Mueller Trade Talk

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As companies continue to test and determine the safest, most efficient and environmentally friendly alternatives available to the traditional CFC refrigerants such as R12 and R502 and HCFC refrigerants such as R22, the chlorine-free HFC refrigerants have become the most common substitutes. While R134a, R404A, R407C, R410, R422A/D and R507 are now widely used in new equipment, along with natural refrigerants such as ammonia (NH3) and carbon dioxide (CO2), the potential for interchangeability and retrofits in existing equipment is very limited due to varying thermodynamic properties, and material compatibility issues.

When proposing a system retrofit, a number of considerations must be examined:

1. SYSTEM AGE

a. While it is typically the older systems that are candidates for retrofits, it should be recognized that the older systems require more evaluation due to the nature of the existing components and their suitability to the refrigerant being considered. In some cases, failure to follow the recommended guidelines by the system manufacturer will result in the violation of the UL Standard for Field Conversion/Retrofit of Alternative Refrigerants in Refrigeration and Air Conditioning Equipment.

2. SYSTEM EVALUATION

a. Depending on the system considered for retrofit, a change to an alternative refrigerant may affect performance, efficiencies, and operating temperatures and pressures.
b. Evaluate the system to be sure that major components are capable of handling a potential increase in system pressures from a new refrigerant. Condensers and compressors have been designed for specific operating conditions, and calculations will be required to be certain that a higher system pressure or a refrigerant with glide will not create safety or performance issues.
c. Examine baseline performance data for the system with the current refrigerant. Assure that the system is operating correctly, and collect temperature and pressure data at various system points including the evaporator, condenser, and compressor suction and discharge locations. Determine any possible information on superheat settings and subcooling operation.
d. Assure the system is operating correctly and make certain that a rigorous pre-retrofit leak check is completed on the system.

3. SAFETY

a. Using only industry approved equipment, recover the system refrigerant and lubricant charge, and follow the appropriate current recovery guidelines.
b. If using a POE lubricant, special care should be taken in handling due to the highly hygroscopic nature and tendency to absorb moisture from the air as soon as the container is opened.
c. If the system uses oil separators, reservoirs, or accumulators, it is important to remove any oil directly from the component where possible.
d. The system should be evacuated with a deep vacuum (of at least 500 microns) to remove all remaining moisture and as a further check for any potential leaks.

4. MATERIAL COMPATIBILITY

a. While some replacement refrigerants may have similar operating characteristics to what is being replaced, it is important to examine all system components and readjust and replace as necessary.
b. Thermostatic expansion valves, pressure regulating valves, pressure switches, and electronic regulation equipment should be evaluated for adjustment and replacement if necessary.
c. As part of the refrigerant replacement process, all system filter driers will need replacement, and should be closely monitored in conjunction with moisture indicators to assure the system does not have excessive moisture.
d. Safety devices and pressure relief valves should be reviewed to assure that they meet the proper settings for the new system refrigerant. If these are not correct, they must be replaced to remain in compliance with safety codes.
e. The new oil and refrigerant will have an impact on system seals, gaskets, and o-rings. Even if a seal has not been previously leaking, the combination of system age and changes in the operating environment will impact the swell characteristics of the seal, potentially creating leaks. System critical seals that seal the system to the atmosphere should be replaced and a comprehensive leak check should be performed as part of the post-retrofit process.

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MUELLER BALL VALVE REFRIGERANT RETROFIT CAP

Mueller ball valves use a unique dual O-ring stem seal inside the valve, to assure refrigerant does not leak to the environment. These seals are installed during the manufacturing process of the valves. The stem is installed from the inside of the valve body prior to final assembly and welding to assure that it cannot dislodge from the valve in the event of overpressure situations. This safety feature prohibits the replacement of the stem seals, which may be necessary in a retrofit application.

In applications where ball valve replacement is not practical, Mueller recommends the use of their specially designed retrofit cap, which essentially mirrors the design and functionality of the internal ball valve stem and O-rings. The cap consists of a large body chamber which screws onto the valve neck, a base seal that is secured between the top surface of the valve neck and body chamber, and a stem extension with dual O-rings that seal to the environment. This unique design will contain any valve stem leaks while allowing the stem to turn easily, providing full functionality of the valve for operation.

When installing a retrofit cap on a Mueller valve, the following steps should be taken:

1. Remove old cap assembly and seal gasket; confirm sealing surface of ball valve neck is clean and free of debris.
2. Check new retrofit cap assembly to assure that new seal is in place (white gasket).
3. Hand-tighten body onto valve neck, being careful to align retrofit cap stem with valve stem underneath (same orientation).
4. Using a wrench, tighten the retrofit cap 1/4 turn past hand-tight.
5. Confirm free movement of retrofit cap stem and check for leaks.

MUELLER BALL VALVE COMPATABILITY TABLE

STRAIGHT BALL VALVES

Size	Old Style Body	Retrofit Cap	New Style Body	Retrofit Cap
FULL PORT CONSTRUCTION				
1/4"	N 2351	A 18351	F 35222, F 36700	A 18351
3/8"	N 2351	A 18351	F 35222, F 36700	A 18351
1/2"	N 2351	A 18351	F 35222, F 36700	A 18351
5/8"	N 2351	A 18351	F 35222, F 36700	A 18351
3/4"	N 2352	A 18352	F 35223, F 36701	A 18352
7/8"	N 2352	A 18352	F 35223, F 36701	A 18352
1 1/8"	N 2353	A 18353	F 35224, F 36702	A 18353
1 3/8"	N 2354	A 18354	F 35949, F 36703	A 18353
1 5/8"	N 2355	A 18354	F 35950, F 36704	A 18354
2 1/8"	N 2356	A 18355	F 35951, F 36705	A 18354
2 5/8"	N/A	N/A	F 35755, F 36706	A 18355
3 1/8"	N/A	N/A	F 35952, F 36707	A 18355
REDUCED PORT CONSTRUCTION				
2 5/8"	N 2356	A 18355	F 35951, F 36705	A 18354
3 1/8"	N 2356	A 18355	F 35951, F 36705	A 18354

3 WAY BALL VALVES

Size	Old Style Body	Retrofit Cap	New Style Body	Retrofit Cap
FULL PORT CONSTRUCTION				
3/8"	F 35222	A 18351	F 35222	A 18351
1/2"	F 35222	A 18351	F 35222	A 18351
5/8"	F 35222	A 18351	F 35222	A 18351
3/4"	F 35223	A 18352	F 35223	A 18352
7/8"	F 35223	A 18352	F 35223	A 18352
1 1/8"	F 35224	A 18353	F 35224	A 18353
1 3/8"	F 35162	A 18354	F 35162	A 18354
1 5/8"	F 35160	A 18354	F 35160	A 18354
2 1/8"	F 35161	A 18355	F 36595	A 18354
REDUCED PORT CONSTRUCTION				
2 5/8"	F 35161	A 18355	F 36595	A 18354
3 1/8"	F 35161	A 18355	F 36595	A 18354

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