

# Amines for Epoxy and Polyurea Applications



| BASF Product          | Chemical Name                                 | Abbreviation | CAS Number               | Chemical Structure                    | Physical Properties           |                                      |                              |                    |                    |             |                                      |                     |                                     |                                     |                                      |                                      | Applications                       |                                       |            |          |              |          |           |                      |                         |          | Benefits |                      |           |  |
|-----------------------|---|--------------|--------------------------|---------------------------------------|-------------------------------|--------------------------------------|------------------------------|--------------------|--------------------|-------------|--------------------------------------|---------------------|-------------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|---------------------------------------|------------|----------|--------------|----------|-----------|----------------------|-------------------------|----------|----------|----------------------|-----------|--|
|                       |   |              |                          |                                       | Curing Agent                  |                                      |                              |                    |                    | Amine/Resin | Cured Resin                          |                     |                                     |                                     |                                      |                                      |                                    | Applications                          |            |          |              |          |           |                      |                         |          |          |                      |           |  |
|                       |   |              |                          |                                       | Amine Hydrogen Eq AHEW (g/eq) | Viscosity 23°C, (mPa·s) <sup>a</sup> | Density (g/cm <sup>3</sup> ) | Melting Point (°C) | Boiling Point (°C) |             | Gel Time of Blend (min) <sup>b</sup> | T <sub>g</sub> (°C) | Tensile Strength (MPa) <sup>c</sup> | Tensile Elongation (%) <sup>c</sup> | Flexural Strength (MPa) <sup>d</sup> | Flexural Modulus, (MPa) <sup>d</sup> | Impact Strength (J/m) <sup>e</sup> | Lap Shear Strength (MPa) <sup>f</sup> | Composites | Flooring | Construction | Coatings | Adhesives | Structural Adhesives | Casting & Encapsulation | Polyurea |          | Composite Lamination | Laminates | Grout  |
| Aliphatic Amines      |   |              |                          |                                       |                               |                                      |                              |                    |                    |             |                                      |                     |                                     |                                     |                                      |                                      |                                    |                                       |            |          |              |          |           |                      |                         |          |          |                      |           |  |
| Amix 1000             | Mixture of Ethyleneamines                     | -            | 68910-05-4               | <chem>NCCN</chem>                     | -                             | 1,750                                | 1.034                        | -30                | 236-310            | -           | -                                    | -                   | -                                   | -                                   | -                                    | -                                    | -                                  | -                                     | -          | -        | -            | -        | -         | -                    | -                       | -        | -        | -                    | -         | Suitable for primary coating.  |
| Baxxodur® EC 110      | Dipropylene triamine                          | DPTA         | 56-18-8                  | <chem>NCCNCCN</chem>                  | 26                            | 8-9                                  | 0.93                         | -16.0              | 239                | 40-60       | 120-123                              | 43-50               | 2.6-3.2                             | 81-101                              | 2400-3080                            | 37-46                                | 9-14                               | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Fast curing; High hardness and temperature resistance; Low color.  |
| DETA                  | Diethylenetriamine                            | DETA         | 111-40-0                 | <chem>NCCNCCN</chem>                  | 21                            | 5                                    | 0.96                         | -39                | 206                | 64          | 109                                  | 59-74               | 1.9-3.2                             | 117-133                             | 2880-3360                            | 42-47                                | 7-8                                | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Fast curing; Ambient temperature activity.   |
