

Technical Application Bulletin

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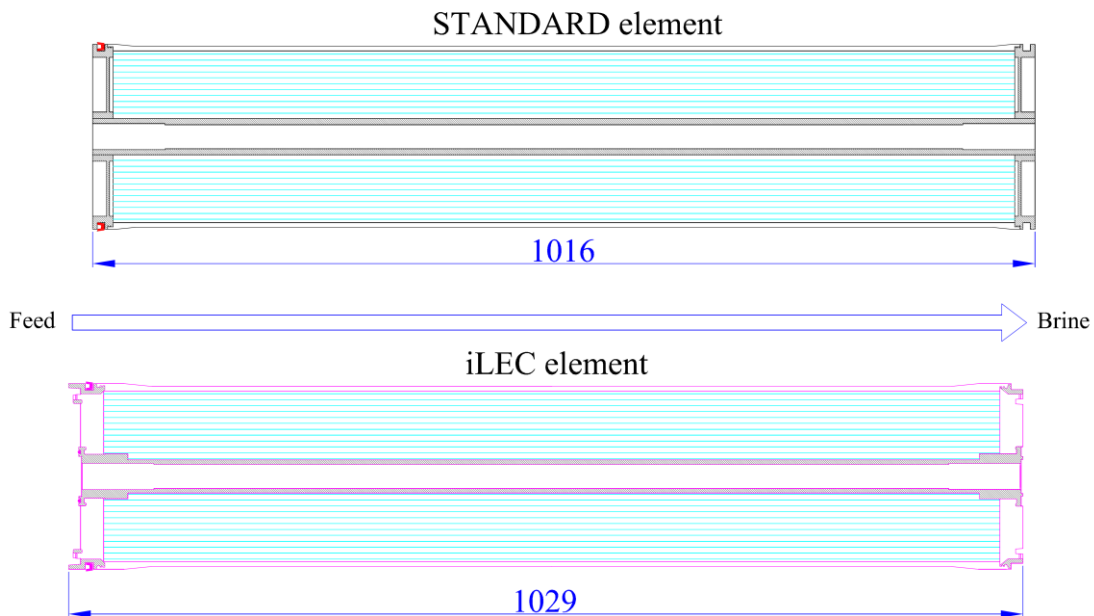
REPLACEMENT OF ILEC ELEMENTS WITH STANDARD ELEMENTS

This document aims to summarize the particularities for replacement of iLec elements with standard elements. Considering that the vessels to replace are fully loaded with iLec elements, the replacement to be performed can be total or partial. The main reason for this document is that iLec membrane elements have different length than standard membrane elements, as showed below:

- Standard element: 1016 mm
- iLec element: 1029 mm (13 mm longer than standard element).

However, when the iLec elements are connected, 13mm of brine side engages on the feed side of the connecting element overlapping total length by 13mm on each connection. Figure 1 shows the lengths of both type of elements.

Figure 1. Standard and iLec element lengths



In a set of connected iLec elements, the total length of the set is as follows:

$$\text{Total length} = 1016 * \text{number of elements} + 13\text{mm}$$

However, if the length is measured on the permeate core tube of the elements, the total length is:

$$\text{Total length on core tube} = 1016 * \text{number of elements}$$

This difference from the shell and core tube lengths comes from the 13 mm extra length non-overlapped on lead element. Figure 2 explains the 13mm difference when length is measured on the core tube or in the element shell. Figure 3 explains the difference between core tube and shell lengths for a single element.

