

Amylase

High activity α -amylase for digesting starch



BIOFUEL



FRUIT PROCESSING



BREWING



GRAIN DIGESTION



IMPROVED YIELDS



BULK OPTION

Amylase Technical Datasheet

1. Product Overview

Our amylase is a high temperature α -amylase produced by submerged fermentation of *Bacillus licheniformis*. The enzyme is an endo-amylase, hydrolysing 1,4- α -glycosidic linkages in starch at random, producing dextrans of different chain lengths and oligosaccharides, resulting in a rapid decrease in the viscosity of starch solutions. This enzyme hydrolysis starch into simpler sugars under high-temperature conditions commonly found in food processing. Its thermal stability allows it to retain activity during processes such as baking, brewing, and syrup production, where conventional enzymes might denature. Key benefits include enhanced starch conversion efficiency, improved product consistency, and reduced processing time and energy costs. It also supports higher yields of fermentable sugars in brewing and ethanol production and contributes to smoother textures and uniform sweetness in processed foods. Being food grade, it is safe for use as a food processing aid and compliant with regulatory standards, making it ideal for applications across the bakery, beverage, and food manufacturing industries.

2. Product Characteristics

Parameter	Specification
Enzyme Class	Hydrolase – α -Amylase (EC 3.2.1.1)
Source	<i>Bacillus licheniformis</i> .
Appearance	Brown liquid
Activity Units	30,000 U / mL Where 1 U is the amount of enzyme required to liquify 1 mg of soluble starch per minute 10-14 % w/v
Total Protein	1.05-1.20 g per mL
Density	
Temperature Range	40–105 °C (operational)
Optimal Temperature	85–95 °C
pH Range	5.0 – 8.0
Optimal pH	5.8 – 6.5
Stability Enhancers	Ca ²⁺ required for structural stabilization (typically 50–100 ppm)
Shelf Life	12–24 months (sealed, recommended storage conditions)

Amylase Technical Datasheet

3. Enzymatic Properties

3.1 Mechanism of Action:

Alpha-amylase is an essential carbohydrate-digesting enzyme that catalyzes the hydrolysis of starch, glycogen, and related polysaccharides. Its mechanism of action relies on cleaving internal α -1,4glycosidic bonds within these long glucose chains. The enzyme binds to the substrate's helical structure and uses a pair of catalytic residues—typically an aspartate acting as a nucleophile and a glutamate functioning as an acid/base—to destabilize the bond and facilitate its breakdown. Through this catalytic process, alpha-amylase rapidly generates shorter oligosaccharides such as maltose, maltotriose, and dextrans. Because it acts endolytically (cutting within the polymer rather than at the ends), it can efficiently reduce the viscosity and complexity of large carbohydrate molecules, making it a pivotal enzyme in digestion, industrial starch processing, and various biotechnological applications.

- Random cleavage of internal α -1,4 starch linkages
- Produces dextrans of varying chain length
- Reduces viscosity rapidly during liquefaction
- No significant activity on α -1,6 linkages (does not fully saccharify)



3.2 Kinetics:

alpha-amylase follows classic Michaelis–Menten kinetics, in which the reaction rate increases with substrate concentration until the enzyme becomes saturated. At low starch concentrations, the rate is directly proportional to substrate availability, but as substrate levels rise, the enzyme approaches its maximum velocity ($V_{\max}$) when all active sites are occupied. The Michaelis constant (K_m) reflects the affinity of alpha-amylase for its substrate, with lower values indicating tighter binding. Reaction velocity is also strongly influenced by temperature and pH, as alpha-amylase requires optimal structural conformation to maintain catalytic efficiency; deviations from the optimal range lead to decreased turnover or denaturation. Because alpha-amylase acts endolytically on α -1,4 glycosidic bonds, product accumulation (e.g., maltose or dextrans) can cause feedback inhibition, altering the apparent kinetic profile. Together, these kinetic characteristics determine the enzyme's efficiency in biological digestion and industrial starch-processing applications.

