Filtrex

Introduction to Filtrex

Filtrex is an innovative, cost-effective, thru-tubing sand control solution, initially designed to eliminate the requirement to perform workovers.

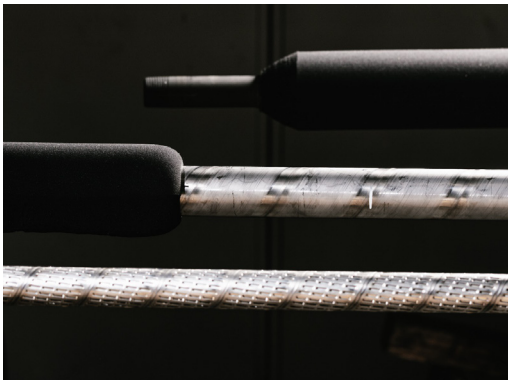
It can be utilised in multiple applications to restore sand control and improve well productivity. The use of Filtrex results in decreased intervention time and expensive associated run charges when compared to traditional thru-tubing methodologies.

The system provides the flexibility to be installed thru-tubing, beyond tight restrictions, whilst offering compliance to the damaged section once set; resulting in controlled sand production and enhanced well performance. The ability to perform sand clean out during the deployment when run on coil tubing/pipe reduces intervention trips. With the capability of self-centralising once expanded in any deviation, the tool is unique to the oil and gas industry.

The control mechanism employed by Filtrex is the **exclusive award-winning** porous multi-layer sand filter, which is comprised of an open cell matrix polymer (OCMP) of varying permeability, encasing a length of perforated tubing. This multi-layer porous conformable filter media ensures full expansion and compliance within the damaged screen or casing section regaining sand control in existing completions. The system design allows the combination of multiple distinct layers with a range of pore sizes resulting in a range of filter permeabilities that can be optimised for each application to ensure appropriate retention of sand in reservoirs up to 100˚C.

Features

- One trip system - sand clean out and sand control restoration
- Self-centralising once expanded in any deviation
- High expansion anchor sub rated to 12T
- Open Cell Matrix Polymer - multi-layered porous conformable filter media
- Compatible in reservoirs up to 100˚C
- Compatible with common wellbore fluids



Benefits

- Revives production
- Conforms to damaged section
- Thru-tubing design flexibility
- Retrievable
- OCMP sized appropriately to retain formation sands
- OCMP configuration bespoke to reservoir conditions and wellbore sand composition

Filtrex Deployment

The installation of Filtrex is performed over several stages and has the potential to significantly improve the financial feasibility of restoring production to failed wells without the requirement for an expensive or complicated workover.

