Ginger Extract Specification Sheet

1. Product Definition

This product is a fine powdered extract made from the rhizome of *Zingiber officinale Roscoe* (Zingiberaceae family) through washing, slicing, extraction, filtration, concentration, drying, grinding and sieving. It retains the characteristic aroma, taste and active ingredients of ginger, with no preservatives, pigments or flavors added. It is widely used in food, pharmaceutical, daily chemical and other fields, complies with international food supplement and raw material standards, and is safe for consumption.

2. Basic Product Information

- Product Name: Ginger Extract
- English Name: Ginger Extract
- Latin Name: *Zingiber officinale Roscoe*
- INCI Name: Zingiber Officinale (Ginger) Root Extract
- CAS No.: 84696-15-1
- EN No.: 283-501-9
- UN No.: None (Non-dangerous goods, no corresponding UN number)
- Part Used: Rhizome
- Extraction Solvent: Food-grade ethanol/water
- Specification: Gingerols 5% (HPLC), customizable from 1% to 20%
- Extraction Ratio: 10:1 (10 parts of raw ginger yield 1 part of extract)

3. Characteristics

- Appearance: Light yellow to brownish yellow fine powder
- Odor: Characteristic ginger aroma, no off-odor
- Taste: Pungent, consistent with ginger characteristics
- Solubility: Freely soluble in ethanol, soluble in hot water

4. Active Ingredients

Test Method: HPLC (ISO 13685)

- Total Gingerols: ≥ 5.0%
- 6-Gingerol: ≥ 3.0%
- 8-Gingerol: ≥ 1.0%
- 10-Gingerol: ≥ 1.0%
- Shogaols: ≤ 1.0%
- Volatile Oil: ≥ 1.5%

5. Physicochemical Indicators

- Particle Size: 95% pass through 80 mesh, Test Method: Sieving
- Loss on Drying: ≤ 5.0%, Test Method: 105℃, 2 h
- Residue on Ignition: ≤ 5.0%, Test Method: Gravimetric method after ignition
- Heavy Metals: ≤ 10 mg/kg, Test Method: AAS/ICP-MS
- Lead (Pb): ≤ 2.0 mg/kg, Test Method: AAS/ICP-MS
- Arsenic (As): ≤ 1.0 mg/kg, Test Method: AAS/ICP-MS
- Cadmium (Cd): ≤ 0.1 mg/kg, Test Method: AAS/ICP-MS
- Mercury (Hg): ≤ 0.1 mg/kg, Test Method: AAS/ICP-MS
- Residual Solvents: Complies with EP/USP standards, Test Method: GC

6. Microbiological Indicators

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

- Total Plate Count: ≤ 1000 CFU/g
- Molds & Yeasts: ≤ 100 CFU/g
- *Escherichia coli*: Negative

- *Salmonella*: Negative
- *Staphylococcus aureus*: Negative

7. Nutritional Composition (per 100 g)

Item	Content	NRV%
Energy	399 kJ	5%
Protein	15.8 g	32%
Fat	8.2 g	14%
Saturated Fat	1.6 g	8%
Carbohydrates	65.5 g	22%
Sugars	3.1 g	3%
Dietary Fiber	12.3 g	49%
Sodium	18 mg	1%

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

8. Application Fields

8.1 Food Industry

Used as a functional ingredient in health foods, functional beverages, condiments, meat products, bakery foods and snack foods to enhance ginger flavor, and provide antioxidant and gastrointestinal-regulating functions, meeting modern healthy dietary demands.

8.2 Pharmaceutical Industry

Used in preparations for anti-inflammatory, antioxidant, gastrointestinal regulation, antiemetic and blood circulation improvement. It can be used as a raw material for traditional Chinese medicine extracts or excipients for western medicines, complying with USP and EP pharmacopoeia standards, with clear scientific evidence for safety and efficacy.

8.3 Daily Chemical Industry

Added to 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, meeting the R&D needs of natural and mild daily chemicals.

8.4 Other Fields

Used in feed additives (improving livestock gastrointestinal function and immunity) and health product raw materials (dietary supplements), with a wide range of applications complying with multi-industry regulatory requirements.

