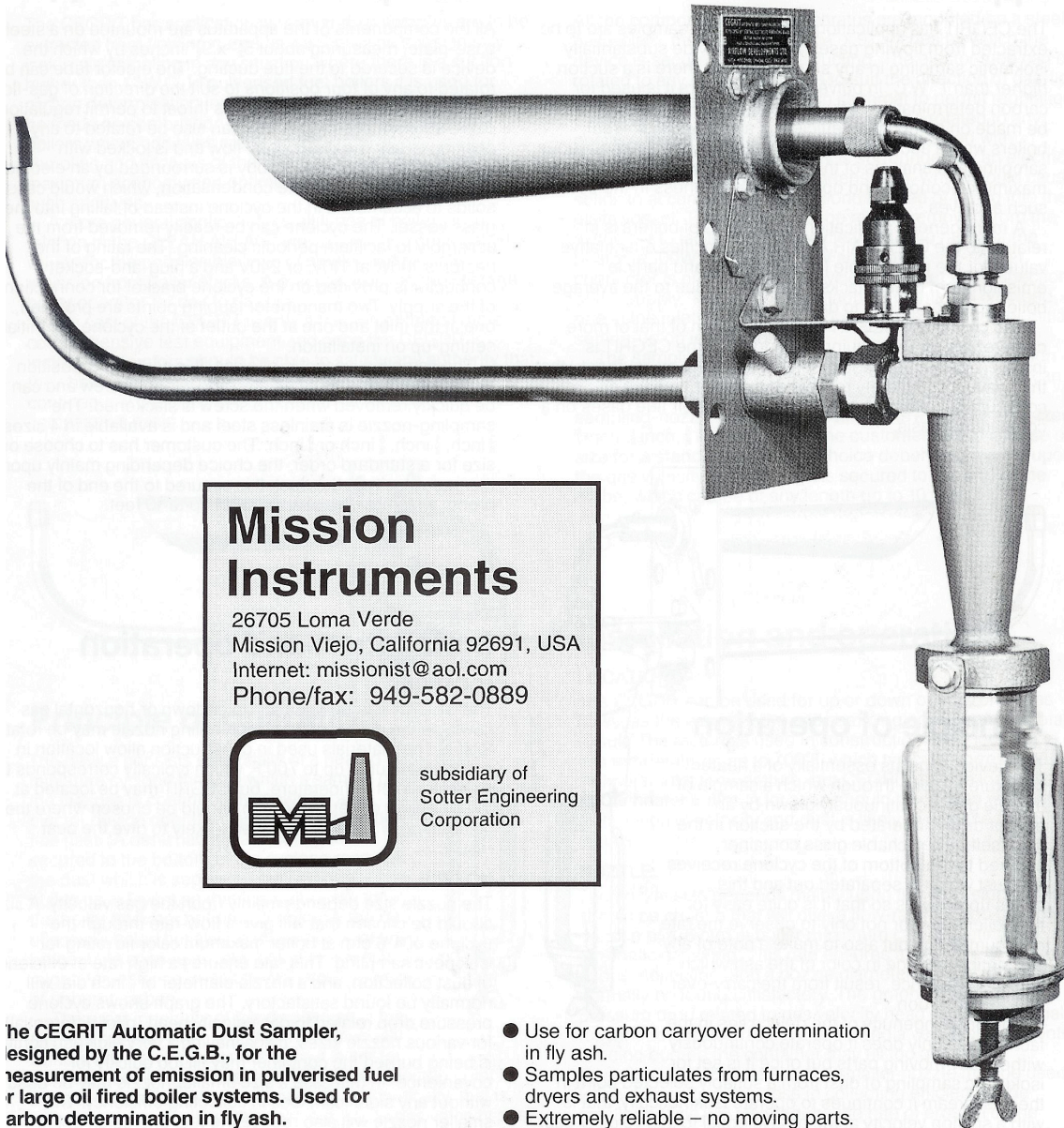


CEGRIT

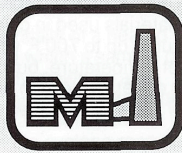
SPECIFICATION AI 132/595/US

Automatic fly ash sampler



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subsidiary of
Sotter Engineering
Corporation

The CEGRIT Automatic Dust Sampler, designed by the C.E.G.B., for the measurement of emission in pulverised fuel or large oil fired boiler systems. Used for carbon determination in fly ash.

