

# APV Paraflow Plate Heat Exchangers For Power Industry Applications

## **Efficient, Compact and Cost Effective**

APV plate heat exchangers offer the most cost-effective solutions for heat transfer applications in the power industry that historically were served by shell and tube technology. Plate heat exchangers play an increasingly important role in helping power producers meet stringent water environmental and energy conservation regulations. Whether you are recovering waste heat or isolating the cooling system from the cooling source, APV has the application knowledge and products to improve your efficiency and performance. Advances in PHE technology have helped it supplant the shell and tube as the technology of choice in this demanding industry.

## **Powerful Benefits**

- Protects equipment from damage caused by contaminants
- Highly efficient heat recovery
- Flow rates up to 20,000 GPM
- Simplifies maintenance, saving time and money
- Modular design facilitates flexibility for reconfiguration
- Compact design saves space

## **Efficiency**

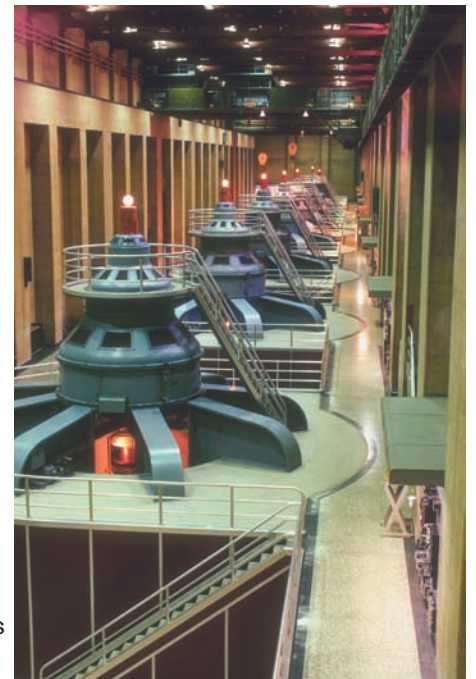
- High thermal efficiency saves money through reduction in required heat transfer area
- Low liquid hold-up improves start-up time and reduces operating fluid costs
- Achieves up to 97% heat recovery

## **Maintenance**

- Eliminates complicated maintenance such as x-ray, ultrasonic and other non-destructive test procedures
- 100% corrosion resistant material reduces inspection and maintenance while ensuring reliable operation
- No moving parts minimizes vibration, ensures reliable operation and reduces maintenance

## **Cost**

- Lower capital costs when compared to traditional shell and tube
- Efficient design reduces weight
- Life cycle cost reduction
- Reduced fouling leads to higher thermal efficiency, and minimizes maintenance and operating costs
- Lower fluid velocity maximizes plate life and reduces maintenance



# Process Knowledge Serving a Wide Range of Applications for Electric Power Generation

As a world-leading supplier in the energy sector of both traditional and alternative energy sources, APV has devoted itself to developing products and systems that improve energy efficiency. APV engineers rely on their extensive experience in the power industry to deliver solutions customized to your specific application.

## **Power Generation Stations**

Heat is produced and transformed into electric energy using different methods. Depending on the source of fuels used to produce the heat and the layout scheme of the power plant, thermal power stations can be split (for the most part) into the following types:

- Conventional power stations using coal, oil, fossil fuels, or natural gas
- Nuclear power stations
- Peak load and other types of electric energy producing power plants:
  - Diesel power
  - Gas turbines
  - Combined cycle power stations (gas turbines + thermal power section in combination)
  - Generation or co-generation
  - Incineration plants
  - Geothermal power stations
  - Hydroelectric power
  - Wind power

## **Primary Applications**

- Nuclear and conventional power stations
- Peak load stations
- Combined heat and power stations
- Incineration plants
- Geothermal schemes

## **Plate Heat Exchanger Duties**

### **Conventional Thermal Power Plants**

Plant auxiliary cooling requirements contain a number of thermal applications ideal for plate heat exchangers (PHE).

- Most applications are related to removal of excess frictional heat from various components in the auxiliary system
- Needs are primarily liquid to liquid duties, water to water, glycol to water or oil to water
- Design pressures in the auxiliary system are seldom above 150 PSIG
- Typical application design temperatures are usually between 120°F (49°C) and 212°F (100°C)

### **Auxiliary Cooling Duties (see diagram)**

- Central cooling
- Vacuum pump cooling
- Generator cooling
- Feed water pump (lube oil cooling)
- Seal water cooling
- Turbine cooling (lube oil cooling)
- Drainage cooling (heat recovery)
- Air compressor cooling
- Emergency diesel cooling
- Condensate cooling (regenerative heat recovery)
- Plant and office heating

## **Hydro Power Stations**

Lubrication oil cooling for the turbine and generator are usually the only applications in a hydroelectric plant.

