**PROCESS CONTROL STRATEGY**

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**UGEE CHEMICALS LIMITED**

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**1.0 PURPOSE**

This document outlines the measures and procedures to which the MSG Department will adhere in ensuring we consistently produce superior-quality products for the consumer with minimal process interruptions. It prescribes our mission to operate a stable, predictable process and attain material and process optimization benefits.

**2.0 SCOPE**

This SOP outlines the control strategies involved in the total cycle of making synthetic granules. It also provides guidance in training and qualification in the Ibadan HHC MSG department.

**3.0 TERMS & DEFINITIONS**

GUI: Graphic User Interface.

Start batch button: This is a SCADA screen GUI button.

Stop batch button: This is a SCADA screen GUI button.

Abort batch button: This is a SCADA screen GUI button.

Phase Manager: This is the GUI for viewing batch sequence and batch status.

Batch recipe: This is the setup/configuration page for viewing, editing, saving, and uploading formulation recipes.

SP: Set Point.

GUI: Graphic User Interface

SCADA: Supervisory Control and Data Acquisition.

**4.0 RESPONSIBILITY & AUTHORITY**

|  |  |  |
| --- | --- | --- |
| No. | Position | Description of Responsibility |
| 1. | Department Process Control Strategy Owner | Ensure the Process Control Strategy is updated. |
| 2. | All MSG Department Personnel | They are required to follow the Process Control Strategy. |

**5.0 POTENTIAL RISK**

Not Applicable

**6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIRED**

Not Applicable

**7.0 DESCRIPTION OF ACTIVITIES**

**7.1 PCS ELEMENTS**

Our Process Control Strategy will be derived from the following:

1. Quality Evolution Chat (QEC)
2. Manufacturing Standard
3. RMPI for raw materials
4. Process Centerlines and Relend Matrix
5. Formula Card Requirements: additional weight control, manual pre-weighing, etc
6. Quality Testing and In-Process Checks; RM activity testing
7. Statistical data recording and trending
8. Alarming and Correction Protocols
9. Performance Tracking (PPM Reporting, % PR, PC, and Accuracy)
10. Autonomous Maintenance (AM) & Preventive Maintenance (PM) Programs
11. Standard Operating Procedures
12. Education, Training, and Qualification

**7.1.1 PCS ELEMENTS IN MSG PROCESS**

Making Synthetic Detergents involves six (6) process blocks. These are:

1. Raw Materials Receipt.
2. Crutching
3. ODOS injection
4. Slurry Pumping
5. Spray Drying
6. Admix & Spray On

ODOS ONLINE INJECTION



**7.2 PCS PRINCIPLES**

1. Identifying all sources of quality failures and defects

Product quality failures and defects are introduced by 6 identified sources (also known as sigma). The imperative of the MSG Process Control Strategy is to identify the relative variability contributions from each of these sources and deploy actions aimed at controlling and eliminating them.

These sources are:

1. Raw Material Activity

2. Process Conditions

3. Analytical Methods

4. Addition Systems & Metering

5. Brand Change-over/ Start-Up/Re-blend Management

6. Homogeneity

σ²F.P. Quality = σ²R.M. ACTIVITY **+** σ²PROCESS CONDITIONS **+** σ²ANALYTICAL METHODS **+** σ²ADDITION SYSTEMS **+** σ²CHANGEOVER **+** σ²HOMOGENEITY

σ² represents variation (Square of Standard Deviation).

1. DMS, Work Processes & Reports

DMS, work processes and reports will ensure continuous improvement is the theme of department operations. Identifying the sources of product and process quality defects will set a clear priority of what parameters are critical to control. Once identified, these key parameters will be tracked, reported and controlled on a continuous, on-going basis. Our approach will comprise of:

1. Internal PCS assessment would be conducted at least annually at the department.
2. Daily Process Audits
3. Data logging on Quality Windows (Level 0)
4. PC & Accuracy Report for Addition Systems and Process Conditions (Level 1 & 2 reports)
5. Material Storage Condition Tracking (Level 1 & 2 reports)
6. MQS reporting
7. Why Why Analyses
8. Line performance tracking
9. AM and PM
10. Reblend Generation and Consumption Tracking
11. Start-up and Shut-down procedures
12. Alarming and Correction Protocols (Level 0)

MSG Process Control Strategy emphasizes clear department-wide activities and measures deployed, such that for each of these process blocks, we identify, track, control and continuously improve upon the following:

1. Process conditions that are related to Quality
2. Process conditions that are Critical to Reliability
3. Process conditions that are Critical to Cost.
4. **RUNNING TO TARGET**

It is expected that the production process is running to target.

