

Detergent Enzymes (Cellulose Granules) Technical Sheet

High activity enzymes on cellulose granules for cleaning applications



HIGH ACTIVITY ECONOMICAL



CLEANING



WASHING



BULK OPTION

1. Product Overview

Cleaning enzymes - amylase, protease and lipase - on biodegradable granulates, offer a versatile, green and highly effective solution for a wide range of cleaning applications. Amylase targets and breaks down starch-based soils, protease hydrolyses protein-based stains such as blood, egg, and dairy residues, while lipase efficiently degrades fats and oils. Together, this synergistic blend accelerates the removal of complex, mixed-type stains, improving cleaning efficiency while reducing the need for harsh chemicals. These granulates are particularly valuable in industrial and household detergents, laundry formulations, and surface cleaners, where they enhance stain removal at lower temperatures, support eco-friendly formulations, and contribute to energy savings. Additionally, their stable granular form ensures long shelf life and consistent enzymatic activity, making them a reliable choice for both professional cleaning operations and consumer products.

2. Product Characteristics

Parameter	Specification
Enzyme Class	Various: EC3.2.1.1, EC3.4.21.62, EC3.1.1.3.
Source	<i>Bacillus</i> , <i>Bacillus alcalophilus</i> , <i>Aspergillus spp.</i>
Activity	Amylase 80,000 U per g*, Protease 4,000 U per g**, Lipase 33,000 U per g***
Unit Definition/s	* Where 1 U is the amount of enzyme required to release 1 µmol of glucose from starch under standard conditions ** Where 1 U is the amount of enzyme required to release 1 µmol of peptide fragments from casein per minute under standard conditions *** Where 1 U is the amount of enzyme required to release 1 µmol of fatty acids per minute from olive oil under standard conditions
Carrier	Cellulose
Moisture	9-11 %
Appearance	Off white powder
Typical Dosage	1-3% w/w
Temperature Range	15–70 °C (operational)
Optimal Temperature	35–45 °C
pH Range	7.0–12.0
Optimal pH	8.0–11.0

3. Enzymatic Properties

3.1 Mechanism of Action:

A concentrated Detergent Enzyme Blend comprising amylase, protease and lipase operates through distinct but complementary catalytic mechanisms that target the major classes of organic soils commonly encountered in cleaning applications. Amylases (α -amylases,) catalyse the endo-hydrolysis of α -1,4-glycosidic linkages in starch and related polysaccharides, yielding smaller, more water-soluble oligosaccharides and sugars. Proteases (serine proteases) in detergent formulations, catalyse the hydrolysis of peptide bonds within proteins, breaking down complex proteinaceous soils into smaller peptides and amino acids that are more readily dispersed and removed. Lipases catalyse the hydrolysis of ester bonds in triglycerides and other fats, producing fatty acids, glycerol and partial glycerides. Their activity at lipid–water interfaces makes them particularly effective against greasy and oily soils. The combined action of these three enzymes enables the systematic breakdown of starch-, protein- and fat-based stains into smaller, more readily removable products.

From a kinetic perspective, each enzyme generally exhibits Michaelis–Menten-type behaviour under appropriate substrate conditions, although performance in practical detergent systems is also influenced by substrate accessibility, diffusion, surface adsorption and the composition of the cleaning formulation. Synergistic effects can occur when the degradation of one component of a complex stain improves access to another; for example, proteolytic breakdown of a protein matrix may increase the accessibility of embedded starches and lipids to amylase and lipase. The blend is formulated to provide effective activity across overlapping pH and temperature ranges relevant to detergent applications, while appropriate stabilisation helps protect enzyme activity during storage and use. Optimisation of the relative amylase, protease and lipase activities provides broad-spectrum stain removal and sustained catalytic performance in concentrated detergent formulations.