## **Nuclear Power Plants**

Cooling requirements in a nuclear power plant can be divided into two main areas: non-nuclear and nuclear island.

### **Non-Nuclear Area**

The major part of the heat exchanger duties in the non-nuclear area are the same for the auxiliaries in a conventional power plant. PHEs are used in the area where the production of electric energy starts (from the turbine, to the distribution of the electricity, to the grid).

### **Nuclear Island**

The nuclear island contains all the systems involved with the reactor for production of steam and the safety systems for the reactor. The PHE duties in the nuclear island are related to the safety circuits or to the cooling of excess heat. The heat exchangers installed in safety circuits are stand-by units. Other than test runs performed on a scheduled basis, these systems are just taken into operation in case of an emergency. Types of emergency cooling systems vary, depending on the type of reactors.

## Cooling Applications

- Seal water for steam turbines
- Turbine lubricating oils
- High-quality water used in stator cooling passages
- Gland sealing oils
- Transformer oils
- Spent fuel element pond water
- Neutron shield
- Energy stand by
- Closed loop cooling using sea, river or cooling towers
- Pressure vessel cooling

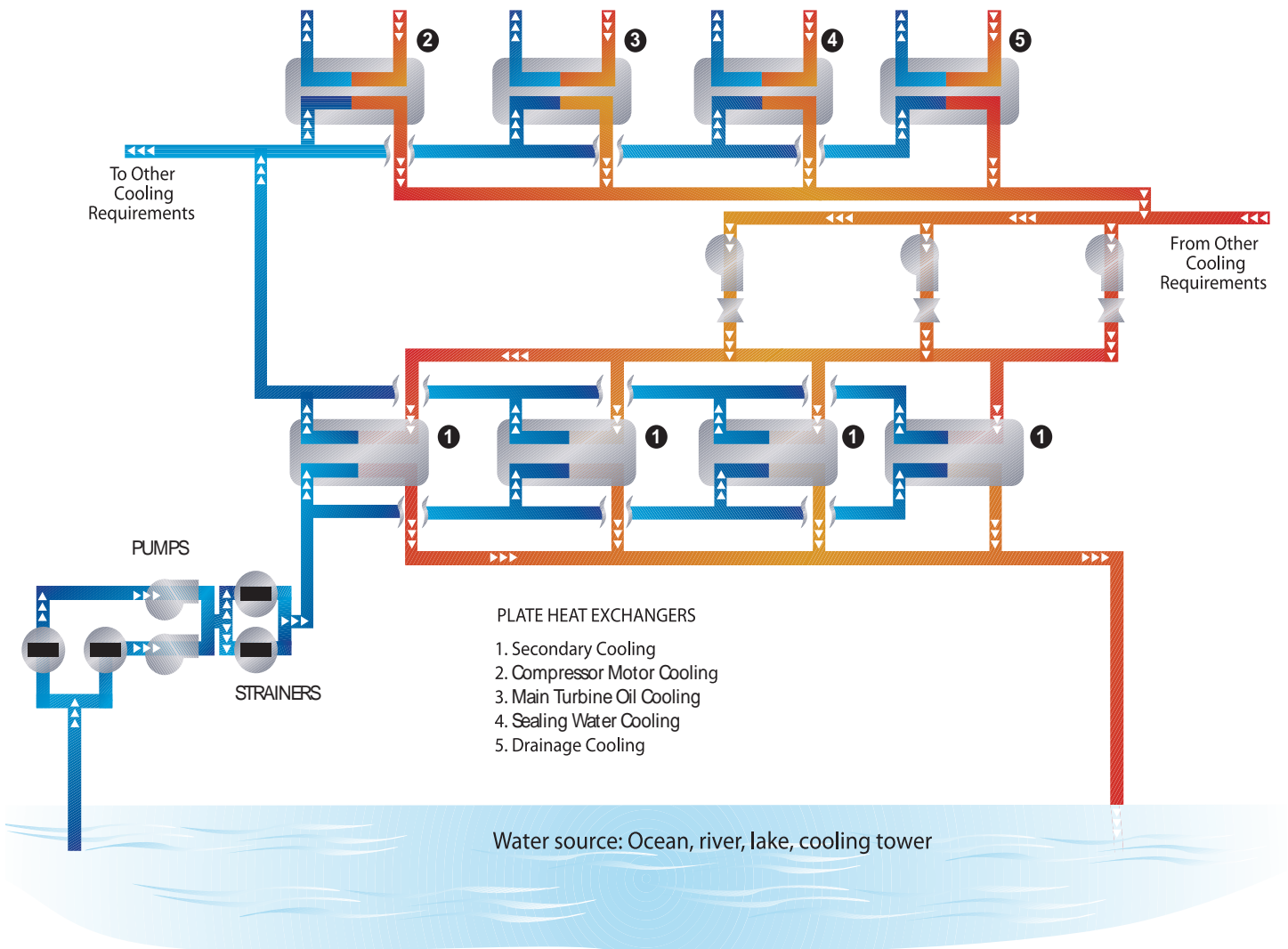
## Energy Recovery Applications

- Boiler house feed water
- Blow-down heat and water
- Geothermal applications
- Pre-heater and/or coolers for scrubber systems

