1.0 DEFINITIONS

The section describes terms used in this document.

Table 1-1. Definitions

KEY	DESCRIPTION
CDA	Clean, dry air. Compressed air supply that has been filtered of particulate and moisture.
FG	Forming gas, a mixture of H_2 and N_2 gasses usually with 4% H2 or less in the mixture.
H_2	Hydrogen gas; a concentration > 8% in air is considered explosive. For concentrations higher than 4%, FurnacePros requires inclusion of the Hydrogen Operation (HO) option to safely use hydrogen as a process gas in a furnace.
IO	Input/Output signals as an aggregate. IO is comprised of signals from one or more of these sources: AI (analog input), AO (analog output), DI (digital input), or DO (digital output).
N_2	Nitrogen gas. Inert. Usually used to displace oxygen from the furnace during processing. The Oxygen Analyzer (OA) option can be used with our automatic sampling system to continually monitor O_2 (oxygen) levels present in any of 3 zones in a furnace, displaying results on the OI and alerting and alarming when detecting levels above pre-set limits.
PID	Proportional, integral derivative control loop that calculates an output to correct the error between a measured process temperature and a desired set point temperature.

2.0 DESCRIPTION OF STANDARD FEATURES AND OPTIONS

Table 2-1 describes standard features which may be included on the specified furnace. See section 802-101410 EQUIPMENT LIST for list of items included in the base bid or offered as options.

Table 2-1. Base Equipment and Options

KEY	DESCRIPTION
AFR	**Air Filter/Trap/Regulator.** High volume air filter, moisture trap and pressure regulator to assure supply compressed air is clean, dry and at the proper pressure before entering the furnace. *Option available on most furnaces.*
AR1	**Gas Reservoir (Belt Tensioner).** Pressurized gas system with tank, check valve and separate regulator to maintain constant pressure on belt even during short term failure or disconnect of the supply gas. *Standard on all furnaces.*
AR10	**Air Reservoir, System Purge.** Adds 30-56 L (8-15 gal) reservoir for supplying process gas in adequate quantity to assure purging the furnace chamber of volatile or toxic gas in the event of a plant power failure. System includes pressure switch and alarm integrated with the OI. *Standard on some applications, option available on most furnaces.*
BE	**Entrance Baffle with Eductor.** The Entrance Baffle/Exhaust Eductor is a 38.1 cm (15 inch) long section that serves to isolate the furnace atmosphere from the facility atmosphere. The entrance baffle is housed inside an aluminum shell lined with ceramic fiber insulation and includes a metal air rake to introduce a gas curtain above the belt. This gas curtain purges the baffle and a series of four equally spaced hanging baffle gates prevents ambient air from entering the furnace chamber. A venturi-assisted exhaust stack (eductor) draws gases from the entrance of furnace zone 1, across a drip tray and out of the furnace to prevent exhaust condensation from falling into the entrance baffle. Proper operation of this system keeps the furnace interior clean. *Standard on most furnace models.*
BNV	**Belt, Ni-Chrome V.** The high temperature belt is a balanced spiral weave of 18 gauge wire wound with 16 gauge cross wire of Nichrome V, 80%Ni/20%Cr alloy (<1% Fe). Because of the balanced construction, it is 50% stronger than conventional weave and any belt tendency toward side travel is greatly reduced. *Standard on high temperature furnaces (>550 C), option available for most furnaces.*
BSS	**Belt, Stainless Steel.** The standard furnace conveyor belt is a balanced spiral weave of 18 gauge wire wound with 16 gauge cross wire made of type 316 stainless steel. Because of the balanced construction, it is 50% stronger than conventional weave and any belt tendency toward side travel is greatly reduced. *Standard on low temperature (<550 C) furnaces.*
BX	**Exit Baffle with Eductor.** The Exit Baffle/Exhaust Eductor is a 38.1 cm (15 inch) long section that serves to isolate the heating chamber from the ambient atmosphere at the furnace exit. The exit baffle is housed inside a metal shell lined with ceramic fiber insulation and is fully insulated so that it will lose heat gradually. The baffle includes a metal air rake to introduce a gas curtain above the belt to purge the baffle and a series of four (4) equally spaced hanging baffle gates to effectively isolate the high temperature furnace section from the ambient atmosphere at the furnace exit. A venturi-assisted exhaust stack draws furnace gases from the last zone, across a drip tray and out of the furnace to prevent exhaust condensation from falling into the exit baffle. Proper operation of this system keeps the furnace interior clean. *Standard on most furnace models.*

