CONVIRON®

# 15 Series

## INSTALLATION MANUAL

278884-ENG-R01

# 15 Series

INSTALLATION MANUAL

**Please read these instructions carefully and completely before operating the chamber.**

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# PREFACE

Welcome to the 15 Series Installation Manual. This manual is provided for the initial uncrating and installation of the Conviron's PGR15, MTR30, and TC30, and is provided to all clients who have purchased a 15 square foot chamber(s).

Clients will find sufficient detail for a typical installation including figures, diagrams, and graphics to operate the chamber without issue. However, given that many installations are specific to each facility and that facilities may have unique requirements, additional information or assistance from Conviron may be required. In such cases, In such cases, local contact information is provided on the Conviron website.

## Functional Description/Intended Use

This series of chambers is designed to provide a controlled environment for plant production and scientific experiments including, but not limited to, plant science, biotechnology, and entomology.

## WEEE and RoHS Compliance Statements

CONVIRON is committed to meeting all requirements of the WEEE directive (2012/19/EU).

Products labeled with the WEEE symbol (a crossed out "waste bin") indicate that the final user should not discard this product along with other household waste, but that it must be collected and treated separately.

Please contact Conviron, or your Conviron distributor, for proper handling and disposal instructions.

CONVIRON is committed to meeting all requirements of the RoHS directive (2011/65/EU). The RoHS directive requires that manufacturers eliminate or minimize the use of lead, mercury, hexavalent chromium, cadmium, polybromated biphenyls and polybromated biphenyl ethers in electrical and electronic equipment sold in the EU after July 1, 2006.

## Document Conventions

The **"PLEASE NOTE"** symbol is used to draw attention to additional information which may assist in the installation of the equipment.

Conviron maintains a policy of continual improvement and reserves the right to change the product without prior notice. Therefore, the images used throughout this manual may differ slightly from the actual configuration due to updates and product changes.

- Wherever possible, textual descriptions are accompanied by photographs or line drawings of the chambers to assist the reader in understanding the material.
- Frequent reference is made to left and right sides throughout this manual. Left is considered to be the left-hand side while facing the equipment.
- Italicized text is used to introduce instructions.
- Red arrows are used to show the required movement of a part, or movable parts during assembly or disassembly.
- Red circles are used to highlight important assembly or disassembly details, or to show important small parts in an otherwise large assembly.
- Highlights are used to outline the location of major assemblies or optional equipment.

# SERVICE & TECHNICAL SUPPORT

Before contacting Conviron, please check the following:

- Read this document the Control System Manual, and the Operation, Maintenance, and Troubleshooting Manual completely before attempting to operate the chamber.
- If you are having a problem using your cabinet(s), pay particular attention to the relevant section and the pertinent information in this manual, and use the information to diagnose and correct the problem.
- If the problem persists and/or you require additional assistance please collect the following information prior to contacting Conviron:
    - The serial number of the cabinet, located on the rating plate
    - The software version of the control system. Instructions for obtaining the software version of your control system are provided in the control system operator manual.
    - A description of the problem
    - A description of what you were doing before the problem occurred.

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# 1 PRECAUTIONS

The equipment is intended to be installed, operated, maintained, and serviced by trained personnel, according to the instructions and precautions described in the manuals provided by Conviron.

The following precautions are intended to help guide users in the safe operation of Conviron chambers. These precautions should be read and understood before proceeding with installation, operation, and maintenance.

## 1.1 Hazard Identification Symbols

**Table 1-1 Hazard Identification Symbols**

| Symbol | Description |
|---|---|
|  | The "**HAZARD WARNING**" symbol is used whenever a hazard exists which could cause personal injury or potential equipment damage, and requires correct procedures/practices for prevention. |
|  | The "**IMPORTANT INFORMATION**" symbol is used to identify operating procedures which must be followed to ensure smooth and efficient equipment operation. |
|  | The "**ELECTRICAL SHOCK/ELECTROCUTION**" symbol is used to identify a source of potentially dangerous electrical current. |
|  | The "**ELECTROSTATIC DISCHARGE**" symbol is used to identify equipment that is sensitive to electrostatic discharge. |
|  | The "**BURN HAZARD/HOT SURFACE**" symbol is used to identify surfaces that are hot enough to cause personal injury. |
|  | The "**MOVING PARTS**" symbol is used to identify a potential hazard from moving parts inside the machine compartment. |
|  | The "**HAND CRUSH/FORCE FROM BELOW**" symbol is used to identify a potential hazard from moving parts inside the chamber. |

