Specification Sheet of Garlic Extract

1.1 Product Definition

This product is a fine powdered extract prepared from the bulbs of *Allium sativum L.* (Liliaceae, Allium) through processes including washing, peeling, crushing, extraction, filtration, concentration, drying, pulverization, and sieving. It retains the characteristic aroma, taste, and active ingredients of garlic, with no added preservatives, colorants, or flavors. It is widely used in food, pharmaceutical, cosmetic, feed, and other industries, complies with international standards for food supplements and raw materials, and is safe for human consumption.

1.2 Basic Product Information

- Product Name: Garlic Extract
- English Name: Garlic Extract
- Botanical Name: *Allium sativum L.*
- INCI Name: Allium Sativum (Garlic) Bulb Extract
- CAS No.: 539-86-6 (for allicin, the core active ingredient)
- EN No.: 215-726-5
- UN No.: None (non-dangerous goods, no corresponding UN number)
- Part Used: Bulb
- Extraction Solvent: Food-grade ethanol/water (single or mixed use available)
- Specifications: Allicin ⩾ 2.0% (HPLC), customizable from 0.2% to 5%; Alliin ⩾ 1.0% (HPLC), customizable from 0.25% to 5%
- Extraction Ratio: 10:1 (10 parts raw garlic yields 1 part extract), customizable from 4:1 to 50:1

1.3 Appearance & Characteristics

- Appearance: Fine powder ranging from brownish-yellow to off-white
- Odor: Characteristic garlic aroma, no pungent off-odor or moldy smell
- Taste: Slightly pungent, consistent with natural garlic, no bitter or astringent taste
- Solubility: Freely soluble in hot water, soluble in ethanol; water-soluble grade with solubility ⩾ 98% at 25℃

1.4 Active Ingredients

- Total Allicin: ⩾ 2.0% (customizable 0.2% – 5%)
- Alliin: ⩾ 1.0% (customizable 0.25% – 5%)
- Garlic Polysaccharides: ⩾ 5.0% (customizable 3% – 10%)
- SOD (Superoxide Dismutase): ⩾ 1000 U/g
- Garlic Oligopeptides: ⩾ 8.0%
- Volatile Oil: ⩾ 1.0%

1.5 Physicochemical Specifications

- Particle Size: 95% passes 80 mesh; customizable 80 – 120 mesh
- Loss on Drying: ⩽ 6.0%
- Residue on Ignition: ⩽ 5.0%
- Heavy Metals: ⩽ 10 mg/kg
- Lead (Pb): ⩽ 2.0 mg/kg
- Arsenic (As): ⩽ 1.0 mg/kg
- Cadmium (Cd): ⩽ 0.1 mg/kg
- Mercury (Hg): ⩽ 0.1 mg/kg
- Residual Solvents: Complies with EP / USP standards

1.6 Microbiological Specifications

Complies with food-grade standards of U.S. FDA and EU EFSA

- Total Plate Count: ⩽ 1000 CFU/g
- Molds & Yeasts: ⩽ 100 CFU/g
- *Escherichia coli*: Negative
- *Salmonella*: Negative
- *Staphylococcus aureus*: Negative

1.7 Nutritional Composition (per 100g)

Item	Content	NRV%
Energy	385 kJ	4%
Protein	14.2 g	27%
Fat	7.8 g	13%
Saturated Fat	1.5 g	7%
Carbohydrate	68.3 g	23%
Sugar	2.8 g	3%
Dietary Fiber	11.5 g	46%
Sodium	22 mg	1%

Note: NRV% is calculated according to China GB 28050-2011, EU Directive 90/496/EEC, and U.S. FDA standards, for reference only.

1.8 Application Fields

1.8.1 Food Industry

Used as a functional ingredient in health foods, functional beverages, condiments, meat products, baked goods, and snack foods. It enhances the characteristic garlic flavor and provides antioxidant, antibacterial, and gastrointestinal health benefits, meeting modern healthy dietary demands.

1.8.2 Pharmaceutical Industry

Used in preparations for anti-inflammatory, antioxidant, antibacterial, gastrointestinal regulating, and lipid-lowering applications. It serves as a raw material for traditional Chinese medicine extracts or excipients for western medicines, complying with USP and EP pharmacopoeial standards with well-documented safety and efficacy.

