



# Hydraulic Fluid Selection and Sales

**The webinar will begin in less than 10 minutes.**

Erica McDonald and Steve Hochberger



# Hydraulic Fluid Selection and Sales

**The webinar will begin in less than 5 minutes.**

Erica McDonald and Steve Hochberger



# Hydraulic Fluid Selection and Sales

Erica McDonald and Steve Hochberger

## Erica McDonald

- CITGO Lubricants Product Specialist
- BS, Integrative Biology with Minor in Chemistry
- 10 Years in the Lubricants Industry, including extensive experience at the CITGO Cicero Lab
- LubeAlert Oil Condition Monitoring Program Support



## Steve Hochberger

- Senior Account Manager
- BA General Business 1981
- 34 Years Lubricant Sales
  - 32 Years at Manufacturer Level
  - 2 Years Marketer
- STLE
  - CLS

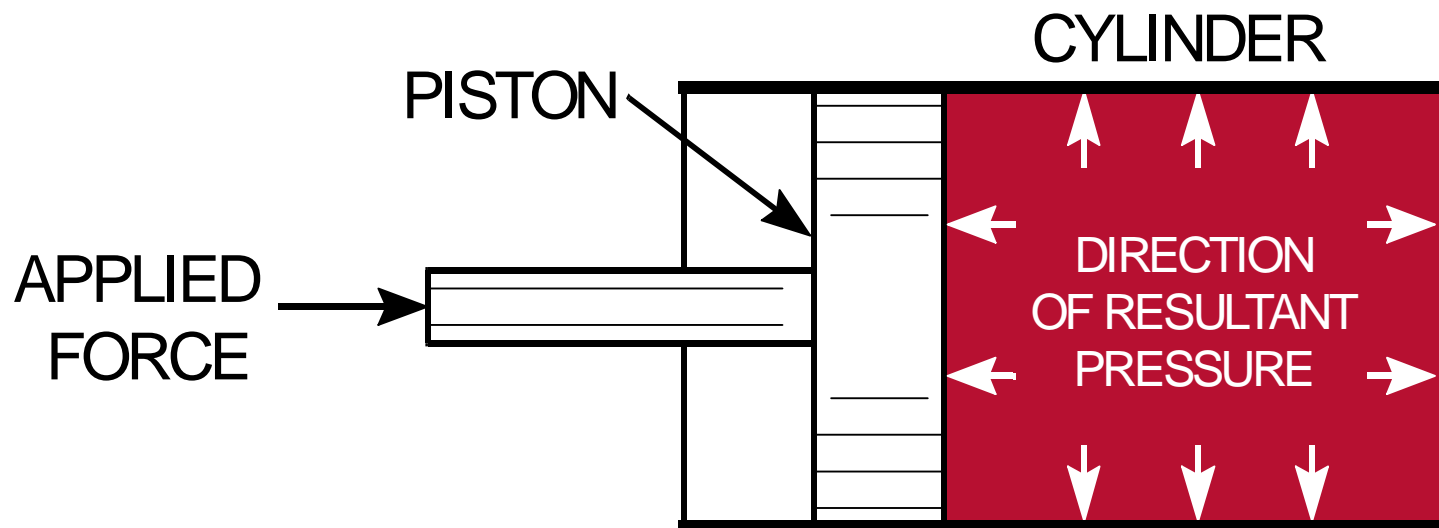




## Agenda

- Hydraulic overview
  - CITGO, Mystik, and Clarion hydraulic portfolio
  - Hydraulic fluid applications
  - Compatibility
  - Selection chart
-