Table 2-1. Base Equipment and Options

KEY	DESCRIPTION
BXO	**Exit Baffle.** The Exit baffle is a 38.1 cm (15 inch) long section that serves to isolate the closed atmosphere cooling section from the ambient atmosphere at the furnace exit. The exit baffle is housed inside an aluminum shell lined with ceramic fiber insulation. The baffle includes a metal air rake to introduce a gas curtain above the belt to purge the baffle and a series of four equally spaced hanging baffle gates to effectively isolate the controlled atmosphere cooling section from the ambient atmosphere at the furnace exit. *Standard on some furnace configurations.*
CACT	**Closed Atmosphere Cooling Tunnel.** The CACT is a 76.2 cm (30 inch) long, high efficiency heat exchanger that reduces the temperature of the product. Inside the CACT, process gas flows through air rakes arranged two above the belt to cool the product to a safe temperature. To expedite heat removal, fans outside the chamber force ambient room air over the heat sink finned surfaces on the outside of the tunnel. Multiple tunnels may be joined end-to-end to obtain required cooling. *Standard on many furnace configurations, option available on most furnaces.*
CAWC	**Closed Atmosphere Water Cooled Tunnel.** The CAWC is a 76.2 cm (30 inch) long, high efficiency heat exchanger that reduces the temperature of the product, but without externally mounted heat sink cooling fans. Instead, water flowing through chambers above and below the tunnel removes heat from the tunnel walls without adding to the heat load in the clean room. Includes OI integrated outlet water temperature sensors and alarms. Requires water supply and drain. Multiple tunnels may be joined to obtain required cooling. Upgrade from CACT. *Standard on many furnace configurations, option available on most furnaces.*
CB-1	**Circuit Breaker.** Three phase circuit breaker. *Required for UL approval. Option available on most furnaces.*
CDA-L	**CDA Lockout.** Manual lockout for CDA supply line, 1724 kPa, 250 psi. *Option available on most furnaces.*
CDA-S	**CDA Auto Shutdown.** Automatically shuts off CDA supply after actual furnace Power OFF to reduce compressor load and gas consumption. Includes timed delay to assure clearing of all process gas and emissions from furnace chamber. Note: furnace control delays actual Power OFF until furnace cools to 100 C. *Option available on most furnaces.*
CFL	**Cabinet Fans, Lower.** Provides a high air volume impeller fan, located below the belt, to remove excess heat from the product and cabinet interior. Used with CMB30 and CMB45 Cross-flow Fan Cooling Modules. *Standard on all furnace configurations with CMB30 or CMB45 modules.*
CM	**Turbulent Air Cooling Module.** Provides a 76.2 cm (30 inch) long, fan-driven cooling module consisting of two rows of 3 m^3/min (106 cfm) fans that force ambient air over all surfaces of the product. This module can be used to bring massive or high-speed product to handling temperature quickly. Controlled atmosphere processes should be reviewed to assure that the product is below its oxidation temperature before reaching the air cooling. The fan speed is controlled via the control console. *Standard on some furnace configurations, option available on most furnaces.*
