

Emplacement tests with granular bentonite

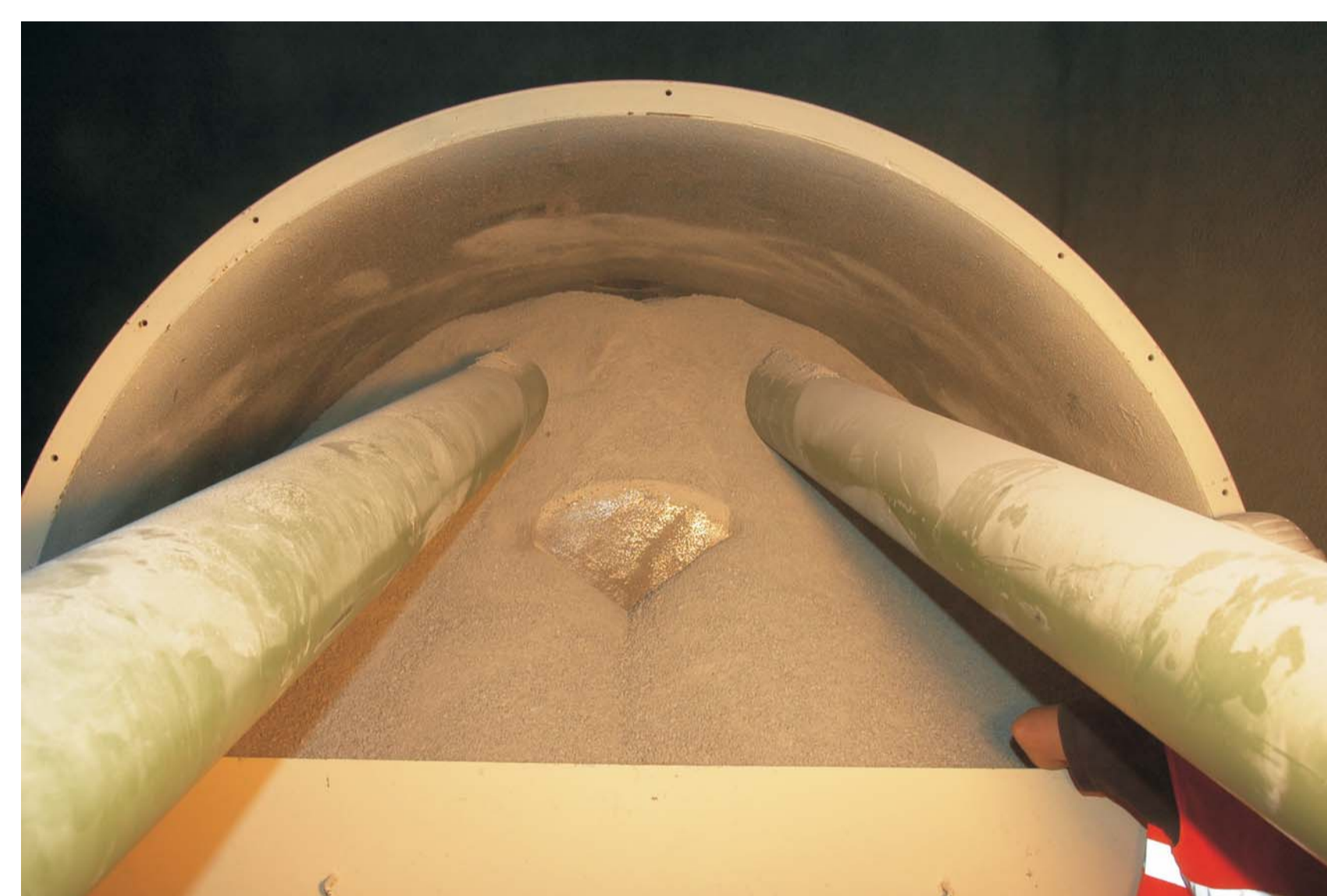