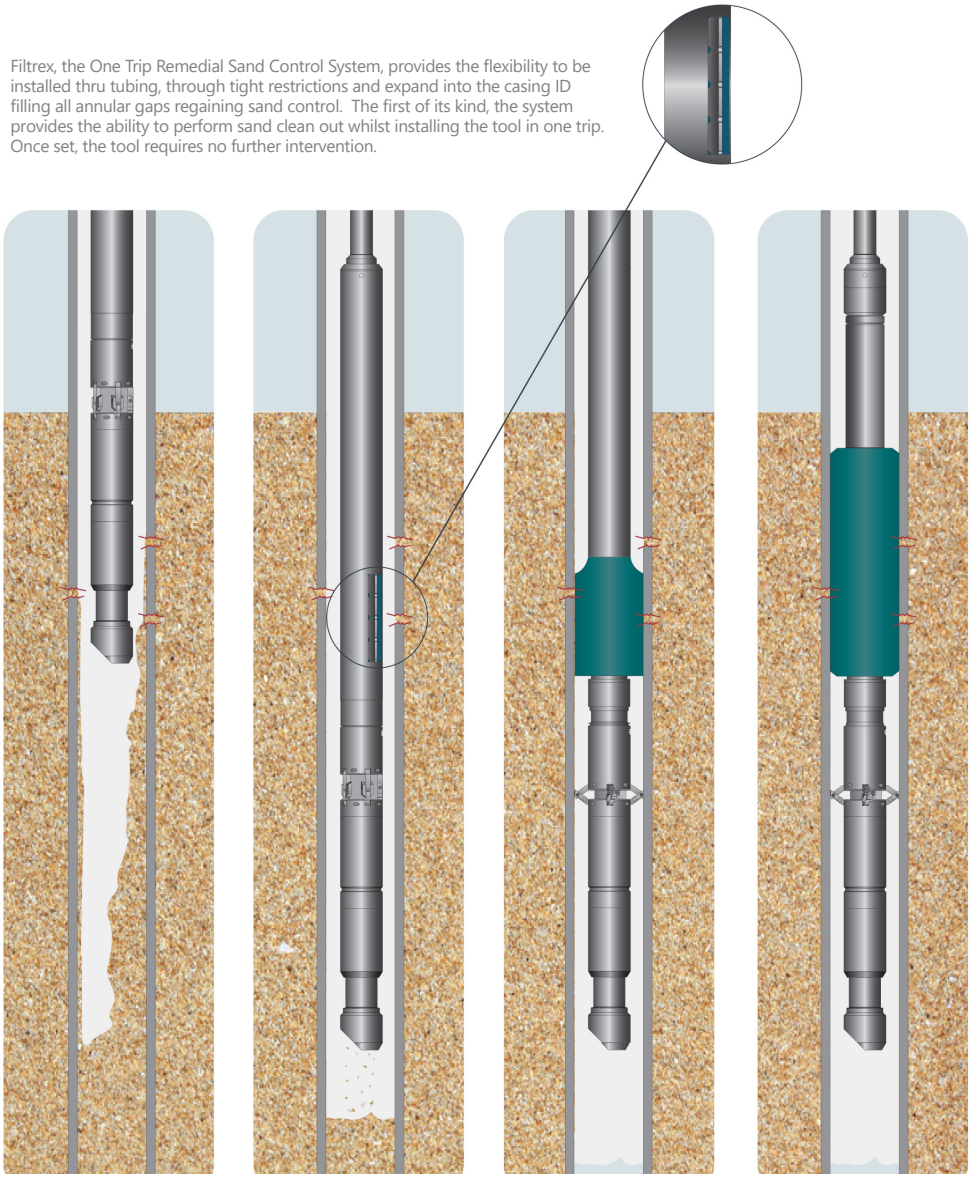
The key to Filtrex's success is the application of its conformable OCMP filter which can be deployed in hole compressed within the running tool and outer sleeve. Upon reaching the zone of interest, if required, integral jetting nozzles can be activated to begin sand clean out. The high compressibility of the OCMP filter allows the assembly to pass through tubing restrictions and expand into the larger casing/liner configurations providing a conforming sand control solution.

This live well deployment system enables sand clean-out and chemical treatments to be performed as a single trip process in combination with the activation of the high expansion anchor which secures the system in place.

Once set, the removal of the compression sleeve enables the OCMP to expand and conform to the ID of the casing or failed screen. The filling of the annular gap prevents further ingress of reservoir solids into the wellbore whilst still allowing passage of liquids or gases. The running tool is then pulled and retrieved from the hole.

Filtrex can be installed on coil tubing / pipe and wireline.

Filtrex, the One Trip Remedial Sand Control System, provides the flexibility to be installed thru tubing, through tight restrictions and expand into the casing ID filling all annular gaps regaining sand control. The first of its kind, the system provides the ability to perform sand clean out whilst installing the tool in one trip. Once set, the tool requires no further intervention.



Stage 1

An existing screen or perforations can become damaged, and provide a sand breakthrough point. Once damaged, there is no sand control and sand is free to fill the wellbore. This can lead to issues on surface and can result in well abandonment.

Stage 2

The Filtrex system is run in hole to depth using a running tool with compression outer sleeve.

Prior to expansion of the system, the jetting nozzles will activate and commence sand clean out.

Stage 3

Sand clean out is complete, the Filtrex system is ready to expanded. The anchor sub is activated and locked into the casing.

The running tool is pulled from the assembly removing the outer protecting sleeve, allowing the multi-layer OCMP to expand to confirm to the ID of the casing or liner.

