

**An Emerald Performance Materials Company****Hypro<sup>®</sup> 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<sub>2</sub>), methacrylate or epoxy. The acrylonitrile content varies in these polymers from zero to 26% which directly affects the solubility and glass transition temperature (T<sub>g</sub>) 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.

**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)

**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<br>(3 - 8 on the Gardner Color Scale) |
| Actives Level                                 | 100%   |
| Brookfield Viscosity,<br>mPa.s or cP @ 27° C  | 110,000 - 160,000  |
| Bound Acrylonitrile<br>Content, %             | 15.5 - 19.5  |
| Carboxyl Content<br>(Equivalents Per Hundred) | 0.046 - 0.058  |

**STORAGE & HANDLING**

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

| Hypro CTB, CTBN and CTBNX Standard Line of Products —Typical Properties |                 |                 |                |                 |                  |                 |                  |
|---|-----------------|-----------------|----------------|-----------------|------------------|-----------------|------------------|
| Hypro Polymers  | 2000X162<br>CTB | 1300X31<br>CTBN | 1300X8<br>CTBN | 1300X8F<br>CTBN | 1300X13*<br>CTBN | 1300X9<br>CTBNX | 1300X18<br>CTBNX |
| Acrylonitrile Content, %  | 0               | 10              | 18             | 18              | 26               | 18              | 21.5             |
| <u>Carboxyl Content:</u>  |                 |                 |                |                 |                  |                 |                  |
| -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<br>or cP @ 27°C (81°F)                           | 60,000          | 60,000          | 135,000        | 135,000         | 500,000          | 160,000         | 350,000          |
| Solubility Parameter<br>(cal/cm <sup>3</sup> ) <sup>1/2***</sup>        | 8.14            | 8.46            | 8.82           | 8.82            | 9.15             | 8.87            | 8.99             |
| Specific Gravity<br>25°/25° (77°F)                                      | 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.,<br>Tg,°C****                                    | -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).

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%



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Hypro<sup>®</sup> 1300X8F CTBN**

## **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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