## Basic Hydraulics – Pascal's Law

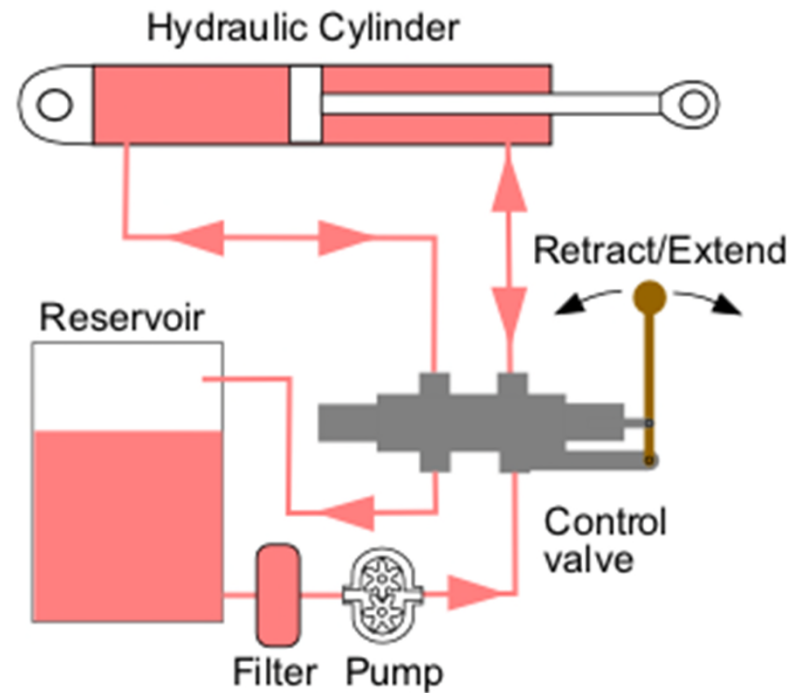


$$\Delta P = \rho g(\Delta h)$$

## Simple Hydraulic Circuit

Components:

- Fluid Reservoir
- Filter
- Pump
- Directional Control Valve
- Hydraulic Cylinder





## Product Lines

- CITGO HyDurance AW Hydraulic Oils
- Mystik JT-9 LeakShield AW Fluids
- Clarion Environmental Hydraulic Fluids
- Clarion Food Grade Hydraulic Fluids



## CITGO HyDurance AW Synthetic Fluids

### Synthetic PAO based

- Ashless anti-wear package
- Maximum service life in vane, piston, and gear pumps
- Excellent thermal and oxidative stability
- Excellent corrosion protection
- Excellent demulsibility characteristics
- High viscosity index
- Wide temperature range performance
- Available in ISO 46 and 68



## CITGO HyDurance AW Fluids

### Mineral oil based

- Blended with API Group II base oils
- Excellent zinc based anti-wear package
- Thermal and oxidative stability
- Excellent rust and corrosion protection
- Anti-foaming performance
- Good demulsibility
- ISO 22, 32, 46, 68, 100, and 150



Rexroth Internal Gear Pump



Rexroth Fixed Displacement Motor



Rexroth Variable Vane Pump



Rexroth Fixed Displacement Bent Axis Pump

## CITGO HyDurance AW All Temp

### Mineral oil based

- Blended with API Group II base oils
- Excellent zinc based anti-wear protection
- Thermal and oxidative stability
- Excellent rust and corrosion protection
- Anti-foaming performance
- Excellent demulsibility
- High viscosity index
- ISO 32, 46, 68



## CITGO HyDurance AW CP Fluid

35 KV dielectric strength

Multi-grade performance (high VI)

26 cSt at 40°C

Applications:

- Tree trimming, fruit picking mobile equipment
- Firefighting lift trucks, buckets, etc.
- Aerial lift buckets
- Mobile hydraulic systems
- Garbage collection equipment
- Public utility vehicles
- Construction equipment in colder services



## CITGO Non-Zinc Hydraulic Fluids

- Ashless zinc free anti-wear performance
- Inherently biodegradable
- Low acute aquatic toxicity

### **CITGO HyDurance AW NZ**

- ISO 32, 46, and 68

### **CITGO HyDurance AW All Temp NZ**

- ISO 32, 46, 68
- High viscosity index

### **CITGO HyDurance AW Super NZ**

- ISO 32, 53
- Suitable for high pressure piston pumps
- High viscosity index – wide temperature range
- Recommended for use in Hitachi excavators



# CITGO Fire Resistant Hydraulic Fluids

## CITGO FR WG-40XD<sup>®</sup> Hydraulic Fluid

- Premium water-glycol type fire-resistant fluid
- Provides optimum performance in hydraulic systems
- Protects against wear, foam, and corrosion



## CITGO Glycol FR-5046HP

- High pressure polymer thickened water-glycol fluid
- Can be used in high pressure systems
- Applications:
  - Environmentally sensitive areas
  - Mobile or stationary equipment



