Specification Sheet for Kudzu Root Extract

1.1 Product Definition

This product is a fine powdered extract manufactured from the dried roots of *Pueraria lobata (Willd.) Ohwi* (Leguminosae) through processes including washing, slicing, crushing, water/ethanol extraction, concentration, purification, drying, pulverization, and sieving. It retains key active ingredients such as puerarin, total isoflavones, daidzin, and daidzein, with no added preservatives, colorants, or fragrances. It is widely applicable in foods, health products, dietary supplements, cosmetics, and special dietary foods, complying with international food ingredient access standards and safety regulations, featuring high safety, controllability, and stability.

1.2 Basic Product Information

- Product Name: Kudzu Root Extract
- English Name: Kudzu Root Extract / Pueraria Lobata Extract
- Botanical Name: *Pueraria lobata (Willd.) Ohwi*
- INCI Name: Pueraria Lobata Root Extract
- CAS No.: 84929-51-1
- EN No.: 284-536-2
- UN No.: Not applicable (non-dangerous goods, no corresponding UN number)
- Part Used: Dried root
- Extraction Solvents: Food-grade purified water, food-grade ethanol (selected according to application scenarios)
- Specifications:
    - Puerarin: ≥2.4%, 5%, 10%, 20%, 30%, 40%, 60%, 98% (determined by HPLC)
    - Total Isoflavones: ≥10%, 20%, 30%, 40%, 60%, 80% (determined by UV)

The above indicators can be customized based on customer application scenarios.

- Extraction Ratios: 5:1, 10:1, 20:1, 30:1, 50:1; customization supported within 5:1~100:1

1.3 Organoleptic Properties

- Appearance: Light yellow to brownish-yellow fine powder, free from caking and visible foreign impurities
- Odor: Characteristic odor of kudzu root, no pungent, moldy, or rancid odors
- Taste: Slightly sweet and bitter, consistent with the inherent characteristics of kudzu root, no off-taste
- Solubility: Soluble in warm water; water-soluble grade has solubility ≥95.0% at 25℃, with excellent dispersibility, suitable for direct dissolution in food processing

1.4 Active Ingredients

- Puerarin: ≥2.4%~98% (customizable), Test Method: HPLC
- Total Isoflavones: ≥10%~80% (customizable), Test Method: UV
- Daidzin: ≥0.5%~5% (customizable), Test Method: HPLC
- Daidzein: ≥0.3%~3% (customizable), Test Method: HPLC
- Total Polysaccharides: ≥5.0% (dry basis), Test Method: Phenol-Sulfuric Acid Method
- Protein (dry basis): ≥8.0%, Test Method: Kjeldahl Method (GB 5009.5)

1.5 Physicochemical Indicators

- Particle Size: 95% passes through 100 mesh; 80~120 mesh customizable, Test Method: Sieving Method (GB/T 5507)
- Loss on Drying: ≤7.0%, Test Method: 105℃ for 2h (GB 5009.3)
- Residue on Ignition (Ash): ≤5.0%, Test Method: Gravimetric Method (GB 5009.4)
- Total Heavy Metals: ≤20 mg/kg, Test Method: AAS/ICP-MS
- Lead (Pb): ≤0.5 mg/kg, Test Method: AAS/ICP-MS (GB 5009.12)

- Arsenic (As): ≤0.5 mg/kg, Test Method: AAS/ICP-MS (GB 5009.11)
- Cadmium (Cd): ≤0.2 mg/kg, Test Method: AAS/ICP-MS (GB 5009.15)
- Mercury (Hg): ≤0.1 mg/kg, Test Method: AAS/ICP-MS (GB 5009.17)
- Residual Solvents: Ethanol ≤0.5%, no methanol residue, complying with food-grade standards, Test Method: GC
- Pesticide Residues: BHC and DDT ≤0.05 mg/kg each, complying with GB 2763

1.6 Microbiological Indicators

Compliant with U.S. FDA, EU EFSA food-grade standards and China National Food Safety Standards

- Total Plate Count: ≤10000 CFU/g, Test Method: GB 4789.2
- Molds & Yeasts: ≤50 CFU/g, Test Method: GB 4789.15
- Coliforms: ≤100 CFU/g, Test Method: GB 4789.3
- Salmonella: Negative / 25g, Test Method: GB 4789.4
- *Staphylococcus aureus*: ≤100 CFU/g, Test Method: GB 4789.10

1.7 Nutritional Composition (per 100g, dry basis)

Item	Content	NRV% (Reference)
Energy	1420 kJ	17%
Protein	8.2 g	14%
Fat	1.5 g	3%
Carbohydrates	72.5 g	24%
Dietary Fiber	12.8 g	51%
Sodium	12 mg	1%

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

1.8 Application Fields

1.8.1 Food Industry

Can be used as a functional ingredient in solid beverages, compressed tablets, meal replacement powders, baked goods, cereal foods, and plant beverages. It exerts functions such as anti-alcohol and liver protection, antioxidation, improving microcirculation, and regulating endocrine, aligning with the trend of natural and healthy food R&D and meeting consumer demand for liver-protective, antioxidant, and endocrine-regulating products.

