

<b>TNI</b>	<b>Technológia ponorných membránových bioreaktorov (MBR)</b>	<b>TNI CEN/TR 15897</b>  59 3032
------------	--	--

Submerged Membrane Bioreactor (MBR) technology

Táto technická normalizačná informácia obsahuje anglickú verziu CEN/TR 15897:2018.  
This Technical standard information includes the English version of CEN/TR 15897:2018.

Táto technická normalizačná informácia bola oznámená vo Vestníku ÚNMS SR č. 03/19

**128236**

**TECHNICAL REPORT****CEN/TR 15897****RAPPORT TECHNIQUE****TECHNISCHER BERICHT**

November 2018

ICS 13.060.30

Supersedes CWA 15897:2008

English Version

**Submerged Membrane Bioreactor (MBR) technology**Technologie MBR - Bioréacteurs à membrane  
immergéeGetauchte Membranbelebungsreaktor (MBR)  
Technologie

This Technical Report was approved by CEN on 4 April 2016. It has been drawn up by the Technical Committee CEN/TC 165.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

**CEN/TR 15897:2018 (E)**

<b>Contents</b>	<b>Page</b>
<b>European foreword</b> .....	<b>4</b>
<b>Introduction</b> .....	<b>5</b>
<b>1 Scope</b> .....	<b>6</b>
<b>2 Normative references</b> .....	<b>6</b>
<b>3 Terms and definitions</b> .....	<b>6</b>
<b>4 General system — requirements</b> .....	<b>12</b>
<b>4.1 Basic considerations</b> .....	<b>12</b>
<b>4.2 Pre-treatment and internal sieving</b> .....	<b>14</b>
<b>4.3 Characteristics of biological systems used in MBR plants</b> .....	<b>15</b>
<b>4.3.1 General</b> .....	<b>15</b>
<b>4.3.2 Mixed liquor suspended solids (MLSS)</b> .....	<b>15</b>
<b>4.3.3 Hydraulic retention time (HRT (or detention time))</b> .....	<b>15</b>
<b>4.3.4 Sludge age (or sludge retention time (SRT))</b> .....	<b>15</b>
<b>4.3.5 Chemical phosphorus removal</b> .....	<b>15</b>
<b>4.3.6 Aeration</b> .....	<b>15</b>
<b>4.4 Membrane filtration system</b> .....	<b>15</b>
<b>4.5 Mixed liquor recirculation</b> .....	<b>17</b>
<b>4.6 Permeate extraction system</b> .....	<b>17</b>
<b>4.7 Desired effluent system</b> .....	<b>17</b>
<b>5 Material characteristics</b> .....	<b>18</b>
<b>5.1 General</b> .....	<b>18</b>
<b>5.2 Porous membranes</b> .....	<b>18</b>
<b>6 Configuration</b> .....	<b>18</b>
<b>6.1 Flat Sheet</b> .....	<b>18</b>
<b>6.2 Hollow fibre</b> .....	<b>19</b>
<b>7 Design and operating parameters</b> .....	<b>19</b>
<b>7.1 General</b> .....	<b>19</b>
<b>7.2 Influent characteristics</b> .....	<b>19</b>
<b>7.3 Fouling</b> .....	<b>20</b>
<b>7.4 Transmembrane pressure</b> .....	<b>20</b>
<b>7.5 Permeability</b> .....	<b>21</b>
<b>7.6 Integrity</b> .....	<b>21</b>
<b>8 Acceptance, commissioning and monitoring tests</b> .....	<b>21</b>
<b>9 Information and documentation</b> .....	<b>22</b>
<b>10 Interchangeability</b> .....	<b>22</b>
<b>10.1 Principle</b> .....	<b>22</b>
<b>10.2 General</b> .....	<b>22</b>
<b>10.3 Process flow diagram (PFD)</b> .....	<b>23</b>
<b>10.4 Scope of supply</b> .....	<b>25</b>
<b>10.5 Interchangeability aspects</b> .....	<b>25</b>

