



An Ingersoll Rand Business

PRESSURE & VACUUM
SOLUTIONS

WHITE
PAPER



**PREMIUM SOLUTIONS
FOR MECHANICAL STEAM
COMPRESSION (EPR)**

A technical line drawing of a mechanical steam compressor is centered on the page. The drawing shows a circular housing with internal components, including a rotor and stator. Several water droplets are depicted falling from the top and rising from the bottom of the housing. The drawing is overlaid on a large, light blue diamond shape that is partially cut off by the page edge.

HIBON was the first company for supplying positive displacement blowers in the 3rd generation of pressurized water reactor (PWR) in nuclear industry.

EPR is a reactor revolutionary with pressurized water system. It combines advanced safety features with enhanced efficiency and power output.

The EPR was developed as a joint project by several European companies, including Areva (now Framatome) and Siemens. It is designed to meet stringent safety standards and provide reliable electricity generation.

KEY FEATURES AND CHARACTERISTICS OF THE EPR

- **Pressurized Water Reactor (PWR):** The EPR is a type of PWR, which means it uses water as both a coolant and a moderator. The water is kept under high pressure to prevent boiling and maintain its liquid state.
- **Enhanced Safety Systems:** The EPR incorporates advanced safety systems to ensure the reactor's safe operation. These include a double containment structure, a core catcher to contain and cool the molten core in case of a severe accident, and passive safety features that rely on natural processes rather than active mechanisms.
- **Higher Power Output:** The EPR is designed to produce a higher power output compared to older reactor designs. It typically has a net electrical output of around 1,600 megawatts, making it one of the largest reactors in operation.
- **Improved Efficiency:** advanced technology to enhance its thermal efficiency, which means it can convert a greater proportion of the released energy into electricity. This leads to improved overall plant efficiency and reduced fuel consumption.
- **Long Operational Lifespan:** The EPR is designed to operate for a long period, typically around 60 years. This longevity contributes to the economic viability of the reactor and maximizes its energy production over its lifetime.
- **Stringent Regulatory Standards:** The design and construction of the EPR adhere to strict regulatory standards set by nuclear safety authorities, including the International Atomic Energy Agency (IAEA) and national regulatory bodies in countries where the reactors are built.



The EPR has been deployed in several countries, including France, Finland, UK, and China, with varying degrees of success and construction challenges. It represents an advancement in nuclear reactor technology, incorporating improved safety features, higher power output, and enhanced efficiency compared to earlier generations of reactors.

So, the EPR reactor takes existing technology a step further into the future. It incorporates all recent advances in the areas of nuclear safety, environmental protection, technical performance and economic efficiency, delivering safe and competitive power without emitting greenhouse gases.

The EPR design incorporates extremely reliable safety features. More specifically, its safeguard systems comprise four redundant trains, each of which is able to totally fulfill one of the two essential safety functions (stopping the nuclear reaction and cooling the reactor), required to protect man and the environment in any situation.

WHERE ARE USED HIBON PRODUCTS IN EPR

Hibon products are installed in the Coolant Storage and Treatment System (TEP) building, for the treatment of this effluent (TEP). They suck and compress the steam from the evaporation column for separating water of boric acid. The steam-pressed on heats the bottom of that column through a tube bundle.

Hibon products are also installed in the Effluent Treatment Building including the non-recycled Liquid Waste Processing System (TEU [LWPS]).

The TEU [LWPS] treats process drains, chemical drains and floor drains from the RPE [NVDS] of the EPR unit(s). The treatment performed to reduce the radioactivity discharged. The HIBON process positive displacement blowers (vapor compressor) sucks and compresses the vapor from the column decontamination.

As recognized supplier in mechanical vapor recompression application, we provide special blower complying with nuclear codes and regulation (RCCM, RCCE...) in last generation of nuclear power station for Flamanville and Hinkley Point Nuclear stations.

In complying with some of highest standards of the industry, we guarantee you top level of:

- **Traceability of material**
- **Technical expertise**
- **Quality execution**
- **Nuclear Safety**
- Follow up of blower **during the full lifetime of plant** (maintenance, reparation, spares...)



WHAT IS MECHANICAL VAPOR RECOMPRESSION?

For a liquid to be concentrated it first must be heated in an evaporator, creating steam that is then sucked in by a booster to compress it, thereby also increasing its temperature.

This superheated vapor is distributed to a heat exchanger to be condensed, using the extracted heat to increase the temperature of the liquid being concentrated and then reinjecting that into evaporator. This process loop allows the production of a new quantity of steam. Using MSC, a concentrate (to be landfilled or incinerated) and a distillate (or condensate) are recovered for reuse. This results in **a notable reduction in the volume of liquid effluents** and the consumption of cooling water to even zero discharge in some cases.

HIBON is well known for its **expertise in MSC** especially with their **rotary lobe steam blowers** that achieve increased thermodynamic potential of steam (increased degree of superheating) in a less expensive method than producing directly superheated steam.

Hibon Positive displacement blowers are also used for typical treatment processes involved in nuclear fuel cycle operations and particularly in radioactive waste removal processes.

It's important to note that the treatment processes involved in the nuclear fuel cycle are highly regulated and subject to strict safety and environmental standards.

In being involved in nuclear industry, Hibon is supporting reduction of CO₂ emission to make our life better.

Would you like to know more about Mechanical Steam recompression? Visit our webpage dedicated to this process:

<https://www.hibon.com/en-gb/markets/process-gas-applications/environmental-applications>

HIBON also have a page dedicated to the nuclear industry, discover it [here](#).

Hurry up, contact our sales representatives!

A CENTURY OF EXPERIENCE

For more than 100 years, Hibon has been supplying air blowers, process gas blowers, neutral gas blowers, vacuum pumps and blower units with operating pressures of up to 1 bar and vacuum levels of up to 92 %. Our products and services are based on our decades of experience, technological expertise and close contact with the customer. To meet and even exceed customer expectations, our engineering team continuously refines our blower and pump solutions, ensuring that they provide an ever higher efficiency and reliability.



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