PROTOCOL FOR TEMPERATURE MAPPING OF SOFTGEL DISPENSED MATERIAL HOLD AREA

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1.0 PROTOCOL APPROVAL:

Signing of this approval page of Protocol indicates agreement with the validation approach described in this document. If modification to the validation approach becomes necessary, an addendum shall be prepared and approved .The protocol cannot be used for execution unless approved by the following authorities.

This protocol of Temperature/Humidity mapping has been reviewed and approved by the following persons:

FUNCTION	NAME	DESIGNATION	DEPARTMENT	SIGNATURE	DATE
PREPARED BY			QUALITY ASSURANCE		
REVIEWED BY			QUALITY ASSURANCE		
			ENGINEERING		
			PRODUCTION		
APPROVED BY			HEAD OPERATION		
			QUALITY ASSURANCE		

2.0 OVERVIEW:

2.1 Objective:

The objective of this protocol is to develop a plan for monitoring of temperature and humidity of

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Dispensed material hold area (softgel) and to identify the minimum and maximum temperature and humidity observed and also to identify the location for monitoring of temperature/humidity on daily basis where the more fluctuation observed and also to demonstrate the reproducibility of the temperature humidity in the area. The mapping shall be performed in line of WHO TRS 961.

2.2 **Purpose:**

The purpose of this protocol is to establish documentary evidence to ensure that the temperature humidity inside the Dispensed material hold area (softgel) maintained & is suitable for storing the dispensed raw material awaited for next processing step.

2.3 **Scope:**

The protocol describes the procedure, documentation, acceptance criteria & revalidation criteria to be used. This protocol shall be used for the mapping of Dispensed raw material hold (softgel).

2.4 **Responsibility:**

In accordance with protocol, following functions shall be responsible for the Temperature humidity mapping of the Dispensed material hold area.

Execution Team (Comprising members from Production, Engineering and Quality Assurance) and their responsibilities are following:

- Prepares the temperature/humidity mapping protocol.
- Ensures that the protocol is in compliance with current policies and procedures on system validation.
- Distributes the finalized protocol for review and approval signatures.
- Execution of protocol.
- Review of protocol, the completed data package and the final report.
- The data logger/sensor shall be placed by the Engineering Persons
- The printout of temperature/humidity mapping data shall be reviewed by production, engineering and QA person.
- In case of any failure of Temperature/Humidity observed the production person shall inform to engineering and QA and engineering persons shall take corrective action.

Head – production/ Engineering:

- Review of protocol, the completed data package and the final report.
- Assist in the resolution of validation deficiencies.

Head – Operation / Quality Assurance:

- Review and Approval of protocol, the completed qualification data package and the final

report.

2.5 Execution Team:

The satisfactory mapping of the room shall be verified by executing the studies described in this protocol. The successfully executed protocol document indicates that the Temperature/Humidity is maintained in the room throughout the mapping period.

Execution team is responsible for the execution of temperature mapping of room. All executors involved with this protocol shall sign within the prescribed format given below:

NAME	DEPARTMENT	DESIGNATION	SIGNATURE	DATE

2.6 Risk analysis:

The Dispensed Material hold area (Softgel) was created for storing of the Dispensed raw material awaited for next processing step. The product is not exposed in this area and only for storing purpose. As such the risk to product is low and if unfortunately temperature/humidity is out of limit for longer time during storage may lead to product abnormality. The risk analysis shall be carried out in line with HACCP tool as per the manual.

The risk hazard analysis and control point identified as per Annexure I.

The risk evaluation has been done as per Annexure II.

Conclusion of risk analysis:

All the risk related to Dispensed material hold area (Softgel) temperature and humidity mapping and excursion evaluated by HACCP tool (Hazard analysis and critical control point) and has been concluded that the risk which is identified during analysis are found high but adequate control point in place.

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3.0 PREREQUISITES:

- Calibrated data logger and sensors or wireless data logger.
- All Standard Operating Procedure shall be verified if any.
- All the measuring parameters shall be verified.

4.0 ACCEPTANCE CRITERIA:

The temperature and humidity in the room should be maintained throughout activity and should be in between temperature 22± 3°C and humidity 50 + 5 %.

5.0 REVALIDATION CRITERIA:

- Change/Modification in Dispensed material hold area.
- Change in storage condition.
- Change/Modification in HVAC system.

