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C4Or1A-04: Design and Test of Cryogenic Flex Cables for Euclid Near Infrared Spectrophotometer

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We describe the design and testing of the Cryogenic Flex Cable (CFC) delivered for the Near-Infrared Spectrophotometer (NISP) instrument for the ESA Euclid mission. The Euclid spacecraft is scheduled for launch in the summer of 2022. It will observe $\sim 1/3$ of the total sky using a telescope with 1.2m SiC primary mirror, passively cooled to $\sim 125\text{K}$, and containing Visible Imager (VIS) and NISP focal plane instruments, from an orbit at the Earth-Sun L2 lagrange point. At the heart of the NISP instrument is a 4X4 mosaic focal plane of Teledyne H2RG infrared detector arrays held at 100K. The CFC described here are designed to link each detector array to a dedicated packaged cryogenic electronics assembly held at $\sim 137\text{K}$ with minimal heat leak to the 100K stage and to withstand handling and launch vibrations. Prototype CFCs were developed and tested by Teledyne. The final 7-layer CFC flexible printed circuit boards and Airborn nanoconnectors were provided by Teledyne and assembled for flight at the Jet Propulsion Lab (JPL). Two flight qualification CFC were made and subjected to thermal conductance, thermal emissivity, thermal cycle, survivability to bend, vibration and normal mode testing at JPL. The flight CFC were subject to bake out and thermal cycle at JPL and then tested with the flight detectors and electronics at Goddard Space Flight Center's Detector Characterization Lab. The results of the qualification tests as well as the measured characteristics of the 39 flight CFC will be summarized.

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