1.8.3 Cosmetic Industry

Incorporated into skin care products, shampoos, body washes, and oral care products. Its antioxidant, anti-inflammatory, and antibacterial properties help improve skin condition, soothe the scalp, and freshen breath, supporting the development of natural and gentle cosmetic formulations.

1.8.4 Other Fields

Used as a feed additive (improves gastrointestinal function, enhances immunity, inhibits bacteria, and promotes growth in livestock and poultry) and a raw material for health products (dietary supplements). It has a wide range of applications meeting regulatory requirements across multiple industries.

1.9 Compliance Statement

1.9.1 Standards Compliance

- International: ISO 14702, ISO 1003
- EU & US: USP, EP, FDA 21 CFR, EU Food Supplements Directive 2002/46/EC
- China: GB/T 29578-2013 (Garlic), GB 28050-2011 (Nutrition Labeling)

1.9.2 Certifications

ISO 9001, HACCP, Kosher, Halal, Organic (optional; relevant certification documents available upon client request)

1.9.3 Additional Statements

- Non-GMO
- Allergen-free
- Non-irradiated
- No preservatives, colorants, or flavors added

1.10 Packaging & Storage

- Packaging: 1kg/aluminum foil bag; 25kg/fiber drum (inner double PE liners); customizable packaging available upon request
- Storage: Sealed, kept in a cool, dry, well-ventilated area, away from strong light, high temperature, odors, and toxic or hazardous substances
- Shelf Life: 24 months under unopened original packaging

1.11 Key Notes on International Standards

- Active Ingredients: Allicin is the core quality control marker; alliin is a characteristic marker required by EU and U.S. clients. Test methods and limits can be adjusted per customer requirements.
- Heavy Metals & Microbiology: Strictly comply with limits set by EU 1881/2006 and FDA cGMP, which are critical for customs clearance in Europe and the U.S. Third-party test reports are available as evidence.
- Supporting Documents: Exports require COA (Certificate of Analysis), MSDS, proof of botanical origin, and third-party test reports. Document content can be customized to target market requirements.

Specification & Model Series

To meet the core demands of different end applications, four product series are available, each with dedicated processing and specifications to precisely match functional positioning and highlight product differentiation.

1. Food Grade (GS-F01)

- Application: Solid beverages, tableted candies, condiments, baked goods, and other food applications
- Specifications: Produced by water extraction only, solvent-free residue, allicin ⩾ 1.0%, alliin ⩾ 1.5%, mild odor without harsh garlic smell, particle size 100 – 120 mesh, excellent instant solubility. Ready for direct use without additional deodorization.

2. Health Product Grade (GS-H02)

- Application: Dietary supplements, health product capsules, oral liquids, and other nutraceutical applications
- Specifications: Produced by water-ethanol dual extraction, allicin ⩾ 2.0%, alliin ⩾ 2.5%, garlic polysaccharides ⩾ 15%, purified by multi-stage membrane separation, high purity and activity, free of impurities and precipitation, complies with health product safety standards, suitable for direct formulation development.

3. Cosmetic Grade (GS-C03)

- Application: Skin care products, shampoos, oral care products, and other cosmetic applications
- Specifications: Produced by ultrasonic-assisted extraction, allicin ⩾ 1.5%, SOD activity ⩾ 1000 U/g, decolorized and deodorized, uniform color, mild odor, good water solubility, compatible with cosmetic formulations to provide antioxidant and antibacterial effects.

4. Pharmaceutical / High-End Custom Grade (GS-M04)

- Application: Pharmaceutical raw materials, high-end health products, core ingredients for luxury cosmetics
- Specifications: Produced by supercritical CO_2 extraction or macroporous resin purification, allicin customizable 5.0% – 10.0%, alliin customizable 3.0% – 5.0%, active retention rate ⩾ 95%, solvent-free residue, ultra-high purity, complies with pharmaceutical standards. Particle size, solubility, and other parameters can be customized.