6.0 TEMPERATURE MAPPING PROCEDURE:

- AHU shall be in running condition upto the end of study and operate the HVAC system to get the Temperature 22± 3 °C and humidity 50 + 5 % in the area.
- Calibrated wireless data logger/sensor shall be used for temperature/humidity mapping process.
- The total area of Dispensed Material hold is 33.258 m^2. Dispensed Material hold area shall be divided in equal squares of 5 meter. At least one probe shall be kept in each square identifying the critical spot. Reason for identifying the location shall be recorded. Place 8 numbers of temperature/humidity data logger/sensor in room as per attached drawing of Annexure III and Table no. 08. As per 5 meter criteria only 2 data logger is required hence 8 data logger is considered for temperature mapping.
- Data logger/sensor shall be placed within 5 meter of the area in the respective room.
- Risk analysis shall be performed for the number of sensor selected and placement of the sensor.
- The temperature/humidity of data logger/sensor shall be placed at different working heights and at different locations so as to get the data of actual temperature / humidity maintained throughout the

room. The data logger shall be placed in such a way that, the highest, lowest, middle stacking height shall be covered.

- Switch on the data logger and check the working of Data logger.
- Set the print interval time of mapping data i.e. 05 minutes.
- Start the mapping and check the data logger/sensor reading on daily basis twice in a day frequency and same shall be recorded for continues Seven days and record the observation in Annexure IV.
- If the temperature is beyond the acceptance limit, immediately rectify the situation and record in discrepancy section and take corrective action.
- At the end of the study remove the data logger and note down the data logger ID from where data logger removed in section No. 09.
- Stop the mapping on data logger and capture the data from data logger and identify the following details.
- Note down the minimum, maximum and mean temperature/humidity.
- Decision to put the digital hygrometer for routine monitoring shall be taken on the location where maximum fluctuation observed in room & hot Zone.
- Finally observed location shall be taken for the routine monitoring on the basis of temperature mapping study and marking is to be done for identified location observed in room.

7.0 DIAGRAM OF AREA SHOWING THE LOCATIONS:

The diagram of the location of temperature/humidity mapping in the area is given in Annexure-III.

8.0 DATA LOGGER / SENSOR LOCATION NUMBER AND NAME

Area name	Location No.	Location name	Location height from the floor (in mm)
Softgel Dispensed Material Hold Area	T1	Left side of entry door, Top of wall	2300
	T2	Left side of entry door, Middle of wall	1800
	T3	Left side of entry door, Bottom of wall	300
	T4	Above the door entry	2200
	T5	Right side of entry door, bottom of wall	700
	T6	Right side of entry door, Middle of wall	1400
	T7	Wall , front of door entry (in top position)	2000

	T8	Hanging in the middle	600

9.0 Test Instrument Calibration Details:

Location No. / Name	Channel number	Instrument ID No. (Before mapping)	Calibration Detail			Instrument ID (After Mapping)
			Calibration Done on	Calibration due on	Checked By sign / Date	
T1						
T2						
T3						
T4						
T5						
T6						
T7						
T8						
Data logger	**NA**					

Remarks: (If Any)

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Reviewed By / Date:

10.0 DISCREPANCIES AND CORRECTIVE ACTION TAKEN:

Discrepancies:

Corrective Action Taken:

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Deviation Accepted By:
(Sign/Date)

Deviation Approved By:
(Sign/Date)

11.0 LIST OF ANNEXURES:

Annexure No.	Document Title

Remarks (if any)**:**

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Done By & Date:

Verified By & Date:

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12.0 ABBREVIATIONS SHEET:

Following Abbreviations are used in the Temperature mapping protocol of Dispensed material hold area of Softgel.

S.No	ABBREVIATION	DESCRIPTION
1.	Sr.	Serial
2.	QAD	Quality Assurance Department
3.	MIS	Miscellaneous
4.	No.	Number
5.	°C	Degree Centigrade
6.	% RH	Relative humidity
7.	HVAC	Heating ventilation and Air Conditioning
8.	i.e.	That is
9.	T	Temperature
10.	I.D.	Identity
11.	QA	Quality Assurance
12.	RM	Raw material

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13.0 SUMMARY & CONCLUSION:

SUMMARY:

CONCLUSION:

Prepared By (Sign/Date): **Checked By (Sign/Date):**

PROTOCOL FOR TEMPERATURE MAPPING OF SOFTGEL DISPENSED MATERIAL HOLD AREA

14.0 FINAL REPORT APPROVAL:

It has been verified that mapping required for Dispensed Material hold area (softgel) has been completed as per the predefined protocol. The data required for this protocol completion has been attached to this protocol or included in the qualification summary report. Verified that all amendments and discrepancies are documented, approved and attached to this protocol.

Signature in the block below indicates that all items in this mapping report of Dispensed Material hold area has been reviewed and found to be acceptable and that all variations or discrepancies have been satisfactorily resolved.

