Phycocyanin Product Specification Sheet

Phycocyanin (C-Phycocyanin, abbreviated as **C-PC**) is a natural functional phycobiliprotein prepared by selecting high-quality cultivated **Arthrospira platensis** as the core raw material, adopting processes including low-temperature targeted cell wall breaking, pure water extraction, membrane separation and purification, and low-temperature vacuum drying. It is highly enriched with natural active ingredients of phycocyanin, and possesses multiple properties such as **natural coloring, nutritional fortification, antioxidant activity and immune regulation**. Retaining the natural nutritional activity of microalgae, it features high purity, strong stability and wide adaptability. It is a premium natural raw material widely applied in high-end health food, functional food, high-end beverages, cosmetics and skincare, pharmaceutical scientific research and feed additives. All indicators comply with national standards and international authoritative testing criteria, aligning with the global development trend of clean labels.

Ⅰ. Basic Information

- Chinese Name：藻蓝蛋白、C - 藻蓝蛋白、钝顶螺旋藻藻蓝蛋白
- English Name：C-Phycocyanin, Phycocyanin (C-PC)
- CAS No.：11016-15-2
- INS No.：None
- CNS No.：08.132 (Food Additive / Natural Colorant / Nutrient Fortifier, complying with **GB 2760-2024**)
- UN No.：None (Non-dangerous goods, general cargo transportation)
- Product Type：Food functional raw material, natural microalgae extract, nutrient fortifier, natural coloring raw material, cosmetic raw material, pharmaceutical and scientific research raw material
- Executive Standards：**GB 2760-2024**, **GB 19643-2016**, **GB 2762-2022**, **GB 14884-2016**, T/QMIS Technical Specification for Preparation of Spirulina Phycocyanin, US FDA GRAS (GRN 486), EU EFSA (EFSA Journal 2013), JECFA 97th Session Standard, FCC 12; complies with special quality control specifications for microalgae extracts
- Production Process：Adopting fresh algal biomass of standardized and cleanly cultivated *Arthrospira platensis* as raw material, the process flow is as follows: Harvesting → Pure Water Cleaning (in line with **GB 5749-2022** Drinking Water Standard) → Low-temperature Targeted Cell Wall Breaking (≤45°C) → Pure Water Extraction → Membrane Separation & Purification → Low-temperature Vacuum Drying (≤50°C) → Fine Crushing → Aseptic Sieving → Sterilization → Vacuum Nitrogen-filled Packaging. The whole process adopts low-temperature physical technology without addition of chemical solvents, maximally retaining heat-sensitive active substances of phycocyanin with **activity retention rate ≥96%**. It features no solvent residue and no nutritional loss, fully meeting clean label requirements.

Ⅱ. Appearance Characteristics

1. Appearance Properties

Bright blue to sky-blue fine powder with loose and delicate texture, no caking, agglomeration, mildew or insect infestation. No visible impurities such as sediment and fiber to the naked eye, with excellent powder uniformity and

consistent color tone.

2. Odor & Taste

Possesses the unique fresh algal fragrance of *Arthrospira platensis*; no rancid, burnt, fishy, bitter, moldy or other peculiar odors, mild and non-irritating in taste.

3. Solubility

Easily soluble in purified water, rapidly dissolving to form a transparent and uniform sky-blue solution with slight natural fluorescence. Slightly soluble in low-concentration ethanol (≤10%), insoluble in organic solvents such as grease, acetone and ether. The aqueous solution is bright and uniform without precipitation or suspended solids.

4. Particle Size Characteristics

Regular grade: 100 mesh / 120 mesh (100% passing sieve); refined high-purity grade: 200–300 mesh. The ultra-fine powder greatly improves water solubility, dispersibility and absorbability, suitable for high-end refined products and liquid formulations.

5. pH Characteristics

1% aqueous solution pH: 6.0–7.5, mildly weakly alkaline. Compatible with most food, beverage, skincare and pharmaceutical formulation systems, with good compatibility with various ingredients.

