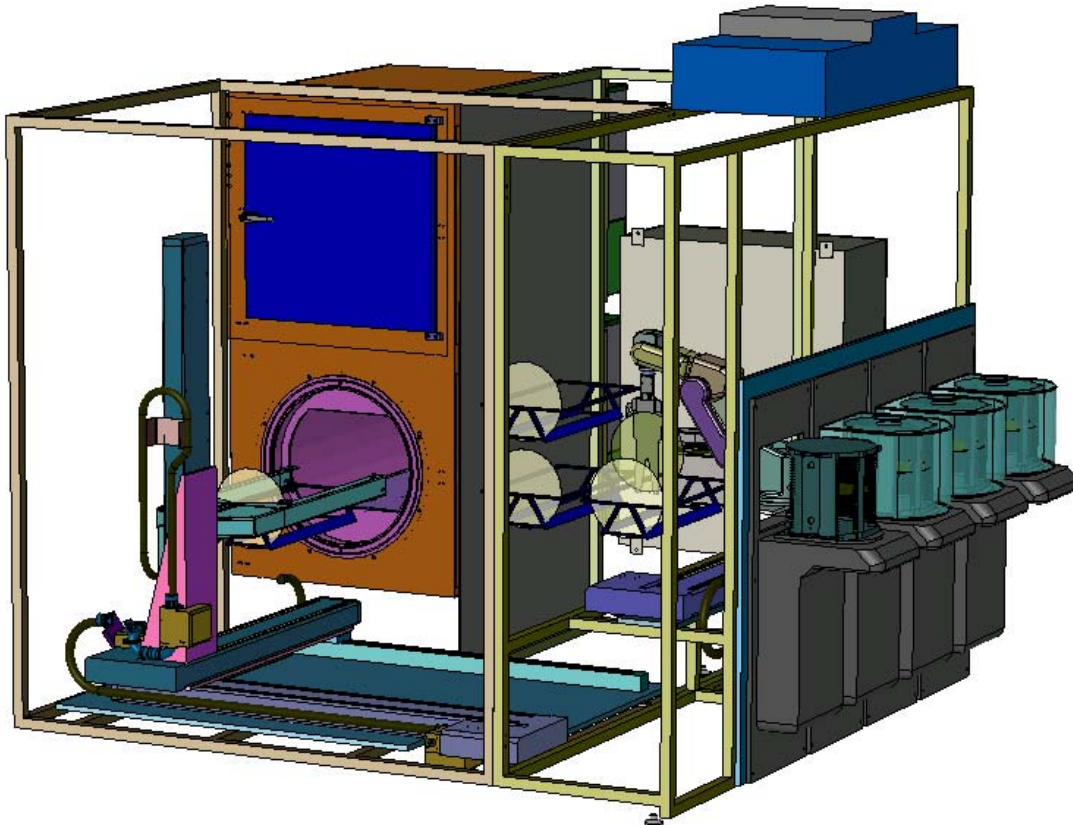


## YES-PBX-4-300 Fully Automated 300 mm Polyimide Bake System



The **YES-PBX-4-300** fully automated system gives you the same proven process that the YES-450PB series manual systems have for many years. Our systems are very effective tools for the polyimide cure process. Advantages of our systems are low oxygen concentration, efficient contamination control with particle removal, effective control of process effluent condensation, low electrostatic charge buildup, and short process duration due to rapid removal of oxygen at the start of the cure process and forced convection chamber cooling at the end. Now these same features and more can be found in our fully automated **YES-PBX-4-300** system.

## Features of the 450PBX-4-300

### Oven Module

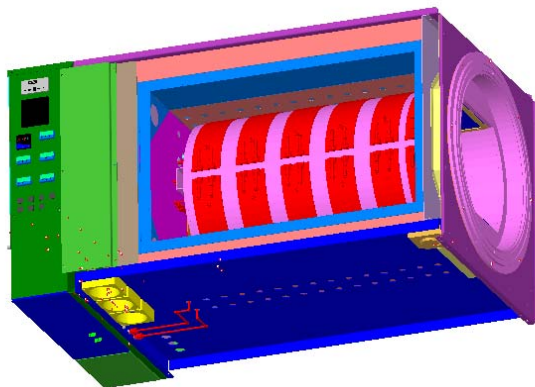
The YES-PBX-4-300 comes standard with two YES-PB12-2X oven modules. If only one oven is required (with 2 FOUP un-loaders and one oven module) then the system becomes the YES-PBX-2-300. For those who want to define their process and later move to automation, the manual oven module (YES-PB12-2X) can be purchased separately. Process on the automated system will be identical.