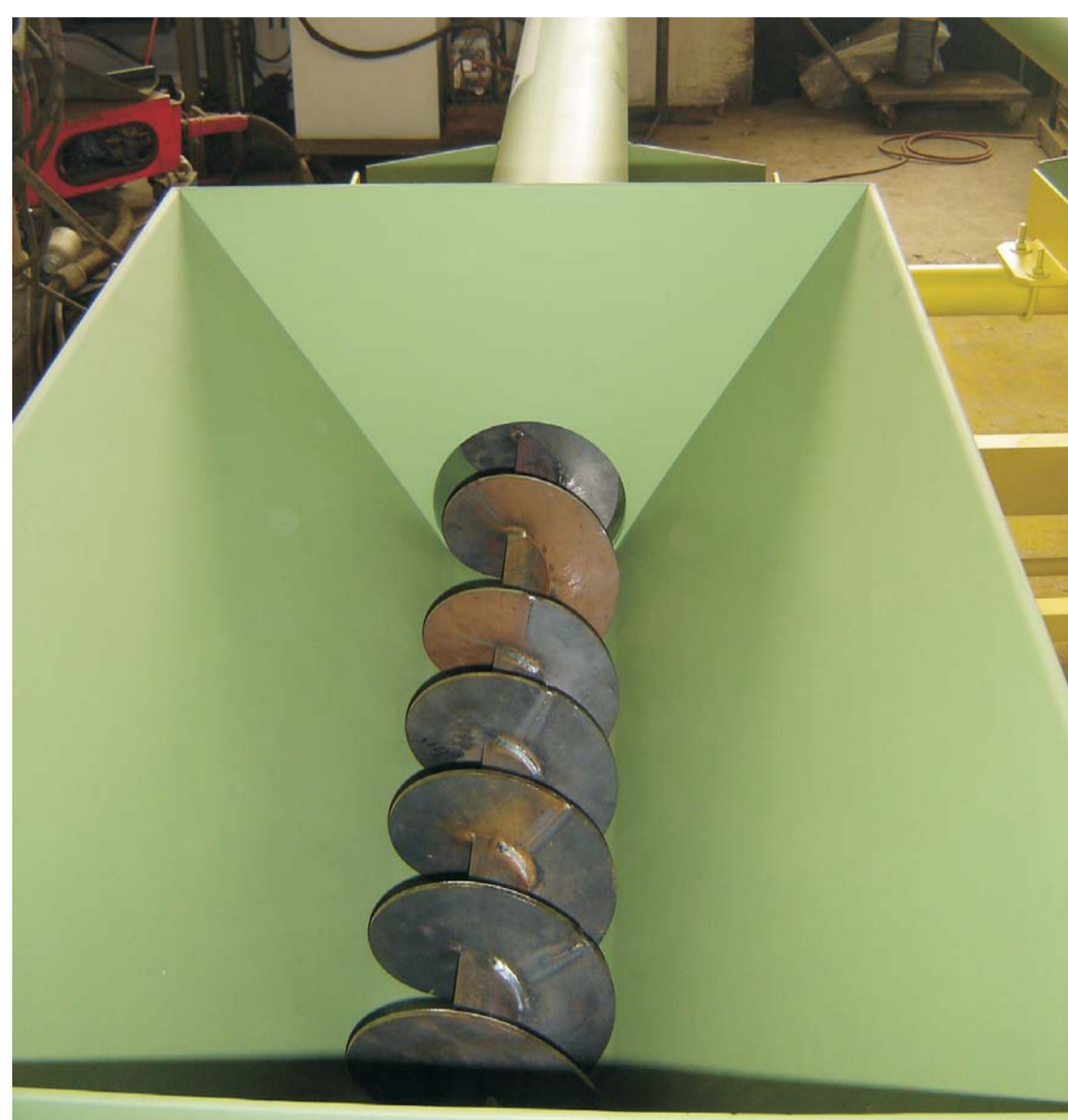
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Objectives / Concept