CMB30	**Forced Air Cooling Module.** Supplies fan-driven ambient air for rapid convection cooling of product on the belt. This 76.2 cm (30 inch) long, forced air cooling module uses two top-mounted cross-flow 13.3 m^3/min (471 cfm) fans to force ambient air into a plenum assembly located above the belt, resulting in a downward laminar flow over the entire surface area of the belt directly under the cooling module. Controlled atmosphere processes should be reviewed to assure that the product is below its oxidation temperature before reaching the air cooling. Fan speed is controlled via the control console. Multiple modules may be joined to obtain required cooling. *Standard on some furnace configurations, option available on most furnaces.*
CMB45	**Forced Air Cooling Module.** Supplies fan-driven ambient air for rapid convection cooling of product on the belt. This 1.143 m (45 inch) long, forced air cooling module shall use three top-mounted cross-flow 13.3 m^3/min (471 cfm) fans to force ambient air into a plenum assembly located above the belt, resulting in a downward laminar flow over the entire surface area of the belt directly under the cooling module. Controlled atmosphere processes should be reviewed to assure that the product is below its oxidation temperature before reaching the air cooling. Fan speed is controlled via the control console. Multiple modules may be joined to obtain required cooling. *Standard on some furnace configurations, option available on most furnaces.*
CWWC	**Cold Wall Water Cooling Module.** High efficiency, 50.8 cm (20 inch) long, water-cooled module that improves heat transfer from cooling tunnel, more rapidly reducing the temperature of the product. Includes OI integrated inlet and outlet water temperature sensors and alarms. Requires water supply and drain. Multiple modules may be joined to obtain required cooling. Upgrade from CACT. *Standard on some furnace configurations, option available on most furnaces.*
CXE15	**Entrance Conveyor Extension.** Extends load station at the entrance of the furnace or dryer. Adds 0.381 m (15 inches) to length of furnace. *Option available on most furnaces.*
CXX15	**Exit Conveyor Extension.** Extends unload station at the exit of the furnace or dryer. Adds 0.381 m (15 inches) to length of furnace. *Option available on most furnaces.*
DCA	**Additional Dryer Chamber.** Adds one heating chamber with lamp elements in the top row only. Adds 0.762 m (30 inches) to length of furnace. *Option available on most furnaces.*
DOCM	**Furnace Owner's Manual.** Installation, startup operating, and troubleshooting instructions for a specific furnace. Includes specific customer drawings, schematics and engineering calculations. *Standard on all furnaces.*

