For more than 180 years, MÜNZING has been helping its customers perfect their products by creating specialty additives that are precisely right for them. Headquartered in Abstatt, Germany, our manufacturing plants in North America and Germany have broad synthesis and formulation capabilities to best serve our global customer base.

MÜNZING has a presence in more than 40 countries and is a technology-driven organization with an extensive network of highly skilled R&D and technical service professionals. Our additives have achieved worldwide recognition for their performance, quality and technical innovation. This first-class product line includes defoamers, dispersants, rheology modifiers, emulsifiers, wetting and leveling agents, micronized and coated waxes, and wax dispersions and emulsions.

If you have a specific challenge, we have the technical expertise and laboratory capabilities to craft a unique solution. As a highly regarded, privately owned company, MÜNZING is committed to providing an unmatched level of technical service to all of our customers and to ensuring that our products deliver optimal performance.

Defoamer Technology

What is Foam? 1

Product Offerings

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Industrial Cleaners 4
Antifreeze, Engine Coolants and De-Icing 5
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**What is Foam?**

**Foam Stabilization Mechanisms**
- Foam is naturally unstable
- Bubbles must rise to the surface to break
- Drainage of the liquid surrounding the foam bubbles leads to rupture
- Stability of foam comes from surfactants that hinder drainage

**Defoamer Mode of Action**
- Defoamers exist as droplets in the liquid and act to destabilize foam by:
  - Entering the foam bubble surface
  - Spreading along that surface and thinning the liquid layer by forcing drainage
  - Bridging the liquid layer to rupture the bubble
- The defoaming process is governed by surface and interfacial tensions
- The surface tension of the defoamer droplets must be lower than that of the liquid

**Defoamer Droplet Size**
- The defoamer droplets need to be the right size
- If the defoamer droplets are too small, there is an insufficient amount to produce an overall impact
- Defoamer droplets that are too large will result in poor compatibility
- More defoamer droplets of the optimal size will increase the rate of foam breakdown

**FOAM BAN® Product Features**
- Exceptional initial and long-lasting defoaming
- Excellent compatibility and stability in fluid concentrates
- Superior washability/paintability (i.e., no paint defects)
- Enhanced defoaming persistence during fluid filtration
Metalworking

The opportunity to make a good product better.
We achieve the delicate balance needed for foam control effectiveness.

<table>
<thead>
<tr>
<th>FOAM BAN®</th>
<th>3057</th>
<th>MS-5A</th>
<th>1839</th>
<th>1840</th>
<th>1849</th>
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<tr>
<td>Carrier of Defoamer</td>
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<td>POA</td>
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<thead>
<tr>
<th>Key Feature</th>
<th>Non-Si</th>
<th>Excellent Compatibility</th>
<th>Persistent Foam Control</th>
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<tbody>
<tr>
<td>Soluble Oil</td>
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= Primary Recommendation  ○ = Secondary Recommendation

**LEGEND - DEFOAMER CARRIER and CHEMISTRIES:**
3D: 3-Dimensional (3D) Siloxane; WA: Special Wax; POA: Polyoxyalkylene Technology; W: Water; M: Mineral Oil
Tankside Defoamers

**Time-tested, cost-effective products.**
Eliminate undesired foam during the manufacturing process.

<table>
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<tr>
<th>Effectiveness</th>
<th>Persistent Foam Control</th>
<th>Fast Foam Break</th>
<th>Non-Si</th>
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<tr>
<td>FOAM BAN TK-360</td>
<td>FOAM BAN TK-320</td>
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<td>FOAM BAN TS-2000</td>
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<td>FOAM BAN TK-75</td>
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<td>FOAM BAN SB-73</td>
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</table>

POTENTIAL APPLICATIONS:
- Metalworking Fluids
- Cleaners
- Degreasers
- Paint Spray Booth
- Printed Circuit Board
- Waste Water
Industrial Cleaners

Soap cleans; foam doesn’t.
A well-balanced formula achieves the right amount of foam.

<table>
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<th></th>
<th>4901</th>
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<th>4950</th>
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</table>

**Application**

- Alkaline Cleaner Concentrates (pH 7-12)
  - ○ ○ ●
- Acid Cleaner Concentrates (pH 3-7)
  - ○ ● ●
- Alkaline & Acid Cleaner Tankside
  - ● ● ● ○
- Floor Cleaners
  - ○ ●
- Dish & Laundry Detergents
  - ○ ● ●
- General Purpose
  - ○ ● ○ ○

*● = Primary Recommendation ○ = Secondary Recommendation*

**LEGEND - DEFOAMER CARRIER and CHEMISTRIES:**
- 3D: 3-Dimensional (3D) Siloxane;
- POA: Polyoxyalkylene Technology;
- W: Water;
- WA: Special Wax;
- M: Mineral Oil
Antifreeze, Engine Coolants and De-Icing

Hot or cold.
Solutions for both environments.

