DIAGNOSTIC DESIGN

MAST Installation

PLEASE NOTE THAT PPPL COMMENTS REGARDING THE DESIGN APPEAR IN THESE BOXES

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Overview

- **Materials**
  - 316 stainless steel
  - Boron Nitride Grade COMBAT A ceramic solid from St. Gobain
  - Phosphor Bronze PB102
- **Secure Screws**
  - Spot-welding SS wire on SS316 screws
  - Spot-welding SS wire on BN?
- **Diagnostic Design**
  - 4-channel array
  - Each channel separated by 7.5 degrees

**COMMENT 2**
**ISSUE:** IS GRADE OF BN CERAMIC APPROPRIATE?
**IDEA:** CONTACT MAST COLLEAGUES

**RESPONSE**
ST. GOBAIN GRADE XP (HIGH PURITY-LOW MOISTURE ABSORPTION)

**COMMENT 9**
**ISSUE:** MAST DESIGN REGULATIONS REGARDING DIAGNOSTICS
**IDEA:** CONTACT MAST COLLEAGUES

**BRONZE WASHER NOW INCORPORATED INTO CURRENT MAST RP- NOT NEEDED FOR PLUG HOUSING UNIT (GET UPDATED RP DRAWINGS)**
Total Assembled View

MAST
Reciprocating
Probe

Diagnostic

Without Shield

NOTE THAT SLIDE 14 HAS SHIELD COMMENTS

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Total Exploded View

- Bronze insert
- Connector
- Base X 4
- Detector X 4
- Foil X 4
- Module
- Shield

Questions:
- WHAT IS FOIL MATERIAL?
- UNNECESSARY WASHER
Assembled View without Shield

MODULE

CONNECTOR

COUNTERSINK SCREWS
ON CONNECTOR
COMMENT 1
ISSUE: POSSIBLE HARDWARE COMPLICATIONS AT MAST, FOR EXAMPLE NEEDING TO REPLACE A MACHINE SCREW
IDEA: CHANGE ALL MEASUREMENTS AND HARDWARE TO METRIC
Module Exploded View with Bases
Module Dimensions

For shield attachment: 42.4307 mm

Vent: 21.2154 mm

For connector attachment: 65.1407 mm

66.675 mm
Module Angles

7.50°

7.50°

7.50°
 MODULE CROSS SECTION

COMMENT 8
ISSUE: DETECTOR INSULATION
IDEA: USE UHV (ULTRA HIGH VACUUM) APPROVED INSULATOR SUCH AS PEEK, VESPEL, MAYCOR, BN CERAMIC, OR TEFLO TO CREATE A THIN SLEEVE AROUND INDIVIDUAL DETECTORS; CONTACT MAST COLLEAGUES FOR MATERIAL APPROVAL

USE PEEK 100 TO INSULATE COMPONENTS NOT EXPOSED TO PLASMA; DETECTOR INSULATION ENCOURAGED

Foil
Detector
Base
BNC connector
This part is replicated from MAST machine drawings to provide for attachment to reciprocating probe

**COMMENT 7**

STATEMENT: THIS SHARP EDGE WILL BE ROUNDED TO REFLECT THE MAST MACHINE DRAWINGS
Shield Dimensions

collimator diameter: 5mm
wall thickness: 6.35 mm
COMMENT 3
ISSUE: SECURE SCREWS TO BN SHIELD
IDEA: SPOTWELD SHIMSTOCK STRAP FROM SCREW HEAD TO CONNECTOR OR USE APPROVED UHV CERAMIC ADHESIVE

COMMENT 4
ISSUE: SCREWS NOT FLUSH WITH SURFACE
IDEA: COUNTERSINK SCREWS FOR SHIELD

COMMENT 5
ISSUE: SHARP EDGES ON SHIELD
IDEA: ROUND ALL EDGES ON SHIELD (INCREASE SHIELD THICKNESS SO EDGES ARE STILL .25" IN THICKNESS)

COMMENT 6
ISSUE: IS ROUNDED RECTANGULAR SHAPE OKAY FOR SHIELD, OR DOES MAST PREFER CYLINDRICAL?
IDEA: CONTACT MAST COLLEAGUES

EITHER SHAPE IS FINE; CYLINDRICAL CHEAPER TO MANUFACTURE
Alternate Washer to Change Collimator Size

COMMENT 10
ISSUE: NEED ANOTHER WAY TO CHANGE COLLIMATOR SIZE, PREFERABLY ONLY REQUIRING THE REMOVAL OF THE BN SHIELD (UNLIKE METHOD SHOWN HERE)
IDEA: INSERT NEW COLLIMATOR CYLINDER THROUGH TOP OF MODULE AND PROVIDE FOR ATTACHMENT

NOTE THAT SKETCH FOR COMMENT 10 IDEA IS ON SLIDE 16

New collimator size
Alternate Washer to Change Collimator Size

**Comment 10**

Consider placing a small lip at the bottom of the shaft for a more secure fit.

- New collimator size
- Hole for machine screw attachment to top of module