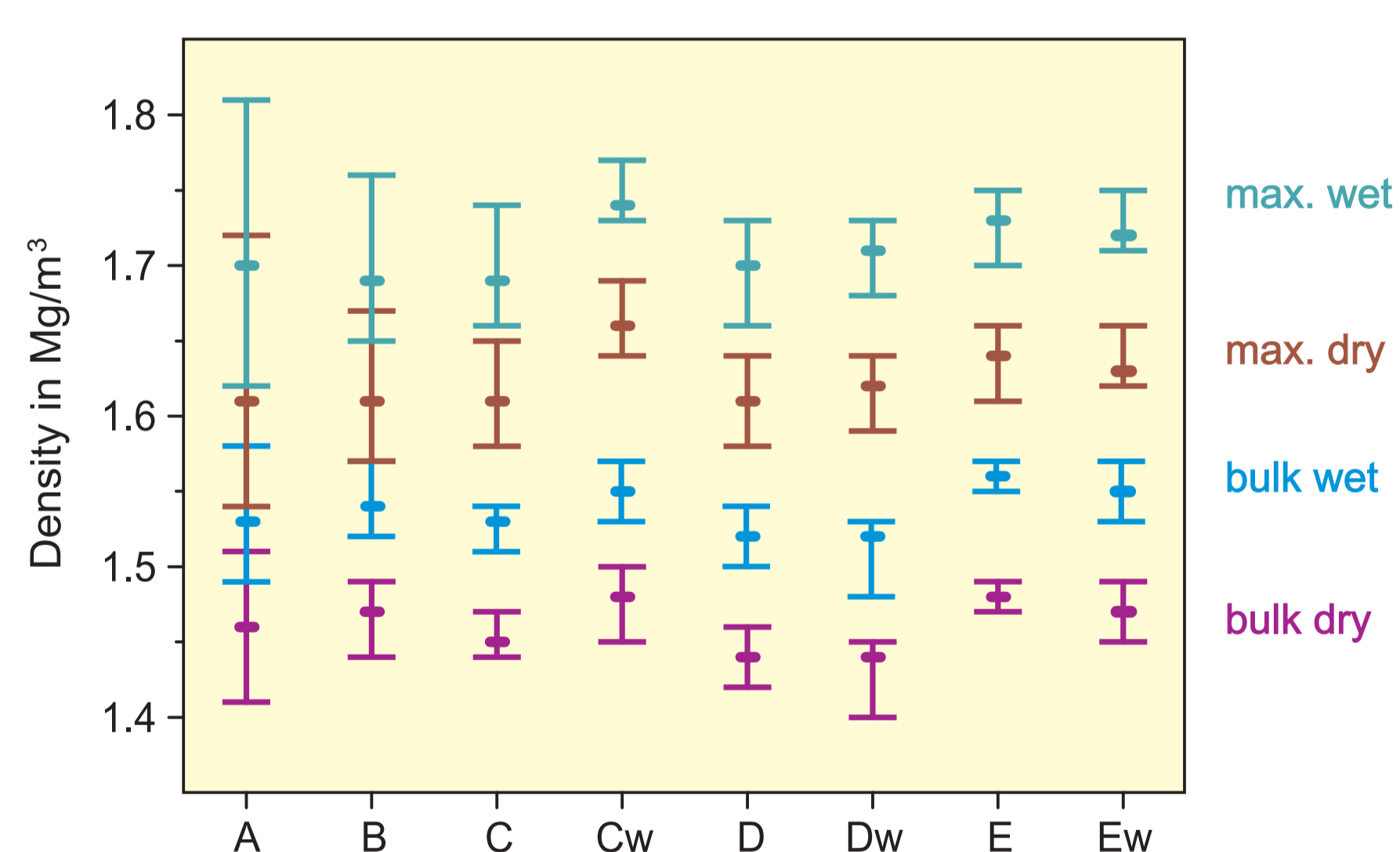
- Testing and demonstrating of suitable granular buffer installation techniques on a full scale in surface facilities;
- Verification if the requirements are fulfilled and optimization of different parameters.
Target value for the emplacement dry density 1500 kg/m³.

