

# DESIGN OF FLAME DEFLECTOR COOLING SYSTEM FOR KSLV-II ON THE PROPULSION SYSTEM TEST COMPLEX

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**Abstract:** The flame deflector is a structure for protecting the propulsion system test complex from the high temperature and exhaust plume of supersonic flow during lift off the launch vehicle. Therefore, it is important to equipped with a special structure, the shape of the flame deflector for the efficient discharge the combustion exhaust gas. The shape of the flame deflector should be designed to restrain the discharged gas from backdraft inside the deflector. According to previous research<sup>[1,2,3]</sup>, the most important factor during the designing of flame deflector is the deflection surface that collides with the exhaust plume ejected from the rocket engine. The shape of the deflection surface of the flame deflector is theoretically calculated using the ideal gas state equation, and then it is manufactured based on the empirical formula according to the experimental results. Also, NASA report published in 1966, the impinging angle, the radius of curvature between the deflection surface and the uplift surface(exit radius), the separation distance from the nozzle exit to impinging point and deflector width should be considered as design factor of the flame deflector. The primary objective of this paper obtains a fundamental understanding of the KSLV-II plume and its impingement characteristics on the propulsion system test complex flame deflector. In addition, basic design results of flame deflector cooling system configurations are included.



Fig.1 Schematic of the propulsion system test complex

## References:

1. E. Lays, *NASA Report. 1966, NASA CR-76058.*
2. J. D. Phillips, *NASA Report. 1980, KSC-STD-Z-0012B.*
3. R. L. Evans; O. L. Sparks, *NASA Report. 1963, NASA TND-1275.*