Stainless Bipolar Plates

Stainless 444, an excellent material for bipolar plates

For fuel cells become commercially successful require a significant reduction in their production cost.

The PEM (Proton Exchange Membrane) fuel cell stack hardware consists of the Membrane Electrode Assembly, the bipolar plate, seal, and end plate, etc. Among the components, the bipolar plate is considered to be one of the most costly and problematic of the fuel cell stack.

The bipolar plate is a multi-functional component within a PEM fuel cell stack. Its primary function is to supply reactant gases to the gas diffusion electrodes (GDE) via flow channels. *The stainless 444 is an excellent material to be used for the bipolar plates, it's comparable to the austenitic 316 in corrosion resistant with the advantage of being an order of magnitude less costly than 316.*

Chemical Composition

Chemical Element	***Stainless AISI 316***	***Stainless AISI 444***
% C	0.08	0.025
%Cr	16.0-18.0	17.5-19.5
%Ni	10.0-14.0	1.00
%Mn	2.00	1.00
%Si	0.75	1.00
%Mo	2.0-3.0	1.75-2.5
%N	0.1	0.035
PREN*	24.2	23.84

Reference: ASTM

* **PREN (Pitting Resistance Equivalent Number)**
  PREN= %Cr + 3.3 x %Mo + 16 x %N

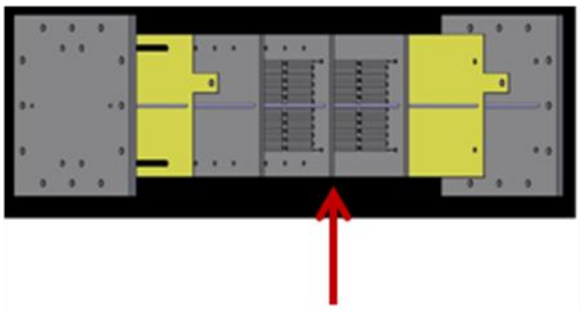
Stainless 444 exhibits good corrosion resistance. We observed corrosion current at 0.6V and air purge around $7x10^{-7}$ **A/cm2.**

Stainless bipolar plates are coated with protective coating layers to avoid corrosion. This coating also has good interfacial contact resistance.

A research was developed to test the functionality of stainless steel 316 and 444 among others. The research showed that both stainless work very well for the cell performance. Three organizations were involved in the research: Centro Nacional para el Desarrollo del Acero Inoxidable (CENDI), Ingeniería y Mecatrónica SA de CV and Centro de investigación y Desarrollo Tecnológico en Electroquímica (CIDETEQ).

Stainless Bipolar Plates for PEMFC (Proton Exchange Membrane Fuel Cell)

Figure: Fuel cell built by Cideteq 2007



Designs	Customized to the client or proposed by Cideteq
Materials	Stainless 316, 316L or 444
Material Thickness	0.1 – 0.3 mm
Coating Applications	Various
Temperature Range	-30°C to 150°C

Contact us for more information:

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