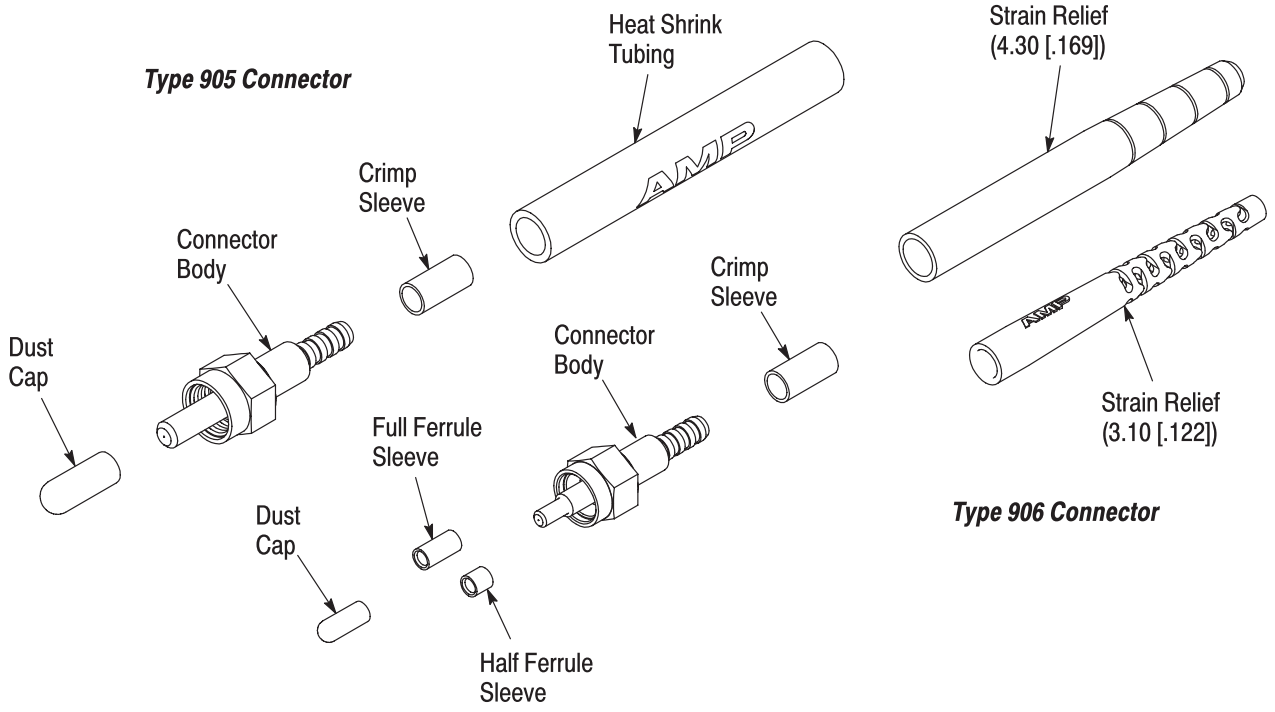


Figure 1

1. INTRODUCTION

This instruction sheet covers the application of OPTIMATE FSMA Fiber Optic Connector Types 905 and 906 for data and telecommunications applications. Base part numbers which apply to each type are listed in Figure 1.

Read this material thoroughly before starting assembly.

NOTE

All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches], unless otherwise specified. Figures are for reference only, and are not drawn to scale.

Reasons for reissue are in Section 6, REVISION SUMMARY.

2. DESCRIPTION

Figure 1 shows the components of each FSMA connector type. Connector Type 905 contains a connector body, crimp sleeve, strain relief, and dust cover. Connector Type 906 contains a full ferrule sleeve and a half ferrule sleeve in addition to a connector body, crimp sleeve, strain relief, and dust cover.

NOTE

If an o–ring is desired, use part number 986799–2. The o–ring must slide over the ferrule and into the connector body groove.

NOTE

If terminating to 2.2 [.087] diameter plastic fiber, use tubing part number 5501275–6 to build up the cable diameter.

Both FSMA connector types provide essentially the same mechanical and optical performance. Both use the close fit of a precision plug (the ferrule) in a precision bore (the coupling bushing) to radially align the optical fibers of mated connectors. With these connectors, the ferrule tips of mated connectors do not touch, but are separated by a small air gap. The correct air gap is established by finishing the connector to the correct length by polishing.

