



# AN INTRODUCTION TO HACCP COMPLIANCE

FOR THE POULTRY AND EGG PROCESSOR



CHILLING



COOKING



COOLING



STORAGE



SHIPPING

The acronym HACCP stands for Hazard Analysis and Critical Control Points. It is an approach to maximizing food safety through identifying biological, chemical, and physical hazards that may occur during the various production processes that could render the food product unsafe and designing measures to reduce these hazards to an acceptable threshold.

The creation of a customized HACCP plans requires strong knowledge of the seven principles as applied throughout the production process, designed to prevent problems before they occur and to correct deviations as soon as they are detected.

# AN INTRODUCTION TO HACCP COMPLIANCE

## FOR THE POULTRY AND EGG PROCESSOR

This guide has been provided courtesy of:



MadgeTech has been a key resource for the food and beverage industry for over 20 years, offering a wide range of temperature monitoring solutions. We have a deep commitment to facilitating regulatory compliance and promoting best practice in food safety. MadgeTech data loggers and monitoring systems have become synonymous with HACCP compliance and process verification throughout the food industry, both domestically and internationally.

Most importantly, the MadgeTech name is widely known for both quality and reliability.

As a provider of leading-edge technology, MadgeTech offers a diverse line of wireless data logging systems for environmental and facility monitoring. This allow FSQA personnel to see both product and process temperatures in real time. From refrigerators to freezers and blast chillers, from the production floor to packaging and storage, MadgeTech provides an easily scalable temperature and humidity monitoring solution for even the most challenging environments.

Our goal is to continue to provide the tools needed to help food safety professionals perform their jobs more effectively and efficiently.

When you think of food safety, think of MadgeTech.

Norman E. Carlson,

A handwritten signature in black ink, appearing to read "Norman E. Carlson".

Founder & President



**EggTemp-RH**

*Egg Shaped Thermal Shield  
for the MicroRHTemp*

**RFRHTemp2000A**

*Wireless Temperature &  
Humidity Data Logger*

**HiTemp140**

*High Temperature  
Data Loggers*

**RFOT**

*Wireless Meat Temperature  
Data Logger*

# SEVEN PRINCIPLES OF HACCP

1

## Conduct a Hazard Analysis

In conducting a hazard analysis, the processing plant's HACCP team must consider each step in the production process and determine the food safety hazards that exist. Measures can then be designed to limit these hazards.

2

## Identify Critical Control Points

The HACCP team must determine and list every *critical control point* (CCP) in the production process. The FSIS defines a **critical control point** as “a point, step, or procedure in a food process at which control can be applied and, as a result, a food safety hazard can be prevented, eliminated, or reduced to acceptable levels.”

3

## Establish Critical Limits for each Critical Control Point

The FSIS defines a **critical limit** as “the maximum or minimum value to which a physical, biological, or chemical hazard must be controlled at a critical control point to prevent, eliminate, or reduce to an acceptable level.” Critical limits are quantifiable values; some of the most common critical limits in meat processing relate to time and temperature.

4

## Establish Critical Control Point Monitoring Requirements

The HACCP team must determine what monitoring procedures it will implement to measure each critical limit of each critical control point. Sufficient monitoring procedures will specify “how the measurement will be taken, when the measurement is taken, who is responsible for the measurement and how frequently the measurement is taken during production.”

5

## Establish Corrective Actions

In putting together its HACCP plan, the HACCP team must determine what actions will be taken in the case of any such deviation from a critical limit. Corrective actions are those procedures that must be followed if a deviation occurs.

6

## Establish Procedures for Verifying the HACCP System is Working

Verification of the plant's HACCP plan will ensure the plan works and provides product safety as intended. A description of the food product, its intended use, and who its intended consumers are should also be included in the HACCP plan.

7

## Establish Record Keeping Procedures

Recordkeeping is a critical element of an HACCP compliant plant. HACCP records allow managers to keep track of production processes, critical control points, corrective actions, etc.

# HACCP COMPLIANCE FOR THE POULTRY INDUSTRY IN THE UNITED STATES



The United States, the USDA has control over slaughter and processing regulations in regard to the meat industry. Whether a facility is federally or state inspected, they are required to adhere to strict guidelines for the processing and storage of commercial meat. As outlined in 9 CFR Part 417, inspections require the implementation of HACCP plans.

As per section 417.2, when a HACCP plan is created, it must be signed and dated by the designated, HACCP trained individual. The plan must be signed again upon acceptance into the company, as well as each time any modification is made. Annually, the plan must be reassessed to validate its adequacy in controlling food safety hazards and its effective implementation. Failure to take corrective actions needed for compliance may render products as adulterated.

