



# Cooling Equipment for Hazardous Areas

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Where the temperature of plant cooling water cannot be guaranteed and, faced with the inevitable cost of treating this water before disposal, refiners and fuel suppliers are looking for alternative ways of cooling analysers and analytical systems used for the determination of on spec products required to meet national standards such as ASTM, ISO and EN. This article looks at the importance of selecting the right type of closed loop chillers, compact air conditioning units and large HVAC systems when considering installing high precision equipment in harsh climates.

## Introduction

As refiners face the prospect of heavier crudes in the future, under standard refining processes, these crude oil sources produce a larger fraction of heavy products. At the same time, world wide demand for transportation fuels is increasing, leading refiners to consider upgrading their existing plants. Results of studies into the need for and location of upgrading capacities have found that due to significant carbon policies in developed countries, a shift in investment in upgrading capacity away from developed countries to developing countries can be seen. To ensure that products from these upgrades meet international standards for transportation fuels, care has to be taken when considering online analysers and analyser systems to operate in specification where unsuitable environmental conditions are to be expected. Temperature is one of the biggest influences on the performance of analytical systems and the results derived from them. The requirement for precision cooling equipment rather than relying on inconsistent low quality plant cooling water is therefore extremely important when designing analytical systems to be located in these areas.

## Cooling Water

As most plant operators will tell you, the quality and availability of plant cooling water can vary from day to day and even hour to hour so the need for a consistent supply of good quality cooling water is not always available for keeping analytical equipment operating in specification. The requirement for cooling is not only restricted to analysers but is also required for reducing the temperature of sample gases or liquids and for keeping the ambient temperature in analytical cubicles and shelters down to acceptable levels to ensure the equipment is within specification as well as for the health and well being of the personnel who maintain and service the equipment inside these cubicles and shelters. This can be shown by considering actual scenarios where the selection of the correct cooling equipment can play an important role when considering installing analytical equipment for hazardous areas in harsh climatic zones.



## Closed Loop Chillers

The online measurement of the boiling range characteristics of petroleum products and light hydrocarbons according to ASTM D86, is one of the most important measurements for process control and blending applications on refineries. Part of the requirement to meet ASTM D86 is that, depending on the type of product to be analysed, the sample is required to be cooled to the correct temperature before analysis begins. Cooling is also required for any storage vessel used before the analysis begins. It is therefore a requirement to have access to accurately controlled cooling systems local to the analysis point to ensure complete compliance with ASTM D86. An example where the importance of high quality cooling systems can be seen was the building of a new refinery in India. Here the requirement was to measure online the Naphtha produced by the refinery according to ASTM D86. Here the naphtha needs to be cooled to between 0 and 5°C. Also the receiver inside the analyser must also be cooled to the same temperature. Bartec Benke, a manufacturer of process analysers, supplied a number of closed loop chillers that are both ATEX and CSA certified for hazardous areas along side numerous Bartec Benke DPA-4 distillation analysers on the refinery.

## Compact Air Conditioning

As the design of process plants becomes more digitally based, the need for remote I/E equipment are becoming more common. These remote systems can be installed in small outdoor standalone cabinets and enclosures. Temperatures within these cabinets can fluctuate due to day and night temperature changes. These fluctuations can, without control, affect the performance of the equipment installed inside them leading to problems for plant operators to meet tight product specifications as indicated. An example of where compact air conditioning systems can solve these problems is on offshore oil well drilling platforms where drilling operator stations are normally small shelters with windows on three sides. Bartec Benke was commissioned to supply a number of air-conditioning systems to a manufacturer of these drilling operator stations. The FKS CLM Ex compact air-conditioning systems manufactured by Bartec Benke are suitable for companies installing or planning to install electrical measurement and control equipment or analysing systems in cabinets or small containers. The compact air-conditioning units are useful for companies wishing to regulate interior temperatures safely and reliably. The units are both ATEX and CSA certified and can be supplied as stand-alone units if required.

## HVAC Systems for Analyser Shelters and Systems

The specification of certified HVAC systems to meet international standards is often overlooked when designing analyser shelters and systems. They can form

a large part of the cost associated with the complete shelter and if incorrectly specified, can cause problems for I/E equipment installed inside the shelters once the plant is operating. Great care has to be taken as the combination of the size of the shelter, the need for filtration, dehumidification/humidification, redundant systems, heating/cooling or ventilation, the ratio of fresh air to re-circulated air and space available can all affect the resulting conditions inside the analyser shelter. An example of this can be explained by considering an actual case where a customer required an analyser shelter for a refinery in Greece. Bartec Benke designed and supplied the HVAC system that was required for this analyser shelter. The space needed by the shelter required that the HVAC was designed so that it could be roof mounted. Bartec Benke have the capability to design HVAC systems that can also be floor mounted next to shelters. For another example, Bartec Benke have supplied an HVAC system which uses stand alone heaters in conjunction with the circulation system to ensure the temperature inside the shelter was maintained at 25°C. HVAC systems for hazardous areas are always bespoke due to the location and size of the shelter, the amount of fresh or re-circulated air needed, whether redundant systems are required and what interlocks with plant shutdown systems are required.



## Conclusion

Online analytical systems used for the monitoring of petroleum products to meet ASTM, ISO or EN standards, play an extremely important role for refiners and suppliers of these products. Getting the right quality cooling water or cooling system is not always possible where the location of these companies is becoming more concentrated in developing countries and unsuitable environmental conditions prevail. The requirement for ATEX and CSA certified cooling equipment allows companies to install these cooling systems in hazardous areas local to the analysis systems. The correctly designed cooling equipment can therefore assist operators to ensure their products meet international standards and provide the right solution when designing analytical systems for the current and future construction of refineries and upgrades to meet the needs for consistent quality of fuels for the international market.