## Start Benefiting Today

APV plate heat exchangers reduce maintenance and operating expenses while minimizing downtime, delivering the benefits you need to improve the profitability of your process. APV's knowledgeable engineers will work with you every step of the way from system design to implementation and beyond, to ensure you get the optimal performance from your system. To learn more about how APV can help improve your profitability, call us today at **1-800-207-2708**.

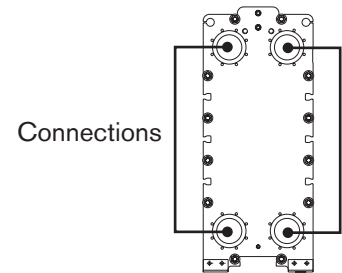
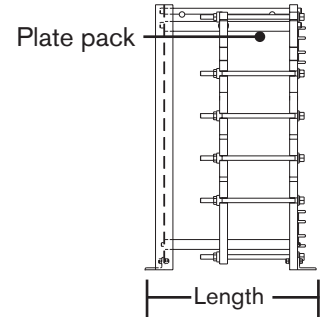
## Typical Auxiliary Cooling Duties For Apv Paraflow Plate Heat Exchangers



# A Wide Range of Plate Heat Exchangers for Power Generation Applications

Model Type	Connection Diameter (Inches)	Maximum US GPM	G	W	D	Standard Frame Length (Inches)**		Maximum Surface Area (ft <sup>2</sup> )
						Minimum	Maximum	
APV - SR1	1.5	125	X			17	31	150
APV - SR2	2.0	200	X	X	X	20	59	650
APV - N35	3.0	460	X		X	16	98	1900
APV - Q030	4.0	800	X			40	104	1550
APV - Q055	4.0	800	X			40	104	2850
APV - Q080	4.0	800	X			40	104	4200
APV - SR6GH	4.0	800	X		X	40	104	1450
APV - SR6GL	4.0	800	X		X	40	104	2400
APV - SR6AG	4.0	800	X			40	104	4000
APV - SR6AA	4.0	800	X			40	104	4450
APV - LR4	4.0	800		X		24	66	1250
APV - R5*	4.0	800	X			37	220	3950
APV - ER5*	4.0	800	X			37	220	4000
APV - A055	6.0	1800	X			30	98	2700
APV - A085	6.0	1800	X			30	98	4150
APV - A145	6.0	1800	X			30	98	6900
APV - SR9*	8.0	3100	X			46	136	3200
APV - J060	8.0	3100	X			39	136	3950
APV - J092	8.0	3100	X			39	136	6250
APV - J185	8.0	3100	X			39	136	13800
APV - TR9GN	8.0	3100	X	X		46	110	5050
APV - TR9AV	8.0	3100	X	X		46	110	6700
APV - TR9AL	8.0	3100	X	X		46	110	8700
APV - B063	12.0	7000	X	X		46	197	6100
APV - B110	12.0	7000	X	X		46	197	10650
APV - B134	12.0	7000	X	X		46	197	12850
APV - B158	12.0	7000	X	X		46	197	15050
APV - B205	12.0	7000	X	X		46	197	15850
APV - Z155	16.0	11,000	X			147	265	12050
APV - Z195	16.0	11,000	X			147	265	15150
APV - Z230	16.0	11,000	X			147	265	18250
APV - Z270	16.0	11,000	X			147	265	21250
APV - Z310	16.0	11,000	X			147	265	24200
APV - Z350	16.0	11,000	X			147	246	24550
APV - Z390	16.0	11,000	X			147	246	27300
APV - Z430	16.0	11,000	X			137	236	29750
APV - S190	20.0	20,000	X			156	250	17000
APV - S280	20.0	20,000	X			156	250	25050
APV - S330	20.0	20,000	X			156	250	29400
APV - S380	20.0	20,000	X			156	250	33900

- \* Wide Gap
- \*\* 150# ASME Frame Design as Basis
- G - Gasketed
- W - Welded Plate Pair
- D - Duo-Safety



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