



CASE STUDY

Electric Class A Truck Oven for Silicone-Jacketed Cable Heat Treatment

Precision Quincy engineered this oven as a 74-500 electric Class A truck oven for controlled batch heat treatment of silicone-jacketed cable product. The oven combined a 48 in W × 48 in D × 60 in H work chamber, 400–500°F processing, full horizontal airflow, 36 kW electric heat, powered Class A exhaust, and a hanging-cart load format suited for repeatable thermal processing in a medical interconnect manufacturing environment.



OVERVIEW

The project was developed for the customer, a medical technology manufacturing partner supporting OEMs with cable assemblies, interconnect technologies, components, and device assemblies. This oven supported the heat treatment of cable with a silicone jacket, aligning with the customer broader medical cable and interconnect manufacturing environment.

The final configuration was a 74-500 electric Class A truck oven built around a 48 in W × 48 in D × 60 in H work chamber with an operating range of 400°F to 500°F, a 500°F maximum temperature, ±10°F uniformity, and full horizontal airflow. The design used 36 kW of electric resistance heat, a Jan-Air recirculation fan delivering 1,800 CFM at 2 in. W.c., and a PQ1 exhauster delivering 550 CFM at 1 in. W.c..

The oven was arranged around a front-loading hanging-cart process that supported suspended cable loads through a controlled thermal cycle. The final design also included a NEMA 1 UL 508A open industrial control panel, an SSI 804 temperature controller, a Gefran 650L excess-temperature controller, and interlocked purge, airflow proving, and cooldown logic appropriate for Class A operation.

This project delivered a compact truck-oven package for repeatable thermal processing of silicone-jacketed cable product where temperature stability, airflow control, and disciplined operating sequence were central to product quality.



CUSTOMER PROCESS REQUIREMENTS

The project was developed for a medical interconnect manufacturing operation requiring controlled batch heat treatment of silicone-jacketed cable product. In this environment, the oven had to support repeatable thermal processing for cable-based product forms while fitting into a disciplined production setting serving critical medical applications.

Application requirement

- The equipment had to process cable with a silicone jacket in a controlled batch format.
- The process had to support a medical cable and interconnect manufacturing environment where repeatability and process control are important.

- The project required a heat-treatment platform rather than a general-purpose storage or warming chamber.

Work chamber / loading requirement

- Required work chamber: 48 in W × 48 in D × 60 in H.
- The process required a hanging-cart loading basis suitable for suspended product handling.
- The hanging cart was required to support 750 lb total load capacity.
- The cart included 2 loading positions.
- Hanger capacity was 200 lb per hanger, uniformly distributed.

Operator / handling requirement

- Product had to be loaded and unloaded from the front of the oven through dual swing doors.
- The oven had to support cart-based movement into the chamber using floor guide tracks.
- The loading arrangement had to preserve workable access for repeated production cycles.

Quality / process-control requirement

- The customer required repeatable thermal exposure across the work envelope.
- The process required $\pm 10^{\circ}\text{F}$ work-zone uniformity.
- The operating sequence had to include dependable purge completion, airflow verification, and excess-temperature protection before and during heating.

Safety / environmental requirement

- The oven had to operate as a Class A system.
- The process required powered exhaust handling for the stated volatile-load basis.
- Heat could only be enabled when required safe operating conditions were satisfied.

Utility requirement

- Required electrical service: 460V / 3PH / 60Hz.

THERMAL / PHYSICAL PROCESS REQUIREMENTS

The project required a controlled forced-convection heat-treatment process for suspended silicone-jacketed cable product. The thermal requirements centered on moderate-temperature batch heating, cross-chamber airflow, safe Class A ventilation, and controlled cooldown behavior.

Temperature requirement

- Operating temperature range: 400°F to 500°F.
- Maximum temperature: 500°F.
- Required work-zone uniformity: $\pm 10^{\circ}\text{F}$.