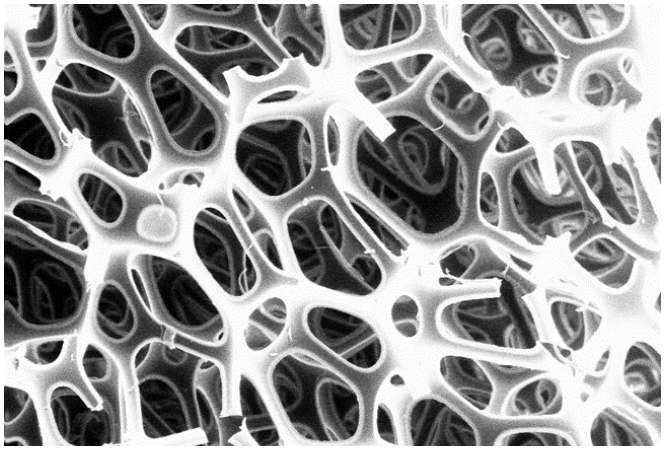
Stage 4

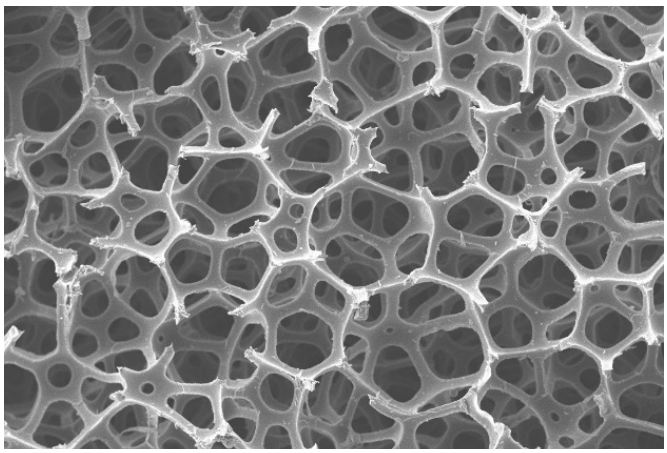
The running tool is fully removed allowing the full filter section to expand to the damaged section. Anchors are locked in the casing and running tool is pulled out of hole.

Open Cell Matrix Polymer Material

The Filtrex design consists of a primary retention layer, with a coarse OCMP layer on the OD to act as a convergence layer.

This layer protects the retention layer, whilst providing added benefits such enhanced retention and reduced risk of plugging. The system design allows the combination of distinct polymer layers with a range of pore sizes for bespoke engineered sand retention. The key to this media, is the polymer filter's ability to compress and return to its previous shape.