| Symbol | Description |
|---|---|
|  | The “**PROTECTIVE EARTH-GROUND-MANDATORY ACTION**” symbol is used to identify the protective earth connection. |
|  | The “**PROTECTIVE EARTH-GROUND**” symbol is used to identify the protective earth connection. |
|  | The “**WEAR EYE PROTECTION-MANDATORY ACTION**” symbol is used to identify areas where eye protection is mandatory. |
|  | The “**OPTICAL RADIATION**” symbol is used to identify areas where exposure to ultraviolet (UV) and infrared radiation may be possible. |
|  | The “**FALL HAZARD**” symbol is used to identify a potential hazard of falling from elevated surfaces. |
|  | The ″**SLIP HAZARD**″ symbol is used to identify a potential hazard of falling due to slippery surfaces. |
|   | The “**READ THE OPERATOR MANUAL**” label is intended to remind the user to have a thorough understanding of the equipment BEFORE use. |

## 1.2 General Precautions

These precautions should be read and understood before proceeding with installation, operation, and maintenance.

Conduct a visual inspection of the equipment and surrounding area by walking around the unit to ensure no debris or obstacles are present that could pose a safety hazard *before* operating the chamber.

Operate your Conviron equipment for a minimum of five days *before* introducing any research material to ensure proper and stable operation.

Avoid direct contact with any broken fluorescent lamps. Fluorescent lamps are extremely fragile and may emit harmful vapors when broken.

| | |
|---|---|
| | Follow all applicable local environmental regulations and guidelines for disposal of hazardous material. If in doubt, contact local authorities for proper disposal procedures. |
|  | *Do not* allow water or liquids to contact any electrical components.<br>Ensure that there are no obstacles in the path of the canopy before moving it.<br>Take all appropriate safety precautions when using and maintaining this equipment including wearing appropriate safety apparel and using appropriate tools.<br>Use only original replacement parts when maintaining and servicing the equipment. If in doubt about safe operation and/or maintenance of the equipment, contact Conviron immediately. |
|  | Working with high voltage will be required when installing the equipment. *Do not* attempt this work unless you have the appropriate knowledge and experience.<br>Disconnect and lock out the main power before servicing the equipment.<br>The main terminal in the control panel has live voltage unless the external breaker is OFF. Use extreme caution when working on the control panel to prevent injury.<br>Water coming into contact with the electrical components presents a high voltage hazard. Avoid these conditions. If you have any doubt about safe watering practices, contact Conviron.<br>The control system may come equipped with an optional Uninterrupted Power Supply (UPS) and power will remain live for a period of time even if the power supply is turned OFF. Use extreme caution when working on the control panel to prevent injury.<br>If you have any doubts as to whether your unit comes equipped with a UPS, contact Conviron. |
|  | Do not touch the lamps. Fluorescent lamps operate at high temperatures and present a burn hazard.<br>Do not touch the lamp holders. The heated metal and glass presents a burn hazard. Ceramic metal halide and high-pressure sodium lamps operate at very high temperatures.<br>Do not touch the heaters. The hot surface presents a burn hazard.<br>Refrigeration lines can be very hot when the chamber is operating. For safe operation, insulate hot gas lines on site to prevent inadvertent contact, i.e., exposed refrigeration lines. |
|  | Keep all body parts out of the path of any canopy in motion. |

| | |
|---|---|
|  | Alert service personnel immediately if a slip hazard is detected. |
|  | Ensure that appropriate fall protection equipment and fall arrest system is in place before starting work above the chamber. |
|  | *Do not* look directly at the ceramic metal halide lamps while in operation.<br>Use adequate eye protection for the concerned wavelengths of Actinic UV, Blue Light and Infrared. Also wear protective clothes and gloves.<br>Alternatively, the operator may turn off the ceramic metal halide lamps through the control panel user interface while accessing the cabinet. |
|  | *Never* check evaporator fans for free movement while power remains ON. Perform visual and auditory checks to ensure circulating fans are operating. |

