

## **Mechanical properties of tin tailing sand-clay mixture from Batu Gajah, Perak, Malaysia for making greensand casting mould**

### **ABSTRACT**

Tailing sand from ex-tin mine in Batu Gajah containing between 95.9 to 98.9% silica. In this research involved the process of, conducting the mechanical sieve grading to identify the size spread, plotting the grain size distribution and calculating the average grain size. Further on with the effects of controlled additions of clay (bentonite) and water and determining the working range on the mechanical properties. The investigation involved comparing the mechanical properties of the tailing sand to the requirement for foundry sand applications listed by Foseco Ferrous Foundrymans Handbook (Foseco). Permeability and green compression strength are the important mechanical properties and considered much in the sand casting mould preparation. These mechanical properties play a vital role in determining the allowable clay and moisture content for working range of tailing sand for making green sand casting mould. Experiments for this investigation were conducted according to American Foundrymen Society (AFS) standard of procedures. Cylindrical test pieces dimensioning of  $\text{Ø}50 \text{ mm} \times 50 \text{ mm}$  in height from various sandwater ratios bonded with 3.8%wt clay and then 7.4%wt clay, were compacted by applying three ramming blows of 6666 g each using Ridsdale-Dietert metric standard rammer. The specimens were tested for green compression strength using Ridsdale-Dietert universal sand strength machine and permeability number with Ridsdale-Dietert permeability meter. Before the tests were conducted, the moisture content was measured using moisture analyser. Tailing sand with allowable moisture content ranging from 3 to 3.5% (bonded with 3.8%wt clay) and 5.5 to 6% (bonded with 7.4%wt clay) were found to have optimum working range with effective green compression strength and permeability.

**Keyword:** Average grain size; Clay and moisture content; Grain size distribution; Green compression strength; Permeability; Tailing sand