**BIOBAN™ CS-1135**

Preservative  
EPA Reg. No. 464-660  
CAS Reg. No. 51200-87-4  
EINECS No. 257-048-2

**General**

BIOBAN™ CS-1135 is a broad-spectrum bactericide based on oxazolidine (4,4-dimethyl-oxazolidine) chemistry. The product is a cost effective antimicrobial that offers both performance and stability in alkaline systems and products such as metalworking fluids, oil and gas production, and mineral slurries. In addition BIOBAN CS-1135 is registered for use as an in-can preservative for paints, inks, emulsions, non-food contact adhesives, surfactants, and in consumer, household and institutional products. BIOBAN CS-1135 helps prevent bacterial degradation in these systems which often result in gas production, off-odors, changes in color and loss of viscosity and film forming properties. Its active component is both water- and oil-soluble. BIOBAN CS-1135 does not contain any metallic or halogenated compounds, or any organic derivatives of sulfur, boron, or phosphorus.

The advantages of using BIOBAN CS-1135 are:

- Antibacterial activity against a broad spectrum of bacteria in a variety of applications
- Effective over a pH range of 7-11
- Effective against sulfate-reducing bacteria
- Low freezing point and excellent thermal and alkaline stability
- Compatible with ionic additives and a variety of other formulation raw materials
- Non skin-sensitizing
- Low cobalt leaching
- No increase in detectable formaldehyde in vapor phase/airspace

In addition to its antibacterial activity, the amine functionality of BIOBAN CS-1135 provides:

- Corrosion inhibition in many systems
- Alkaline buffering capability to prevent pH drift
- Assistance in maintaining optimum viscosity of emulsion formulations

**Structure**

![Structure Diagram](image)
**Physical Properties**

The following are typical properties of BIOBAN™ CS-1135; they are not to be considered product specifications.

- Total Oxazolidines (%): 73-77
- pH (as supplied): 10.5-11.5
- Neutral equivalent as a base: 128-133.5
- Color, APHA: 100 (max.)
- Flash point (Tag Closed Cup): 49°C/120°F
- Freezing point: Below -20°C/-4°F
- Molecular weight: 101.1
- Specific gravity @ 25/25°C: 0.98-0.99
- Viscosity @ 25°C: ~ 7.5 cps
- Weight per U.S. gallon: 8.2 lb
- Solubility: Soluble in anhydrous alcohols, glycerol, propylene glycol, hydrocarbons and water

The partition coefficient between mineral oil and water is 0.0371 based on measurement of the oxazolidine content in the two phases. The octanol:water partition coefficient is 0.73. Partition coefficient is the ratio of the BIOBAN CS-1135 concentration in oil to that in water.

**Antibacterial Activity**

The ability of BIOBAN™ CS-1135 to inhibit the growth of bacteria is illustrated by the minimum Activity inhibitory concentration (MIC). The tests were conducted in vitro by serial-dilution methods. Dilutions of BIOBAN CS-1135 prepared in trypticase soy broth were inoculated with the appropriate organism and incubated at 37°C/98°F. The minimum inhibitory ranges shown are the highest concentration showing growth and the lowest with no growth. They are neither intended as a claim for recommended use concentration nor as a complete list of microorganisms involved in contamination and biodeterioration.