**7.3 PROCESS CONTROL STRATEGY SCOPE**

Three levels of control have been defined to ensure Process Control. Each level is related to the type of data collection/analysis carried out and the response taken.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Level** | **Intent** | **Control** | **Freq of Review** | **Point of Review** |
| 0 | Detection and response to failure modes. Process parameters are compared versus targets & Centerlines in real time. Alarms alert operators of deviations / OOL data logging | \* Operator intervention.  \*Troubleshooting Guide  \*Visual Standards | Instantaneous / Shiftly | \* On the Floor \* Shift Hand-Over |
| **1** | Compliance reporting of data obtained at L0, to determine any trends over daily/weekly production run. It serves as a predictive tool to avoid OOL tendencies. | \*Quality windows update.  \*PC & Accuracy Report  \*Actions from root cause analysis | Daily / Weekly | \*MSG DDS Meeting,  Action Planning Sheet |
| **2** | Assessment of the robustness of our control strategy to achieve our performance objective and establish statistical reassurance. | \* PCS Monthly Report  \*Monthly Gap Analysis  \*PQM reports | Monthly | \*Module Meeting \*PCS Action Review |

**7.4 PROCESS CONTROL STRATEGY TO ADDRESS SOURCES OF VARIABILITY WITHIN EACH PROCESS BLOCK**

* + 1. **For Raw Material Receipt Operation**

**7.4.1.1 LEVEL 0**

1. Receive Raw material that has the corresponding RMS # with that on the RM receipt document or visual display; if not, the RM is rejected outright.
2. Receives RM that has a QA release Label and rejects outright any RM without this Label.
3. Reject outright RM that is dirty, dented, in a torn package, or generally with a missing QA release label. Material Unloading into the correct tank or dump spot, as applicable; padlocks on the pump for the tanks, and a bar code scanner system for the dump spot.

**PROCESS CONDITION**

1. Temperature monitoring of materials at the Tank farm and warehouse
2. Temperature monitoring of Percarbonate at the day bin, where available.

**7.4.1.2 LEVEL 1**

1. **RM Activity**
2. RM Activity tracking for materials requiring active balance
3. **BRAND CHANGEOVER/START-UP**
4. RM MU Tracking
5. Quality Failure Appearance tracking for Aesthetic contamination in the FP
6. **RAW MATERIAL ADDITIONS**.
7. Calibration Schedule Compliance for feeders and flowmeters
8. Daily PQM reporting.
9. % MU tracking for RM

**7.4.1.3 LEVEL 2**

1. **RM Activity**
2. Monthly RM Compliance tracking and reporting for all materials
3. RM Activity tracking for materials requiring active balancing
4. Monthly MQS reporting.
5. MQS Gap analysis and improvement where MQS result is less than target.
6. **BRAND CHANGEOVER/START-UP**
7. Review & Conduct Gap Analysis for Quality failures related to Start Ups and Change Overs.
8. **RAW MATERIAL ADDITIONS**.
9. Conduct & Review Monthly Scale Calibration Compliance check and fixes
10. Conduct & Review monthly PQM compliance
11. Review & Conduct RM MU compliance and Gap Analysis
12. **PROCESS CONDITION**
13. Conduct & Review monthly CL compliance reports and Gap analysis
14. Conduct & Review Monthly PC & Accuracy compliance gap analysis
15. Define improvement areas and outline clear action plan for long term.

**7.4.2 For Crutching operation**

**7.4.2.1 LEVEL 0**

1. **PROCESS CONDITION**

1. Set a limit for the current reading (AMPS) on the Crutcher Agitator motor. In the event of an OOL, a visual alarm comes up mandating Crutcher operator intervention.