## 1.3 Installation Precautions

| | |
|---|---|
|  | *Do not* attempt to install or maintain this equipment without the appropriate knowledge and expertise.<br>Use extreme caution when moving the cabinet. Conviron recommends a minimum of two people to move the cabinet.<br>*Do not* tilt the cabinet when moving it. Heavy components located in the machine compartment can cause the cabinet to tip.<br>*Do not* over-tighten the cam locks. The cam locks could be rotated to the point where they no longer properly engage their receptacles.<br>Ensure that the drain connections are secure *before* operation if the cabinet is equipped with a separate coil dehumidifier.<br>Ensure that the cabinet is leveled and secured to the floor *before* operating the unit.<br>Inspect all connections in the machine compartment *before* connecting the equipment to the building utilities. |
|  | Ensure that power to the chamber line is off, and locked out or tagged out, *before* making any electrical connections at the chamber.<br>Ensure that all electrical boxes and panels are closed and that no one is in contact with the equipment *before* powering up. |

# 2 INSTALLATION

Only qualified trades-people, i.e. electricians, plumbers, refrigeration mechanics, etc. who have read and completely understand these instructions should perform the required installation work. This work must be done in accordance with local codes and regulations.

Contact Conviron immediately if in doubt about safe and proper installation of the equipment.

## 2.1 Installation Overview

The following is an overview of the steps required to install the chamber in its final location. Each step on the list is covered in detail in the subsequent sections.

1. Determine the chamber location.
2. Uncrate and unpack the chamber.
3. Move chamber to the final location and level it.
4. Make all required external and utility connections.
5. Start the system.

## 2.2 Determining Chamber Location

The following considerations must be addressed before an appropriate location for the chamber can be determined:

- Ambient environmental requirements.
- Clearances required for operation and service.
- Access to required utility connections.

### 2.2.1 Ambient Environment Requirements

The chamber requires a conditioned ambient environment to achieve the performance specifications. It is important to ensure that the room in which the growth cabinet is located adheres to these environmental conditions.

#### 2.2.1.1 Temperature

Conviron guarantees performance of the growth chamber for ambient temperature conditions between 59°F to 95°F (15°C and 35°C). Recommended ambient conditions are 70°F (21°C) at 50%RH.

### 2.2.1.2 Humidity

The chamber will tolerate a range of ambient relative humidity conditions; however, performance will be limited by the following factors:

- Humidity is not controlled in chambers that are not equipped with the optional humidification and/or dehumidification devices. The resulting internal humidity will be a combination of the ambient conditions and internal conditions within the cabinet.
- The lowest achievable relative humidity in the growth cabinet with a dehumidification option will be a resultant dew point determined by the capability of the chamber. Ambient humidity conditions above the equivalent moisture content of 70°F (21°C) at 50%RH may cause a reduction in dehumidification performance.
- The highest achievable relative humidity in the growth chamber with a humidification option is resultant to a dew point of 77°F (25°C) unless stated otherwise. Ambient humidity conditions below the equivalent moisture content of 70°F (21°C) at 50%RH may cause a reduction in additive humidification performance. The range of operational ambient humidity is up to 90%RH (non-condensing).

### 2.2.1.3 Altitude

The maximum altitude is specified to be 7000ft. (2134 m) above sea level.

### 2.2.2 Clearance Requirements

Minimum clearances (Figure 2-1) are required to ensure normal operation and adequate space for servicing.

