

MÉNARD AND THE PRESSUREMETER TEST

By **Alexandre Lopes dos Santos**, young member of the French Society for Soil Mechanics and Geotechnical Engineering (CFMS Jeunes), April 2022

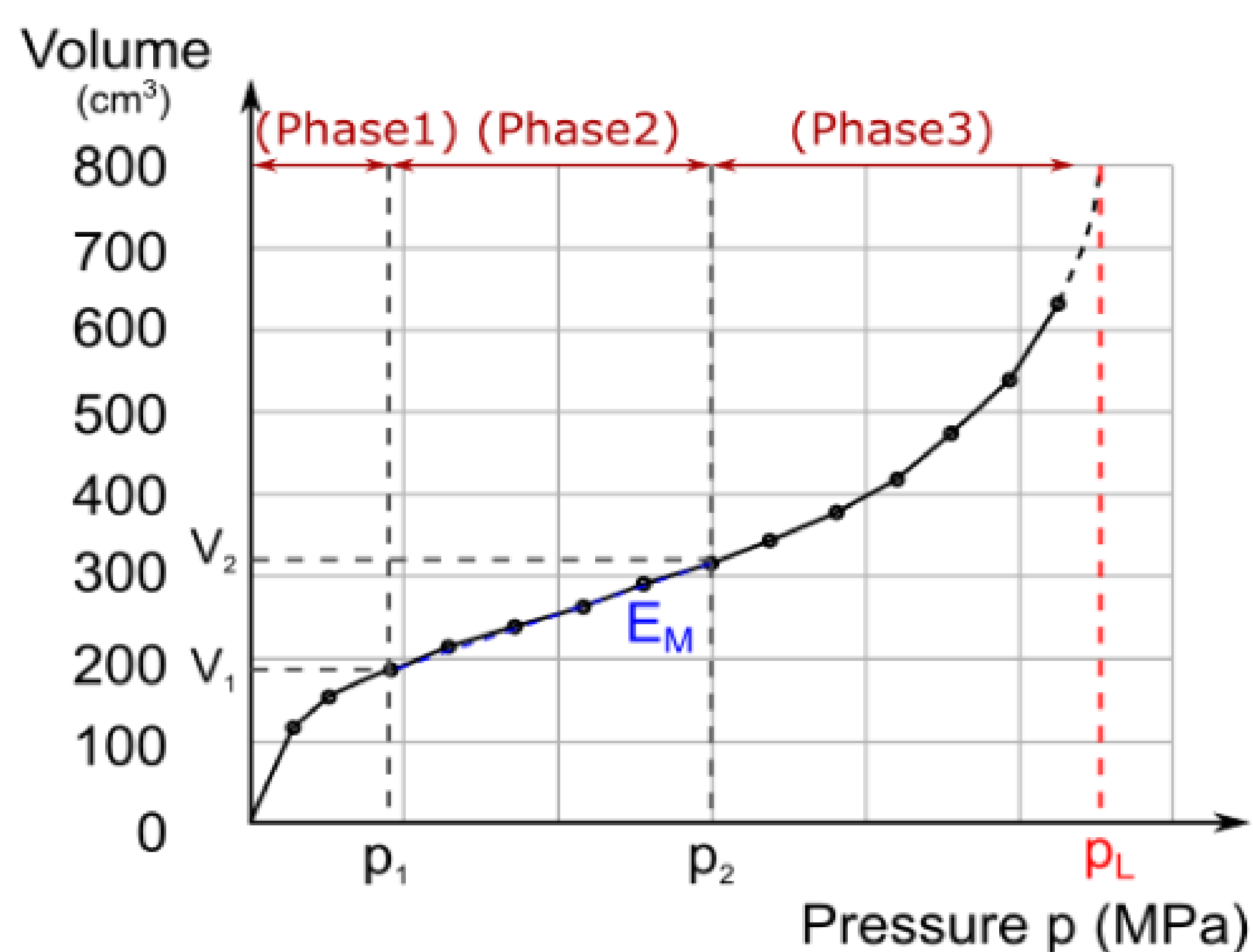
Ménard developed an innovative *in situ* investigation technique that provides both deformation and failure parameters of the ground. More than that, he developed concepts that are the basis of an original school of thought on foundation engineering.

The engineer: Louis Ménard



Louis Ménard

Louis Ménard (1931 - 1978) was a French engineer who graduated from *Ecole Nationale des Ponts et Chaussées*. He is internationally known for the invention and the development of **the pressuremeter** and **the pressuremeter test**.