6. Stability

Stable under dry and sealed conditions; resistant to weak acid and weak alkali (pH 4.5–9.5); short-term heat resistance ≤80℃ (10min), adaptable to conventional food processing technologies. Strong light, high temperature and long-term open storage will cause degradation of active ingredients and solution discoloration. Light-proof storage and application are recommended; addition of sodium citrate and trehalose can enhance stability.

7. Hygroscopicity

Moderate hygroscopicity; stable and not easy to cake in dry and airtight environment, prone to moisture absorption and agglomeration in high humidity environment (relative humidity ＞60%). Strict humidity control is required during production, processing and storage.

8. Bulk Density

0.30–0.50 g/mL with good powder bulkiness. Suitable for various processing technologies such as tableting, filling, powder sub-packaging and liquid blending, avoiding equipment blockage caused by caking.

Ⅲ. Physical and Chemical Indexes (Food Grade, Dry Basis)

- Phycocyanin (UV Method, A620/A280)：≥25% (Regular Grade), ≥35% (High-content Grade), ≥50% (High-purity Refined Grade); Purity ≥3.5 (Food Grade), ≥4.0 (High-end / Pharmaceutical Grade)
- Color Value (E10%, 618nm)：≥100 (Regular Grade), ≥180 (General Grade), ≥250 (High-purity Grade)
- Total Protein (Dry Basis)：≥45% (Regular Grade), ≥60% (High-content Grade), ≥75% (High-purity Refined Grade)
- β-Carotene：≥500 mg/kg
- Chlorophyll a：≥2500 mg/kg
- Moisture：≤6.0%
- Ash Content：≤8.0%
- pH (1% Aqueous Solution)：6.0–7.5

- Particle Size: 100/120/200/300 mesh (100% Passing Sieve)
- Heavy Metals (Calculated as Pb): ≤0.3 mg/kg
- Total Arsenic (Calculated as As): ≤0.2 mg/kg
- Mercury (Hg): ≤0.01 mg/kg
- Cadmium (Cd): ≤0.1 mg/kg
- Microcystin: Not Detected
- Pesticide Residues: BHC and DDT both ≤0.03 mg/kg, no excessive pesticide residues
- Solvent Residue: Not Detected (Pure physical extraction process, no chemical solvents added)

Ⅳ. Microbiological Indexes

- Total Aerobic Bacterial Count: ≤1×10^3 CFU/g
- Molds & Yeasts: ≤100 CFU/g
- Coliforms: ≤10 MPN/100g
- Salmonella: Not Detected / 25g
- Shigella: Not Detected / 25g
- Staphylococcus Aureus: Not Detected / 25g
- Bile-tolerant Gram-negative Bacteria: ≤100 CFU/g
- Pathogenic Bacteria: Not Detected (complying with **GB 4789** series standards)

Ⅴ. Application Fields

High-end Health Food

Health capsules, tablets, concentrated powder, functional oral liquid, compound nutritional dietary supplements, immune-regulating nutrition packs. Can be added as a characteristic ingredient to support functional claims such as immune regulation and antioxidant activity (in compliance with relevant regulatory requirements).

High-end Functional Food

High-end meal replacement powder, functional solid beverage, sugar-free compressed candy, sports nutrition food, high-end baking ingredients, nutritional fortification for dairy products (yogurt, cheese, milk jelly). It performs dual functions of natural blue coloring and nutritional fortification.

Beverage Industry

High-end fruit and vegetable functional drinks, plant protein drinks, sports hydration drinks, light luxury bottled nutritional water, beer and tea beverages. Only 0.08%-0.1% addition can present ideal blue color, compatible with various beverage formulas without peculiar odor interference.

Medicine & Scientific Research

Biological fluorescent probes, diagnostic reagents, raw materials for photodynamic therapy, anti-inflammatory preparations, carrier materials. High-purity grade products can be applied in scientific research fields such as cell labeling and medical testing.

Cosmetics & Daily Chemicals

Antioxidant facial masks, soothing and repairing essences, moisturizing skincare lotions, nourishing hair care products, blue-toned makeup products. Relying on the antioxidant, anti-inflammatory and repairing properties of

phycocyanin, it realizes skin stability and resistance to oxidative damage, natural, safe and non-irritating.