Airflow / heat-transfer requirement

- Airflow direction basis: full horizontal airflow.
- The process required steady cross-chamber convection around suspended cable loads.
- Using the documented recirculation airflow and chamber cross-sectional area in the airflow direction, the first-pass average chamber crossflow is approximately 90 FPM.

Heat-input requirement

- Heat source: electric resistance heat.
- Installed heat basis: 36 kW total.
- The process required controlled electric heat input matched to the stated operating range and uniformity requirement.

Ventilation requirement

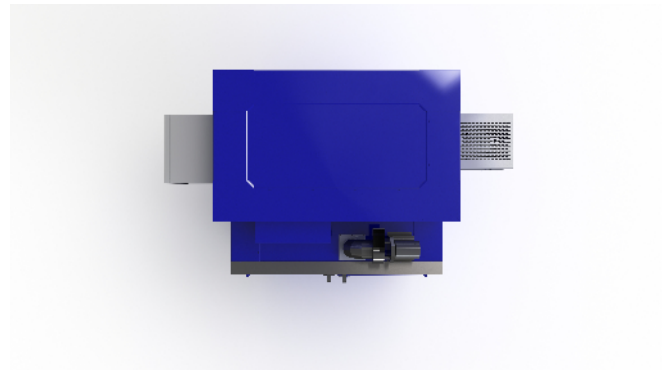
- The oven required Class A exhaust and purge sequencing.
- Exhaust basis: 550 CFM.
- Maximum volatile-load basis: 0.44 gal/batch o-xylene equivalent.
- Design elevation basis: below 1,000 ft.

Control / protection requirement

- The thermal cycle required a dedicated work-area temperature controller and a separate excess-temperature limit.
- Airflow had to be proven for both the exhaust fan and recirculation fan before heat was enabled.
- The oven had to complete a timed purge cycle before entering heat.

Cooldown requirement

- The process required continued fan operation during cooldown.
- Fans had to remain on until oven temperature fell below 250°F.



EQUIPMENT CONCEPT & ARCHITECTURE

To satisfy those requirements, Precision Quincy configured the project as a 74-500 electric Class A truck oven with front-loading cart handling, horizontal airflow, electric resistance heat, and interlocked safety controls.

Pages 6–8 — Technical Specifications

Overall concept

- One electric Class A truck oven.
- Front-loading batch configuration for suspended cable product.
- Hanging-cart process arrangement sized for repeatable batch loading and unloading.

Heating architecture

- Heat source: electric resistance heat.
- Total installed heat: 36 kW.
- Heater package based on twelve 3,000 W heating elements.
- Heat output controlled through solid-state relays with a backup contactor.

Airflow architecture

- Airflow pattern: full horizontal airflow.
- Recirculation system based on a Jan-Air 13.5 × 5 FC fan assembly.
- Recirculation performance: 1,800 CFM at 2 in. W.c..
- Recirculation motor: 1.5 HP.
- Integrated fresh-air inlet built into the oven body.

Exhaust / ventilation architecture

- Class A exhaust based on a PQ1 exhauster.
- Exhaust performance: 550 CFM at 1 in. W.c..
- Exhaust motor: 0.75 HP.
- Exhaust, airflow proving, and purge timing are integrated into the heater-enable logic.

Chamber / shell architecture

- Internal work chamber: 48 in W × 48 in D × 60 in H.
- 4-inch insulated wall construction.
- Insulation: 4 in of 6 lb mineral wool.
- Interior material: aluminized steel.
- Front-loading floor built with cart guide tracks.
- Oven frame includes lifting lugs and floor anchors.

Door / loading architecture

- Two swing doors at the load face.
- Hanging cart designed for 750 lb total load capacity.
- Cart configured with 2 loading positions.
- Product handling is organized around suspended loading rather than fixed shelving.

Controls architecture

- SSI 804 temperature controller for primary work-area temperature control.
- Gefran 650L for excess-temperature protection.
- NEMA 1 UL 508A open industrial control panel.
- Eagle purge timer and dual airflow switches integrated into the operating sequence.
- Panel layout includes dedicated controls and indication for exhaust fan, recirculation fan, purge complete, and heat bank on status.
- Control enclosure includes an enclosure cooling fan.

