

Nor-Cal Products



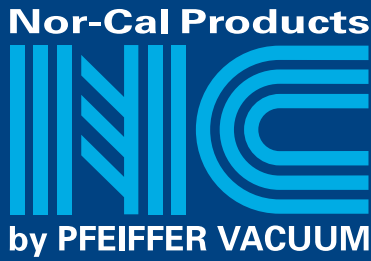
by PFEIFFER VACUUM

Where technology takes shape





High and ultra-high  
vacuum components for  
industry and research



Nor-Cal Products is a  
strong partner of the  
vacuum science industry.

## Markets Served

High Vacuum Processes

Semiconductor Manufacturing

Compound Semiconductor & LED

Thin Film Deposition

Flat Panel Display Manufacturing

Research & Development

Solar Manufacturing

Energy Processes

Engineered Materials

Vacuum Pump Manufacturing

Instrumentation Manufacturing

Aerospace & Defense Development

Life & Health Sciences Development

Special requirements?  
Call 800-824-4166

Quality ■ Performance ■ Confidence ■ Value ■ Innovation



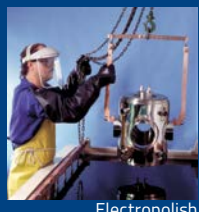
3D Modeling



CNC Machining



Precision Welding



Electropolish



Chem-Cleaning



Mechanical Inspection



Clean Room Assembly



Helium Leak Testing



Clean Room Packaging

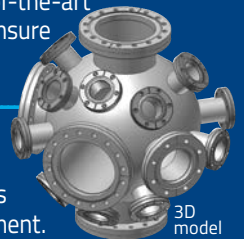
# Our Capabilities

## Innovation in design. Precision manufacturing.

While Nor-Cal Products offers over 6000 standard vacuum system components, we specialize in the precision design and manufacturing of custom chambers, systems, and assemblies. Customization of standard components is also common. High customer standards require a focus on maintaining in-house state-of-the-art design and manufacturing capabilities, and to ensure quality components and on-time delivery.

### Engineering & Design

Our engineering team's input during the design phase of your build-to-print custom chamber or other component often results in cost savings during production and a superior quality component.



3D model

### Research & Development

Our in-house research and development capabilities include prototype machining, pressure, conductance and thermal characterization, as well as software and electronic development testing.

XRF provides precise  
chemical makeup of  
materials



### Materials Selection

Only the highest grade stainless steel, aluminum and other materials are used. Vapor pressure, corrosion resistance and permeability are important considerations during the material selection process.

### Fabrication

Proper UHV practices reduce outgassing, and minimize entrapments. State-of-the-art CNC equipment produces high quality components consistently. Most valve and trap body ports and weld fittings are die-formed to eliminate sharp inside corners that can entrap contaminants, and to allow faster pumpdown and lower outgassing. TIG fusion welding is used for vacuum-tight metal bonding. Orbital welders are used for precise weld penetration.

### Cleaning, Electropolishing & Surface Treatment

High standards of component cleanliness are attained by passivation in a light acid solution, to remove weld scale and oxide, then a wash to remove machine lubricants, followed by a final wash and rinse with deionized water. In-house tumbling, bead blasting, chem cleaning and electropolishing are performed as required.

### Cleanroom Assembly & Packaging

Two Class 1000 clean rooms feature dedicated areas for assembly, leak check, testing, and packaging to promote greater visibility, better inventory control and compressed assembly lead times.

### Helium Leak Check

Every weld and assembly is leak checked to ensure a leak rate of  $1 \times 10^{-9}$  mbar  $\text{ls}^{-1}$  He, or less, conforming to ASTM E498. Testing for lower leak rates is possible on our chamber qualification test bench that contains vacuum pumps, gauges, RGA, quartz heaters, nitrogen back fill and a leak detector.



### Ultra-Clean Vacuum

Nor-Cal Products can precisely measure outgassing rates of a wide range of atomic mass units from 1-200 using a highly precise, state-of-the-art RGA test stand.

