

# Hamon Wet Cooling Systems

---

COOLING TOWERS



# Hamon field erected cooling towers: engineered by experts

## Why Wet Cooling?

Wet Cooling offers an outstanding performance by taking full advantage of the ambient air humidity. Wet Cooling, also called Evaporative Cooling, enables to obtain a re-cooled water temperature at least 20°C lower as compared to a radiator. As turbine output and hence power plant output increases by 0.3 to 1% per degree of better cooling, Wet Cooling is a technology that can generate outstanding fuel saving and carbon emission reduction.

## Does Wet Cooling use a lot of water?

Only 1-2% of the water is evaporated, and for this reason, a closed loop circuit with a cooling tower needs an external source providing make-up water (river, lake, sea, etc.).

The make-up flow depends on the raw water hardness, limited to 4%.

The water that is not evaporated is returned to the external source. During its transit in the cooling system, the water is never in contact with any fluid from the factory process and therefore cannot be polluted by it.

## More than 100 years experience

Hamon has installations and equipment operating worldwide and in a multitude of industries. With over 6000 total references, Hamon has supplied cooling towers in industries such as power plant, refinery and downstream petrochemical plant, fertiliser, paper industry, steel mill, sugar mill, zinc smelter and other metallurgical installation, chemical plant, etc.



## Network

Hamon supports a network of factories and sister companies, which locally assure contracting, procurement and field services. Hamon offices are based in the UK, Germany, Spain, Italy, Poland, Russia, Spain, US, Australia, United Arab Emirates, China, India, Korea, Indonesia, Thailand, Vietnam...

## Our commitment to the industry

Hamon aims at offering the best economical solution for the lifetime of field erected cooling towers.

Hamon's services include:

- Thermal, hydraulic and structural design
- Noise and plume abatement as well as other environmental aspects
- Selection of associated equipment such as: pumps, piping, electrical and instrumentation, water treatment, lighting, etc,
- Civil work construction and mechanical erection
- Commissioning, testing and auditing
- Upgrading, repair and maintenance
- Dismantling and recycling (also PVC film)

Depending on the application requirements, equipment is designed to the customer-preferred combination of efficiency, long-life expectancy, power saving and environmental local regulations.

# Natural draft cooling towers



## Fan assisted natural draft

For when

- Limited plot size and/or height are available
- Important heat load variation is expected



## NDCT refurbishment

- Restoration or improvement of the CT performance
- Experienced teams used to work during limited shutdowns
- Removal and replacement of asbestos cement sheet
- Recycling and re-use of PVC



## Flue gas dispersion through NDCT

- Applicable in thermal power plants
- No large chimney necessary
- Better flue gas dispersion
- Hamon design



In the seventies and early eighties, many large power plants were built and equipped with tall natural draft cooling towers (NDCT) in Europe, US, South Africa, India, China, etc.

Now natural draft cooling tower projects are worldwide, as these towers are regarded as environmentally friendly due to their power saving efficiency.



Beyond the power saving, NDCT offers the following advantages:

- limited plot area
- no mechanical noise (no fan)
- limited maintenance
- high longevity (generally more than plant life expectancy)

The payback period of an NDCT is 8 to 16 years depending on several factors. The main one is the local construction cost, which may dramatically vary from one country to another. Hamon can either supply the turnkey tower or the thermal part with services like civil work design, construction steering, supervision, erection, etc.

Hamon has designed and built more than 300 NDCT and has a wide experience even for high seismic and severe weather conditions.

Hamon is at your disposal to help you developing your project anywhere on the globe, preparing budget proposal, civil work included, and selecting the most appropriate solution for performance, heat transfer media, noise reduction, etc.