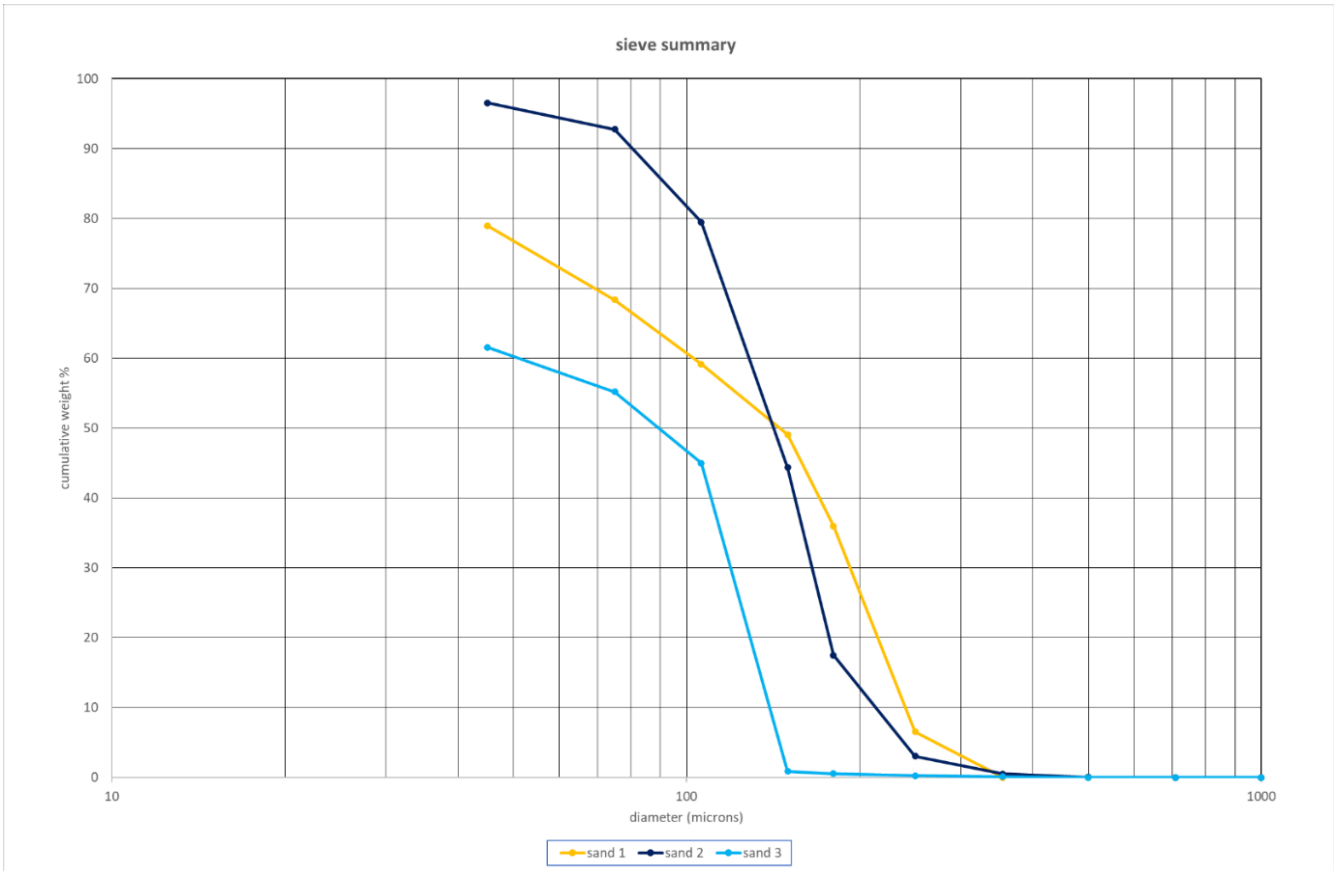
Porosity and Permeability

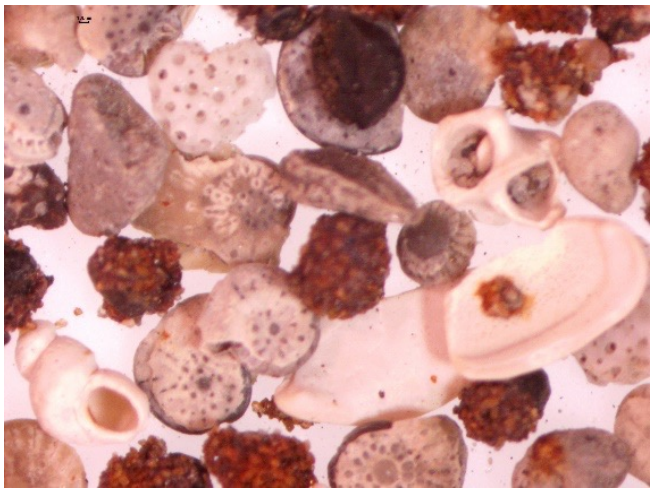
Laboratory testing has shown that the polymer filter has a high porosity of 77 - 85% and permeability of 43.7 Darcies when in an uncompressed state.

The TAQA sand laboratory can provide an indication of the retained permeability within the OCMP once sand retention testing has been completed – post sand injection. These measurements are recorded based on fixed flow rate before and after inclusion of the outcrop/formation sand and calculated based on the increased pressure using Darcy's equation.

Particle Sizing

Representative reservoir sand samples are chemically cleaned to remove any oily residue, examined under the microscope, and carefully disaggregated prior to particle size measurement. Industry standard dry sieve analysis and detailed image analysis are performed to give a detailed evaluation of the sand prior to retention testing.

