

This is a general guide for the compatibility of R&M Energy Systems Ultra-Flex® elastomers with various chemicals that may be encountered in down-hole applications. This guide should be used as a reference only. The performance of Ultra-Flex® elastomers will be dependent on the combination of chemicals encountered, concentration levels, temperature and pressure. For more detailed information on the performance of a specific Ultra-Flex® elastomer in a particular fluid consult your R&M Energy Systems technical representative for assistance.

CHEMICALS & MATERIALS	COMPATIBILITY / LIMIT	RECOMMENDED Ultra Flex® ELASTOMERS
Acetone	Not Compatible	N/A
<u>Aromatic Hydrocarbons:</u>		
Benzene	Not Compatible	N/A
Cyclohexane	Yes	138, 158, 167, 170, 175
Hexane	Yes	138, 158, 167, 170, 175
Napthalene	Not Compatible	N/A
Toluene	Not Compatible	N/A
Xylene	Not Compatible	N/A
ASTM Oil No. 1	Yes	102, 106, 138, 158, 167, 170, 175
ASTM Oil No. 2	Yes	102, 106, 138, 158, 167, 170, 175
ASTM Oil No. 3	Yes	102, 106, 138, 158, 167, 170, 175
ASTM Oil No. 4	Yes	102, 106, 138, 158, 167, 170, 175
<u>ASTM Reference Fuels:</u>		
A (100% Iso-Octane)	Not Compatible	N/A
B (70% Iso-Octane, 30% Toluene)	Not Compatible	N/A
C (505 Iso-Octane, 505 Toluene)	Not Compatible	N/A
Barium Sulfate	Yes	102, 106, 138, 158, 167, 170, 175
Brine > Ph 5.0	Yes	102, 106, 138, 158, 167, 170, 175
Brine < Ph 8.0	Yes	102, 106, 138, 158, 167, 170, 175
Brine < Ph 5.0 or > Ph 8.0	Consult RMES	Consult RMES
Butane	Yes	102, 106, 138, 158, 167, 170, 175
Carbon Dioxide	Consult RMES	102, 138, 170, 175
Condensate (50° API)	Not Compatible	N/A
Corrosion Inhibitors	Consult RMES	102, 106, 138, 158, 167, 170, 175
<u>Crude Oil (Petroleum):</u>		
API Gravity <30°	Yes	102, 106, 138, 158, 167, 170, 175
API Gravity >30° & <40°	Yes	138, 158, 167, 170, 175
API Gravity >40°	Consult RMES	158, 175

De-emulsifiers	Consult RMES	102, 106, 138, 158, 167, 170, 175
Detergents	Consult RMES	102, 106, 138, 158, 167, 170, 175
Diesel Oil	Yes	102, 106, 138, 158, 167, 170, 175
Hydrochloric Acid	Consult RMES	N/A
Hydrogen Sulfide	Yes	102, 158, 167, 170, 175
Iron Sulfide	Yes	158, 167, 170, 175
Kerosene	Yes	138, 158, 167, 170, 175
Ketone	Not Compatible	N/A
Methane	Yes	102, 106, 138, 158, 167, 170, 175
Naptha	Not Compatible	N/A
Natural Gas	Yes	102, 106, 138, 158, 167, 170, 175
Paraffin	Yes	102, 106, 138, 158, 167, 170, 175
Paraffin Inhibitors	Consult RMES	102, 106, 138, 158, 167, 170, 175
Propane	Yes	102, 106, 138, 158, 167, 170, 175
Sea Water	Yes	102, 106, 138, 158, 167, 170, 175
Scale Inhibitors	Consult RMES	102, 106, 138, 158, 167, 170, 175
Soap Solutions	Yes	102, 106, 138, 158, 167, 170, 175
Sulfuric Acid	Consult RMES	N/A

## ULTRA-FLEX® ELASTOMERS OVERVIEW

Ultra-Flex®	Description
102	UF102 is the work horse in the industry. It is used when the well fluids consist of petroleum oils with water, CO <sub>2</sub> and H <sub>2</sub> S, at a temperature of 200°F or below. It has very high resistance to gas permeation. Physical properties are average
106	UF106 is designed specifically for use in applications where the solid volume fraction and aromatic levels are high. Environments involving a combination of high sand percentage with aromatic oil and water are common applications for UF106. Physical properties are average.
138	UF138 is designed for use where resistance to gas permeation and dynamic loading is required. It has a high resistance to aromatic fluids and a very high resistance to gas permeation. Physical properties are above average.
158	UF158 is designed for use in applications which are not suitable for UF102 or UF138 due to the level of aromatic fluids or temperature. It has a very high resistance to aromatic well fluids and can operate at temperatures up to 250° F without high percentages of swell or physical property loss. Physical properties are high.
167	UF167 is designed for use in applications which are not suitable for UF102 or UF138 due to the level of petroleum oil or high temperature. It can function in oils, aromatic well fluids, water environments, and temperatures up to 300°F without high percentages of swell or physical property loss. Physical properties are high.
170	UF170 is designed for use in applications which are not suitable for UF102 or UF138. This can be due to the level of petroleum oil, high temperature, or when gas permeation prevents the use of UF167 or UF158. It can function in oils, aromatic well fluids, water environments, and temperatures up to 300°F without high percentages of swell or physical property loss. It has very high resistance to gas permeation.
175	UF175 is designed for use in applications which are not suitable for UF158 or UF167 due to the level of petroleum oil, high temperature, and gas. It can function in oils, aromatic well fluids, water environments, and temperatures up to 300°F without high percentages of swell or physical property loss. It has very high resistance to gas permeation. Physical properties are high.