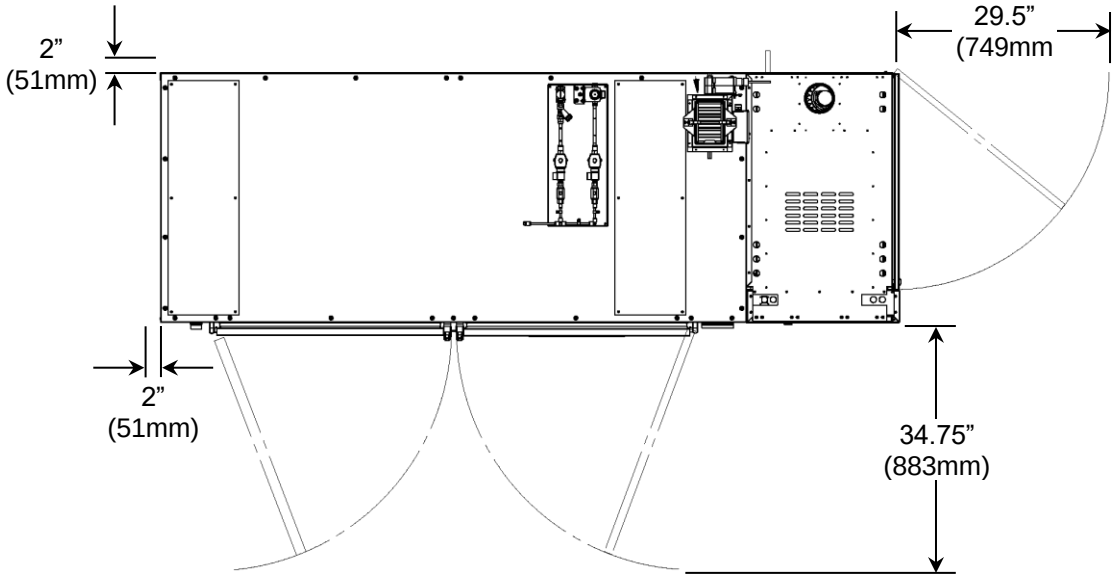


**Figure 2-1 Installation Clearances**

### 2.2.3 Utility Connection Requirements

**Table 2-1 Utility Connection Requirements**

| Connection | Used by | Connection at Cabinet | Specifications | Standard/ Optional |
|---|---|---|---|---|
| Electrical | All electrical components | Terminal block | Refer to rating plate attached to the chamber. | Standard |
| Water | Water cooled DX refrigeration system | 1/2" OD copper pipe | Water @ 50psi (3.45 Bar) minimum | Standard |
| Drain | Cabinet drain | 3/4" copper pipe | Drain must not be elevated above cabinet drain connection. | Standard |
| Purified Water | Spray Nozzle Humidification System (SNH) | 3/8" push-in fitting | Water Quality:<br>• RO Water<br>• filtration: <2 microns or 0.00008"<br>• resistivity: 0.01 to 0.02 Meg ohm-cm<br>Pressure and flow rate:<br>60 psi (4.2 bar)<br>Maximum water usage: 1.44 US Gal/hr. (5.5 l/hr.) | Optional |
| Glycol/Water | Hydronic refrigeration system | 3/4" copper | Designed to work with central chiller refrigeration system. | Optional |
| $CO_2$ | Additive $CO_2$ control system | 1/4" push-in fitting | $CO_2$ @ 0.04 – 0.5 LPM | Optional |
| Refrigeration | Remote outdoor air-cooled (DXRAC) and outdoor air-cooled (OACU) condensing units | Dependent on placement of cabinet and condensing unit | Dependent on refrigeration system specifications and placement of cabinet and condensing unit | Optional |
| Alarm Contacts | Central alarm contacts | Terminal block | Normally Open, Dry Contact, 5A maximum | Standard |
| Ethernet | Communication (COMM) option: Central Management System | RJ45 Ethernet port | Straight Through Cable:<br>For CM or building network connection<br>Crossover Cable:<br>For direct computer connection | Standard |

## 2.3 Installation Procedure

The 15 Series growth chambers are shipped in one crate (Figure 2-2), attached to the shipping pallet with lag bolts. Dismantle and remove the crate from the shipping pallet.

Only qualified trades-people, i.e. electricians, plumbers, refrigeration mechanics, etc. who have read and completely understand these instructions should perform the required installation work. This work must be done in accordance with local codes and regulations.

Contact Conviron immediately if in doubt about safe and proper installation of the equipment.

## 2.4 Uncrate & Remove the Pallet

**Figure 2-2 Shipping Crate**

*Do not* leave any nails, staples, or screws protruding from the crating material to eliminate potential puncture injuries.

Recycle or properly dispose of the crating material and shipping pallet.

***If using a fork lift:***

1. Remove the four lag screws (Figure 2-3), two on each end, securing the shipping bracket to the pallet.

**Figure 2-3 Shipping Lag Screws**

2. Position the fork lift centered with the center of the cabinet.
3. *Slowly*, lift the cabinet off the shipping pallet, ensuring the cabinet is balanced on the forks and it is rising evenly.
4. Remove the shipping pallet.

