

# Static Gravimetric Method with Flying Start-and-Finish for Calibration of Small Hydrocarbon Flow

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Static gravimetric method with flying start-and-finish is widely used for calibration of large and medium liquid flow for its advantage of maintaining continuous flow through the flowmeter. However one needs to take certain considerations in implementing this method in small flow systems to obtain good accuracy. At NMIJ, we adopted this calibration method for small hydrocarbon flow facility using two newly designed diverting systems: one is a modified compact double-wing rotating diverter for the upper flow range (1 L/h~100 L/h) and another is a set of two instantaneous switching valves for the lower flow range (0.02 L/h~1 L/h). Calibration and measurement capability (CMC) of the flow facility using this calibration method is estimated to be 0.064 %~0.078 % for volumetric flow range (0.02 L/h ~ 100 L/h) and 0.020 %~0.050 % for mass flow range (0.016 kg/h ~ 80 kg/h) (coverage factor:  $k=2$ ). This paper explains the design features and operation of each diverting system, and also discusses the uncertainty analysis of the calibration method, giving focus on the timing errors of the diverting systems evaluated according to ISO4185.

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