CITGO FR WG-40XD WATER ADJUSTMENT CHART						
BRIX	VISCOSITY (SUS) AT 100°F	VISCOSITY (cSt) AT 40°C	PERCENT WATER IN UNADJUSTED FLUID	GALLONS OF WATER NEEDED PER 100 GALLONS OF UNADJUSTED FLUID IN SYSTEM	CONDITION	
50.0	412	82.5	28.4	18.1	SEVERE	
48.5	394	78.8	29.3	17.1		
49.0	377	75.0	30.2	15.8		
48.5	358	71.2	31.2	14.4		
48.0	342	67.9	32.2	13.0		
47.5	324	64.3	33.3	11.5		
47.0	309	61.3	34.2	10.2		
46.5	294	58.4	35.3	8.8		MODERATE
46.0	280	55.6	36.5	7.3		
45.5	266	52.7	37.7	5.8		
45.0	253	50.1	38.8	4.5		
44.5	241	47.7	40.0	3.0		
44.0	228	45.0	41.5	1.5	NORMAL	
43.5	217	43.0	42.7	0.0		
43.0	207	41.0	43.9	0.0		
42.5	197	38.9	44.5	0.0		
42.0	187	37.0	45.5	0.0		
41.5	177	34.5	-	Excess Water		
40.0	153	30.0	-	Excess Water		

## Mystik JT-9 LeakShield Hydraulic Fluids

- Blended with API Group II base oils
- Excellent zinc based anti-wear protection
- Thermal and oxidative stability
- Excellent rust and corrosion protection
- Anti-foaming performance
- Excellent demulsibility
- ISO 22, 32, 46, and 68

### HVI-32 and HVI-68

- High viscosity index
- Wide temperature range
- High dielectric strength – 35 kV





## Clarion Food Grade Hydraulic Fluids

### Clarion Food Machinery AW Oils

- Based on white mineral base oils
- NSF HX-1 additives
- NSF H1 for incidental food contact
- ISO 32, 46, 68, and 100 grades

### Clarion Food Grade FR Fluid

- For high-temperature hydraulic applications where there is a risk of fire
- Contains dipropylene glycol
- Excellent heat transfer properties
- NSF H1 for incidental food contact

Clarion CompressorGard products can be used where a synthetic food grade hydraulic fluid is needed.



# Clarion Green Hydraulic Fluids

## Clarion Green AW Oils

- White mineral oil based
- Inherently biodegradable
- ISO 32, 46, and 68 grades

## Clarion Green Synthetic Fluids

- Synthetic ester based
- **Readily biodegradable**
- Meet EPA 2013 VGP requirements
- ISO 22, 32, 46, and 68 grades

## Clarion Green Bio fluids

- Natural ester based (vegetable oil)
- **Readily biodegradable**
- Meet EPA 2013 VGP requirements
- ISO 32, 46, and 68 grades



# Hydraulic Power - Applications

## Advantages of hydraulic power:

- ✓ power and precision to move heavy loads with fine control
- ✓ reliability
- ✓ compact, economical systems

## Hydraulic systems are found in all industrial sectors:

- ✓ manufacturing (e.g. injection moulding machines, presses, metalworking)
- ✓ mobile equipment (e.g. construction equipment, agricultural machinery, utility equipment)
- ✓ mining, oil rigs, bridge and lock gate machinery, rescue equipment





## Application Considerations

- Machine or Component OEM Recommendation
    - Starting Point
  - Equipment under Warranty
    - Yes, defer to OEM recommendations
    - No, options are available based on conditions
  - Inventory Consolidation
-



## Application Considerations

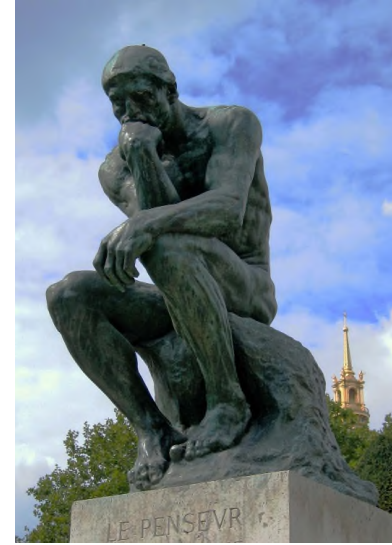
- Operating or Ambient Temperature Range
    - Viscosity Index
  - Current Product
    - Is current product performance acceptable
  - Compatibility
  - Zinc vs. Non-Zinc
  - Environmental Considerations
-

## Right Choice vs. Best Choice

- OEM Recommendations
- Operating conditions
- Operating or ambient temperature range
- Previous product
- Compatibility