***If not using a fork lift:***

1. Position lifting devices, such as pallet jacks or small scissor jacks, under the cabinet frame and raise the pallet and the cabinet slightly.
2. Place spacers, such as small pieces of 2” x 4” lumber, under the eight leveling feet under the cabinet, and lower the cabinet onto the spacers.
3. Remove the four lag screws, two on each end, from the ends of the pallet.
4. Remove the pallet end boards and remove the remains of the pallet.
5. Remove the spacers and proceed with installation.

## 2.5 Level the Chamber

When in position in its final location, it is critical that the chamber is leveled for stability and proper operation before making the utility connections. Eight levelers are located around the perimeter of the chamber.

Use a pipe wrench to level the cabinet.

**Figure 2-4 Chamber Levelers**

Make all the mechanical connections to the ventilation, water and drainage systems and re-install the covers *before* making any electrical connections.

## 2.6 Connect the Drain Line

The chamber is equipped with a drain, terminating in a 3/4” copper pipe located at the machine compartment end of the cabinet.

Connect this drain to a building floor drain or drainage system.

**Figure 2-5 Chamber Drain Connection**

## 2.7 Connect the Refrigerant Lines

The refrigerant line connection points are located at the back of the mechanical compartment. The number of pipes and connections vary depending on the type of refrigeration system provided. Generally, the connections will either be water lines labeled Water Out and Water In, in the case of water cooled condensing units, or glycol refrigerant lines labeled Return and Supply in the case of remote air condensers (RAC) or outdoor condensing unit systems (OACU). All refrigeration lines are labelled at the factory.

### 2.7.1 Refrigerant Cooled Systems

The refrigeration system on the chamber and the remote condenser or condensing unit may come pre-charged with refrigerant or nitrogen. Each system will be labelled indicating how the system has been shipped. If shipped with refrigerant, only the piping lines must be evacuated. If shipped with nitrogen, the entire system must be evacuated.

1. Remove any caps installed on the copper lines.
2. Connect the building condenser water or glycol supply and return piping as labeled on the chamber connection points.

If the pipe lengths are longer than 10 feet (3.0m), evaluate the building pipe size to determine if the pipes are appropriately sized for the required flow rate.
The pipe size on the chamber may not be appropriate for long building pipe runs. Piping to the chamber may need to be upsized and then reduced at the chamber connection point.

3. Pressurize the lines to ensure there are no leaks.
4. Evacuate the remote lines per standard refrigeration principles down to 500 microns.
5. Charge with the refrigerant quantity indicated on the shipping instructions.
6. Open the in-line valves, if so equipped.


**Figure 2-6 Water Cooled System Connections**

**Figure 2-7 Glycol Cooled System Connections**

### 2.7.2 Air Cooled Systems

- Remote air-cooled condenser (RAC): Connection points are labelled Hot Gas and Liquid.
- Out-door air-cooled condensing unit (OACU): Connection points are labeled Liquid, Hot Gas and Suction.

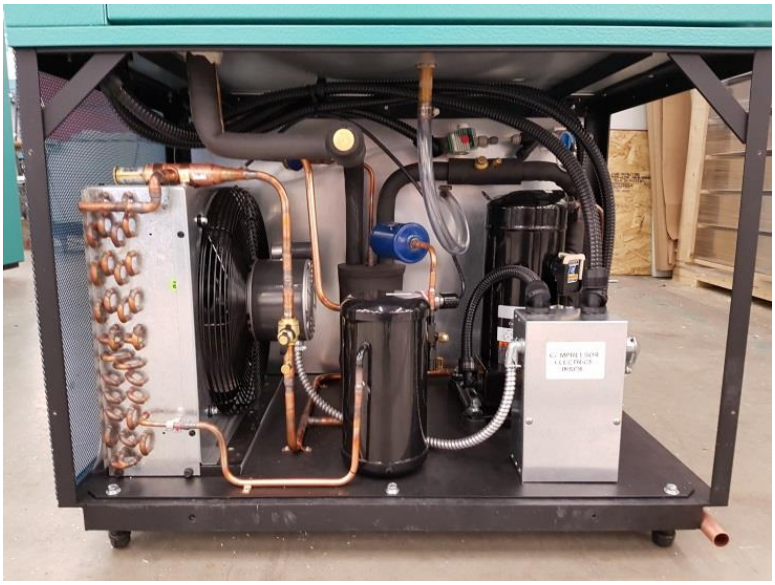

**Figure 2-8 Air Cooled Condensing Unit**

## 2.8 Connect the Optional Systems (if so equipped)

### 2.8.1 Auto Watering Irrigation System and Spray Nozzle Humidifier Line

Attach the water supply line to the 3/8” push-in fitting inlet on the shut-off valve.

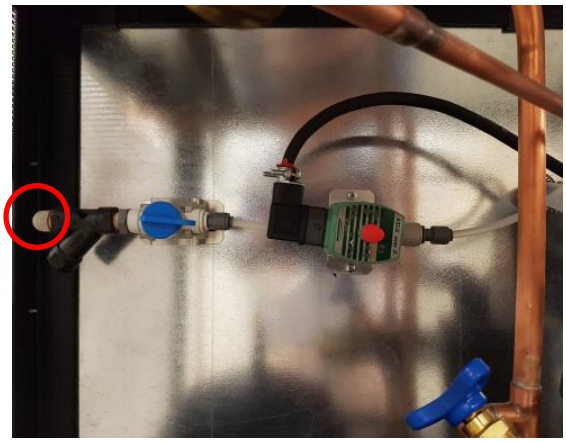

**Figure 2-9 Irrigation and Humidification Systems Connection**

Depending on order configuration, water connections for the optional irrigation and humidification systems may be located on the top of the cabinet.

### 2.8.2 $C0_2$ Supply Line

Install 1/4” OD tubing from the $CO_2$ supply to the inlet on the regulator.

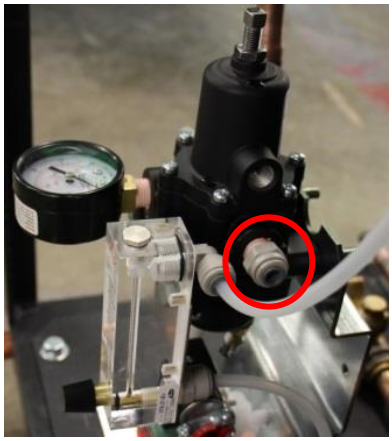

**Figure 2-10 $C0_2$ Supply Line Connection**

## 2.9 Connect the Electrical Service Lines

Ensure that power to the cable from the main breaker panel to the chamber is off, and locked out or tagged out, *before* making any electrical connections at the chamber.

Check all wire connections inside the control panel to ensure the connections have not come loose in transit. Tighten any loose connections to the torque specifications of each component listed on the electrical drawings.

1. Open the control panel door and install the power cable into the cabinet.
2. Ensure the main power disconnect switch is OFF.
3. Install ferrules onto the ends of the power and neutral wires.
4. Connect the ground wire to the ground terminal block.
5. Connect the neutral wire to the neutral terminal block.
6. Connect the 3∅ wires to the TI, T2, and T3 terminals on the main power disconnect switch.
7. Connect the UPS internal red battery wire (for the UPS Option only).

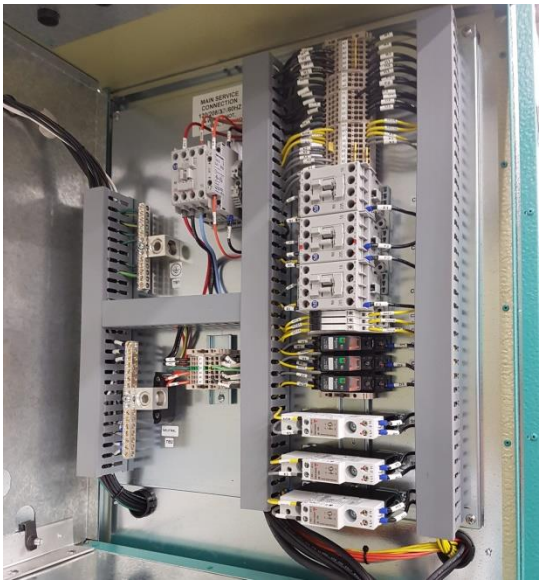

**Figure 2-11 Electrical Service Line Connections**

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Management System Certified to ISO9001

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