1. Set Crutcher mix temperature limits for different formulations as indicated on the BPRs. If the Crutcher mix temperature exceeds this limit the Visual alarm prompts the Operator’s intervention.
2. Set level alarms ‘High’, ‘High High’, and ‘Low’ on the Ageing vessel. Pop-up alarms are activated when limits are exceeded. Request operator intervention and shut off the slurry transfer pump or High-Pressure Pump (INTERLOCK STRATEGY).
3. **RAW MATERIAL ADDITIONS**
4. Set material addition limits on the SCADA GUI data entry point at the beginning of a new formulation or changeover. Use the Approved Batch Production Record as reference.
5. Formulation SCADA set points are activated for automatic run of batches.
6. When value is not acknowledged – by ENTER, no value appears, prompting operator intervention.
7. Fix 10% tolerance for all Crutcher Load Cells controlled raw material additions for Solids (i.e. Sulphate) and 5% tolerance for Liquids (i.e. EW Base). If addition weight for any material exceeds set tolerance, pop-up alarms are activated to hold the batch, requesting operator intervention
8. Load cell & Flow meter calibration checks conducted as per schedule.
9. **CHANGE OVER AND STARTUP**
10. Follow Changeover procedures (UCL-QMS-MSG-SOP-03)

**7.4.2.2 LEVEL 1**

1. **RAW MATERIAL ADDITIONS**
2. Review Process Capability and Accuracy report on raw material addition on daily and weekly (%PC<=5%, Acc.< 1%)
3. Calibration of Crutcher Load Cells (CLC) and flow meters as per schedule.
4. **PROCESS CONDITION**
5. Daily review of Crutcher Mix Moisture compliance via Tower Report Summary
6. Daily review BP density, Moisture via Tower Summary report and BP CatSO3 on QW
   * + 1. **LEVEL 2**
7. **RAW MATERIAL ADDITIONS**
8. Monthly report of Rm Addition Compliance via PC and Accuracy for all CLC controlled raw materials additions.
9. Review Bulk RM addition compliance on the MUV sheet
10. Calibration Schedule Report for Flowmeters and Crutcher load cell.
11. Gap Analysis with corrective and systemic actions plan to address outages.
12. **PROCESS CONDITION**
13. Review Monthly Crutcher Mix Moisture compliance.
14. Review monthly Blown Powder, density, moisture and CatSO3 using applicable statistical measures as PC & Acc, Cr & Tz Cpm.
15. Gap Analysis with corrective and systemic actions plan to address outages

