

Conceptual design of a cooling system for a new NEG vacuum pumps system of the SPIDER experiment

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SPIDER is the 100 keV full-size Ion Source prototype of the ITER Neutral Beam Injectors and it is operating at Consorzio RFX in Padova, Italy. After one and half year experiment, necessity of increase the vessel vacuum level has been recognized, in order to overcome some limitations to the operative limits and fulfill the full experiment performance. The existing vacuum system is based on standard forevacuum, turbomolecular and cryogenic pumps. The upgrade of the vacuum pumping system is based on the addition of Non Evaporable Getter (NEG) pump, composed by 512 cartridges. The NEG are arranged in 16 x 32 modules and will be housed in an extension module of the existing SPIDER vacuum vessel. Each NEG cartridge requires to be heated up to 600°C to regenerate the getter material for 72 hours by electrical heaters (180 kW, total power). Thus, an active cooling system is necessary to protect the SPIDER components and VV from excessive heat during the regeneration process by means of copper thermal shields and cooling channels. This paper deals about the design and sizing of the dedicated cooling system.