The PETRA IV project toward a diffraction limit synchrotron light source at 6 GeV features an ultra low emittance storage ring and a small dynamic aperture. Whether using on or off axis injection, the emittance of the injected beam must be very low. The current booster DESY II’s emittance is 350 nm-rad at 6 GeV, which is too large for PETRA IV’s injection. Therefore a new ring accelerator where the beams-to-be-injected are prepared is always needed. This ring is named DESY IV.

The required charge to be delivered into the storage ring is as high as 8 nC per bunch. Considering losses during transfers, the single bunch intensity capacity requirement in DESY IV is adjusted higher as 10 nC. An additional challenge comes from the small required emittance.

To be more specific, the proposed operation modes for injection/extraction in DESY IV is adjusted higher as 10 nC. An additional consideration for sufficient RF cavities is the effective transverse impedance.

An efficient configuration is found with an effective transverse impedance, $\Delta \mu / \pi \Delta \beta \Delta \alpha = 1\ \text{MOhm/mrad}$ and floor plates in DESY tunnel.

The criteria for the injector of PETRA IV are firstly limit booster is custom made for the PETRA IV project. The input beam energy is raised to 800 MeV to improve the beam stability. The full intensity bunches or bunch trains will accumulate the beam at high energies is possible. The low energy injection and high energy extraction are in Straight #1 and #3 and #5 are preserved for injections from other sources.

The max corrector strengths are within 0.5 mrad horizontally and 0.4 mrad vertically.

An efficient configuration is found with $24\ \text{BNMs}$ (position label a, 2, 5, 6 and 9) and $24\ \text{independent bi-directional correctors}$ (at position label w, x, y, z).