Table 2-1. Base Equipment and Options

KEY	DESCRIPTION
DOCR	**Furnace Reference Manual.** Continuous Belt IR Furnace Reference Manual including information on IR furnace nomenclature, thermal processing; furnace control and software; maintenance, troubleshooting and calibration; and process engineering. *Standard on all furnaces.*
DSC	**3-Phase Safety Disconnect:** On-board circuit breaker to meet local codes or customer requirements. Disconnects furnace power distribution system (all on-board electrical components and wiring) from facility 3-phase power lines. Lockable for safety. *Option available on most furnaces.*
EH	**Edge Heat:** Edge heat elements allow trim of the furnace for a precise and uniform temperature profile across the belt width. EH serves to compensate for heat loss at the edges of the belt, through the chamber sides and through the ends of the lamps that would otherwise cause a drop in temperature at the outer edges of the belt. The power levels in the left and right edge heaters can be adjusted to vary the proportion of energy delivered by the left and right elements. Each side can be varied from 0% to 100% power. When properly trimmed, typical temperature deviations across the belt can be held to a minimum for profiles with modest temperature differences between adjacent zones. *Standard on 24, 36 and 48 (nominal belt width, inches) model furnaces, option available on most furnaces.*
EM	**Element Monitors:** Adds circuitry and special programming to sense and alert on failed heating lamps. Signals the operator audibly and visually via the OI should a failure occur. The failure display indicates the failed lamp location, allowing the operator to quickly discern location and process affected, if any. *Option available for most furnaces. Recommended on furnaces with plenum covers (see HC).*
EME	**Entrance Emergency Machine Off, Vertical Mount.** Two (2) SEMI approved 40 mm diameter emergency shutoff buttons are located on either side of the entrance on the vertical face of the furnace approximately 1.27 m (50 inches) above grade. *Standard on all furnaces.*
EMT	**Entrance Emergency Machine Off, Top Mount.** Two (2) SEMI approved 40 mm diameter emergency shutoff buttons located at the entrance on the horizontal surface of the furnace load area approximately 0.94 m (37 inches) above grade, or on top of the furnace 1.5 m (64.5 inches) above grade, or at customer specified location. *No cost option replaces EME, if specified at time of order.*
EMX	**Exit Emergency Machine Off, Vertical Mount.** Two (2) SEMI approved 40 mm diameter emergency shutoff buttons are located on either side of the exit on the vertical face of the furnace approximately 1.27 m (50 inches) above grade. *Standard on all furnaces.*
ENG	**English Units of Measure** or US customary units**.** Furnace control software shall depict belt speed in inches per minute (in/min), gas flow in standard cubic feet per hour (scfh). Temperature units shall be degrees Celcius (°C). *Standard on all furnaces unless SI is selected at time of order.*
ETM	**Elapsed Time Meter.** Adds a mechanical meter to keep track of the cumulative time the furnace is ON. *Standard on all furnaces.*
FHS	**Furnace Heating Section.** The heating section shall be comprised of 30 inch (76 cm) long chambers; each chamber shall be partitioned into temperature controlled zones using ceramic dividers. The dividers shall be configured with the smallest possible opening that can be made to be consistent with the parts clearance specifications to assure very high thermal isolation between the zones. *Chambers*. Each chamber shall be contained within a stainless steel shell lined with ceramic fiber insulation. Gas introduced into a plenum between the shell and the porous insulation shall be heated as it passes through the insulation to enter the chamber at chamber temperature. This method of gas distribution shall not affect the temperature profile, shall assist in keeping the interior of the furnace clean and shall speed the cool down process when the lamps are turned off. *Control Zones*. The interior of the furnace chamber shall be partitioned into controlled zones using ceramic dividers. The dividers shall be designed with the smallest possible opening that can be made to be consistent with the parts clearance specifications to assure very high thermal isolation between the zones. Each zone shall have its own thermocouple connected to the control system. *IR Lamps*. Within each zone, an array of tungsten filament, halogen gas quartz lamps shall be located above (in dryers) or both above and below (in furnaces) the transport belt. These lamps shall generate near-wave IR light at a color temperature of approximately 2500K (peak wavelength centered at 1.16µm) with most IR power delivered throughout the chamber in wavelengths of 0.5-3µm. The lamps, producing up to 100 watts per inch, shall be capable of heating the furnace chamber interior to a state of equilibrium within minutes. *Standard on all furnaces.* See also: SCR Computerized SCR Load Management, HC Hermetic Chamber Sealing option and EH Edge Heat Elements option.
FCA	**Additional Furnace Chamber.** Adds one heating chamber with lamp elements in the top and bottom rows. Adds 0.762 m (30 inches) to length of furnace. *Option available on most furnaces.*

