



Flexible Pipelines for the Fracking Industry



Our experience is your solution

Angus Flexible Pipelines brings its experience in long distance rapid deployment and retrieval layflat pipelines spanning decades to the fast moving world of hydrofracking.

The large quantities of water required in fracking operations, often at short notice, require a partner with an in-depth knowledge of hose development, production, deployment and retrieval systems capable of operating in remote and harsh environments.

Angus Layflat Hose Systems are in use world-wide supplying the worlds' peacekeepers with fuel and drinking water; the leading oil majors with exploration hose; groundwater extraction and mining industries with flexible rising main systems; municipalities and refineries with large diameter water supply hoses; and fire and rescue services with high volume water relay solutions.



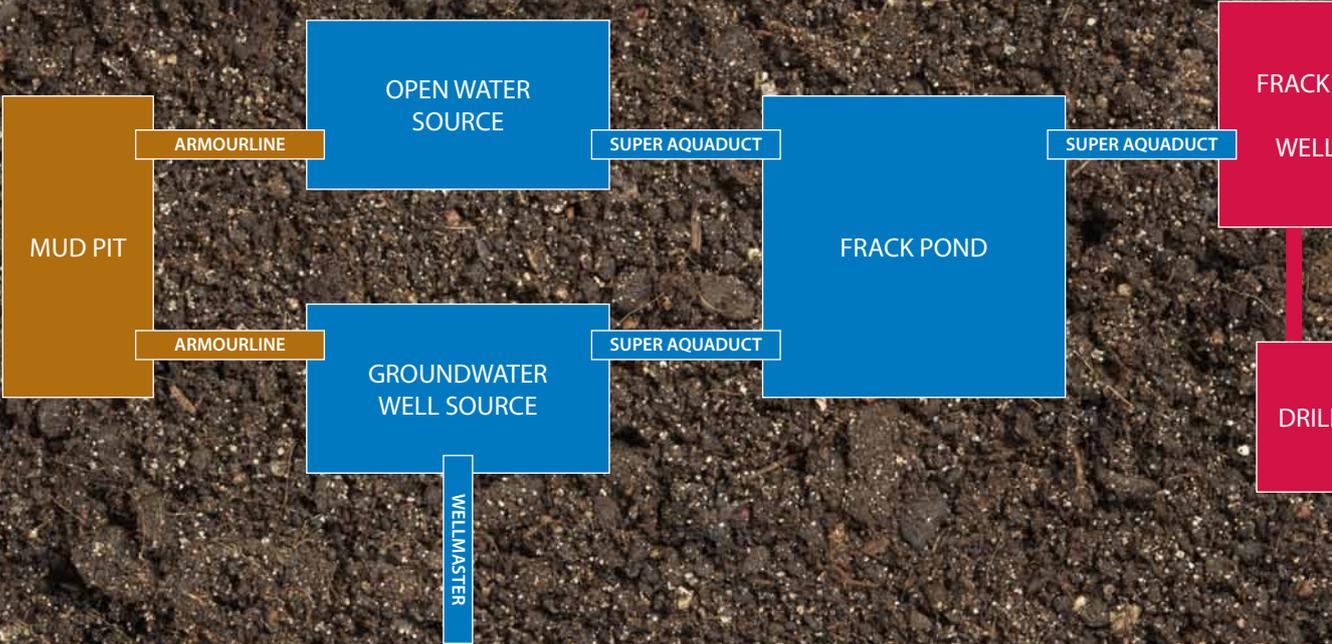
- Long distance rapid deployment military fuel and drinking water hose relay systems to US Marine Corp., US Army and other NATO Forces and military logistics units worldwide – over 150 miles in service.
- Large diameter emergency drinking water supply lines for water main bypass in earthquake relief operations in East Bay Municipality, California.
- Large diameter emergency fire main systems – over 20 miles of 12-inch supplied to Japan.
- Cross desert process water supply deployment and retrieval systems utilising Angus Armourline to supply onshore exploration rigs. Over 300 miles of 6-inch in service with BP, Shell, PDO, Occidental, Nabors Drilling, Total/Fina/Elf and KPO in Algeria, Gabon, Kazakhstan, Oman and Nigeria.
- Hi-Vol, high volume water supply systems for fire fighting operations; 5- and 6-inch hose lines, manifold and control equipment; FETCH units (Fast Efficient Technique for Collecting Hose) supplied to fire brigades and OPG emergency services worldwide.
- Chemicoil high pressure oil line bypass hose trailer mounted deployment and retrieval units in service in some of the most inhospitable areas of the world.

