

**Aemion+ Polymer Materials Comparison**

Product Name		AH2-HNN8-45-X	AH3-HNN9-45-X
Polymer lot number		1819I01	-
Thickness [ $\mu\text{m}$ ]		45.3	45.8
$\sigma$		1.3	2.6
Tensile Strength [MPa]		43.8	62.3
$\sigma$		4.4	5.7
Tensile Strain [%]		57.1	25.7
$\sigma$		5.9	1.2
Elastic Modulus [MPa]		556	1093.2
$\sigma$		44.7	25.9
Water uptake @60 °C	in 0.1 M KOH [wt%]	888	50.4
	$\sigma$	87	2.7
	in 2 M KOH [wt%]	101	76.1
	$\sigma$	8	11.0
Z- expansion @60 °C	in 0.1 M KOH [%]	354	48.0
	$\sigma$	16	3.5
	in 2 M KOH [wt%]	111	65.7
	$\sigma$	2	10.1
Conductivity [ <i>ex-situ</i> Cl <sup>-</sup> form, mS/cm]		8.0	4.6
$\sigma$		0.6	0.2
Conductivity [ <i>in-situ</i> OH <sup>-</sup> form @60 °C, mS/cm]		41.5	38.1
$\sigma$		6.5	1.6
Gas crossover (mA/cm <sup>2</sup> /bar)		0.527	0.512
$\sigma$		0.015	0.009
Alkaline Stability (zero degradation)		3 M, 70 °C	5 M, 70 °C <sup>‡</sup>
Alkaline Stability (zero degradation)		1 M, 90 °C	1 M, 100 °C <sup>‡</sup>
Max Temperature (non-alkaline) <sup>†</sup>		150 °C	150 °C

<sup>‡</sup> Test ongoing - upper limit undefined, however membrane can be dried in OH form and maintain mechanical strength indicating extreme alkaline & temperature stability (approaching 10M KOH & 100 °C).

<sup>†</sup> Processing at higher temperatures is possible with an alternative conditioning process, please contact us if this is desired

*Note: The presented data provides comparative values based on monolithic membrane films as a means of polymer comparison. These are prototype materials only intended to be used for early development activities and not intended for production items. Product information is to be used as a guide only, not as a design specification, and is subject to change at any time as part of ongoing product development. Ionomr makes no warranties, express or implied, and assumes no obligation or liability in connection with any use of this information or for results obtained in reliance thereon.*

Document ID: FM-7040	Title: AP2 vs. AP3 Polymer Comparison	
Revision: A	Prepared By: Shan Zhu	Effective Date: 2021-11-04
	Approved By: Ryan Jansonius	

This document is reviewed to ensure its continuing relevance to the systems and process that it describes.

**Revision History:**

Revision	Date	Description of Changes	Approved By
A	2021-11-04	Initial Release	Ryan Jansonius

PRELIMINARY INFORMATION