



# ENG-033 - CRR - CHIT RESOLUTION REPORT

## Shutter Mat Mod Peer Review Chit Resolution

*NSTXU\_1-4-1\_CRR\_101*

Work Planning #:  
Effective Date: **03/10/2020**  
Prepared By: **Yusi Cao**

<b>Reviewed By</b>	Yusi Cao, Preparer	03/10/2020 14:37:30 PM
<b>Reviewed By</b>	Yuhu Zhai, Project Engineer	03/10/2020 14:35:42 PM
<b>Reviewed By</b>	Brentley C. Stratton, Responsible Engineer	03/10/2020 14:49:50 PM
<b>Approved By</b>	Timothy N. Stevenson, Design Review Chair	03/10/2020 15:37:55 PM



# **Chit Resolution Report for Shutter Material Modification Peer Review**

**NSTXU\_1-4-1\_CRR\_101, Rev 0**

Prepared By:

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Cognizant Individual – A. Cao

Approved By:

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Approved By:

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Design Review Chair – T. Stevenson



**Summary of Chits**

<b>Review</b>	<b>ID</b>	<b>Chit</b>	<b>Status</b>
Shutter Mat Mod Peer Review	IVSHUTMATMODPR01	Please check the specific heat of Inconel 625 vs that of SS 304. This should not make any big difference but we shall document the property change as we change materials for the shutter.	Closed
Shutter Mat Mod Peer Review	IVSHUTMATMODPR02	When JHU diagnostic comes off, document with drawing and perform calculation	Open
Shutter Mat Mod Peer Review	IVSHUTMATMODPR03	Please update the dB/dt in the CALC report for the Ultra Soft X-Ray Diagnostic Calculation - considering VV shielding effect	Closed
Shutter Mat Mod Peer Review	IVSHUTMATMODPR04	Please complete the checking and sign off for this CALC report (material change to Inconel 625)	Closed



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## **Introduction**

This report provides resolution of chits and recommendations originating from the In-Vessel Shutter Material Modification Peer Review held on 02/19/2020.

The chits in the NSTX-U Recovery chit log can cite the sections in this report as evidence of closure. The chit resolution described herein is aligned with the chit table in the Peer Review dashboard.

## 1 CLOSED: IVSHUTMADM0DPR01 – Check Inconel Specific Heat

Review	ID	Chit	Review Board Comment
Shutter Mat Mod Peer Review	IVSHUTMATMODPR01	Please check the specific heat of Inconel 625 vs that of SS 304. This should not make any big difference but we shall document the property change as we change materials for the shutter.	Concur

The specific heat of Inconel 625 is 0.41 J/g-°C compared to 0.50 J/g-°C of stainless steel 304. Because of this difference, the shutter ratcheted temperature will be higher for Inconel 625 than for stainless steel 304.

NSTXU-CALC-40-01-00, calculation of diagnostics and diagnostic shutters, which has been referenced for shutter thickness qualification, includes analyses of shutters using both Inconel 625 and stainless steel 304 as the material. The ratcheted temperature for the thinnest shutter analyzed, 0.03", is near 400 °C for Inconel 625 or 350 °C for stainless steel 304. These temperatures are both well beneath the annealing temperatures of either material. This signed calculation report qualifies all proposed material modifications for shutters for NSTX-U thermal considerations.

## 2 OPEN: IVSHUTMADM0DPR02 – Analyze USXR Diagnostic

Review	ID	Chit	Review Board Comment
Shutter Mat Mod Peer Review	IVSHUTMATMODPR02	When JHU diagnostic comes off, document with drawing and perform calculation	Concur

The JHU Ultra Soft X-Ray (USXR) diagnostic will be removed for diode maintenance before NSTX-U operations commence. Because no drawings exist at PPPL for this legacy diagnostic, we must measure dimensions and document the diagnostic with a drawing. A calculation will be performed using the dimensions taken during the maintenance. Because of this, IVSHUTMATMODPR02 will remain open until the work is complete.

### 3 CLOSED: IVSHUTMADM0DPR03 – Update dB/dt in CALC

Review	ID	Chit	Review Board Comment
Shutter Mat Mod Peer Review	IVSHUTMATMODPR03	Please update the dB/dt in the CALC report for the Ultra Soft X-Ray Diagnostic Calculation - considering VV shielding effect	Concur

The VV shielding effect will lower the dB/dt used for the analysis, which will reduce the torque on the welds of the USXR diagnostic. The dB/dt used in the CALC report, NSTXU\_1-4-1\_CALC\_100 R0, has been updated to account for the shielding effect of the vacuum vessel.

### 4 CLOSED: IVSHUTMADM0DPR04 – Complete CALC Signature

Review	ID	Chit	Review Board Comment
Shutter Mat Mod Peer Review	IVSHUTMATMODPR04	Please complete the checking and sign off for this CALC report (material change to Inconel 625)	Concur

The CALC report for this peer review, NSTXU\_1-4-1\_CALC\_100, has been checked, signed, and filed in the document management system.