9. Compliance Statement

9.1 Standards

- International: ISO 13685, ISO 1003
- EU & US: USP, EP, FDA 21 CFR, EU Food Supplement Directive 2002/46/EC
- China: GB/T 30383-2013 (Ginger), GB 28050-2011 (Nutrition Labeling)

9.2 Certifications

ISO 9001, HACCP, Kosher, Halal, Organic (optional, supporting documents available upon request)

9.3 Additional Claims

- Non-GMO
- Allergen-free
- Non-irradiated
- No preservatives, pigments or flavors

10. Packaging & Storage

- Packaging: 1 kg/aluminum foil bag; 25 kg/fiber drum (double PE liner)
- Storage: Sealed, stored in a cool, dry, ventilated place, away from strong light and high temperature
- Shelf Life: 24 months (unopened original package)

11. Key Points of International Standards

1. **Active Ingredients**: Gingerols are the core QC index; 6-gingerol is the characteristic marker, required by EU and US customers. Test methods and limits can be adjusted as required.
2. **Heavy Metals / Microbiology**: Strictly comply with EU 1881/2006 and FDA cGMP limits, critical for export customs clearance. Third-party test reports are available.
3. **Documentation**: COA, MSDS, botanical origin certificate and third-party reports are required for export, customizable for target markets.

Appendix: Ginger Extract Specifications & Types

Ginger extract is classified by **active ingredient content, solubility, physical form and application**.

1. By Active Ingredient Content (Core Grade)

- **Regular Grade**: Total gingerols 1%–5%, for food seasoning, feed, basic daily chemicals; traditional water/ethanol extraction.
- **Medium Grade**: Total gingerols 5%–10%, for functional food ingredients, basic health foods & cosmetics; enzymatic + ultrasonic extraction.
- **High Grade**: Total gingerols 10%–20%, for high-end health products, pharmaceutical excipients, premium cosmetics; membrane separation + low-temperature freeze-drying.
- **Extra Grade (Monomer)**: Total gingerols ≥20% or single gingerol ≥15%, for pharmaceutical and high-end cosmetic core ingredients; supercritical CO_2 extraction + fine purification.

2. By Solubility

- **Water-Soluble Ginger Extract**: Water solubility ≥98%, total gingerols 3%–10%; for beverages, oral liquids, toners.
- **Lipid-Soluble Ginger Extract**: Lipid solubility ≥95%, total gingerols 6%–20%; for skin care, external patches, fat-soluble foods.
- **Universal (Dual-Soluble)**: Water solubility ≥80%, lipid solubility ≥75%, total gingerols 1%–8%; for general food, daily chemicals and feed.

3. By Physical Form

- **Powder (Most Common)**: 80–200 mesh, good flowability; easy for storage, transport and dosing.
- **Paste**: Solid content 50%–70%; for liquid drinks, external ointments, feed.
- **Liquid**: Total gingerols 0.5%–3%; ready-to-use for oral liquids, skin toners, liquid feed.

- **Granule**: 20–40 mesh, fast dissolving; for solid drinks, granule health products.

4. By Application Grade

- **Food Grade**: Total gingerols 1%–5%, complies with national food standards.
- **Health Food Grade**: Total gingerols 5%–15%, supports functional claims.
- **Cosmetic Grade**: Total gingerols 3%–10%, safe and non-irritating.
- **Pharmaceutical Grade**: Total gingerols ≥10%, complies with pharmacopoeia standards.
- **Feed Grade**: Total gingerols 1%–3%, cost-effective for antibacterial and growth-promoting use.

Supplementary Note

Specifications including particle size, gingerol content and moisture can be customized. Core specifications (gingerol content, solubility) determine application and price, closely related to production processes (water extraction, ethanol extraction, enzymatic hydrolysis, supercritical CO_2, etc.).

Manufacturing Process of Ginger Extract

1. Process Overview

Ginger extract is a standardized product obtained from dried ginger rhizomes via physical and chemical treatments to target active ingredients: gingerols, essential oil, polysaccharides, etc. Processes focus on high extraction rate, stability and safety, with low energy consumption and maximum retention of actives. Main processes include traditional and modern assisted methods, customizable for different applications.