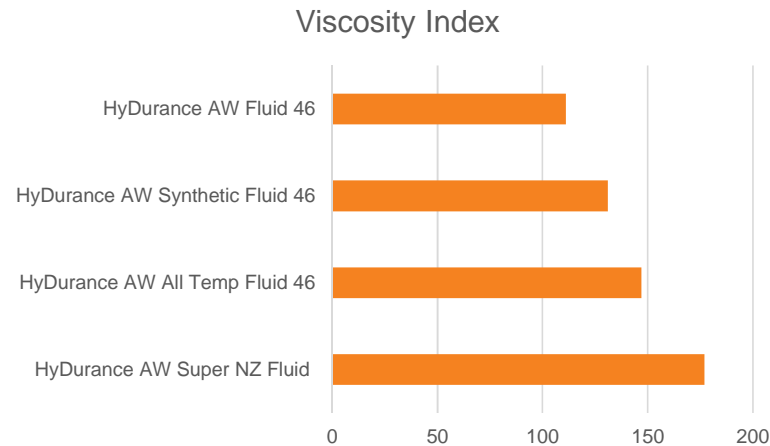
- **EXAMPLE**

- HyDurance AW 46 – OEM Recommendation – RIGHT CHOICE
- HyDurance AW All Temp 46 – Ambient Temp ranges – BETTER CHOICE
- HyDurance AW All Temp NZ 46 – Current Product – BEST CHOICE