# Mechanical draft cooling towers

## Different types of structures



Wood



Concrete



Steel



FRP



Due to its flexibility and cost effectiveness, the mechanical draft cooling tower (IDCT) meets most cooling applications and plant requirements. With more than 5600 references in this type of tower, Hamon has come across most of the application requirements and has developed the technology to meet them. Customers rely on Hamon's experience and technology database to get equipment that meets their requirements and budget. We build any size of IDCT with any type of structure (steel, wood, FRP, prefab concrete, cast concrete) and many heat exchange surfaces (from splash grids to high performance film). All system elements, beyond customer specific requirements guide our design:

- water quality
- air environment (chemicals, dust, ...)
- noise and plume limitation
- available plot area
- local labor costs

All our equipment is supplied with an O&M manual that clearly specifies operation, maintenance, health and safety requirements and recommendations.

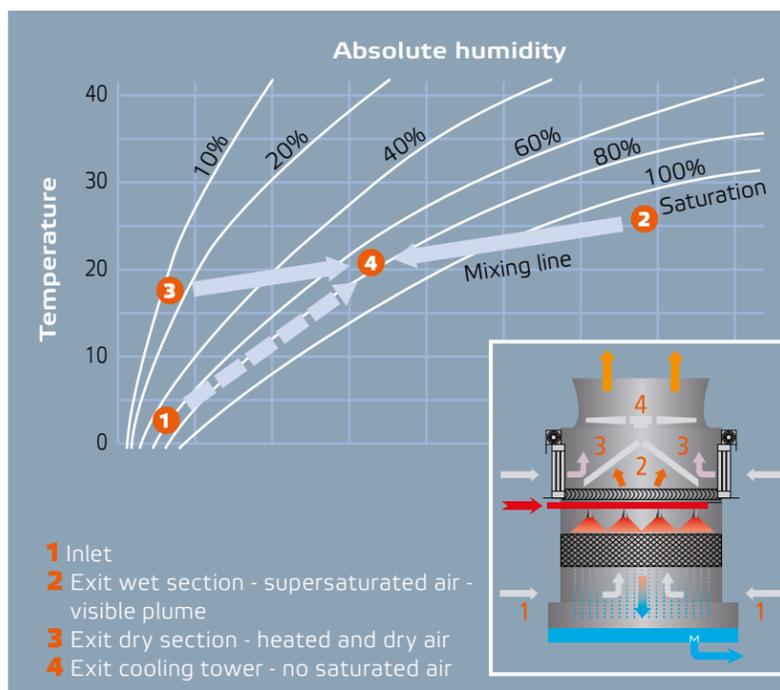
For all cooling towers, we clearly advise the impact on the environment such as performance, drift loss, noise level, etc. In order to help in the prevention of legionella, our cooling tower designs follow the best practices and allow cleaning and access to the internal parts of the tower.

# Plume abated cooling towers



## Principle of plume abatement

Outlet air of the wet section of the cooling tower ② is mixed with the air heated ③ by the finned tube bundles installed in the walls above the wet section. Outlet air characteristics ④ will then be positioned on the line linking points ② and ③. If the line linking points ④ and ① does not cross the 100% humidity curve, no plume will be visible.



A plume abated cooling tower is the best available solution where local constraints are such that the presence of plume is not accepted in normal conditions (along motorways, airports, close to residential areas...). In this area, Hamon's technology is unrivaled.

## Mechanical draft

The first option is an IDCT offering the same flexibility, adaptability and all features listed in the previous pages. Compared to other technical solutions, it combines the following advantages:

- no plume visibility
- outstanding performance of an evaporative cooling tower
- cost attractiveness

## Fan assisted natural draft (circular hybrid)

Circular hybrid cooling towers are the best technical solutions for large heat loads and stringent plume abatement requirements. It combines the following advantages among others:

- compact arrangement / space saving
- limited height
- use of natural draft
- strong upward draft
- no washdown

# Special applications

## Sea water

When close to the sea shore, many plants are cooled by a once-through sea water system. The investment for such a system is huge and the heat rejection back to the sea can either generate hot water recirculation and/or impact the sea ecosystem beyond acceptable levels. Replacing the once-through system by a cooling tower circuit tremendously reduces both initial investment costs and sea environmental impact of the power plant. The design of the cooling tower will take, among others, the salt concentration into account. Special care is given to construction materials (structure in concrete, protection for mechanical parts, etc.) and fill media type.