- K_m (soluble starch): 1–6 mg / mL (typical values depending on source)
- $V_{\max}$: 3,000–12,000 U / mg protein (varies by formulation)

Amylase Technical Datasheet

- Thermal half-life:
 - 90 °C: 20–60 minutes
 - 100 °C: 5–15 minutes

3.3 Inhibitors:

- Heavy metals (Hg^{2+} , Cu^{2+})
- Low and high pH
- Temperatures above 105 deg. C
- Oxidants
- High chelator concentrations (EDTA)

4. Applications

4.1 Starch Liquefaction (Corn, Wheat, Tapioca):

- Typical dosage: 0.4-1.0 kg / ton dry solids (liquid enzyme)
- Conditions:
 - pH: 5.8–6.2
 - Temp: 85–95 °C
 - Ca^{2+} : 50–100 ppm
- Benefits: Rapid viscosity reduction, consistent DE yield

4.2 Ethanol Production (Grain or Cellulosic Starch)

- Used in high-temperature cook or jet-cooking
- Dosage: 0.50-1.0 kg / ton dry grain
- Improves fermentation efficiency by increasing fermentable sugars

4.3 Detergents:

- Granular or encapsulated thermostable amylase used in laundry and dishwashing
- Effective at 40–60 °C
- Removes starch-based stains (rice, pasta, custards)

4.4 Textile Desizing:

Amylase Technical Datasheet

- Applied to remove starch-based warp sizes
- pH: 5.8–7.5
- Temp: 60–90 °C
- Dosage: 0.05–0.2% enzyme solution

4.5 Paper and Pulp:

- Used for viscosity control of starch adhesives
- Enhances coating properties

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)

7. Quality Control Specifications

Test	Specification
Activity assay	≥ labelled activity

Amylase Technical Datasheet

Density (liquid) 1.05–1.20 g / mL

Moisture (powder) $\leq 8\%$

Microbial load Total plate count $\leq 50,000$ CFU / g

Pathogens *Salmonella* negative, *E. coli* negative

9. Shelf Life

- **Liquid:** 12 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.

Amylase Technical Datasheet

11. Allergen Information

Item	Statement
Product	Amylase liquid enzymatic preparation.
Enzyme allergen warning	Contains enzyme protein. Enzyme dust, mist, vapour or spray may cause allergy or asthma symptoms, or breathing difficulties, if inhaled. Avoid aerosol formation and use suitable respiratory protection where required.
Source organism	Produced by submerged fermentation of <i>Bacillus licheniformis</i> .
Intentional allergen ingredients	No major food allergen ingredients are intentionally added to this product.
EU/UK major allergen status	No intentionally added cereals containing gluten, crustaceans, egg, fish, peanut, soybean, milk, tree nuts, celery, mustard, sesame, sulphur dioxide/sulphites at declarable levels, lupin or molluscs.
Use statement	Supplied for use as an industrial or food-processing aid. Suitability for a finished food, feed, detergent or industrial application should be confirmed by the user according to the final formulation, process and local regulations.

12. Nutritional Information

This product is an enzyme preparation and is not intended to be consumed directly as a nutritional ingredient. Nutritional values for the complete preparation are not determined. At typical use levels, contribution to the nutrition of the final product is expected to be negligible.

Parameter	Typical / declared value
Energy	Not determined / not applicable as supplied enzyme processing aid
Fat	Not determined
of which saturates	Not determined
Carbohydrate	Not determined
of which sugars	Not determined
Protein	Total protein 10-14% w/v as declared in Product Characteristics.
Salt	Not determined
Density	Approximately 1.0-1.2 g/mL liquid formulation

Note: The statements above are based on the supplied product information and typical formulation details. Users should verify suitability and compliance for each specific end use and jurisdiction.

THIS SHEET SUPERCEEDS AND CANCELS ALL PREVIOUS EDITIONS