1.8.2 Health Products / Dietary Supplements

Used in the production of dietary supplements for liver protection, cardiovascular and cerebrovascular care, antioxidation, and menopausal syndrome regulation. It serves as a core raw material for capsules, granules, oral liquids, and tablets, with stable active ingredient content, complying with USP, EP pharmacopoeial standards and Chinese health product raw material requirements, suitable for the development of high-end functional products.

1.8.3 Cosmetics Industry

Applicable in skin creams, essences, facial masks, and hair care products. The antioxidant, anti-aging, repairing, and skin barrier-regulating properties of kudzu isoflavones enhance product differentiation, conforming to the trend of natural botanical skincare.

1.8.4 Other Fields

Used as a functional ingredient in special dietary foods, medicinal and edible formula foods, and traditional tonics. Customized active indicators and process parameters are available for different industry scenarios.

1.9 Compliance Statement

1.9.1 Standard Basis

- International: ISO 20483, ISO 6496
- EU & US: USP, EP, FDA 21 CFR, EU Food Supplements Directive 2002/46/EC
- China: Pharmacopoeia of the People's Republic of China (2025 Edition Vol. I), GB 14881, GB 28050-2011, GB 2760

1.9.2 Certifications

ISO 9001, HACCP, Kosher, Halal, Organic (optional; ECOCERT, USDA Organic, etc., available upon customer request)

1.9.3 Additional Statements

- Non-GMO
- Allergen-free (compliant with EU allergen directives, no common allergens)
- Non-irradiated
- No preservatives, colorants, fragrances, or harmful solvent residues
- No animal-derived ingredients, suitable for vegetarian and halal applications

1.10 Packaging and Storage

- Packaging: 1kg/5kg aluminum foil bags; 25kg fiber drums (double PE liner). Small packaging customizable. Oxygen scavengers included, well-sealed to prevent moisture absorption and oxidation.
- Storage: Sealed, stored in a cool, dry, ventilated area, away from strong light, high temperature (>30℃), odors, and toxic/hazardous substances to avoid moisture, oxidation, and microbial contamination.
- Shelf Life: 24 months (unopened original packaging); use within 30 days after opening with proper sealing.

1.11 Key Points of International Market Standards

- Active Ingredients: Puerarin and total isoflavones are core international QC indicators, mandatory for EU, US, Japanese, and Korean customers. Test methods and limits can be adjusted as required.
- Heavy Metals / Microbes: Strictly comply with EU 1881/2006 and FDA cGMP limits, critical for global export. CMA/CNAS accredited third-party test reports are available.
- Documentation: Export documents include COA, MSDS, botanical origin certificate, and third-party test reports, customizable for target markets (EU,

US, Southeast Asia, Japan, Korea) to ensure smooth customs clearance.

Appendix: Specifications Classified by Application Scenario

1. **Food Grade (GE-F01)**
   - Application: Solid beverages, compressed tablets, condiments, baked goods, plant beverages, etc.
   - Specification: Water extraction only, solvent-free, puerarin ≥2.4%~10%, mild odor, 100~120 mesh, excellent instant solubility, directly usable, food-grade compliant.

2. **Health Product Grade (GE-H02)**
   - Application: Dietary supplements, liver-protective capsules, cardiovascular oral liquids, granules, etc.
   - Specification: Water extraction & ethanol precipitation + macroporous resin purification, puerarin ≥20%~40%, total isoflavones ≥30%~60%, high purity and activity, no harmful impurities, complying with strict health product standards.

3. **Cosmetic Grade (GE-C03)**
   - Application: Essences, facial masks, creams, hair care products, etc.
   - Specification: Low-temperature extraction + decolorization refining, puerarin ≥10%~30%, light color, mild odor, heavy metal-safe, complying with cosmetic raw material safety regulations.

