

Model Specification For Earthworks Improvement Using Quicklime

Model Specification For The Treatment Of Unsuitable Cohesive Earthworks Material With Quicklime To Produce General Fill

1. Overall Requirements.

The moisture condition value (MCV) of the untreated earthworks material shall be established according to BS 1924: Part 2. Quicklime shall then be added to achieve an MCV in the range 8 to 12 at the time of placement and compaction. Records of the MCV values before and after the addition of quicklime, and the percentage of quicklime added, shall be recorded and graphed to enable the correct dosage to be applied during construction.

2. Material to be treated.

There are no requirements for the material other than the practical limits set by the capabilities of the plant and the ability to reach the required MCV after the addition of quicklime. Should it be necessary to comply with a particular specification the criteria should be assessed after treatment with quicklime. Depending on the end use of the treated material the presence of sulfates, total sulfur and organics may need investigation in the laboratory to ensure there is no adverse effect on the long term performance of the material.

3. Quicklime.

The quicklime used in the works shall be to the following specification with an addition rate to meet the MCV requirements.

- ♦ CaO + MgO content > 80%
- ♦ MgO content < 10%
- ♦ Reactivity with water, established in accordance with BS 890 or EN459-2, shall achieve a temperature of at least 60°C within 5 minutes
- ♦ Particle size: 100% passing a BS 10 mm sieve and at least 95% passing a BS 5 mm sieve

4. Construction.

4.1 Lime addition shall be carried out by spreaders that apply an accurate and uniform dosage of quicklime and minimise airborne dust. Spread rates shall be checked every 500m².

4.2 MCV tests shall be carried out every 500m³ before and after the addition and mixing of quicklime.

4.3 Any water required to be added to the treated material to achieve the required MCV range in clause 1 shall be free from deleterious material and shall be added in a uniform manner that achieves homogeneous mixing.

4.4 Mixing of quicklime with the unacceptable material shall be carried out using ploughs, disc harrows or rotovators or a combination of such. Sufficient mixing shall be carried out to produce a homogeneous mixture throughout the full depth of treatment.

4.5 Unless otherwise agreed by the Engineer, the treated material shall be pulverised such that 95% passes a BS 28mm sieve prior to compaction.

4.6 For lime treatment carried out at source the depth of mixing shall be compatible with the capability of the spreader and mixer(s). For treatment carried out at the point of use the depth of the layer shall also reflect the capability of the compaction plant and the requirement of clause 4.8.

4.7 Site material mixed at source may be excavated immediately and transported to the point of use. In the case of very wet material a delay of 1 hour may be beneficial to allow the drying process to complete.

4.8 Spreading and compaction of the treated material at the point of use shall be carried out in accordance with clause 612 of the Specification for Highway Works. If layers thicker than 250 mm are to be constructed the Engineer shall confirm the number of passes required by the compaction plant to ensure adequate compaction at the bottom of the layer as demonstrated on a trial area.

4.9 Lime improved material allowed to deteriorate due to exposure to the elements shall be treated with additional quicklime if too wet, or water if too dry. This shall be in accordance with the above clauses, and shall meet the required MCV range before compaction.

4.10 Lime improved material may be susceptible to frost and should be used in accordance with good practice principles for any frost susceptible fill material.

5. Treatment of Granular Material and Chalk.

The requirements for these materials are similar to cohesive soils but the controlling criteria is moisture content rather than MCV. Moisture content shall be in the range Optimum Moisture Content to OMC-2% or other appropriate range demonstrated by trials. No account needs be taken of sulfate or sulfur content providing clay is not present in the material.



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Manchester Airport 2nd runway constructed using lime
Photographs supplied courtesy of Manchester Airport.

specification

data 1

earthworks improvement



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The British Lime Association is one of the constituent bodies of the Quarry Products Association, the trade association for the aggregate, asphalt and ready-mixed concrete industries.

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