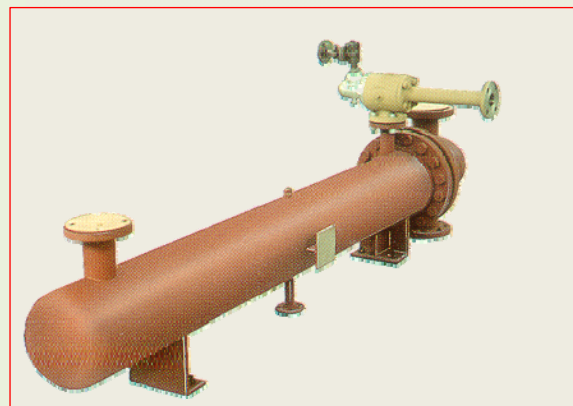




## TURBINE GLAND SEAL SYSTEMS – ENGINEERING DATA

### GENERAL

These systems generally consist of single- or two-stage 100% capacity ejectors, single 100% surface-type pre- or inter/aftercondensers, suction & steam isolation valves and interconnecting vacuum piping. They are designed to remove air & steam from the turbine gland seal area to prevent air from flowing into the condenser on condensing steam turbines.



**MODEL PC23E GLAND SEAL SYSTEM with Quickcheck® Steam Chest**

- Power Plant Turbine Requirements**

Gland Steam ejectors designed to meet the turbine manufacturers specified requirements for dry air leakage and water vapor at the specified vacuum level. These systems are typically two-stage units with inter- & aftercondenser, or a single-stage unit with pre-condenser, depending on the operating pressure requirement. Condensate is the most common cooling medium for the condensers.

- Commercial Standard Requirements**

Gland Steam ejectors designed to meet typical HVAC Standards should handle the air leakage specified plus water vapor at the pressure specified by the turbine manufacturer. Single-stage, single-element systems with pre- or aftercondenser are typical. Also common is one, single-stage ejector only on smaller turbines. Condensate or cooling water is used for the condensers.

### STANDARD MATERIALS OF CONSTRUCTION

EJECTORS		INTERCONNECTING VACUUM PIPING	
<b>Steam Chest:</b>	Carbon Steel	<b>Pipe &amp; Fittings:</b>	Carbon Steel
<b>Steam Nozzle:</b>	303SS	<b>VACUUM VALVES (Gate-Type), Manual</b>	
<b>Suction Chamber:</b>	Carbon Steel	<b>Body:</b>	Cast Iron
<b>Diffuser:</b>	Carbon Steel	<b>Trim:</b>	Carbon Steel
CONDENSERS		STEAM PIPING	
<b>Shell:</b>	Carbon Steel	Steam piping, valves & strainers are suitable for the design motive pressure and temperature of system motive steam supply. Standard is Sch. 80 pipe (A106) with 3,000# fittings and 800# class valves (A105).	
<b>Water Boxes:</b>	Carbon Steel		
<b>Tube Sheets:</b>	Carbon Steel		
<b>Tubes:</b>	304LSS		
<b>Baffles:</b>	Carbon Steel		

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## **TURBINE GLAND SEAL SYSTEMS – ENGINEERING DATA**

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Most steam turbines have a shaft-sealing system which uses carbon rings to isolate the rotor assemblies on both ends with steam injected to prevent air in-leakage into the turbine. This leakage would reduce turbine efficiency and flow into the condenser downstream of the turbine further reducing system efficiency. This “gland steam” must be removed by an ejector or other vacuum-producing device to prevent it from flowing back into the turbine.

Unique Systems has developed standard gland steam exhauster equipment, with both single- and twin-element ejector systems, to serve commercial application and power industry requirements.

For larger power generation turbines, a two-stage gland steam system is common, as the unit must operate at medium vacuum levels (4” to 15” HgA). Inter- & aftercondensers are required, commonly using condensate as the cooling medium. Some turbines require a gland steam system to operate at low vacuum levels (25+” HgA) but with high steam flow rates. This results in a gland steam system that utilizes a pre-condenser with a single-stage ejector, typically using condensate as the cooling medium.

Commercial-duty turbines (commonly used on HVAC, power cogeneration or gas compressor drive applications) typically require single-stage ejector gland steam systems with either a pre- or aftercondenser for condensate recovery. Some smaller turbines require only a single ejector without a condenser. We offer a line of standard gland steam systems and single-stage ejectors to accommodate all these requirements.

Custom gland steam systems using liquid ring vacuum pumps and centrifugal blowers are also available. Unique Systems offers the most comprehensive line of gland steam systems in the industry.

### **SERIES “PCE” GLAND STEAM EXHAUSTERS**

- Designed for high leakage rates, low pressure differential requirements
- Suction pressures from 3 to 15” HgV
- Capacities from 10-200 #/hour air + steam to saturate
- Aftercondenser for condensate recovery (Optional)
- Accessories include steam isolation valves, strainers, condensate traps & instrumentation

Models: PC11E, PC15E, PC23E, PC32E – Complete Systems

Custom-engineered systems are available for any requirement or specification.

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## TURBINE GLAND SEAL SYSTEMS – ENGINEERING DATA

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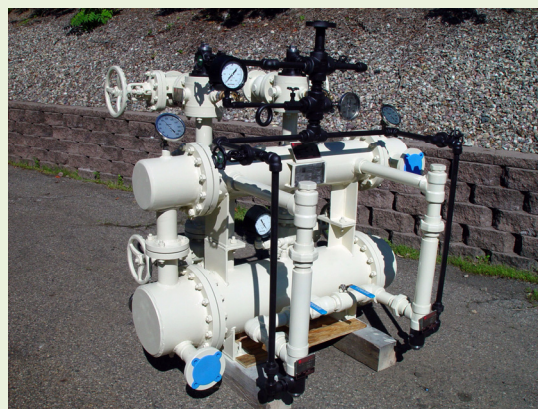
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### SERIES "TCE" GLAND STEAM EXHAUSTERS

- Designed for low to moderate leakage rates, medium to high pressure differential requirements
- Suction pressures from 29 to 20" HgV
- Capacities from 10-200 #/hour air + steam to saturate
- Complete packaged system including inter- & aftercondenser, valves, piping & instrumentation

Models: TC23E, TC32E, TC42E, TC62E – Complete Systems

Options: Automation & single-element configurations



Custom-engineered systems are available for any requirement or specification.



### SERIES "P3136" GLAND STEAM EJECTORS

- Designed for low pressure differential requirements & low leakage rates
- Operating range from 28.8 to 32+ " HgA
- Capacities from 80-275 #/hour DAE
- Aftercondenser for condensate recovery (Optional)
- Low capital cost & fast delivery!

### PERFORMANCE DATA FOR "P3136" SERIES EJECTORS

For preliminary estimate only. Please consult Unique Systems for actual figures relating to your application.

EJECTOR FRAME SIZE	CAPACITY(#/HOUR) 70°F DRY AIR	NOMINAL STEAM CONSUMPTION (#/HOUR) 100 PSIG Motive Steam *
P3136A500	80	50
P3136A600	160	100
P3136A700	275	175

Additional Information:

- Minimum steam pressure is 20 PSIG. \* Please consult Unique Systems for steam pressures other than 100 PSIG.
- Motive steam consumption will be less at higher steam pressures and more at lower pressures.
- Also available using air as a motive fluid. Air consumption is 2x listed steam consumption.
- Custom configurations, including our patented Quickcheck® design, are available for other conditions.

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