Figure 2. iLec elements engagement and lengths

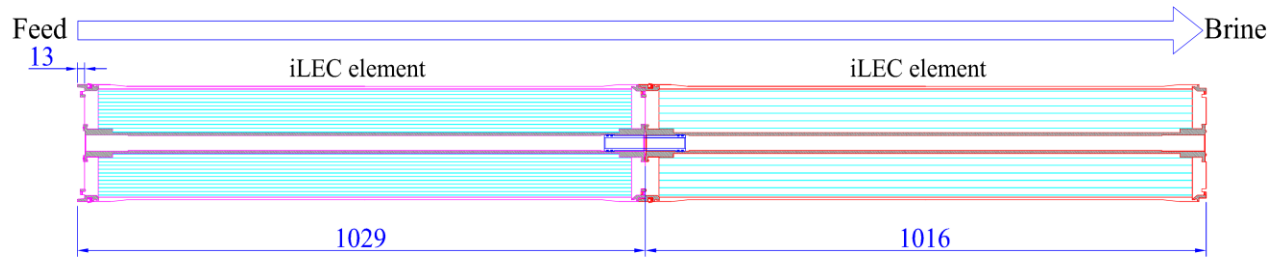
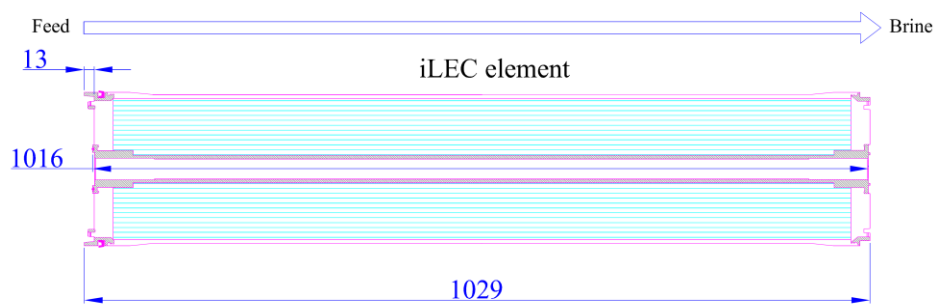


Figure 3. Core tube and shell lengths of iLec element



The excess of length on the shell on the feed side of the vessel is not an issue as there is free space from end-cap to lead element provided there is no thrust cone on the feed side.

Adaptors

Membrane elements within a vessel must be connected to the permeate ports on feed side and concentrate side endcaps. This connection is accomplished by the end-cap adaptor which are supplied by the pressure vessel manufacturers. It is important to check the existing end-cap adaptors as there are 2 types of adaptors as seen in Figures 4 and 5:

- Standard adaptor
- iLec adaptors

Figure 4. Standard and iLec end-cap adaptors

Standard Adaptor



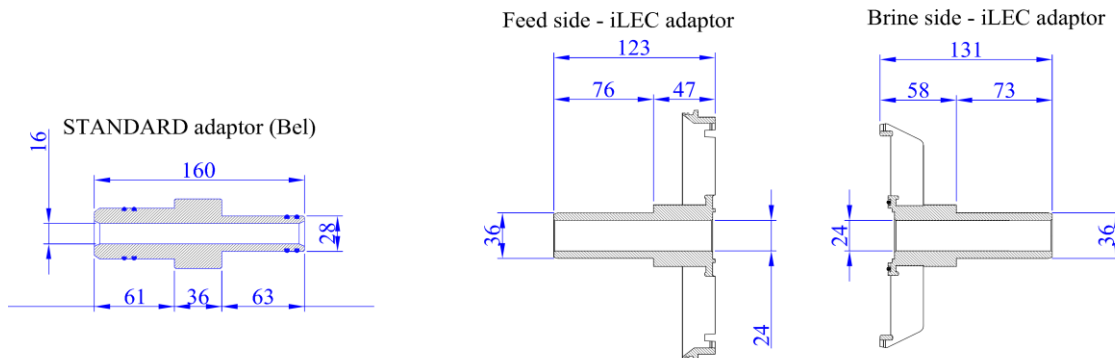
Feed Side – iLec Adaptor



Brine Side - iLec Adaptor



Figure 5. Adaptors drawings



Standard adaptors can be attached to both type of elements, standard and iLec, so if existing iLec system is equipped with standard adaptors, iLec elements can be replaced by standard elements.

If the system is equipped with special iLec adaptors, these adaptors are not compatible with the standard elements and it is necessary to contact pressure vessel manufacturer to order standard adaptors before replacement.

Interconnectors

iLec membrane elements engage each other without need of interconnector piece while standard elements are connected each other with interconnector piece (provided with new membrane elements by the membrane manufacturers). iLec elements can connect to standard elements using the interconnectors provided with the standard elements.

Full replacements

Vessels loaded with iLec elements can be fully replaced with standard elements provided that standard end-cap adaptors are available.

