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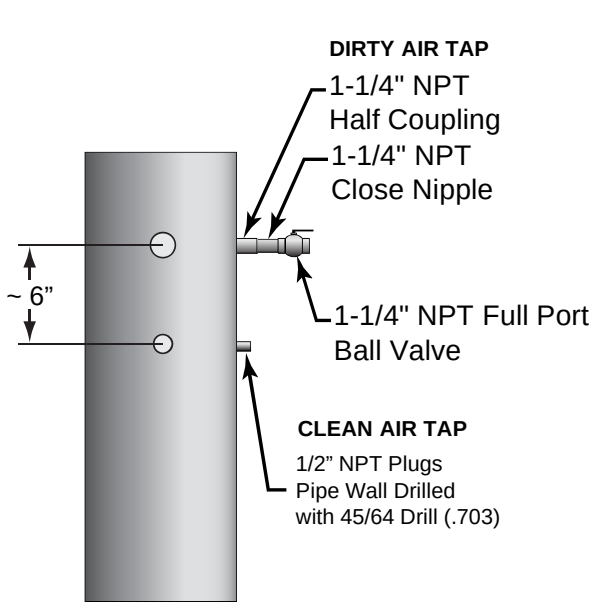
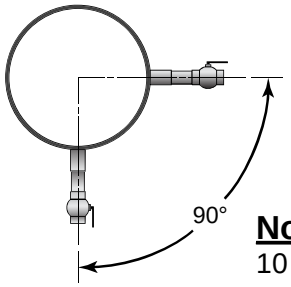
ASME Coal Fineness Sampling Test Procedure

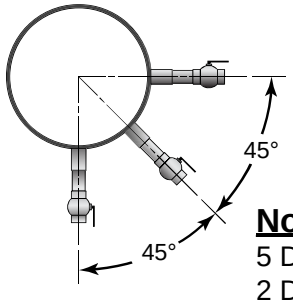
The design of the ASME Fineness Sampler has been adapted from our long-standing Isokinetic Coal Sampler. We still recommend and prefer the use of the Isokinetic sampler in instances where precise accuracy is needed, such as acceptance tests or in situations where determination of individual fuel balance is necessary. However, we also realize that most labs trend pulverizer fineness on a weekly or monthly basis and require a sampler that is not as time or labor intensive. In these situations where relative fineness is the objective, the ASME style sampler with filter canister is acceptable, as long as the below sampling procedures are followed.

- Sample locations are positioned correctly with regard to bends and restrictions. Ideally, test taps should be located in a vertical run of piping, 10 diameters upstream and downstream from the nearest disturbance. A minimum of two taps, 90° apart, is required. Taps should not be located at the discharge of an exhauster.