To assist that meat processing establishments meet HACCP requirements, FSIS created generic models for each of the processes where hazards are likely to occur. FSIS has indicated that the generic models can be used as a starting point for putting together plant-specific HACCP plans.



## CHILLING



According to the **Modernization of Poultry Slaughter Inspection**, carcasses should be refrigerated as soon as possible after slaughter to reduce bacterial growth and extend the shelf-life, unless poultry is to be frozen or cooked immediately. The FSIS states for carcasses under 4 pounds, the internal temperature must be reduced to 40 °F or below within 4 hours of processing; carcasses weighing 4 to 8 pounds, within 6 hours of processing; and those weighing over 8 pounds, within 8 hours of processing.

For establishments producing ready-to-cook poultry or granted waivers under the Salmonella Initiative Program (SIP), alternative chilling procedures can be implemented into their HACCP system. Alternative procedures to chill young chicken carcasses involve reducing the internal temperature to 44° F or below in 6 hours. For time and temperature as the critical limit (CL) in the critical control point (CCP), reduce the internal temperature of young chicken carcasses to 45° F or below in 16 hours.



### RFTTemp2000A

*Wireless Thermocouple-Based Temperature Data Logger*

- Wireless capabilities for continuous monitoring
- Measure both ambient and thermocouple temperature
- LCD screen for real-time readings and statistics
- User-programmable alarms and notifications



## COOKING



To comply with cooking requirements the FSIS issued the **Compliance Guidelines for Meeting Lethality Performance Standards for Certain Meat and Poultry Products**. The guidelines state that cooked poultry products should reach an internal temperature of at least 160 °F; cured and smoked poultry rolls and other cured and smoked poultry should reach an internal temperature of at least 155 °F; and cooked ready-to-eat poultry should be fully cooked to the 160 °F internal temperature.

Under these guidelines, the FSIS states, “Establishments producing cooked poultry rolls and other cooked poultry products should have sufficient monitoring equipment, including recording devices, to assure that the temperature (accuracy assured within 1 °F) limits of these processes are being met. Data from the recording devices should be made available to FSIS program employees upon request.”

### HiTemp140

*High Temperature Data Logger*

- Compliant with USDA regulations
- Completely submersible
- Food-grade stainless steel
- Withstand temperatures up to 284 °F (140 °C)





## COOLING (STABILIZATION)



The FSIS provides guidelines for the stabilization of fully and partially heat-treated RTE and NRTE poultry products. The revised **Appendix B** offers several cooling options depending on the product and whether to limit bacterial growth to  $\leq 1.0\text{-log}_{10}$  or  $\leq 2.0\text{-log}_{10}$ .

The primary hazards of concern during cooling and hot holding are *Clostridium (C.) perfringens* and *C. botulinum*, so establishments must first gather time-temperature data to fully understand the rate of temperature change during cooling.

To prevent or limit the growth of spore-forming bacteria, the FSIS recommends, “data be gathered in 15 to 30 minute time increments when the product temperature is between 130 °F and 80 °F. The time/temperature data should be in 30 to 60 minute time increments when the product temperature is between 80 °F and 40 °F or 45 °F.”

### RFOT

#### *Wireless Meat Temperature Data Logger*

- Wireless monitoring throughout production process
- Measures temperatures from -4 °F (-20 °C) to 212 °F (100 °C)
- Splash-proof to withstand wash down cycles
- Available in a variety of probe lengths





## STORAGE



Once chilled, the FSIS **Modernization of Poultry Slaughter Inspection** states that poultry to be packaged is to be stored at 40 °F or less. For poultry that undergoes further processing, the internal temperature of the carcass may rise to 55 °F if it is immediately chilled to 40 °F or placed in a freezer after packaging. To ensure no bacterial growth occurs, poultry that has been packaged and held at the establishment for longer than 24 hours should be held in a room at a temperature of 36 °F or lower.

Alternative procedures are available to establishments that meet the requirements. For time and temperature as the critical limit in the critical control point, after chilling the internal temperature of the carcass may rise to 60 °F during further processing. Immediately after processing, poultry must be packaged and refrigerated to lower the internal temperature to 45° F or less until shipping. Under this procedure, packaged poultry held in excess of 24 hours needs to be held in a room at a temperature of 36° F or less.