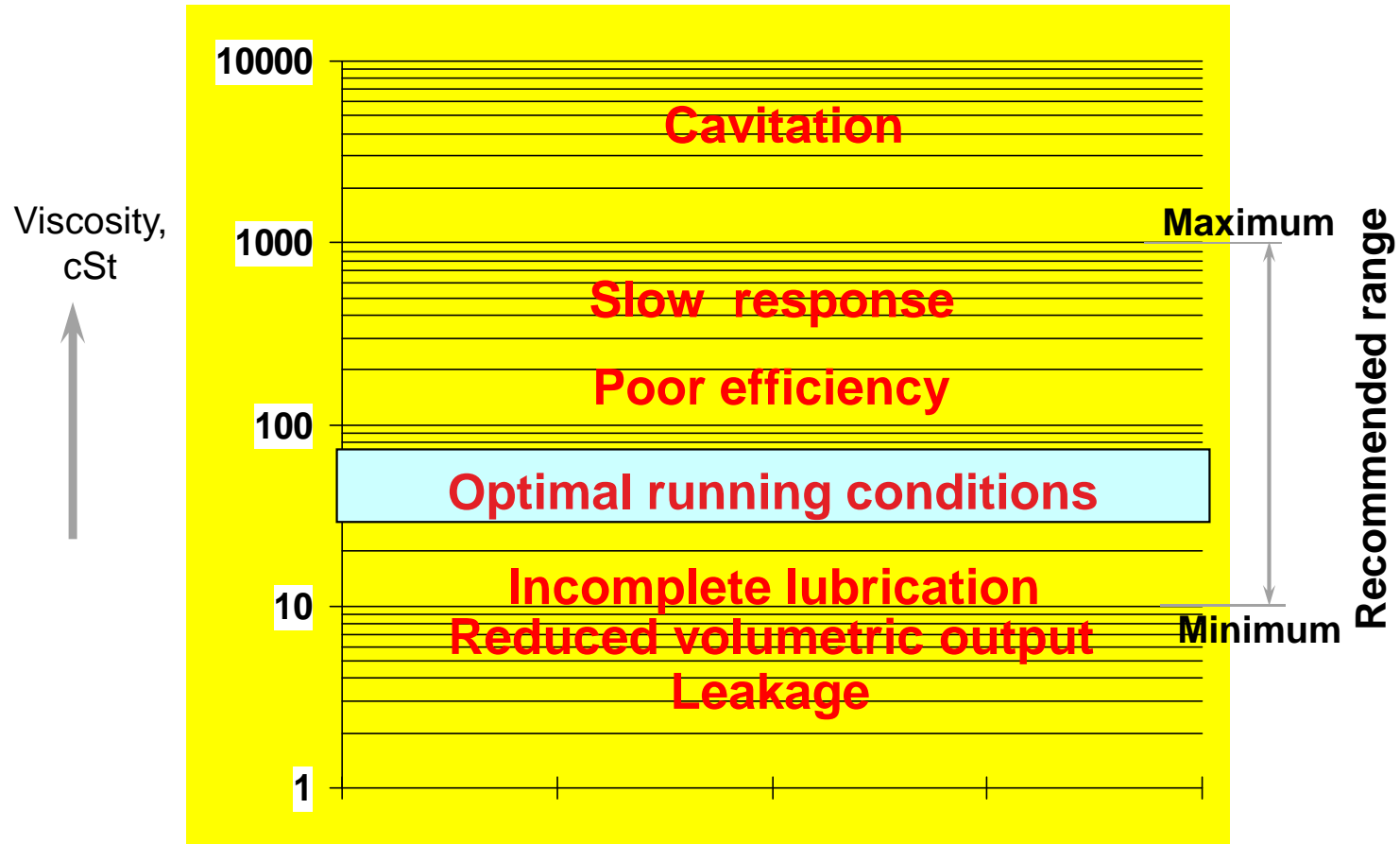


## HVI Characteristics

- CITGO and Mystik hydraulic fluids are formulated with premium base stocks.
- CITGO HyDurance AW Synthetic Fluids are formulated with PAO base stocks and have a naturally higher VI of around 135.
- Higher VI, mineral oil based hydraulic fluids, such as CITGO HyDurance All Temp and CITGO HyDurance Super NZ fluids all contain shear stable polymers.



# Viscosity – Temperature Operating Window (TOW)







## Zinc vs Non-Zinc

- Zinc based hydraulic fluids contain zinc dialkydithiophosphate (ZDDP). It is an organic zinc-sulfur-phosphorus containing additive. It is a well known additive used in a wide variety of applications since the 1940s, such as motor oils, hydraulic fluids, and greases for anti-wear.
  - There are applications or situations where a zinc based hydraulic fluid is not suitable, such as environmentally sensitive areas or the food and beverage industry.
  - Non-zinc hydraulic fluids are becoming more popular in environmentally sensitive applications, such as elevators, construction equipment over or near water, and amusement park rides.
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## Compatibility

- Zinc and non-zinc chemistries should not be mixed.
- Elastomer compatibility should be considered. Mineral oil and PAO fluids work well with traditional elastomers used in oil based systems.
- Ester-based fluids have unique compatibility concerns, due to the solvency of esters. Elastomers used with esters should have excellent resistance.



# Compatibility

Elastomer/Plastic	Abbreviation	Trade Names	Mineral Oil	Synthetic Hydrocarbon	Synthetic Ester	Water/Glycol
		Example Products	HyDurance AW HyDurance AW All Temp Mystik JT-9 LeakShield Clarion AW Hydraulic Fluids	HyDurance AW Synthetic Fluids	Clarion Green Bio Fluids Clarion Green Synthetic Fluids	FR WG-40XD, Glycol FR-5046HP Clarion Food Grade FR Fluid
Polyacrylate	ACM	HyTemp	Very Good			
Ethylene-Acrylic	AEM	Vamac	Good	Good		
Ethylene-Propylene-Diene Monomer	EPM, EPDM	Duttral, Nordel, Vistalon	Poor	Poor	Poor	Recommended
Fluoroelastomers	FKM, FPM	Viton, Fluorel	Very Good	Very Good	Very Good	Suitable
Nitrile (Acrylonitrile-Butadiene)	NBR, XNBR, HNBR	NBR, Purbunan, Buna-N, Chemigum, Hycar, Paracril, Nipol, Krynac, Europrene	Good	Good	Poor to Good	Suitable
Perfluoroelastomers	FFKM	Kalrez, Parafleur	Very Good	Very Good		
Polychloroprene	CR	Neoprene	Fair	Fair to Good	Poor	Suitable
Silicones	MQ, VMQ, PMQ, FMQ	VMQ	Poor to Good	Poor to Good	Poor to Fair	
Styrene-Butadiene	SBR	SBR, Buna-S	Poor	Poor to Good	Poor	Suitable
Polyester			Good	Good	Poor to Fair	
Polytetrafluoroethylene	PTFE	Teflon	Very Good	Very Good	Very Good	Suitable
Polyamide	PA	Nylon, Zytel	Poor to Good	Poor to Good	Poor	
Polycarbonate	PC		Good			
Natural Rubber	NR		Poor to Fair	Poor to Fair	Poor	Suitable
Polyethylene	PE (LDPE, HDPE)		Good	Good	Good	
Polypropylene	PP		Good to Poor			
Butyl Rubber	IIR		Very Poor to Poor	Very Poor to Poor	Poor to Fair	
Polyvinyl Chloride	PVC	PVC	Poor to Good	Poor to Good	Poor	
Chlorosulfonated Polyethylene	CSPE, CSM	Hypalon	Fair			
Polyether Ester	TPC-ET	Hytrel	Good			
Polyurethane	PU		Good to Fair			
Polyoxymethylene, Polyacetal, acetal resin, polytrioxane, polyformaldehyde, and paraformaldehyde	POM	Delrin, Kepital, Celcon, Hostaform and Ultraform	Excellent - Good			
Fluorosilicone	FSI		Good			
Ethylene-Propylene Rubber	EPR		Poor	Poor		Good
Fluorovinyl Methyl Siloxane	FVMQ	Fluorosilicone	Good to Excellent			
Note: Always consult the elastomer supplier or Original Equipment Manufacturer (OEM) regarding the compatibility of a specific material with the lubricant to be used. If in doubt, have the elastomer/lubricant combination tested.						

