Electrophoretic deposition, thermal co-evaporation and RF magnetron sputtering methods are used for the preparation of Mn-Co based ceramic coatings for solid oxide fuel cell steel interconnects. Both thin and relatively thick coatings (1–15 μm) are prepared and characterised for their potential protective behaviour. Mn-Co coated Crofer22APU samples are electrically tested for 5000 h at 800 °C under a 500 mA cm⁻² current load to determine their Area Specific Resistance increase due to a growing chromia scale. After tests, samples are analysed by scanning and transmission electron microscopy. Analysis is focused on the potential chromium diffusion to or through the coating, the oxide scale thickness and possible reactions at the interfaces. The relationships between the coating type, thickness and effectiveness are reviewed and discussed. Out of the three Mn-Co coatings compared in this study, the one deposited by electrophoretic deposition presents the best protection against Cr diffusion and offers long term stability.