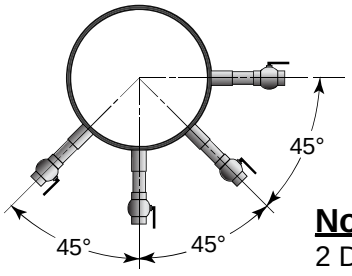




No. 1
10 Diameters Upstream
5 Diameters Downstream



No. 2
5 Diameters Upstream
2 Diameters Downstream



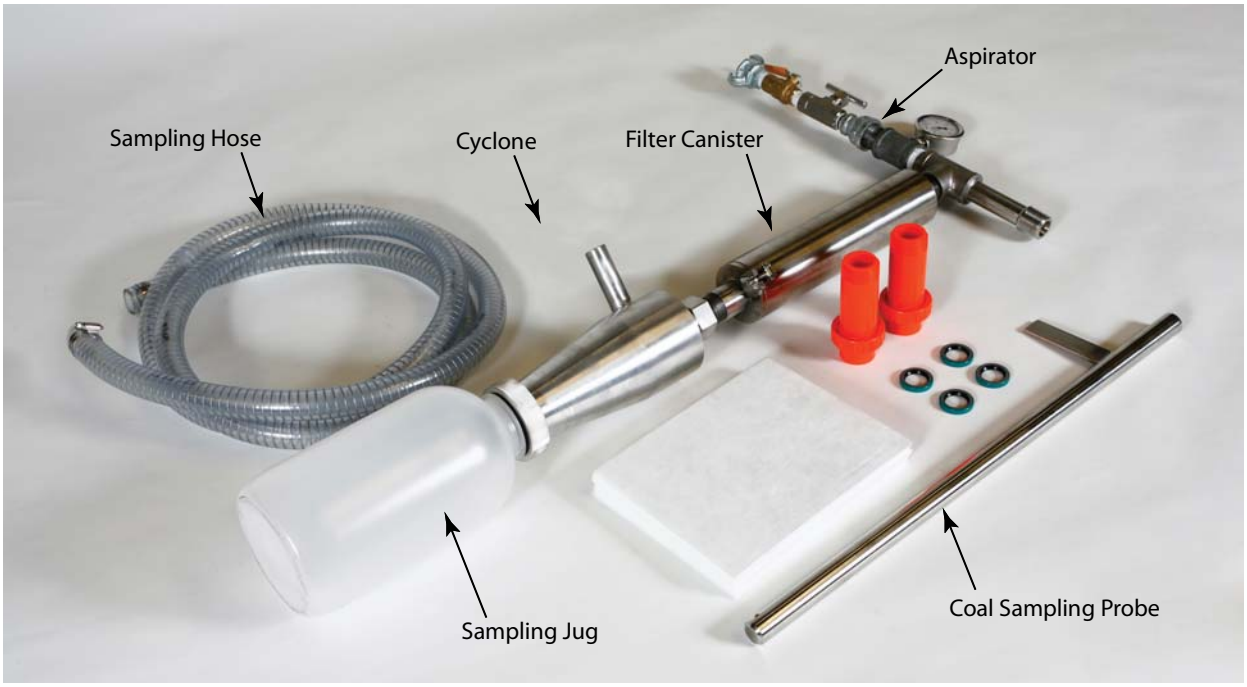
No. 3
2 Diameters Upstream
1 Diameter Downstream

Notes:

1 - The 1-1/4" NPT Connections must fit a 1.050 sample probe

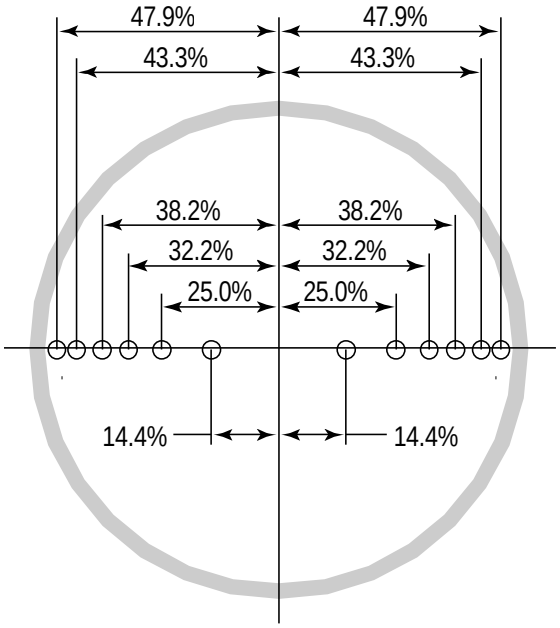
2 - The ball valve plus half coupling plus close nipple should be (+/-) 1/8" of the same length for max. productivity of test team (to avoid difference in probe marking)

The picture below shows the orientation and individual components of the ASME Coal Sampler.

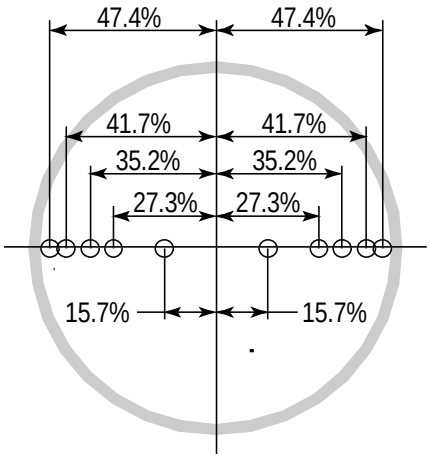


One end of the sampling hose will connect to the Cyclone and the other end will connect to the user (flag) end of the Coal Sampling Probe. One piece of fiberglass filter paper provided with the kit should be rolled and inserted inside the perforated cylinder which can be found inside the filter canister. This filter paper should be replaced as necessary, but certainly after each pulverizer test is completed.