<table>
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<th>FOAM BAN®</th>
<th>1849</th>
<th>1880</th>
<th>1860</th>
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<table>
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<tr>
<th>Application</th>
<th>Traditional</th>
<th>Organic Acid (OAT)</th>
<th>Hybrid</th>
<th>Premix 50:50</th>
<th>De-Icing Fluids</th>
<th>De-Icing Recycling</th>
<th>Windshield Cleaner</th>
<th>Packaging/Filling Operations</th>
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LEGEND - DEFOAMER CARRIER and CHEMISTRIES:
3D: 3-Dimensional (3D) Siloxane; POA: Polyoxyalkylene Technology;
W: Water; OMS: Organo-Modified Siloxane
Non-Aqueous Lubricants

**Additive Value.**
The right defoamer extends the life of the lubricant.

---

**FOAM BAN®**

<table>
<thead>
<tr>
<th>Foam Control</th>
<th>Air Release</th>
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<tbody>
<tr>
<td>Siloxane</td>
<td>FOAM BAN 169</td>
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<tr>
<td>Acrylate</td>
<td>FOAM BAN 154*, 159*</td>
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<td>FOAM BAN 155</td>
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<tr>
<td></td>
<td>FOAM BAN 130B*, 149*</td>
</tr>
<tr>
<td></td>
<td>FOAM BAN 3633E, 152</td>
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</table>

**Product Features:**
Typical level: 500ppm
Ready to use
Low viscosity
Easy to handle
Excellent surface foam control

**Legend indicates where each product is most effective:** *
= NSF HX-1 Registered

Hydraulic Fluid: 130B, 3633E
Gear Oil: 130B
Turbine Oil: 159
Transmission Fluid: 154
Engine Oil: 130B, 169
Compressor Oil: 130B
Cutting Fluid: 3633E, 152
Universal: 149, 155

*(Universal: Effective in many applications)*
Energy - Oil Field

Our focus: Reducing foam.
Your focus: Efficient and effective production.

<table>
<thead>
<tr>
<th>Application</th>
<th>FOAM BAN®</th>
<th>AGITAN® OF-52</th>
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<td></td>
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<td>Carrier of Defoamer</td>
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<tr>
<td>Amine Scrubbing (Post Add)</td>
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<tr>
<td>Glycol Dehydration (Post Add)</td>
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<tr>
<td>Glycol Dehydration (Concentrate)</td>
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<tr>
<td>Oil &amp; Gas Phase Separators</td>
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<td>Deliquification Process</td>
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<td>Well Drilling</td>
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LEGEND - DEFOAMER CARRIER and CHEMISTRIES:
3D: 3-Dimensional (3D) Siloxane; POA: Polyoxyalkylene Technology; W: Water; M: Mineral Oil;
FS: Fluoro Silicone; VO: Vegetable Oil; HS: Hydrophobic Silica; WA: Wax
Surface Finishing Industry

Versatile uses.
PCB strippers, PCB cleaners, plating compounds and polishing slurries.

<table>
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<th>Acid Concentrates</th>
<th>Tankside - Alkaline Applications</th>
<th>Tankside - Acid Applications</th>
<th>Low Cost Tankside</th>
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LEGEND - DEFOAMER CARRIERS and CHEMISTRIES:
3D: 3 Dimensional (3D) Siloxane; POA: Polyoxyalkylene Technology; W: Water

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## Additional Products

### Release Agents

**Silicone-Based Emulsions**
- **MAGRABAR® SE 1335 FG**: 35% active
- **MAGRABAR® SE 1335 FG RTU**: 15% active

**MAGRABAR® PD-655**
- Mineral oil emulsion, non-siloxane
- Safe for use with ultrafiltration membranes

**Biodegradable Defoamers**
- **AGITAN® 109**: vegetable oil and polyoxalkylene-based emulsion
- **AGITAN® 361**: 100% active, vegetable oil, easily emulsifies
- **AGITAN® 6686/W**: vegetable oil and polyether-based emulsion

### Emulsification / Lubricity

**Blend of Special Polyglycolesters, Biodegradable**
- **METOLAT® 386** (HLB 14)
- **METOLAT® 387** (HLB 8.3)
- **METOLAT® 388** (HLB 10.6)
- **METOLAT® 389** (HLB 11.4)
- Non-ionic, hard water stable

**MAGRABAR® J-305**
- Mixture of mono- and di-glycerides
- Formulated to be liquid at room temperature
- Provides effective air release in a variety of fluids

**METOLAT® 200**
- Anionic polymeric ester
- Self-emulsifying after neutralization
- Low foam tendency

**METOLAT® 250**
- Sulfated vegetable oil, anionic
- Suitable for a wide range of aqueous systems

### Defoamers

**Silicone Emulsions**
- Industrial: FOAMTROL 10L, 30N
- Food Grade: MAGRABAR® 5-SN, 10-SN, 20-SN, 30-SN

**FOAMTROL 110**
- 100% active silicone compound

**MAGRABAR® SI-110**
- Crosslinked siloxane emulsion, 10% active
- Typically more effective than conventional silicone emulsions

**METOLAT® 386** (HLB 14)
- **METOLAT® 387** (HLB 8.3)
- **METOLAT® 388** (HLB 10.6)
- **METOLAT® 389** (HLB 11.4)
- Non-ionic, hard water stable

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- Anionic polymeric ester
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