Protease (Cellulose Granules) Technical Sheet

High activity enzyme to digest protein for cleaning applications

Scientific & Technical™

1. Product Overview

Our detergent-grade protease enzyme delivers powerful and targeted removal of protein-based stains—such as blood, sweat, dairy, grass, and food residues—by rapidly breaking down complex protein molecules into smaller, easily washable fragments. Engineered for exceptional stability in modern detergent environments, it remains active across wide pH ranges, high surfactant levels, and low-temperature wash conditions, ensuring superior cleaning performance even in fast or cold cycles. By boosting stain-fighting efficiency while reducing reliance on harsh chemicals, this advanced protease enables manufacturers to create high-performance, eco-friendly, and cost-effective detergent formulations that consistently impress consumers with brighter, fresher, and visibly cleaner results.

2. Product Characteristics

Parameter	Specification
Enzyme Class	EC3.4.2.1
Source	*Bacillus alcalophilus*
Activity	12,000 KPU / g
Unit Definition/s	* Where 1 U is the amount of enzyme required to release 1 µmol of peptide fragments from casein per minutes under standard conditions
Carrier	Cellulose
Moisture	5-10 %
Appearance	Off white powder
Typical Dosage	1-3% w/w
Temperature Range	30–70 °C (operational)
Optimal Temperature	45–45 °C
pH Range	8.0–12.0
Optimal pH	10.5–11.5

3. Enzymatic Properties

3.1 Mechanism of Action:

Protease enzymes remove protein-based stains by catalyzing the hydrolysis of peptide bonds within complex protein molecules, effectively breaking them down into smaller, more water-soluble fragments. When applied to stains such as blood, sweat, milk, egg, or grass, the protease binds to accessible regions of the protein structure and uses its catalytic residues—typically part of a serine, cysteine, or metalloprotease active site—to cleave peptide linkages. This reduces the

size, strength, and adhesion of the stain, allowing surfactants in the cleaning formulation to lift, disperse, and wash away the degraded protein residues. Because detergent-grade proteases are engineered to remain active in alkaline, surfactant-rich, and low-temperature washing environments, they deliver rapid, effective stain removal even in modern cold-wash and short-cycle programs.

3.2 Kinetics:

Protease reaction kinetics follow typical Michaelis–Menten behaviour, where the rate of protein hydrolysis increases with rising substrate concentration until reaching a maximum velocity (Vmax) determined by the enzyme's catalytic capacity. Because proteins are often insoluble or partially folded, substrate accessibility plays a significant role, meaning factors such as temperature, pH, and detergent composition strongly influence observed kinetic parameters. In alkaline detergent systems, detergent-grade proteases are engineered to maintain high activity, enabling rapid cleavage of peptide bonds early in the wash cycle. Surfactants help unfold or loosen protein structures, increasing enzyme access and improving catalytic efficiency. As the protease converts large proteins into smaller peptides, the reaction accelerates until the enzyme becomes saturated or the substrate is fully broken down. These optimized kinetics allow proteases to deliver fast, consistent stain removal even under dilute, low-temperature, and short-wash conditions.

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

- 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	*Salmonella* negative, *E. coli* 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.

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