### Quality Assurance

We are ISO 9001-2008 Certified, have SEMATECH SSQA Preferred Supplier status, support the MIL-Q-9858 Quality Program Requirements and ANSI/ASQC C1 General Requirements for Quality Programs. Calibration procedures meet MIL-STD-5662A. QA sampling plan according to MIL-STD-105E.



■ Quality ■ Performance ■ Innovation ■ Value ■ Confidence ■

# Custom Components

**Exceeding your expectations is our goal.**

Our reputation as a premier vacuum chamber fabricator is built on the high-quality, appearance and performance of our stainless steel and aluminum chambers and custom components. Chamber bodies can be spherical, cylindrical or rectangular. Water-cooled chambers and flanges with double walls or channels offer solutions for diffusion CVD, and other high-temp applications.

Our welded ultra-high vacuum aluminum chambers provide several advantages including low material cost, light weight, high thermal conductivity, low nuclear activation, and low magnetic permeability.

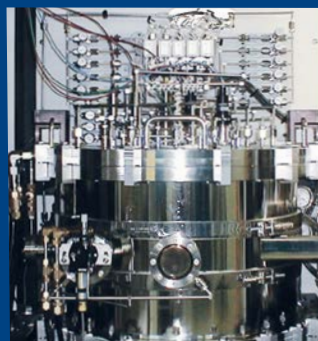
On request, Nor-Cal can assemble an entire system including chamber, frame, pumps, gauges, valves, manipulators and other components built to customer specifications. Our vacuum technicians can complete a thorough qualification of system performance, including time to base pressure and RGA scan, before the system is back filled with nitrogen and shipped to the customer.

Because Nor-Cal manufactures tees, elbows and other weldments in-house, fabrication of exhaust weldments is possible from a single piece of tubing. This eliminates numerous welds, manufacturing steps, improves cleanliness and fit, while reducing cost. Savings of up to 30% are possible with this technique.

## We can support your quick-turn needs.

Nor-Cal Products employs lean manufacturing techniques that combine bottleneck management and KANBAN with traditional MRP for production scheduling and capacity planning.

Small lot sizes and standardized routings maximize scheduling flexibility.



MOCVD Reactor Chamber



Research end station



Surface science research end station



Custom weldments





# Custom Components

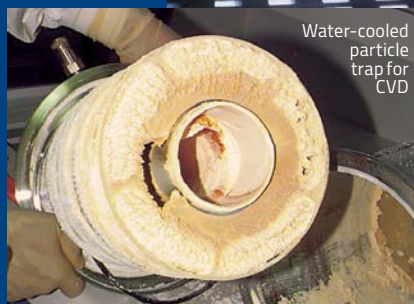
**Our focus is on your satisfaction.**

## Process Specific Traps

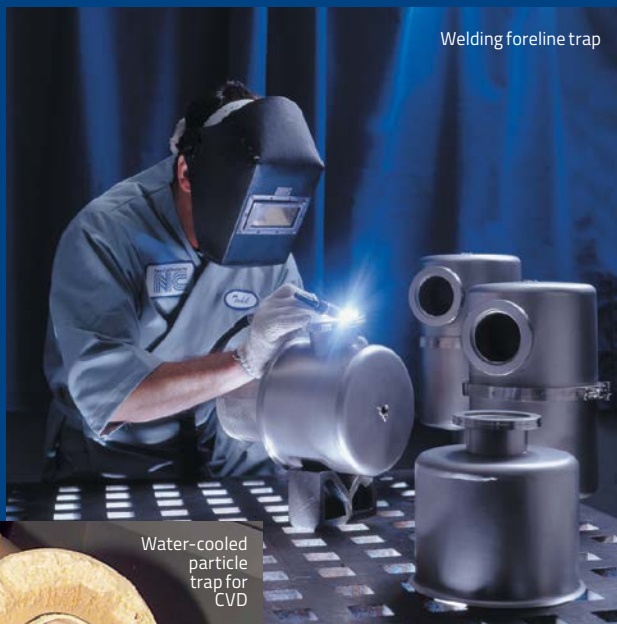
We have years of experience designing and building custom foreline traps to protect pumps and eliminate buildup of condensable by-products in forelines and exhaust lines. Examples of these include water cooled and particle traps for LPCVD/TEOS, PECVD, metal CVD, MOCVD and metal etch. Others are particle traps for crystal growers, liquid traps for reclamation of photo resist and oil reclamation traps for industrial applications. Often times our customers see a 50% decrease in preventative maintenance frequency after installation of one of these traps.



