TECHNICAL BULLETIN

KAYSER TECHNOLOGY

ACE-MODEL AT PERFORMANCE CAPABILITIES

j.kayser@kaysertech.com

www.kaysertech.com

SUMMARY

ACE-Model AT is an "Attrition Test" apparatus that evaluates the physical degradation of catalysts by high-velocity gas jets at elevated temperatures. KTI prefers the "hot" attrition measurement for FCC and related catalysts because temperature significantly alters the binding forces that hold particles together against the forces of attrition: forces which cause both particle fracture and abrasion. KTI has six Model AT attrition cells.

ASTM D5757-11 (2017) describes a room temperature attrition test that uses a 3-orifice design which aims the gas jet flows vertically upward into a fluidized bed of material. Albemarle's "Hot Attrition Test" is a direct analog of ASTM D5757 but usually performs the attrition at 600°C. KTI decided to not follow the design concepts of ASTM D5757-11 since this forces the reactor bottom design to be a flat plate. The Model AT uses a 6-orifice design and the orifices are aimed upwards at a 45° degree angle from vertical.

Like other attrition tests (jet-cup, ASTM, and Albemarle HAT), the Model AT design measures catalyst lost by elutriation from the attrition vessel at a specific velocity. So, particles below a certain diameter are lifted essentially by the principle of Stokes' Law.

The ACE-Model AT can measure thermal shock effects (particle degradation by rapid temperature change) and has several other features which provide quantitative insight into the extent that FCC catalyst particles succumb to attrition.

CAPABILITIES

HOT ATTRITION MEASURMENTS:

- Initial loss by thermal shock (thermal shock may also be avoided)
- Initial loss in the non-linear region
- Linear loss rate over time
- Other special measurements and variables

KTI uses several parameters to describe the attrition results depending on the "other special measurements" performed. Attrition data may be condensed down to a singular number like an Attrition Index, but this is an oversimplification. KTI plans to publish attrition measurements pertinent to ACE-Model AT and include comparisons to other techniques whenever possible.

END DOCUMENT (February 1, 2021)