Analysis of Garlic Extract Manufacturing Process

Preface

As a natural food and medicinal material, garlic extract is rich in active ingredients including allicin, alliin, garlic polysaccharides, and SOD (superoxide dismutase). With outstanding antioxidant, antibacterial, gastrointestinal-regulating, and lipid-lowering properties, it is widely used in functional foods, health products, cosmetics, pharmaceuticals, feed, and other fields.

This document provides an in-depth analysis of the full manufacturing process of garlic extract, systematically presenting process principles, core technologies, quality control standards, and product advantages from raw material sourcing to finished product delivery. It demonstrates professional production capacity and technical barriers while clearly communicating core product value, offering customers comprehensive and reliable technical references to support the selection of high-quality natural garlic raw materials.

Our garlic extract is manufactured through a full-chain modern process: selected raw materials + low-temperature enzyme inactivation + targeted extraction + multi-stage purification + low-temperature drying. Under mild conditions, it maximally retains core active ingredients such as allicin, alliin, and garlic polysaccharides, while effectively removing pungent odors and impurities.

Production strictly follows food-grade standards with full-process monitoring at key control points, ensuring high purity, high activity, and high stability. It is widely applicable in functional foods, health products, cosmetics, and feed, providing customers with safe, stable, and high-quality natural plant-derived materials.

I. Raw Material Source Control: Building a Solid Quality Foundation

Raw material quality is fundamental to the activity and safety of garlic extract. We adhere to the principle of “source selection and strict admission” and establish a full-chain raw material control system covering variety, origin, harvesting, and testing to ensure every batch meets high-end production standards and lays a solid foundation for subsequent processing.

1.1 Variety Selection: Targeted Screening of High-Activity Varieties

We select high-quality varieties such as purple-skin garlic and single-clove garlic instead of common garlic. These varieties feature plump bulbs and alliin content over 30% higher than ordinary garlic. Scientifically cultivated, non-GMO, and non-artificially modified, they naturally contain rich allicin and garlic polysaccharides, ensuring efficacy and stability at the variety level.

1.2 Direct Sourcing from Core Origins: Ensuring Freshness and Purity

We source from core garlic-growing regions in China (Jinxiang in Shandong, Zhongmu in Henan, etc.), characterized by fertile soil, suitable climate, no industrial pollution, and irrigation water meeting drinking water standards, eliminating risks of pesticide residues and excessive heavy metals at the source.

Using a "direct origin procurement + immediate transportation" model, garlic is delivered to the workshop within 24 hours of harvesting to maximize freshness, prevent oxidation and loss of active ingredients, and preserve natural quality.

1.3 Incoming Raw Material Inspection: Strict Admission, Batch-by-Batch Testing

A strict incoming inspection standard is implemented. Every batch must pass multi-dimensional testing before entering production:

- Organoleptic testing: No damage, mold, pests, or off-odor; uniform color and plump bulbs
- Physicochemical testing: Moisture $\leqslant$ 8%, ash $\leqslant$ 5% to ensure dryness and prevent mold during storage
- Safety testing: Pesticide residues (organophosphorus, pyrethroids) $\leqslant$ 0.05 mg/kg; heavy metals (Pb $\leqslant$ 0.1 mg/kg, As $\leqslant$ 0.05 mg/kg, Cd $\leqslant$ 0.01 mg/kg, Hg $\leqslant$ 0.001 mg/kg) in compliance with EU EFSA, U.S. FDA, and Chinese GB standards
- Activity testing: Alliin $\geqslant$ 1.5% to ensure sufficient active foundation

Non-conforming raw materials are rejected entirely, eliminating quality risks at the source for customer confidence.

II. Pretreatment Process: Precise Temperature Control for Low-Odor, High-Activity Base

Pretreatment is critical for achieving "low odor and high activity" in garlic extract, solving industry pain points of harsh garlic odor and active loss in traditional processes. Through refined operations, impurities are removed while core active ingredients are maximally retained, paving the way for subsequent extraction.

2.1 Washing & Cleaning: Thorough and Gentle

A dual system of "high-pressure spraying + manual sorting" is adopted. Spraying water temperature is strictly controlled below 25℃ to avoid activating alliinase. Manual sorting removes damaged, moldy bulbs, residual roots, and outer tunics. After washing, materials are quickly drained to prevent leaching of active ingredients during prolonged soaking, ensuring clean, sediment-free raw materials.

