About Ascend

Headquartered in Houston, Texas, Ascend Performance Materials is one of the world’s largest fully-integrated producers of nylon 6,6 resin. As the world’s only large-scale converter of acrylonitrile to adiponitrile, Ascend is uniquely positioned for the production of dozens of amines, acids, esters and intermediates used in a variety of end applications. Our integrated manufacturing processes allow us to produce a wide range of specialty chemicals. Ascend’s specialty chemicals are used in hundreds of brand-name adhesives, coatings, cleansers and detergents. Ascend manufactures chemicals at its facilities in Texas, Alabama and Florida.

For more information on our specialty chemicals visit us at www.ascendmaterials.com/specialtychemicals

inspiring everyday
The FlexaTram family of multifunctional amines is tailored to a variety of end use applications. Ascend’s vertically-integrated production and large scale allow a reliable supply of these products around the globe.

FlexaTram-DAM is a unique family of products based on:
- formulated blends of cycloaliphatic amines (DACH)
- formulated blends of hexamethylenediamine (HMD)

### Key attributes
- Multifunctional
- Low viscosity
- Economical compared to other amine alternatives
- High amine value
- Cycloaliphatic amines content for enhanced performance

### Physical Data

<table>
<thead>
<tr>
<th></th>
<th>FlexaTram-DAM 120</th>
<th>FlexaTram-DAM 200</th>
<th>FlexaTram-DAM 700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purity (Amines %)</td>
<td>&gt;90</td>
<td>&gt;90</td>
<td>&gt;90</td>
</tr>
<tr>
<td>Form</td>
<td>Liquid</td>
<td>Liquid</td>
<td>Liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Light yellow</td>
<td>Light yellow</td>
<td>Light yellow</td>
</tr>
<tr>
<td>Amine Value Range, mg KOH/g</td>
<td>700-900</td>
<td>750-850</td>
<td>800-950</td>
</tr>
<tr>
<td>Amine Hydrogen Equivalent Weight (AHEW) (g/l)</td>
<td>27</td>
<td>27</td>
<td>26-28</td>
</tr>
<tr>
<td>Freezing Point, °C</td>
<td>14-15</td>
<td>9-11</td>
<td>&gt;15</td>
</tr>
<tr>
<td>Viscosity, cP (4°C)</td>
<td>6.0-8.0 (25°C)</td>
<td>6.0-8.0 (4°C)</td>
<td>7.0-9.0 (4°C)</td>
</tr>
<tr>
<td>Purity as (DAM%)</td>
<td>91±1</td>
<td>91±1</td>
<td>91±1</td>
</tr>
</tbody>
</table>

### Grades

- **FlexaTram-DAM 120**
  - General purpose
  - High cycloaliphatic amine
  - High hexamethylenediamine content

- **FlexaTram-DAM 200**
  - For drilling, stimulation, production and other applications in oil and gas
  - High performance oil and gas applications, including cementing, surfactant and stabilizer

- **FlexaTram-DAM 700**
  - General purpose
  - High cycloaliphatic amine
  - High hexamethylenediamine content

### Purpose

- **FlexaTram-DAM 120**
  - General purpose
  - High cycloaliphatic amine
  - High hexamethylenediamine content

- **FlexaTram-DAM 200**
  - For drilling, stimulation, production and other applications in oil and gas
  - High performance oil and gas applications, including cementing, surfactant and stabilizer

- **FlexaTram-DAM 700**
  - General purpose
  - High cycloaliphatic amine
  - High hexamethylenediamine content

### Other Applications
- Water Treatment
- Detergents
- Textiles
**FlexaTram™-DAM**

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**Key attributes**
- Multifunctional
- Low viscosity
- Economical compared to other amine alternatives
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- Cycloaliphatic amines content for enhanced performance

<table>
<thead>
<tr>
<th>Physical Data</th>
<th>FlexaTram-DAM-120</th>
<th>FlexaTram-DAM-200</th>
<th>FlexaTram-DAM-700</th>
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</thead>
<tbody>
<tr>
<td>Purity (Amines %)</td>
<td>&gt;90</td>
<td>&gt;90</td>
<td>&gt;90</td>
</tr>
<tr>
<td>Form</td>
<td>Liquid</td>
<td>Liquid</td>
<td>Liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Slightly yellow</td>
<td>Slightly yellow</td>
<td>Slightly yellow</td>
</tr>
<tr>
<td>Amine Value Range, mg KOH/g</td>
<td>780-800</td>
<td>750-795</td>
<td>900-990</td>
</tr>
<tr>
<td>Amine Hydrogen Equivalent Weight (AHEW) (g)</td>
<td>27</td>
<td>27</td>
<td>26-28</td>
</tr>
<tr>
<td>Freeze Point Range, °C</td>
<td>14-15</td>
<td>9-11</td>
<td>3-6</td>
</tr>
<tr>
<td>Viscosity, cp</td>
<td>6.5 (25°C)</td>
<td>6.0 (45°C)</td>
<td>7.0-9.0 (45°C)</td>
</tr>
<tr>
<td>Purity as (DAM%)</td>
<td>91%</td>
<td>42%</td>
<td>91%</td>
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</table>

