STRESS ENGINEERING SERVICES INC.

www.stress.com

Plant Services

OCTG Thread Protectors & Pipe Protection Products

The Performance Bar is Going Up

Will your thread protectors meet the new Annex I specification of API 5CT / ISO 11960.2?

In the fall of 2011 the game changed when thread protector manufacturers were required to satisfy the new Annex I of API 5CT/ISO 11960.2. This change makes one of the most challenging thread protector load cases — *IMPACT* — significantly more difficult to pass.

Annex I requires that protectors survive the **45 degree angular impact test,** and the **axial impact test** at the temperature extremes of -50˚F (-46˚C) and +150˚F (66˚C). Buyers of these thread protectors are becoming more insistent that independent test labs have verified the performance claims. After testing a broad range of commercial thread protector products, it is clear that satisfying this requirement is going to be a challenge for manufacturers.

Your Answer to Annex I is in the Test Results

Stress Engineering Services (SES) provides independent 3rd party testing services in accordance Annex I of API 5CT/ISO 11960.2. SES has four decades of experience supporting all aspects of oil field-related engineering and testing. Our design, analysis and testing expertise specifically related to the structural applications of high density polyethylene (HDPE) components dates back to 1982.

Damage coupling from angular impact test.

Damaged pin from axial impact test.

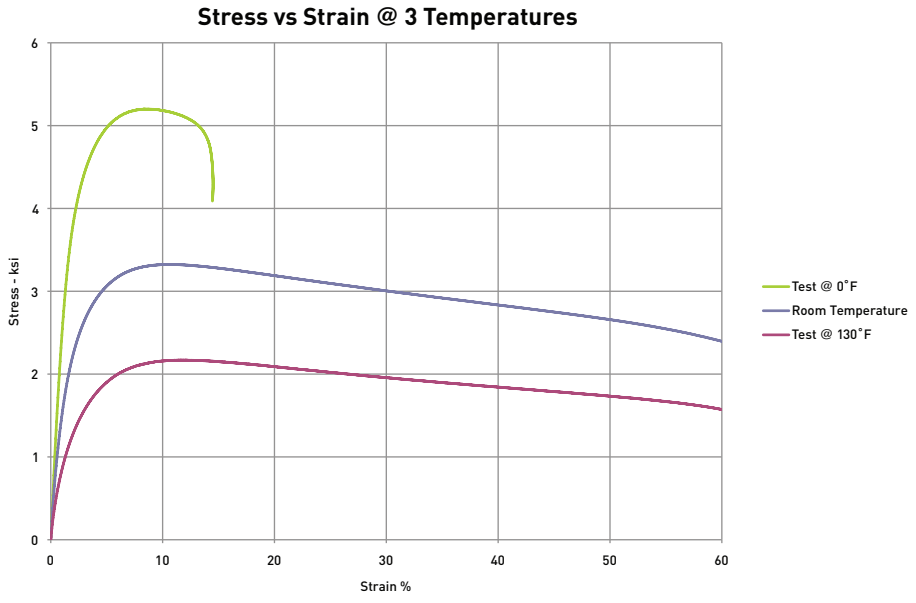
SES Thread Protector Impact Load Frame with 45 degree angle drop fixture installed.

Environmental conditioning chambers with -50˚F to 375˚F thermal range.

SES test capabilities include a dedicated load frame for Thread Protector Impact Testing, including the environmental chambers needed to condition the parts at extreme temperatures.

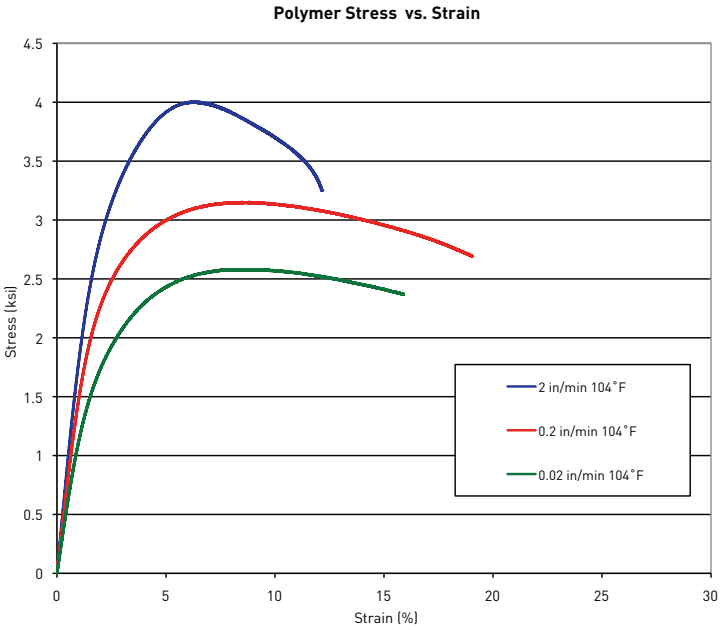
The extreme temperature range mandated by Annex I will be difficult for some manufacturers to satisfy. On the low end (-50˚F) HDPE may have adequate strength, but significantly lower ductility.

On the high end of the temperature range (150˚F), the material has adequate ductility, but significantly lower strength. The lower strength at elevated temperature enables the material ,'flow' away from the impact zone, resulting in more localized damage to the pipe. This dichotomy, low temperature vs. high temperature presents a significant challenge to thread protector designers.



Here's What the Annex I Challenge Looks Like

The graph (right) illustrates stress vs. strain curves for a polymer in the polyolefin family, tested at elevated temperature. The curves show the effect of strain rate. At low strain rates, the yield strength is lower and ductility is higher. At higher strain rates, the yield strength increases and ductility decreases.

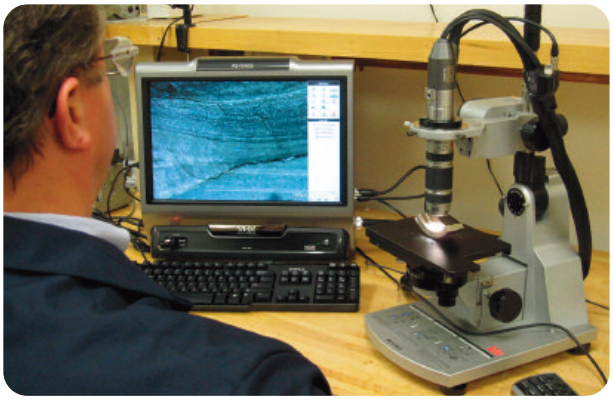


Stress vs. Strain graph for a polymer in the polyolefin family tested at 104˚F at three strain rates.

Full Service Plastics Design and Material Expertise

Design, analysis, material selection and testing of plastic components are among SES's core competencies. Our plastics-related experience spans a broad range of applications, including industrial, building, consumer, medical, pharmaceutical, oil field and transportation products.

The SES Cincinnati office, with 35 engineers and a fully equipped plastics materials testing and characterization laboratory is the hub of plastics services.



A computer simulation of an angular impact test. The box thread protector and coupling box are shown in cross-section at the end of the impact.