Partial replacements

When iLec elements are going to be partially replaced with standard elements, the standard elements must be always placed downstream iLec elements. It is not allowed to place standard elements in front of iLec elements, or to intercalate standard elements with iLec elements.

- Every standard element connected to iLec element, being in front of the iLec element, will result in an increase of 13 mm on the total elements length (measured from permeate port to permeate port) as shown in Figure 6. Therefore, membrane elements will not fit in the vessels.
- If standard element is connected to iLec element, being in front of the iLec element, the standard element will be supported by the outer circumference of the brine seal of the iLec element, but the center port will not be supported, posing a risk of element telescoping. This situation is shown in Figure 7.

Figure 6. Detail of the standard to iLec element connection lengths measured on core tubes

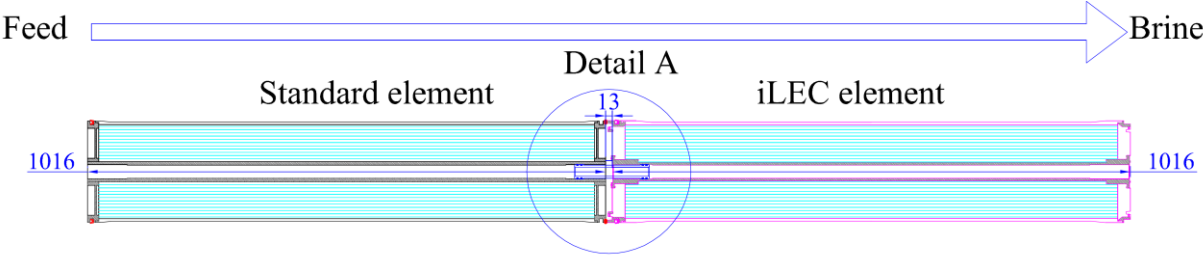
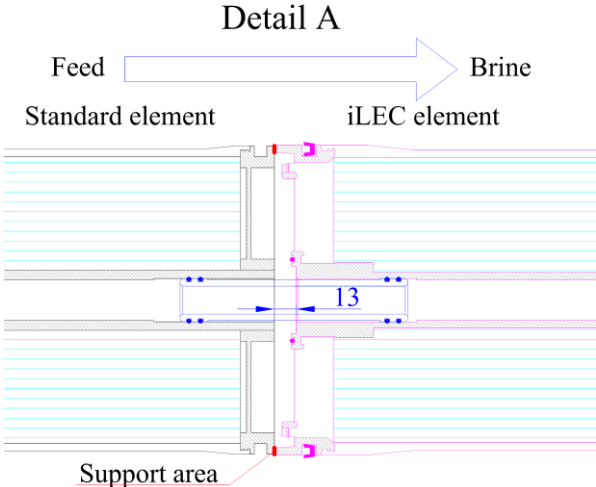


Figure 7. Support areas on Standard to iLec element connection (in red)



Figures 8 and 9 shows the connection with iLec element and Standard element. When the standard element is downstream the iLec element, the total length as measured in core tubes is not increased. The iLec element is supported in the brine seal of the standard element and in the center of the Standard element, protecting the iLec element from telescoping.

Figure 8. Detail of the iLec to standard element connection lengths measured on core tubes

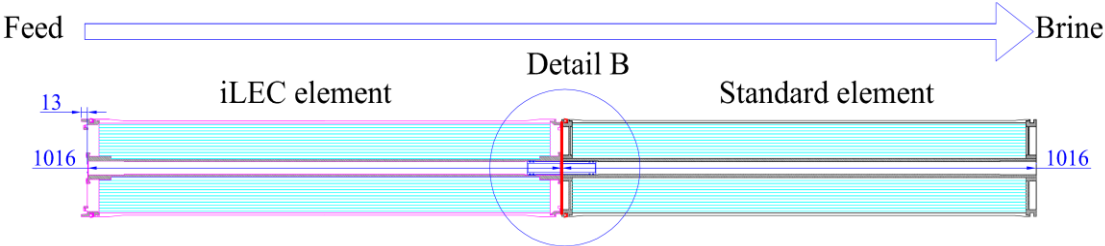


Figure 9. Support areas on iLec to Standard element connection (in red)