<table>
<thead>
<tr>
<th>Organism</th>
<th>MIC (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterobacter aerogenes</td>
<td>250-300</td>
</tr>
<tr>
<td>Bacillus megaterium</td>
<td>200-250</td>
</tr>
<tr>
<td>Bacillus subtilis</td>
<td>200-250</td>
</tr>
<tr>
<td>Bacillus mycoides</td>
<td>200-250</td>
</tr>
<tr>
<td>Desulfovibrio desulfuricans</td>
<td>150-200</td>
</tr>
<tr>
<td>Desulfovibrio aeniari</td>
<td>200-250</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>450-500</td>
</tr>
<tr>
<td>Gaffkya tetragena</td>
<td>150-200</td>
</tr>
<tr>
<td>Lactobacillus acidophilus</td>
<td>200-250</td>
</tr>
<tr>
<td>Micrococcus flavus</td>
<td>100-150</td>
</tr>
<tr>
<td>*Mycobacterium ranae</td>
<td>250-500</td>
</tr>
<tr>
<td>*Pasteurella multocida</td>
<td>31-62</td>
</tr>
<tr>
<td>*Yersinia pseudotuberculosis</td>
<td>125-250</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>500-550</td>
</tr>
<tr>
<td>Pseudomonas fluorescens</td>
<td>450-500</td>
</tr>
<tr>
<td>Proteus vulgaris</td>
<td>300-350</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>150-200</td>
</tr>
<tr>
<td>Streptococcus faecalis</td>
<td>300-350</td>
</tr>
<tr>
<td>Streptococcus hemolyticus</td>
<td>450-500</td>
</tr>
<tr>
<td>*Shigella dysenteriae</td>
<td>125-250</td>
</tr>
<tr>
<td>Micrococcus luteus</td>
<td>450-500</td>
</tr>
</tbody>
</table>

*Pathogenic organisms were tested in an independent laboratory.
BIOBAN™ CS-1135 may be used in and is efficacious in the following applications. BIOBAN CS-1135 is best suited for systems in which the pH is greater than 7. As with all formulations, it is recommended that compatibility of BIOBAN CS-1135 be tested against other formula ingredients.

**Uses**

**Metalworking Fluids**

Metalworking fluids are formulated as concentrates which are diluted with water for use. These fluids are subject to gross microbial contamination in both the concentrated and use-diluted form. Such contamination provides the opportunity for slime formation, loss of fluid stability, equipment corrosion, dermatitis, and odor formation.

For metalworking-fluid applications where cobalt leaching is a concern, BIOBAN CS-1135 is an excellent choice. BIOBAN CS-1135 will generally not contribute to cobalt leaching when used at recommended treatment levels.
BIOBAN™ CS-1135 should be dosed in use-diluted fluids at a rate of 1000-2000 ppm (1.0-2.0 pints per 100 gallons of fluid) to control gross microbial contamination. Weekly addition of 250-500 ppm BIOBAN CS-1135 should be sufficient to maintain microbiological control of the system (0.25-0.5 pints for 100 gallons fluid).

BIOBAN CS-1135 may be incorporated into metalworking-fluid concentrates and will remain stable if the pH of the fluid is maintained above pH 7.0. Long term stability studies should be carried out by the manufacturer on specific formulations to ensure compatibility with fluid ingredients. The level in the fluid concentrate should be chosen so that the desired 1000-2000 ppm in the use-diluted fluid is obtained.

**Die Cast Lubricants and Mold-Release Agents**

BIOBAN CS-1135 is effective for control of microorganisms in lubricating fluids used as mold-release agents in metal die-cast applications and in the manufacture of plastic articles.

The typical treatment level is 1000 to 2000 ppm of BIOBAN CS-1135 in the mold-release agent. Additionally, 250-500 ppm of BIOBAN CS-1135 may be added weekly as required to maintain control in recirculated fluids.

BIOBAN CS-1135 also may be incorporated in concentrates prior to dilution for use. BIOBAN CS-1135 should be stable in such concentrates if the pH of the concentrate is maintained above 7. However, long-term stability tests should be carried out before manufacture of such concentrates to ensure compatibility with BIOBAN CS-1135.

**Paints, Inks, and Emulsions**

Paints, inks and emulsions contain many raw materials such as defoamers, dispersants, thickening agents, and pigments which are subject to microbial degradation. The results of this degradation may include gas production, loss of viscosity and off odors.

BIOBAN CS-1135 is an effective preservative in water-containing systems such as latex paints, inks (non-food contact), and wax and resin emulsions at concentrations from 0.1-0.5 lb per 100 lb (1000-5000 ppm). BIOBAN CS-1135 may be added at any point in the manufacturing process. The recommended dosage rate for preservation of inks and latex paints is 0.1-0.2 lb per 100 lb (1000-2000 ppm) of the formulation. For emulsions, the recommended dosage rate for preservation is approximately 0.2 lb per 100 lb of the formulation.