- Deformation parameter: **the Ménard modulus E_M**
- Failure parameter: **the limit pressure p_L**

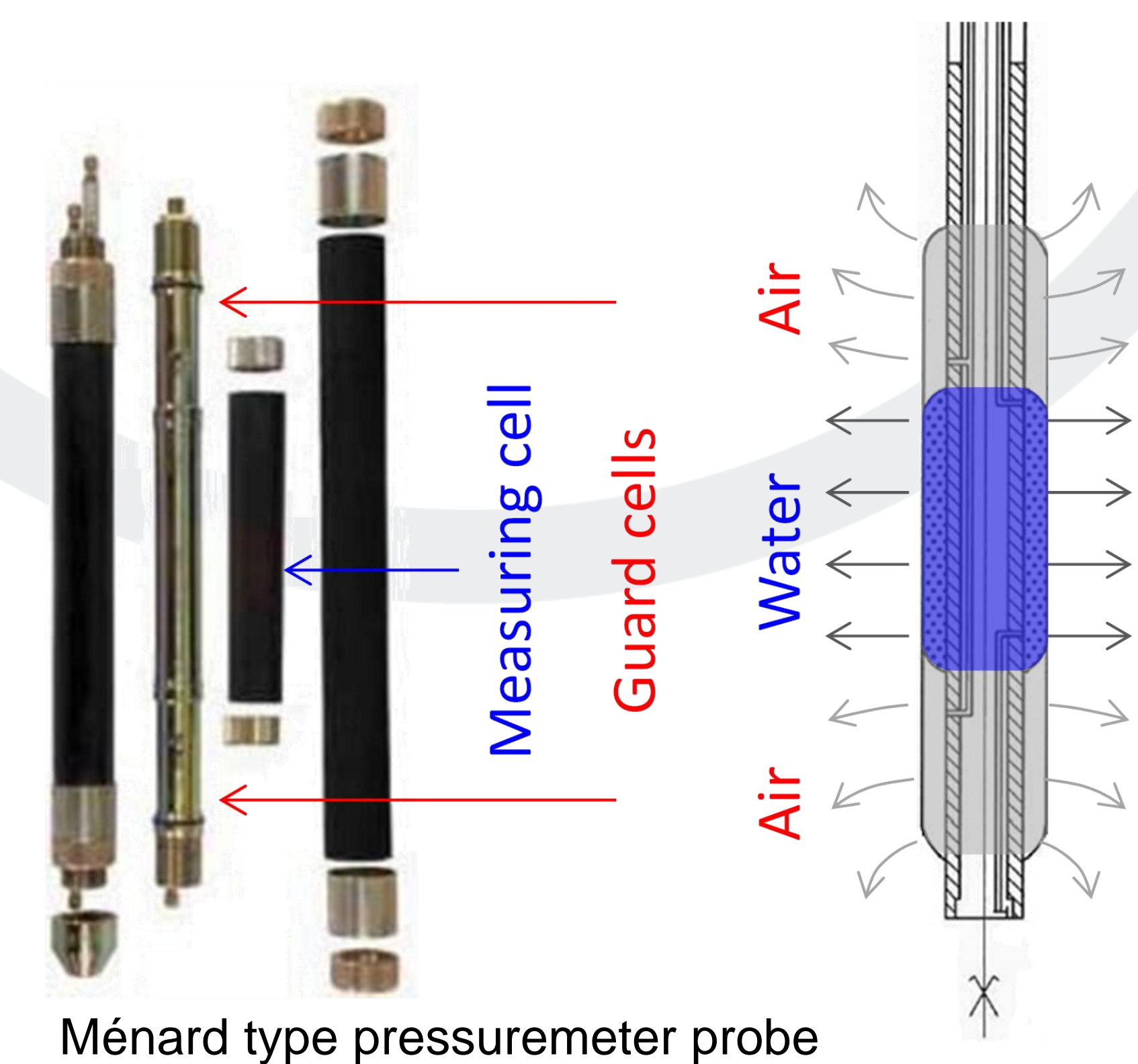
A remarkable work

Ménard was only 23 years old when he invented the pressuremeter. He developed concepts and methods that contributed to a deep change in the way geotechnical investigation and foundation design was done in France. Besides an engineer and inventor, he proved to be a businessman able to spread his ideas worldwide. Amongst his contributions we can quote:

- Creation of the journal **Sols-Soils** (1962-1980)
- Development of the first **foundation design rules using the pressuremeter** (Notice D60). These rules evolved and are now present in the international foundation standards
- The development and implementation of the **dynamic compaction** techniques

The pressuremeter test continues to evolve:

- The **International Symposium on Pressuremeters** was initiated in 1982 and is now in its 7th edition
- The French joint industry-academia research project, **ARSCOP** (2016-2022) is dedicated to the improvement of the pressuremeter techniques and design methods



Ménard type pressuremeter probe

The pressuremeter test

The pressuremeter test is an *in situ* **cylindrical cavity expansion test**. The test consists of **inserting an inflatable probe into the ground**, inflating the probe and **pressurizing the ground** according to a given loading protocol and taking **measurements of pressure and volumetric expansion**. It results in a cavity expansion curve, from which it is possible to derive a **ground deformation E_M** and **failure parameter p_L** – see graph. These parameters can be directly used for the design of foundations and other geotechnical structures.



Recent Pressuremeter equipment



Dynamic compaction techniques were also a contribution by Ménard

Interview with Professor Roger Frank

*“The pressuremeter test is very useful because it can be performed in **all ground conditions**, from soft soils to hard soils or soft rocks, and it provides the geotechnical engineer with **both deformation and failure parameters**, which are useful for **all aspects of foundation engineering**”*

Want to see the whole interview? Please visit the Time Capsule Project page on the CFMS site.