Aquaculture / Feed / Pet Industry

Color enhancement and growth promotion for aquatic seedlings, natural color-enhancing feed for ornamental fish, livestock and poultry nutritional additives, raw materials for high-end pet functional snacks. It improves body immunity, enhances hair color and body condition, with natural and residue-free features.

Ⅵ. Product Advantages

Highly Concentrated Active Ingredients

Compared with ordinary spirulina powder, the purity of phycocyanin is multiplied and enriched with invalid impurities removed, delivering stronger functionality. As the core active ingredient, phycocyanin content can reach 25%-50% of dry weight, meeting the demand of high-end refined products.

Excellent Water Solubility

The low-temperature extraction and purification process removes crude fiber and invalid impurities. The fine powder dissolves easily without precipitation or suspended solids, instant soluble in cold water, perfectly suitable for liquid beverages, skincare essences and all kinds of liquid formulations.

Natural Antioxidation & Anti-inflammation

High-content phycocyanin acts as a natural antioxidant factor with **DPPH scavenging rate ≥80%**, capable of eliminating free radicals, soothing skin and regulating body immunity. It is also rich in B vitamins, β-carotene and other nutritional components, serving as a natural functional active raw material.

Strong Formula Compatibility

Low impurity content, mild pH value, good processing resistance and high stability. Compatible with multiple categories of formulas including food, health products, daily chemicals, pharmaceuticals and feed without incompatibility conflict. Can be compounded with natural pigments such as cochineal red and turmeric.

100% Natural Clean Label

Non-GMO, no irradiation treatment, no artificial pigments, no preservatives, no flavors, no solvent residues. Adopting pure physical low-temperature extraction, it conforms to the global clean label trend. It can be used as a food for coloring purposes in the EU without E number labeling.

Stringent Safety Standards

Strict control on microcystin, heavy metals and pesticide residues, exceeding national standards as well as EU and US import standards. Complete export qualifications to meet compliance requirements of major global markets.

High Activity Retention Rate

The whole process adopts low-temperature extraction and drying (≤50℃) to avoid high-temperature damage to active ingredients. Heat-sensitive nutrients and phycocyanin activity are fully retained with consistent batch stability and fluctuation range ≤5%.

Customizable Multiple Specifications

Customization supported for phycocyanin purity, color value, powder mesh number and dosage form (powder / liquid) to meet differentiated formula needs of different customers. Special products for tea beverages, soft candies, beer and other categories can be developed.

Ⅶ. Quality Assurance

Full Inspection Control per Batch

Each batch of products undergoes full-item inspection including sensory evaluation, physical and chemical indexes, active ingredients, microbiology, heavy metals, toxins and solvent residues before delivery, accompanied by official COA quality inspection reports. Test methods comply with authoritative standards such as SN/T 1113.

Authorized System Certification

The production workshop complies with ISO 22000, HACCP, FSSC 22000 and GMP food safety production systems, implementing full-process clean and sterile control. The production process conforms to special quality control specifications for microalgae extracts.

Diversified Authoritative Qualifications

Complete compliance qualification documents are available including China Organic, USDA Organic, EU Organic, Halal, Kosher and FDA GRAS, satisfying market access requirements at home and abroad.

Full-process Raw Material Traceability

Raw materials are sourced from closed standardized microalgae breeding bases with pure algal species (*Arthrospira platensis*). Breeding water quality complies with **GB 5749-2022** Drinking Water Standard to eliminate pollution and ensure stable and controllable batch quality.

Third-party Authoritative Re-inspection

Re-inspection by domestic and international authoritative testing institutions such as SGS, CTI, PONY and Eurofins is supported with true and verifiable data, ensuring product quality meets customer requirements.

Customized Personalized Specifications

Customized high-purity specifications including 25%-50% phycocyanin, 100-300 mesh powder and different color value grades are available. Formula debugging and application solution guidance are provided to support R&D and production of various high-end products.

