



MUELLER STREAMLINE CO.
150 Schilling Blvd., Suite 201
Collierville, TN 38017
P 901.751.7709



SUBJECT: Use of Long-Radius Elbows in HVAC/R Applications

Mueller Streamline Co. recommends the use of long-radius elbows in all HVAC/R applications. Long-radius elbows are best equipped to handle the dynamics of refrigerant-bearing applications in three critical ways.

1. Long sweeps are able to absorb expansion and contraction forces as the radius can flex – however minutely – and minimize stress on the inside of the bend, which are inherent due to compressor vibration and rapid temperature shifts.
2. Long sweeps reduce pressure drop and turbulence, which supports maximum flow rates of refrigerants in both the liquid and gaseous phases as well as oil return.
3. Long sweeps smoothly redirect flow as opposed to diverting it. Rapid directional changes, even in 45-degree elbows, result in residual stresses as fluids collide with the back wall of the fitting and put strain on the inside of the bend.

Intermediate-radius 90-degree elbows (available in select diameters only) provide some of these benefits while in a more compact footprint. Designers should consider the intensity of use, criticality of the system, and other factors to absorb expansion/contraction when determining whether these elbows are sufficient for the application.

Short-radius 90-degree elbows are intended for plumbing and mechanical applications where the compact designs have proven reliable and effective for water and gases with modest temperature swings. These fittings should not be utilized in refrigerant-bearing systems due to the severity of temperature shifts as they are unable to absorb rapid expansion and contraction. Compressor vibration and rapid temperature shifts can lead to fatigue failure when the inside radius of an elbow is subjected thousands of cycles that act to subtly open and close the bend from less than 90 to more than 90 degrees.

For the same reason, Mueller recommends against use of 45-degree elbows in HVAC/R applications. Normal 45-degree elbows* are produced with a short-radius. While the degree of bend is less severe, there is no sweep to this design. Experience confirms that these fittings can be more susceptible to fatigue failure in refrigerant-bearing applications. Where a 45-degree bend is truly needed, the use is generally fine as long as expansion-contraction is appropriately addressed. However, use of two 45-degree elbows to mimic a long-radius 90 is strongly discouraged.

* Streamline ACR Press 45 Elbows are not subject to this limitation as they have a long sweep design.