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P3.127 On the alignment of the Scraper Elements at Wendelstein 7-X

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Wendelstein 7-X (W7-X) is equipped with ten symmetric arranged divertor units consisting of horizontal and vertical targets each. In the current completion phase, Scraper Elements (SE) have been installed in front of two out of ten divertor units to protect the gap between the horizontal and vertical targets (pumping gap) from thermal overload out of the plasma. During the next plasma operation, investigations of the principal behavior of the SE should clarify their influence on the pumping rate as well as their capability of thermal protection. It is expected that the right functionality as well as the risk of a thermal overload of the SE depend sensitive on the geometric accuracy of SE shape and alignment.
The paper reports on the SE assembly with special focus on the geometric accuracies in shape and alignment. After delivery of the SE (dimension: approx. 700 x 400 x 300 mm^3) an incoming inspection has confirmed the high accuracy of the graphite machining. The Best-Fit of the as-built surface shows maximum deviations lower than 0.6mm compared to the CAD. Local steps in the graphite surface are much smaller.
From plasma physical reasons, each SE has to be aligned locally to its corresponding divertor unit. This makes it necessary to adapt the reference co-ordinates of each SE according to the as-built position of the divertor unit measured in the last completion phase of W7-X. In addition, the expected environmental conditions during assembly have been taken into account for calculation of new reference co-ordinates.
The assembly procedure of the SE is presented in the paper including the measurement processes and the datum systems used to orientate the measurement tools. Finally, the alignment of the SE has been performed within an accuracy of less than 1.5mm, which fulfill the positioning requirements.

Presenter: BRAEUER, Torsten (Max-Planck-Institute for Plasma Physics)

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