TEMPERATURE MONITORING SOLUTIONS
HACCP COMPLIANCE
FOR THE MEAT 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.

MadgeTech
WE BUILD DATA LOGGERS

TEMPERATURE MONITORING SOLUTIONS
HACCP COMPLIANCE
FOR THE MEAT PROCESSOR

This guide has been provided courtesy of:

MadgeTech
WE BUILD DATA LOGGERS

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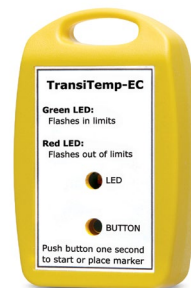
Our goal is to continue to provide the tools needed to help food safety professionals perform their jobs more effectively and efficiently.

When you think of food safety, think of MadgeTech.

Norman E. Carlson,

Founder & President

TransiTemp-EC

Green LED:
Flashes in limits

Red LED:
Flashes out of limits

● LED

● BUTTON

Push button one second
to start or place marker

HiTemp140
High Temperature Data Logger
Ambient Range: -40°C to 140°C

CE

TransiTemp-EC
Shipping Temperature Data Logger

HiTemp140
*High Temperature Data Loggers
(with optional thermal shield)*

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 in 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.

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HACCP COMPLIANCE FOR THE MEAT 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

Carcasses should be refrigerated as soon as possible after slaughter to reduce bacterial growth and extend the shelf-life.

Currently, the United States does not have regulatory requirements for the initial chilling process. However, **Beef Research** recommends meats cool to a surface temperature of at least 39 °F (4 °C) within 24 hours.

Chilled meat must be kept cold until it is either sold or cooked. Failure to maintain the meat just above the freezing temperature of 32 °F (0 °C) and provide adequate spacing to allow for air circulation will induce condensation and encourage microbial growth.

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

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COOKING

HiTemp140
High Temperature Data Logger

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

Processing plants that produce ready-to-eat meats are required by FSIS to meet the lethality performance standards for the reduction of Salmonella.

Critical operating parameters for cooking all meats are time, temperature and relative humidity. **FSIS Appendix A** provides time and temperature combinations to meet either a 6.5-log or 7-log reduction of Salmonella.

The FSIS states that establishments "should have sufficient monitoring equipment, including recording devices, to assure that the time (accuracy assured within 1 minute), the temperature (accuracy assured within 1 °F), and relative humidity (accuracy assured within 5 percent) limits of these processes are being met."

HiTemp140X2 HiTemp140-1 HiTemp140-2 HiTemp140-5.25 HiTemp140-7 HiTemp140-PT-1

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COOLING (STABILIZATION)

Processing plants that produce ready-to-eat meats are required by FSIS to meet the stabilization standards for preventing spore-forming bacteria.

According to **FSIS Appendix B**, all cooked meat products should be cooled from 120 °F (48 °C) to 55 °F (12.7 °C) in no more than 6 hours and continue until the product reaches 40 °F (4.4 °C).

The internal temperature of a product should not remain between 130 °F (54 °C) and 80 °F (26 °C) for more than 1.5 hours or between 80 °F (26 °C) and 40 °F (4 °C) for more than 5 hours. This is the range of rapid growth for *Clostridium perfringens*.

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Proper storage is the key factor for keeping foods safe. Refrigeration slows bacterial growth while freezing inactivates any microbes present including bacteria, yeast and molds.

Refrigerator temperature must be maintained at 40 °F (5 °C) or below. Stored frozen meats must be solidly frozen at the ideal freezer temperature of 0 °F (-17.7 °C).

To comply with government regulations, it is necessary to verify refrigerator and freezer temperatures. If meat has been exposed to temperatures above 40 °F (5 °C) for more than 2 hours, it could be potentially hazardous and should be discarded.

RFTCTemp2000A
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

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It is important to maintain the "cold chain" to ensure the product is kept at the proper temperatures continuously throughout transport. In order to protect the product, temperature control is essential.

Meat must be maintained at an internal temperature of 40 °F (4 °C) or below before being transported, and trucks should be pre-cooled for at least an hour before loading. According to the **FSIS Transportation Security Guidelines**, during pre-cooling the doors should be closed and the temperature setting of the unit should be no higher than 26 °F (-3 °C).

The temperature and function of the refrigeration unit should be checked and recorded every 4 hours.