The built twin auger system to emplace the buffer material has a length of 9 m and a weight of 1350 kg. The length of the two auger casings is 7.0 m, the diameter of the auger tubes are 0.2 m. The feed rate can be controlled by the auger turning speed. The maximum feed rate is 7 m³ per hour. The maximum filling volume of the steel cylinder is 7 m³, resp. about 10 tons of granular bentonite.



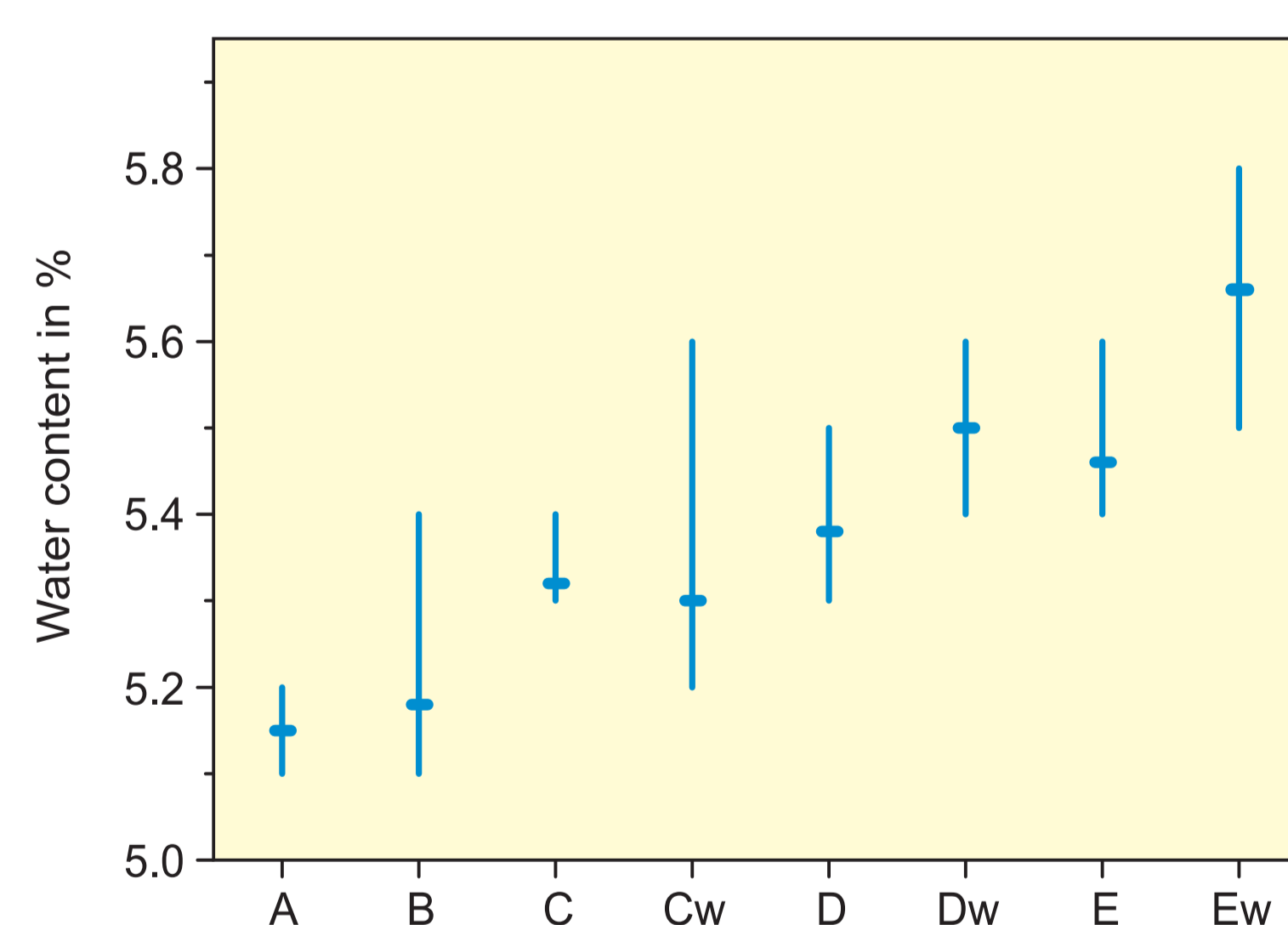
Results

Laboratory density measurements



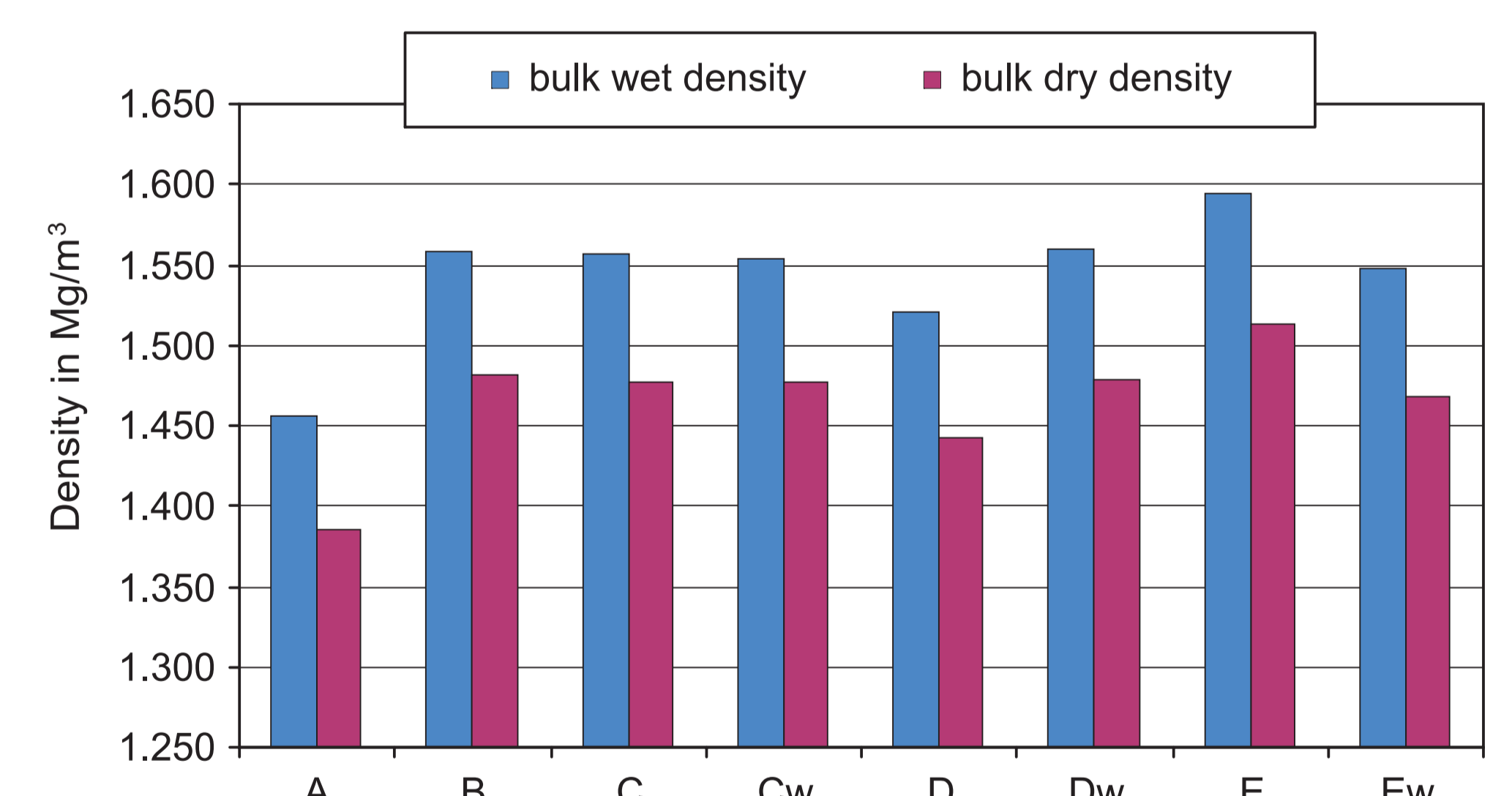
Bulk dry density of loosely filled material from 50 cm height
Bulk wet density of loosely filled material from 50 cm height
Max. dry density of vibrated material on a sieve shaker table
Max. wet density of vibrated material on a sieve shaker table