### **RFRTDTemp2000A**

*Wireless RTD-Based  
Temperature Data Logger*

- Wireless capabilities for continuous monitoring
- Monitor remotely with MadgeTech Cloud Services
- LCD screen for real-time readings and statistics
- User-programmable alarms and notifications



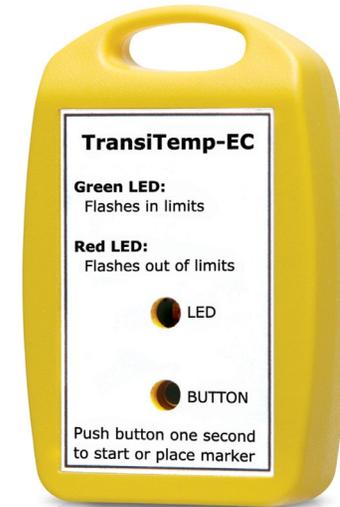
## SHIPPING



In order to prevent contamination, the FSIS released **safety and security guidelines** for the transportation and distribution of poultry. To ensure all poultry products are protect from temperature changes, trailers and trucks used for the transportation should be pre-cooled for at least 1 hour before loading with the temperature set no higher than 26 °F.

Before the product is loaded for transportation, it should be documented that all freight is 40 °F or lower. During transit, the driver must periodically check the integrity of the load. The temperature and function of the refrigeration unit must be checked at least every 4 hours and documented to verify the product was maintained at the appropriate temperatures.

To help establish control procedures the FSIS advices, “Use time-temperature recording, indicator, or integrator devices, if they are available, to monitor the condition of cargo. Check the devices every 4 hours.”



### TransiTemp-EC

*Shipping Temperature Data Logger*

- Compact to fit into shipping containers
- Splash-proof enclosure
- Measures temperatures from -4 °F (-20 °C) to 158 °F (70 °C)
- Built in LED indicators for temperature validation

# HACCP COMPLIANCE FOR THE EGG INDUSTRY IN THE UNITED STATES



Jurisdiction over regulation of eggs in the United States is shared at the federal level by the USDA and the FDA. The FDA has primary jurisdiction over shell eggs and the USDA has primary jurisdiction over egg products, so processors should be familiar with regulations carried out by both agencies.

In 2009, the FDA released its final rule that requires shell egg producers to implement measures to prevent Salmonella Enteritidis (SE) contamination. The **Egg Safety Rule** requires egg producers with 3,000 or more laying hens to register with the FDA and implement preventative measures from farm to table. The requirements include documenting prevention plans for SE testing, refrigeration, biosecurity, cleaning and disinfection, as well as pest control.

The use of a HACCP plan can assist with the implementation of the requirements called out in the Egg Safety Rule. However, in 2011, the FDA passed the Food Safety Modernization Act (FSMA) which requires all domestic and foreign food facilities that register with the FDA to comply with these additional set of rules.

## Handling – Shell Eggs

For shell eggs, those typically sold by the dozen, cooling begins at 24 and 36 hours for eggs that are 1 to 60 days old and stored at temperatures from 45 °F to 60 °F, then followed by refrigeration at 45 °F until eggs are pasteurized.

[https://www.fsis.usda.gov/wps/wcm/connect/16abcb5f-21fc-4731-9346-fd8401582ba4/SE\\_Risk\\_Assess\\_Oct2005.pdf?MOD=AJPERES](https://www.fsis.usda.gov/wps/wcm/connect/16abcb5f-21fc-4731-9346-fd8401582ba4/SE_Risk_Assess_Oct2005.pdf?MOD=AJPERES) – Page 10

## Pasteurization – Egg Products

“Such products shall not be released into consuming channels until they have been subjected to pasteurization, heat treatment, or other approved methods of treatment,” **9 CFR Part 590.415**.

To prevent the contamination of the product, during pasteurization, every particle of the egg product must be rapidly heated to the required temperature and held for the minimum required holding time as listed in Table 1 of **9 CFR 590.570**.

This section goes on to state, “The temperature of the heated liquid egg product shall be continuously and automatically recorded during the process.”

## Storage & Shipping

According to **21 CFR Part 118.4**, eggs must be stored and transported at or below 45 °F (ambient temperature) 36 hours after time of lay. Eggs that are processed as table eggs can be stored at room temperature for no more than 36 hours just prior to processing to allow an equilibration step to temper the eggs.

“Data and information reflecting compliance activities must be entered on records at the time the activity is performed or observed, and the records must contain the actual values observed, if applicable,” **21 CFR Part 118.10**.

The FSIS also oversees the evaluation of egg handling and pasteurization performance standards in an effort to reduce the possibility of Salmonella contamination. The FSIS released the **Risk Assessments of Salmonella Enteritidis in Shell Eggs and Salmonella spp. in Egg Products** guide to help identify microbial hazards and the proper produces to effectively reduce the risk of contamination with a HACCP plan.

