APEX BIOTECH

Bakery Lipase for Dough Strength and Crumb Structure

A technical overview for evaluating microbial lipase as a flour and dough improver in bread, buns, steamed products, and selected pastry systems.

APPLICATION	Bakery & Pastry | Bread, buns, steamed products, selected pastry
DOCUMENT TYPE	Commercial technical overview
LEGAL ENTITY	Guangzhou Apex Biotech Co., Ltd.

How to use this document

Use this overview to screen technical fit, plan a controlled bakery trial, and define the COA and market documents required before commercial use.

> Activity units are method-dependent and cannot be converted directly into one universal addition rate. Final use level must be set from the supplied product COA, native flour enzyme activity, formulation, and production trials.

Source discipline

Reference specification ranges below are adapted from a third-party technical sheet supplied with commercial adaptation rights. They are not presented as Apex Biotech batch data. Public research and regulatory sources are identified separately.

Function and technical positioning

Bakery lipases hydrolyze selected flour lipids and can generate reaction products that alter gas-cell stabilization, gluten-lipid interactions, dough tolerance, and crumb texture. The response depends on enzyme substrate preference, activity method, flour lipid composition, formula, process, and use level. A lipase is not a guaranteed one-for-one replacement for DATEM, SSL, or another emulsifier.

Reference specification framework

Technical field	Reference range or requirement	Use in Apex evaluation
Source	Aspergillus niger in the supplied reference sheet	Confirm production strain, enzyme class, and regulatory dossier for the offered grade.
Activity definition	One unit releases 1 micromole titratable fatty acid per minute from substrate at 40 C and pH 7.5 under the stated assay	Unit values depend on substrate and assay method. Do not convert across methods directly.
Activity range	Reference solids: 20,000 or 100,000 U/g; reference liquid: 100,000 U/mL	Use the delivered batch COA for a mass-basis trial plan.
pH	Reference working range 2.5-10.5; optimum 6.0-8.0	Treat as reference-method data. Dough performance must be measured in the real formula.
Temperature	Reference working range 30-60 C; optimum 35-45 C	Confirm grade-specific stability and deactivation behavior.
Storage	Reference sheet: sealed below 25 C in a cool, dry place; 12 months solid, 6 months liquid	Follow the delivered label and stability statement. Protect from heat and sunlight.

Application fit

Bread and buns: evaluate proof stability, oven spring, crumb cell distribution, softness, and sliceability. Steamed products: evaluate surface brightness, color, internal cell structure, resilience, and mouthfeel. Pastry systems: use only after confirming that lipid modification supports the target lamination, volume, and bite rather than disrupting fat functionality.

Trial design and risk boundaries

Define the target	Choose one or two primary outcomes such as proof tolerance, specific volume, crumb softness, steamed-product brightness, or emulsifier reduction.
Characterize the base	Record flour source, lipid and ash context where available, protein quality, damaged starch, emulsifier system, shortening or oil, and dough water absorption.
Create controls	Use an untreated control and the current emulsifier or improver benchmark. Hold mixing energy, fermentation, proofing, baking or steaming, and cooling constant.
Dose from COA	Build a low-to-high activity gradient using the offered grade and its assay method. Do not borrow a mass dosage from another lipase product.
Measure and repeat	Track dough rheology, gas retention, proof stability, product volume, surface color, crumb cells, firmness, resilience, flavor, and storage quality over multiple batches.

Risk boundaries

Excess activity or a poorly matched substrate profile can create slack or sticky dough, loss of handling tolerance, flavor shifts, excessive lipid hydrolysis, or an unstable crumb response. Emulsifier reduction must be validated against the complete formula and process. Report only results generated with the defined Apex trial protocol and offered commercial grade.

Combination systems

Lipase may interact with alpha-amylase, xylanase, glucose oxidase, ascorbic acid, and emulsifiers. Measure the full system because improvements in gas retention, water redistribution, browning, and crumb softness can overlap or conflict.

References and technical basis

1. Supplied commercial reference sheet: lipase, pages 1-2. Used only for reference specification ranges and handling language.

2. Moayedallaie S, Mirzaei M, Paterson J. Bread improvers: comparison of a range of lipases with a traditional emulsifier. Food Chemistry. 2010;122:495-499. DOI 10.1016/j.foodchem.2009.10.033.

3. Melis S et al. Lipases in wheat flour bread making: importance of an appropriate balance between endogenous lipids and hydrolysis products. Food Chemistry. 2019.

4. U.S. FDA GRN 296. Lipase enzyme preparation from Aspergillus niger for baked goods, with use described for dough gas-holding capacity and proof stability.

5. EFSA Journal 2025;23:e9225. Safety evaluation for a triacylglycerol lipase from Aspergillus niger. Intended uses and safety conclusions are preparation-specific.

Food-enzyme authorization, processing-aid treatment, labeling, and permitted use conditions must be rechecked for each destination market and final enzyme preparation. Avoid creating inhalable dust when handling powdered enzyme preparations.