2.2 Low-Temperature Enzyme Inactivation: Core Technology to Eliminate Pungent Odor

Alliinase naturally present in garlic decomposes alliin into allicin at room temperature, producing harsh garlic odor and causing active loss.

Our precise low-temperature enzyme inactivation technology processes cleaned garlic at a constant 55 – 65℃ for 20 minutes, or uses microwave-assisted inactivation (500 – 800 W, 5 – 8 minutes), selectively inactivating alliinase to suppress pungent odor at the source while avoiding thermal degradation of heat-sensitive ingredients such as alliin and SOD, ensuring mild odor and complete activity retention.

2.3 Low-Temperature Crushing: Mild Cell Rupture for Improved Extraction Efficiency

Inactivated garlic is rapidly cooled to 0 – 5℃ and crushed into coarse powder (20 – 40 mesh) using low-temperature milling equipment. This gently breaks cell structures to increase contact area between active ingredients and extraction solvent, improving extraction efficiency while avoiding oxidation caused by heat generation during crushing. Crushed material is stored sealed to prevent oxidation upon air exposure.

III. Core Extraction Process: Multi-Mode Targeted Extraction Balancing Efficiency & Activity

Extraction is the core step for enriching active ingredients. We abandon traditional single extraction and adopt a modern "multi-process adaptation, targeted enrichment" system. Based on application scenarios and customer needs, flexible extraction methods are selected to ensure high efficiency and maximal retention of active ingredients, demonstrating technical professionalism and flexibility.

3.1 Water Extraction: Green and Safe for Food-Grade Applications

For foods, beverages, and other applications requiring zero solvent residue, pure food-grade water is used as the extraction medium. Material-to-liquid ratio is 1:10 to 1:12, extraction temperature 60 – 70℃, repeated 2 – 3 times for 1.5 – 2 hours each with continuous stirring, fully releasing water-soluble actives (garlic polysaccharides, SOD, alliin).

Advantages: Eco-friendly, no organic solvents, zero residual risk, mild retention of actives, high safety, ideal for foods and water-soluble health products.

3.2 Water-Ethanol Dual Extraction: Targeted Enrichment for Higher Active Content

For applications requiring high allicin content, water-ethanol dual extraction combines purified water and food-grade ethanol (70 – 80%). Water-soluble components are first extracted, followed by lipophilic components (allicin, volatile oil) using ethanol, achieving full-spectrum active enrichment.

Extraction is performed in closed equipment at 50 – 60℃ for 1.5 – 2 cycles. Ethanol is recoverable and reusable, reducing costs while ensuring residual solvents meet international

standards.

Advantages: High extraction efficiency; simultaneous enrichment of water- and fat-soluble actives; allicin content increased by over 40% compared to single water extraction; enhanced efficacy, suitable for health products and cosmetics.

3.3 Modern Assisted Extraction: High-End Enhancement and Technical Barriers

For high-end pharmaceutical and nutraceutical applications, ultrasonic-assisted extraction combined with low-temperature negative-pressure extraction further improves efficiency and activity retention:

- Ultrasonic extraction: Uses cavitation to gently rupture cell walls, accelerating diffusion of actives. Extraction time reduced to 30 – 60 minutes, yield increased by over 25%, without thermal degradation.
- Low-temperature negative-pressure extraction: Performed at 40 – 50℃ under −0.08 to −0.09 MPa in a closed system, minimizing volatile loss and ensuring ⩾90% retention of heat-sensitive actives such as allicin and SOD.

For ultra-high-end custom products, supercritical CO_2 extraction is available, producing solvent-free, ultra-pure extract with allicin content up to 10%+, ideal for pharmaceutical raw materials and high-end cosmetic actives.

IV. Separation & Purification Process: Multi-Stage Refining for High Purity and Low Odor

Extract contains starch, protein, crude fiber, and other impurities that reduce purity, appearance, odor, and solubility. Our multi-stage purification system precisely removes impurities while retaining actives, producing high-purity, low-odor, highly soluble products for high-end customer demands.