## CITGO® Hydraulic Fluids—Properties and Specifications Chart

	KEY PROPERTIES										MEETS OR EXCEEDS					
	Viscosity Grades (ISO)	Fire Resistant	High Efficiency/ Energy Saving	Dielectric Strength**	Wide Temperature Range	Reduced Leakage	Low Temperature Properties	High Viscosity Index	Lower Toxicity Zinc Free Formulation	Readily Bio-degradable (meets VGPEAL requirements)	Parker Hannifin HF-0	DIN 51524	Eaton Brochure	Fives Cincinnati	NSFH-1	Bosch Rexroth
<b>HYDRAULIC FLUIDS</b>																
<b>CITGO</b>																
HyDurance® AW Fluids	22, 32, 46, 68, 100, 150										•	•	•	•		•
HyDurance AW CP Fluids	26*			•	•		•	•			•	•	•			
HyDurance AW Synthetic Fluids	46, 68				•		•	•			•	•	•	•		
HyDurance AW All Temp Fluids	32, 46, 68		•		•		•	•			•	•	•			•
HyDurance AW/AL HVI 100	100		•	•	•	•		•			•		•			•
HyDurance AW NZ Fluids	32, 46, 68							•			•	•	•	•		
HyDurance AW All Temp NZ Fluids	32, 46, 68		•		•		•	•	•		•	•	•			
HyDurance AW Super NZ Fluids	32, 53*		•		•		•	•	•		•	•	•	•		
FR WG-40XD Hydraulic Fluid	40*	•					•	•	•							
Glycol FR-5046 HP	46	•					•	•	•	•						
<b>MYSTIK®</b>																
JT-9™ LeakShield® AW Hydraulic Oils	32, 46, 68, 100					•					•	•	•	•		•
JT-9 LeakShield AW Hydraulic Oils - HVI	32, 68		•	•	•	•		•			•	•	•	•		•
<b>CLARION®</b>																
Green Bio	32, 46, 68			•				•	•	•			•			
Green Synthetic Fluids	22, 32, 46, 68		•	•	•		•	•	•	•						
Green AW Fluids	32, 46, 68							•								
CompressorGard®	32, 46, 68		•		•		•	•	•						•	
SynBar® Fluid 22	22		•				•	•	•						•	
Food Machinery AW Fluids	32, 46, 68, 100							•							•	
Food Grade FR Fluid	46	•						•							•	

\* Value shown is cSt @ 40°C, not an ISO viscosity grade.

\*\*Dielectric strength is extremely sensitive to humidity and contamination. Once the containers are opened, the dielectric strength cannot be expected to remain at its original value. Containers should be kept tightly sealed and stored in a dry environment.



## Sales Tools

[Hydraulic Comparison Chart \(all brands\)](#)

[Mystik JT-9 LeakShield AW Hydraulic Oil Brochure](#)

[Mystik JT-9 LeakShield Hydraulic Oils Infographic](#)

[Mystik Website: Hydraulic](#)

[CITGO Website: Hydraulic](#)

[Clarion Website: A/W](#)

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## Questions

- Please post your questions using the Q&A function.
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## How to Contact Us

- Lubes Answer Line
  - 800-248-4684
    - 8:00 AM - 12:00 PM, 1:00 PM – 5:00 PM CT
    - Monday through Friday
  - [lubeshelp@citgo.com](mailto:lubeshelp@citgo.com)
    - Available 24/7
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## Future Webinars

May 28, 2021

Off Road Products

June 11, 2021

Tractor Hydraulic Fluids

June 25, 2021

Clarion Lubricants for the Food and  
Beverage Industry

July 9, 2021

Lubricants for the Steel Industry

July 23, 2021

Wear Modes and Failure Analysis

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