CVC Thermoset Specialties

An Emerald Performance Materials Company

TECHNICAL BULLETIN

Hypro® Reactive Liquid Polymers
1300X8 CTBN & 1300X8F CTBN
Carboxyl Terminated Butadiene-Acrylonitrile
CAS #68891-46-3

DESCRIPTION

Hypro Reactive Liquid Polymers (RLP) are 100% solids liquid rubbers used to improve the toughness, flexibility, adhesion and impact resistance of thermoset resin systems including epoxies, vinyl esters, unsaturated polyesters, acrylics and urethanes. These materials are a family of butadiene homopolymers and butadiene-acrylonitrile copolymers with functionality at the chain ends. Functional groups are carboxyl (COOH), amine (NH or NH_2), methacrylate or epoxy. The acrylonitrile content varies in these polymers from zero to 26% which directly affects the solubility and glass transition temperature (Tg) of the materials.

Hypro 1300X8 CTBN is a carboxyl terminated butadiene-acrylonitrile copolymer used predominately as a reactant with a base thermoset resin to gain product performance improvements. These resultant pre-reacts or adducts can be incorporated at various levels to suit the needs of your specific formulation. 1300X8F CTBN is very similar to 1300x8 CTBN in its physical characteristics and meets requirements for food contact applications as cited in 21 CFR 175.300 for resinous and polymeric coatings.

TYPICAL USES

- Film and Paste Adhesives (Structural and Semi-Structural Applications)
- Coatings (Solution, Powder, Waterborne)
- Composites
- Polymeric Intermediate for Epoxies and Vinyl Esters
- End uses include Aerospace, Automotive, Electrical/ Electronics, Industrial, Marine and Construction Applications

TYPICAL PROPERTIES

Appearance	Liquid polymer, amber in color (3 - 8 on the Gardner Color Scale)
Actives Level	100%
Brookfield Viscosity, mPa.s or cP @ 27° C	110,000 - 160,000
Bound Acrylonitrile Content, %	15.5 - 19.5
Carboxyl Content (Equivalents Per Hundred)	0.046 - 0.058

BENEFITS/FEATURES

- Enhances Toughness/Flexibility of Thermoset Resins
- Improves Adhesion to Difficult to Bond to Substrates
- Increases Low Temperature Mechanical Properties
- Increases Impact/Crack Resistance
- Improves Durability (Fatigue Resistance)

STORAGE & HANDLING

To ensure optimal product performance, store material in original unopened containers at or below 50°C.

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844 North Lenola Road / Moorestown, NJ 08057 / Phone: 856-533-3000 / Fax: 856-533-3003 / www.cvcthermoset.com

Hypro® 1300X8 CTBN & Hypro® 1300X8F CTBN

Hypro CTB, CTBN and CTBNX Standard Line of Products —Typical Properties							
Hypro Polymers	**2000X162 CTB**	**1300X31 CTBN**	**1300X8 CTBN**	**1300X8F CTBN**	**1300X13* CTBN**	**1300X9 CTBNX**	**1300X18 CTBNX**
Acrylonitrile Content, %	0	10	18	18	26	18	21.5
Carboxyl Content:							
-Acid Number	25	28	29	29	32	38	39
-EPHR**	0.045	0.050	0.052	0.052	0.057	0.067	0.070
Brookfield Visc. mPa.s or cP @ 27ºC (81ºF)	60,000	60,000	135,000	135,000	500,000	160,000	350,000
Solubility Parameter $(cal/cm^3)^{1/2}$***	8.14	8.46	8.82	8.82	9.15	8.87	8.99
Specific Gravity 25º/25º (77ºF)	0.907	0.924	0.948	0.948	0.960	0.955	0.961
Functionality	1.9	1.9	1.8	1.8	1.8	2.4	2.4
Molecular Weight, Mn	4,200	3,800	3,550	3,550	3,150	3,600	3,400
Glass Transition Temp., Tg,ºC****	-77	-66	-52	-52	-39	-52	-46

* An FDA version of this polymer is also available.
** Equivalents per hundred rubber. *** Calculations based on molar attraction constants.
**** Measured via DSC (Differential Scanning Calorimeter).

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The following table shows some of the benefits that can be obtained when using Hypro 1300X8 CTBN in a typical elevated temperature cured epoxy adhesive formulation:

	A	B	C
DGEBA Liquid	100	85	77.5
Hypro 1300X8 Adduct (HyPox 840)*	—	25	37.5
Tabular Alumina	40	40	40
Omicure DDA 10	5	5	5
Omicure U405	2	2	2
Cab-O-Sil TS 720 (Cabot Corporation)	3	3	3
Cured Properties**	A	B	C
Lap Shear, psi (MPa)			
@ R.T.	1300 (8.97)	1410 (9.72)	1340 (9.24)
@ 90°C	1210 (8.34)	1230 (8.48)	1140 (7.86)
T-Peel, Pli (N/mm.)			
@ -40°C	8.1 (1.42)	11.1 (1.95)	17.6 (3.09)
@ R.T.	10.0 (1.75)	25.2 (4.42)	19.7 (3.46)

**Cure Conditions: 1/2 Hour @ 177°C
Substrates: Electro galvanized Steel
Bond Line, mils: 10

* EEW=340; 1300X8 content = 40%

PACKAGING & AVAILABILITY

Hypro 1300X8 CTBN & Hypro 1300X8F CTBN are available in 55 gal. non-returnable steel drums (net weight 425 lbs.) and 5 gal. plastic pails (35 lbs. net). For further information regarding these materials or any other CVC Thermoset Specialties product, please contact your local Sales Representative or our Customer Service Department at 800-296-0040.

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