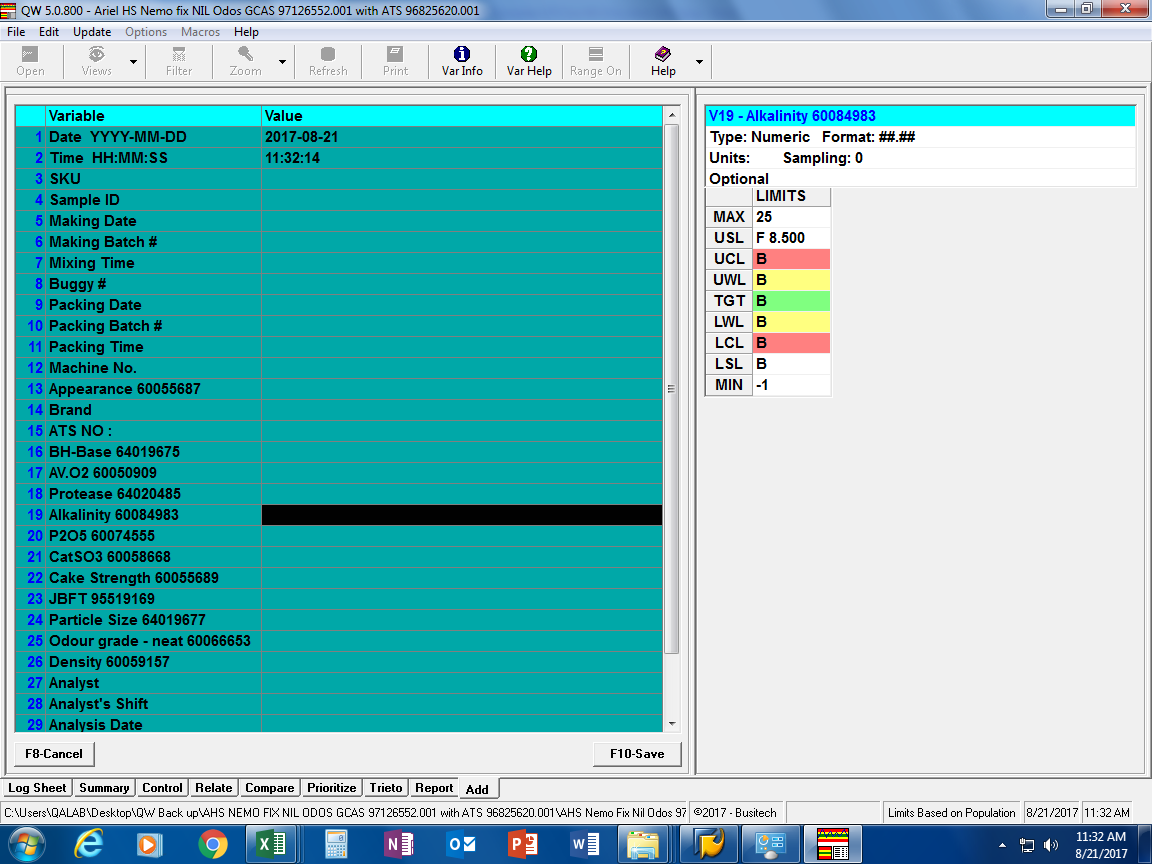
7.4.3 FOR PUMPING & SPRAY DRYING OPERATION

