



CASE STUDY

Electric Heated Cabinet Oven for Overseas Electric Motor Paint Drying

Precision Quincy engineered this oven as a 40C-550 Class A electric cabinet oven for the customer supporting an overseas electric-motor finishing application. The equipment was developed to provide repeatable batch drying of thin polyurethane paint on electric motors using full horizontal airflow, electric heat, Class A exhaust architecture, and a compact cabinet platform intended for operation at Petroterminal de Panama, S.A., Panama.



OVERVIEW

Precision Quincy engineered this oven as a 40C-550 Class A electric cabinet oven for the customer supporting an overseas electric-motor finishing application. The equipment was quoted to support repeatable batch drying of thin polyurethane paint on electric motors in a compact cabinet format using full horizontal airflow, electric heat, Class A exhaust architecture, and a standardized platform intended for operation at Petroterminal de Panama, S.A., Panama.

The oven used a 48 in W × 48 in D × 38 in H work chamber and was designed for an operating temperature of 482°F (250°C), a maximum temperature of 550°F (288°C), and a stated work-area uniformity of $\pm 10^{\circ}\text{F}$. Heating was provided by an electric heater bank delivering 36 kW total through 24 × 1500 W heating elements, with a recirculation system rated at 1,500 CFM and a PQ1 exhaustor rated at 300 CFM for Class A operation.

The oven was configured to process approximately 0.25 gal of paint per batch and was designed around a documented maximum VOC load basis of 0.22 gal/batch (o-xylene basis) at a design elevation of less than 1,000 ft. Product support included two 100 lb evenly distributed capacity shelves, while the chamber layout preserved flexibility for different motor sizes and loading arrangements so long as airflow passage through the work area remained open.

Controls were housed in a NEMA 1 enclosure using an SSI-804 temperature controller, Gefran 650L excess temperature controller, and Type J thermocouples, with the control enclosure listed as a UL 508A Open Industrial Control Panel. The quoted project identified the customer as the customer and listed the intended operating location as Petroterminal de Panama, S.A., Panama. The quote also stated that special or export crating was not included in the oven price and would be handled separately if required.



CUSTOMER PROCESS REQUIREMENTS

This oven was developed for the customer to support an overseas deployment of thermal-processing equipment for an electric-motor paint-drying application.

Application requirement

- The equipment was required for drying polyurethane paint on electric motors.

- The customer required a repeatable batch-process platform suitable for industrial finishing work rather than a one-off laboratory unit.
- The project also reflected the need to support an international deployment through the customer procurement and integration channel.

Work chamber / load requirement

- Required work chamber: 48 in W × 48 in D × 38 in H.
- The oven was supplied with two 100 lb evenly distributed capacity shelves.
- The application also required load flexibility for varying motor sizes and configurations, with shelf loading limited to 100 lb per shelf.
- Customer loading practices had to preserve open airflow passage through the chamber for proper thermal performance.

Process requirement

- The system had to support drying of thin polyurethane paint coatings on electric motors.
- Process basis: approximately 0.25 gal of paint per batch.
- Required operating temperature: 482°F (250°C).
- The customer required consistent airflow and temperature control for repeatable batch drying results.

Safety requirement

- The oven was configured as an NFPA 86 Class A unit.
- The documented maximum VOC load basis was 0.22 gal/batch (o-xylene basis).
- The control enclosure basis was UL 508A Open Industrial Control Panel.

Utility / shipment / export requirement

- Required electrical service: 480V / 3PH / 60Hz.
- Intended location of operation: Petroterminal de Panama, S.A., Panama.
- The project was quoted for overseas deployment through the customer.
- Special or export crating was not included in the quoted oven price and would be handled separately if required.

THERMAL / PHYSICAL PROCESS REQUIREMENTS

These thermal process requirements were established from the customer's need to dry thin polyurethane paint coatings on electric motors in a controlled Class A batch oven platform quoted for the customer and intended for operation at Petroterminal de Panama, S.A., Panama.

Temperature capability

- Operating temperature: 482°F (250°C)
- Maximum temperature: 550°F (288°C)
- Required work-area uniformity: ±10°F

Process basis

- The thermal process basis was drying thin polyurethane paint on electric motors.
- Process basis: approximately 0.25 gal of paint per batch.
- The application required repeatable temperature exposure and airflow across varying motor sizes while maintaining proper open airflow paths through the load.
- Design elevation basis: <1,000 ft.

Heat input requirement

- Heat source: electric resistance heat
- Heater bank: 24 elements × 1500 W
- Total installed heat: 36 kW

Airflow delivery requirements

- Airflow style: full horizontal airflow
- Recirculation airflow basis: 1,500 CFM
- Recirculation static pressure basis: 2 in. W.c.
- Recirculation fan motor: 1.5 HP

Exhaust / ventilation basis

- Exhaust fan: PQ1 exhauster
- Exhaust airflow: 300 CFM
- Exhaust static pressure: 1 in. W.c.
- Exhaust fan motor: 0.75 HP

Thermal instrumentation / control basis

- Primary controller: SSI-804 temperature controller
- Work-area thermocouple: Type J
- Excess temperature controller: Gefran 650L high-limit arrangement

Safety / classification basis

- Oven classification basis: NFPA 86 Class A
- Maximum VOC load basis: 0.22 gal/batch (o-xylene basis)
- Purge timer basis: 3 minutes minimum
- Airflow switches were used on both exhaust and recirculation fans as part of the safe-operating sequence



EQUIPMENT CONCEPT & ARCHITECTURE

To deliver the customer and thermal process requirements for this oven, Precision Quincy developed the following equipment concept and architecture.