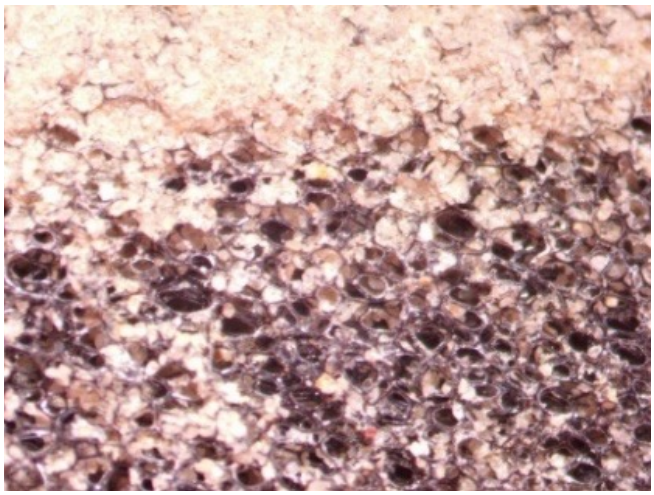


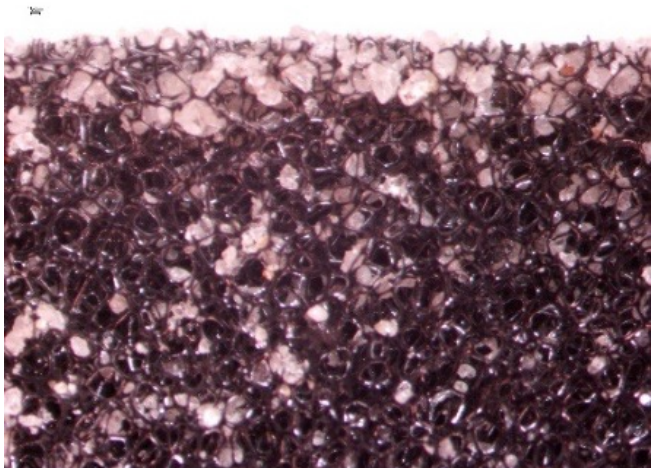


Sand Retention Testing

Retention testing can be conducted in the laboratory to fully evaluate the behaviour of the OCMP material whilst under different levels of compression to simulate the tool set inside a damaged screen or casing. Sand retention capability, pressure responses, plugging and material performance/behaviour can all be carefully assessed to find an optimum compression level in line with manufacturing requirements.

By using client reservoir data and/or performing customised sand retention testing, TAQA can tailor the OCMP filter layers to ensure adequate performance and retention for all applications.





Fluid Compatibility

Samples of the OCMP are continually tested in numerous different fluids including crude oils, base oils, and brines at temperature over several months. Testing has shown the OCMP material to be compatible with many common fluids expected to be in contact with the filter.

Initial testing indicates that OCMP is compatible with short term exposure to Hydrochloric Acid (HCl) replicating exposure of a remedial acid treatment. The sample was also evaluated in a Lewis Acid-Base Adduct HCR-7000 with the same mineral dissolving capacity as 15% HCl and no adverse effects were observed. Further testing with HF acid has also been conducted with no compatibility issues noted.

Commonly encountered oil field fluids continue to be tested at temperature to establish impact on the OCMP filter. For each new application, TAQA will perform testing when required to ensure compatibility for all exposed fluids within the reservoir.

Technical Specification

Completion Restriction	Tool OD during Deployment	Casing to set in	Minimum ID of Filtrex Tool	Filtrex OCMP length (m)	Deployment Method
3.813″	3.625″	7″ 23# - 29# (6.184″ - 6.366″)	2.441″	5	Coil Tubing* TAQA Anchor
6.184″	4.4″	7″ 23# - 29# (6.184 - 6.366″)	2.441″	5	Coil Tubing* TAQA Anchor
3.81″	3.62″	4.50″ 12.6# (3.958″)	2.630″	2.5	Wireline* Packer set
2.75″	2.69″	3.50″ 9.2# (2.992″)	1.508″	2.5	Wireline* Packer set

* TAQA are not limited to these sizes.

www.tq.com

TDK-BR-0723