**7.4.3.1 LEVEL 0**

1. **PROCESS CONDITION**
2. It is expected that operators review QW data at least once every hour. They check to ensure it is auto-pulling data correctly.
3. It is expected that operators review the Level Zero alarming software at least once every 15 minutes. The alarming software page will always be in front of them during the run.
4. Set limits for discharge pressure from the HPP.
5. Set limits for HPP RPM % as defined in the Centerline document. The operation should be run at Target speed. When the maximum limit of the pump is exceeded, HPP should shut off.
6. Set limits for Pressure balance in the tower visual alarms are activated when the limit is exceeded. Operator intervention is required.
7. Set limits for Tower exhaust temperature. Switch the Burner to stack when an OOL situation occurs. Operator intervention is prompted.
8. Set limits for air inlet temperature at the tower. Switch the Burner to stack when an OOL situation occurs. Operator intervention is prompted.
9. Program start-up sequence for the Air heater into the Control panel. Alarms are displayed when the prescribed start-up sequence is violated.
10. All process data are auto-pulled to QW and QW is setup to give a visual alarm if the process is in control or out of control.
11. Out-of–specs parameters like BP Density, BP moisture & BP CatSO3 during start-up or on-going operation is visually popped up by the QW.
12. If QW Flags out-of-specs in the following BP parameters; BP Density, BP Moisture, BP CatSO3(Active matter), the Operator should divert BP Spray into the streamlining bin. The BP in the streamlining bin should be mixed out in Quantities prescribed in the Reblend Matrix.
13. For Out-of-specs BP spray lasting enough to fill the Streamline bin, the Operator must stop spray drying operation to fix the Out-of-Spec parameter(s), & the streamlining Bin emptied (Reduce) into Buggies (or Big Bags).
14. Furthermore, the Finished Product Buggy produced when the OOS was discovered and the previous buggy MUST be put **ON HOLD** and re-blended as per the re-blend matrix.
15. The following parameters (as shown in the Table below) are read-off and auto -pulled or entered into QW by the control room operator(s) & Quality control technician(s) and checked versus centerlines.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **2. Key Factors** | |  | **5. Level 0 - Process Control** | | | | |
| **Unit Operation** | **Key Factors** | **4. Design-in Controls** | **Description** | **Frequency** | ***Action Limit*** | **Interface with operator** | **Fixed / Adjustable** |
|  |  |  |
| Crutcher | Batch Size (kg) | recipe download / upload | Recipe | NA | Range | NA | Fixed |
| Crutcher | Crutcher weight at end of batch (Kg) | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Crutcher | Dry scrap SP (% of Crutcher weight) | recipe download / upload | Recipe | Real time | Range | Alarm on HMI | Variable |
| Crutcher | Wet scrap SP (% of crutcher weight) | recipe download / upload | Recipe | Real time | Range | Alarm on HMI | Variable |
| Crutcher | Crutcher amps consumption | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Crutcher | CMM (%) - refer to centerline document for exact values | - | measure sample | every other batch | Range | QW | Fixed |
| Crutcher | Slurry temperature (°C) | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Drop tank | Drop Tank Temperature ('C) | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| LPP | Temperature after Rietz | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| LPP | low pressure line pressure (bar) | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| LPP | HPP Speed | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| HPP | HPP pressure (bar) | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| HPP | Slurry flowrate (kg/hr) | - | NA | NA | NA | NA | NA |
| Spray Drying | AI- compressed air Pressure | - | indication on HMI | Real time | Range | Interlock | Fixed |
| Spray Drying | AI - compressed air flowrate | - | indication on HMI | Real time | Range | Alarm on HMI | Variable |
| Spray Drying | Tower inlet temperature (°C) | - | indication on HMI | Real time | Range | Alarm on HMI | Variable |
| Spray Drying | MTIT | interlock if > HH | indication on HMI | Real time | Range | Interlock | Fixed |
| Spray Drying | Tower exhaust temperature (°C) | - | indication on HMI | Real time | Range | Alarm on HMI | Variable |
| Spray Drying | tower belt temperature (°C) | - | indication on HMI | Real time | Range | Alarm on HMI | Variable |
| Spray Drying | Pressure at nozzles (bar) | - | indication on HMI | Real time | Range | Alarm on HMI | Variable |
| Spray Drying | Number of nozzles | - | indication on HMI | Real time | Range | Visuals on HMI | Variable |
| Spray Drying | \*Nozzles Length | - | NA | NA | NA | NA | Fixed |
| Spray Drying | \*Nozzles Size | - | NA | NA | NA | NA | Fixed |
| Spray Drying | Tower balance\* | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Spray Drying | Balance at Tower exit\* | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Spray Drying | dilution fan % | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Spray Drying | BP Density (g/l) - model | - | measure sample | every 15 mins | Range | QW | Fixed |
| Spray Drying | BP Moisture (%) - refer to matbal for exact values | - | measure sample | every 15 mins | Range | QW | Fixed |
| Spray Drying | Base Powder MPS (um) | - | measure sample | every 2 hours | Range | QW | Fixed |
| Spray Drying | BP CatSO3 (%) - refer to matbal for exact values | - | measure sample | every 2 hours | Range | QW | Fixed |
| Spray Drying | Tower Rate Ton/hr | - | NA | NA | NA | NA | NA |
| Mix Drum | Base Powder % | recipe download | indication on HMI | Real time | Range | Visuals on HMI | NA |
| Mix Drum | RVSO - Non Ionic % | recipe download | indication on HMI | Real time | Range | Visuals on HMI | NA |
| Mix Drum | FP Mixing Rate (ton/hr) | recipe download | indication on HMI | Real time | Range | Visuals on HMI | Fixed |
| Mix Drum | Perfume Spray-on Pressure (bar) | software controlled | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Mix Drum | NI Spray-on Pressure (bar) | software controlled | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Mix Drum | RVSO - Number of RVSO Nozzles | recipe download | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Mix Drum | Mix Drum RPM | recipe download | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Mix Drum | RVSO - Emulsion flow per nozzle (kg/hr) | software controlled | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Mix Drum | RVSO - Emulsion pressure at manifold (bar) | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Mix Drum | RVSO - atomization air pressure (bar) | interlock if < LL | indication on HMI | Real time | Range | interlock | Fixed |
| Mix Drum | RVSO - atomization air temperature | interlock if < LL | indication on HMI | Real time | Range | interlock | Fixed |
| Mix Drum | RVSO - atomization air flow per nozzle | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Mix Drum | RVSO - atomization air/slurry flow ratio | interlock if < LL | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| Mix Drum | RVSO - IKA motor speed % | recipe download | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| BFS - Filling | FP Temperature ('C) | - | measure sample | every 3rd buggy | 45 | Manual / QW | Fixed |
| BFS - Filling | FP Fresh Density (g/l) | - | measure sample | every buggy | Range | Manual / QW | Fixed |
| BFS - Filling | FP Fresh Overs > 2360 (g/l) | - | measure sample | every buggy for DNS | Range | Manual / QW | Fixed |
| All | Metering systems accuracy | L 5% +20sec - LL 20% + 5sec | indication on HMI | Real time | Range | Interlock | Fixed |
| All | Metering systems R-Factor (PV/CV) | - | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| All | Starting materials activity | - | CoA compliance | every receipt | Range | MQS | Fixed |
| All | Starting materials dumping | - | correct RMS | every container | Range | Visuals | Fixed |
| All | Starting materials storage | - | conditions ≡ RMPI | Real time | Range | NA | Fixed |
| All | Reblend Management | adhere to reblend matrix | indication on HMI | Real time | Range | Alarm on HMI | Fixed |
| All | Analytical methods | - | control samples | Daily | Range | QW | Fixed |