The difference between the types is that Type 906 has a stepped ferrule which requires the use of a ferrule sleeve over it for alignment. The half sleeve is used in ADM (active device mount) applications and the full sleeve is used with a coupling bushing. Since the optical and mechanical performance of both connector types is comparable, it is suggested that Type 905 connectors be used where possible.

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CAUTION

Type 905 connectors cannot be mated with Type 906 connectors in a coupling bushing. Type 905 can only mate with Type 905, and Type 906 can only mate with Type 906. Also, the use of a full sleeve in an ADM application will damage the active device.

3. PREPARATION

3.1. Required Tools and Materials

The following tools and materials should be on hand to perform FSMA fiber optic connector terminations according to these instructions. The number in parentheses indicates the corresponding Tyco Electronics instruction sheet.

A. Tools

— PRO–CRIMPER* II Hand Tool Assembly 58551–1 with Die Assembly 58552–1 (408–4090)
— KEVLAR‡ Shears 1278637–1
— Polishing Plate 501197–1
— Cable Stripper 501198–1 (408–9394)
— Epoxy Mixer 501202–1 (used with BIPAX† epoxy)
— Heat Cure Oven 502134–1 when using heat curing epoxies (408–9460)
— Curing Sleeve 502248–2
— Inspection Microscope Kit 1754767–1
— Fiber Stripper 504024–1 (203 µm [.008 in.], red handle) (408–9485)
— Fiber Stripper 504024–3 (305 µm [.012 in.], white handle) (408–9485)
— Cleave Tool 504064–1 (408–4293)
— Polishing Bushing 228025–1
— Template 501813–1
— SMA Microscope Adapter 1985040–1
— Microscope Coupling Adapter 1985041–1

B. Consumables

— .3–µm Polishing Film 228433–5
— 1–µm Polishing Film 228433–7
— 5–µm Polishing Film 228433–8
— 15–µm Polishing Film 228433–9
— Epoxy Applicator Kit 501473–3
— Alcohol Fiber Wipe 501857–2
— BIPAX Epoxy 1918652–1, General Purpose

C. Termination Kits

The tools and consumables listed are included (with exceptions) in the following kits.

— FSMA Termination Kit 503746–2 (does not include epoxy mixer, epoxy cure oven, microscope kit, alcohol fiber wipe, and epoxy)

‡Trademark of E.I. Du Pont De Nemours and Company Corporation
†Trademark of TRA–CON, Inc.

3.2. Preparing Strain Relief

1. For cable having an outer diameter less than 2.54 [.100], use the strain relief as supplied.

2. For cable having an outer diameter between 2.54 [.100] and 4.32 [.170], cut strain relief, using the KEVLAR shears, at the appropriate segments shown in Figure 2.

3. For cable having an outer diameter larger than 4.32 [.170], use the heat shrink tubing instead of the strain relief.

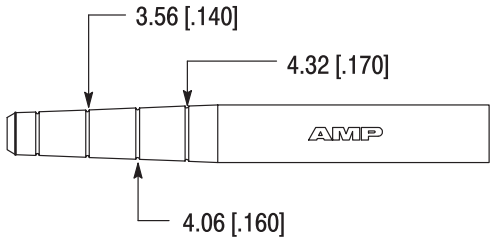


Figure 2

3.3. Preparing Fibers

DANGER

ALWAYS wear eye protection when working with optical fibers. NEVER look into the end of terminated or unterminated fibers. Laser radiation is invisible but can damage eye tissue. NEVER eat, drink, or smoke when working with fibers. This could lead to ingestion of glass particles.

DANGER

Be very careful to dispose of fiber ends properly. The fibers create slivers that can easily puncture the skin and cause irritation.

1. Slide the strain relief (small end first) or the heat shrink tubing over the cable. Refer to Figure 1.

2. Slide the crimp sleeve (if cable has strength members) over the cable. Refer to Figure 1.

NOTE

Do NOT use the crimp sleeve if the cable has no strength members. Crimping is not required when cable has no strength members.

Then proceed as follows:

A. For Jacketed Cable With Strength Members

1. Use the template or refer to Figure 3, Detail A, and mark the outer jacket at 38.1 [1.500] and at 7.87 [.310] from the first outer jacket mark.

2. Strip the outer jacket to 7.87 [.310] using the cable stripper.

CAUTION

The cable stripper must be adjusted to the appropriate cable jacket diameter; otherwise damage to the fiber will occur. Refer to Instruction Sheet 408–9394 for adjustment instructions.