- Use for carbon carryover determination in fly ash.
- Samples particulates from furnaces, dryers and exhaust systems.
- Extremely reliable – no moving parts.
- Easy to install – very low maintenance.
- High efficiency rate – typically 99%.
- Industrial construction.

CEGRIT (pronounced 'see-grit')

- A device for continuous sampling of gas borne dust.
- Developed by the South Eastern Division of the British Electricity Generating Board as other methods proved unreliable, inconvenient and too expensive. Airflow improved the design and manufactures under licence.
- For all combustion or other processes where control of dust

emissions is desirable and there is a flue suction of not less than 1 inch W.C. (250 Pa).

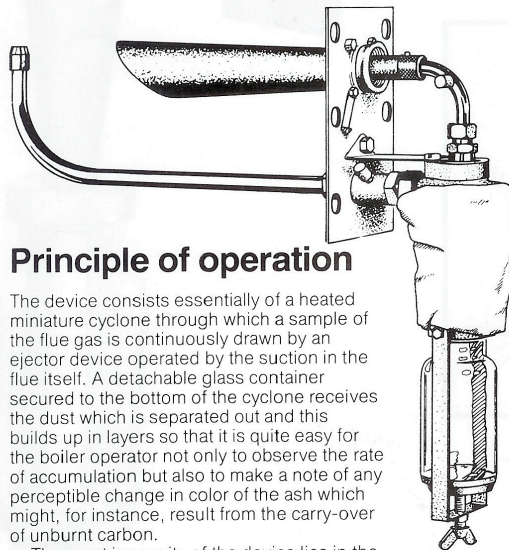
- Long life, easy to install, no moving parts, ideal for all stages of combustion from start to full load.
- Samples collect in glass vessels for easy observation or removal for analysis.

Applications

The CEGRIT has application wherever dust samples are to be extracted from flowing gases as it will provide substantially isokinetic sampling in any situation where there is a suction higher than 1" W.C. In pulverised fuel boilers it is used for carbon determination in fly-ash enabling a valuable check to be made on combustion efficiency, and in large oil fired boilers where additives are used to control acidity, continuous sampling and analysis of the flue dust helps to achieve maximum economy and optimum effectiveness in the use of such additives.

A more general application on all types of boilers is in relation to the CLEAN AIR ACT which specifies quantitative values for the permissible level of smoke and particle emission from boiler stacks. A practical value to the average boiler operator for day to day use.

The cost of the CEGRIT is only a fraction of that of more comprehensive test equipment and once the CEGRIT is installed, operators should be able to satisfy any authority that they have a completely reliable and efficient means of continuously checking the grit burden of their flue gases on a comparative basis.



Principle of operation

The device consists essentially of a heated miniature cyclone through which a sample of the flue gas is continuously drawn by an ejector device operated by the suction in the flue itself. A detachable glass container secured to the bottom of the cyclone receives the dust which is separated out and this builds up in layers so that it is quite easy for the boiler operator not only to observe the rate of accumulation but also to make a note of any perceptible change in color of the ash which might, for instance, result from the carry-over of unburnt carbon.

The great ingenuity of the device lies in the fact that not only does it operate continuously without any moving parts but once it is set for isokinetic sampling of dust from a suitably selected point in the gas stream it continues to operate isokinetically, that is with a suction velocity at the nozzle equal to gas velocity past it, irrespective of variations in the main gas flow resulting from adjustment of flue suction.