1. The process should be running at Centerline at all times. The visual alarm on QW are as stated below;



Running at Warning Limit, act immediately to prevent to process from drifting out of control and return to target

Process is out of control, intervene immediately. See steps below

Running at Target

Running at Out of Limit, Production should not continue until issue is resolved. See steps below

1. If process parameter is on Warning or Control Limits

a. Revert to centerline.

b. Check BP quality.

c. If it is not possible to run at target centerlines to achieve BP quality, operator should fill in deviation report/ temporary centerline and have it approved with the Process Engineer and increase BP sampling to assure confidence that there is no OOS. The approved temporary centerlines, should also be documented in QW via the QW excel input file.

\*Note: For Blown powder quality, if results are obtained for BP Density, Moisture or CatSO3 below is the reaction to visual alarm on Quality window

- **Green:** At Target, no action required.

- **Yellow**: Notify the Control Room, ensure action(s) is/are taken to return to target.

- **Red**: The process is out of control. Action should be taking immediately to return the process to centerline. All powder from this run should be moved to streamlining bin if this continues for next 30 minutes.

**- White**: The BP is Out of Spec. and should be diverted to streamlining bin immediately. The production should be stopped and issue resolved before commencing production. There should be a clear action plan documented to fix the Out of Spec. Department QA Leader must be notified of the Out Of Spec that occurs during normal ongoing production.

7.4.3.2 **LEVEL 1**

1. **PROCESS CONDITION**
2. Daily Report and review of Process Centerline and Blown Powder compliance as captured in Process Compliance Report.
3. Daily review of Blown Powder CatSO3 on QW using statistical means e.g. Cr & Tz, PC & Acc., Cpm.
4. Calibration of Satellite laboratory scales and Moisture analyzer.
5. Define corrective actions to fix any gaps.

**7.4.3.3 LEVEL 2**

1. **PROCESS CONDITION**
2. Monthly review of Process and BP Characteristics Compliance as captured in Process Compliance report
3. Monthly review of PPM level for FP Density.
4. Review calibration records for laboratory instruments.
   1. Gap Analysis with corrective and systemic actions plan to address outages

**7.4.4 FOR ADMIX & SPRAY-ON (LIW FEEDERS)**

1. **LEVEL 0**
2. Cutoff limits for feeders:

* 5% deviation +20 sec. timer (Brabender controlled).
* 20% deviation +5 sec. timer (PLC controlled).

