

## **Palabora Mining Company to increase life of mine with Johnson Controls chillers**

*New contract will provide copper mine with added cooling for extended operations*

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The Palabora Mining Company -- one of South Africa's major producers of refined copper -- has awarded a chiller contract to Johnson Controls, the global leader in delivering energy efficiency. The contract calls for supplying YORK chiller units to cool the extended underground copper mining operation to help keep the rock temperature at workable levels and increase the life of the mine to 2030.

PMC, owned by global mining company Rio Tinto, is presently mining at 1,200 meters below the surface where the virgin rock temperature is 47 degrees Celsius. The company is planning to mine as deep as 1,600 meters, where the temperature can rise to 57 degrees Celsius.

"As PMC enters the early works stage, our designs are being refined and the chillers are vital to enable operations," said Gavin Meredith, senior engineering advisor at PMC. "Our existing ventilation equipment, an 18-megawatt ammonia plant located on the surface, is running at full capacity and mining this far underground makes it unfeasible to cool from the surface."

Mining at great depth the rock can heat well beyond the 28 degrees Celsius wet-bulb temperature (a measurement including air and water vapour) requirement. And at 31.5 degree Celsius wet-bulb temperature the mine must shut down and evacuate.

To keep the mine safe and operational Johnson Controls has developed a phased installation of four YORK Compound Centrifugal Chillers. Each YORK Compound Centrifugal Chiller provides about 3,500 kilowatts of cooling, which is ideal for underground operations.

"This chiller is intended to perform well in specific environments," said Russell Hattingh, engineering contracts manager at Johnson Controls Systems and Services, South Africa. Two compressors in series produce the higher lift required to make use of the warmer cooling water available in the mine."

He said the YORK Compound Centrifugal Chiller is designed to use two centrifugal compressors arranged in series and can make use of warmer cooling or condensed water temperatures typically outside the range of standard single-stage centrifugal chillers.

The first two chillers have been installed. Phase II, including the installation of the third and fourth chillers, will be concluded by early 2013. Support of the new chillers will be provided by Palabora's in-house team of refrigeration technicians.