMP 1300 are used to improve the flexibility of solvent based paints, but particularly for solvent free coatings, castings and adhesives.

THIOCURE® ETTMP is used for example with epoxy resins in casting compounds, floorings and resin-based mortars for the construction industry, as well as in casting compounds, adhesives and sealants for the electronic industry. In combination with highly reactive polythiols such as THIOCURE® PETMP or TMPMP epoxy hardeners can be formulated, which are particularly suitable for curing at low temperatures.

Catalysts such as tertiary amines are of essential importance in this process, but mixtures with THIOCURE® ETTMP are prone to degradation reducing the shelf-life time significantly.

Combined with other polythiols or polyols THIOCURE® ETTMP can be used for polyurethane- as well as thiourethane-systems. Already 5-10 % of total formulation affects significantly the flexibility of the system.

In thermal or radiation cured thiol-ene systems THIOCURE® ETTMP can be used preferably in combination with tougher and more reactive types (THIOCURE® PETMP or TMPMP) together with acrylates, vinyl-, allylethers etc.. Thiol-ene systems which react via radical initiation and step-growth polymerization do not show oxygen inhibition and provide lower shrinkage compared to standard UV cured systems reacting via chain-growth polymerization.

As a modifier in standard radiation curing systems THIOCURE® ETTMP can improve film flexibility. Even a proportional use (5-10 % of total formulation) can generate such an effect on the surface properties.

#### General Information, Distinctive Feature

THIOCURE® ETTMP 700 is characterized by a lower molecular weight. It is less flexible and higher in reactivity than ETTMP 1300.

Comparison of polymer thiols:

Functionality	THIOCURE® PCL4MP 1350 > ETTMP 700 = ETTMP 1300 > PPGMP 2200
Molecular weight	THIOCURE® PPGMP 2200 > PCL4MP 1350 ≈ ETTMP 1300 > ETTMP 700
Reactivity	THIOCURE® PCL4MP 1350 ≈ ETTMP 700 > ETTMP 1300 > PPGMP 2200
Flexibility/Softness	THIOCURE® PPGMP 2200 > ETTMP 1300 > PCL4MP 1350 ≈ ETTMP 700

Compared to the mercaptoacetates and mercaptopropionates (THIOCURE® PETMP, TMPMP, TEMPIC, GDMP and PETMA, TMPMA) the reactivity is significantly reduced.

## Solubility / Compatibility

THIOCURE® ETTMP can be diluted with most organic solvents such as esters, glycol ethers and aromatic hydrocarbons. However, the solutions must be tested for their storage stability.  
ETTMP 1300 is pro rata miscible with water, however not sufficiently resistant to hydrolysis.

THIOCURE® ETTMP can be mixed in any proportions with other THIOCURE® types, at the exception of ETTMP 1300 and THIOCURE® PPGMP 2200 which are not compatible.

## Formulation and Processing Information

- ❖ Calculation of hardener content for Epoxy resins:

$$\text{THIOCURE}^{\text{®}} [\text{g}] = \text{Epoxy value} \times \text{SH-equivalent}$$

(Epoxy value = 100/EP-Equivalent weight)

- ❖ Calculation of required Isocyanate-hardener:

$$\text{Isocyanate} [\text{g}] = \frac{\text{amount THIOCURE}^{\text{®}} [\text{g}] \times \text{SH-content} [\%] \times 42}{33 \times \text{NCO-content} [\%]}$$

- ❖ Chemical conversion with double bonds (e.g. acrylate monomers, -oligomers etc.):

$$1 \text{ mol SH per mol double bond}$$

During the formulating and the processing of products containing THIOCURE® ETTMP, care should be taken to avoid heavy metal contamination, especially with iron and nickel, which can lead to discoloration in clear coats and affect the reactivity of the system.

## Specifications

Parameter	Unit	Range		Method	SOP-No.
		ETTMP 700	ETTMP 1300		
Appearance		clear, colorless to yellowish		Visual (5cm optical path)	
Color Number	APHA	max. 100	max. 50	Hazen	PA-QW-013
Mercapto Sulfur (SH)	% w/w	12.2 – 15.0	6.8 – 8.3	Iodometric	PA-QW-303
Acid number	mg KOH/g	max. 5.0	max. 5.0	Alkalimetric	PA-QW-302
Refractive Index $n_{20}^d$		--	1.480 – 1.490	Electr. Refractometer	PA-QW-014

## Other Properties

Parameter	Unit	Range		Method	SOP-No.
		ETTMP 700	ETTMP 1300		
H-weight equivalent	g/mol	236 - 262	435 - 448	calculated	
Nonvolatile content	% w/w	>99.5	>99.5	DIN EN ISO 3251 (1h 125°C)	
Viscosity	mPas	~200	~400	Rotational Viscometer DIN 53019, 20 °C	
Density $d_{4}^{20}$	g/cm <sup>3</sup>	1.165 – 1.175	1.150 – 1.155	Oscillating Densitometer	PA-QW-005
Refractive Index $n_{20}^d$		1.490 – 1.500	--	Electr. Refractometer	PA-QW-014

## Handling, Storage conditions and Shelf-life

Consult the appropriate Material Safety Data Sheet for safety and handling guidelines for this product.

Storage at room temperature up to +25 °C maximum is recommended.

THIOCURE® ETTMP 700 / 1300 can be stored for at least 12 month from the date of manufacture if kept closed in the original packaging. Expiration of shelf life time does not necessarily mean the product is no longer usable. However, prior to using THIOCURE® ETTMP we recommend to testing it and verifying that it still meets the specification.

THIOCURE® ETTMP 700 / 1300 should be stored in the original container. Alternatively, packaging in glass, HDPE, PP or inside-coated packaging can be used. Opened packaging should be closed tightly after use

## Standard Packing (net)

## ETTMP 700

41074	PE-Can	kg	37.5
41125	PE-Drum	kg	250.0

## ETTMP 1300

40682	PE-Can	kg	37.5
40666 (USA)	PE-Can	kg	36.3
40891	PE-Drum	kg	240.0

## Regulatory Status

	Europe	Australia	China	Japan	Canada	Korea	New Zealand	Philip-pines	USA	Taiwan
	REACH	AICS	IECSC	ENCS	DSL	ECL	NZIoC	PICCS	TSCA	CSNN
<b>THIOCURE® ETTMP 700</b>	Polymer	-	+	-	-	-	-	-	-	-
<b>THIOCURE® ETTMP 1300</b>	Polymer	-	-	-	-	-	-	-	-	+

+ = registered  
 - = not registered  
 n/a = not applicable

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