1. Monitor the relation for all feeders on SCADA, if the relation is OOL for one of the critical feeders (affecting one of the 10 rated CCQPs in QEC), sound an alarm and take immediate action to confirm the correct addition. If the correct addition is confirmed continue working and feed back to CIL/Equipment owner.
2. Monitor Perfume pressure every change over.
3. Fix Brabender alarm configurations to cut off.
4. Analyze process. Check sample at Start Up at a minimum for FP CatSO3, AvOx, and where applicable or recommended by MPD, BH Base, Protease and perfume identity. Samples can be picked from the buggy station or on the packing line, but preferably from the packing line.
5. Check fresh FP density and particle size on Buggy filling station every new buggy discharge.
6. **LEVEL 1**
7. Review daily R-Factor Compliance for all feeders (# of Alarms) and feedback to CIL/Equipment owner.
8. Monitor related quality alerts.
9. Monitor PC and accuracy for all feeders on a daily basis.
10. **LEVEL 2**
11. Static and Dynamic calibration check of LIW every month (as per schedule).
12. Review monthly PC and Accuracy reports for all feeders.
13. Review MUV results for all raw materials added via feeders.
14. Review monthly PPM data for all variables.
15. Gap Analysis with corrective and systemic actions plan to address outages

The tale below summarizes the various PCS strategy for the LIW feeders

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Design | Level Zero | Level One | Level Two | Action  (Level Zero) |
| * Addition Accuracy and PC | * Automatic recipe download and verification every changeover. | * 5% deviation + 20 second timer.   (Brabender controlled)   * 20% deviation + 5 second timer.   (PLC controlled). | * Monitor PC and accuracy for all feeders daily. (Random sampling). | * Monthly Report PC / accuracy for all feeders and flow meters. * Monthly calibration of all feeders and flow meters. * Monthly MU report for all raw materials added via feeders. * Monthly PQM report for all variables. | * Recipe verification every changeover |
| * Relation for all feeders | * Auto-pull of PV/CV on QW for all feeders. * Real time alarm for all feeders | * Monitor relation in real time for all feeders. Visual display on relation alarm on Production tab of Admix Page | * Review daily relation for all feeders (# of alarms) and feedback to CIL/Equipment owner. | * Monthly report (Number of alarms for all feeders). | * Troubleshoot * Immediate confirmation of correct addition accuracy. |
| * Process check sample | * Periodic Sampling for analysis. | * Analyze process check sample at Start Up / Change Over for CatSO3, AvO2 |  | * Monthly PPM report for all variables. | * Process and Quality Troubleshooting. |
| * FP Density | * Periodic Sampling for analysis. | * Check fresh FP density from buggy filling station every new buggy discharge. |  | * Monthly PPM Report for density. | * Process and Quality Troubleshooting. |

**7.4.5 FOR WEIGH BELT FEEDERS**

1. **LEVEL 0**
2. Cutoff limits for feeders:

* 5% deviation + 20 sec. timer (Brabender controlled).
* 20% deviation + 5 sec. timer (PLC controlled).

1. Static and dynamic calibration check for BP WB feeders.
2. Fix Brabender alarm configurations to cut off.
3. Check process check sample results every changeover, in case OOL STOP and calibrate BP feeder.
4. **LEVEL 1**
5. Monitor PC and Accuracy daily.
6. Calibration checks for Weigh Belt feeders as per schedule
7. CIL for Weigh Belt feeders as per schedule.
8. **LEVEL 2**
9. Review Calibration records for the BP feeder.
10. Review monthly MU report for Tower Materials
11. Review monthly CatSO3 PPM data in FP.
12. Gap Analysis with corrective and systemic actions plan to address outages.

The tale below summarizes the various PCS strategy for the Weigh belt feeder

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Design | Level Zero | Level One | Level Two | Action  (Level Zero) |
| * Blown Powder Addition Accuracy and variability | * Automatic recipe downloads and verification every changeover. * Weekly calibration check of weigh belts feeder * CIL for Weigh belts feeder. | * 5% deviation + 20 seconds timer (Brabender Controlled). * 20% deviation + 5 seconds timer (PLC controlled). * Cutoff process check samples result and weekly static and dynamic calibration. | * Daily PC reporting and accuracy of BP feeders. | * Monthly PC reporting/accuracy for WB feeders and * Monthly CatSO3 PPM data. * Monthly calibration report * Monthly MU report | * Report quality alert if CIL or calibration is not being complied to. |
| * Fresh FP density. | * Monitor density every batch | * Monitor density every batch | * Monitor related quality alerts | * Monitor and analyze PPM report with respect to FP density. | * Check BP density and BP feeder calibration. |
| * Process check sample | Periodic Sampling for analysis. | * Analyze process check sample at Start Up / Change-over for CatSO3, AvO2 |  | * Monthly PPM report for all variables. | * Process and Quality Troubleshooting. |
| * FP Density | Periodic stratified Sampling for analysis. | * Check fresh FP density from buggy filling station every new buggy discharge. | * Daily Aged FP density results | * Monthly PPM Report for density. | * Process and Quality Troubleshooting. |

