Checks for Calculation No: <u>NSTXU-CALC-011-20-00</u>

Revision No: 00 #

Title Calculation of Plasma Facing Components: IBDV LHF Tile and Variants Transient Thermal and Structural Analysis

Component was checked against latest design Yes.

All required load cases are included and current Yes

Discuss method used in the calculation

ANSYS workbench is used for the Analysis. The simulation includes transient thermal runs and static structural runs. Structural simulation includes thermal load, and bolt preload and stress plots are given in the document.

Discuss how the calculation was checked (*)

Temperature ratcheting is compared to 2D global thermal model (NSTXU-CALC-10-6-00).

List issue identified and how they were resolved

- 1. Clarify what "Default Stresses" mean? Like "Figure 14: Default Tile Stresses", "Figure 15: Default Tile T-Bar", "Figure 16: Default Tile Bolt Stress" etc...
- 2. Clarify what loads are used for stress evaluation? Thermal loading?
- 3. Only 1 pulse followed by 20 mins cooling is simulated, and looks like tile temperature has not reached its maximum yet. With more pulses and higher temperature, not sure whether stresses are still acceptable or not. It is better to run more pulses, at least six.
- 4. Section 6.2 mentioned "INCONEL Alloy 718 has a yield stress of 1,034 Mpa. The design tresca stress (Sm) value is 2/3 of the material yield stress", I remember "tresca stress value shall be lesser of 2/3*Sy or 1/3Su" (ref. to NSTX_CRIT-0001-02B). Inconel 718 seems have quite close yield and ultimate. Please verify this.
- 5. During thermal run, it is better to include some uncertainty of manufacturing error: like imperfect profile of tile shape or circularity error etc. that may cause bad fit between tile and casing.
- 6. Better to include halo and eddy current load too, if there is.

Checker's name: Han Zhang

Technical Authority:

_(sign and date)

(*) independent calculations can be appended