| N4 Amine              | N,N'-Bis-(3-Aminopropyl) ethylenediamine      | -            | 10563-26-5               | <chem>NCCNCCNCCN</chem>               | 29                            | 28                                   | 0.95                         | -1.5               | >169               | 38          | 60                                   | 74-76               | 3.4-3.5                             | 71-126                              | 3100-3460                            | 51-57                                | 9-11                               | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Cross-linking agent.   |
| Cycloaliphatic Amines |   |              |                          |                                       |                               |                                      |                              |                    |                    |             |                                      |                     |                                     |                                     |                                      |                                      |                                    |                                       |            |          |              |          |           |                      |                         |          |          |                      |           |  |
| Baxxodur® EC 210      | Methyl-diaminocyclohexane                     | MCDA         | 13897-55-7<br>13897-56-8 | <chem>C1CCN(C1)N</chem>               | 31                            | 7                                    | 0.94                         | -92                | 210                | 190         | 110                                  | 36-51               | 1.3-1.9                             | 40-42                               | 2200-3200                            | 122-154                              | 9-13                               | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Long pot life; Very low viscosity; Low amine hydrogen equivalent weight; Moderate curing speed.  |
| Baxxodur® EC 201      | Isophorone diamine                            | IPDA         | 2855-13-2                | <chem>C1CC(C)CCN1</chem>              | 43                            | 19-20                                | 0.92                         | 10.0               | 247                | 130-190     | 128-132                              | 70-86               | 3.2-4.1                             | 117-125                             | 2790-2940                            | 44-46                                | 16-18                              | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | High mechanical strength and temperature resistance; Excellent moisture and chemical resistance; Low color and good color stability.         |
| Baxxodur® EC 330      | 4,4'-methylenebis(cyclohexylamine)            | DC           | 1761-71-3                | <chem>C1CCN(C1)CC2CCN(C2)C1</chem>    | 55                            | 19-20                                | 0.93                         | 33.5-44.0          | 326                | 210-260     | 135-136 <sup>g</sup>                 | 42-60               | 2.2-3.6                             | 91-98                               | 2310-2410                            | 38-40                                | 14-18                              | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | High temperature resistance; Good moisture and chemical resistance; Good adhesion on metal substrates; Good color stability; Long pot life.  |
| Baxxodur® EC 331      | 3,3'-Dimethyl-4,4'-diaminodicyclohexylmethane | DMDC         | 6864-37-5                | <chem>C1CCN(C1)CC2(C)CCN(C2)C1</chem> | 61                            | 110                                  | 0.95                         | -7.0-1.0           | 347                | 320-480     | 140-145                              | 52-68               | 2.0-3.7                             | 88-100                              | 2480-2660                            | 45-55                                | 20-22                              | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Excellent chemical, moisture and high temperature resistance; Good adhesion on metal substrates; Good color stability.                       |
| Baxxodur® PC 136      | Modified IPDA                                 | MIPDA        | 93940-97-7               | <chem>C1CCN(C1)C(C)C</chem>           | 136                           | 913                                  | 0.99                         | <-20.0             | >200               | -           | -                                    | -                   | -                                   | -                                   | -                                    | -                                    | -                                  | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Excellent UV and color stability; Faster film development; Easy to formulate; Slower gel time; Good film stability at elevated temperatures. |