FUNCTION	NAME	DESIGNATION	DEPARTMENT	SIGNATURE	DATE
REVIEWED BY			QUALITY ASSURANCE		
			ENGINEERING		
			PRODUCTION		
APPROVED BY			HEAD OPERATION		
			QUALITY ASSURANCE		

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Annexure I

HAZARD ANALYSIS AND CRITICAL CONTROL PARAMETERS

S. No	PROCESS STEP	HAZARD	RISK	CRITICAL LIMIT/FREQUENCY	JUSTIFICATION	CORRECTIVE AND PREVENTIVE ACTION	ESTABLISHMENT OF VERIFICATION
1	Dispensed Material Hold Area	If temperature does not maintained in the area there is a possibilities of degradation of product and hazard to the patient.	Low	Specified limit is 22 ± 3 °c / 50±5 %.The frequency of monitoring during mapping is 5 minutes for continuous Seven days. Routine monitoring shall be performed at twice in a day frequency at the position where fluctuation is more.	The temperature mapping is carried out to check the temperature accuracy/distribution avoid the degradation of the product.	Personal entering into Dispensed Material Hold Area are well trained in GMP practices.	SOP of temperature monitoring is in place. Protocol based study for temperature mapping is done.
2	Man and material movement	Possibilities of excursion in temperature may be observed which may lead to the abnormality of product stored.	High	Specified limit is 22 ± 3 °c / 50±5 %.The temperature mapping is performed for seven consecutive days with temperature logging at 5 minutes frequency.	Effect of routine operations done in the area with normal man and material movement shall be evaluated by using online data logging system during mapping and same shall be verified during routine monitoring. Door closure is available.	Personal entering into dispensed material hold area are well trained in GMP practices. Training to be given for entry exit to new employee.	SOP is in place for entry and exit to dispensed material hold area, Door closure is available.
3	Door opening and closing	Possibilities of excursion in temperature may be observed which may lead to the abnormality of product stored.	High	Specified limit is 22 ± 3 °c / 50±5 %.The temperature mapping is performed for seven consecutive days with temperature logging at 5 minutes frequency.	Effect of routine operations done in the area with normal man and material movement shall be evaluated by using online data logging system during mapping and same shall be verified during routine	Personal entering into dispensed material hold area, are well trained in GMP practices. Training to be given for entry exit to new	SOP is in place for entry and exit to dispensed material hold area. Door closure is available.

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S. No	PROCESS STEP	HAZARD	RISK	CRITICAL LIMIT/FREQUENCY	JUSTIFICATION	CORRECTIVE AND PREVENTIVE ACTION	ESTABLISHMENT OF VERIFICATION
					monitoring. Door closure is available.	employee.	
4	Breakdown of HVAC	Breakdown of HVAC may have direct impact on the temperature and may not be maintained in the area which may lead to product abnormality.	High	Specified limit is 22 ± 3 ° c / 50±5 %.The temperature monitoring is performed at twice in a day frequency. The temperature mapping is performed for seven consecutive days with temperature logging at 5 minutes frequency.	In case of failure of HVAC due to continues running temperature may increase.	The preventive maintenance for HVAC system shall be done for proper functioning to be maintained. The Diesel generator is provided if power failure occurred.	Routine monitoring shall be carried out twice in day. SOP for preventive maintenance is in place.
5	Sensor location selection during mapping	Wrong selection of sensor location would lead to faulty temperature mapping result which would not be the representative of the area.	High	Specified limit is 22 ± 3 ° c / 50±5 %.The frequency of monitoring during mapping is 5 minutes for consecutive Seven days and routine monitoring shall be performed with twice in day.	The room shall be equally divided within 5 m area and 8 number sensors shall be placed in the area at different height (minimum and maximum covering door opening, middle of the room and corners.	Correct placement of temperature sensors would give the temperature mapping data which would be the representative of the room	Approved protocol of temperature mapping and drawing shall be prepared prior to putting the sensor on location and put the sensor as per the drawing.

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S. No	PROCESS STEP	HAZARD	RISK	CRITICAL LIMIT/FREQUENCY	JUSTIFICATION	CORRECTIVE AND PREVENTIVE ACTION	ESTABLISHMENT OF VERIFICATION
6	Faulty sensor/ Wrong sensor/ Faulty data logger	Faulty sensor may gives the faulty result	High	Specified limit is 22 ± 3 ° c / 50±5 %.The calibration of the data loggger shall be verified before start of the activity.	Before start of the activity the calibration of data logger shall be verified.	The calibration of sensor and data logger shall be carried out as per predefined frequency.	The calibration of SOP is in place for sensors and data logger.
7	Sensor hanging in middle	If wrong selection of sensor location then the result will not be representative the actual status dispensed material hold area.	Low	Specified limit is 22 ± 3 ° c / 50±5 %. The frequency of monitoring during mapping is 5 minutes for continues Seven days.	The data logger shall be hanged in middle which select because the material is kept in middle and which represent result of all area.	Correct placement of temperature sensors in the middle of the room would give the temperature mapping data which would be the representative of the room.	Sensor location diagram temperature mapping is in place and location is marked on the drawing.
8	Near door	If wrong selection of data logger location then the result will not be representative the actual status of Dispensed material hold area.	High	Specified limit is 22 ± 3 ° c / 50±5 %. The frequency of monitoring during mapping is 5 minutes for consecutive Seven days.	The data logger shall be hanged near door which has been selected because door opening and closing possibilities temperature increases into room and maximum temperature is observed at door location	Correct placement of temperature sensors near the door would give the temperature mapping data which would be the representative of the area.	Sensor location diagram temperature mapping is in place and location is marked on the drawing.
9	All wall of Dispensed material hold area	If wrong selection of data logger location then the result will not be representative the actual status of Dispensed	Low	Specified limit is 22 ± 3 ° c / 50±5 %. The frequency of monitoring during mapping is 5 minutes for consecutive Seven days.	Location is selected at specified height on the wall so that the sensor shall represent the condition of the room at different	Correct placement of temperature sensors at right and left side wall of entry would	Sensor location diagram temperature mapping is in place and location is marked on the drawing.

