Temperature and Humidity Design Guidance

Hall B – CLAS12

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Hall B has a long history of operation and much data on the temperature and humidity within the Hall. Studying this historical data and including likely calibration errors in the humidity sensors we determine the most likely conditions that the detectors will be exposed to over long periods.

Of highest concern is the temperature. There seems to be a direct correlation between wire breakage in our drift chambers and temperature excursions in the Hall. The data is logged and if the temperatures get out of the normal range then alarms go off and our on call paging system alerts Hall B personnel to take actions to prevent the temperature excursions from getting too large.

From the temperature history of the last 10 years, it can be observed that the temperature at the floor level is approximately 70^0F. The history is shown in Fig. 1. A peak temperature of 79^0F was observed in January 2000 (shown in Fig. 2). During this peak, the temperature was above 75^0F for a period of approximately 12 hours. A low temperature of 63^0F was observed in December 2003 – January 2004. During this period, the temperature was below the 65^0F mark for 10 days. The temperature on Level 1 space frame is approximately 73^0F. During October 2003 two temperature spikes were observed at 84^0F and 80^0F. These spikes were only a couple of hours in duration. Temperature on Level 2 space frame is around the 74^0F mark with a peak around 80^0F. A low temperature of 66^0F was observed in December 2005 – January 2006.

The humidity at the floor level and on Level 2 space frame is around 55% in the summer months and around 35% in the winter months (shown in Fig.3). On Level 1 space frame it is around 60% in the summer and around 40% in the winter.

Based on the temperature and humidity history of the hall over the last 10 years, the ambient temperature of Hall B is 72^0F and humidity is 45%. A temperature change of +/- 10^0F would be a good estimate in designing for thermal expansion/contraction.