- Traverse points will need to be marked on the sampling probe based on an equal area test grid. Traverse points for a circular duct or pipe are calculated by first selecting the diagram below that corresponds to a 12" or larger pipe or a 10" – 11" pipe. Dimensions are a percentage of the pipe diameter.



6 ZONES
12" OR LARGER



5 ZONES
10" - 11" PIPE

To mark off the coal sampling probe use the following instructions:

1. First you will need to find the longest coupling/ball valve combination. Usually these are plus or minus an inch but you will need the longest one for the next step.
2. Screw the dustless connector in on the ball valve that was identified in Step 1.
3. Insert the coal sampling probe into the dustless connector, open the ball valve and push the probe all the way until it hits the back wall of the burner line. Using a paint marker make a small mark on the probe at the very end of the dustless connector.
4. Reverse Step 2 above and take the probe back out of the pipe. Using your tape measure and the paint pen, locate the mark you just made and measure 3/8" towards the tip of the probe and make another mark (this accounts for the pipe wall thickness for 12 inch and larger pipes but for pipes smaller than 12 inches use the appropriate wall thickness). Erase your first mark. From the new mark you will want to measure out the pipe radius towards the tip of the probe and make a small mark that represents the center of the pipe with the probe fully inserted. For example, on a standard schedule 18 inch pipe the inside diameter is 17.25" inches which makes the radius 8.625". Now you are ready to mark off the probe with your traverse grid.
5. From the mark representing the center of the pipe you will need to put a mark on **both** sides of this center mark using the percentages of pipe diameter identified in the diagram above. For our example standard schedule 18 inch pipe these marks would be at 2.592", 4.5", 5.796", 6.876", 7.794" and 8.622". If you did this correctly you should have 6 marks on **both** sides of the center mark (12 marks total). These marks are your traverse points and you can use your paint pen to fully mark the diameter of the probe so that it will be easy to see during your test. You can erase the small mark that you made in Step 4 that represents the center of the pipe.

The proper procedure to collect coal samples using the ASME Coal Sampler is as follows:

- Insert the sample probe into the dustless connector, open the ball valve, and slide the probe in to the first port (probe completely inserted) with the flag oriented in the direction of flow (which enables the sample tip to collect pulverized coal from the burner line). Turn on and adjust the aspirating air and start the stopwatch. Aspirating pressure should be selected per the ASME PTC 4.2 code***. Sample each traverse point for 5 seconds. Upon completion of the last traverse point, cut off the air, and remove the probe. Repeat the process for the second port on the pipe. Thus with two test ports the total burner line sample time will be 2 minutes, assuming a 24 point traverse grid. If the pipe is equipped with three or more test taps then adjust the individual point time to achieve a total of 2 minutes per pipe. It is important that the traverse points are sampled for equal time intervals.
- After completing traverses of all pipes on the pulverizer being tested, empty the sampling jug (which now contains pulverized coal from all of the burner lines on the pulverizer being tested) and the contents of the filter canister into a Ziploc 1 gallon freezer bag labeled with the date and all relevant pulverizer information. Sieve per instructions provided in the ASME PTC 4.2.

***Once all burner lines on the pulverizer have been tested, calculate the measured fuel flow using the following equation.

$$\text{Coal Flow} = \frac{\text{Sample Weight (grams)}}{453.6 \text{ grams/pound}} \times \frac{60 \text{ minutes/Hour}}{\text{Total Sample Time (min)}} \times \frac{\text{Pipe Area - ft}^2}{\text{Sample Tip Area - ft}^2}$$

[Sample Tip Area for the ICT Coal Sampling Probe = 0.0021 ft^2]

The result of this calculation is the approximate measured coal flow in pounds per hour. Divide this number by the control room indicated coal flow in pounds per hour to calculate coal recovery. If the recovery is not between 90% – 110% of the feeder indication, then repeat traverse again increasing and/or decreasing the aspirating pressure until desired recovery is achieved.