Safety architecture

- Applicable standards basis: NFPA 79, NFPA 86, UL 508A.
- Operating logic follows this sequence:
 - Start exhaust fan
 - Start recirculation fan
 - Complete purge
 - Enable heat
 - Maintain heat only while required safe-operating conditions remain satisfied
 - If a required safe-operating condition is lost, the oven turns heat off.
 - Cooldown logic keeps the fans running until temperature falls below 250°F.

Service / access architecture

- Control-enclosure door swing: 36 in.
- Oven door swing: 37 in.
- Heater-plug removal depth: 32 in.
- Fan-assembly removal depth: 10 in.

TECHNICAL SPECIFICATIONS

Oven Configuration

Model	74-500
Type	Electric Class A truck oven
Quantity	1 oven
Process	Heat treatment
Product Basis	Cable with silicone jacket
Airflow Pattern	Full horizontal airflow
Work Chamber	48 in W × 48 in D × 60 in H
Door Style	2 swing doors
Loading Basis	Hanging cart / suspended product

Electrical System

Power Supply	460V / 3PH / 60Hz
Full Load Amps	50.5 A
Control Enclosure	NEMA 1
Enclosure Listing Basis	UL 508A Open Industrial Control Panel
Enclosure Size	42 in × 30 in × 12 in
SCCR	5,000 amps
Main Disconnect	100A non-fused disconnect switch

Heating System

Operating Temperature	400°F to 500°F
Maximum Temperature	500°F
Uniformity	±10°F
Heat Source	Electric resistance

Installed Heat	36 kW
Element Basis	12 × 3,000 W heating elements
Heater Control	SSR with backup contactor

Recirculation / Airflow System

Airflow Pattern	Full horizontal airflow
Recirculation Fan	Jan-Air 13.5 × 5 FC fan assembly
Recirculation Performance	1,800 CFM at 2 in. W.c.
Recirculation Motor	1.5 HP
Estimated Average Chamber Crossflow	~90 FPM

Exhaust / Ventilation System

Exhaust Fan	PQ1 exhauster
Exhaust Performance	550 CFM at 1 in. W.c.
Exhaust Motor	0.75 HP
Oven Classification	Class A
Maximum Volatile Load	0.44 gal/batch o-xylene equivalent
Design Elevation	<1,000 ft
Purge Basis	Timed purge before heat enable

Construction / Chamber Details

Wall Thickness	4 in
Insulation	4 in of 6 lb mineral wool
Interior Material	Aluminized steel
Approximate Oven Weight	3,200 lb
Fresh-Air Inlet	Integrated into oven body
Floor Anchors	4

Lifting Lugs	4
Cart Guide Track Spacing	32 in center-to-center

Cart / Product Handling

Cart Load Capacity	750 lb
Loading Positions	2
Hanger Capacity	200 lb per hanger, uniformly distributed
Cart Overall Width	43.00 in
Cart Overall Depth	46.38 in
Cart Overall Height	49.75 in
Hanger Depth	33.50 in
Cart Handle Height	27.75 in

Controls & Safety

Main Temperature Controller	SSI 804
Excess Temperature Controller	Gefran 650L
Thermocouples	Type J
Purge Timer	Eagle BRE8A6
Airflow Proving	Exhaust and recirculation airflow switches
Indicators	Exhaust fan on, recirculation fan on, purge complete, heat bank on
Fan Shutdown Protection	Fans remain on until oven is below 250°F
Applicable Standards Basis	NFPA 79, NFPA 86, UL 508A

Equipment Dimensions

Overall Width	84.31 in
Overall Depth	65.03 in
Overall Height	91.97 in

Oven Body Width	69.27 in
Oven Body Depth	61.07 in
Height to Top of Control Enclosure	69.00 in
Height to Exhaust Outlet	81.83 in
Exhaust Outlet Size	7.5 in × 3.375 in
Oven Door Swing	37 in
Control-Enclosure Door Swing	36 in



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