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C1Po1E-01: Evaluation of helium loss for a closed-loop cryogenic system

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Notification of remarkable helium loss in early stage is crucial, especially in the shortage period of helium supply market, for operating a cryogenic plant with its downstream cryostats of superconducting devices. This paper proposes an indicator representing the amount of helium gas remained in the cryogenic plant and associate cryostats during their normal operation period. The indicator is based on normal operation status of the cryogenic system and intakes the effect from outdoors temperature and cryostat geometry. Applying the indicator to look back on helium loss from the archived data of an operating cryogenic system shows that the indicator provides an uncertainty close to 1% total amount of helium circulated in the system. This indicator is suitable for monitoring the helium loss of a closed-loop cryogenic system being in operation.

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