### Temperature Uniformity

The YES-PB12-2X design allows for system temperature uniformity of better than  $\pm 3.5^{\circ}\text{C}$  during process. This includes our patented laminar flow of preheated nitrogen, as well as door thermal baffles to reduce load front-end temperature drop during both dwell and ramp.

### Chamber

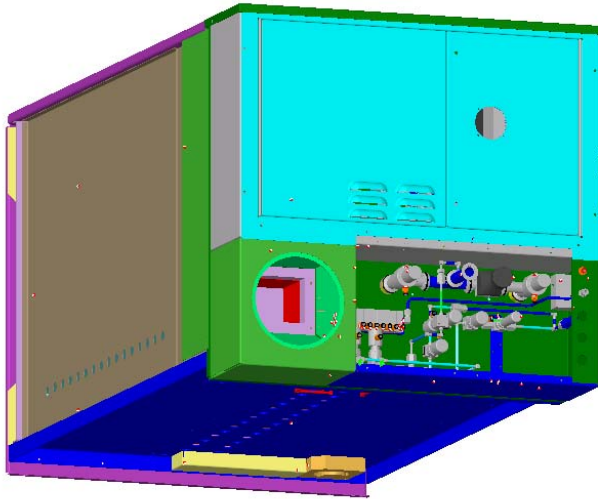
The chamber is welded 316L stainless steel with our newest door seal closure design with pump-out zone. Special thermal baffles make temperature uniformity even better than our previous model systems. The product zone within the chamber contains a product temperature control thermocouple, a sensing port for the chamber pressure, and fixturing to retain the product cassette in the correct orientation for robotic pick up. Gas flow in the product zone is vertical laminar flow downward during process. Wafers are processed in the product zone in a near-vertical orientation to gain maximum benefit of the vertical laminar flow process.



### Chamber Temperature Control

The system features six electrical band heaters with a combined heating power of 12,000 Watts for heating the process chamber. Like all of our systems the process gas is pre-heated before entering the chamber.

The system features a cooling design, which allows the process chamber to be cooled using forced air convection. The system has an outer chamber around the process chamber. In this outer chamber airflow is created by suction to pull heat away from the outside of the process chamber. Since this all occurs in an outer-chamber no air or turbulence is introduced to the inner process chamber. This outer process chamber is surrounded by an insulated inner cabinet structure for temperature uniformity during process.



### **Gas Piping**

All process gas piping is welded, 316 stainless steel construction with VCR connections. MFC flow control is available as an option.

### **Vacuum Piping**

Process vacuum piping is 316L stainless steel inside the chamber. The vacuum diffuser is removable for cleaning or other maintenance. An exhaust cooler/effluent trap is located adjacent to the chamber. Exhaust piping from the chamber has a low point trap to inhibit liquid effluent from flowing back into the chamber. A bellows line attached to the trap is cooled by forced-air convection. Both the exhaust cooling bellows line and the effluent trap are easily removable for cleaning.

The standard pressure control includes two parallel vacuum lines, which a throttle valve in one vacuum line, to the pump connection. Both lines have pneumatic shut-off valves. Automatic pressure control is available as an option. The automatic pressure control option uses an automatic throttle valve to dynamically adjust the pumping speed at the chamber to maintain constant pressure.

### **Chamber Pressure Sensing**

Standard pressure sensor for the system is a convectron vacuum gauge with a digital vacuum gauge controller. The optional pressure control configuration uses two capacitance diaphragm gauges to measure chamber pressure.

## O2 Analyzer Option

The O2 Analyzer provided as an option with the system is intended to provide verification of process cycle purge effectiveness and vacuum chamber integrity for oxygen sensitive processes.