Features and benefits of Angus Flexible Pipelines:

- *Ease of deployment*
- *Minimises environmental impact*
- *Reduces vehicle movements*
- *Reduces air and noise pollution*
- *Long lengths require fewer couplings reducing the risk of leaks*
- *Reduces overhead hazards*
- *Deployment and retrieval equipment available*
- *Follows contours of the ground – no pipe supports or bridging required*
- *No long term ground impact – when it's gone, it's gone*
- *Large volume, long distance pumping with minimum pressure loss – pump more, further*
- *Wide product range to support a multitude of fracksite logistics*



Flexible pipeline fracking applications



TANKS
PAD

ARMOURLINE

PRODUCED/RECOVERED
WATER POND

ARMOURLINE

SURFACE DISPOSAL

DRAGMASTER

TREATMENT UNIT

ARMOURLINE

RE-INJECTION WELL

MONITORING
WELL

WELLMASTER

L RIG

Frack supply

When it comes to the extraction and delivery of water for fracking operations, there are many advantages to be gained from the use of layflat flexible pipeline hose.

Trucking in water for the frack is a major cost and environmental headache for operators (costs can be \$7/bbl of water). Typically, large fleets of delivery vehicles are utilised to transfer water to site. Not only does the use of flexible hose reduce, if not effectively eliminate, the emissions and environmental impact of trucks, but there is also a substantial benefit in reducing accidental injuries and deaths as a result. Oil and Gas workers in the United States are 8.5 per cent more likely to die in motor vehicle accidents while working than any other industrial sector. Vehicles account for 28 per cent of all worker deaths.



So, a reduction in vehicle use to and on site offers the benefits of reduced emissions, noise pollution and infrastructure damage, and a consequent increase in personal safety as a result.

Nowadays, there is increased pressure on the use of groundwater for both agricultural and drinking supplies. This is causing the fracking industry to consider other alternatives such as the use of brackish or salt water. Brackish water aquifers are typically deeper than potable water, but an estimated 80 per cent in the United States are within reach of Angus Flexible Pipelines' Wellmaster range.

Wellmaster is the next generation Flexible Rising Main for all types of ground water extraction. Its simplicity of installation makes it the cost-effective alternative to rigid steel pipe, especially for deep well construction.

Super Aquaduct then delivers water to the frack site. Designed for long life and maintenance-free service in even the harshest environments, it is tough and durable with exceptional resistance to abrasion and cutting for use on a wide variety of ground conditions.

What both products have in common is exceptional strength and superior hydraulic performance, ease of storage and transport, rapid installation and retrieval, cost-effective set-up and operation, and long service life.



Flowback

Once used for the frack, the disposal of produced and recovered water becomes the next major consideration. Once again, the use of flexible pipelines eliminates the use of trucks and can bring substantial benefits in safety to workers on site. Likewise, the reduction flexible pipelines offer in transport, treatment and disposal costs plays a significant role in controlling operational budgets for maximum profitability.

Angus Flexible Pipelines' **Armourline** and **Dragmaster** ranges are specifically designed to handle this task. Long continuous lengths can be quickly deployed and retrieved using light duty trailers, flaking boxes, or power-driven reels. High flexibility and kink resistance allow natural ground contours to be followed without putting stress on the pipeline and eliminates expensive path-cutting work. Fewer joints and faster connections mean reduced labour and equipment costs, and low pressure loss delivers efficient pumping.



Monitoring and re-injection

Social and environmental responsibilities lie on the shoulders of all major corporations these days. Our **Wellmaster** range is also designed for use in systems monitoring ground water of potable aquifers and disposal wells where high levels of SRBs, iron bacteria, salinity and NORMs all need to be kept under control. The same applies where treated produced and recovered water is re-injected into disposal wells.

Overall, it is the superior hydraulic performance with low friction loss for reduced operation costs; rapid installation and retrieval methods resulting in substantial labour and cost savings; and lightweight, layflat coiled construction for ease of storage, handling and transport that makes layflat flexible hose the pipeline of choice for fracking operators worldwide.





INTERNATIONAL SALES

Angus Flexible Pipelines

Angus House, Haddenham Business Park,

Pegasus Way, Haddenham, Aylesbury, HP17 8LB, UK

Tel: +44 (0)1844 293600 • Fax: +44 (0)1844 293664

UK SALES

Angus Flexible Pipelines

Station Road, Bentham, Lancaster, LA2 7NA, UK

Tel: +44 (0)1524 264000 • Fax: +44 (0)1524 264180

Email: info@flexiblepipelines.co.uk • Web: www.flexiblepipelines.co.uk