Water content

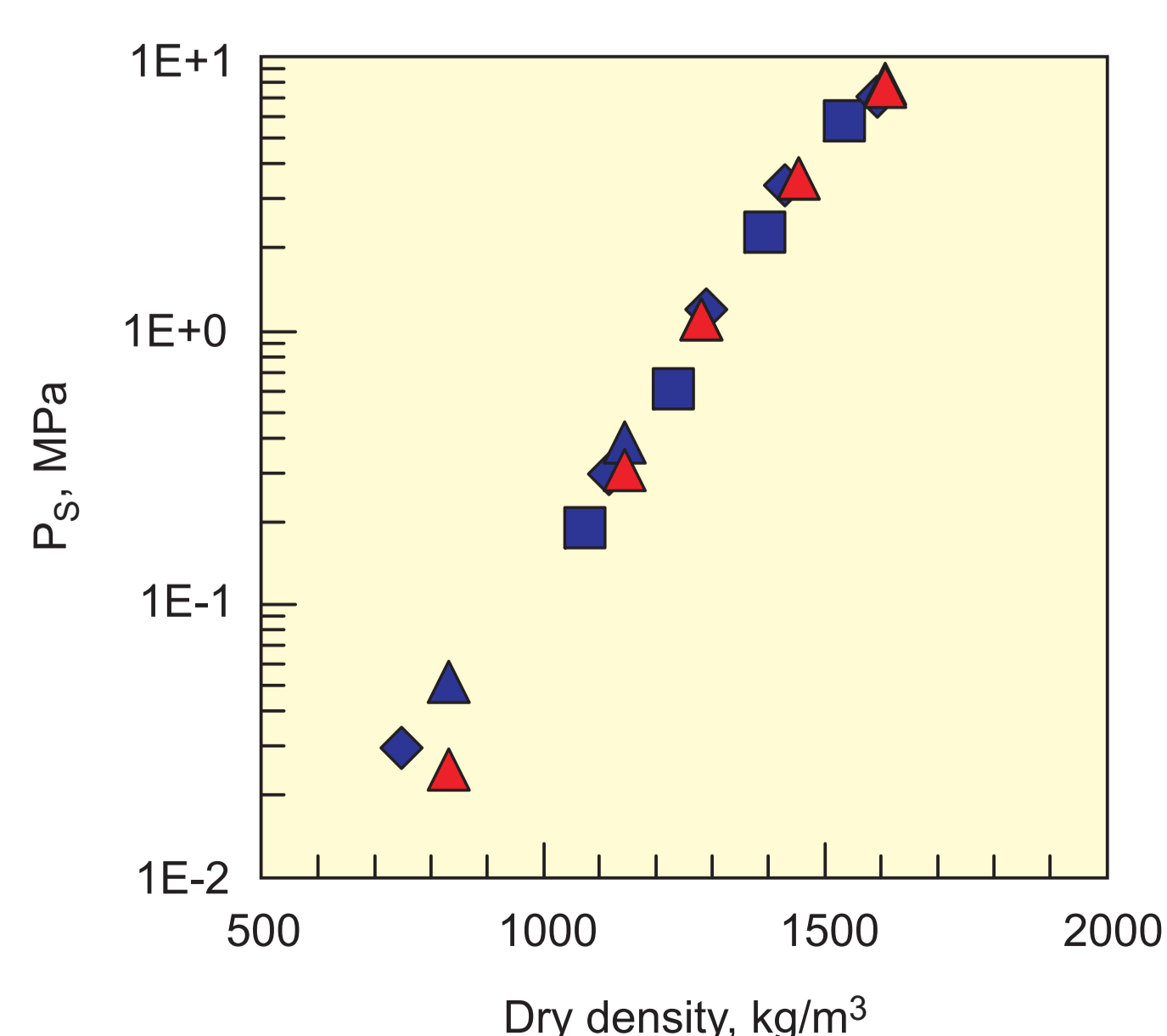


A 100 % coarse rounded granular material, embedded in two layers
B 92 % coarse, 8 % fine, two layers
C 85 % coarse, 15 % fine, two layers
Cw 85 % coarse, 15 % fine, two layers

Overall density calculation (total weight/total volume)



D 70 % coarse, 30 % fine, two layers
Dw 70 % coarse, 30 % fine, repeat run, two layers
E 64 % coarse, 28 % fine, 8 % briquettes, two layers
Ew 64 % coarse, 28 % fine, 8 % briquettes, repeat run, only one layer



Swelling pressure (left) and hydraulic conductivity (right) as a function of dry density for all samples with Wyoming bentonite. Squares show results from reference bentonite, diamonds show results from granulated material, and triangles shows results from the second series of granulated material before (blue) and after heating to 90°C (red).