4.1 Multi-Stage Filtration & Centrifugation: Basic Impurity Removal

Extract is first filtered through a plate filter to remove coarse garlic residue and suspended solids, then centrifuged at 3000 – 5000 rpm at 20 – 25℃ to remove fine impurities and protein precipitates, ensuring a clear, transparent solution for further purification.

4.2 Membrane Separation Technology: Precise Purification for Improved Quality

Ultrafiltration (20,000 Da) and nanofiltration membranes are used in series to sieve small-molecule impurities, pigments, and odorous compounds while concentrating allicin, alliin, and garlic polysaccharides. No chemical reagents are added, eliminating secondary pollution.

Advantages: Product purity increased by over 30%; impurity- and precipitation-free; water solubility significantly improved (≥98% at 25℃); further deodorization for milder odor, suitable for high-end foods, health products, and cosmetics.

4.3 Decolorization & Deodorization: Sensory Optimization for Wider Compatibility

Food-grade activated carbon is used at below 50℃ to adsorb pigments and residual odorous compounds. Carbon is removed by filtration afterward, resulting in uniform color (brownish-yellow to off-white), non-irritating garlic odor, and mild taste, avoiding negative impacts on end product development.

4.4 Macroporous Resin Purification (High-End Custom): Targeted Enrichment for Ultra-High Purity

For high-purity requirements, column chromatography with macroporous resin is used to selectively elute and concentrate target actives (allicin, alliin), removing trace impurities. Allicin content can be customized to 5 – 10%, suitable for pharmaceutical and high-end nutraceutical applications.

V. Low-Temperature Concentration: Mild Temperature Control to Lock in Activity

Concentration aims to remove excess water and increase active content without damaging heat-sensitive ingredients. We use low-temperature vacuum concentration with precise mild thermal control to ensure activity retention and batch consistency.

- Precise temperature control: 50 – 60℃ to avoid degradation of allicin, SOD, etc., with ≥90% activity retention
- Closed vacuum system: −0.08 to −0.09 MPa reduces volatile loss and prevents external contamination
- Batch stability: Specific gravity controlled at 1.2 – 1.3 to ensure consistent concentration across batches
- Eco-efficiency: Condensed water recyclable, saving resources and lowering production costs

VI. Drying Process: Graded Solutions for Premium Powder Quality

Drying directly determines powder quality, flowability, solubility, and shelf life. We provide graded drying technologies based on application and customer needs, balancing efficiency and quality for end-use compatibility.

6.1 Spray Drying (Mainstream): Efficient for Mass Production

For foods, feed, and general health products, spray drying is used. Concentrated paste is atomized at inlet 160 – 180℃ and outlet 70 – 80℃, instantly forming fine powder of 80 –

120 mesh with smooth texture, good flowability, high instant solubility, and no caking.

Advantages: High efficiency for large-scale production; moisture ⩽6.0%; shelf life up to 24 months; suitable for solid beverages, tablets, feed additives, etc.

6.2 Vacuum Drying (Auxiliary): Mild Drying for Activity Retention

For high-viscosity pastes and small-batch custom products, vacuum drying is performed at 50 – 60℃ under −0.08 to −0.09 MPa to moisture ⩽5.0%. Dried material is milled and sieved for uniform particle size and full activity retention, ideal for small-batch high-end production.

6.3 Freeze Drying (High-End): Ultimate Activity Preservation

For pharmaceuticals and high-end health products requiring maximum activity, freeze drying is conducted at −40 to −50℃ under high vacuum. It preserves ⩾95% of allicin, SOD, and other actives with ultra-high purity and excellent solubility, free from thermal damage, ideal for pharmaceutical raw materials and premium supplements.

6.4 Post-Drying Treatment: Blending & Sieving for Batch Stability

Dried extract is milled, sieved (80 – 120 mesh), and thoroughly blended to ensure uniform particle size and composition. Organoleptic, physicochemical, and active properties remain consistent across batches, eliminating variability and enhancing product stability.