"Monitor the temperature and function of the refrigeration unit at least every 4 hours. If there is a unit malfunction, the problem should be corrected by an authorized refrigeration mechanic before the temperature of the load rises."
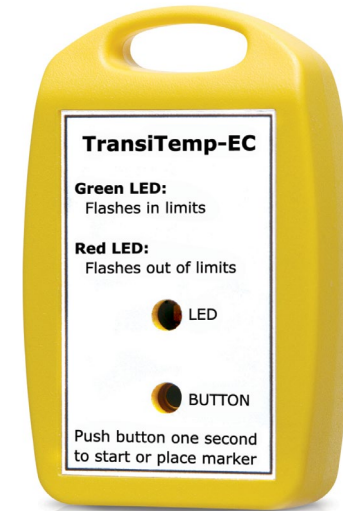
TransiTemp-EC
Shipping Temperature Data Logger

- 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

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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.
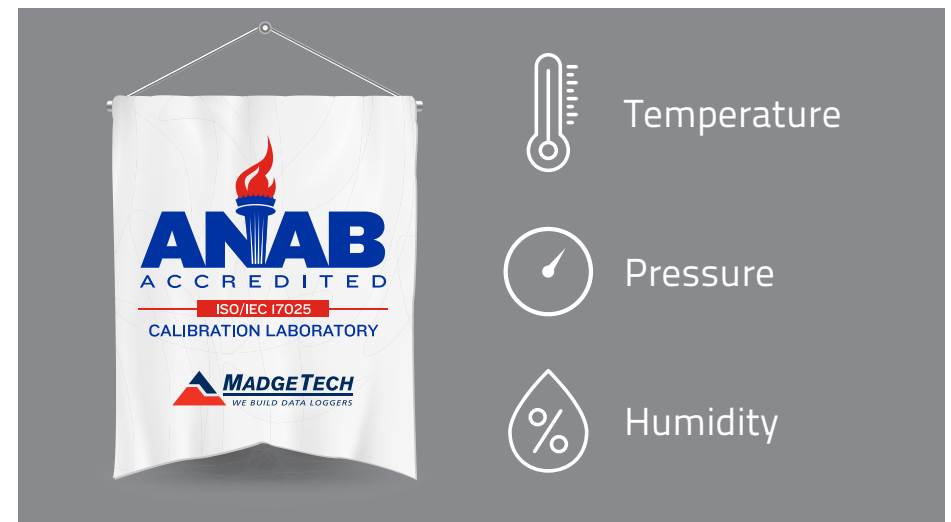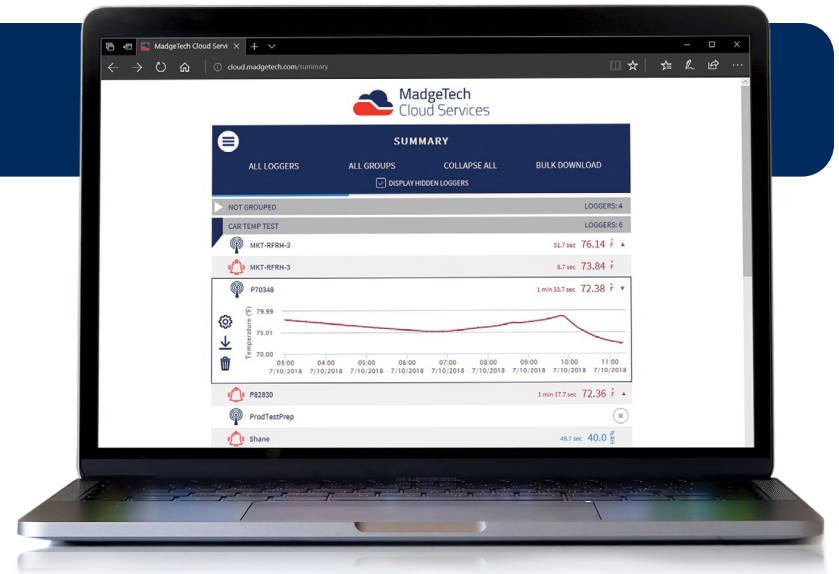
MADGETECH CLOUD SERVICES

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

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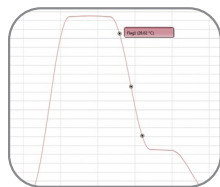
MadgeTech 4 Software has a powerful and comprehensive statistics system that allows the user to customize and view statistics as desired. Another feature is customizable engineering units. This enables users to support and program devices with many different unit types as well as the ability to display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

Cooling Flags	Graph View	Tabular Data View	Alarm Notifications	Automation	Export to Excel

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

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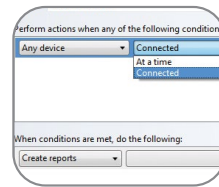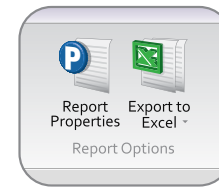WE BUILD DATA LOGGERS