

Protease (detergent) Technical Sheet

High activity enzyme for digesting proteins



HIGH ACTIVITY ECONOMICAL



CLEANING



WASHING



BULK OPTION

 Scientific & Technical™

Protease (detergent) Technical Datasheet

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	Hydrolase (EC 3.4.21)
Source	<i>Bacillus alcalophilus</i>
Appearance	Light brown liquid
Activity	12,000 KPU / g
Units	Where 1 U is the amount of enzyme required to release 1 µmol of peptide fragments from casein per minute under standard conditions
Total Protein	5-10 % w/v
Density	1.2-1.3 g per mL
Temperature Range	30–70 °C (operational)
Optimal Temperature	45–55 °C
pH Range	8.0–12.0
Optimal pH	10.5-11.5
Shelf Life	24 months (sealed and kept under recommended storage conditions)

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

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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 (V_{max}) 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.

3.3 Inhibitors:

- Heavy metals (Hg^{2+} , Cu^{2+})
- Urea, Guanidine hydrochloride, SDS
- Extreme low or high pH
- High temperatures above 80 deg. C
- High chelator concentrations (EDTA)

4. Applications

4.1 Laundry Detergents (Liquid, Powder, Pods):

- Removal of fatty, oily, and sebum-based stains
- Enhanced cleaning performance in cold-water and short-cycle washes
- Improved stain removal in eco-friendly, low-surfactant formulations

4.2 Pre-Soak and Pre-Treat Stain Removers:

- Targeted breakdown of tough grease spots
- Effective on collar/cuff grime, food oils, cosmetics, and body-fat residues

4.3 High-Efficiency (HE) Washing Machine Detergents:

- Optimized for low-water washing environments
- Faster emulsification and removal of lipid soils

4.4 Automatic Dishwashing Detergents:

- Breakdown of food oils, baked-on fats, and greasy residues
- Supports low-temperature and rapid-wash programs

4.5 Industrial & Institutional Cleaning:

- Laundry services (hotels, hospitals, restaurants) needing efficient fat removal

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- Enhanced cleaning of heavily soiled textiles and uniforms

4.6 Multi-Enzyme Detergent Formulations:

- Synergistic action with proteases, amylases, cellulases, and mannanases
- Creation of premium, high-performance enzyme blends

4.7 Eco-Friendly & Low-Chemical Detergent Lines:

- Enables reduction of surfactant loading
- Supports sustainability claims such as biodegradability and energy savings

4.8 Fabric Care & Longevity Products:

- Gentle cleaning with less harsh chemicals
- Helps maintain fabric softness, brightness, and integrity over time

4.9 Household Degreasers and Hard-Surface Cleaners:

- Removal of kitchen grease from counters, stovetops, filters, and tiles
- Effective in enzymatic spray cleaners and foam formulations

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 ~1–5% 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 MSDS for complete safety details.

6. Packaging Options

- 0.1 L, 1 L, 10 L, 25 L (1000 kg totes available upon request)

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7. Quality Control Specifications

Test	Specification
Activity assay	≥ labelled activity
Density (liquid)	1.2–1.3 g / mL
Microbial load	Total plate count ≤ 50,000 CFU / g
Pathogens	<i>Salmonella</i> negative, <i>E. coli</i> negative

9. Shelf Life

Liquid: 24 months, when stored in original container, sealed, in cool conditions.

10. 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