



EP30-2
Qualified by Laser
Interferometer
Gravitational-Wave
Observatory for optical
assembly applications



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Master Bond EP30-2 epoxy was qualified for use in critical Laser Interferometer Gravitational-Wave Observatory (LIGO) bonding applications. The main applications involved bonding prism elements, and bonding acoustical dampeners to optical components.

The two part epoxy was mixed and cured based on the mix ratio and the cure schedule recommended on the data sheet. The cured product was then validated for its low outgassing properties. The product already met NASA/ASTM E-595 standards for low outgassing. However, given the sensitivities involved for these applications, the outgassing rates (Torr-L/s/cm²) for the various gases involved were also measured. This was done using a Residual Gas Analyzer (RGA). The outgassing rates for hydrogen, helium, and certain hydrocarbons to name a few, were measured. The levels for these gases were of the order of 10-11 Torr-L/s/cm² or even lower.

The twin LIGO detectors were used to identify gravitational waves, confirming a major prediction of Einstein's 1915 general theory of relativity, that gravitational waves are produced during the final fraction of a second of the merger of two black holes. It is this collision of two black holes that was observed on 9/15/15 by the LIGO detectors. Master Bond is proud that our epoxy was used 100 years later for this major discovery.

References

Ingram, Dale, "Gravitational Waves Detected 100 Years After Einstein's Prediction" News Release February 11, 2016. LIGO Hanford Observatory, Caltech (Kathy Svitil), MIT (Kimberly Allen), NSF (Ivy Kupec). <https://www.ligo.caltech.edu/news/ligo20160211>. Retrieved 2/22/2016.

B.P. Abbott et al, "Observation of Gravitational Waves from a Binary Black Hole Merger", LIGO Scientific Collaboration & Virgo Collaboration, 1/11/2016. <http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.116.061102>. Retrieved 2/22/2016.

Material Qualification RGA Test Results: Master Bond EP30-2 epoxy <https://dcc.ligo.org/LIGO-E1000386/public>. Retrieved 2/22/2016.