

FUMOSO INDUSTRIAL, S.A.

ORDER: RANGE OF USE FOR DRENOTUBE[®] SYSTEM DEPENDING ON THE STRESS OF INSTALLATION

Mr. Josep Madurell Fernández, responsible for the drenotube[®] product, hereby certifies that drenotube[®] can work through the pressure range between 0 and 100KPa as test performed demonstrate (test found under ETA 115/0201 for CE)

Drainage systems are usually installed close to the surface and stand pressure values under 30KPa. In this situation, the EPS aggregate absorbs the majority of the deformation; for example, under 20KPa the ensemble's deformation with a standard SN4 tube in the DR370L6 equals to 65mm. The EPS aggregate has an instant deformation of 25%, that over the 210 mm width (the total diameter is 370 mm and the tube's diameter is 160 mm) results in a deformation of 52,25 mm. The rest is the tube's deformation, 12,5 mm, representing 9% of the inner diameter.

Deep installed drainages are under bigger pressure values. For the standard drenotube[®] series, the EPS aggregate's deformability is $\geq 50\%$. The tube acquires an ovoid shape over the 50% too, for example, under 100 KPa, the DR370L6 is capable of draining up to 65% of his maximum hydraulic capacity even though the ensemble has a deformation of 42%, around 155 mm in relation of the 370 mm

For working conditions that fall under the high pressure range ($P \geq 40$ KPa), a special series drenotube[®] containing a SN8 draining tube is offered. This tube's deformation will be smaller. It is recommended to verify each case with drenotube[®]'s technical office, which will answer questions about viability, performance and other correcting measures.

In the end, it is considered unviable using the SN16 tube in drenotube[®]'s special series assembly due to economic and technical reasons. The EPS aggregate's deformability makes it incompatible with the SN16 tube's pressure performance.

Picture found in *Appendix 1* explains the general design of the experiment performed in order to compare the standard certified product's tube (SN4) with the special series' tube (SN8). The chart (*Chart 1*) was obtained after a non-normalized assay and therefore is only displayed to show the difference between tubes. Chart 1 is used by Fumoso Industrial only for auto control purposes.

Pictures found in *Appendix 2* demonstrate the tube's behavior under different pressure values. It has to be noticed that in real situations, the soil surrounding the ensemble would distribute the pressure differently than in the experiment and the deformity would be significantly smaller as all the drenotube components work together.

Parets del Vallés 19/11/15

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Appendix 1

Experiment design

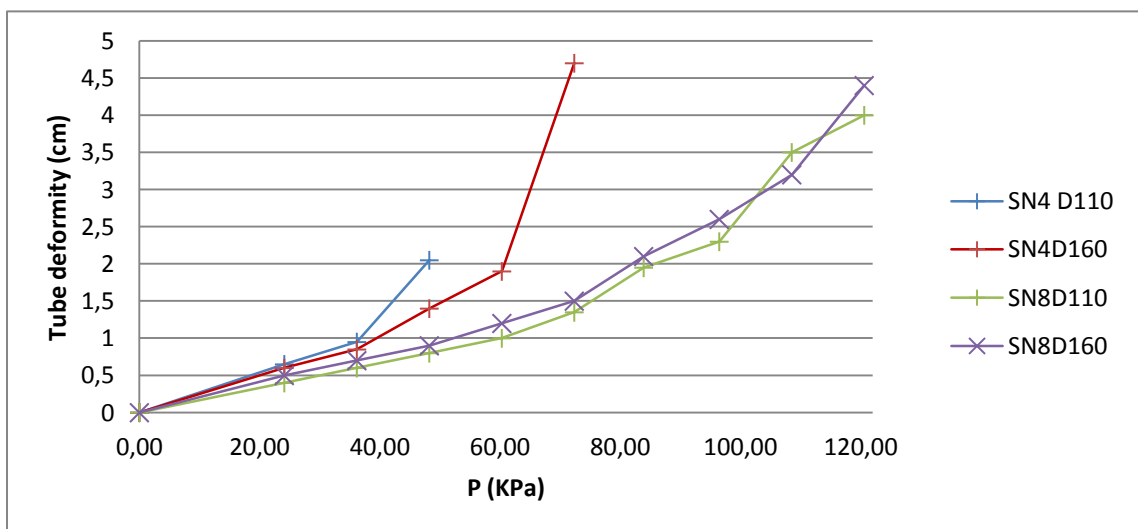
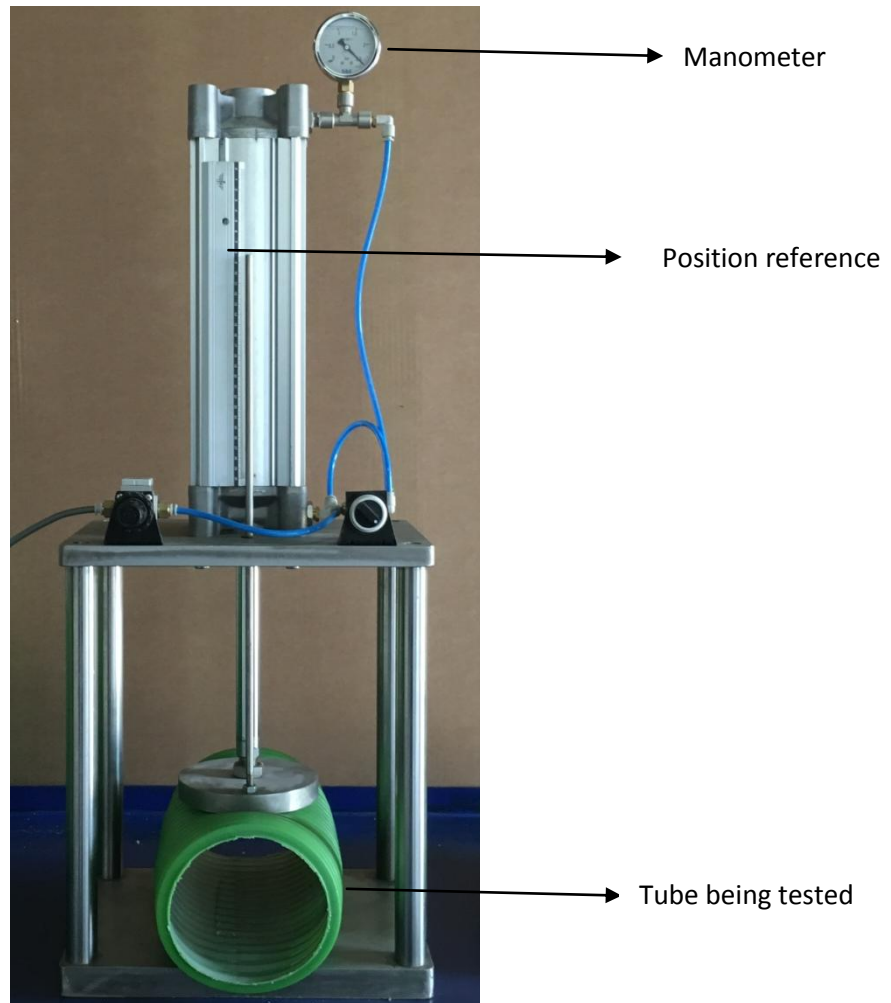


