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## The Vacuum System of the Photon Transport Beamlines at the European XFEL Facility.

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The European XFEL is a 3.4 km long underground facility that generates extremely intense X-ray flashes to be used by researchers from all over the world. It officially began operation in September 2017. In full operation it produces coherent femtosecond pulses with unprecedented brilliance in the energy range from 250 eV to 25 keV at MHz repetition rate. The facility comprises a linear accelerator and initially three branched beamlines: SASE1 and SASE2 that operate in the hard X-ray regime, and SASE3 that covers the soft X-ray range up to 3,5 keV.

One of the main challenges faced during the installation has been the fact that a large proportion of the almost 2.8 km long photon vacuum system had to be assembled under ISO5 cleanroom class to guard the optical properties of the high quality X-Ray mirrors.

The UHV specifications were developed not only to fulfil the mentioned issue, but also to harmonize the different contributions from the involved industry partners and/or the various in-kind component contributions from the rest of participating institutions.

In general, the overall static pressure is in the  $10^{-9}$  mbar range. Since most of the system is unbaked, this is achieved using a combination of proper cleaning processes, surface treatments and a lumped distribution of triode ion pumps with additional specific configurations at critical components (mirrors, gratings, etc.) where NEG cartridges are also used.

For all the existing windowless gas based devices (diagnostics and beam intensity attenuation) a distribution of TMP differential pumping schemes has been systematically deployed.

The activities of the Vacuum Team are being progressively extended to the coordination and support of the six experimental end-stations to optimize the performance of any subsystem dealing with vacuum, including experimental chambers, centralized forevacuum distribution lines, operational consolidation of vacuum equipment and installation or upgrade activities.

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