



## UFS Corporation

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# Technical Reference

## Topic: DurAnode™ Conductive Ceramic Electrodes

Normally, stainless steel is the electrode material of choice in e-coat. It is low in cost, readily available, and performs well in many e-coat applications.

As part of the e-coat process, however, stainless steel breaks down into iron oxides. While the membrane shell does a good job of preventing the iron oxides from passing into the paint bath, some do enter into the anolyte by a cut or tear, or by accidental overflow from the paint bath.

As outlined below, there are some situations when paint bath contamination can be problematic. In these, UFS Corporation recommends the use of more inert materials such as Ruthenium Oxide Coated Titanium Electrodes or DurAnode Ceramic Electrodes.

**Light Color Paints:** In applications where light color or white paint is applied (such as the appliance industry), iron oxides can cause changes in the cured paint color.

**Paint Surface Smoothness:** Iron oxides can cause rough surfaces that require costly and time-consuming sanding prior to subsequent coats.

**Paint Resin Cross-Linking:** In e-coat cure, deposited paint molecules form one long polymer. Iron oxides can interfere with this cross-linking process, resulting in weak areas in the primer coat.

**High Current Densities:** Electrodes in some areas of the paint tank (entrance zone for example) are required to run at higher current densities. High current leads to increased erosion for a stainless steel electrode.

**Low Acid Removal Cells:** In e-coat tanks where excess acid removal is a problem, UFS recommends the use of Low Acid Removal Cells. Iron oxide can foul the specialized membrane used in these Cells, leading to short Cell life.

**Neutral Cells:** In these Cells, anolyte is returned to the paint tank by gravity overflow.

If stainless steel is used, the overflow provides an opportunity for iron oxides to enter the paint bath.

### DURANODE CONDUCTIVE CERAMIC ELECTRODES

The DurAnode Electrode is made of a proprietary conductive ceramic material, which is especially resistant to dissolution. Benefits of the DurAnode Electrode include:

- **Long Life** – Because the ceramic material has almost no erosion, it therefore has a very long life. Field-tests have indicated a life span of eight years or more.
- **No Paint Contamination** – There are no iron oxides or other metals that can contaminate the paint bath.
- **No Membrane Fouling** – With no iron dissolution, there are no by-products that can gather on the inside of the membrane, preventing the exchange of ions.
- **Consistent Voltages** – Because the DurAnode electrode is made of a stable material, it provides consistent voltages.

Changes in tank conditions will not affect anodes. Changes in paint formulations or paint

bath chemistry will not affect the DurAnode electrodes.

#### **LIMITATIONS OF THE DURANODE CELL**

- **Handling.** The DurAnode Electrode is very fragile. Extreme care must be taken not to crack or break the surface. If the DurAnode is cracked or broken, it will quickly fail.
- Take care in **storing** unused DurAnode electrodes. Store them in the original packaging.
- **Do not drop** a DurAnode Electrode. Do not accidentally hit it against something when carrying it.
- Do not let fallen parts hit the DurAnode electrode when fishing items from the tank.
- **Expensive.** The DurAnode is several times more costly than a RuO electrode, and many times more costly than a 316 stainless steel electrode.

**For more information**, call UFSc at the phone number shown above.