How to Assess Ferrule Performance by Appearance After Pre-Assembly

Many users are unsure how to evaluate the performance of ferrules they purchase or determine whether the product meets performance requirements. Although many ferrules on the market appear similar, their performance may vary significantly. When standard performance testing is not feasible, how can users visually assess product quality to reduce risks and ensure suitability? Below are several key points to help buyers make a preliminary judgment.

For ferrule fittings—especially those conforming to ISO 8434-1 / DIN 2353 standards—once pre-assembly is complete, performance (especially sealing and mechanical grip) can be roughly assessed by appearance.

1. Reasonable Tube-End Contraction (Slight)

- **What is tube-end contraction?**

After pre-assembly, due to the ferrule biting into the tube, the end of the tube may show slight inward contraction or reduced diameter. This is because: **Sharp cutting edges generate radial forces during penetration, causing localized plastic deformation, which leads to diameter reduction.**

- **How to assess?**

Use a vernier caliper to measure the tube's outer diameter before and after pre-assembly.

Parameter	State	Evaluation Criteria
Contraction ΔD = D_original - D_after_assembly	0.05 ~ 0.15 mm (steel tubes)	Normal range
Contraction too large	> 0.2 mm	May cause visible plastic deformation, weakening the support at the cut

- **Possible reasons for excessive contraction:**

✓ Low compressive strength of ferrule cutting edge

✓ Dull cutting edge

✓ Work-hardened surface or thin-walled tubing with high hardness

✓ Ferrule designs with negative clearance may also increase radial contraction

2. Presence of a Distinct Circular Flange (Metal Ring)

After pre-assembly, a uniform and continuous metal flange should appear on the tube surface ahead of the cutting edge. This indicates effective engagement of the cutting edge. With stainless steel or harder tubes, the flange may be smaller but should still be visible.

- **How to assess?**

✓ **Flange too small or inconsistent** → May indicate insufficient cutting or poor edge sharpness/hardness

✓ **Flange too large or with burrs** → May suggest dull edge or low edge strength

3. Axial Stability of Ferrule on the Tube

The ferrule should be firmly seated on the 24° conical sealing surface of the fitting body, with no noticeable play.

- **How to assess?**

Try rotating the ferrule slightly by hand. If it feels loose or wobbly, check the tube's roundness or the roundness of the 24° cone face of the fitting body. Roundness = Maximum radius - Minimum radius of a circular contour.

4. Slight Radial Movement of Ferrule

- **How to assess?**

You should be able to gently rotate the ferrule by hand. It should conform tightly to the steel tube but still allow slight circumferential movement to maintain appropriate elasticity. This elasticity is essential during operation, helping compensate for plastic deformation caused by stress relaxation or vibration.

5. Uniform Cutting Edge Imprint

- **How to assess?**

After disassembly, inspect the tube. There should be a continuous raised imprint from the ferrule's cutting edge with no gaps or peeling. This directly affects the tensile resistance of the ferrule fitting.

Additional Testing (When Necessary)

- ✓ **Leak-tightness tests**
- ✓ **Tensile (pull-out) strength tests**

For more information, please consult www.srt-schneidringe.com
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