Take Risk Out…
…Put Advantex® Glass In.

OCV™ Reinforcements

Composites
Glass Fiber Reinforcements

For:
ICERP2011
MUMBAI
March 3rd, 2011
Owens Corning At A Glance

- Founded in 1938, an industry leader in glass fiber insulation, roofing and asphalt and glass fiber reinforcements
- 2010 sales: $5 billion
- 15,000 employees in 28 countries
- FORTUNE 500 company for 56 consecutive years

Leading North American Market Positions

- Residential Insulation
- Commercial & Industrial Insulation
- Manufactured Stone Veneer
- Residential Shingles
- Roofing Asphalts

Global Leader

- Composite Reinforcements
- OCV® Reinforcements
- OCV® Technical Fabrics
Owens Corning Makes & Sells Glass Fiber Reinforcements

- Pioneered the use of glass as a reinforcement in composites
- Instrumental in converting applications to glass reinforced composites
- World's largest supplier
- Linked with 1,000's of fabricators

Our legacy of innovation continues today
Advantex® glass is a patented corrosion resistant E-CR glass fiber, developed for several reasons:

- Increased mechanical properties compared to E & E-CR glass
- Improved corrosion resistance compared to E-glass
- Significant improvement on the environment

Advantex® glass meets the following glass standards:

- **ASTM D 578-00**: States E-CR is defined by being a 100% boron-free glass composition for improved resistance to corrosion
- **ISO 2078**: Recommends using E-CR glass in acid environments. E-glass for general purpose
What are ways that allow the glass fiber to be attacked?

- Poor curing
- Diffusion
- Osmosis
- Applied stress
- Embrittlement
- Micro-cracking
- Swelling
- Impact
- Environmental cycling
- Time

...can allow the corrosive media to reach the structural fibers.

Source: Ageing of Composites – 2008, and Owens Corning
Composites Materials and the Effects of Corrosion

Test methods to determine performance of glass fiber reinforcements:

1. Bare glass testing
2. Stress-Corrosion tensile testing of composite rods
3. SEM/EDX (Scanning Electron Microscopy coupled with Energy Dispersive X-ray Spectrometry)
10% Hydrochloric Acid Immersion @96°C

- E-glass
- Advantex®
- C-glass
- S-glass
- AR-glass
- XStrand H
- H-free

Percent Weight Loss

- after 24 hour
- after 168 hour

Take Risk Out…Put Advantex® Glass In
Stress-Rupture of Composite Rods in 1 Normal Acids (HCl - H₂SO₄)

• Advantex® glass offers a useful stress 12 times that of a laminate made with traditional E-Glass in acid applications.

Another way of looking at the performance differences is by noting that the traditional E-glass laminate would fail in approximately four days when stressed at the 50 year stress limit for the Advantex® laminate while exposed to a 10% hydrochloric acid environment.
Advantex® glass continues to perform after three months with no leaching, cracking, or weakening. Maintaining its strength in a corrosive environment.
Advantex® E-CR glass Performs in Corrosion Even After 6 Months Exposure

E-Glass 10% Sulfuric Acid Advantex® E-CR glass

E-glass rod, 6 months 10% H2SO4

Advantex® E-CR glass rod, 6 months 10% H2SO4
Study Conclusion:

Advantex® fibers demonstrate superior corrosion resistance compared to E-glass when used as a reinforcement in composites exposed to corrosive environments.

Specifying Advantex® E-CR glass:

• Reduces risk
• Lowers maintenance costs
• Provides longer life of applications in the field
• Reduces down time
• Lowers overall lifetime cost

Combining the best suited materials will deliver:
Highest Performance, Longevity, and Reduction of Risk
Material Selection is Key

Using the best suited materials for applications facing corrosive environments is key to long-term success of those applications.

- **Glass Reinforcements**
  - Provides Strength and Modulus
  - Orientation Maximizes Directional Properties
  - Glass Type Optimizes Corrosion Performance

- **Resin**
  - Locks fibers in place
  - Determines heat resistance, flame retardance
  - Certain types offer higher corrosion resistance

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**Filament Winding or Laminate**
(Ex. Pipe, Tank, Ducting, etc.)

**Exterior**
- Structural FRP (Provides the Strength)
- Single-End Roving, Chopped Roving or Fabric

**Interior**
- Corrosion FRP Barrier
- Veil, and/or Mat layers

**Pultruded Applications**
(Ex. Grating, Railing, Structural, etc.)

- Veil
- Single-End Roving
- Unifilo (CFM)
**CASE STUDY:** PITSA Picks Advantex® E-CR Glass Fiber Reinforcements for Critical Project

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**Fabricated by** Plasticos Industriales de Tampico (PITSA), of Tampico, Mexico.

**Installation**: Main island of New Caledonia in the South Pacific,

**No. & size of tanks**: 4 & The tanks range in diameter from 10 to 14 meters (33 to 46 feet) and in height from 8 to 18 meters (26 to 59 feet).

**Chemicals stored:**
- Hydrochloric acid and nickel chloride at a mineral extraction plant for one of the world's largest nickel mines.

Courtesy of www.pitsafrp.com
CASE STUDY: U.S. Composite Pipe South

Fabrication Process
Filament winding – continuously advancing mandrel

Resin
polyester

Reinforcements
Advantex® E-CR glass fiber reinforcements
Single-end roving

Principal markets
Water & Sewage
Industrial
Hydropower and Penstock applications

Courtesy of U.S. Composite pipe
• **NOV FGS**
  – Composite Pipe & Tank manufacture

• **Fabrication process**
  – Filament winding
  – Centrifugal casting

• **Matrix & Reinforcements**
  – Epoxy and Vinyl ester
  – Single end roving
  – Woven roving and other fibreglass fabrics

• **Principal markets**
  – Oil field
  – Chemical and industrial
  – Marine and offshore
  – Petroleum marketing
Put Advantex® E-CR glass in composite applications

E-Glass

Advantex® E-CR glass

Thank you
For more information please visit our website:

http://www.owenscorning.com/composites/
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