

unusual MBR membrane materials. The *Porocep*[®] system comprises ten 8.5 m² elements fitted into a 1 m-tall module (or “box”), with the *POR* modules then forming a single- or double-deck skid.

Table 4-26 Hyflux *Porocep*[®] membrane module and skid specifications

| | | | |
|--|---------------------------------------|----------------------------|----------------------------|
| Material: | HDPE | | |
| Filament diameter, mm: | 0.4 | | |
| Pore size, µm: | 0.1 | | |
| Model: | | <i>POR 101 -510</i> | <i>POR 102-1020</i> |
| | Module* | Single-deck | Double-deck |
| Height, mm: | 1000 | 1744 | 2748 |
| Width, mm: | 500 | 1050 | 1050 |
| Length or breadth, mm: | 345 | 1163 | 1163 |
| Membrane area, m ² : | 85 | 510 | 1020 |
| No. module per cassette: | - | 6 | 12 |
| Packing density, m ² /m ² : | 493 | 279 | 354 |
| Membrane air scour rate, Nm ³ /(m ² .h): | 0.1 (double-deck) - 0.2 (single-deck) | | |
| Net flux, LMH: | 10-20 (with 10-30% relaxation) | | |
| Recommended operating TMP, mbar | 100-500 | | |

*module comprises 10 x 8.5m² elements

4.2.7 Koch Membrane Systems

Koch Membrane Systems Inc. is an established membrane filtration technology supplier – dating back to the early 1960s – prior to acquiring the *PURON*[®] technology in 2004. The technology is unusual in that the aerator is integrated with the membrane module, the latter comprising a series of 3.47-4.56 m² cylindrical fibre bundles (Table 4-27) according to the bundle length. Nine such bundles form a “fibre row”, and between 8 and 44 such rows form complete modules of between 250 and 1,800 m² membrane area. The Koch Membrane Systems *PURON*[®] product is also differentiated by having a single bottom header with the fibres individually sealed at the top end. This is to allow the sludge solids to escape from the top of the module without being impeded by the header. The HF membrane has a braided core to provide mechanical strength and was originally of PES until a PVDF *PSH* product was introduced in 2009.

Table 4-27 The Koch Membrane Systems *PURON*[®] membrane and module specifications

| | | | |
|--|----------------------------------|-------------------------|----------------------------|
| Material | PVDF | | |
| Filament diameter, mm: | 2.6 | | |
| Pore size, µm: | 0.03 | | |
| Model: | Bundle | <i>PSH 31-41</i> | <i>PSH 250-1800</i> |
| Height, mm: | 1821-2319 | 1821-2319 | 2384 -2530 |
| Width, mm: | 92 | 828 | 893-1755 |
| Thickness or length, mm: | 92 | 92 | 906-2244 |
| Membrane area, m ² : | 3.47-4.56 | 31-41 | 250-1800 |
| No. bundles/rows per module: | - | 9 | 8-44 |
| Packing density, m ² /m ² : | 410-542 | | 309-457 |
| Membrane air scour rate, Nm ³ /(m ² .h): | - | | |
| Flux, LMH: | - | | |
| Max TMP, mbar | 600 rward filtration & backflush | | |

4.2.8 Kolon

The Kolon Industries, Inc. PVDF HF membrane is used for both fresh and wastewater treatment. It is strengthened by a braided core, and is mounted in modules which are configured both horizontally and vertically (Table 4-28). A number of industrial complexes in Korea and China have MBR effluent treatment plants based on the Kolon module (called *Cleanfil*[®]); configured as an MBR it is referred to as the *KIMAS* (Kolon Immersed Membrane Advanced System) MBR. The MBR cassette can contain 10-30 horizontal modules or 20/40 vertical modules.