managed by Brookhaven Science Associates
for the U.S. Department of Energy

www.bnl.gov

RFP 457842 Questions & Answers

Attachment C - Technical Specification for the FHCAL - Doc Nr EIC-DET-SPC-021

1. Paragraph 3.2 - Materials

    a. AISI 1020 steel alloy (now known as SAE Grade 1020 since AISI organization stopped supporting materials in 1995) is a typical "commodity" alloy only produced to a "Chemistry" and not any minimum mechanical properties nor any magnetic property testing. While the required chemistry is typical for this product and the min mechanical properties are typical for this alloy, the mills/distributors are taking exception to these mandatory min mechanical properties. The required listed specs in Para 3.3 are only for Chemistry and only apply to Plate thicknesses and do not apply to the 14 Ga (0.0747") material. Testing for Yield and Tensile properties can be performed and provided **"For Information Only"**

Answer: SOW and Specification documents are being revised.

    b. Magnetic Permeability testing per ASTM A773 - the Grade 1020 steel is not considered a "magnetic alloy" and not processed like an electrical steel alloy. Typically this Grade 1020 does not have the mill process controls to control magnetic permeability unless special order. The magnetic properties are impacted by the chemistry (especially Mn, Si), rolling practice, heat treatments, grain size, residual stress from slitting/flattening/leveling, etc. Only after production can this be tested and no procedures are provided to rework the material in case the results are out of the required range. Additionally, this test costs approx $2400 each and 4 samples are required per heat lot of steel so an extra $10,000/heat just for this test. No procedures are provided in case material is out of spec.

We can only test for Magnetic Permeability and provide the results **"For Information Only"**

Answer: SOW and Specification documents are being revised.

2. Paragraph 3.3 - Code/Standard Compliance

    a. We have several issues with these ASTM callouts:

        i. ASTM A6 - "General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling" - This standard does **NOT APPLY** for 14 ga sheet - only the thicker plate

            1. What specification should be used for the 14Ga 1020 sheet?

Answer: A6 should be replaced with A1011 (hot rolled) or ASTM A1008 (cold rolled)

        ii. ASTM A773 "Standard Test Method for Direct Current Magnetic Properties of Low Coercivity Magnetic Materials Using Hysteresigraphs" - Usually must be arranged through third-party outside testing labs since 1020 steel is a commercial alloy and not an electrical steel so the mills and distributors typically do not have in-house capabilities. Per Paragraph 4.1.2.1, this test must be performed on four samples at approx $2400 each (and min 10 day leadtime) - what is the required location for each of these samples? Should we take all from one sheet? Please clarify this testing requirement. As noted, we can only test for Magnetic Permeability and provide the results **"For Information Only"**

Answer: The samples should be evenly spaced across the sheets. The test can be arranged through third-party facilities.

        iii. ASTM B733: "Standard Specification for Autocatalytic (Electroless) Nickel-Phosphorus Coatings on Metal -

Please identify where the rack/witness marks can be located. Should any secondary coating be applied to these marks? Where should thickness testing be performed on the parts.

Answer: Ideally, plating would use the 10x M6 threaded holes in the top of the unit. If this is not feasible, the towers are best placed on a rack on their short sides (opposite the recess in the absorber plates). A secondary coating is not necessary, but this is subject to confirmation in the pre-production units. The coating thickness can be tested on samples. Visual inspection of the

quality of the coating is sufficient if the module dimensions and layer alignment are confirmed before the coating.

iv. ASTM A830 “Standard Specification for Plates, Carbon Steel, Structural Quality, Furnished to Chemical Composition Requirements” - This is directly applicable for Grade 1020 plate but does not apply to the 14ga 1020 sheet.

3. Paragraph 4.1.2.1 Acceptance Tests

   a. "*.....magnetic permeability shall be measured for conformance to the technical specifications for four samples of each heat of steel*".

      i. As noted earlier, magnetic permeability is never conducted by mills/distributors for Grade 1020 steel, so this can be performed only after production. Please identify locations from each heat lot that these 4 test samples shall be taken. The typical cost for each magnetic permeability test is about $2400. Since it will be performed after production we will test and provide results **"For Information Only"**

Answer: Not specific locations are required, but the samples should be spaced out across the heat and not be too close to each other.