Table 2-1. Base Equipment and Options

KEY	DESCRIPTION
FM	**Independent Zone Flow Control.** Process Gas is controlled by variable rate flowmeters enclosed behind a clear panel. Panel access can be restricted by one of three methods: Keyed lock, mechanical latch or fastened by screws (lock and latch shall both be provided). Atmosphere shall be controlled by manually adjustment of the flowmeters. *Standard on all furnaces.*
FZN	**Furnace Control Zone.** Adds additional control zone in an existing furnace or dryer chamber. Additional zone is integrated with the OI. *Standard on –X models. Option available on most furnaces.*
GUIDE	Roller bearings and belt serving as a belt guide at entrance and exit. *Standard on most furnaces.*
GUIDES	Manually adjustable product guides at takeoff end of the furnace to align product boats to for transfer to the shuttle pickup mechanism. When used with the SMEMA option, the software can be set to prevent unused lanes from adversely interfering with the line operation. *Options available with SMEMA option.*
HC	**Hermetic Chamber.** Adds sealed lamp-end plenums, plumbing and flowmeters necessary to operate the furnace at the lowest level of oxygen (O_2) or moisture contamination from ambient air. During operation, process gas, under flow meter control, is fed to the plenum boxes under pressure to prevent ambient air from entering the furnace chamber through the lamp seals. Chamber gaseous contamination levels can be held typically to ≤20 ppm. This option, when utilized with nitrogen (N_2) or forming gas (N_2/H_2 mix) process atmospheres prevents the oxidation of metal surfaces during processing. *The option must be ordered before NO, HO, OSS, OA or MA options can be included. Option available on most furnaces.*
HD	**Hydrogen Detection.** Combustible gas detectors mounted at entrance, exit and in control enclosures detect and alarm in the presence of hydrogen above safe concentrations. Integrated with the furnace software for emergency purge and shutoff in the event of an alarm . *Option, required with HO and HO/NMH.*
HO	**Hydrogen Operation.** Electro-mechanical control of the atmosphere required for hydrogen (H_2) operation with more than 5% H_2 concentration. The H_2 cycle includes a nitrogen (N_2) chamber purge and provides power to H_2 igniter coils on exhaust stacks at the entrance and exit of the heating chamber. Included is fail-safe automatic N_2 purge, and audio and visual alarms in the event of a failure of an igniter coil, or loss of N_2 or H_2 pressure. Includes special H_2 valve and controls enclosure with constant N_2 purge. Control circuitry visibly indicates the gas or gases flowing to the process and all alarm conditions. All curtain, eductor and cooling gas is N_2. *Requires HD option with enclosure H2 detector and additional H2 detectors at furnace entrance and exit. Also requires IPS, HC, OSS and OA options. Optional on some furnaces.*
HO/NHM	**Hydrogen Operation-Nitrogen Hydrogen Mixing.** Provides the facility to mix hydrogen and nitrogen using furnace controls as well as the ability to vary the nitrogen/hydrogen ration along the length of the furnace. A single mix switch allows gas to flow through both the nitrogen and the hydrogen flowmeters and allows different zones to receive gas with different N2/H2 ratios. *Includes HO option. Requires HD option with enclosure H2 detector and additional H2 detectors at furnace entrance and exit. Also requires IPS, HC, OSS and OA options. Optional on some furnaces.*
HSK	**Handshake Signaling.** NO and NC signals to upstream and downstream equipment or to the production line controller about the furnace status when the furnace is part of an automatic production line. *Requires the Process Ready/Alarm Light Tower (LT) option. Option available on all furnaces.*
HT	**High Temperature Operation.** High temperature construction for furnace operation above 500°C up to 1000°C. Includes upgraded insulation and materials, changes BSS 316 stainless steel belt to BNV Nichrome material, and adds cabinet temperature thermocouple plus alert/alarm on cabinet temperature. *Option available on most furnaces.*
IE	**Intermediate Exhaust Eductor.** An exhaust stack with eductor that is located between selected chambers to increase control of process gas flow, to promote isolation of specific furnace chambers and to evacuate volatile emissions off-gassed from product. *Standard on some furnaces.*
IPS	**Inlet Pressure Switch.** Pressure switch upstream of the gas distribution system that signals the operator and the furnace control system in the event of pressure loss in the process gas supply line. Furnace PROCESS START mode will be inhibited automatically until pressure is restored to normal. *Option available on most furnaces.*
IR-E	**Interface Roller, Entrance.** Small diameter belt rollers at the entrance of the furnace that permit close transfer of parts from upstream conveyor equipment. The rollers are less than 3 inches (76.2 mm) in diameter. Adds 6.4 cm (2.5 inch) to the length of the furnace. *Option available on most furnaces.*
IR-X	**Interface Roller, Exit:** Small diameter belt rollers at the exit of the furnace that permit close transfer of parts to downstream conveyor equipment. The rollers will be less than 3 inches (76.2 mm) in diameter. Adds 6.4 cm (2.5 inch) to the length of the furnace. *Option available on most furnaces.*
LAMPIR	**Infrared heating elements:** Long life quartz lamps originally designed by RTC for IR furnace applications and manufactured in USA, Germany or Japan.
LEXAN	Clear protective shields installed in front of Safety panel, power distribution panel, element monitoring panel, and SCR panel. *Standard on most furnaces.*