## Chamber Door Actuation

The chamber door is opened and closed automatically under the control of the oven module PLC. The door actuator controls have several hardwire interlocks to prevent injury to personnel or damage to equipment.

## Power Distribution

The system power distribution components are designed to be in accordance with NFPA 79, NFPA 70, and SEMI S2 guidelines for safe electrical design. European versions of the system are designed to be in accordance with EN61010-1.

## Safety and Process Interlocks

The oven electrical design includes hard-wired safety and process interlocks:

## Oven Controller

The oven is controlled by a programmable logic controller (PLC) located in the control enclosure at the rear of the oven module in accordance with NFPA safety requirements. Operation of the PLC is directed by the user interface. Data acquisition is an option.

## Oven Module Specifications

Max. Capacity: 50 wafers per oven module

Max Heat up rate: 12°C/min

Max Cool Down rate: 7°C/min

Temp. Uniformity at Dwell: +/-3.5°C

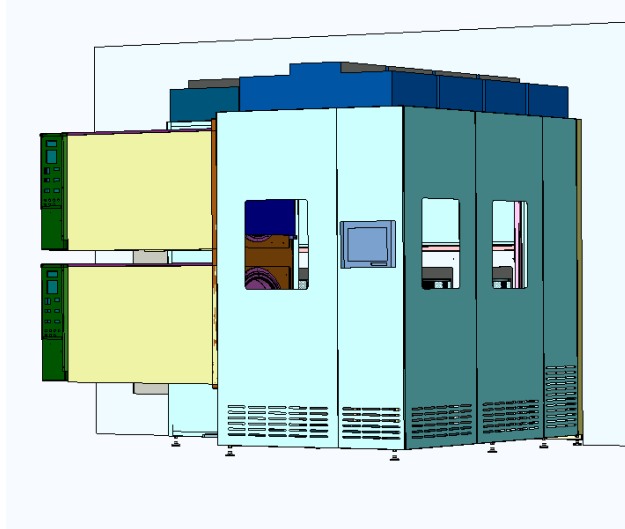
Temperature range: Ambient to 450°C



## ***Environmental Front End Module (EFEM)***

### **300mm FOUP Load Ports**

The YES-PBX-4-300 has four 300mm load ports. System may be ordered as a PBX2-300 with just two load ports and one oven. This configuration may later be field upgraded to add the additional two load ports and additional oven module. Load ports have wafer-mapping capability to detect cross-slot errors and double-slot errors, vacuum assisted door removal, and RF tag reader for carrier identification.



### **Wafer Handling Automation**

The YES-PBX-4-300 standard wafer-handling robot is an Adept Six 300CR six-axis robot on a 1600mm Adept Module linear track. The wafer-handling robot uses an edge-grip type end effector. The wafer handling robot removes wafers horizontally from the FOUP, turns them nearly vertical and inserts them into a YES stainless steel cassette at a slight angle from vertical. Wafers are processed vertically in the YES-450PB12-2X oven module in order to gain the maximum benefit from the cleanliness of the vertical laminar process gas flow.

200mm wafer processing is available as an option for the YES-PBX-4-300 or PBX2-300 systems. The option includes 200mm YES stainless steel cassettes, adapter plates to place 200mm product cassettes on the load ports, and a 200mm end effector for the wafer-handling robot.

There is an Emergency Stop button located at each operator station and one inside the mini-environment. The Emergency Stop button halts all robot motion.

### **Wafer Pre-aligner with OCR Wafer ID Reader (Optional)**

An optional wafer identification system is available that is able to read SEMI T7, SEMI M12 or 13, or SEMI T1-95 wafer ID codes. The wafer identification option consists of an Adept pre-aligner and a wafer reader.

## Cassettes and Cassette Stations

Wafers are processed in YES custom stainless steel cassettes. Each cassette will accommodate 50 wafers for processing. Stainless steel is preferred over quartz cassettes due to abrasive particle generation. A conductive cassette also reduces electrostatic charge build-up during vertical laminar flow processing and consequently reduces particle adhesion.