Description

All the components of the apparatus are mounted on a steel base-plate, measuring about 5½" x 9½" inches by which the device is secured to the flue ducting. The ejector tube can be rotated to any of four positions to suit the direction of gas-flow and has an adjustable nozzle in its throat to permit regulation of the suction. The probe-tube can also be rotated to any position to suit the direction of flow and is locked with locking-nuts. The cyclone body is surrounded by an electrical heating-jacket to eliminate condensation, which would cause solids to accumulate in the cyclone instead of falling into the glass vessel. The cyclone can be readily removed from the assembly to facilitate periodic cleaning. The rating of the heater is 100W at 110V, or 240V and a plug-and-socket connector is provided on the cyclone bracket for connection of the supply. Two manometer tapping points are provided, one at the inlet and one at the outlet of the cyclone, for initial setting-up on installation.

The sampling-vessel is of glass. It is secured in position below the cyclone by a U-clamp and winged screw and can be quickly removed when the screw is slackened. The sampling-nozzle is stainless steel and is available in 4 sizes – ⅜ inch, ½ inch, ⅝ inch or ¾ inch. The customer has to choose one size for a standard order, the choice depending mainly upon the gas velocity in the duct. It is secured to the end of the probe, which can be of any length up to 10 feet.

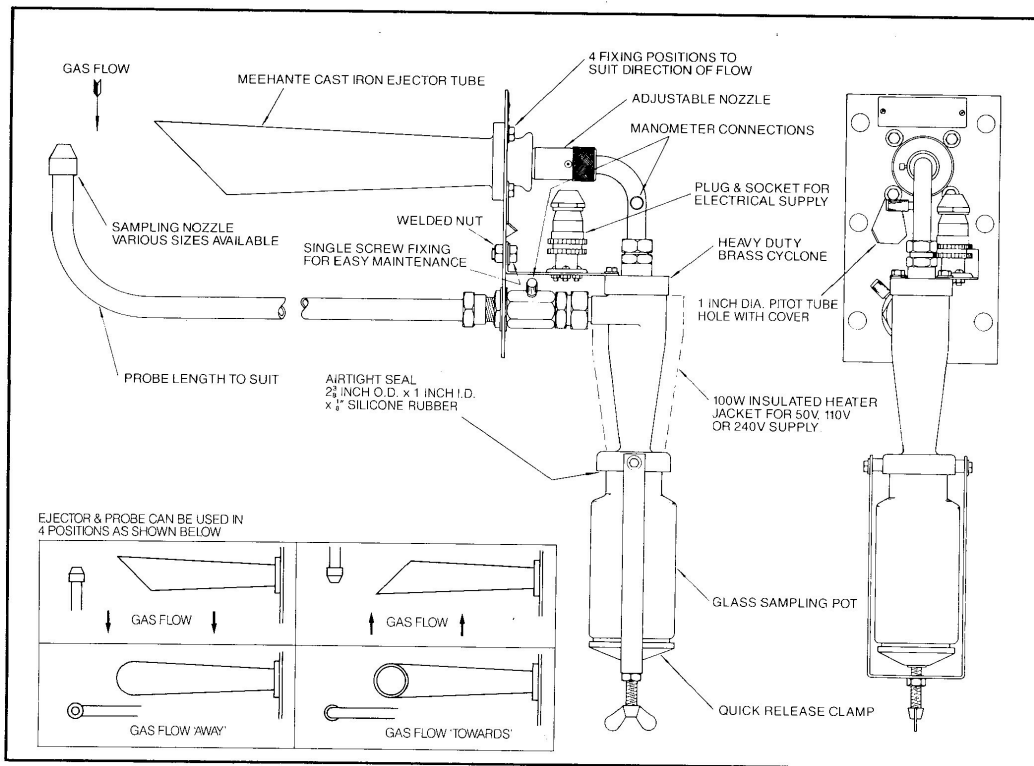
Installation and operation

LOCATION.

The CEGRIT can be used for up or down or horizontal gas flows, as the ejector-tube and sampling nozzle may be rotated to suit. The materials used in construction allow location in gas temperatures up to 700°F, which typically corresponds to air heater inlet temperature; but CEGRIT may be located at the air heater outlet. A location should be chosen where the distribution of velocity and dust is likely to give the best results.

NOZZLE.