2. Raw Material Preparation & Pretreatment

2.1 Raw Material Requirements

High-quality fresh ginger, intact, pest-free, meeting heavy metal and pesticide residue limits. Water complies with drinking water standards.

2.2 Pretreatment Flow

1. **Washing**: High-pressure spraying + manual sorting to remove mud and damaged parts.
2. **Peeling**: Optional; peeling improves purity for high-grade products.
3. **Grinding**: Sliced or coarsely ground to break cell walls, low temperature to avoid oxidation.
4. **Auxiliary Treatment (Optional)**: Enzymolysis or freezing to improve extraction efficiency.

3. Core Extraction Processes

3.1 Water Extraction (Traditional, Food Grade)

Low cost, eco-friendly, no organic solvent residue.

- Uses purified water; heated and stirred; filtrate separated from residue.
- Pros: Low cost, safe. Cons: Lower yield, higher impurities.

3.2 Organic Solvent Extraction (Mainstream, High Purity)

High solubility for lipophilic actives; ethanol commonly used.

- Closed equipment, solvent recovered and reused.
- Pros: High yield, targeted extraction. Cons: Possible solvent residue, higher cost.

3.3 Ultrasonic Assisted Extraction (Modern Upgrade)

Uses cavitation to break cell walls; combined with water or solvent extraction.

- Pros: Short time, high yield, low energy. Cons: Higher equipment investment.

3.4 Supercritical CO_2 Extraction (High-End)

For high-value lipophilic ingredients; no solvent residue.

- Pros: Highest purity, full activity retention. Cons: High investment and energy cost.

3.5 Combined Extraction (Industrial Preferred)

Pretreatment + multiple processes for comprehensive utilization and high added value.

4. Separation & Purification

- **Filtration & Centrifugation**: Remove suspended solids.
- **Clarification & Impurity Removal**:
  - Alcohol Precipitation: For water extracts.
  - Activated Carbon: Decolorization and deodorization.
  - Membrane Separation: High precision for high-grade products.
- **Column Chromatography (Optional)**: For pharmaceutical-grade high purity.

5. Concentration & Drying

5.1 Concentration

Vacuum concentration under reduced temperature to protect actives.

- Water extracts: Vacuum concentration to paste.
- Solvent extracts: Solvent recovered first, then concentrated.

5.2 Drying

- **Spray Drying**: Mainstream for powder, large-scale, good flowability.
- **Freeze Drying**: Premium, maximum activity retention.

- **Vacuum Drying**: For high-viscosity pastes.

5.3 Post-Drying Treatment

Grinding and sieving to uniform particle size; sealed to prevent moisture absorption.

6. Finished Product Handling & Packaging

1. **Blending & Homogenization**: Ensure uniform composition and particle size.
2. **Quality Inspection**: Sensory, physicochemical, microbiological and safety tests.
3. **Packaging & Storage**: Nitrogen-filled sealed packaging; stored cool, dry and ventilated.

7. Key Control Points (KCP) & Process Optimization

- Raw material, extraction, purification, concentration/drying and storage.
- Optimization: Improve yield, reduce cost, enhance purity, ensure stability.

8. Process Comparison

Extraction Process	**Yield**	**Purity**	**Cost**	**Application**
Water Extraction	Medium	Low	Lowest	Food-grade
Organic Solvent	High	Medium	Medium	Food, cosmetic
Ultrasonic Assisted	High	Medium	Medium-high	Large-scale high-efficiency
Supercritical CO_2	Highest	Highest	Highest	Pharmaceutical, high-end cosmetic

9. Conclusion

Ginger extract production is customized by raw material, purpose and capacity. Traditional processes support large-scale low-cost production; modern technologies improve efficiency and purity for high-end markets. Future development will focus on high efficiency, energy saving, environmental protection and high added value, promoting standardized and large-scale industry growth.

Appendix：Manufacturing Process Flowchart of Ginger Extract