<table>
<thead>
<tr>
<th>Grades</th>
<th>FlexaTram-DAM-120</th>
<th>FlexaTram-DAM-200</th>
<th>FlexaTram-DAM-700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>General purpose</td>
<td>High cycloaliphatic amine</td>
<td>High hexamethylene diamine content</td>
</tr>
<tr>
<td>Purpose</td>
<td>For drilling, stimulation, production, and other applications in oil and gas</td>
<td>High performance in epoxy floor coating formulations and highly effective for your gas applications for oil and gas</td>
<td>High performance oil and gas applications, including asphalt, adhesives and sealants</td>
</tr>
</tbody>
</table>

**Oil and Gas**
- H2S & CO2 Scavenging
- Scale Corrosion Inhibitors
- Clay Stabilizer & Drilling Mud
- Chelating Agent
- Lubricant & Surfactant

**Emulsions**
- FlexaTram-DAM can be used to produce a wide range of ethoxylated amines and ethoxylated fatty amines with various amounts of ethylene oxide. These amines are used for emulsification, surfactant and inorganic strength characteristics in oil and gas and most industrial and institutional cleaning applications.

**Epoxy Coatings**
- FlexaTram-DAM is used as an epoxy curing agent for composites & civil engineering applications such as flooring & paving to provide high chemical and temperature resistance with superior mechanical performance. Composite applications include processes such as filament winding, infusion, RTM and hand lay-up.

**Water Treatment**
- Detergents
- Textiles
- Chemicals
- Intermediates

**Other Applications**
- Water Treatment
- Derivatives
- Textiles

**FlexaTram-DAM-120**
- General purpose
- High cycloaliphatic amine
- High hexamethylene diamine content

**FlexaTram-DAM-200**
- General purpose
- High cycloaliphatic amine
- High hexamethylene diamine content

**FlexaTram-DAM-700**
- General purpose
- High cycloaliphatic amine
- High hexamethylene diamine content
FlexaTram™-DAM

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- formulated blends of hexamethylenediamine (HMD)

Key attributes
- Multifunctional
- Low viscosity
- Economical compared to other amine alternatives
- High amine value
- Cycloaliphatic amines content for enhanced performance

Physical Data

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>FlexaTram-DAM-120</th>
<th>FlexaTram-DAM-200</th>
<th>FlexaTram-DAM-700</th>
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<tbody>
<tr>
<td>Purity (Amine %)</td>
<td>&gt;90</td>
<td>&gt;90</td>
<td>&gt;90</td>
</tr>
<tr>
<td>Form</td>
<td>Liquid</td>
<td>Liquid</td>
<td>Liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Slightly yellow</td>
<td>Slightly yellow</td>
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</tr>
<tr>
<td>Amine Value Range, mg KOH/g</td>
<td>700-900</td>
<td>750-850</td>
<td>900-1100</td>
</tr>
<tr>
<td>Amine Hydrogen Equivalent Weight (AHEW)</td>
<td>27</td>
<td>27</td>
<td>26-24</td>
</tr>
<tr>
<td>Freezing Point Range, °C</td>
<td>14-15</td>
<td>9-11</td>
<td>&lt;15</td>
</tr>
<tr>
<td>Viscosity, cP (at 4°C)</td>
<td>6.5 (8-9°C)</td>
<td>6.0 (8-9°C)</td>
<td>7.2 (&lt;18°C)</td>
</tr>
<tr>
<td>Purity as (DAM%)</td>
<td>n/a</td>
<td>42 min</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Epoxy Coatings

FlexaTram-DAM is used as an epoxy curing agent for composites & civil engineering applications such as flooring & paving to provide high chemical and temperature resistance with superior mechanical performance. Composite applications include processes such as filament winding, infusion, RTM and hand lay-up.

Emulsions

FlexaTram-DAM can be used to produce a wide range of ethoxylated amines and ethoxylated fatty amines with various amounts of ethylene oxide. These amines are used for emulsification, surface tension, stability and various strength characteristics in oil and gas and most industrial and institutional cleaning applications.

