

CERTIFICATE OF ANALYSIS (COA) & HPLC PROFILE

1. GENERAL BATCH INFORMATION

- **Product Name:** Frozen NFC (Not From Concentrate) Ginger Juice
- **Product Code:** PAS-NFC-GIN-200K
- **Botanical Name:** *Zingiber officinale*
- **Batch Number:** PI-NGJ-20260812-04
- **Manufacturing Date:** August 12, 2026
- **Expiry / Best Before:** August 11, 2028
- **Packaging Unit:** 200 kg Aseptic Nitrogen-Flushed Steel Drum
- **Storage Conditions:** Stored and Maintained at $\leq -18^{\circ}\text{C}$ (-0.4°F)
- **Country of Origin:** India

2. ORGANOLEPTIC & PHYSICO-CHEMICAL TEST RESULTS

Parameter	Specification / Acceptance Standard	Analytical Result	Test Method / Protocol	Status
Appearance	Pale yellow-gold opaque liquid	Complies	Visual Inspection	PASS
Odor & Flavor	Fresh, highly pungent ginger aroma; no off-notes	Complies	Sensory Panel	PASS
Brix ($^{\circ}\text{Bx}$ at 20°C)	$4.0^{\circ} - 7.0^{\circ}$ Brix	5.4° Brix	Refractometer (ISO 2173)	PASS
pH Value (at 20°C)	$5.80 - 6.40$	6.12	pH Meter (AOAC 981.12)	PASS
Titratable Acidity	$0.25\% - 0.50\%$ w/w (as Citric Acid)	0.38% w/w	Titrimetric (AOAC 942.15)	PASS
Specific Gravity	$1.015 - 1.035$ g/cm ³	1.024 g/cm ³	Pycnometer Method	PASS
Pulp / Insolubles	$2.0\% - 6.0\%$ v/v	3.8% v/v	Centrifuge (3000 RPM)	PASS
Volatile Oil Content	$\geq 0.35\%$ v/w	0.48% v/w	Clevenger Distillation	PASS

3. MICROBIOLOGICAL QUALITY ANALYSIS

Test Parameter	Specification Limit	Test Result	Reference Standard	Status
Total Plate Count (TPC)	$< 5,000$ CFU/g	320 CFU/g	ISO 4833-1	PASS
Yeast & Moulds	< 500 CFU/g	< 10 CFU/g	ISO 21527-1	PASS
Coliforms	< 10 CFU/g	< 10 CFU/g (Absent)	ISO 4832	PASS
Escherichia coli	Absent in 1g	Absent	ISO 16649-2	PASS
Salmonella spp.	Absent in 25g	Absent	ISO 6579-1	PASS
Listeria monocytogenes	Absent in 25g	Absent	ISO 11290-1	PASS

4. HEAVY METALS & CONTAMINANTS ANALYSIS

Contaminant	Maximum Limit	Test Result	Test Method	Status
Lead (Pb)	≤ 0.10 mg/kg	< 0.01 mg/kg	ICP-MS (AOAC 999.11)	PASS
Arsenic (As)	≤ 0.10 mg/kg	< 0.01 mg/kg	ICP-MS (AOAC 999.11)	PASS
Cadmium (Cd)	≤ 0.05 mg/kg	< 0.005 mg/kg	ICP-MS (AOAC 999.11)	PASS
Mercury (Hg)	≤ 0.01 mg/kg	< 0.002 mg/kg	ICP-MS (AOAC 999.11)	PASS
Pesticide Residues	Below EU / US MRL Limits	Complies (ND)	GC-MS / LC-MS Screen	PASS

5. HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC) PROFILE

Active Pungent Marker Compounds Analysis

- **Column Type:** C18 Reverse-Phase (250 mm × 4.6 mm, 5 µm)
- **Mobile Phase:** Acetonitrile : Water (Gradient Elution)
- **Detection Wavelength:** UV at 280 nm
- **Flow Rate:** 1.0 mL/min
- **Sample Preparation:** Direct methanol extraction of thawed NFC juice supernatant.

Peak No.	Retention Time (Rt, min)	Identification Marker	Target Spec Range	Batch Concentration	Peak Area %
1	6.42	6-Gingerol (<i>Primary active pungency marker</i>)	≥ 0.80 mg/g	1.24 mg/g	64.2%
2	9.15	8-Gingerol	≥ 0.12 mg/g	0.19 mg/g	9.8%
3	12.80	10-Gingerol	≥ 0.18 mg/g	0.27 mg/g	14.1%
4	15.34	6-Shogaol (<i>Thermal degradation marker</i>)	≤ 0.05 mg/g	< 0.01 mg/g	< 0.5%
5	18.02	Zingerone	Trace	0.02 mg/g	1.1%
TOTAL	—	Total Active Gingerols	≥ 1.10 mg/g	1.70 mg/g	89.2%

HPLC Profile Analysis Key Findings:

- **High Pungency Retention:** The primary active biomarker, **6-Gingerol**, shows a high concentration (1.24 mg/g), proving fresh rhizome extraction.
- **Zero Thermal Degradation:** The extremely low level of **6-Shogaol** (<0.01 mg/g) verifies that the juice was cold-pressed without heat application, maintaining true NFC status.

6. FINAL QUALITY VERDICT & AUTHORIZATION

Declaration: Batch No. **PI-NGJ-20260812-04** of Frozen NFC Ginger Juice has been sampled, tested, and analyzed according to international food quality standards. The batch complies fully with all physical, chemical, microbiological, and HPLC active marker specifications.

- **Final Disposition: RELEASED FOR EXPORT & COMMERCIAL USE**

Analyst Signature:

Quality Control Analyst

Passaro Testing Laboratory

Approved By:

Head of Quality Assurance

Passaro International, Chennai, India

Date: August 19, 2026