4. **High-End Custom Grade (GE-C04)**
   - Application: High-end supplements, special dietary foods, pharmaceutical intermediates, high-purity monomers, etc.
   - Specification: Preparative chromatography purification, puerarin 60%~98%, total isoflavones 60%~90%, solvent-free, ultra-high purity; particle size, solubility, clarity customizable.

Analysis of Kudzu Root Extract Manufacturing Process

As a classic medicinal and edible herb, kudzu root extract is rich in puerarin, daidzin, daidzein, total isoflavones, and polysaccharides. It is widely used in functional foods, health products, cosmetics, and special dietary foods due to its excellent effects in anti-alcohol liver protection, antioxidation, microcirculation improvement, endocrine regulation, and cardiovascular protection. This document provides an in-depth analysis of the full manufacturing process, from raw material sourcing to finished product delivery, systematically presenting process principles, core technologies, quality control standards, and product advantages, demonstrating professional production capabilities and technical barriers while clearly conveying core product value, providing customers with comprehensive and reliable process references for selecting high-quality natural kudzu root ingredients.

Our kudzu root extract adopts a full modern production line: **selected authentic raw materials + low-temperature pretreatment + targeted extraction + macroporous resin purification + membrane separation refining + deep decolorization & deodorization + low-temperature drying**. Active heat-sensitive ingredients such as puerarin are maximally preserved under mild conditions, while ineffective impurities (starch, resins, pigments, crude fibers) are rigorously removed. Production strictly adheres to food/health product/cosmetic-grade standards with full-process quality control, ensuring high purity, high activity, no harmful residues, and excellent stability for use in functional foods, health products, solid beverages, and cosmetics.

I. Raw Material Control: Select Authentic Kudzu, Secure Activity Foundation

Raw material quality is the core premise for activity and safety. We adhere to the principle of **source selection, authentic control, strict access**, establishing a full-chain raw material management system covering botanical origin, production area, harvesting, and testing to ensure high-standard raw materials.

1.1 Botanical Origin & Harvest Selection

Dried roots of authentic *Pueraria lobata (Willd.) Ohwi* aged ≥3 years are used, rejecting moldy, worm-eaten, hollow, or highly lignified materials. High-quality roots with sufficient starch, low fiber, and high puerarin content are selected, with isoflavone accumulation over 50% higher than one-year-old roots. Naturally cultivated, non-GMO, ensuring efficacy and stability.

1.2 Direct Sourcing from Authentic Producing Areas

Selected from authentic kudzu cultivation regions with superior ecology, fertile soil, sufficient sunlight, and no industrial pollution. Irrigation water meets drinking standards, eliminating pesticide and heavy metal risks. Adopt **direct harvest + immediate slicing & low-temperature drying** to avoid fermentation, mold, and active ingredient loss.

1.3 Incoming Raw Material Inspection (Batch-by-Batch)

- Organoleptic: No mold, worms, sediment, black heart, off-odor, or impurities
- Physicochemical: Moisture ≤12%, ash ≤8%
- Safety: Pesticide residues comply with EU and national standards; heavy metals meet EFSA, FDA, and GB limits
- Activity: Minimum puerarin content guaranteed

Non-conforming materials are rejected to eliminate quality risks at the source.

II. Pretreatment: Cleaning & Wall Breaking, Mild Activity Preservation

Pretreatment solves traditional pain points: low extraction rate, high starch, dark color, and poor taste, removing impurities while protecting heat-sensitive isoflavones.

2.1 Washing & Purification

Triple cleaning: **high-pressure countercurrent spraying (<25℃) + mechanical screening + manual sorting** to remove sand, mud, root hairs, moldy parts, and black hearts. Rapid draining prevents active loss from prolonged soaking.

2.2 Slicing, Crushing & Wall Breaking

Sliced to 0.3~0.5cm, then crushed to 40~80 mesh at ≤40℃. Mild breaking increases surface area, breaks cell walls, improves extraction efficiency, and avoids thermal degradation. Sealed storage to prevent oxidation.

III. Core Extraction: Multi-Mode Targeted Extraction

Abandon traditional high-temperature rough extraction; adopt a modern flexible system balancing efficiency and activity preservation.

3.1 Low-Temperature Purified Water Extraction (Food Grade Mainstream)

For solvent-free applications (solid beverages, tablets), using purified water at material-liquid ratio 1:8~1:15, 40~60℃, 2~3 cycles ×1~2h, low-speed stirring.

- Advantage: Green, no organic residues, mild odor and taste.

3.2 Water-Ethanol Targeted Extraction (Health Product Grade Mainstream)

For high-activity supplements, using 30%~70% food-grade ethanol at 1:10~1:12, 60~80℃, 2 cycles ×1.5h, closed stirring.