Chamber Leak Test in Class 1000 Clean Room



Water-cooled particle trap for CVD



Welding foreline trap

## Comprehensive Downstream Solutions

Our broad product offering enables integration of components to provide comprehensive system solutions to semiconductor fabs

and equipment manufacturers. Traps, thermal products, weldments and control valves can be integrated as turnkey foreline modules.

*Ask for a cost of ownership model to show payback as a result of increased tool utilization.*

## System Integration

Thermal and vacuum characterization can be performed before the assembly is supplied leak checked, blanked off and clean room packaged. A thorough system evaluation is conducted to fine tune overall performance, thus decreasing maintenance costs and achieve customer defined goals.

## Engineering

Nor-Cal's engineering department employs the latest versions of SolidWorks™ drafting and solid modeling software.



3D Modeling

We can work from a sketch, specifications, 3D models or prints. For our customers who do not have drafting personnel available and require a complex assembly, we will provide complete CAD drawings for approval upon receipt of order.

## Research & Development

In addition to developing new standard products and improving existing ones, our Research and Development departments design and test customer specified products for equipment manufacturers. Our in-house research and development facility has prototype machining capabilities. We can also perform pressure, conductance and thermal characterization as well as software and electronic development and testing.



System Integration

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# Standard Components

The right component whatever the application

## Chambers & Accessories

- Stainless Steel and Aluminum Chambers
- Weldments ■ Surface Analysis Chambers ■ Bell Jars
- Baseplates ■ Feedthrough Collars ■ Add-a-doors
- Viewports ■ Load Locks ■ Manipulators ■ Monitors
- Crystal Sensors ■ Liquid and Electrical Feedthroughs



## Flanges, Fittings, Adapters & Hardware

- NW/EVAC, ISO, CF/CF-Wireseal and ASA Flanges and Fittings
- Aluminum to Stainless Steel Transitions
- Chain Clamps, Adapters and Hardware

## Weld Fittings & Tubing

- Conical Reducers ■ End Caps and Reducers ■ Elbows ■ Tees
- Crosses ■ Stainless Steel Tubing ■ Exhaust Lines

## Flexible Hose & Couplings

- Weldable Flexible Stainless Steel Hose ■ PVC Flexible Hose
- Braided Stainless Steel Hose ■ Flex Couplings

## Thermal Products

- Semiconductor Process Solutions
- Silicone Cloth Heater Jackets ■ High Temperature Cloth Heater Jackets
- Heater Controllers ■ Insulators and Accessories

## Foreline Traps

- Custom Process ■ Metal Sieve ■ Semiconductor Process
- Sealed Coaxial ■ Liquid Nitrogen ■ Molecular Sieve
- Particulate ■ Water-cooled ■ Filters and Parts

## Isolation & Pressure Control Valves

- Standard Poppet Valves
- Bellows Poppet Valves
- Linear Gate Valves
- Harsh Process Valves
- Bakeable All-Metal Valves
- Pressure Control Valves
- Ball Valves
- Leak Valves
- Butterfly Valves
- Pendulum Valves



Electropolishing Weld Fittings



Heated Foreline System with Trap



Genesis Modular Poppet Valves



Pneumatic and Manual Ball Valves



Linear Gate Valve

Angle Valve with Custom Fitting

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# Intellisys™



## The fastest, most precise pressure control system

Intellisys™ components fulfill downstream pressure control system with high performance throttling valves, controllers and pressure gauges. Reduce time to pressure setpoint and increase tool throughput with over 100,000 control resolution steps and a 20x speed increase. Intellisys™ throttling butterfly, pendulum, and gate valves feature closed-loop motor control with many optional functions and features. In addition, we offer a Universal Valve Drive, a motor drive product, that can be tailored to fit most other manufacturers' valves to greatly improve their pressure control performance at a reduced cost.