Oil and Gas

<table>
<thead>
<tr>
<th>Purpose</th>
<th>FlexaTram-DAM-120</th>
<th>FlexaTram-DAM-200</th>
<th>FlexaTram-DAM-700</th>
</tr>
</thead>
<tbody>
<tr>
<td>N2H &amp; CO2 Scrubbing</td>
<td>Scale/Corrosion Inhibitors</td>
<td>Clay Stabilizer &amp; Drilling Mud</td>
<td>Chelating Agent</td>
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</tbody>
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Coatings

<table>
<thead>
<tr>
<th>Coating Type</th>
<th>FlexaTram-DAM-120</th>
<th>FlexaTram-DAM-200</th>
<th>FlexaTram-DAM-700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy Curing Agent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urethane Curing Agent/Catalyst</td>
<td>Polyurethane Resin Adhesives</td>
<td></td>
<td></td>
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</table>

Composites

<table>
<thead>
<tr>
<th>Composite Type</th>
<th>FlexaTram-DAM-120</th>
<th>FlexaTram-DAM-200</th>
<th>FlexaTram-DAM-700</th>
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</thead>
<tbody>
<tr>
<td>Wind Turbines</td>
<td>Sporting Goods</td>
<td>Automotive Parts</td>
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Intermediates

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<thead>
<tr>
<th>Intermediate Type</th>
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<th>FlexaTram-DAM-200</th>
<th>FlexaTram-DAM-700</th>
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</thead>
<tbody>
<tr>
<td>Herbicides</td>
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<td></td>
</tr>
<tr>
<td>Pharmacy</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other Applications

<table>
<thead>
<tr>
<th>Application Type</th>
<th>FlexaTram-DAM-120</th>
<th>FlexaTram-DAM-200</th>
<th>FlexaTram-DAM-700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Treatment</td>
<td>Detergents</td>
<td>Textiles</td>
<td></td>
</tr>
</tbody>
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Grades

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<td>High performance in epoxy floor coatings and as high performance oil and gas applications for oil and gas</td>
<td>High performance oil and gas applications, including solvents, adhesives and surfactants</td>
</tr>
</tbody>
</table>
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Clay Stabilizers and Drilling Mud

FlexaTram-DAM can be used as shale hydration inhibitors and clay stabilizers in water-based drilling fluids and fracking fluids. FlexaTram-DAM is modified to form quaternary ammonium salt, which is then used to improve the inhibitive properties and high temperature resistance of shale inhibitors.

- FlexaTram-DAM exhibits superior water-inhibitive properties when compared to other products such as ICI and choline chloride. Unlike other amines, the pyridinium salt content in FlexaTram-DAM can provide high temperature resistance.
- FlexaTram-DAM’s hydrophilic and chemical nature intercalates into clays at a drilling site. The product is especially effective in intercalating clay ( bentonite and smectite) with monolayer orientation.
- The quaternary ions in FlexaTram-DAM neutralize the negatively charged clay surface after adsorption, while the chemical’s hydrophilic properties prevent ingress of water.

Corrosion Inhibitor (CI)

FlexaTram-DAM can be used in oil well drilling, completion, production and water flood systems.
- VPCI and FFCI based on FlexaTram-DAM are commonly used as in-situ filming inhibitors.
- FlexaTram-DAM is dispersible in light brines and fresh water. It is effective against (H₂S, CO₂) organic acids and small amounts of oxygen. FlexaTram-DAM is normally formulated with other additives such as nonionic surfactants and alcohol.
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- FlexaTram-DAM exhibits superior water inhibitive properties when compared to other products such as KCl and choline chloride. Unlike other amines, the quaternary ammonium content in FlexaTram-DAM can provide high temperature resistance.
- FlexaTram-DAM’s hydrophobic and chemical nature intercalates into clay at a drilling site. The product is especially effective in intercalated aluminosilicate clay (bentonite and montmorillonite) with monolayer orientation.
- The quaternary ions in FlexaTram-DAM neutralize the negatively charged clay surface after absorption, while the chemical’s hydrophobic properties prevent ingress of water.

Corrosion Inhibitor (CI)

FlexaTram-DAM can be used in oil well abortions, completion, production, and water flood systems.

- VPCI and FPCI based on FlexaTram-DAM are commonly used in production and sub-sea tubing inhibitors.
- FlexaTram-DAM is dispersible in brine and fresh water. The product is effective against H2S, CO2, organic acids, and small amounts of oxygen. FlexaTram-DAM is normally formulated with other additives such as non-ionic surfactants and acids.

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FORMULATED AMINES

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