1. Introduction

Recently, ICOLD published a review of "Conventional Methods in Dam Construction" (ICOLD 1990). In the chapter devoted to filters and drains we find the following formulations:

"...Granular filters are required to prevent the smaller size fractions from migrating from adjacent material...

The Terzaghi criteria for grain sizes is generally followed, being:

\[
\frac{D_{15}}{D_{85}} f > 4 \quad \text{and} \quad \frac{D_{15}}{D_{85}} s < 4 \ldots
\]

It is not surprising that there is a great deal of confusion in the understanding of filter problems, if this matter is dealt with in such a way as in the ICOLD article. First of all, one should not use the words "filter" and "drain" in one breath, as we too often do. As is clearly to be seen from figure 1, filter and drain functions are in no way required at the same time in actual situations. In the first case shown, a drain is required, having a sufficient drainage capacity to drain off the seepage quantity of percolating water. The material of the drain, in fact, has to meet the filter requirements so as to prevent erosion in the dam. In the second case, a filter is required in order to prevent contact erosion between the dam material and the toe drain. By no means is a drainage capacity of this filter zone required here. The filter and drainage functions should clearly be kept apart from each other and the actual requirements in each individual case have to be properly checked.

It is therefore not adequate to refer to "Terzaghi's filter criteria" as quoted above, since the first criterion given refers to the drainage function whereas only the second criterion is the one referring to the filter stability problem.
Not even the introductory remark quoted is correct when mentioning the "smaller size fractions from migrating from adjacent material". As is well known, one has to rely on the internal filter stability (or "autostability") of the finer material in a base/filter combination of two soils in contact. Thus, it is sufficient if the filter is able to retain the coarse fractions of the base material. This can be seen directly from Terzaghi's filter criterion $D_{15_F}/D_{85_S} < 4$ (see above) in that it uses $D_{85_S}$ (S denoting the base material) to characterise the base material, that is the grain size of the 85 %-fractile of this soil.

In the following presentation of the present practice of filter design, the index $F$ is used to describe the filter material, the index $B$ is used to denote the base material, as is common in current literature relevant to this theme.