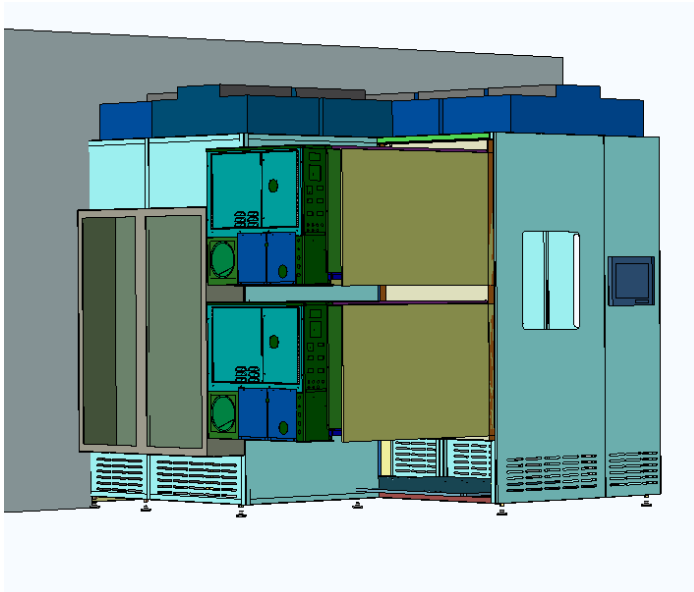
YES cassettes are serialized with an 8-bit code that is read by the load cassette station on the YES-PBX-4-300. YES cassettes are available for the YES-PBX-4-300 in 300mm size and an optional 200mm size. 200mm cassettes have the same external dimensions as the 300mm cassettes and are interchangeable in the YES-PBX-4-300. All three of the cassette stations will detect the wafer size of any YES cassette that is placed on them.

## Cassette Handling Robot

The cassette handling robot is a 1200mm x 1200mm x 950mm Cartesian robot made of Adept SmartModules linear actuators. The robot has absolute encoders on all three axes to track end effector position. It also has power off brakes on all three axes to prevent uncontrolled movement in the event of a power outage or EMO. Robot movement is interlocked to prevent oven door actuator movement unless the robot is retracted out of the door path. It is also interlocked to stop movement if an EFEM access panel is opened. An EMO or interlock activation will cause the cassette-handling robot to quickly decelerate to a stop.

Independent proximity sensors verify end effector position before the robot approaches a cassette for pickup and before dropping off a cassette at a station or oven.

## Mini-Environment



The product area of the YES-PBX4-300 EFEM is enclosed in an ISO class 3 mini-environment designed in accordance with the recommendations of INTL Sematech 99033693A-ENG, "Integrated Mini Environments Design Best Practices".

## **Power Distribution**

YES-PBX-2-300 power distribution components are designed to be in accordance with NFPA 79, NFPA 70, and SEMI S2 guidelines for safe electrical design. European versions of the YES-PBX-2-300 are designed to be in accordance with EN61010-1. All power distribution components are located in a NEMA class 4 enclosure located adjacent to the oven modules.

## **System Controller**

An Adept CX system controller controls the cassette stands, the UPS, the wafer handling robot, the cassette-handling robot, the pre-aligner, and the mini environment. It directs the operation of the load ports, and the wafer ID reader. The operation of the system controller is in turn directed by the user interface. In accordance with NFPA 79 safety requirements, controller outputs supply 24VDC to operate devices and PLC inputs are actuated by a 24VDC signal from sensors.

## **User Interface**

The YES-PBX-4-300 user interface is implemented on a PC with the Windows 2000 Server operating system. The user interface has user definable, password control.

The user interface includes SEMI E37 compliant HSMS host communications as a standard feature. The YES-PBX-4-300 has two operator stations. The primary operator station is located at the front of the tool adjacent to the load ports. The primary station has a touch-screen display for the user interface, a four-color light tower, plus power on, power off, emergency stop, and EMO buttons. The auxiliary operator station is located at the rear of the machine adjacent to the oven modules. The auxiliary operator station has a touch-screen display to provide access to the user interface plus power on, power off, emergency stop, and EMO buttons.

For more detailed information on this system please contact BITA Luxembourg or Stockholm office:  
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