From: Emil Huedem [mailto:huedem@fnal.gov]
Sent: Friday, March 03, 2006 2:30 PM
To: Fukuda, Shigeki; Larsen, Ray S.
Cc: Asiri, Fred; 'Lee Hammond'; Corvin, W. Clay; Hitoshi Hayano; Chris Jensen; Adolphsen, Chris; atsushi.enomoto@kek.jp; Tom Lackowski; Jean-Luc Baldy; Vic Kuchler
Subject: Re: Fw: RF Cooling

Ray, Shigeki,

Thanks for the info. Either supply temperature is doable, but note that for going to 20C (from 35C) will require additional equipment (based on ~25C wet bulb peak design condition in Illinois). Is the consensus then to use 20C supply? and 65C outlet?

The current racks heat dissipation of only ~13KW total from a number of racks per RF, which equate to very small amount of heat dissipcation per rack, is not a lot for air cooling, (and is noted from Ray's email below that this will increase). Let us know if this will be watercooled.

for now we'll use Shigeki's spreadsheet number for this until it is updated.

Regards,
Emil

----- Original Message -----
From: Larsen, Ray S.
To: Fukuda, Shigeki ; Emil Huedem
Cc: Tom Lackowski ; atsushi.enomoto@kek.jp ; Adolphsen, Chris ; Chris Jensen ; Hitoshi Hayano ; Corvin, W. Clay
Sent: Wednesday, March 01, 2006 8:13 PM
Subject: RE: Fw: RF Cooling

Shigeki and all -- This is a very nice, comprehensive list that goes beyond the power systems into asssociated rack instrumentation like LLRf, bpms, cryogenics etc. In this area it is perhaps a good estimate of total power needs, which are only 13KW total, but we should note that details can be expected to change as others responsible weigh in.

I think the assumed inlet temperature of as high as 35C is a bad choice. A good choice is 20C. If the inlet is 35 and the outlet 65 the tunnel ambient temperature will be unhealthy for both electronics and humans.

Another problem is the assumption that all relay rack instruments or power supplies blow their heat into the tunnel air. This is very undesirable. The most efficient cooling is to transfer heat from air to water as close to the source as possible. Modern rack systems use enclosed air-water-cooled racks, especially important in keeping the dirty, damp air of the tunnels out of the cooling loop. As much heat as possible should be captured and removed by the much more efficient water cooling systems.

I believe the Global Controls & LLRF group is responsible for specifying standard racks and getting agreement from other Technical Systems groups. The racks must have good RFI shielding and monitors for temperature, fan failure, fire alarm and fire suppression system. For

high availability, fans should be redundant and hot-swappable without interrupting operations. Large power system racks may have different features than instrument racks but they too should be enclosed and water cooled.

Ray

From: "Fukuda, Shigeki" [mailto:shigeki.fukuda@kek.jp]
Sent: Wednesday, March 01, 2006 3:59 AM
To: Emil Huedem
Cc: Tom Lackowski; atsushi.enomoto@kek.jp; Larsen, Ray S.; Adolphsen, Chris; Chris Jensen; Hitoshi Hayano
Subject: Re: Fw: RF Cooling

Hi, Emil,

I filled the numbers in your exel sheet. In the 3 sheets, I also added the details of the tables,which were basis to extract the numbers. That tables were revised one.
Best regards,

Shigeki

At 06:51 06/03/01, you wrote:

Shigeki-san,

Attached is an example of data that will be most useful for us (with regard to the cooling information). As you continue to compile all the necessaary data, it will be also useful to note also the approximate location of the water cooled RF components (whether this is in the beam or service tunnel).

Currently, we'll continue to use the following (per RF) as basis, until we get a refined numbers.

- 147.5KW heat load to water (excluding the 34.5Kv Transformer)
- 35 C supply temperature
- 68 C return temperature (assumed)
- ~18KW heat to air

Thank you,
Emil

----- Original Message -----
From: Lee Hammond
To: 'Emil Huedem'
Sent: Monday, February 27, 2006 11:46 AM
Subject: RE: RF Cooling

Relay racks?

Charging Supply?

Other transformers? Pulse transformers?

What are the windows?