# DATA LOGGING TECHNOLOGY

Section 417.5 states an important element of any HACCP plan is the collection, monitoring, verification and recording of data. Verification of HACCP implementation includes documenting actual times, temperatures and other quantifiable values during the monitoring of critical control points.

Continuous monitoring devices and data loggers are an excellent way to determine if a HACCP plan is functioning as intended. Data loggers are often used as a verification procedure at critical control points and do not require any human action to monitor their critical limits, reducing the risk of human error. In order to comply with 9 CFR 417.4(a)(2), the HACCP plan must include procedures and frequencies for calibration of any process monitoring instrument. Calibration methods should be in accordance with industry standards and manufacturer instructions.

## Software and Maintenance

As precision measurement instruments, data loggers do require maintenance. This typically includes battery replacement, O-ring replacement and at least an annual recalibration. To provide accurate measurements, the data logger being used should always be certified and calibrated to a known standard.

When using data loggers, in most cases there will be software required to allow for further analysis of the data collected. Certain software programs include customizable features that can help easily analyze the data.

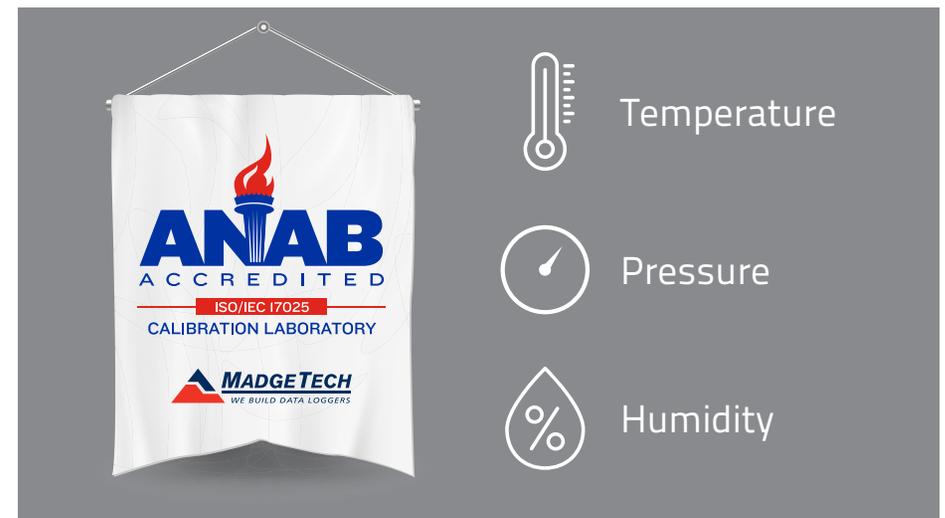
MadgeTech's on-site calibration laboratory performs calibrations on all of its data logging solutions and is **ISO/IEC: 17025** accredited, covering specific temperature, humidity and pressure products.

## Calibration and Recordkeeping

A critical piece of any HACCP plan is monitoring and recordkeeping of critical limits, which makes reliable calibration and maintenance of devices crucial.

Thermometers and hygrometers for measuring temperature and humidity require a much more intensive regimen by designated plant personnel, with a greater likelihood of deviation. Data loggers provide a cost-effective means of extremely accurate data collection and recordkeeping over long periods of time and under harsh conditions, with far less requirements for human supervision and involvement.

To ensure data accuracy, most data logging companies provide services to maintain the correct and consistent calibration of its devices. A calibration certificate indicates the date and condition of the services, providing the documentation required by most regulatory agencies to prove proper periodic calibration.