Chart 1 - Tube deformity vs Pressure

Appendix 2

SN4 and SN8 tubes under different pressure

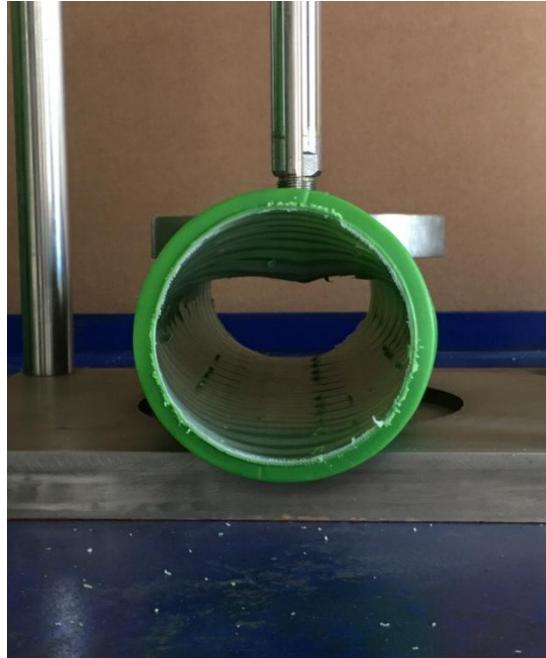


Image 1- SN4 Ø110 under 48,3 KPa



Image 2- SN8 Ø110 under 48,3 KPa



Image 3- SN4 Ø160 under 83,9 KPa

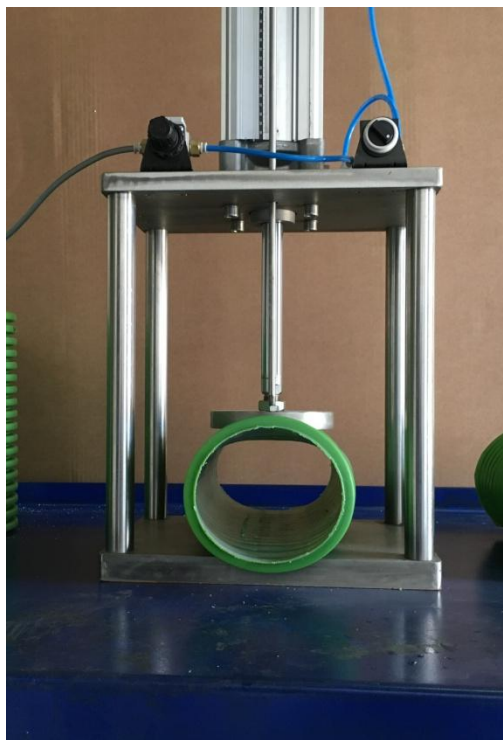


Image 4- SN8 Ø160 under 108,6 KPa