Table 2-1. Base Equipment and Options

KEY	DESCRIPTION
LOAD	**Load Station.** The load station is an area 381 mm long (15 inch) at the entrance of the furnace which provides open access to accommodate loading of product on the continuous belt for processing by the furnace. *Standard on all furnaces.*
LFI	**Line Filter** to improve quality of power supplied to the furnace. *Optional on most furnaces.*
LT	**Process Ready/Alarm Light Tower:** Provides a three stage alarm status light tower. The status system activates a three element alarm light, located above the upper frame, as follows: ○ Red Indicator: Alarm Condition, audible alarm ○ Yellow Indicator: Process Not Ready, no alarm ○ Green Indicator: Process Ready, no alarm *Option available on most furnaces.*
LTR	**Left to Right:** Belt moves from left to right as viewed from the operator console. This is the default furnace configuration. *Standard on all furnaces if RTL is not specified with original order.*
MA	**Moisture Analyzer:** Provides a moisture monitoring system for the process atmosphere in a furnace with a hermetic sealed chamber. A gas sample is withdrawn continuously from a sample port in the furnace chamber through the analyzer. A switched pump and vacuum break are provided to withdraw the sample. The analyzer is provided with an inline 1µm filter for removal of particulates from the sample flow. ProControl™ OIT displays dew point in ºC or moisture as PPM, and alert/alarm conditions. *Option available on most furnaces. Requires OSS option.*
N2-S	**Nitrogen Auto Gas Shutoff:** Automatically opens the nitrogen supply inlet valve when the control system is started, prior to furnace entering WARM UP mode, and automatically shuts off that valve at furnace shutdown after COOL DOWN mode is complete. Can help minimize waste of process gas and relieves the operator having to return to the machine to shut off the process gas when the furnace has cooled down. Includes timed delay to assure clearing of all process gas and emissions from furnace chamber. *Requires NO or NGFS, option available on most furnaces.*
NGFS	**Nitrogen/Forming Gas Selector.** Allows ability to select between nitrogen (N_2) or a nitrogen hydrogen (N_2/H_2) mix (forming gas) process atmosphere in heating chamber of the furnace, depending on process requirements. *Requires HC. Option available on most furnaces.*
NO	**Nitrogen Operation.** Allows for efficient use of nitrogen (N_2) in the furnace, minimizing consumption where an N_2 process atmosphere is required. N_2 is supplied only to oxygen-controlled areas (entrance baffle, heating chamber, and transition tunnel), while CDA is supplied to eductors and cooling. Controlled atmosphere processes should be reviewed to assure that the product is below its oxidation temperature before reaching cooling section. *Order with HC, standard on some furnaces, option available on most furnaces.*
OA	**Oxygen Analyzer:** Provides an oxygen monitoring system for the process atmosphere in a furnace with a hermetic sealed chamber. A gas sample is withdrawn continuously from a sample port in the furnace chamber through the analyzer. A switched pump and vacuum break are provided to withdraw the sample. The analyzer is provided with an inline 1 µm filter for removal of particulates from the sample flow. ProControl™ OIT displays oxygen concentration in PPM, and alert/alarm conditions. *Requires OSS-On-line Gas Sampling. System, option available on most furnaces.*
OI	**Operator Interface.** Operator Interface also known as MMI (man machine interface), and HMI (human machine interface). OI refers to the furnace graphical display software that the operator uses to communicate with the furnace PLC and to observe data collected by the Furnace PLC. Furnace graphical interface software that allow the user to view and modify furnace operating parameters and communicate with the PLC. *Standard on most furnaces.*
OIT	**Operator Interface Terminal.** Furnace computer, OIT refers to the furnace computer that the operator uses to communicate changes to the furnace PLC and to observe data collected by the Furnace PLC. Furnace computer and monitor are wired to stay "ON", regardless of control panel ON/OFF pushbuttons, as long as power is supplied to furnace. This arrangement allows reliable startup and shutdown of the furnace computer, allows use of the furnace computer without powering up the furnace, and extends furnace computer life and reliability. *Requires OI. Standard on most furnaces.*
OS7	**Windows7 Operating System.** Microsoft Windows7™ operating system on the OIT. *Standard on most applications.*
OSS	**On-line Gas Sampling System:** The sampling system provides 4 selectable inputs: 3 sample ports in the furnace and 1 port with a 13.7 kPa (2 psi) regulator in-line for source gas monitoring or sensor purging to improve sensor response during startup of sampling. System may be turned on/off and any of the 4 inputs selected via the furnace OI. *Required for OA and MA options, option available on most furnaces*
OSXP	**XP Operating System.** Microsoft WindowsXP™ operating system on the OIT.
OT	**Over-temperature Monitor & Shutdown Alarm.** Provides completely independent temperature measurement in each zone with audible alarm and automatic furnace shutdown for temperatures out of range. Includes second thermocouple for each zone directly connected to separate zone scanner and monitor with display. Alarm integrated with the furnace OI. *Option available on most furnaces.*