**7.4.6 PERFUME SPRAY-ON**

1. **LEVEL 0**
2. Cutoff limits for addition:
3. 20% deviation + 5 sec. timer (PLC controlled).
4. Fixed spray-on pressure limit of 2-4 bar for monitored continuously.
5. **LEVEL 1**
6. Monitor PC and Accuracy daily
7. Daily review of spray-on-related quality alerts.
8. CIL for perfume pump as per schedule.
9. **LEVEL 2**
10. Review calibration records for flow meters as per the schedule
11. Monthly review of spray-on pressure PC and Accuracy.
12. Review MU report for spray-on RM.
13. Develop long-term action plan.

The tale below summarizes the various PCS strategy for the perfume Spray On.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Design | Level Zero | Level One | Level Two | Action  (Level Zero) |
| * Perfume spray-on pressure. | * Fix spray-on perfume pressure to 2-4 bar. * Automatic addition of perfume with respect to HMI set point through perfume spray nozzles controlled by automatic metering feedback. | * 20% deviation + 5sec. timer (PLC controlled) * Monitor pressure once every changeover. | * Monitor PC and accuracy of perfume pressure on a daily basis.   . | * Monthly MU report | * Process troubleshooting using the right tool. |

7.4.6 RELEND SYSTEM

1. **LEVEL 0**
2. Feeder cutoff deviation limit (5%, +20 Second) Brabender controlled.
3. Relend matrix compliance tracking using the controlled release checklist and QW Data
4. Relend generation and consumption tracking per shift
5. **LEVEL 1**
6. Review Relend-related quality alerts.
7. Net Zero Relend
8. **LEVEL 2**
9. Total Relend on Site for the period
10. Net Zero Relend which is the difference between Reblend generated and Consumed for a given period
11. Monthly report for Reblend generation stratification.
12. Gap Analysis with corrective and systemic actions plan to address outages

The table below summarizes the various PCS strategy for the Reblend feeders

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Design | Level Zero | Level One | Level Two | Action  (Level Zero) |
| * Blown Powder Addition Accuracy and variability | * Fixed Reblend percent in as per MI. * Controlled with a fixed feeder speed with 0% tolerance on HMI. * Lock maximum reblend SP as per MI. * Follow reblend matrix in MI. | * Used Reblend feeder according to reblend matrix. * Ensure reblend cards attached in release every brand | * Daily review of reblend related quality alerts | * Monthly stratification for reblend sources. | * Process troubleshooting using the right tools. |
| * BP2 reblend | * Lock maximum reblend SP as per MI. | * Use one reblend type at a time. * Follow BP reblend matrix. | * Daily review of related quality alerts | * NA | * Process troubleshooting using the right tools |
| * Dry/Wet scrap addition | * Automatic dry and wet scrap addition as per MI * Continuous moisture compensation to maintain CMM. | * Automatic scrap addition with manual moisture compensation. | * Daily review of related quality alerts | * NA | * Check CMM, tower CL and PWS CIL. |

Attached to this SOP is a list of all interlocks identified and implemented in the department.

**8.0 RELATED DOCUMENTS & RECORDS**

- Training & Qualification

- Model Answers

- List of Interlocks

- Step Up Cards

- List of Process Equipment

**9.0 REFERENCES & ATTACHMENTS**

Not Applicable

**Appendix 1**

Not Applicable

**Document History**

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Description of change | Reviewed by | Version No. |
| 30th Mar. 2025 | First issue of document. | Operations Manager | 1.0 |
|  |  |  |  |