All design arrangements are available with sea water: NDCT, FANDCT, IDCT, PACT.



## Emergency cooling tower for NPP's

The safe cooling of the nuclear island is a must because this is the ultimate heat discharge in the process. Hamon has been closely involved in the development of emergency cooling towers and has already delivered several.

For new applications Hamon recommends in general emergency cooling towers

- being built of small cellular modules in reinforced concrete with forced draft fans with up to 4-fold redundancy
- with water storage of a minimum 2 days
- which consider the applicable hazards and are designed for extreme climate conditions
- which integrate housing the additional equipment like pumps, piping, valves, electrical, etc.
- almost completely built of non flammable construction materials

For existing plants, the technical solution must be developed according to the actual needs and situation.



## Noise attenuation

- In order to limit the noise level, actions can be taken at three levels:
- at the source with low noise fans and mechanical devices
  - at the emission area with louvers, baffles, motor enclosures, special casing type
  - between the noise source and the reception point with screens, walls or embankments

## Cooling towers for acid solutions

Hamon has developed cooling solutions for low pH waters. Forced draft has been selected for easy access and maintenance.

## District cooling

Working on broadly similar principles to district heating, district cooling delivers chilled water to buildings. For this application widely spread in the Gulf area, Hamon has supplied more than 150 cells.

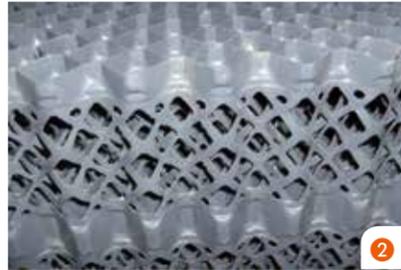
## Architectural cooling towers

Cooling towers can be adapted to an architectural project for a better integration in the environment.

# Heat transfer media



1



2



3



4



5



6



Hamon has a wide range of heat transfer media suitable for:

- any industrial water
- sea water
- low pH solution
- TSE (treated sewage effluent)

The **GOLDENGRIDS 1**, the real splash fill, is the all purpose solution suitable for most water qualities, including sea water and heavily contaminated water. This heat transfer media consists of trays hung from beams located above the water distribution. The grids, their supports and spacers are made of polypropylene; the wires according to the water aggressiveness are in SS316 or in a more exotic alloy.

The **TRICKLEFILL 2** offers what is probably the highest resistance to scaling and fouling worldwide. Using Hamon's well proven technology of non-contact sheets, this vertical core fill is designed with wide sheet spacing. The sheets are smooth and incorporate a number of large square holes. The holes induce beneficial turbulence for heat transfer, whilst no fouling or scaling occurs on the supports. The strips (resulting from perforation) make this pack act partly like a grid type. Therefore it is an excellent alternative to "mesh" or "3D grids". It can be produced PVC and PP.

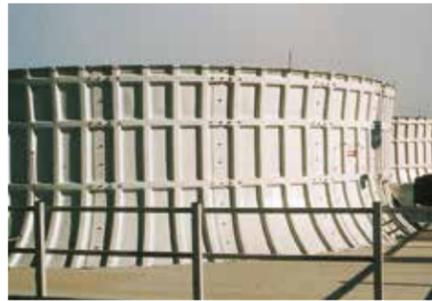
The **COOLFREE 3** is the most advanced film fill combining low-fouling and low-scaling properties whilst retaining good thermal performance. The main application is for cooling towers using very poor water quality, in some cases even without water treatment. It is also very good for film fill cross-flow cooling towers.

The **CLEANFLOW 4** film fill has been qualified worldwide as the best film fill combining low fouling properties with good thermal performance. It is well adapted to any induced draft or natural draft cooling tower using poor quality industrial water. It is also suitable for other severe applications such as laminated decanting and gas cleaning.

The **CLEANFLOW PLUS 5** is the improved technology of the cleanflow fill by increasing its thermal performance whilst retaining its fouling resistance. It is well adapted to any induced or natural draft cooling tower using poor industrial water quality, in particular sea water.