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S. No	PROCESS STEP	HAZARD	RISK	CRITICAL LIMIT/FREQUENCY	JUSTIFICATION	CORRECTIVE AND PREVENTIVE ACTION	ESTABLISHMENT OF VERIFICATION
		material hold area			location with different height.	give the temperature mapping data which would be the representative of the area.	

Prepared By:
Sign/Date:

Checked By:
Sign/Date:

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Annexure II

Risk evaluation for Hazard Identification

Process Step	Occurrence (O)	Justification	Severity (S)	Justification	Risk matrix (O X S)	Risk	Action plan
Dispensed material hold area	2	SOP of temperature monitoring is in place. Protocol of temperature mapping is in place.	2	The temperature mapping is carried out to check the temperature accuracy/distribution avoid the degradation of the product.	4	Low	Adequate measures are available to identify the critical control parameters in the system.
Man and material movement	5	Man and material movement is occurred for transfer of the material for several time during the day activity hence the occurrence almost certain	1	The temperature mapping is carried out to check the temperature accuracy/distribution with various in operation condition avoid the degradation of the product. Door closure is available.	5	Low	Adequate measures are available to identify the critical control parameters in the system. Door closure is available.
Door opening and closing	5	Door opening occurs several times for transfer of the material.	1	Effect of routine operations done in the area with normal man and material movement shall be evaluated by using online data logging system during mapping and same shall be verified during routine monitoring. Door closure is available.	5	Low	Automatic door closing system is in place. Control measures are adequate for monitoring of temperature at daily basis twice in day which easily identify the excursion of temperature. Door closure is available.
Breakdown of HVAC	1	HVAC system has been installed to control the temperature and relative humidity and also preventive maintenance is	4	All ready HVAC connection has been provided in area to maintain the desired temperature condition;	4	Low	In dispensed material hold area HVAC system has been provided and additional preventive maintenance shall be in a

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Process Step	Occurrence (O)	Justification	Severity (S)	Justification	Risk matrix (O X S)	Risk	Action plan
		in place.					place.
Selection of Sensor location during mapping	1	The area is divided into equally and sensor shall be placed at different location with at different height	4	Wrong selection of location may not provide actual status of all area.	4	Low	Proper distribution of sensor for temperature mapping shall be verified as per the diagram.
If Faulty sensor/ Wrong sensor/ Faulty data logger	1	The activity shall be carried out by approved external vendor with calibrated data logger.	4	Faulty data and wrong representation of area shall be given by data logger.	4	Low	Prior to start the activity calibration and working of data logger shall be verified.

Prepared By:
Sign/Date:

Checked By:
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ANNEXURE IV

1. CHECK LIST BEFORE STARTING OF TEMPERATURE MAPPING

S.No.	Check point	Verification status	Verified by
1.	Data logger/sensor calibration status		
2.	Data logger/sensor working		
3.	Data logger/sensor placed at defined location as per drawing		

2. *PHYSICAL VERIFICATION OF DATA LOGGER DURING TEMPERATURE MAPPING

S.No.	Date	Morning								Verified by	Evening								Verified by
Location No.		T1	T2	T3	T4	T5	T6	T7	T8	NA	T1	T2	T3	T4	T5	T6	T7	T8	NA
Data logger Code No./Channel No.																			
1.																			
2.																			
3																			
4.																			

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S.No.	Date	Morning								Verified by	Evening								Verified by
Location No.		T1	T2	T3	T4	T5	T6	T7	T8	NA	T1	T2	T3	T4	T5	T6	T7	T8	NA
Data logger Code No./Channel No.																			
5.																			
6.																			
7.																			
8.																			
9.																			
10.																			

*Physical verification means position of data logger at right position, data logger location & display screen working. Put "√" if found satisfactory & "**X**" if not satisfactory

Remark:----------

Verified By Sign/Date: