

Sterilizers, Dryers, & Pharmaceutical Ovens



TPS[™]
Thermal Product Solutions





Proven technology

Since 1932, Gruenberg has designed and manufactured high quality custom and standard pharmaceutical sterilizers, dryers and continuous process ovens. Today, pursuing a philosophy of uncompromising performance, Gruenberg has emerged as a leader in the manufacturing of Class 100 (ISO 5) and heat processing equipment worldwide, including clean room ovens and cooling tunnels.



Gruenberg

Gruenberg

Consider the fact that you can often get a custom oven designed and built by Gruenberg for what others charge for an off-the-shelf machine.

Over the years, Gruenberg has evolved as a premier builder of customer-specific applications. Our experience in designing custom systems translates into reasonable prices.

The result is a superior piece of equipment that gives more material content, more long-term reliability, and more satisfaction.

Gruenberg enjoys one of the highest customer retention rates of any pharmaceutical oven manufacturer in the world by offering comprehensive proposals, realistic schedules, and timely deliveries. Effective service before, during, and after every purchase has earned Gruenberg an extensive list of satisfied customers.

Exceptional craftsmanship, proven reliability and durability, and complete build-to-order capability are just a few of the reasons to specify Gruenberg.



Cooling tunnels for hot-fill are an additional product, as are a number of continuous conditioning systems.

When no off-the-shelf parts are available in stainless steel, Gruenberg machines their own, as with these door latches.



Or note the fully-adjustable hinge blocks, machined from a block of 304 stainless steel.



Radius corners and slope-to-drain are combined in this particularly challenging fabrication task.



Gruenberg uses fully welded heater tubes to keep all electrical connections exterior to the chamber.



We machine stainless steel casters here because no one else makes them. (Makes you wonder what the other guys use.)



Sterilizers



Hot Air Sterilizers/Depyrogenation Ovens

Laboratory, Cabinet, Truck In

Whether standard or custom, every sterilizer provides simple operation, precise control, and even heat distribution. Flexibility in options allows a custom unit to be built for standard prices.

CONSTRUCTION

Though flexible in design, Gruenberg sterilizers are rigid where it counts: in construction. All units are built around a welded structural steel frame for long term durability. No panel joints are used. Instead, a unitized construction



standard sterilizer

is incorporated to prevent heat loss and contamination. Between the inner and outer walls, 4" of high performance insulation helps retain heat. The exterior of the oven is constructed of 16 and 18 gauge 304 stainless steel with a #4 polish to withstand frequent washdowns. The interior is constructed of 304L, or if required, 316L. All interior seams are sealed by continuous heliarc welding. Interior 3/4" radius corners are standard, along with other grades of stainless and finishes up to #8.

TEMPERATURE UNIFORMITY

Standard sterilizers are rated for 250 °C depyrogenation. Multiple heater banks are designed to bring the load to sterilization temperature quickly and hold it economically. A digital proportioning control will hold the temperature with a uniformity of ± 5 °C.

AIRFLOW

A high volume horizontal airflow is used for superior temperature uniformity. Sterilizers are only shipped after the airflow tolerances have been finely tuned and checked by a multi-point uniformity test that samples a minimum of 12 points within the chamber. Gruenberg uses a distinct semi-pierced side wall that allows fine tuning of the airflow.

FILTRATION

To keep the process chamber at Class 100 (ISO 5) quality, HEPA filters are installed on the air intake, the exhaust and in the recirculation wall.



Shown here is the non-sterile side of a typical truck-in sterilizer. Two removable truck tracks on the process chamber floor allow easy cleaning. Between the two truck tracks are steel pegs. The steel pegs lock the transfer cart and sterilizer together while loading the truck into the process chamber.

The HEPA filters are a minimum 99.97% efficient at 0.3 microns. The intake HEPA filter prevents contaminants from entering the sterilizer during operation. The exhaust HEPA filter ensures that contamination will not be drawn into the sterilizer as the cycle ends.

Side wall filters provide distinct advantages. Filtration takes place just before the air enters the sterilization chamber so that Class 100 (ISO 5) conditions are ensured. Plus, they afford easy access to filters for validation and maintenance.

ADDITIONAL FEATURES

Most sterilizers are designed for pass-through operation and are installed between sterile and non-sterile classified areas. An automatic door interlock system prevents unloading until the sterilizing and cooling cycles have been completed. Forced cooling helps shorten the cool-down period.

The door and loading tracks are elevated so that a proper seal can be made at the bottom of the door. Wiper gaskets are not recommended because they can sweep particles into the sterilizer.

Each sterilizer is designed for easy use and maintenance. Side walls and loading tracks are easily removable for cleaning. The entire door seals against a continuous, silicone P-gasket.

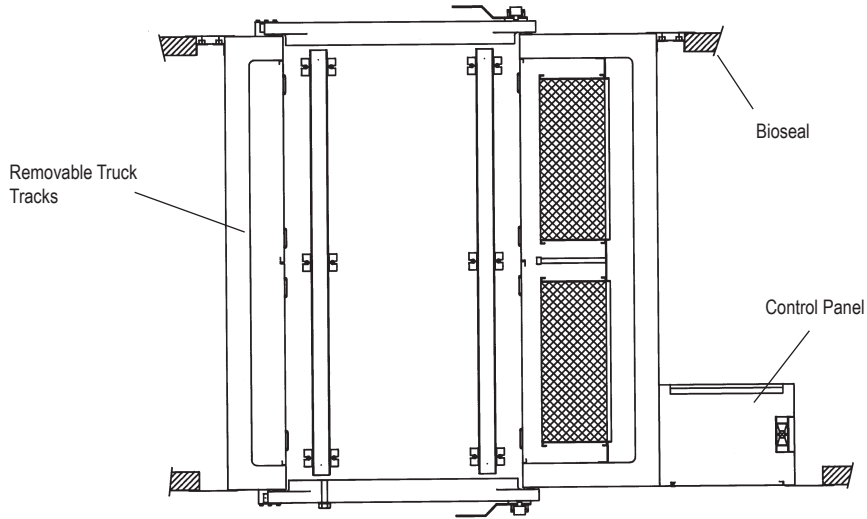


Features

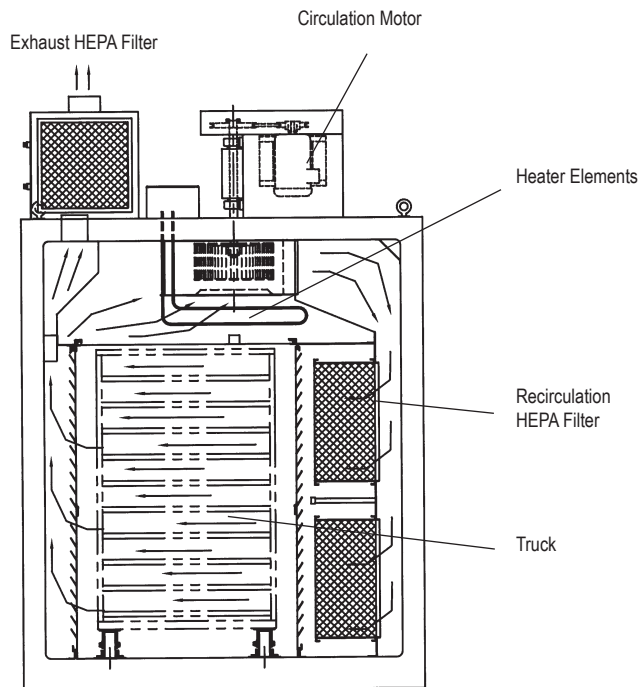


Hot Air Sterilizers/Depyrogenation Ovens

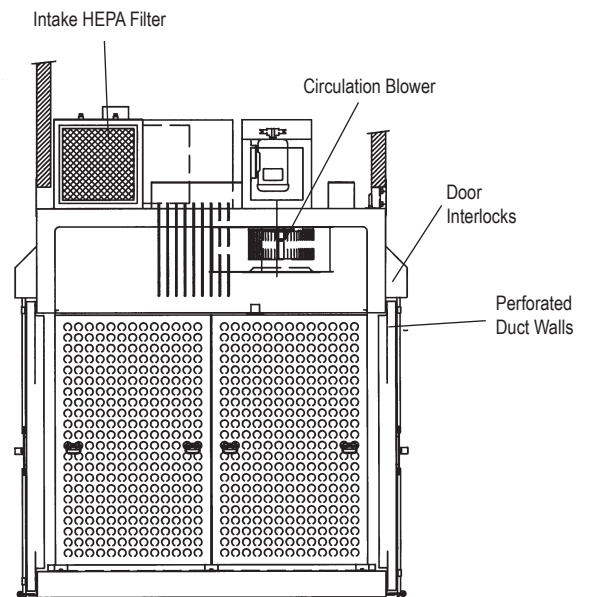
TOP VIEW



FRONT VIEW



SIDE VIEW



Standard Features at a Glance

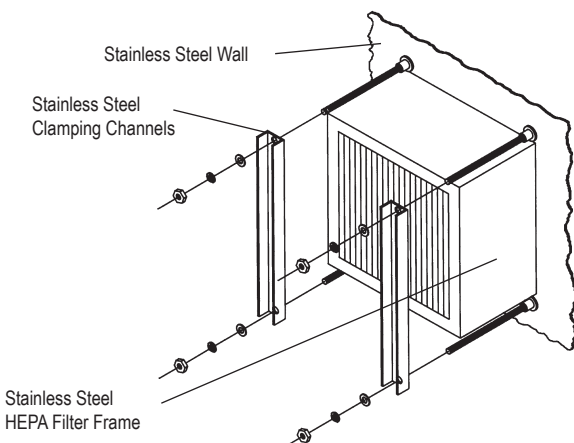
Frame:	Unitized construction for durability and handling (heavy-duty structural steel framework)	Heating:	Electric
Exterior:	Stainless steel type 304 with a #4 finish	Airflow:	Horizontal for superior uniformity
Interior:	Stainless steel type 304L with a 2-B finish and a continuously welded liner.	Prefilter:	On air intake, 55% efficient
Temperature Range:	Above ambient to 280 °C	HEPA filters:	99.97% efficient @ 0.3 microns HEPA Filtered Air Intake HEPA Filtered Exhaust Recirculation HEPA Filters
Uniformity:	±5 °C @ 250 °C typical	Electrical:	All voltages available
Insulation:	4" thick fiberglass 6" thick fiberglass floor	Control Panel:	Attached or remote-standing console
		Side Walls & Ceiling:	Easily removable for cleaning (no screws)
		Gasket Retention:	Brass nuts on stainless studs for rapid and easy gasket replacement



Hot Air Sterilizers/Depyrogenation Ovens

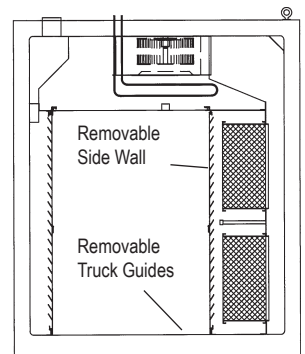
Changing of HEPA Filters

Gruenberg engineers have designed an easy way to access the HEPA Filters for testing or replacement. The HEPA filters are located behind a removable sidewall in the interior of the sterilizer. Simply lift up on the handles of the sidewall and remove the panel.



The recirculation HEPA filters are installed against a heavy-duty stainless steel wall. The wall is reinforced by structural steel so that filter sealing surfaces will remain square as the sterilizer reaches maximum temperature. The frame also adds extra support for clamping of the HEPA

filters. The HEPA filter has a silicone gasket that provides a tight seal so that no particles shall bypass the HEPA filter. A stainless steel C-channel holds the filter in place. The clamping mechanisms are located against the filter frames and do not interfere with the airflow.



Sizes available from 8.3 to 600 cubic feet.

S-Series



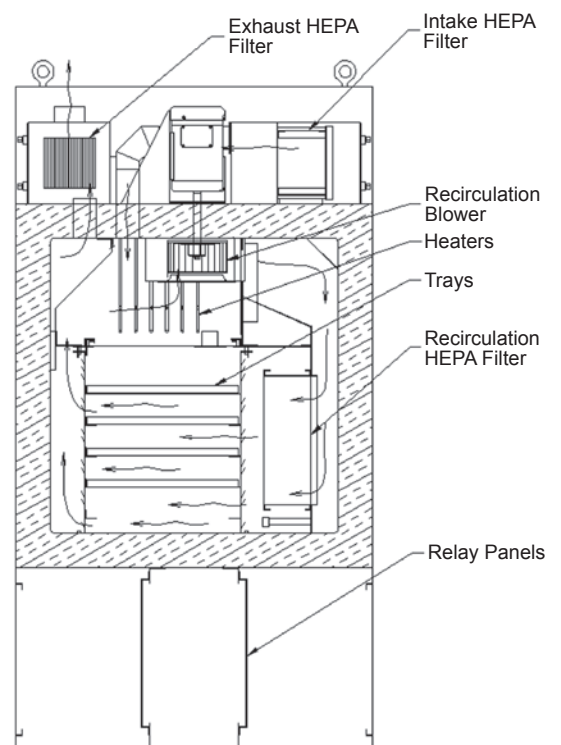
S-Series Sterilization and Depyrogenation Oven

Gruenberg S-Series Sterilizer

Gruenberg's line of S-Series sterilizers complete with all necessary features as a standard. These units are designed and manufactured to comply with all pertinent cGMP requirements. The interior is manufactured with a fully welded 304L-2B stainless steel liner. All interior corners are formed with a 3/4" radius to provide ease of wipe downs. The S-Series sterilizers are rated for depyrogenation temperatures, as a standard, of up to 280 °C and provide a guaranteed full Class 100 (ISO 5) condition throughout the entire process cycle. HEPA filters, rated at a minimum 99.97% efficient at 0.3 microns, are installed in the air intake, exhaust and recirculation wall. The intake with an upstream prefilter. The exhaust HEPA filter ensures that contamination will not be drawn into the sterilizer at the cycle's end and side wall filters provide filtration immediately prior to the process air entering the sterilization chamber. Filter housing design provides ease of access to the filters for validation and maintenance purposes. A Bio-seal flange is provided to seal the sterilizer into the facility wall at the clean side of the system and ensures a positive barrier preventing particulate from entering the room from the maintenance area. The doors are provided with an automatic pneumatic latching and locking system that provides correct pass-through operation.



Cycle Description/Air Path





S-Series Sterilization and Depyrogenation Oven

Physical Specifications

Model	Interior Dimensions (in.)			Exterior Dimensions (in.)			Heating Input (Standard Ramp Rate)	Chamber Capacity (cubic feet)
	W	D	H	W	D	H		
SC55H8.3PTSS	20	30	24	45.75	47.75	85.38	9 kW	8.3
SC55H13.2PTSS	24	34	28	49.75	51.75	93.38	18 kW	13.2
ST55H31.4PTSS	32	34	50	70.75	51.75	97.38	24 kW	31.4
ST55H59.9PTSS	37	56	50	75.75	73.75	103.38	45 kW	59.9
ST55H95.8PTSS	48	69	50	86.75	86.75	103.38	54 kW	95.8

Gruenberg has available a variety of additional sterilizers to meet your specific requirements.

Note: Exterior dimensions are overall cabinet dimensions.

Performance Specifications

	Maximum Heating Rate	Maximum Cooling Rate	Maximum Temperature	Estimated Cycle Time
Accelerated Ramp	5 °C Min	4 °C/Min Air	280 °C	2.7 hours
	5 °C Min	5 °C/Min Water	280 °C	2.5 hours
Standard Ramp	1.5 °C/Min	1.5 °C/Min	280 °C	6.0 hours

Standard Features at a Glance

Frame:	Unitized construction for durability and handling (heavy-duty structural steel framework)	Circulation:	Recirculation internal to chamber
Exterior:	Stainless steel type 304 with a #4 finish typical	Airflow:	Horizontal for superior uniformity
Interior:	Stainless steel type 304L with a 2-B finish and a continuously welded liner	Motors:	Direct drive, premium efficiency
Temperature Range:	Above ambient to 280 °C electric	Prefilter:	On air intake, 55% efficient HEPA filters: 99.97% efficient with a 0.3 microns HEPA Filtered Air Intake HEPA Filtered Exhaust Recirculation HEPA Filters
Uniformity:	±5 °C @ 250 °C depending on circulation system	Electrical:	All voltages available.
Insulation:	Fiberglass mineral wool 4" thick fiberglass walls 6" thick fiberglass floors	Control Panel:	Attached or remote-standing console
Heating:	Seamless tubular Incoloy electric heaters	Side Walls & Ceiling:	Easily removable for cleaning (no screws)
		Gasket Retention:	Brass nuts on stainless studs for rapid and easy gasket replacement

Controls



Gruenberg Sterilizer Controls

As a standard feature, Gruenberg provides TWO 21 CFR 11 ready control system equipped with PLC and OIT (Operator Interface Terminal) technology.

Option 1

The control system comes equipped with PLC and OIT (Operator Interface Terminal) technology. The Allen Bradley Compact Logix PLC with on board Ethernet communications to connect to the Allen Bradley PanelView Plus 700 Touch screen OIT. This is a stand alone unit (Hybrid) that complies with 21 CFR 11 in conjunction with the Temperature Recorder. Local on-board security resides on the PanelView and the ability to store up to 10 recipe profiles. (Hybrid)

Option 2

The control system comes equipped with PLC and OIT (Operator Interface Terminal) technology. The Allen Bradley Compact Logix PLC with on board Ethernet communications to connect to the Allen Bradley VersaView 1200 touch screen OIT. The VersaView offers a TFT color screen, on board Ethernet connectivity, network security (only) and audit trail capabilities (using A/B FactoryTalk) for 21 CFR 11 applications, data logging, alarm logging and the ability to store up to 10 recipe profiles.

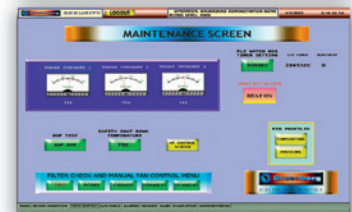
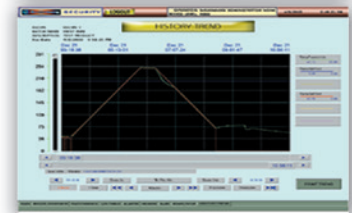
NOTE: Information regarding the domain (required) and IP addresses should be provided upon purchase.

As an option, Gruenberg offers the SCADA control system equipped with PLC and HMI (Human Machine Interface) technology.

SCADA Control System (optional)

The SCADA (Supervisory Control and Data Acquisition) control system comes equipped with PLC and HMI (Human Machine Interface) technology. The Allen Bradley Compact Logix PLC with on board Ethernet communications to connect to a desktop or panel mounted touch-screen PC. The PC is loaded with Windows 7 OS and Wonderware's Intouch 2014 - HMI for standard or custom designs to meet the customers control system requirements.

The HMI comes complete with field installed and validated 21 CFR Part 11 ready control and data acquisition system.



*HMI Content is for reference and subject to change without notice.

Chambers



Gruenberg Steady State Stability Chambers

Gruenberg steady-state chambers are available in four convenient sizes. With workspace sizes of 8, 16, 32, and 58-cubic-feet and a variety of temperature and humidity combinations, these chambers provide the flexibility for a wide range of uses.

A programmable controller allows remote and unattended operation in setting up programs and setpoints. The controller also allows easy control over both temperature and humidity settings in one controller. Common design elements of the chambers allow shelves to be interchanged among different models. Streamlined design allows Thermal Product Solutions to ship chambers customized to the customer's needs in far less time than previous product lines. Customers with several CEO chambers, even if different sizes, now have consistent controls, utility requirements, and heat output, so plant management issues are greatly reduced.

Applications Include

- International Committee of Harmonization (ICH)
- Accelerated shelf-life studies
- Steady-state testing
- Stability testing
- Burn-in
- Curing
- Controlled temperature storage
- Clean room processes
- Bio-medical research

Features

- Remote and unattended operation in setting up programs and setpoints
- Easy control over both temperature and humidity settings
- Non-ramping, manual mode
- Serial communications capabilities via the EIA-232 and EIA-485 standards
- Modbus RTU protocol
- Direct printing to a serial printer
- Direct connection to a PLC, or computer workstation
- High-definition LCD display with four digital input lines
- Two alarm outputs and eight digital event outputs
- Installation has also been improved with the addition of new combination casters/leveling legs



Dryers



Granulation Dryers

Gruenberg manufactures granulation dryers from 15 to 800 cubic feet of chamber capacity. Steam, hot water, or electrically-heated dryers are rated up to 90 °C. Two types of circulation systems are standard: controlled recirculation and single-pass systems.

CONSTRUCTION

Granulation dryers, just like the sterilizers, are built around a welded structural steel frame for long-term reliability.

All interior surfaces are constructed of 100% continuously welded stainless steel for quick and easy washdowns. To simplify cleaning, both side walls are removable, and as an option, the floor may be sloped to a drain. Radius corners are standard.

The exteriors can be either painted cold-rolled steel or stainless steel depending upon your needs. Between the interior and exterior walls are over 3" of high-performance insulation.

AIRFLOW

Distinct perforated walls provide for a superior temperature uniformity of ± 2 °C. Every dryer is fully tested for airflow and temperature uniformity by a multi-point strip recorder prior to shipping.



128 ft³ custom double bay granulation dryer

CONTROLLED RECIRCULATION

Controlled recirculation is the most common means of handling airflow in a granulation dryer. Heated air is passed over the product; before some of the air is exhausted, much of it is recirculated, reducing energy consumption. Temperature uniformity for controlled recirculation is more stable than in single-pass systems.

SINGLE-PASS SYSTEM

Single-pass systems heat the air, pass it across the load, then totally exhaust it. This system was developed for use with high alcohol or flammable liquid mixes.

HEPA FILTRATION

HEPA filters, 99.97% efficient, at 0.3 microns, are installed on the fresh air intake and the exhaust. The HEPA filters have a stainless steel frame and vary in thickness depending on airflow. A disposable pre-filter is installed upstream of the intake HEPA filter to remove larger particles and to extend the life of the HEPA filter. As the dryer cycles off, the exhaust HEPA filter prevents particles from entering back into the process chamber.

CONTROLS

Controls for granulation dryers are very similar to controls for the sterilizers pictured in this brochure. Control panels can be mounted on the side of the granulation dryer or placed in remote locations. Control panels are designed around their installation classification.

ADDITIONAL FEATURES

Typically, two magnehelic gauges are supplied to monitor the intake and exhaust HEPA filters. Photohelic gauges can replace the magnehelic gauges as an option. Photohelic gauges will sound an alarm if the HEPA filters are loaded beyond a preset pressure drop.

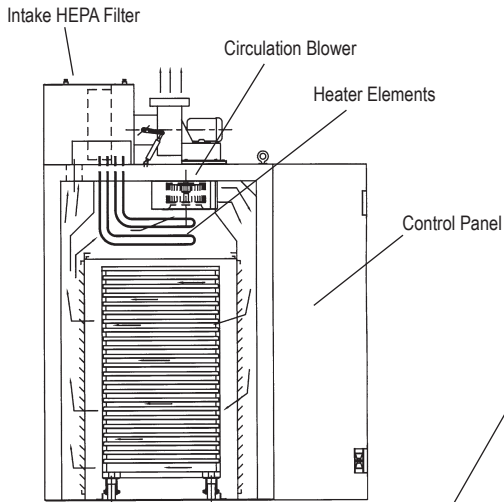
Door switches are standard on granulation dryers to prevent the oven from operating when the door is opened.

An electrical disconnect on the control panel protects maintenance personnel by de-energizing the power when the electrical access door is open.

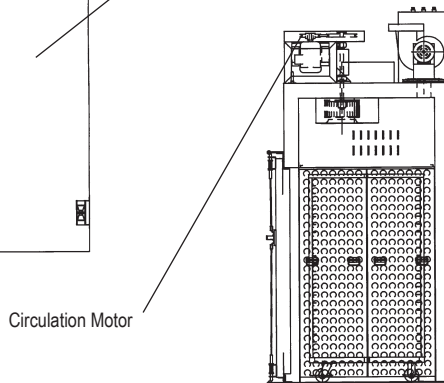


Granulation Dryers

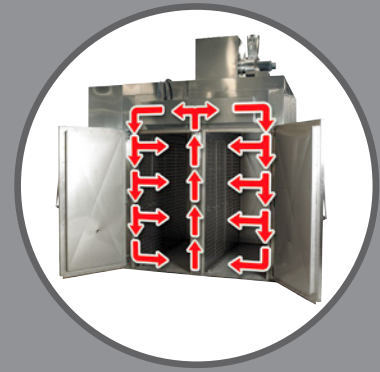
FRONT VIEW



SIDE VIEW



Sizes available from
15 to 800 cubic feet.



PRECISIONFLO™

*100% focused
forced-air
convection
technology.*

**Patent Pending*

On larger Granulation Dryers the TPS Precision Flo™ airflow design is utilized for uniformity of drying conditions.

Standard Features at a Glance

Frame:	Unitized construction for durability and handling (heavy-duty structural steel framework)	Circulation:	Recirculation internal to chamber
Exterior:	Stainless steel type 304 with a #4 finish typical	Airflow:	Horizontal for superior uniformity
Interior:	Stainless steel type 304L with a 2-B finish and a continuously welded liner	Motors:	Direct drive, premium efficiency
Temperature Range:	Above ambient to 90 °C steam or electric	Prefilter:	On air intake, 55% efficient HEPA filters:99.97% efficient with a 0.3 microns HEPA Filtered Air Intake HEPA Filtered Exhaust
Uniformity:	±2 °C @ 80 °C	Electrical:	All voltages available
Insulation:	3" thick fiberglass mineral wool	Control Panel:	Attached or remote-standing console
Heating:	Steam coil with regulator, or low watt density electric heaters	Side Walls & Ceiling:	Easily removable for cleaning (no screws)
		Gasket Retention:	Brass nuts on stainless studs for rapid and easy gasket replacement

Optional air preconditioning units are available to maintain consistency of drying conditions throughout the year when using an ambient air supply.



Granulation Dryers

Explosion Resistant Granulation Dryers

Design requirements set by OSHA and NFPA 86A (Class A) must be added to any dryer processing alcohol, solvent mixes, or other volatile atmospheres within the dryer. Class A dryers require a specific exhaust rate to dilute vapors and an increased KW rating to compensate for the increased exhaust. Explosion venting relief panels or pressure-relief door latches are necessary, along with monitoring pressure switches that would shut off the heating system if the exhaust rate were to drop below acceptable limits.

Dryers operating in atmospheres that are Class I, Group D, require explosion resistant housings for all electrical; static-eliminating belt drives; explosion resistant motors, non-sparking hardware, purged control consoles, airflow switches and associated high limits and shut-offs.

GRUENBERG CAN MEET THE FOLLOWING REQUIREMENTS:

- Class I, Group D
- Class I, Group E
- Class I, Group F
- Class I, Group G

Consult the factory for any other Class or Group.



A custom-built device to supply conditioning air to a remote chamber. Class I, Division I Class.



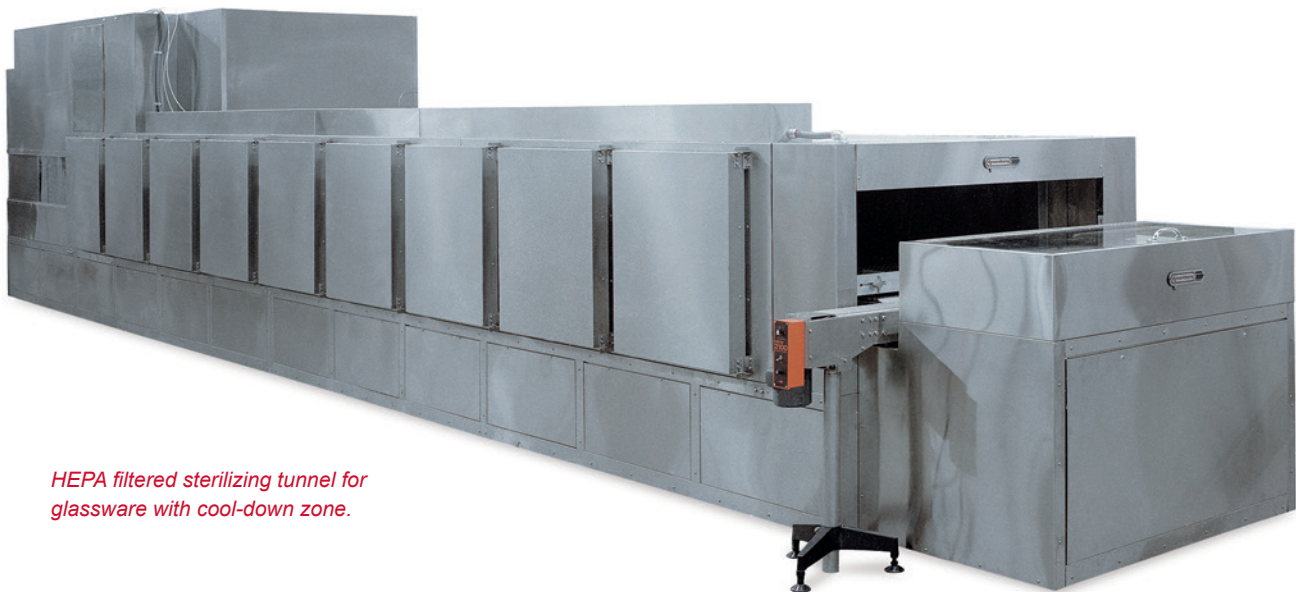
Custom explosion-resistant single pass dryer system, Class I with HEPA filter air intake.



Custom Granulation Dryers, Continuous Process, and Sterilizers



Conveyor oven used to precisely and consistently dehydrate pharmaceutical solutions. Make up air and recirculated air is HEPA filtered to achieve vertical down airflow with adjustable velocity for fine tuning of the process.



HEPA filtered sterilizing tunnel for glassware with cool-down zone.

Trucks



Trucks, Transfer Carts and Trays

Gruenberg offers many different sizes and types of trucks, trays, and transfer carts. Standard trucks and trays are shown here, but custom trucks and trays are available to fulfill any special requirements.

Trucks

Trucks provide a quick and efficient way to load and unload products. Single, double, triple, and quadruple bay trucks are available to match any product load. To simplify loading and unloading, a front or side loaded truck may be specified.

Standard truck construction is type 304 stainless steel with a 2B finish. Trays are often 316L. The frame, casters, and shelf guides are all stainless steel for easy, frequent washdowns.

Transfer Carts

Trucks can be transported to and from sterilizers and dryers by transfer carts. The transfer carts keep the trucks off the floor, reducing the amount of dirt or contamination entering the process chamber. A spring loaded latch and truck guides keep the truck secure during transportation. Power-assisted transfer carts are also available.

Transfer carts are constructed of type 304 stainless steel with a 2B finish. Two swivel and two stationary, non-marking casters are supplied to permit ease of movement and control.



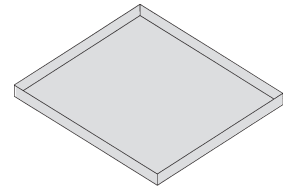
Loading the truck into the sterilizer or dryer is quick, easy, and safe. Simply line up the truck guides of the transfer cart with the truck guides of the process chamber, then lower the loading ramp located on the front of the transfer cart onto two stainless steel pins on the process chamber floor. The transfer cart and process chamber are now locked together. Pull the spring latch on the back of the transfer cart to release the truck. Gently push the truck into the process chamber, raise the loading ramp, and close the door.



Trays

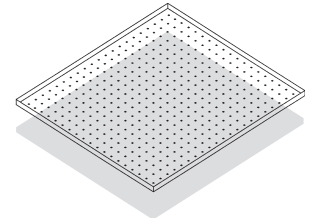
SOLID STAINLESS STEEL TRAYS

Solid trays are constructed of any type stainless steel. All seams are continuously heliarc welded, ground smooth, and passivated.



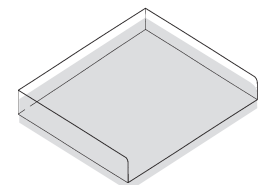
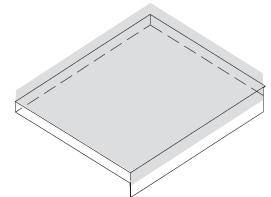
PERFORATED STAINLESS STEEL TRAYS

Perforated stainless steel trays typically have 3/8" diameter perforations on 1 1/2" centers. Larger and smaller sized perforations are available upon request.



COVERED STAINLESS STEEL TRAYS

Covered stainless steel trays are used with both sterilizers and granulation dryers. The covers protect the product from contamination and windage.



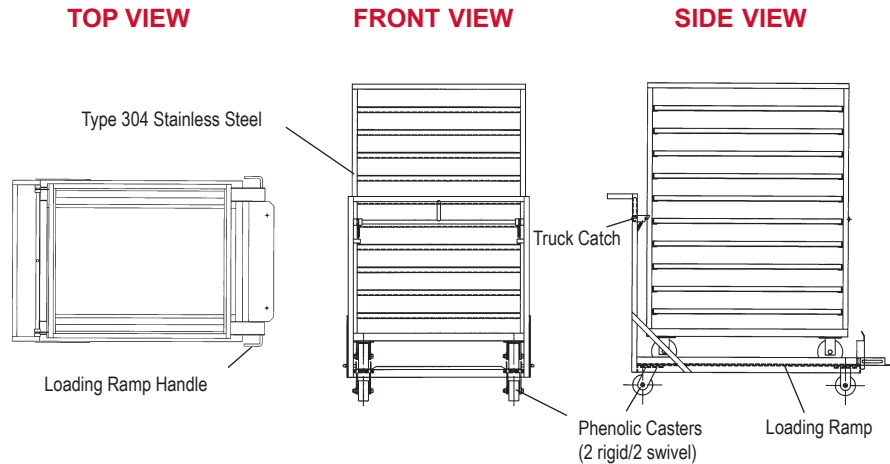


Trucks, Transfer Carts and Trays

Trucks - Standard and Custom

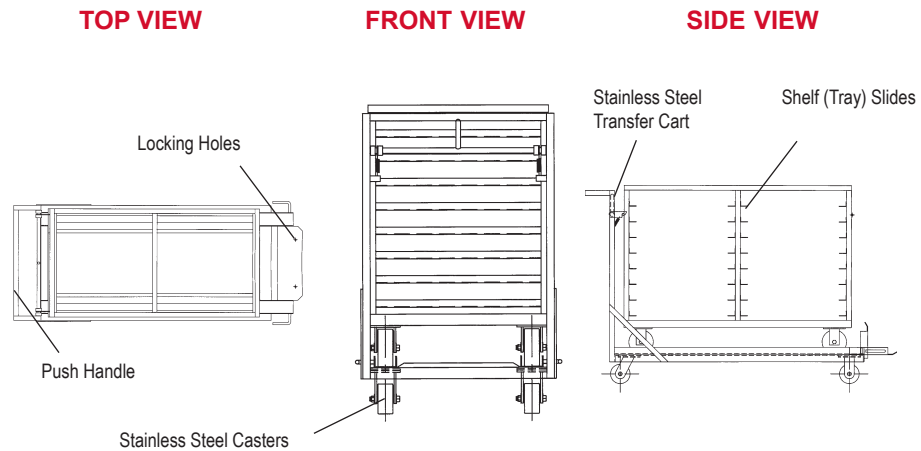
Single-Bay Truck (front-loaded)

Single-bay trucks are used with small and medium sized sterilizers and dryers for maximum product loading. This truck can be used in medium size units if the product is light in weight.



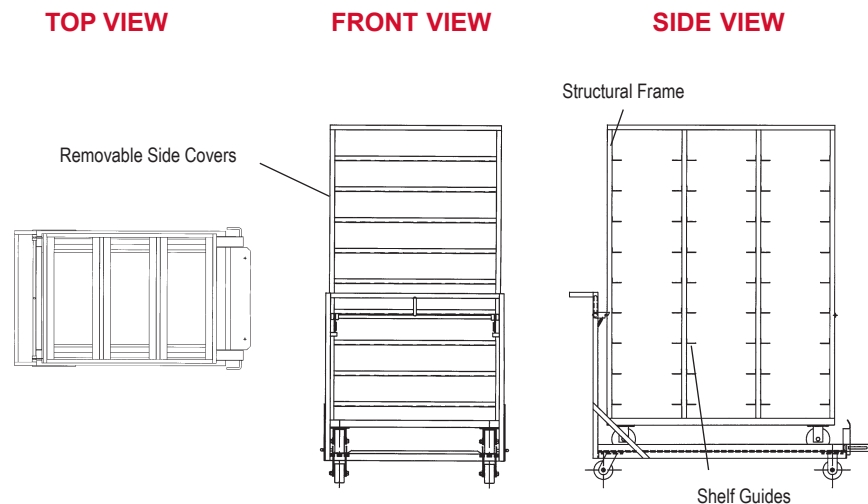
Double-Bay Truck (side-loaded)

Double-bay trucks can be used with small, medium, and large sterilizers or dryers depending upon product load. Shown here is a side loaded truck with a transfer cart.



Triple-Bay Truck (side-loaded)

Triple-bay trucks are used with medium to large sterilizers and dryers.



Controls



Typical Controls

These recorders and controllers are used because of their reliability, accuracy, performance, and user friendly features. However, if a specific brand name of controller, recorder, or option is required, it can easily be incorporated.

TEMPERATURE / PROCESS CONTROL:

Temperature conditions are controlled by a Yokogawa Model UP55A Controller. The UP55A is a profiling type 1/4 DIN single channel controller that can be programmed with up to 30 programs. A total of 300 segments can be programmed with a maximum of 99 segments per program. A 4-20 mA heat control output is sent to a SCR power controller for precise control of the heater bank.

An Allen-Bradley Model MicroLogix 1200 Programmable Logic Controller is used for process control. The MicroLogix 1200 is a modular micro-PLC with integrated packages of processor, power supply and embedded inputs and outputs in a rackless design. The PLC integrates various inputs from manual switches, component switches, and instrument outputs with the PLC program to control the entire process cycle.

YOKOGAWA UP55A CONTROLLER MAIN FEATURES

Temperature control is achieved with the Yokogawa Model UP55A Controller. The UP55A is a profiling type, 1/4 DIN controller with the following main features.

- Single Channel
- 5 Powerful Control Modes
- Program Capacity – Up to 30 Patterns, with up to 300 Segments and 400 Events
- Auto-tuning, “SUPER” overshoot suppress function, and new “SUPER 2” hunting suppress function
- 1 Input Universal Process Input: Type J Thermocouple is used to sense oven temperature
- 1 Universal Heat Control Output: 4 - 20 mA
- Up to 7 Contact Inputs
- Up to 7 Contact Outputs for Alarms / Events
- Support for Light Loader – LL100 PC-based Parameter Setting Tool
- Communications: RS-485, Modbus



Yokogawa Model UP55A Controller

Options



Optional Equipment

PHOTOHELIC GAUGES

Photohelic gauges measure the pressure differential upstream and downstream of the HEPA filters. The photohelic gauges have a low and high set-point. If the pressure differential should go above or below the setpoints, an audible alarm will sound and indication light will be activated.



SINGLE AND DOUBLE PEN CHART RECORDERS

Chart recorders provide visible documentation of the process temperature and length of the cycle. The solid-state Honeywell 4300 GP, electronic recorder is available with either a 24-hour or 7-day recording and has a 10" diameter circular chart. The recorder system comes with a thermocouple sensor accurate to within .5% of range scale.



Double-pen recorders use different colored pens and indicate process temperature and product temperature. The recorders are chosen for reliability, accuracy, and user-friendly features.

MULTIPOINT STRIP RECORDER

The multi strip recorder records up to 30 locations and prints the numbers in an easy-to-read format. All the channels can be printed in 6 seconds with an accuracy of plus or minus .05% of scale. The recorder can be programmed to read from one minute increments to 24 hours. Additional features are the ability to be hooked into an alarm package and six color printing.



COMBINED RECORDER AND MICROPROCESSOR TEMPERATURE CONTROLLER

The combined recorder and controller utilizes either a single or double-pen, 10-inch circular chart. A 24-hour or 7-day recorder is available. The microprocessor controller has 8 programs with six ramp segments and six soak segments. The controller has an LED display and an accuracy of $\pm 25\%$ of span.



PLC AND OIT TECHNOLOGY

The control system comes equipped with PLC and OIT (Operator Interface Terminal) technology. The Allen Bradley Compact Logix PLC with on board Ethernet communications to connect to the Allen Bradley PanelView Plus 700 Touch screen OIT.

RAMPS

Removable ramps can be provided for loading and unloading trucks.

DESIGN MODIFICATION

Specific design requirements can be fulfilled quickly and cost effectively.

PORTS

Any size port can be provided whether for DOP testing, thermocouple, or for any other reason. Stainless steel, sanitary fittings are used to seal off the ports when they are not in use.

SPECIAL VOLTAGE

Standard power is 480 volt, 60hz three phase. All other voltages and specialty formats are available.

REMOTE MOUNTED CONTROL PANELS

Remote control panels or freestanding control consoles are available when control panels must be placed in different atmospheres or areas.

PRESSURE DIFFERENTIAL CONTROL SYSTEM

The pressure differential control system consists of two differential pressure transmitters, one Universal Digital Controller, one exhaust blower, one adjustable frequency AC drive, and an electro-mechanical linear actuator for the intake pressure blower damper.

The differential pressure transmitters measure the difference between the interior work chamber and the sterile and non-sterile rooms. The Universal Digital Controller receives the outputs from the differential pressure transmitters, and generates a 4-20 milliamp output to the adjustable frequency AC drive, which controls the drive motor of the exhaust blower.

SOLVENT VENTING PACKAGE

Gruenberg includes properly sized exhausting system, high limit thermostat with main power back-up relay, airflow switches on the exhaust and circulation, purge timers, and additional kilowatt compensation.

ISOLATOR COMPATIBLE

Air tight chamber designs can be supplied for ovens interfaced to isolators and barrier systems.

Panels

BIOSEAL OR SEALING FLANGE FILLER PANELS

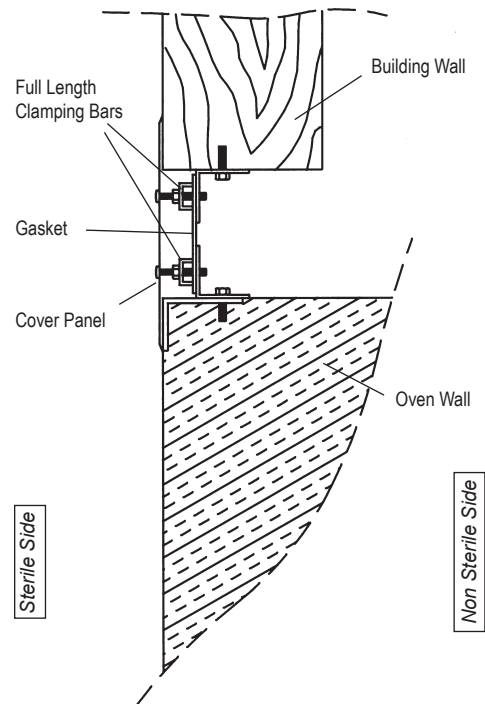
These panels are used to create the absolute seal between a sterile and non-sterile area. The seal prevents biological agents or contaminated air from entering the sterile side. Typically, the seal is used with a pass through design.

The filler panel is constructed of type 304 stainless with a #4 polish. The panels can be constructed of other materials to match the exterior of the dryer or sterilizer.

TRIM PANELS

When sterilizers or dryers are installed within a wall and an absolute seal is not required, a trim panel is installed. The trim panel connects the oven with the wall and is installed on the non-sterile side of a pass through sterilizer.

The panel is constructed of type 304 stainless steel with a #4 polish as standard. Other material can be specified.



Aftermarket Services

INSTALLATION SUPERVISION

During a supervised installation, a TPS supervisor guides your installation technicians through the process, giving you confidence that your equipment is assembled and installed correctly.

START-UP & TRAINING

A TPS technician inspects the installation of your equipment and performs on-site adjustments prior to giving hands-on training to operator and maintenance personnel. Startup and training services may be included with turnkey installation packages. Other voltages and specialty formats are available.

TURN-KEY INSTALLATION

A complete turn-key installation by TPS factory trained technicians takes care of your entire installation from start to finish.

Items that may be included in a turn-key installation are:

- Factory trained technicians on-site for the duration of the installation
- Rental of any equipment needed for installation
- Offloading of equipment
- Provide rigging crane and operator to position equipment
- Installation of any roof-mounted components removed for shipping
- Hook up all gas and utility connections
- Lag and level equipment after placed in final destination
- Verify operation of equipment after installation is complete

PREVENTIVE MAINTENANCE

Preventive Maintenance (PM) is a service program in which wear, tear, and change are anticipated. A PM program minimizes premature deterioration of equipment through continuous corrective actions that ensure peak efficiency and performance.

The experienced TPS technicians will customize a PM program for your equipment that involves a planned and controlled plan of systematic inspection, adjustment, lubrication, and replacement of components, as well as performance testing and analysis.

Some typical items that can be included as part of a successful PM Program include:

- Recertification of temperature uniformity
- Cleaning and adjustment of burners to improve efficiency
- Replacement (or recommendation of replacement) of parts to specifically prevent faults from occurring

INSTRUMENT CALIBRATION

TPS can provide complete calibration services for your equipment to include A2LA and ISO17025 Calibration Certificates.



Calibration CERT #3782.01

TEMPERATURE UNIFORMITY

TPS can provide on-site uniformity testing and certification for your equipment. Adjusting your equipment for proper airflow balance and heat distribution provides a tighter temperature tolerance, which can increase your product quality and process results. Consideration is given to air pressure (positive or negative) in your building, which can impact uniformity. In many cases, profile testing and associated adjustments can be completed in a single 8 to 10 hour work day.

Onsite Profile Testing may include:

- Ensure equipment is balanced, adjusted and within tolerance
- Calibrated and non-calibrated testing available
- Moving, parts, and static testing

GAMP DOCUMENTATION

From the clients URS, TPS offers development and execution of the full range of GAMP documentation including FRS, HDS, SDS, FAT, SAT, and, IQ/OQ.

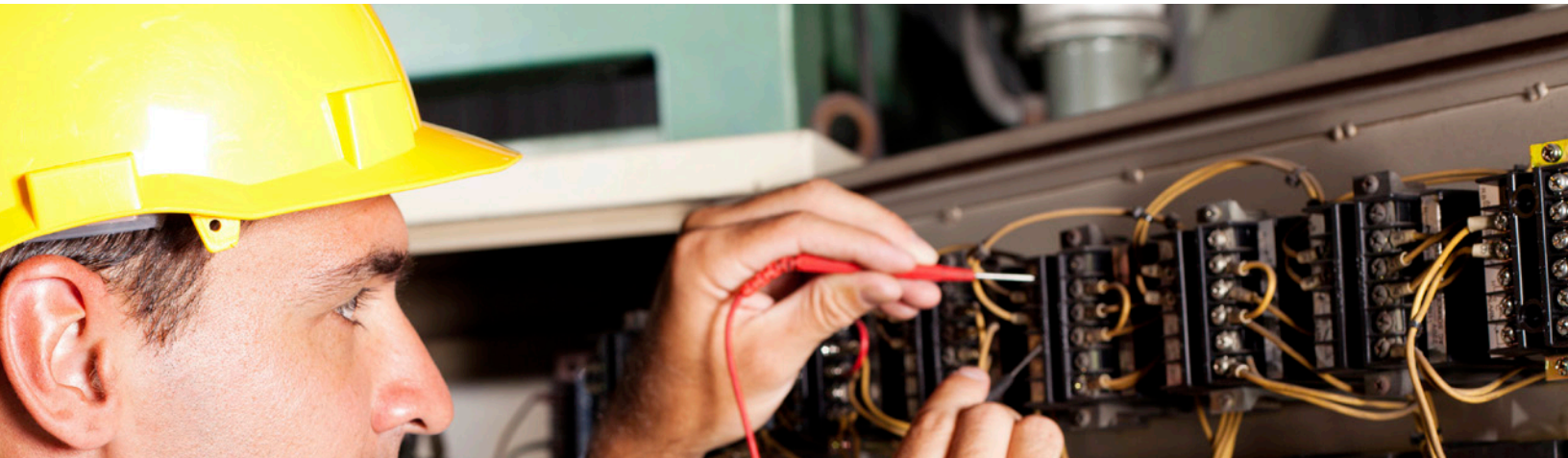
WATER QUALITY ANALYSIS

TPS can perform a water quality analysis test to check for the presence of various conditions that could be harmful to your equipment or process.

These tests include:

- PH/Acid Level: Our team will determine the amount of acid in the water, which can cause wear of certain metal surfaces.
- Total Dissolved Solids Level (TDS): If our team discovers a high TDS level, this indicates that hard water is being used, which can reduce equipment performance and contribute to maintenance costs over time.
- Attacking Elements (Chlorides, Chlorine, etc.): Our analysis will determine if elements are present that can cause a carbonic acid reaction when mixed with oxygen, which can lower the pH level and cause wear to metal surfaces.

After the analysis is complete, a report of the findings and suggestions on how to fix/prevent the issues found will be supplied. The analysis will highlight all parameters which exceed maximum concentration levels established as "Federal Safe Drinking Water." If a water filtration system is needed, TPS can assist in determining what system is the best solution to improve your water quality.





MAX PROGRAM



www.thermalproductsolutions.com

TPS MAX PROGRAM

The TPS MAX Program allows the customer to purchase future service and/or parts without the need to have a purchase order approved and released when parts or service of any kind is needed. These funds are then available to be used on any parts or service items at any time in the future, which will save you and your company valuable down-time. Enrollment also entitles the customer to the many other advantages listed below. Enrollment into the TPS MAX Program can be initiated with a minimum purchase of \$5,000.00. Any amount above \$5,000.00 will be accepted. Funds do not expire.

10% OFF ITEMS:

- 10% Off Service Labor (Including: Training, Installation, Preventive Maintenance)
- 10% Off Travel Time
- 10% Off Calibration
- 10% Off Parts

The following items are also included with the Max Program:

- Free Ground Shipping on Parts
- No overtime charges will be billed for work or travel performed Monday through Friday
- Mileage is FREE





www.thermalproductsolutions.com



XP Granulation Dryer shown with bag-in-bag-out HEPA filters



**Baker Furnace, Blue M, Gruenberg, Lindberg/MPH,
Lunaire, Tenney, Wisconsin Oven**

Address: 2821 Old Route 15 | New Columbia, PA 17856-0150 | USA

Phone: (570) 538-7200 | Fax: (570) 538-7380

info@thermalproductsolutions.com

www.thermalproductsolutions.com