

Product Specific Specifications for

Crinkle Cut (CC-13mm)

Table of Contents

1. Introduction
2. Product Overview
3. Quality Specifications
4. Equipment and Performance Requirements
5. Inspection and Testing Procedures
6. Downgrading and Rework Protocols
7. Error Codes and Troubleshooting
8. Maintenance and Calibration
9. Appendices and Examples

1. Introduction

This document delineates the detailed product-specific quality and operational specifications for the Crinkle Cut (CC-13mm) SKU. It serves as a standard reference for quality assurance, process optimization, and equipment calibration within manufacturing operations. Adherence to these specifications ensures product consistency, regulatory compliance, and optimal equipment performance.

It is applicable to all personnel involved in production, quality control,

maintenance, and supervisory functions related to the CC-13mm SKU. Continuous monitoring and enforcement of these parameters are essential to maintain product integrity and meet customer expectations.

2. Product Overview

The Crinkle Cut (CC-13mm) is a frozen potato product characterized by its distinctive crinkled shape, intended for retail and foodservice markets. It is produced through a specialized cutting process designed to achieve a uniform 13mm width and a consistent crinkle pattern.

Key specifications for this SKU are derived from both industry standards and customer-specific quality benchmarks as outlined in the last six months of operations, including manual references for equipment throughput, efficiency metrics, and defect tolerances.

Equipment Models and Their Rated Throughputs

| Equipment Type | Model | Rated Throughput | Efficiency Threshold |
|------------------|----------|------------------|----------------------|
| Cutting Machine | CUT-2000 | 8.5 t/h | 85% min |
| Frying Equipment | FRY-XL | 6.0 t/h | 80% min |

Regular equipment maintenance, calibration, and operational monitoring are critical to sustaining these throughput levels and ensuring product quality.

3. Quality Specifications

This section specifies the target quality parameters, acceptable deviations, and defect tolerances for the CC-13mm SKU.

3.1. Moisture Content (Dry Matter %)

The target dry matter percentage for the product is **21.8%**. Acceptable variation is within ± 0.3 percentage points, resulting in a tolerance band of 21.5% to 22.1%.

| Parameter | Target Value | Tolerance | Acceptable Range |
|-----------------------|--------------|-------------|------------------|
| Dry Matter Percentage | 21.8% | $\pm 0.3\%$ | 21.5% – 22.1% |

3.2. Defect Level Thresholds

Defect percentages should not exceed the limits specified below. The overall defect rate includes any undesirable surface or structural anomalies.

| Defect Type | Maximum Allowed % | Notes |
|----------------|-------------------|---------------------------------------|
| Surface Cracks | 2.0% | Due to handling or processing defects |
| Broken Pieces | 1.5% | Handling during transfer or packaging |

3.3. Fry Color Range

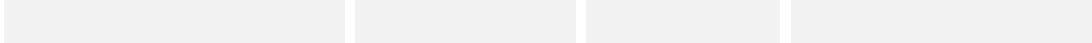
The desired fry color should fall within a standardized range on a calibrated color scale (e.g., ASTM color scale). For CC-13mm:

- **Minimum:** Light Golden Brown (Color grade 3)
- **Maximum:** Deep Golden Brown (Color grade 5)

Color during frying should be evaluated at the end of the process to ensure adherence within this range, minimizing over- or under-coloring issues.

3.4. Tolerance Bands and Acceptable Variations

All parameters must conform to the specified target values within the tolerance thresholds outlined above. Deviations outside these limits require corrective actions as described in subsequent sections.



4. Equipment and Performance Requirements

4.1. Cutting Machine (CNC-2000)

- Must operate at a consistent throughput of at least 8.5 t/h.
- Blade sharpness should be checked every 200 operational hours; dull blades can cause irregular cuts and increased defect rates.
- Maintain blade alignment within ± 0.05 mm tolerances.
- Address common error codes such as:
 - **DOW-PI-4500:** Blade misalignment detected
 - **DOW-PI-4510:** Feed motor overload

4.2. Frying Equipment (FRY-XL)

- Capable of maintaining fry oil temperature within $\pm 2^\circ\text{C}$ of specified target (e.g., 175°C).
- Oil filtration systems should operate continuously to prevent degradation of color and texture.
- Frying duration for optimal color is approximately 3–4 minutes at specified temperature.