| Etheramines           |   |              |                          |                                       |                               |                                      |                              |                    |                    |             |                                      |                     |                                     |                                     |                                      |                                      |                                    |                                       |            |          |              |          |           |                      |                         |          |          |                      |           |  |
| Baxxodur® EC 130      | 4,7,10-Trioxatridecane-1,13-diamine           | TTD          | 4246-51-9                | <chem>NCCCCOCCCCOCCCCN</chem>         | 56                            | 13-14                                | 1.01                         | -32.0              | 146-148            | 80-120      | 68-72                                | 49-51               | 4.7-6.0                             | 72-77                               | 2300-2500                            | 97-102                               | 17-30                              | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Excellent thermal shock resistance, adhesion, and toughness; Good flexibility; Low color.  |
| Baxxodur® EC 280      | 4,9-Dioxadodecane-1,12-diamine                | DODA         | 7300-34-7                | <chem>NCCCCOCCCCOCCCCN</chem>         | 52                            | 10-11                                | 0.96                         | 4.5                | 298                | 100-140     | 76-77                                | 49-52               | 6.8-8.7                             | 70-82                               | 2110-2510                            | 75-79                                | 21-25                              | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Excellent thermal shock resistance; Good adhesion and toughness; Very good flexibility; Low color.   |
| Baxxodur® EC 301      | Polyetheramine D 230                          | D 230        | 9046-10-0                | <chem>NCC(O)CCN</chem>                | 61                            | 10                                   | 0.95                         | -88.0              | >200               | >550        | 67-78                                | 65-67               | 5.8-7.0                             | 95-98                               | 2690-2820                            | 74-81                                | 23-25                              | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Excellent adhesion and toughness; Good flexibility and thermal shock resistance; Low color; Long pot life.                                   |
| Baxxodur® EC 302      | Polyetheramine D 400                          | D 400        | 9046-10-0                | <chem>NCC(O)CCN</chem>                | 111                           | 25                                   | 0.97                         | <-40               | >200               | >600        | 43-46                                | 49-52               | 2.7-3.7                             | 72-75                               | 2900-2910                            | 63-77                                | 20-24                              | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Good adhesion, toughness, and thermal shock resistance; High peel strength; Long pot life.   |
| Baxxodur® EC 303      | Polyetheramine D 2000                         | D 2000       | 9046-10-0                | <chem>NCC(O)CCN</chem>                | 501                           | 273                                  | 1.00                         | -29.0              | >250               | >600        | -                                    | 0.4-0.6             | 13.7-24.4                           | -                                   | -                                    | -                                    | -                                  | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Excellent flexibility; High peel strength; Light color; Very long pot life.  |
| Baxxodur® EC 310      | Polyetheramine T 403                          | T 403        | 39423-51-3               | <chem>NCC(O)CCN</chem>                | 81                            | 102                                  | 0.99                         | <-20.0             | >250               | >500        | 84-86                                | 61-63               | 5.7-6.4                             | 90-93                               | 2640-2760                            | 55-60                                | 23-24                              | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Excellent adhesion; Good flexibility, toughness, and thermal shock resistance; Low color; Long pot life.                                     |
| Baxxodur® EC 311      | Polyetheramine T 5000                         | T 5000       | 64852-22-8               | <chem>NCC(O)CCN</chem>                | 967                           | 870                                  | 1.00                         | -50.0              | >200               | >600        | -                                    | -                   | -                                   | -                                   | -                                    | -                                    | -                                  | ■                                     | ■          | ■        | ■            | ■        | ■         | ■                    | ■                       | ■        | ■        | ■                    | ■         | Excellent flexibility; High peel strength; Low color; Very long pot life.  |