The nozzle size depends mainly upon the gas velocity. A size should be chosen that will give a flow-rate through the cyclone of 4-6 cfm at boiler maximum calorific rating for isokinetic sampling. This rate ensures a high rate of efficiency of dust collection, and a nozzle diameter of ⅝ inch dia. will normally be found satisfactory. The graph shows cyclone pressure drop related to gas velocity head (pitot differential) for various nozzle sizes. If coal having a very high ash content is being burned the container may fill too quickly for convenience: in this case a size smaller nozzle may be used without any significant loss in collecting efficiency. The smaller nozzle will also reduce the rate of erosion of the cyclone, which would otherwise tend to be high when the rate of dust-accumulation is very high.



INSTALLATION.

Ensure that the entire assembly and the joint between the flue ducting and the mounting flanges are completely air tight. Switch on the heater and allow the cyclone body to warm up, then connect a manometer across the manometer tapping points. A 0-8" W.C. "Slim Jim" manometer (see leaflet AI 135/185) is ideal for this purpose. Insert a pitot tube into the duct through the sight hole provided for the purpose in the mounting flange and with the boiler operating at a suitable steady load (say between 80% or 100% M.C.R.) take a reading as near as possible to the sampling nozzle without allowing the reading to be affected by the proximity of the nozzle. The cyclone differential (measured on the manometer) required to suit the gas velocity as indicated by the pitot reading can be determined from the calibration graph. Adjustment is made by axially repositioning the nozzle in the ejector throat.

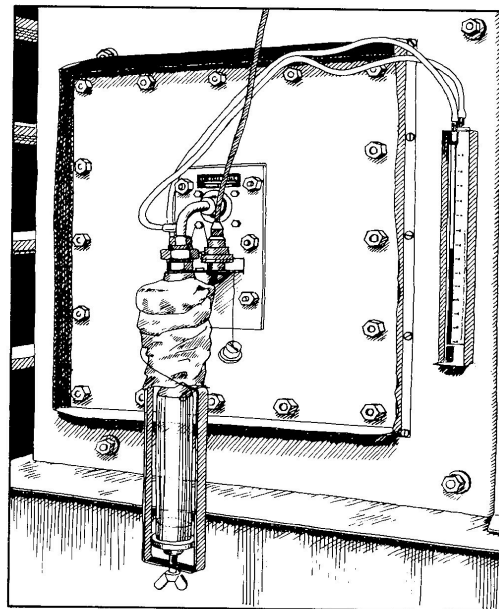
OPERATION.

As the CEGRIT will operate during the lighting-up and initial loading stages, the sample collected during this time should be discarded if it is not to be included in the sample for the whole shift. When the sampling flow rate has been correctly set at a given boiler load it is self-regulating to within 12% of isokinetic conditions from zero to maximum boiler load. Deviations of this order have no significant effect upon the accuracy of sampling.

