The stave or petal core will be assembled from the components listed below along with initial tests to control their quality before their being used to assemble a stave/petal core. With the exception of the graphite/epoxy, all components will be weighed and visually inspected.

Component	Tests
Co-cured facing	Thickness. Tape measurements identical to those described for a bus tape. Modulus tests on facing coupons. Resistance measurements on co-cured copper strips.
Carbon honeycomb	Thickness. Crush strength. Density.
Pipes	Pressure tests ~ 200 bar. Helium leak tests.
Carbon Foam	Density. Electrical conductivity. Thermal conductivity.
C-channels	Thickness and dimensional measurements.
Peek closeouts	Thickness.
Graphite/epoxy	Two molded dog bone sample coupons per stave/petal. Full electrical and thermal testing of one sample for a fraction of the cores (1 in 5 cores or 1 in 10 cores). Other sample will remain a traveler with stave/petal for later testing if needed.

During construction of the stave core the partially assembled core will be weighed after each glue step. This allows the amount of epoxy used at each step to be ascertained and is a check on the consistency of the construction techniques. The determination of the amount of epoxy that is used is necessary to calculate the final radiation length of the stave core.

Before attachment of the second facing electrical measurements of resistances between various components such as the foam to the EOS copper strips will be made and recorded. This will determine the consistency of the assembly

The following measurements that will be made on each assembled stave/petal core and their purpose are listed below. Each stave/petal core will first be thermal cycled between 25 deg-C and -40 deg-C for 24 hours before the measurements are made so that thermal or mechanical defects introduced by the cycling will be detected.

Bending stiffness

The stave/petal core is simply supported at each end and different weights are placed on the center of the core. From this simple measurement the bending stiffness of the stave is determined. The bending stiffness should be within acceptable limits and its determination is a check on the overall quality and consistency of the core construction. From the bending stiffness the effective tensile modulus of the facings are determined and is a final check on their fabrication. The bending stiffness also serves to provide the fundamental vibrational frequencies of the stave/petal core.

Thermal imaging

This technique involves chilling the core via coolant flowing through its pipes down to -30 deg-C. The stave is chilled in dry air or nitrogen. An infrared thermal imaging camera takes an image of the complete core. From this technique the thermal impedance of each point on the surface of the core can be determined. Stave/petal cores with anomalously high thermal impedances will be rejected.

Delamination

This technique is still under development but has been demonstrated on a short stave prototype. The purpose of this technique is to ensure good bonding of the facing material to the honeycomb and foam. The core is constructed to be virtually air tight but has two ports on the pipe side closeout that are used to vent the core. These ports can be used to apply an interior pressure as well. Approximately 5 psi of pressure will be applied to the interior of the core and a scanning technique will be used to look for deformations in the facings. Deformations indicate a lack of a good glue joint at that location. Deformations above a certain height will be used to reject a stave/petal core. This technique will serve to assess the overall quality of the fabrication process. It is expected that with good fabrication techniques very few cores should will show any deformations.

Flatness

A similar or identical scanning technique will be used to assess the flatness of the core. As the final shape of the core in the experiment will be determined by its mounting brackets and its orientation on the barrel, this test serves to provide an approximate check on the consistency of the core construction. Cores that exhibit large deviations from flatness will be rejected.

The same measurements will assess local flatness, which we take to be flatness of the stave/petal core over dimensions of a silicon module (~ 10 cm). Nominally a core should have a local flatness not to exceed ~25 um to permit good application of the 100 um thick module-to-core glue.

Electrical

This tests measures the resistances between all the co-cured copper strips on both sides of the stave/petal core. They should all be connected to each other with a low resistance via the conductive graphite/epoxy used to construct the core.

Bus Tape

Perform bus tape short and continuity tests with test robot. How integrate with Tony's text?

Final Weight

The measurement of the final core weight gives the total glue weight.

Stave locking point test

A standard torque should be applied the stave for 24 hours in each direction and deflection and creep measured to see that these quantities remain in anticipated limits.