6. Testing

6.1. Environmental Service

6.1.1. Exposure to Ultraviolet Light (UV) and Atmospheric Moisture

Pole wall samples shall show no indication of fiber blooming after exposure to a minimum of ~~2,500~~10,000 hours of accelerated weather testing per ASTM G154 Cycle 1. The duration of accelerated exposure time shall be correlated to real world UV data to substantiate service life claims~~.~~ (De Jong, B. 1973).

6.1.3. Exposure to Fire

Although FRP utility poles can have self-extinguishing properties, the poles may be susceptible to brush fires, arson, and flash-over fire exposure. To date, an industry-wide, approved fire test method to simulate pole exposure due to forest fires does not exist.

Depending on the material composition and manufacturing method for a particular FRP utility pole, there are two fire test options~~.~~: Coupon level and custom-designed full-scale test. Consult the FRP utility pole manufacturer for the applicable test options.

Option 1: Coupon Level Tests

(a) UL 94

The FRP utility poles shall be manufactured to meet or exceed UL 94 vertical burn test with a V0 or "self-extinguishing" rating. Consult the FRP utility pole manufacturer for additional information.

(b) ~~Option 2:~~ ASTM D635 with Horizontal Burn Classification

The test coupons shall receive the horizontal burn (HB) category designation if the behavior of the specimens adheres to the following when tested per ASTM D635:

~~a)~~1. There are no visible signs of combustion after the source is removed; or
~~b)~~2. The flame front does not pass the 1 in. [25 mm] reference mark; or
~~c)~~3. The flame front passes the 1 in. [25 mm] reference mark but does not reach the [100 mm] reference mark; or
~~d)~~4. The flame front reaches the 4 in. [100 mm] reference mark and the linear burning rate does not exceed 1.5 in. [40 mm/min] for specimens having a thickness between 0.1 in. and 0.5 in. [3 and 13 mm] or 3 in/min [75 mm/min] for specimens having a thickness less than [3 mm].

Option 2: Custom Designed Full Scale Tests

An FRP pole manufacturer may hire an independent fire consultant to design and execute a full scale test protocol that simulates a severe to extreme forest fire moving through a utility line right of way. As an additional element of the fire test, post fire exposure the pole may be full scale strength tested per ASTM D1036 to quantify any strength loss as a result of the fire exposure. Alternatively, post fire exposure coupon level testing can be completed to quantify any change in material properties if full scale bend testing cannot be completed.

Figure 6.1.1 below shows an FRP pole exposed to a 2 minute (severe) fire exposure test.

Regardless of which fire test method is used, a coupon level test, utilizing UL 94 or ASTM D635, or a custom designed full scale fire test, the end user shall determine if the fire test results are adequate for their project requirements.