VII. Quality Control System: Full-Chain Monitoring for Safety & Compliance

We have established a full-chain quality control system “from raw material to finished product” with multiple Key Control Points (KCPs) for real-time monitoring, ensuring every batch meets international and domestic standards — safe, stable, and controllable — earning customer trust through professional QC.

7.1 Full Monitoring of Key Control Points (KCPs)

- Raw material control: 100% incoming inspection; non-conforming materials rejected
- Pretreatment control: Real-time monitoring of enzyme inactivation temperature and time; particle size verification
- Extraction control: Continuous recording of temperature, time, material-to-liquid ratio, and solvent concentration
- Purification control: Strict control of membrane pore size, carbon dosage, and elution parameters
- Concentration & drying control: Real-time monitoring of temperature, vacuum, and moisture

- Finished product control: Full inspection before packaging and release

7.2 Finished Product Full-Item Testing: Strict Compliance

Every batch undergoes comprehensive testing covering active ingredients, physicochemical properties, and safety, in accordance with ISO 14702, USP, EP, and Chinese GB standards. Third-party test reports are available to ensure full compliance:

- Active ingredients: Allicin, alliin, garlic polysaccharides, SOD; customizable limits
- Physicochemical: Moisture ≤6.0%, ash ≤5.0%, 95% through 80 mesh, qualified solubility, color, and odor
- Safety: Heavy metals, pesticides, residual solvents, microbiology (TPC ≤1000 CFU/g, molds & yeasts ≤100 CFU/g, negative pathogens)
- Regulatory compliance: Meets EU EFSA, U.S. FDA, and Chinese GB standards for domestic and export markets

7.3 Testing Equipment & Team: Professional Support for Precision

We operate a professional testing laboratory equipped with HPLC, AAS, microbiological analyzers, and other advanced instruments. An experienced technical team ensures accurate and reliable results, safeguarding product quality.

VIII. Summary of Process Advantages: Technology-Driven Core Competitiveness

Our garlic extract manufacturing process integrates three core strengths: source control, precise engineering, and strict quality management. With professional technical barriers and precise customer alignment, it delivers six key advantages providing customers with high-quality, high-value natural garlic raw materials:

8.1 Activity Advantage: Full Low-Temperature Process for Maximum Activity Retention

From enzyme inactivation to concentration and drying, the entire low-temperature process preserves ≥90% of allicin, alliin, SOD, and other core actives, delivering superior efficacy for high-end functional product development.

8.2 Quality Advantage: High Purity, Low Odor, Wide Compatibility

Multi-stage purification and deodorization produce a pure, low-odor product with excellent water solubility and uniform particle size. It is directly usable in food, health products, cosmetics, pharmaceuticals, and feed without additional treatment.

8.3 Safety Advantage: Residue-Free, Fully Compliant

Green extraction eliminates organic solvent residues. Raw materials and finished products pass strict testing for heavy metals, pesticides, and microbiology, complying with international and domestic standards. Full documentation supports global market access.

8.4 Stability Advantage: Full-Chain QC for Consistent Batches

Real-time monitoring at key stages ensures consistent organoleptic, physicochemical, and active properties across batches, minimizing variation and supporting stable long-term supply.

8.5 Flexibility Advantage: Multi-Process Adaptation and Customization

Extraction and drying methods can be flexibly selected. Active content (allicin, alliin), particle size, and solubility are customizable to support tailored solutions for diverse end products.

8.6 Environmental Advantage: Circular Resource Use for Sustainable Production

Ethanol and condensed water are recycled; garlic residue is reused in feed additives, reducing waste and costs while supporting eco-friendly and sustainable industrial development.

IX. Conclusion

The quality of garlic extract comes from precise control at every processing stage. Guided by the principles of “professionalism, rigor, and innovation,” we deeply optimize garlic extract production from raw material to finished product, pursuing excellence at every step. We demonstrate the strength of modern manufacturing while upholding our core promise of “natural, safe, and high-quality.”

We will continue to refine our processes and improve product quality to provide global customers with better, more stable, and more valuable garlic extract products, supporting innovation and growth in functional foods, health products, cosmetics, and related industries for a shared future.

Appendix: Simplified Garlic Extract Manufacturing Flowchart & Model Specifications

