

# **Services**

### **Transportable Moisture Limit**

### **TML Testing**

The transportable moisture limit (TML) is the moisture content above which the liquefaction phenomenon takes place, under the specified acceleration and compaction condition. Certain bulk cargoes have a transportable moisture limit that, if exceeded, pose a risk of liquefying.

A wet (partially saturated) granular material consists of solid particles and voids (water and air). When compaction is applied, particles may move microscopically and the volume of the void may decrease. In such case, if the void is filled with water and the water flow through the small void is resisted, the pressure of the water in the void increases.

The shear strength of granular materials is maintained by friction and cohesion. Friction is expressed as the product of effective compressive force between particles and the friction coefficient. When the pressure of water in the void increases, effective compressive forces between particles decrease; then, the shear strength of the granular material becomes insignificant. If cohesion is negligible, the material may flow. Such a phenomenon is called "liquefaction".

TUNRA Bulk Solids is accredited by the Australian Maritime Safety Authority (AMSA), the competent authority for the International Maritime Solid Bulk Code in Australia, as a provider of testing services that may issue TML certificates in accordance with the IMSBC code or relevant international standards.

TUNRA is not only a test provider but, together with the Centre for Bulk Solids & Particulate Technologies, was also heavily involved in the research work that led to the development of the Proctor/Fagerberg Methods modified for Iron Ore Fines and Coal.







### Flow Table Method

### Penetration Table Method





### **Proctor Fagerberg Modified for Coal and Iron Ore**





### **Proctor Fagerberg Modified for Bauxite**



### **Proctor Fagerberg Standard TML Test**





## Why TUNRA Bulk Solids?

### **Experience and Expertise**

We have provided expert solutions to industry for over 45 years and are the leading organisation for materials handling research and consulting in Australia and internationally

#### **Research and Development**

We have a proven track record in research and development through the close association with The University of Newcastle

#### **Quality Service**

We have highly qualified, well-trained and specialist staff that are committed to delivering excellence

### First Class Facilities

Our laboratory is a state of the art facility located within the Newcastle Institute of Energy and Resources (NIER) at The University of Newcastle

Industry Standards We are accredited to ISO 9001, ISO 45001 and ISO 14001

**Independent** We are independent and not for profit



# Further information

- To access our Case Studies visit www.bulksolids.com.au
- To discuss your industry and business needs
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