Oil Safe AR®

1030 Wireline

Technical Data Sheet

Oil Safe AR® -1030-WLF is a safe yet functional replacement for traditionally inhibited hydrochloric acid treatments and MEA infused hydrochloric acid systems (also referred to as "modified acids for wireline").

Heartland Energy Group, Ltd introduced "patented synthetic acid systems" or "patented green acid" technologies in 2006. As the original pioneers and developers of synthetic acid systems our quality has remained consistent for almost 20 years in the industry. We are pleased to offer the same consistent backbone technology along with a few improvements which allow our 1030-WLF blend to meet and exceed the strict industry standards for corrosion rates and wireline integrity. Not only do we meet and exceed industry standards but have a proven supply chain and are not dependent on unstable commodities like MEA. Our pricing remains very stable and does not suffer large spikes due to oversees shipping challenges or plant shutdowns. Heartland Energy Group has multiple manufacturing locations in all the major plays and can deliver large volumes of our Oil Safe AR® - 1030-WLF blend at a very competitive and economical price.

Heartland's 1030-WLF blend offers operators a great choice for acid spearhead work, stimulation and workover treatments. It allows operators the ability to safely spot spearhead acid with the perforating guns in the hole. Thus resulting in huge cost savings and large reductions in water use.

FEATURES & BENEFITS

- An excellent choice for acid spearhead treatments and workovers
- Wireline friendly and compatible system
- Requires no additional additives for most applications
- Compatible with standard oilfield elastomers
- Biodegradable
- Non-toxic, Non mutagenic
- Non-fuming, No VOC's
- Non-corrosive to skin tissue
- Non-regulated for ground transport per USDOT
- Reduces precipitation and formation damage
- Improves water usage and disposal of effluent
- Consistent and stable price model unlike MEA based systems

PHYSICAL PROPERTIES

Appearance:	Clear to slight yellow liquid
Specific Gravity:	1.09 ± 0.04
Odor:	Mild soapy odor
Initial Freezing Point:	~ -3°F (-19.44°C)
Boiling Point:	> 212°F(100°C)
pH:	< 1.0
Solubility:	Soluble in water
Shelf Life:	> 1 year

HEARTLAND ENERGY GROUP LTD.

www.HeartlandEnergyGroup.net

Phone: 1.877.797.2811

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TOTAL SOLUBILITY

Table 1. Total solubility of Oil Safe AR® concentrate on representative scale samples.

Acid	Scale	Total Solubility (lb/gal)
15% HCl	$CaCO_3$	~1.78
Oil Safe AR® Concentrate	$CaCO_3$	~1.82
Oil Safe AR® Concentrate	FeS	~1.45

NOTE: Scale samples may vary based on source material.

CORROSION RATES

Oil Safe AR® - 1030-WLF demonstrates corrosion rates well below industry standards.

Table 2. Corrosion rates of Oil Safe AR® - 1030-WLF tested against common oilfield metals.

Material Tested	Initial Coupon Weight (g)	Post Exposure Coupon Weight (g)	Mass Loss Difference (g)	Mass Loss Difference (lb)	Corrosion Rate @ 6 hours (lb/ft²)
316 SS	4.4561	4.456	1E-04	2.20E-07	0.0000
J55	4.7944	4.7872	0.0072	1.59E-05	0.0016
N80	4.9409	4.9348	0.0061	1.34E-05	0.0013
L80	4.8718	4.8694	0.0024	5.29E-06	0.0005
P-110	4.987	4.9719	0.0151	3.33E-05	0.0033
QT-900	26.6346	23.5672	0.0674	1.49E-04	0.0088

TEST TEMPERATURE: 230° F TYPE: Rotating type autoclave TESTING PERFORMED: TORP Labs

AUTOCLAVE PRESSURE: 400 PSI FLUID TESTED: Oil Safe AR®-1030-WLF

NOTE: Typical pipe industry accepted corrosion rate less than 0.05 lb/ft² at 6 hours.

Typical coil tubing accepted corrosion rate less than 0.02lb/ft² at 6 hours.

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CORROSION RATES

Table 3. Corrosion rates of Oil Safe AR® - 1030-WLF wireline mass loss data

Material Tested	Initial Coupon Weight (g)	Post Exposure Coupon Weight (g)	Mass Loss Difference (g)	Mass Loss Difference (lb)	Corrosion Rate @ 6 hours (lb/ft²)
WL#7(1030-WLF)	17.9223	17.6172	0.3051	1.70	0.0321
WL#8(1030-WLF)	17.798	17.4736	0.3244	1.82	0.0339
WL#9(1030-WLF)	17.3651	17.0707	0.2944	1.70	0.0310

TEST TEMPERATURE: 194° F

TYPE: Rotating type autoclave

TESTING PERFORMED: TORP Labs

AUTOCLAVE PRESSURE: 400 PSI

FLUID TESTED: Oil Safe AR®-1030-WLF

TIME: 6 hrs.

WIRELINE TESTING

Oil Safe AR® has been tested with multiple labs on commonly used wireline. **Table 4. Tensile Testing of Oil Safe AR® - 1030-WLF**

Material Testing	Test Condition	lbF	N	Average (N)
Wireline T1	Non-exposed wire sample	9,583.2	42,628.2	42,084
Wireline T2	Non-exposed wire sample	9,084	40,411.6	42,084
Wireline T3	Non-exposed wire sample	9,714.4	43,211.8	42,084
Wireline A1	Exposed at 194°F for 6 hours	8,117	36,107	38,141
Wireline A2	Exposed at 194°F for 6 hours	9,332	41,509	38,141
Wireline A3	Exposed at 194°F for 6 hours	8,275	36,807	38,141

TESTING PERFORMED: Stress Engineering Services Inc., Houston, Texas

FLUID TESTED: Oil Safe AR®-1030-WLF

SAFETY, STORAGE & HANDLING

Oil Safe AR® 1030 Wireline is shipped in 275g totes or tanker trucks from manufacturing facility. Smaller quantities are avaible upon request.

When pumping, storing or transporting this product it is strongly recommended to use manufacturer approved hose couplings or fittings. Polypropylene Banjo cam-lock style connections or stainless steel connections are suggested. Do not use aluminum fittings, pumps or tanks when handling this material. Store product in acid lined tanks, fiberglass tanks or high density polypropylene (HDPE) tanks, HDPE drums or HDPE IBC totes. If heating, use stainless steel heat exchanger or tank steam coils. Keep temperatures below 160°F.

Shelf life of Oil Safe AR® is greater than 1 year.

Refer to SDS for additional information and PPE concerns.

HMIS RATINGS

HEALTH	0	4-EXTREME 3-SERIOUS 2-MODERATE 1-SLIGHT 0-MINIMAL
FLAMMABILITY	0	
REACTIVITY	0	
PERSONAL PROTECTION EQUIPMENT	A	SAFETY GLASSES

DOT DESCRIPTION: Non-regulated for ground transportation

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