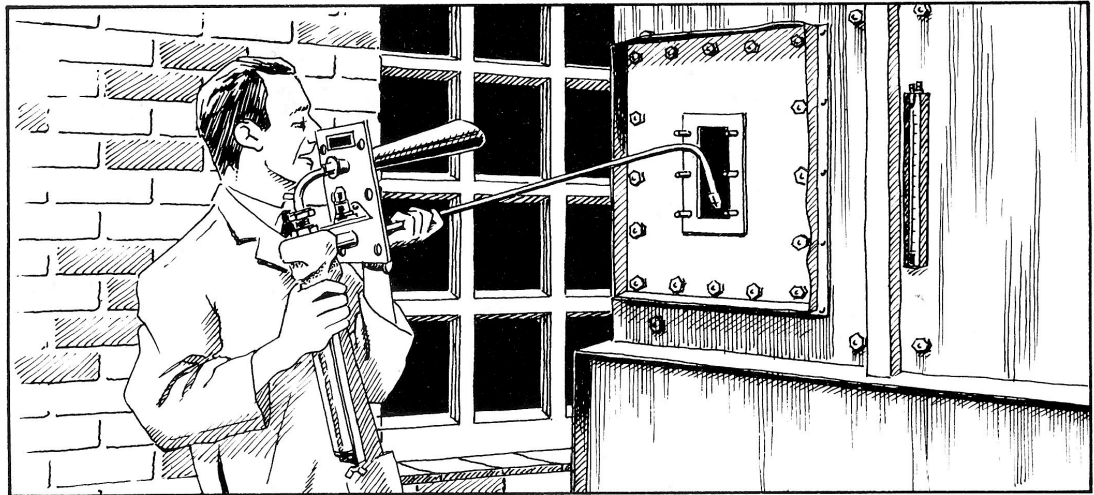
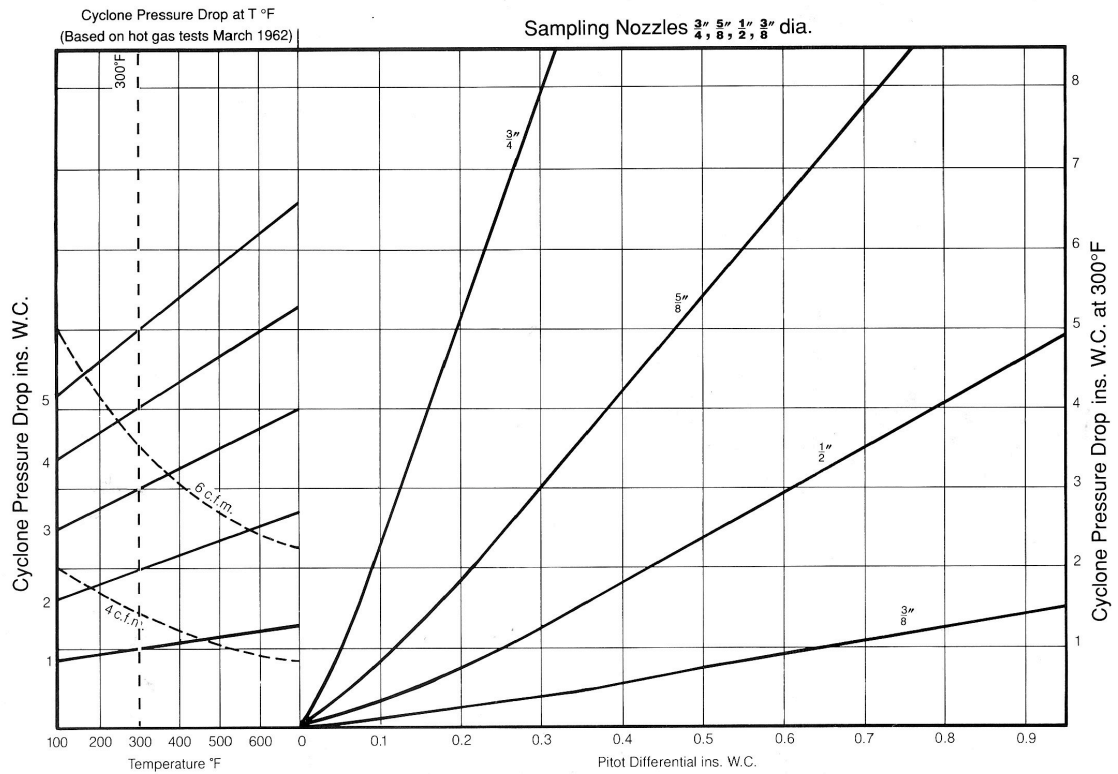
The sampling efficiency is very high: for example, with a nozzle of $\frac{3}{8}$ inch diameter in gas at a velocity between 20 and 45ft/sec, the efficiency with a typical fine pulverised-fuel dust is at least 99%.

AGITATOR.

If the grit emission is of a clogging nature, we are able to offer as an option an agitator which comprises a tough striker suspended on a stainless steel wire on the axis of the cyclone. The agitator vibrates freely in the air stream thus minimising the build-up at the throat.




CEGRIT in operation connected to setting manometer at a C. E. G. B. Power Station



CEGRIT being inserted into a boiler flue at a C.E.G.B. Power Station.

Should you require a more detailed specification for a product described herein, please contact our Sales Department. In view of our continuous program of improvement we reserve the right to change the specification, color range and price for any model or item described in the publication.

Developed by the C.E.G.B. (British Patent No. 872904)



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