Table 2-1. Base Equipment and Options

KEY	DESCRIPTION
PC	**Computer, Managed Platform.** PC configured to act as the interface the operator uses communicate with the furnace PLC, store process recipes, log furnace behavior and reinstall furnace software. Includes dual drives in RAID1 array and dual Ethernet network interface ports.
PCM	**Monitor, LCD.** Standard 4:3 aspect ratio, 17 inch LCD monitor. *Standard on most furnaces.*
PCMS	**Computer Monitor, Special.** *Option available on most furnaces.*
PH1	**Parts Height, 1 inch.** Reduces clearance at all baffle and cooling section throats, and zone dividers) to 25 mm (1 inch) from the standard 51 mm (2 inch). Allows for larger zone-to-zone temperature differences for small parts. *Option available on most furnaces.*
PH2	**Product Height.** Standard furnace clearance allows a maximum of 50 mm (2 inch) high product to pass through all baffle and cooling section throats, and zone dividers. *Standard on all furnaces.*
PH4	**Parts Height, 4 inch.** Raises clearance at all baffle and cooling section throats, and zone dividers to 102 mm (4 inch) from the standard 51 mm (2 inch). *Option available on most furnaces.*
PLC	**Programmable Logic Controller.** The 32-bit industrial computer that controls the actual operation of the furnace. It sends and receives analog and digital signals from the furnace to control the furnace behavior. Programming of the PLC is performed from the PC. *Standard on most furnaces.*
RTL	**Right to Left:** Belt moves from the right to left as viewed from the operator console. *No cost option when specified at time of order, available on all furnaces.*
SBW	**Special Belt Weave.** Custom belt in lieu of standard balanced weave design. *Option available on most furnaces.*
SCR	**Computerized SCR Load Management.** Computer/PLC controlled SCR power modules that operate the furnace efficiently through phase angle firing, providing steady state, true proportioning control of the IR lamps without flicker. Each SCR firing circuit accepts process command signals from the PLC to regulate the power delivered to the heating elements in each furnace zone. Actual power output to the lamps in each zone is displayed directly on the OIT. Each SCR can be calibrated for maximum voltage output and maximum permissible power applied to each zone can be limited via the OI. Loads shall be balanced across phases. *Standard on all furnaces.*
SI	**Metric Units of Measure.** Furnace control software shall depict belt speed in centimeters per minute (cm/min). Temperature units shall be degrees Celcius (°C). *No cost option in lieu of ENG on most furnaces if SI is selected at time of order.*
SMEMA	**SMEMA Lane Control.** Product tracking sensors at entrance and exit which provide SMEMA 1.1 busy/board available signal generation to coordinate product handling from upstream and downstream equipment. The on-screen tracking feature counts the number of product units travelling through the furnace. The tracking feature sets off an alarm if the exit sensor does not detect the arrival of an expected product unit at the unloading station. *Option available on most furnaces.*
SP1	**Critical Spares Kit.** Increases furnace availability. Package includes critical parts, such as fuses, SCR, PLC I/O modules and lamps that may be needed to restore full operation of the furnace. An itemized list of included spare parts shall be available. *Option available on all furnaces.*
SPL	**Split for Shipment:** Furnace may be manufactured to allow separation into sections to facilitate shipping and relocation. *Standard on all furnaces 5.7 m (225 in.) long or longer. Option available on furnaces 4.6 m –5.3 m (180 in.-210 in.) long.*
SPP	**Special Paint.** Customer specified color in lieu of standard Sherwin Williams Stone Gray, P/N F63TXA-0382-2322 Polane-T Texture or equal. *Option available on most furnaces.*
TT	**Transition Tunnel.** Similar to the BX Exit Baffle/Exhaust Eductor, the transition tunnel works as a barrier to prevent contaminants from passing from the heating section into the cooling section. The transition tunnel is housed inside an aluminum shell lined with ceramic fiber insulation and is fully insulated so that it will lose heat gradually. A metal air rake introduces a gas curtain above the belt to purge the tunnel and a series of four equally spaced hanging baffle gates effectively isolate the high temperature furnace section from the cooling section. A venturi-assisted exhaust stack draws furnace gases from the last zone, across a drip tray and out of the furnace to prevent exhaust condensation from falling into the transition baffle. Proper operation of this system keeps the furnace interior clean. *Standard on most furnace models.*

