

Table II: Technical Targets for Membranes: Automotive
All targets must be achieved simultaneously

Characteristics	Units	Calendar year		
		2000 status ^a	2005	2010
Membrane conductivity, operating temperature	$\Omega\text{-cm}^{-1}$	0.1	0.1	0.1
Room temperature	$\Omega\text{-cm}^{-1}$			
-20° C	$\Omega\text{-cm}^{-1}$			
Oxygen cross-over ^b	mA/cm^2	5	5	2
Hydrogen cross-over ^b	mA/cm^2	5	5	2
Cost	\$/kW		50	5
Operating Temperature	°C	80	120	120
Durability	Hours	1000 ^d	>4000 ^e	>5000 ^f
Survivability ^c	°C	-20	-30	-40
Thermal cyclability in presence of condensed water		yes	yes	yes

Notes:

- a) Status is present day 80°C unless otherwise noted; targets are for new membranes/CCMs
- b) Tested in CCM
- c) Indicates temperature from which bootstrapping stack must be achieved
- d) Continuous operation
- e) Includes thermal cycling
- f) Includes thermal and realistic driving cycles