3.2 Inhibitors:

- Heavy metals (Hg^{2+} , Cu^{2+})
- Urea, Guanidine hydrochloride, SDS
- Extreme low or high pH
- High temperatures above 90 deg. C
- High chelator concentrations (EDTA)

4. Applications

4.1 Laundry Detergents (Liquid, Powder and Pods)

- Broad-spectrum removal of starch-, protein- and fat-based stains
- Effective against food residues, sauces, dairy, egg, grease, oils and body soils
- Enhanced cleaning performance at lower wash temperatures and during short-cycle washes
- Suitable for household and professional laundry detergent formulations

4.2 Pre-Soak and Pre-Treat Stain Removers

- Targeted enzymatic breakdown of complex and mixed organic stains
- Effective against starch-based food stains, proteinaceous residues, grease, oils and sebum
- Helps loosen stubborn soils prior to the main wash cycle
- Suitable for concentrated pre-treatment and soaking formulations

4.3 High-Efficiency (HE) Washing Machine Detergents

- Effective enzymatic cleaning under low-water washing conditions
- Multi-enzyme action supports efficient stain removal during shorter wash cycles
- Helps improve cleaning performance without relying solely on high temperatures or increased chemical loading

4.4 Automatic Dishwashing Detergents

- Breakdown of starch residues, proteinaceous food soils, oils and fats
- Helps remove dried and baked-on food residues from dishes and cookware
- Supports effective cleaning in low-temperature and rapid-wash programmes
- Suitable for powder, tablet and other automatic dishwashing formulations

4.5 Industrial & Institutional Cleaning

- Suitable for commercial laundry applications including hotels, healthcare facilities, restaurants and workwear
- Broad-spectrum degradation of starch-, protein- and lipid-based soils
- Enhanced cleaning of heavily soiled textiles, uniforms and washable materials
- Suitable for professional and institutional detergent formulations

4.6 Multi-Enzyme Detergent Formulations

- Provides synergistic amylase, protease and lipase activity for broad-spectrum stain removal
- Simultaneously targets starch-, protein- and fat-based components of complex soils
- Suitable for premium and high-performance detergent formulations
- Enables formulation of concentrated multi-enzyme cleaning products

4.7 Eco-Friendly & Low-Chemical Detergent Lines

- Supports effective cleaning at reduced wash temperatures
- May enable optimisation of surfactant and other cleaning-agent concentrations
- Supports development of energy-efficient and enzyme-based cleaning formulations
- Biodegradable cellulose carrier provides a practical granular enzyme delivery system

4.8 Fabric Care & Laundry Products

- Enzymatic removal of organic soils under comparatively mild washing conditions
- Helps reduce dependence on aggressive cleaning conditions for stain removal
- Suitable for everyday, professional and concentrated laundry formulations
- Effective against a broad range of common food and body-derived stains

4.9 Household & Hard-Surface Cleaners

- Breakdown of food residues, grease, oils and proteinaceous soils on washable surfaces
- Suitable for kitchen and general-purpose enzymatic cleaning formulations
- Effective on suitable counters, tiles, filters and other washable hard surfaces
- Can be incorporated into compatible spray, foam and concentrated cleaning formulations

4.10 Septic Tank & Waste Treatment Products

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- Suitable for incorporation into enzyme-based septic tank and waste treatment formulations
- Amylase, protease and lipase provide complementary breakdown of starch-, protein- and fat-based organic matter
- Helps hydrolyse complex organic materials into smaller, more readily biodegradable components
- Suitable for biological maintenance products designed for septic tanks, drains and associated wastewater systems

5. Handling & Storage

5.1 Storage Conditions:

- Store at 4–25 °C in sealed containers
- Avoid direct sunlight and freezing
- Keep away from acids, oxidizing agents, and heavy metals

5.2 Stability on Storage:

- Activity loss ~1–2% per month at room temperature
- Refrigeration improves stability

5.3 Safety Information:

- Non-toxic and biodegradable
- May cause allergic reactions via inhalation or skin contact
- Use protective clothing, gloves, goggles
- Avoid aerosol formation

Refer to product SDS for complete safety details.

6. Packaging Options

- 0.1 kg, 1 kg, 10 kg, 25 kg

7. Quality Control Specifications

Test	Specification
Activity assay	≥ labelled activity
Microbial load	Total plate count ≤ 50,000 CFU / g
Pathogens	<i>Salmonella</i> negative, <i>E. coli</i> negative

8. Shelf Life

Powder: >12 months. When stored in original container, sealed, in cool conditions.

9. Disclaimer

This technical data sheet provides general information. Application testing is recommended to determine optimal use conditions.

NOTE: THIS DOCUMENT CANCELS AND SUPERSEEDS ALL OTHER EDITIONS