**Adhesives**

Adhesives contain a variety of materials which are particularly susceptible to microbial attack including starches, proteins and latexes. Microbial degradation of these raw materials results in gas production, loss of viscosity, pH drop, off odor and other effects which result in loss of adhesive properties.

BIOBAN CS-1135 is approved for control of microbial contamination in adhesives that do not come in contact with food. The dosage rate should be between 0.1 and 0.5 lb per 100 lb (1000-5000 ppm) total formulation weight.

**Surfactant Preservation**

BIOBAN CS-1135 may be used to inhibit bacterial degradation during storage and use of anionic, nonionic, amphoteric and cationic surfactants used in the production of industrial and consumer products. BIOBAN CS-1135 can be added at any point during the
manufacturing process at a dosage rate of 0.04-0.2 lb per 100 lb (400-2000 ppm) based upon the final formulation volume.

**Consumer, Household and Institutional Products**

BIOBAN™ CS-1135 may be used for the inhibition of bacterial spoilage during the production, shelf-life storage and use of consumer, household and industrial products including dishwashing liquids, surface cleaners, laundry cleaners and polishes. BIOBAN CS-1135 should not be used when food contact will occur. The recommended dosage rate is 0.04 to 0.2 lb per 100 lb (400-2000 ppm).

**Mineral Slurries**

Mineral slurries by their very nature are often highly contaminated with bacteria and fungi.

BIOBAN CS-1135 is approved for control of microbial growth in mineral slurries. BIOBAN CS-1135 should be dosed at 400-2000 ppm (0.04-0.2 lb per 100 lb of slurry), to keep microbial growth in check.

For product safety information, refer to Safety Data Sheet (SDS).

**Toxicity, Environmental Effects, First Aid and Precautionary Labeling**

BIOBAN™ CS-1135 should be stored in the original containers in such a manner that the label Storage is readily visible. Do not store near heat or open flame. In case of fire, use water, dry chemical, foam or CO₂ as the extinguishing agent.

Do not store with food or feed. Keep containers closed when not in use. Contents of leaking containers should be transferred to clean, sound drums, and relabeled. Leaks or spills may be removed by flushing area with plenty of water into acceptable disposal system.

After the container has been emptied, it may contain explosive vapors; observe all warnings and precautions listed. Do not cut, puncture, or weld on or near the container. Flush empty drums three times with water before reuse, sale as used containers, or burial in a safe place. Dispose of washings in acceptable disposal system.

**Shipping and Packaging**

BIOBAN™ CS-1135 is classified as a Class 3 (Flammable liquid) hazardous material in the Packaging regulations issued by the U.S. Department of Transportation (49CFR), the International Air Transport Association (IATA) and the International Maritime Organization (IMDG Code).

The bill of lading description used by DOW is:

FLAMMABLE LIQUID, N.O.S. (4,4-DIMETHYLOXAZOLIDINE),3,UN1993, III.
DISINFECTANT NOI, OTHER THAN MEDICINAL OR TOILET PREPARATIONS.
NMFC ITEM 57100 SUB 3 CLASS 60 TRADE NAME = BIOBAN™ CS-1135

<table>
<thead>
<tr>
<th>Shipping Container</th>
<th>Net Wt.</th>
<th>Gross Wt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-gallon drum</td>
<td>39 lb</td>
<td>44 lb</td>
</tr>
<tr>
<td>55-gallon drum</td>
<td>425 lb</td>
<td>465 lb</td>
</tr>
</tbody>
</table>
**Product Stewardship**

When considering the use of any Dow product in a particular application, review the latest Safety Data Sheet (SDS) and country-specific product label to ensure the intended use is within the scope of approved uses. Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

**Customer Notice**

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including Safety Data Sheets (SDS), should be consulted prior to use of Dow products. Current Safety Data Sheets are available from Dow.