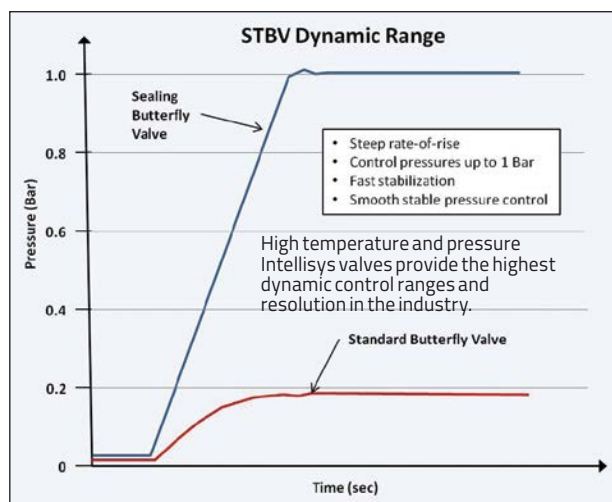
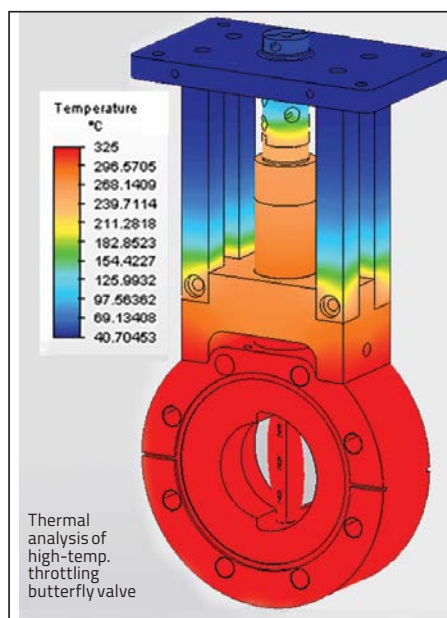


Intellisys adaptive pressure controller calibration

Adaptive pressure controllers are available for each type of valve or valve drive, and generally come in two styles. The stand-alone buried box controllers are ideal for applications where expanded communications or user interfaces are desired. For installations where space is of concern, the on-valve IQ-series controllers may be a preferred choice. Regardless of type, all Intellisys™ controllers are DSP powered and have many available host communications interfaces such as DeviceNet, Ethernet, EtherCAT, RS-232, RS-485, and Analog/TTL. Nor-Cal Products capacitance diaphragm gauges feature an ultra-stable ceramic diaphragm, advanced digital circuitry in all unheated and heated models, and are available in common ranges. Popular fittings and connectors are offered.

### Intellisys Components

- Throttling Butterfly, Pendulum and Gate Valves ■ Throttling Valve Heaters
- Adaptive Pressure Controllers ■ Capacitance Diaphragm Gauges



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# Quality Assurance

High priority is placed on controlling and improving our manufacturing processes.

Periodic defect analysis results in process improvements with narrower acceptable limits on subsequent production runs. Our quality system is ISO certified, SSQA certified and MIL-Q-9858 and MIL-I-45208 compliant.

Every weld is leak checked with a helium mass spectrometer to insure a leak rate of  $1 \times 10^{-9}$  mbar  $\text{Ls}^{-1}$  He or less. Our chamber qualification test benches, which contain vacuum pumps, gauges, RGA, quartz heaters, nitrogen back fill and a leak detector are used on components requiring lower leak rates. Once water and other background are eliminated by the  $150^{\circ}\text{C}$  bakeout, we can provide customized scans to detect the slightest contamination enabling us to attain the highest possible cleanliness for your application.



