

# SwellPlug

A versatile solution for an array of sealing requirements ranging from perforations and fractures to micro annuli and pore spaces in a simple and cost-effective way.

Throughout the productive life of a well, it might be necessary to isolate existing perforations for the purpose of water shut off or re-completing the wellbore. Also, at the end of the productive and economic life of a well, it is necessary to plug and abandon them to permanently seal the well with a cement plug to isolate the hydrocarbon-bearing formation from water sources and prevent leakage to the surface.

Traditional methods for both operations can be complex and costly and gas channeling and inadequate cement jobs are operational challenges. Cement jobs are often impaired by permeable defects, such as fractures within the cement or debonding at the casing/cement interface resulting in micro-annuli. These defects can be caused by various factors, including ineffective cement placement, autogenous shrinkage and debonding upon setting of the cement. The defects offer possible routes for fluid or gas migration, potentially leading to sustained casing pressure (SCP) and other sealing integrity issues.

Tendeka has developed SwellPlug, a cost effective, low complexity, patent protected sealing method capable of generating a high pressure seal in multiple applications. The SwellPlug is pumped in a slurry and can be used to isolate existing perforations, address casing leaks and seal off fractures within cement or prevent micro-annuli from forming mitigating annular migration of fluids or gas. SwellPlug can either be pumped in a low viscosity slurry to fill perforation tunnels, ahead of cement or as an integral part of the cement formulation. This is particularly useful in Plug and Abandonment operations where an effective, long-lasting seal is paramount.

## Description

SwellPlug consists of patent protected water swellable particulate material pumped in a slurry that swells through the process of osmosis. Unlike other water swellable elastomers, the Tendeka osmotic swellable material remains swollen regardless of the subsequent fluids that it sees making the seal permanent

## Uses

SwellPlug can be used to control leak off when pumped ahead of a cement squeeze in scenarios where losses would prevent an effective cement job. It can also be used as a secondary seal above the cement plug providing a contingency should the cement form a micro-annulus. The proprietary water swellable particles effectively plug any fractures or fissures optimizing the conditions for an effective cement squeeze while minimizing the risk of gas/fluid channeling compromising integrity.

## Features

- Patent protected irreversible water swellable osmotic polymers
- Can be pre-mixed or added dry on the fly and pumped in an aqueous slurry
- Tight particle to particle contact
- Chemical and temperature resistance

## Benefits

- Remain swollen even after the water is removed from the system
- Operationally simple and effective
- Capable of withstanding up to 10,000 psi pressure
- Suitable for harsh environments

SwellPlug is also used to permanently isolate existing perforations for the purpose of re-completing or water shut off. Traditional methods involve setting a plug, straddling the perforations with an insert liner or performing a cement squeeze, all of which can be complex and costly and in the case of a straddle, result in a reduced wellbore ID.

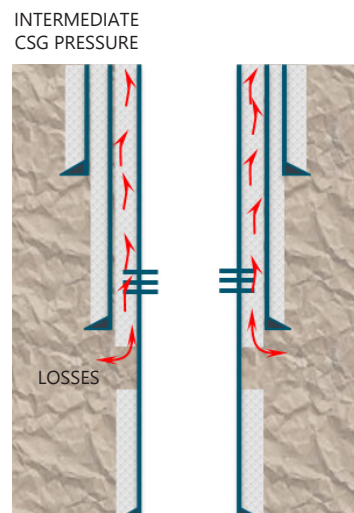


Fig 1. Annular Migration

## Technical Specification

Particles Size	Proprietary blend of coarse and fine particles
Colour	Black
SG	1.41g/cm <sup>3</sup>
Swel Fluid	Lightly viscosified fresh water/brine
Holding Pressure	Up to 10,000psi
Swell Time	Dependent on temperature and fluid salinity

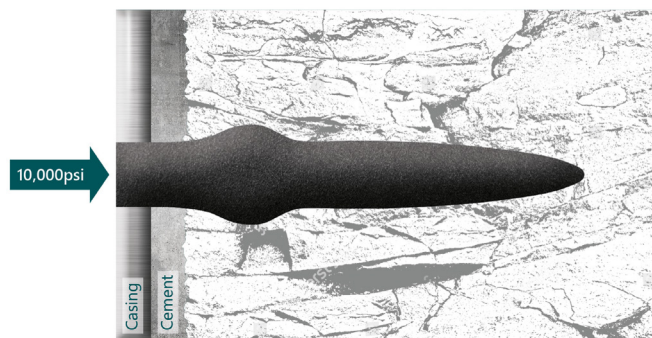


Fig 2. Perforation Plug



Fig 4 Proprietary blend of Coarse and Fine Particulate

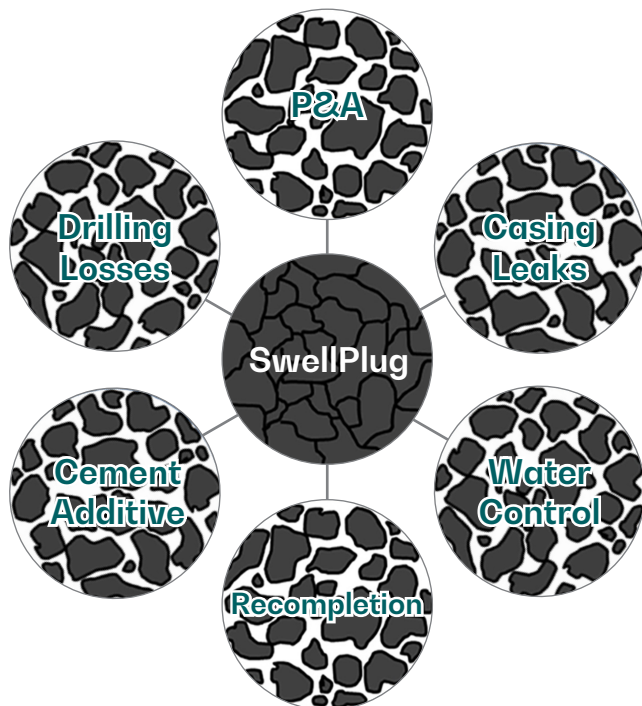


Fig 3. SwellPlug Applications