Table 2-1. Base Equipment and Options

KEY	DESCRIPTION
TTDE	**Transition Tunnel, Dual Eductors.** The TTDE module is similar in construction and design to the TT Transition Tunnel with the addition of a 2nd Exhaust Eductor to prevent contaminants from passing from the heating section into the cooling section. The transition tunnel is housed inside an aluminum shell lined with ceramic fiber insulation and is fully insulated so that it will lose heat gradually. A metal air rake introduces a gas curtain above the belt to purge the tunnel and a series of four equally spaced hanging baffle gates effectively isolate the high temperature furnace section from the cooling section. Two exhaust eductors, one at each end of the tunnel, expedite removal of gaseous contaminants from the furnace atmosphere and establish a counter flow of cooler gas from the cooling section, raising a high barrier to contamination passing from furnace to cooling section. Each eductor shall have a separate flow meter control for proper balancing of the exhaust flow. *Standard on some furnace models with multiple CACT or CACW cooling modules. Option available on most other furnaces.*
UC	**Ultrasonic Cleaner.** An ultrasonic belt cleaning system to remove particulate and fines that accumulate on the belt during normal furnace operation. Includes ultrasonic generator, heated tank, pumped water recirculation system, and compressed air blow-off of water droplets. As the belt is drawn through a tank of water, ultrasonic energy removes particulate matter and contamination from the belt. Tank water levels are automatically maintained. As the belt exits the tank, a flow of facility-supplied CDA blows water droplets from the belt to aid belt drying through evaporation. Start of ultrasonic cleaning and its duration are set by the user in the OI. The ultrasonic tank water is automatically filled, heated, and drained at the end of cleaning. The system requires plant clean water supply and drain. Same as UCD option, but without electric heater/blower drying system. *Option available on most furnaces.*
UCD	**Ultrasonic Cleaner with Dryer.** An ultrasonic belt cleaning system to remove particulate and fines that accumulate on the belt during normal furnace operation. Includes ultrasonic generator, heated tank, pumped water recirculation system, and an electric heater/blower system to provide automatic cleaning and drying of the belt. As the belt is drawn through a tank of water, ultrasonic energy removes particulate matter and contamination from the belt. Tank water levels are automatically maintained. As the belt exits the tank, a flow of facility-supplied CDA blows water droplets from the belt and then completely dried by an electric heater/blower system. Start of ultrasonic cleaning and its duration are set by the user in the OI. The ultrasonic tank water is automatically filled, heated, and drained at the end of cleaning. The system requires plant clean water supply and drain. Same as UC option, but with electric heater/blower system. *Option available on most furnaces.*
UCF	**UCD Water Filter, External, Quick Disconnect.** Filter for UC or UCD ultrasonic cleaner tank recirculation system. Allows the filter, enclosed in a stainless steel filter housing mounted outside furnace cabinet, to be replaced without opening furnace panels. *Requires UCD or UC, option available on most furnaces.*
ULOAD	**Unload Station.** The unload station is an area 38.1 cm long (15 inch) at the exit of the furnace which provides open access to accommodate removing product from the continuous belt after processing by the furnace. *Standard on all furnaces.*
UPSC	**Un-interruptible Power Supply, Computer.** Short term battery backup for emergency power when facility power fails. Provides instantaneous protection to computer system from input power interruptions and power surges. Does not provide power for furnace operation (see UPSF option). *Available on most furnaces.*
UPSF	**Un-interruptible Power Supply, Furnace.** Short term battery backup for emergency power when facility power fails. Provides necessary power to run the belt, fans, and control system for at least twenty minutes during a power outage. The transport belt continues to run at set speed which minimizes product loss during brief power failures. The unit automatically switches from standby to PROCESS START upon restoring power if the lower alarm temperature limit has not been reached. The control software includes modification to add automatic reset without using the normal power up and screen menu selection process, so that immediate restart is available after power interruption. Includes power for computer operation (see UPSC option for computer UPS only). *Available on most furnaces.*
UT	**Universal Transformers.** Multi-tap transformers that convert power lines ranging from 208 Vac to 480 Vac to voltages required by the furnace control system and accessories, and allow change to a different power line voltage with a single tap change. Other voltages can be accommodated upon request. *Standard on all furnaces.*
W-SS	**Stainless Steel Work Surfaces.** Entrance load station and exit unload station horizontal work surfaces of 304 stainless steel. *Standard on most furnaces.*

3.0 ALTERNATE MATERIALS

Many furnace components can be manufactured of alternate materials, if requested at the time of order. Key for alternate materials.

Table 3-1. Alternate Materials

KEY	DESCRIPTION
-AL	**Aluminum.** Standard material for many furnace components.
-SS	**Stainless Steel.** Fabricated from stainless steel, various grades.
-304	**Stainless Steel.** Fabricated from 304 and 304L stainless steel, and 316 and 316L as available.
-316	**Stainless Steel.** Fabricated from 316 and 316L stainless steel.
-PTFE	**Teflon.** Components of Polytetrafluoroethylene (PTFE) - manufactured by DuPont as Teflon® or equal.

[end of specification]