- Advantage: Comprehensive active dissolution, ethanol recyclable, residue controllable.

3.3 Modern Assisted Extraction (High-End)

- Ultrasound-assisted: Cell wall cavitation, time reduced by 50%, yield increased by >25%
- Low-temperature negative pressure: <60℃, -0.08~-0.09MPa, active retention ≥90%
- Enzymatic extraction (custom): Mild wall breaking, targeted release, chemical-free.

IV. Separation & Purification: Multi-Stage Refining

Extract contains starch, resin, pigment, fiber, and colloid. Multi-stage purification ensures high purity, solubility, and safety.

4.1 Multi-Stage Filtration & Centrifugation

Plate-frame filtration removes dregs; high-speed centrifugation (4000~6000r/min) removes fine impurities, starch, and colloid for clarified extract.

4.2 Macroporous Resin Purification (Core Technology)

Using AB-8, D101 resins with high isoflavone selectivity:

1. Adsorption: 1~2BV/h loading
2. Water washing: Removes sugars, starch, salts
3. Ethanol elution: 50%~70% ethanol collects active fraction
4. Regeneration: Acid-base cycling, reusable

4.3 Membrane Separation Purification

Ultrafiltration retains macromolecules; nanofiltration concentrates actives, desalts, decolorizes, and purifies. Physical separation at room temperature, no flocculants, no secondary pollution.

4.4 Decolorization & Deodorization

Low-temperature food-grade activated carbon adsorption (<50℃) removes excess pigment and odor, yielding light yellow to off-white powder with uniform color and mild odor for high-end formulations.

V. Low-Temperature Concentration

Adopt low-temperature negative-pressure dual-effect concentration to protect heat-sensitive ingredients:

- Temperature ≤60℃, no Maillard reaction
- Vacuum: -0.08~-0.09MPa, reduces oxidation
- Solids: 15%~25%, stable batch consistency
- Condensate and ethanol recycled, eco-friendly

VI. Drying Process: Graded Drying

Drying determines flowability, solubility, color, and shelf life.

6.1 Spray Drying (Food/Health Product)

Inlet 160~180℃, outlet 60~80℃, instant drying to 80~120 mesh fine powder, moisture ≤7.0%, 24-month shelf life.

6.2 Vacuum Drying (Small-Batch Custom)

50~60℃, moisture ≤6.0%, uniform particle size, stable activity.

6.3 Freeze Drying (High-End High-Activity)

-40℃ pre-freezing + vacuum sublimation, active retention ≥95%, porous, high solubility, white color, no thermal damage.

6.4 Post-Drying Treatment

Low-temperature pulverization, vibration sieving (80~120 mesh), 3D blending for 20~30min ensures uniformity and stability.

VII. Quality Control System: Full-Chain Management

Key Control Points (KCP) monitored in real time with full records, complying with international and domestic standards.

7.1 Full-Process KCP Monitoring

- Incoming material, pretreatment, extraction, purification, concentration, drying, finished product inspection

7.2 Finished Product Full-Item Testing

Batch testing per ISO, USP, EP, GB standards; CMA/CNAS third-party reports available:

- Active ingredients, physicochemical, safety (heavy metals, pesticides, solvents), microbiology

7.3 Testing Equipment & Team

HPLC, UV, AAS, ICP-MS, microbiological lab, professional team ensuring accurate data.

VIII. Summary of Process Advantages

1. **Activity Advantage**: Full low-temperature process, active retention ≥90% (≥95% high-end)
2. **Quality Advantage**: Multi-stage purification, light color, fast dissolution, no odor
3. **Safety Advantage**: Green process, no residues, compliant with EU/US/CN standards
4. **Stability Advantage**: Standardized QC, consistent batches, long shelf life
5. **Flexibility Advantage**: 4-grade customization (food, health, cosmetic, high-end)
6. **Environmental Advantage**: Water and solvent recycling, sustainable production

IX. Conclusion

Kudzu root extract quality relies on precise process control. Guided by **professionalism, rigor, naturality, and safety**, we specialize in modern kudzu extraction from authentic sourcing to low-temperature drying, upholding the commitment to **high activity, no residues, purity and safety**.

We will continuously optimize processes and upgrade quality to provide global customers with stable, high-value kudzu root extract, supporting innovation and market growth in functional foods, health products, cosmetics, and special dietary foods.

Appendix: Simplified Flow Chart of Kudzu Root Extract Manufacturing Process