4.3. Maintenance and Calibration Protocols

Routine calibrations of measuring instruments, such as moisture analyzers and colorimeters, performed monthly, are mandatory. Maintenance schedules must be logged, and any deviations corrected immediately to prevent quality drifts.

5. Inspection and Testing Procedures

5.1. Raw Material Inspection

Test incoming potatoes for uniformity in size, moisture content, and absence of defects. Implement sampling protocols with statistical confidence levels:

- Sample size: 50 potatoes per batch
- Inspection points: skin integrity, size distribution, and preliminary moisture content

5.2. In-Process Monitoring

Regular checks during production include:

- Monitoring moisture levels using calibrated moisture analyzers after dehydration
- Visual assessment of cut quality every 30 minutes
- Color measurements post-frying using a colorimeter at set intervals

5.3. Final Product Testing

Sample 100 units per batch for:

- Moisture content (target 21.8%, $\pm 0.3\%$)
- Defect levels via visual assessment and statistical sampling
- Color measurement against standard color reference

Documentation of test results must be stored for traceability and quality audits.

5.4. Test Equipment and Calibration

Ensure all testing devices are calibrated according to the manufacturer's instructions every month. Calibration logs should be maintained in the maintenance records.

6. Downgrading and Rework Protocols

6.1. Criteria for Downgrading

Products failing to meet specific quality parameters shall be classified into downgrades based on the nature and extent of defects:

- **Minor non-conformance:** Slight deviations within $\pm 0.3\%$ dry matter, minor surface blemishes, no structural damage. Allowed as Grade B.
- **Major non-conformance:** Defects exceeding tolerances, such as deep cracks or uneven fry color. Classified as Grade C or rejected.

6.2. Rework Procedures

Rework is permitted under the following conditions:

- Moisture content slightly outside the target but within the allowed bump-up or correction process
- Minor surface defects that are removable through screening or manual correction
- Re-frying or additional drying steps to achieve color and texture targets, documented in batch records

Strict reprocessing limits should be adhered to, and re-worked batches must be re-inspected before approval.

6.3. Documentation and Traceability

All downgraded and reworked batches must be documented with reasons, corrective actions taken, and personnel involved, ensuring full traceability.

7. Error Codes and Troubleshooting

7.1. Common Error Codes and Their Significance

| Error Code | Description | Symptoms | Likely Causes | Resolution |
|-------------|-----------------------------|---|--|--|
| DOW-PI-4500 | Blade misalignment detected | Uneven cut edges, increased defect rate | Blade wear or misadjustment | Realign blade using calibration procedure, inspect for wear, replace if needed |
| DOW-PI-4510 | Feed motor overload | Production slowdown, error alert during operation | Foreign object blockage, motor malfunction | Stop equipment, clear obstruction, test motor, replace if faulty |

7.2. Troubleshooting Flowchart

For quick resolution, follow the troubleshooting steps below:

1. Identify error code displayed on control panel
2. Consult troubleshooting table corresponding to the error code
3. Perform visual inspection of equipment components
4. Follow listed corrective actions
5. Verify problem resolution through test runs

Note: Always document all troubleshooting steps and resolutions for future reference and maintenance records.

8. Maintenance and Calibration

8.1. Scheduled Maintenance

Follow the maintenance schedule for all equipment involved in CC-13mm production:

- Blade sharpening and alignment every 200 operational hours
- Fryer oil filtration and temperature sensor calibration monthly
- Motor and gearbox lubrication every 500 hours

8.2. Calibration Procedures

Calibration of critical instruments should be performed using certified standards:

- Moisture analyzers calibrated using standard moisture calibration plates
- Colorimeters calibrated with traceable color reference standards

Calibration logs must be maintained and reviewed periodically during audits.

8.3. Preventive Maintenance and Record Keeping

Maintain detailed logs for all maintenance activities, inspections, and calibration events. Use checklists aligned with equipment manuals to ensure completeness.

9. Appendices and Examples

9.1. Sample Inspection Report

Batch ID: CC13-20231120-001

Date: November 20, 2023

| Parameter | Measured Value | Specification | Status | Comments |
|-----------------|----------------|---------------|--------|------------------|
| Dry Matter % | 21.9% | 21.8% ±0.3% | Pass | Within tolerance |
| Surface Defects | 1.2% | ≤2.0% | | |