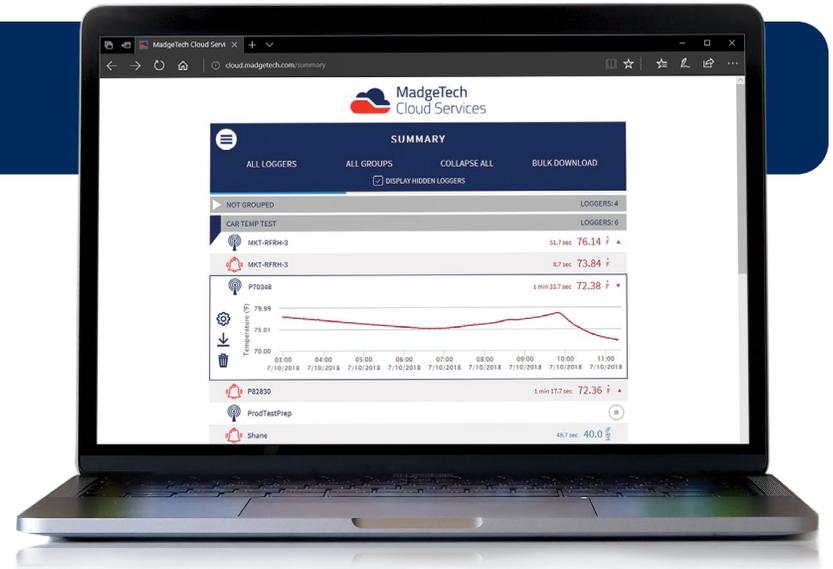




# MADGETECH CLOUD SERVICES

## Access Data Instantly and Securely from Anywhere in the World

The **MadgeTech Cloud** is compatible with all MadgeTech wireless data loggers, providing users with instant access to real-time data from any location. With the MadgeTech Cloud, data loggers can securely transmit data to be viewed on any Internet enabled device such as a computer, tablet or smartphone.



### Scalable Solution

The MadgeTech Cloud is designed to support organizations of any size. From a single data logger to a network consisting of hundreds of loggers, the MadgeTech Cloud provides facilities with on-demand data supervision, attainable results, and flexibility like never before. The MadgeTech Cloud gives users the power to have control of all their critical data right in the palm of their hand.

### Cloud Capabilities

All wireless MadgeTech data loggers can transmit data to the MadgeTech Cloud to be saved, viewed and controlled. The data is available for viewing from any Internet enabled device anywhere in the world. Equipped with many features, the MadgeTech Cloud is flexible enough to adapt to any data logging needs.

### New Logger Groups

Assembling data loggers is easier than ever thanks to the MadgeTech Cloud's Logger Groups. Users have the ability to organize data loggers into groups and subgroups, making all data easily accessible from one central location.

### Email & Text Message Alerts

The MadgeTech Cloud allows users to configure alarms to alert for no readings, channel thresholds or battery level. When an alarm is triggered, text message or email notifications are instantly sent, giving users the ability to view the data and assess the situation immediately.



Quick and Easy Setup



View Data From Anywhere



Access Data Instantly



Email and Text Notifications

# MADGETECH 4 SOFTWARE

The simple, easy-to-use, Windows-based software enables the user to effortlessly collect, display and analyze data. A variety of powerful tools can be used to examine, export, and print professional quality reports with just a click of the mouse. This software can be downloaded for free from the MadgeTech website.



## MadgeTech 4 Software Customizable Features and Options

**MadgeTech 4 Software** can communicate with multiple loggers through multiple interface cables. Capable of simultaneous start, stop and download of over 100 devices, this software serves as your virtual command center for large scale facilities and small. Display your data in graphs, with tabbed views and multi-monitor support. Utilize the infinite graphing flexibility by combining channels and datasets as desired. All graphing makes use of accelerated graphics hardware for real-time updating and high performance visuals.

MadgeTech 4 Software is designed with a built-in database for automatic storage of downloaded data. The look and feel is organized much like standard email programs to aid in user friendliness and ease of use. MadgeTech 4 Software also offers extensive alarming options across multiple devices, wireless and non-wireless. Alarm output options include email, on-screen, text message and run-a-program alerts.

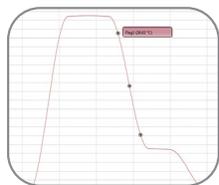
MadgeTech 4 Software has a powerful and comprehensive statistics system that allows the user to customize and view statistics as desired. Another feature is customizable engineering units. This enables users to support and program devices with many different unit types as well as the ability to display them as an alternate unit if desired.

## Software Features

- Multiple Graph Overlay
- Statistics
- Digital Calibration
- Zoom In / Zoom Out
- Cooling Flags
- Lethality Equations (F0, PU)
- Mean Kinetic Temperature
- Full Time Zone Support
- Data Annotation
- User Friendly File Management
- Min. / Max. / Average Lines
- Timeslice
- Data Table View
- Automatic Report Generation
- Summary View
- Workflows / Automation



Cooling Flags



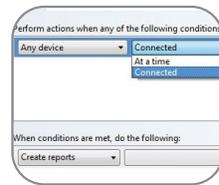
Graph View

A table with columns for Time, Time Zone, and Delta. The data is organized in a grid format, showing time intervals and corresponding delta values.

Tabular Data View



Alarm Notifications



Automation



Export to Excel