Notes: <sup>a</sup> Falling ball viscometer; <sup>b</sup> 100 g at 23°C ASTM D 2471; <sup>c</sup> At break, crosshead speed 5 mm/min.; <sup>d</sup> At yield, crosshead speed 2.5 mm/min.; <sup>e</sup> Izod, notch; <sup>f</sup> Steel/Steel (overlap is 6 mm)  
Please note that the physical properties data for cured system may not be consistent throughout the above table since not all the curatives were tested under the same condition. Cured for 2 hours at 80°C plus 3 hours at 125°C (Data range for DGEBA resins from different suppliers, EEW ranges from 182-188)

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We have strong global manufacturing footprint in U.S., Germany and China. Commercial products are available for delivery to customers with short lead time.

Our products are featured in many epoxy formulations. They perform as highly efficient curing agents for composites, coatings, sealants, etc. They are also used in polyurea applications for protective coatings in many industries such as automotive, infrastructure, and construction.

### BASF Baxxodur® products offer the following advantages:

- Comprehensive portfolio
- Flexibility in formulation with various amine systems
- Provide a range of characteristics for various needs such as:
  - Reactivity
  - Hardness
  - Weatherability
  - Chemical resistance
  - And many more to meet formulators and end user requirements

### Strong global production network of the Baxxodur® products from BASF



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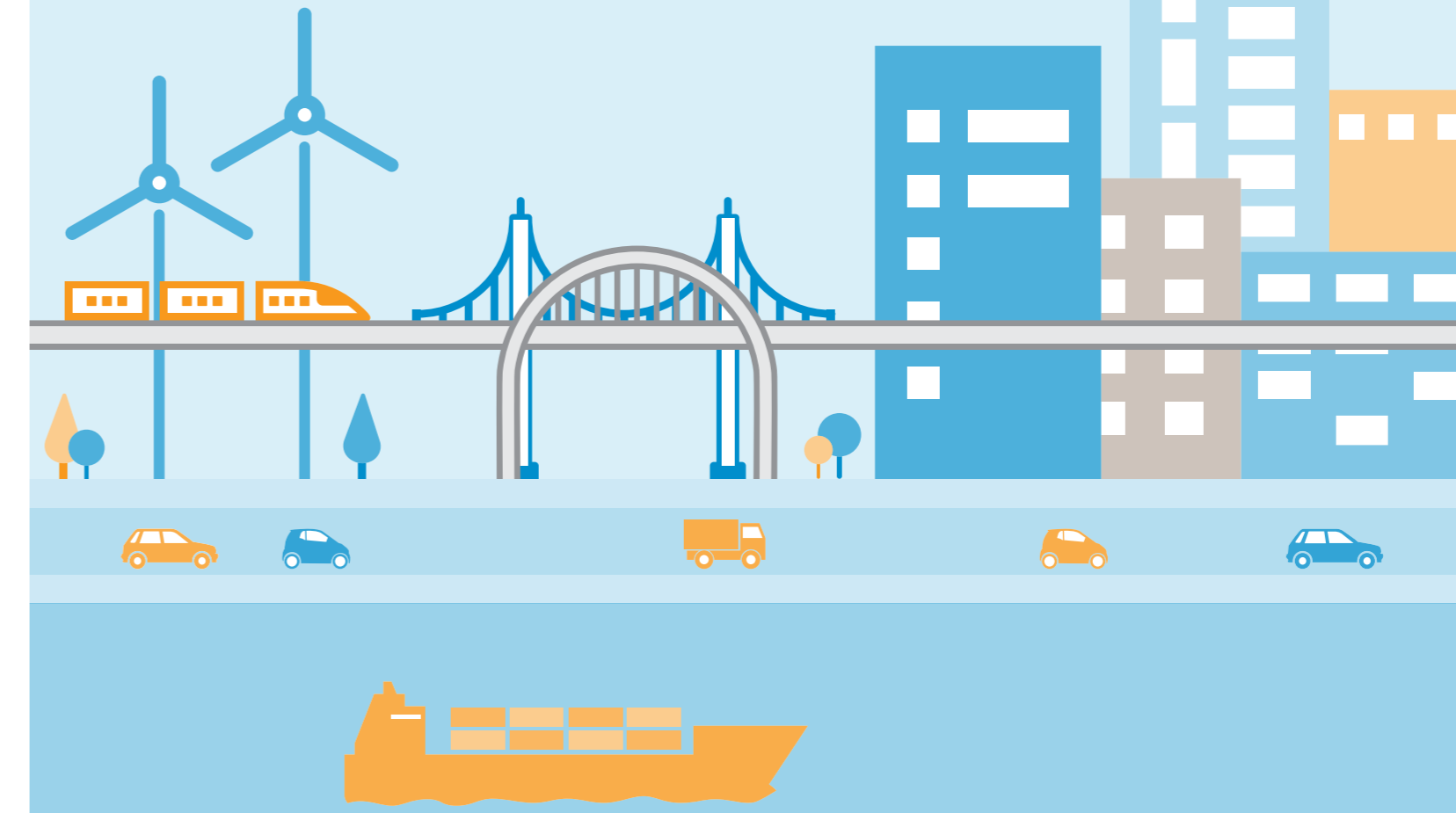
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## Amines for Epoxy and Polyurea Applications



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