Ⅷ. Packaging & Storage

Packaging Specifications

• **Inner Packaging:** Food-grade light-proof aluminum foil bag with vacuum nitrogen-filled sealed packaging, isolating oxygen and light to lock active ingredients and prevent oxidative degradation.

• **Outer Packaging:** 25kg standard food-grade cardboard drum (Φ38×50cm) lined with food-grade PE bag; standard equipped with 1kg/5kg/10kg aluminum foil sealed bags for shockproof and damage prevention.

• **Custom Service:** Support 250g/500g small-specification sample packaging, cross-border export neutral unlabeled packaging and customized private label packaging to meet sample trial and export demands.

Storage Conditions

• Store in a cool, dry, ventilated and light-proof warehouse with ambient temperature ≤25℃ and relative humidity ≤55%; keep away from heat sources and humid environments.

• Strictly prohibit mixed storage with toxic, harmful, odorous and corrosive articles to avoid pollution, moisture absorption and deterioration.

Transportation Requirements

• Keep moisture-proof, sun-proof, rain-proof, extrusion-proof and damage-proof during the whole transportation;

avoid high-temperature exposure (transportation temperature ≤30℃).

• Prohibit mixed transportation with toxic, harmful, corrosive and odorous goods to ensure raw material cleanliness and safety; conventional general cargo transportation is acceptable.

Shelf Life

• Unopened sealed state: 24 months (under specified storage conditions).

• After opening, seal and store away from light under refrigeration (2-8℃); it is recommended to use up within 2 months to avoid activity attenuation.

Phycocyanin Nutritional Composition Table

Ⅰ. Nutritional Composition

Basic Nutrition (Per 100g, Dry Basis)

Item	Per 100g	NRV%
Energy	≈290–350 kcal	14.5–17.5%
Protein	45–75 g	90–150%
Fat	2–5 g	3.3–8.3%
— Unsaturated Fatty Acid	1.8–4.2 g	—
Carbohydrates	8–14 g	2.7–4.7%
Dietary Fiber	1.2–3.5 g	4.8–14%
Sodium	≤700 mg	≤35%

Core Active Ingredients

- Phycocyanin: 25–50 g
- Spirulina Polysaccharide: 5–10 g
- Chlorophyll a: 2500–4000 mg
- β-Carotene: 500–1000 mg
- Vitamin B_{12}: 10–25 μg (content is about 3-4 times that of animal liver)

Vitamins

- Vitamin B_1: 1.0–2.5 mg
- Vitamin B_2: 3.5–8.5 mg
- Vitamin E: 20–45 mg
- Total Vitamin A (β-Carotene): 3000–5500 μg RAE (content is about 25-30 times that of carrots)

Minerals

- Calcium: 800–1300 mg
- Iron: 200–500 mg (content is about 18-20 times that of wheat)
- Magnesium: 200–360 mg
- Potassium: 1000–1800 mg
- Zinc: 3.5–7.0 mg
- Selenium: 0.10–0.25 mg

Ⅱ. Labeling Specification

Mandatory Labeling Items

1. Product Name: Phycocyanin (mark purity, color value and powder particle size as required)
2. Executive Standards: **GB 2760-2024**, T/QMIS Technical Specification for Preparation of Spirulina Phycocyanin
3. Ingredients: Phycocyanin (no additional ingredients added)
4. Nutritional Composition Table: Labeled in accordance with **GB 28050-2025** standard specifications
5. Production Date, Batch No., Shelf Life, Storage Conditions
6. Manufacturer Information, SC Food Production License No., Origin

Compliant Claims

High-activity phycocyanin, natural microalgae extract, high-protein nutrition, natural antioxidant, immune regulation, natural coloring, clean label, non-GMO, no solvent residue, no artificial addition, food for coloring purposes (EU region)

Prohibited Claims

• Strictly prohibit labeling medical efficacy (blood sugar reduction, blood pressure reduction, disease treatment, fat loss, anti-inflammatory treatment, etc.)

• Prohibit absolute extreme words (highest, best, top-level, No.1, etc.) and false functional claims