📘 LESSON PACKET

Capillary Tube Repair & Compressor Line Modification

TMM Academics – Sealed System Training

📌 Lesson Overview

This lesson covers the process of repairing a damaged capillary tube and modifying the suction line during compressor replacement. Students will learn how to safely cut, prepare, and reconnect tubing while understanding how capillary tube length and placement affect system performance.

🔹 Section 1: Understanding the Capillary Tube Design

In some refrigeration systems, the capillary tube is routed inside the suction line.

This design improves efficiency, but it also makes repairs more difficult. If the tubing is damaged or cut, the technician must carefully modify the system to restore proper operation.

Key Point:
Capillary tube placement directly affects system performance and cannot be altered without consequence.

🔹 Section 2: Identifying the Problem

During compressor replacement, the capillary tube may be accidentally cut or damaged.

When this happens, the technician cannot simply reconnect it inside the suction line, as this would create a restriction and reduce system performance.

🔹 Section 3: Modifying the Repair Approach

Instead of reinstalling the capillary tube inside the suction line, the repair must be done externally.

This allows:

- Proper brazing
- Easier access
- Reduced risk of restriction

The capillary tube is rerouted and reconnected outside the original internal path.

🔹 Section 4: Cutting the Capillary Tube

Capillary tubes must be cut carefully to avoid collapse or restriction.

A common method is using a triangular file to score the tubing and then snap it cleanly. This creates a proper opening without crushing the tube.

Key Point:
A clean cut is critical to maintaining proper refrigerant flow.

🔹 Section 5: Capillary Tube Length Considerations

Capillary tube length is critical to system operation.

- Removing too much tubing reduces efficiency
- Small adjustments (a few inches) may still allow operation
- Excessive shortening can significantly impact cooling

Technicians must limit how much tubing is removed during repair.

🔹 Section 6: Replacing the Suction Line Section

When repairing the system, a new section of tubing may be installed.

Steps include:

- Measuring tubing length

- Cutting replacement pipe
- Bending to fit the compressor

This allows proper alignment and connection to the system.

🔹 Section 7: Preparing Tubing for Brazing

Before brazing, tubing must be prepared properly.

This includes:

- Sanding off paint and oxidation
- Cleaning the surface
- Ensuring proper fit

Paint must be removed because it will burn during brazing and contaminate the joint.

🔹 Section 8: Reaming the Tubing

After cutting tubing, the inside must be reamed.

Reaming removes restrictions caused by the cutting process and restores proper internal diameter for refrigerant flow.

🔹 Section 9: Swaging for Proper Fit

Swaging is used to expand tubing so another pipe can fit inside it.

This creates a strong connection and reduces the need for additional fittings. Proper swaging ensures a tight and leak-free joint.

🔹 Section 10: Creating a Capillary Exit Path

A groove or opening must be created in the tubing to allow the capillary tube to exit.

This step is necessary when modifying the original design and prevents pinching or damaging the capillary tube.

🔹 Section 11: Aluminum Brazing Practice

Technicians may need to work with aluminum components.

Aluminum brazing requires:

- Lower heat
- Specialized brazing rods
- Controlled flame

Excessive heat will quickly burn through aluminum tubing.

🔹 Section 12: Heat Control During Brazing

Heat must be carefully controlled during the repair.

Too much heat can:

- Damage tubing
- Burn holes in aluminum
- Weaken the joint

Proper heat application ensures a clean and durable connection.

🔹 Section 13: Final System Considerations

After completing the repair, the technician must ensure:

- No restrictions are present
- Tubing is properly aligned
- Joints are sealed correctly

Even small mistakes during capillary tube repair can result in poor system performance or failure.

🔹 Section 14: Takeaway

Capillary tube repair requires precision and attention to detail.

Understanding how tubing length, cleanliness, and heat affect the system is essential for successful sealed system repairs.

📝 Review Questions

Multiple Choice

1. Why can the capillary tube not be reinstalled inside the suction line after repair?
   A. It increases pressure
   B. It causes a restriction
   C. It improves cooling
   D. It reduces heat

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2. What is the purpose of reaming tubing?
   A. Increase pressure
   B. Remove internal restriction
   C. Add refrigerant
   D. Clean oil

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3. What happens if too much capillary tube is removed?
   A. System pressure increases
   B. System efficiency decreases
   C. System cools faster
   D. No effect

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4. Why must paint be removed before brazing?
   A. It improves appearance
   B. It increases pressure
   C. It contaminates the joint when heated
   D. It cools the pipe

Short Answer

5. Why is capillary tube length important in a sealed system?
6. What is the purpose of swaging tubing?

Scenario-Based

7. A technician cuts too much capillary tube during a repair.
   What effect will this have on the system and why?

✅ Answer Key

1. B – It causes a restriction
2. B – Remove internal restriction
3. B – System efficiency decreases
4. C – It contaminates the joint when heated
5. It controls refrigerant flow and system efficiency
6. To expand tubing so another pipe can fit inside it
7. Reduced efficiency and improper refrigerant flow due to incorrect capillary restriction