Dimensional verification of process chamber with CMM



At Nor-Cal, nearly all custom weldments and vacuum chambers receive a final coordinate measuring machine (CMM) inspection to confirm that port lengths, flange centerlines, theoretical targets and other features are within dimensional tolerances. A portable CMM, with a 2.5 meter reach, is used to perform in-process inspections of large chambers while still on the machining center. This increases machine center utilization and eliminates manufacturing bottlenecks.



In-process vacuum chamber inspection with portable CMM



UCV RGA Test Stand

## ASME U Stamp Certification

Nor-Cal is ASME U Stamp Certified. Stamped components are fabricated to the latest edition of the ASME BPV Codes. The ASME BPVC Certification Program conforms to the rules governing the design, fabrication, materials, assembly, and inspection of boiler and pressure vessel components during construction. ASME certification is recognized in the United States, Canada and an estimated 100 countries around the world.

**Thank you for your interest in Nor-Cal Products.**

We'd appreciate the opportunity to discuss your next project!

## We build quality into our components and customer confidence into our service.

All Nor-Cal Products employees take responsibility for our "quality ethic." While quality improvements are implemented by senior management, each employee builds quality, service and productivity into their particular responsibilities. Nor-Cal's use of statistical methods in manufacturing, training programs and continuous improvement of equipment are evidence of our commitment to our goals of excellence and accountability.

### Our Quality Assurance guidelines and goals are:

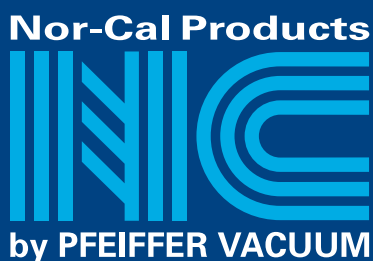
- to eliminate defects by reducing process variables relating to manufacturing.
- to foster an atmosphere of cooperation with customers and suppliers.
- to foster creative solutions to our industries' manufacturing problems.
- to deliver 100% customer satisfaction and the best possible customer service.



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 by PFEIFFER VACUUM





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Semiconductor Manufacturing

Compound Semiconductor & LED

Thin Film Deposition

Flat Panel Display Manufacturing

Research & Development

Solar Manufacturing

Energy Processes

Engineered Materials

Vacuum Pump Manufacturing

Instrumentation Manufacturing

Aerospace & Defense Development

Life & Health Sciences Development



Global sales, design and manufacturing headquarters in Yreka, California

## Our Heritage

Nor-Cal Products, now a division of Pfeiffer Vacuum Technologies AG, has origins that date back to 1948 when the company's founder began manufacturing pumping stations for the dairy industry. In 1962, Nor-Cal Products, Inc. was formed to serve the emerging vacuum industry. Fabrication of high quality standard and custom vacuum components quickly elevated Nor-Cal Products to be a preferred supplier to equipment manufacturers and national laboratories. In 1998, Nor-Cal Products designed and patented a successful line of downstream pressure control valves and controllers.

In 2007, a 33,000 sq. ft. low-cost region manufacturing facility was established in Vietnam. In 2019, this facility was tripled in size

We remain dedicated to emerging technologies and manufacturing techniques, and to supporting the vacuum science industrial and research communities. Nor-Cal Products is also proud of its history of service and commitment to building safe and strong communities. We strive to be a catalyst for economic growth and a good neighbor in the locations we operate... especially Yreka, California where we continue to grow.



# Global Sales & Service

### Corporate Headquarters & Manufacturing Facilities

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530-842-4457

Fax: 530-842-9130

E-mail: [ncsales@n-c.com](mailto:ncsales@n-c.com)

### Bay Area Sales Office

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San Jose, CA 95131, USA

Phone: 1-800-824-4166

Fax: 530-842-9130

E-mail: [ncsales@n-c.com](mailto:ncsales@n-c.com)

### [www.n-c.com](http://www.n-c.com)

Secure online ordering, request quotes, download spec sheets, 3D models and more.

### In Europe

#### Pfeiffer-Vacuum

#### Components & Solutions

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Göttingen 37081, Germany

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