WelPAN™

Cement Strengthening Additive

Description

WelPAN™ cement strengthening additive is a 3.2 mm precision-cut polyacrylonitrile (PAN) acrylic micro-fiber engineered to enhance the mechanical performance and long-term integrity of cement systems. Manufactured from polyacrylonitrile (PAN), the same base polymer used in carbon fiber production, WelPan provides high-strength synthetic reinforcement within the cement matrix. Upon hydration and set, the distributed fibers help mitigate microcrack initiation and propagation, improve tensile strength and increase resistance to mechanical and thermal stresses. The result is a more resilient cement sheath designed to maintain zonal isolation under demanding downhole conditions.

Advantage

- WelPAN™ creates a distributed micro-reinforcement network within the cement sheath, improving tensile strength and resistance to fracture propagation.
- The 3.2 mm precision-cut fiber length optimizes dispersion and bonding within the cement matrix without adversely affecting slurry pumpability.
- WelPAN fiber chemistry provides high thermal stability and chemical resistance in downhole environments.
- The fiber structure enhances resistance to shrinkage cracking and stress loading.
- WelPAN contributes to improved impact resistance and flexural strength of set cement.

Application

- WelPAN™ is used in primary cementing applications where enhanced mechanical integrity and crack resistance are required to ensure long-term zonal isolation.
- It is particularly suited for wells exposed to thermal cycling, pressure fluctuations, and mechanical loading that can induce micro-annulus formation or sheath debonding.
- The fiber is effective in cementing across depleted, fractured, or stress-sensitive formations where durability and toughness are critical.
- WelPAN can be integrated into both conventional and lightweight slurry designs to improve tensile performance without compromising pumpability.
- It is recommended for wells with elevated risk of sustained casing pressure or long-term structural fatigue where reinforced cement systems provide added reliability.

Environmental Advantage

- WelPAN™ reinforces the cement matrix, limiting fracture development, reducing the likelihood of remedial squeeze operations and additional cement jobs.
- The distributed PAN fiber network enhances mechanical integrity, supporting extended cement sheath service life under cyclic downhole stresses.
- By mitigating cement fracture propagation and structural fatigue, WelPAN lowers long-term failure risk and reduces the need for future material-intensive interventions over the life of the well.

Treatment Recommendations

- WelPAN™ dosage should be determined through laboratory slurry design testing based on well conditions, mechanical performance requirements, and loss severity.
- Typical concentrations are selected to enhance tensile and flexural properties without adversely affecting slurry rheology or pumpability.
- Laboratory evaluation should confirm thickening time, compressive strength development, and fiber dispersion prior to field application.
- WelPAN should be introduced through dry blending or bulk blending systems to ensure uniform fiber distribution within the cement slurry.
- Adequate mixing energy is recommended to prevent fiber agglomeration and promote consistent reinforcement throughout the cement matrix.

Physical Properties

Appearance: Fine white/yellow synthetic fibers

Temperature: Suitable for elevated downhole temperature conditions

Fiber Type: Polyacrylonitrile (PAN) acrylic monofilament

Fiber Length: 3.2 mm precision cut

Diameter: .0.008–0.012 mm

Handling and Storage

WelPAN™ should be stored in a clean, dry environment and protected from moisture prior to use. Packaging should remain sealed until blending to prevent contamination. Standard bulk material handling practices should be followed, and personnel should consult the Safety Data Sheet for appropriate safety procedures and personal protective equipment requirements.

Packaging

WelPAN™ is packaged in 4 - 10 lb bags per box. 30 boxes per pallet.

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