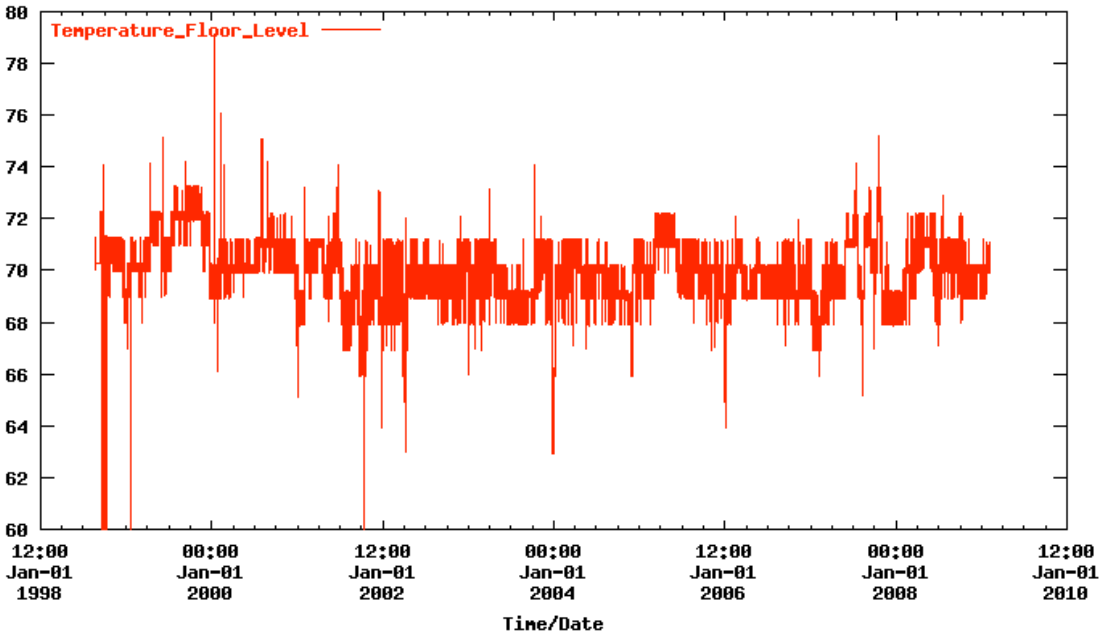

Fig.1 Temperature history at the Floor Level

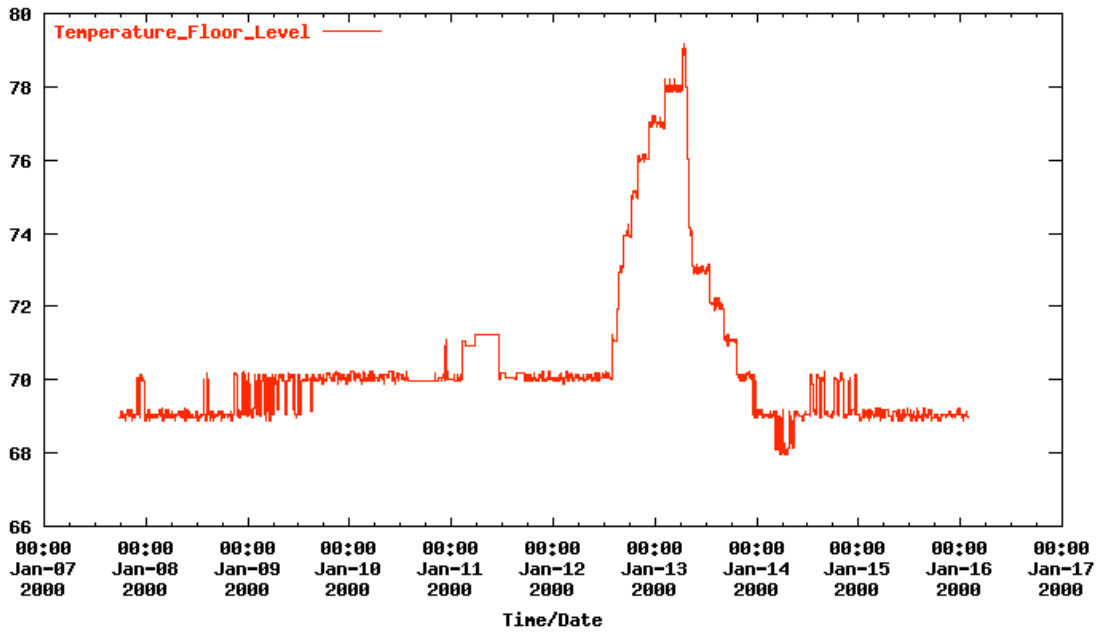

Fig.2 Peak temperature at Floor Level

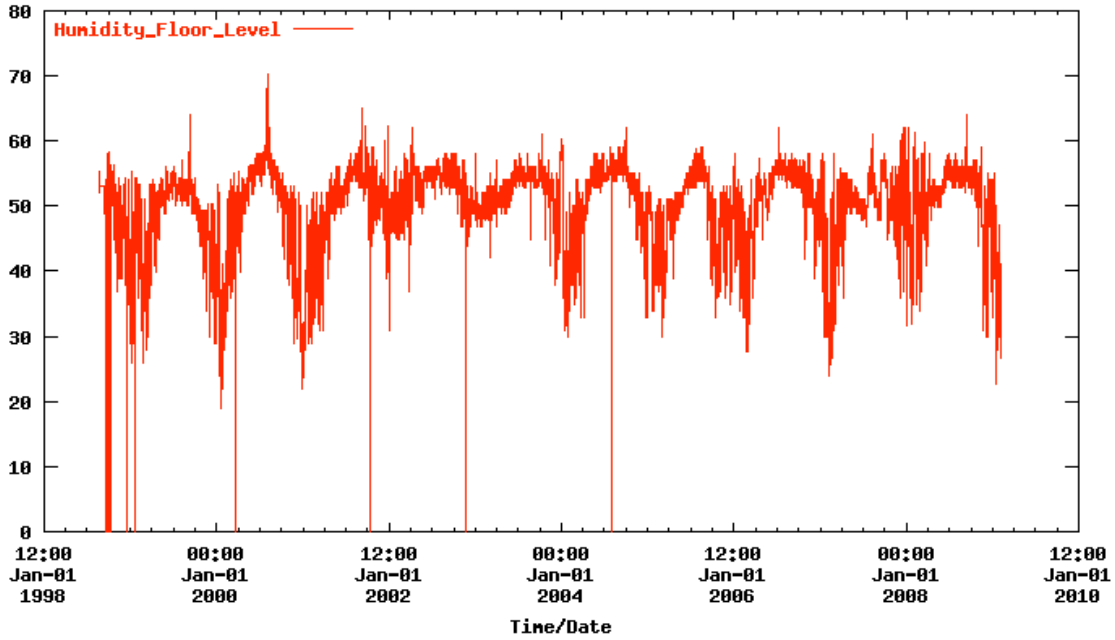

Fig.3 Humidity at Floor Level