The **COOLFILM 6** is probably the most thermally efficient fill worldwide. It is well adapted to any induced draft or natural draft cooling tower using normal industrial water quality.

# Service



1 Fan stack



2 Motor-fan group



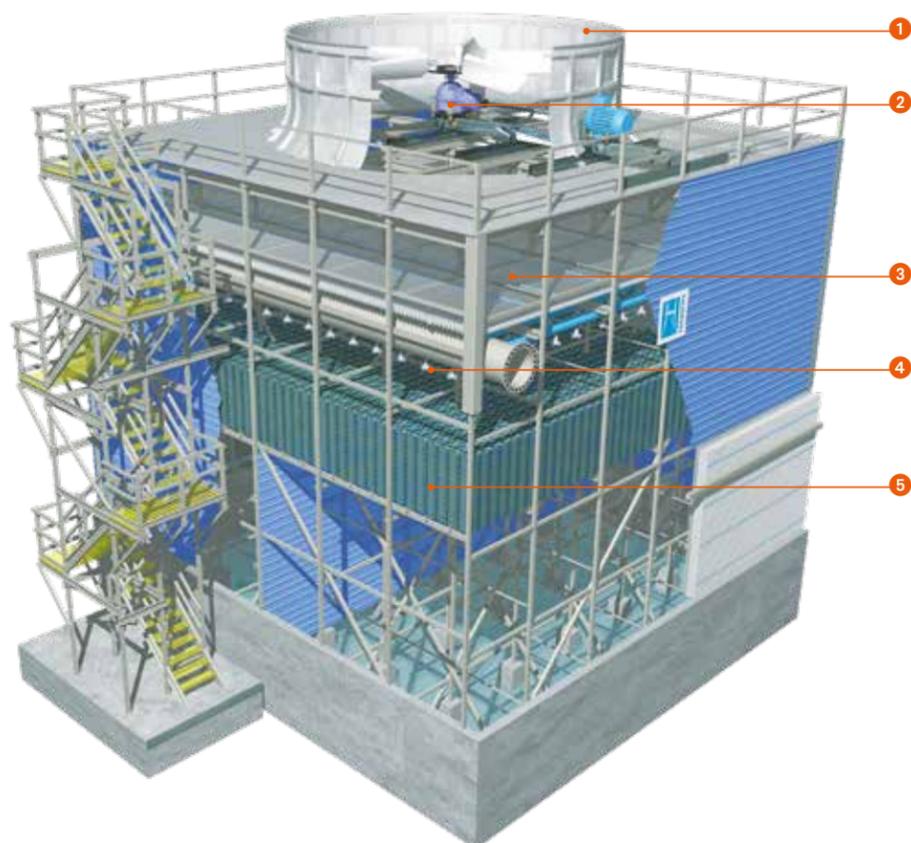
3 Drift eliminators



4 Distribution



5 Heat exchange media



## Spare Parts

Hamon designs and manufactures its own products (fan stacks, heat exchange media, drift eliminators, distribution elements). The Spares Parts Department will help all clients select the appropriate part for any Hamon cooling tower or from other manufacturers.



## Maintenance

A preventive maintenance program is essential to ensure smooth operation avoiding unexpected costly shutdowns and problems associated with legionella.

## Repair – Refurbishment – Upgrade

Thanks to the outstanding cooling tower competence of its site teams, Hamon can consider any type of repairs, refurbishment and upgrades.

Customers recognize Hamon for its finely tuned service assuring:

- short shutdowns
- reliable diagnosis
- focus on the action needed

Our test team consisting of high level, experienced thermal Engineers can perform any test: performance, fan flow, hydraulic, noise, vibrations.



## INTEGRATED SOLUTIONS FOR A CLEAN ENVIRONMENT

The Hamon group is a global source for engineering and contracting. Its activities include the design, the manufacturing of critical components, the installation and the after-sale services of cooling systems, air quality (AQS) systems, HRSG's and chimneys.



[WWW.HAMON.COM](http://WWW.HAMON.COM)