<b>10.5.1 General</b> .....	<b>25</b>
<b>10.5.2 Membrane type</b> .....	<b>26</b>
<b>10.5.3 Layout</b> .....	<b>26</b>
<b>10.5.4 Tank</b> .....	<b>26</b>
<b>10.5.5 Draining and flushing</b> .....	<b>28</b>
<b>10.5.6 Integrity check</b> .....	<b>29</b>
<b>10.5.7 Accessibility and maintainability</b> .....	<b>29</b>
<b>10.5.8 Chemical cleaning</b> .....	<b>29</b>
<b>10.5.9 Process control system (PLC)</b> .....	<b>30</b>
<b>Annex A (normative) Information and documentation</b> .....	<b>34</b>
<b>Annex B (informative) Example for clean water permeability test</b> .....	<b>38</b>
<b>B.1 Abstract</b> .....	<b>38</b>
<b>B.2 Materials and methods</b> .....	<b>38</b>
<b>B.2.1 Measuring apparatus</b> .....	<b>38</b>
<b>B.2.2 Measuring procedure</b> .....	<b>39</b>
<b>Annex C (informative) Example for vacuum leak test</b> .....	<b>40</b>
<b>C.1 Abstract</b> .....	<b>40</b>
<b>C.2 Materials and methods</b> .....	<b>40</b>
<b>C.2.1 Measuring apparatus</b> .....	<b>40</b>
<b>C.2.2 Measuring procedure</b> .....	<b>41</b>
<b>Annex D (informative) Example for pore diameter measurement</b> .....	<b>42</b>
<b>D.1 Abstract</b> .....	<b>42</b>
<b>D.2 Materials and methods</b> .....	<b>42</b>
<b>D.2.1 Latex solution</b> .....	<b>42</b>
<b>D.2.2 Measuring apparatus</b> .....	<b>43</b>
<b>D.2.3 Measuring procedure</b> .....	<b>43</b>
<b>Annex E (informative) Paper filtration measurement</b> .....	<b>45</b>
<b>E.1 Objective</b> .....	<b>45</b>
<b>E.2 Measuring method</b> .....	<b>45</b>
<b>Annex F (informative) Impact of pore size distribution on membrane fouling</b> .....	<b>47</b>
<b>Bibliography</b> .....	<b>48</b>

**CEN/TR 15897:2018 (E)****European foreword**

This document (CEN/TR 15897:2018) has been prepared by Technical Committee CEN/TC 165 “Wastewater engineering”, the secretariat of which is held by DIN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document is based on the CWA 15897:2008, Submerged Membrane Bioreactor (MBR) Technology which was prepared by the CEN Workshop 34 – ‘Submerged’ Membrane Bioreactor (MBR) technology.

This document supersedes CWA 15897:2008.

## **Introduction**

This document deals with custom designed MBR systems for more than 500 PT. It became clear that it is not possible to have interchangeable membrane modules without considering a complete system. So this led to the conclusion that this document deals with the entire membrane system rather than the membrane modules alone.

It was realized that today's market is a growing one with fast developments in membrane technology. Standards might be too early and may hamper the technological development. So it was decided at this stage to create a basic document for submerged MBR technology by means of a Technical Report.

Regarding interchangeability of MBR systems, this document especially focuses on separate membrane tanks as there is a tendency that large MBR systems (more than 10 000 m<sup>3</sup>/d) are designed with separated membrane tanks.

Although there are differences between hollow fibre and flat sheet membrane manufacturers' designs, it is believed that there is no need for separate guidelines because these are focused on membrane tanks. Furthermore, it is clear that interchangeability between hollow fibre membrane systems is not so easy and the same is true for flat sheet membrane systems. Thus, producing two sets of guidelines would be of no real benefit to interchangeability.

**CEN/TR 15897:2018 (E)****1 Scope**

This Technical Report defines terms commonly used in the field of membrane bioreactor technology. This document aims at submerged MBR systems for the treatment of municipal wastewater with MBR Separate Systems and MBR Integrated Systems.

This document establishes general principles for MBR filtration systems interchangeability between different MBR filtration systems from different manufacturers.

**2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12255-11, *Wastewater treatment plants - Part 11: General data required*

EN 16323, *Glossary of wastewater engineering terms*

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**