Overall concept

- One 40C-550 Class A electric cabinet oven
- Designed for drying thin polyurethane paint on electric motors
- Developed for the customer for an overseas deployment
- Configured as a full-horizontal-airflow batch oven for repeatable drying performance

Heating architecture

- Heat source: electric resistance heat
- Heater bank output: 36 kW total
- Heater bank arranged as 24 × 1500 W heating elements
- Heat controlled through solid-state relay architecture with a back-up contactor

Airflow / recirculation architecture

- Airflow pattern: full horizontal airflow
- Recirculation fan concept:
 - 1,500 CFM
 - 2 in. W.c.
 - 1.5 HP motor
- Exhaust fan concept:
 - PQ1 exhauster
 - 300 CFM at 1 in. W.c.
 - 0.75 HP motor
- The chamber and load concept required maintaining open airflow paths around the product for proper process performance

Chamber / construction architecture

- Internal work chamber: 48 in W × 48 in D × 38 in H
- Wall thickness: 4 in
- Insulation: 4 in of 6 lb mineral wool
- Interior material: unpainted aluminized steel
- Exterior finish: PQ Blue
- Control panel finish: ANSI 61 gray
- Floor: 3/16 in plate floor

Door / access architecture

- Two swing doors
- Supplied with two 100 lb evenly distributed capacity shelves
- Shelf spacing shown at 3 in adjustable increments
- The shelf and chamber arrangement supported load flexibility for varying electric-motor sizes and configurations, with 100 lb maximum per shelf

Controls architecture

- NEMA 1 control enclosure
- Primary temperature controller: SSI-804
- Excess temperature controller: Gefran 650L
- Work-area thermocouples: Type J
- Control enclosure listed to UL 508A Open Industrial Control Panel

Safety / compliance architecture

- Oven classification basis: NFPA 86 Class A
- Applicable standards basis: NFPA 79, NFPA 86, UL 508A
- Included Class A exhaust, purge timer, airflow switches on exhaust and recirculation fans, and overtemperature protection
- Maximum VOC load basis: 0.22 gal/batch (o-xylene basis)
- Design elevation basis: <1,000 ft

Shipping / installation architecture

- Intended location of operation: Petroterminal de Panama, S.A., Panama
- The project was quoted for overseas deployment through the customer
- Special or export crating was not included in the quoted oven price and would be handled separately if required

TECHNICAL SPECIFICATIONS

Oven Configuration

Quantity	1 oven
Type	40C-550 Class A electric cabinet oven
Application	Drying thin polyurethane paint on electric motors
Internal Work Chamber	48 in W × 48 in D × 38 in H
Airflow Style	Full horizontal airflow

Thermal Heat Power System

Operating Temperature	482°F (250°C)
Maximum Temperature	550°F (288°C)
Uniformity	±10°F
Heat Source	Electric resistance heat
Installed Heat	36 kW
Heater Bank Basis	24 × 1500 W elements
Design Elevation	<1,000 ft

Recirculation / Airflow System

Recirculation Airflow	1,500 CFM
Recirculation Static Pressure	2 in. W.c.
Recirculation Fan Motor	1.5 HP
Airflow Pattern	Full horizontal

Exhaust System

Exhaust Fan	PQ1 exhauster
Exhaust Airflow	300 CFM

Exhaust Static Pressure	1 in. W.c.
Exhaust Fan Motor	0.75 HP

Construction Materials / Shell System

Wall Thickness	4 in
Insulation	4 in of 6 lb mineral wool
Interior Material	Unpainted aluminized steel
Floor	3/16 in plate floor
Exterior Finish	PQ Blue
Control Panel Finish	ANSI 61 gray
Door Style	Two swing doors
Adjustable Shelf Pitch	3 in increments

Loading / Product Support

Standard Shelves	Two 100 lb capacity shelves
Shelf Rating Basis	100 lb evenly distributed load each
Product	Electric motors
Process Coating	Thin polyurethane paint
Batch Basis	Approximately 0.25 gal of paint per batch
Load Flexibility	Supports varying motor sizes/configurations
Airflow Loading Note	Product positioning must preserve open airflow passage

Controls & Electrical

Temperature Controller	SSI-804
High Limit	Gefran 650L
Thermocouples	Type J
Control Cabinet	NEMA 1

Listing Basis	UL 508A Open Industrial Control Panel
Primary Power	480V / 3PH / 60Hz
Full Load Amperage	52.5 A
SCCR	5,000 A
Main Disconnect	100A non-fused disconnect switch
Heat Control	Solid-state relays with back-up contactor

Safety & Compliance

Classification	NFPA 86 Class A
Maximum VOC Load Basis	0.22 gal/batch (o-xylene)
Applicable Standards	NFPA 79, NFPA 86, UL 508A
Purge Timer Basis	3 minutes minimum
Airflow Safeties	Airflow switches on exhaust and recirculation fans
Overtemperature Protection	Excess temperature controller

Shipping / Export

Shipment Style	Shipped assembled
Intended Destination	Petroterminal de Panama, S.A., Panama
Export Preparation	Special or export crating not included in quoted price
Approximate Oven Weight	1,400 lb

Process Summary

Market / Application	Industrial finishing / electric motor paint drying
Process Type	Batch drying of thin polyurethane paint coatings
Batch Basis	Approximately 0.25 gal of paint per batch
Deployment Context	Quoted through the customer for operation in Panama
Key Verification Concept	Repeatable control of temperature, airflow, exhaust, and safe operating limits



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