

SandAid

Sand conglomeration technology

APPLICATIONS

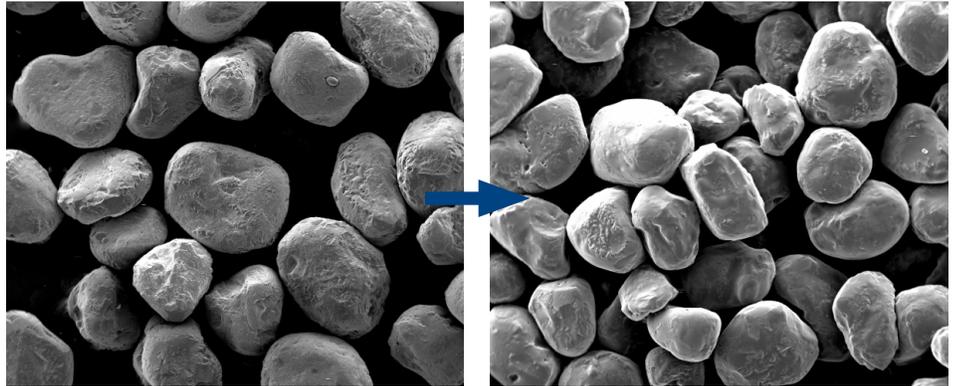
- Unconsolidated sandstone reservoirs
- Remedial sand control
- Deepwater, continental shelf, and onshore wells
- All well types, including oil, gas, and water
- Wells with reservoir temperatures up to 350 degF [177 degC]

BENEFITS

- Maximizes value by increasing sand-free production rate
- Delivers a strengthened attraction between particles without damaging formation permeability
- Enhances existing sand control methods by preventing plugging due to small sand and fines migration
- Provides a superior, nondamaging alternative to resin-consolidation treatments
- Contributes to the longevity of the well

FEATURES

- Range of permeability from 1 to 10,000 mD
- Ability to disperse and coat sand grains and formation fines when added to aqueous solutions
- Ability to alter the zeta potential of solid surfaces to optimize agglomeration
- Very low viscosity for easier application on long intervals when compared with resins
- Pumpable down production tubing, coiled tubing, or flow line
- Can be mixed in freshwater, brines, and seawater
- Adaptable to changing reservoir stress conditions by remaining ductile and able to reagglomerate
- Pumpable downhole as a matrix treatment
- Relatively low cost and simple to apply



Scanning electron microscope ($\times 40$) images of 20/40 mesh sand showing untreated sand (left) and sand treated with SandAid technology (right).

SandAid™ sand conglomeration technology is a patented chemical solution that dramatically improves sand management and enhances production. This one-of-a-kind chemical process increases the attraction between particles without imposing damage, by trapping formation sand and fines to maximize sand-free flow rates and increase production.

Safe and easy to use

SandAid technology is easy to apply and is less damaging than resin- or epoxy-based solutions. In existing wells, SandAid technology can be pumped through either coiled tubing or existing production tubulars.

Maximum attraction between particles

When added to an aqueous solution, the formulation rapidly coats solid-particle surfaces, including metal oxides, sand, and formation fines, as well as other anionic substrates. During this process, SandAid technology alters the zeta potential, or the electrokinetic potential between the surface of a particle and the bulk-phase of the suspending liquid, to the optimal range for maximum attraction between particles.

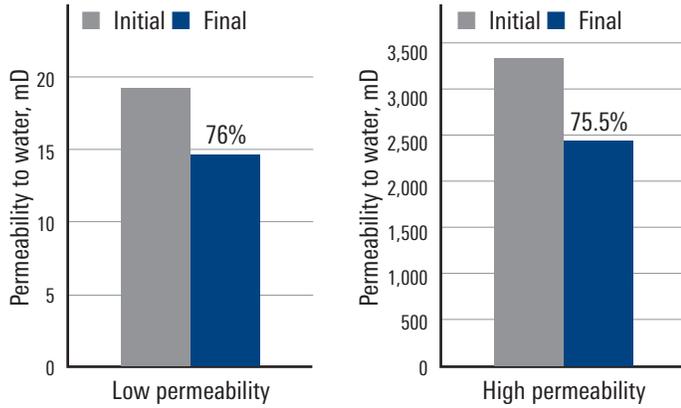
Preparation, injection, and shut-in

SandAid technology is prepared and pumped with standard blending and pumping equipment. It is recommended to pump SandAid technology on the fly with continuous pumping. The fluid is then injected into the reservoir at matrix rates by bullheading process or using coiled tubing. A step-rate test is performed to determine the maximum injection rate below the frac pressure. A preflush treatment is injected to prepare the treated zone, after which the SandAid technology fluid system is injected into the reservoir. An overflush treatment displaces the SandAid technology treatment from the critical matrix. The well is then shut in for a few hours to allow for optimum agglomeration before the well is slowly put on production.

Field-proven to increase sand-free production rates

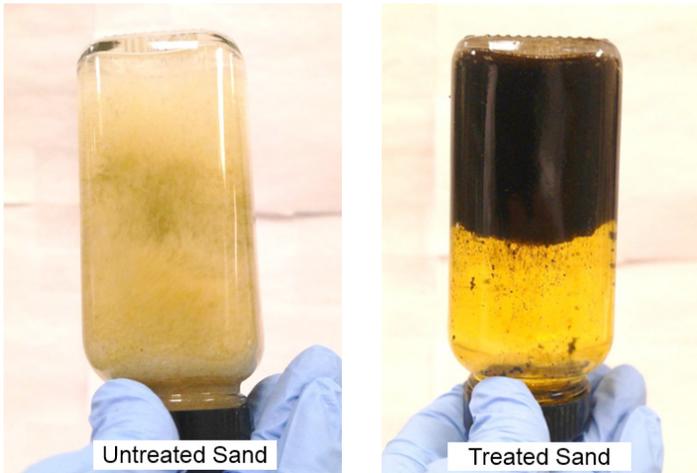
SandAid technology has successfully treated more than 300 wells around the globe. After application of the treatment, sand-free flow rates increased in each successful well — with no damage to the wellbore or the reservoir.

Formation Damage Evaluation



Test performed with 5% SandAid technology at 195 degF [91 degC].

Agglomeration Test



Agglomeration of the sand for untreated sand (left) and sand treated with SandAid technology (right).

SandAid Technology Specifications

Temperature, degF [degC]	Up to 350 [up to 177]
Unconfined compressive strength, psi [kPa]	N/A
Permeability range, mD	1–10,000
Regained permeability, %	75
Max. interval length, ft [m]	200 [61]
Shut-in time, hours	6
Fluid viscosity, cp	1 at 70 degF [21 degC]

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