

## Congo Red Induction Time (CRIT) for PVC-EIA Liners/Covers

### Abstract

Six (6) commercial grades of PVC-EIA liners were tested for their level of thermal stability using the Congo Red test to generate their CR Induction Time at 200 deg.C. The longer the CR induction time in minutes, the greater the level and effectiveness of the heat stabilizers in the PVC-EIA and the longer these sample will perform in the environment exposed to heat and light.

### Introduction

The Congo Red Induction Time (CRIT).C measures the thermal stability of PVC and PVC-EIA liner/cover samples by using Congo Red indicator paper to measure the time to the onset of acid evolution from the samples at 200 deg thus signalling the start of thermal decomposition of the sample.

The longer the induction time, the greater the level of heat stabilizer in the material. The test is performed using the specialized apparatus shown below. Test endpoints are recorded using a digital video camera.

This test is routinely used to measure the thermal stability of PVC cables but it is also appropriate for PVC-EIA liners since they are exposed to heat in service particularly as floating covers.

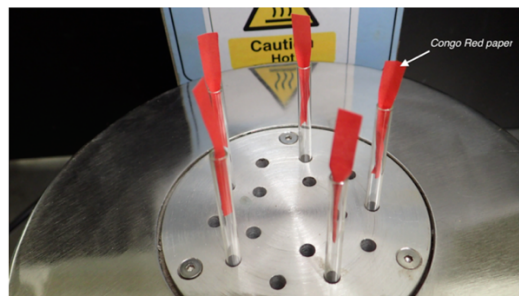
### **CONGO RED THERMAL STABILITY TESTING OF PVC CABLES**



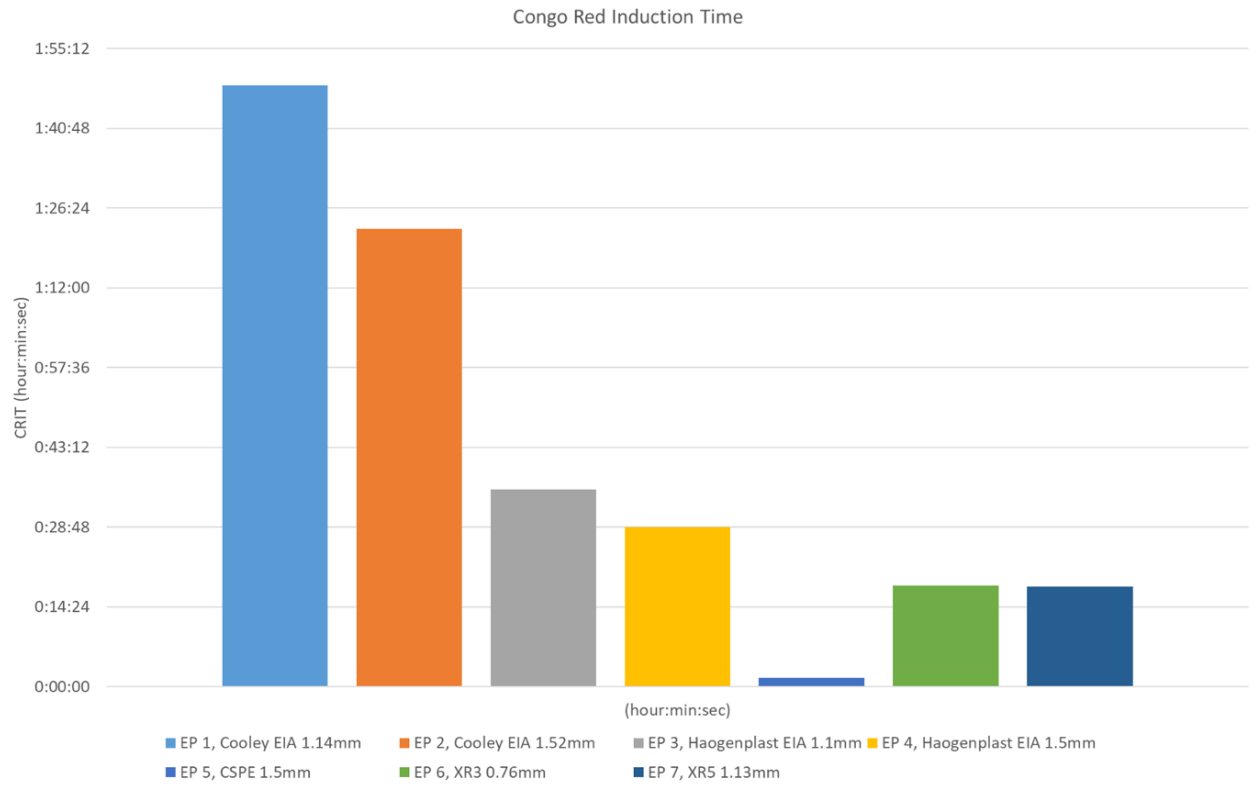
#### **ISO 182-1:1990**

Plastics -- Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures -- Part 1: Congo red method.

Intended primarily as a simple and rapid quality-control test during the manufacture and conversion of PVC compounds. Suitable for coloured compounds. The determination is carried out on a sample of the PVC compound which is maintained at an agreed temperature such as 180 or 185 deg.C in still air in an aluminium block heater until the colour of a Congo red paper held above it changes from red to blue.



**Results**



It is clear from the results above that the Cooley liner/cover samples are very well stabilized with heat stabilizers. These samples therefore scored a 5 out of 5 for their excellent thermal stability and the results agree well with the heat stabilizer additive analysis results and the TGA onset temperature results presented earlier.

Next in order of thermal stability are the Haogenplast samples which both scored a 3 out of 5.

The XR-3 and XR-5 samples had the lowest thermal stability of the PVC-EIA liners/covers tested and they both scored a 2 out of 5. All these results also agreed very well with the TGA onset temperature results to be presented later.

The CSPE sample was tested for curiosity reasons and it exhibited the lowest CRIT result but the test is not appropriate for CSPE as it is a thermoset and not strictly a vinyl polymer.