

# **Pressure Drop Estimation in the Central Solenoid Using Nitrogen Gas and Prediction for Alternative Coolants**

## **Abstract**

The Central Solenoid (CS) coil in the PCS is water-cooled under normal operating conditions to reduce cool-down time. Before testing with water, the pressure drop across the coil can be estimated. The properties of nitrogen can be used to estimate the pressure drop in the CS and to predict the pressure drop for water, precooled helium gas (80 K), and liquid nitrogen (LN2 at 80 K) using conventional methods. Nitrogen gas is ideal for this purpose, as it does not react with copper coils, ensuring safety and preventing rust or scaling. The data generated through this study will be used to optimize the cooling loop of the PCS.

### **Objective**

The objective of this study is to establish a methodology for testing the OH coil using nitrogen gas as a coolant. The main tasks for this study are as follows.

- Measuring the pressure drop using nitrogen gas and estimating the corresponding pressure drop for other fluids, such as water, liquid nitrogen and helium gas.
- Assessing the structural integrity and flow characteristics of the cooling system.

### **Academic Project Requirements:**

**1) Required No. of student(s) for academic project: 1**

**2) Name of course with branch/discipline: B.E./B.Tech. Mechanical Engineering**

**3) Academic Project duration:**

**(a) Total academic project duration: 6 Weeks**

**(b) Student's presence at IPR for academic project work: 5 Full working Days per week**

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