3. Trim the strength members even with the outer jacket using the KEVLAR Shears.

4. Strip the outer jacket at the 38.1 [1.500] mark using the cable stripper.

5. Mark the fiber buffer at 28.0 [1.100] from the cable jacket.

6. Strip the fiber buffer using the fiber stripper (red handle) for fiber having a diameter less than 150 μm or the fiber stripper (white handle) for fiber having a diameter less than 231 μm and greater than 151 μm. Remove no more than 6.35 [.250] of buffer at a time.

NOTE

Fiber strippers are available to accommodate cable up to 1000–μm diameter.

7. Clean the fiber using an alcohol fiber wipe.

B. For Jacketed Cable Without Strength Members

1. Use the template or refer to Figure 3, Detail B, and mark the outer jacket at 38.1 [1.500].

2. Strip the outer jacket using the cable stripper.

CAUTION

The cable stripper must be adjusted to the appropriate cable jacket diameter; otherwise damage to the fiber will occur. Refer to Instruction Sheet 408–9394 for adjustment instructions.

3. Mark the fiber buffer at 28.0 [1.100] from the cable jacket.

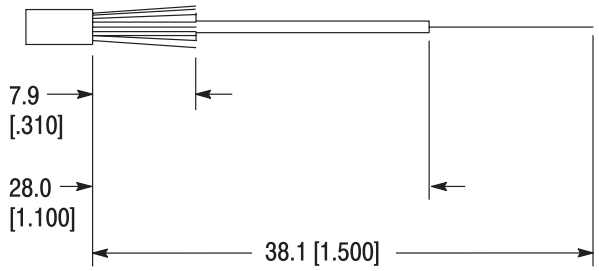
4. Strip the fiber buffer using the fiber stripper (red handle) for fiber having a diameter less than 150 μm or the fiber stripper (white handle) for fiber having a diameter less than 231 μm and greater than 151 μm. Remove no more than 6.35 [.250] of buffer at a time.

5. Clean the fiber using an alcohol fiber wipe.

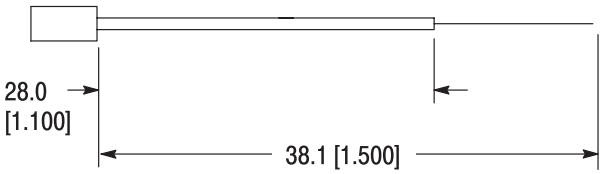
C. For Bare Buffered Fiber

1. Use the template or refer to Figure 3, Detail C, and mark the fiber buffer at 38.1 [1.500].

Detail A
Jacketed Cable With Strength Members



Detail B
Jacketed Cable Without Strength Members



Detail C
Bare Buffered Fiber or Plastic

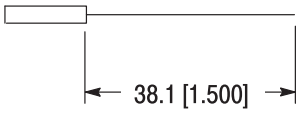


Figure 3

2. Strip the fiber buffer using the fiber stripper (red handle) for fiber less than 150–μm diameter or the fiber stripper (white handle) for fiber less 231–μm and greater than 151–μm diameter. Remove no more than 6.4 [.250] of buffer at a time.

3. Clean the fiber using an alcohol fiber wipe.

D. For Plastic Fiber

1. Use the template or refer to Figure 3, Detail C, and mark the outer jacket at 38.1 [1.500].

2. Strip the outer jacket using the cable stripper.

CAUTION

The cable stripper must be adjusted to the appropriate cable jacket diameter; otherwise damage to the fiber will occur. Refer to Instruction Sheet 408–9394 for adjustment instructions.

3. Clean the fiber using an alcohol fiber wipe.

3.4. Preparing BIPAX Epoxy

BIPAX Epoxy, General Purpose
Pot Life: 30 minutes
Ambient Cure Time: 24 hours at 25°C [77°F] or
Oven Cure Time: 2 hours at 65°C [149°F]

1. Install the needle tip of the epoxy applicator. Make sure it is secure; then remove the plunger.

2. Remove the separating clip from the epoxy package.

3. Mix the epoxy thoroughly for 20 to 30 seconds. Use of the epoxy mixer is recommended for thorough mixing of epoxy.

4. Cut the epoxy pack open and squeeze the epoxy into the back of the applicator.

5. Reassemble the plunger and hold the applicator needle tip up. Slowly push the plunger until the entrapped air escapes and a bead of epoxy appears at the tip.

3.5. Applying Epoxy

A. For Jacketed Cable With Strength Members

1. Hold the connector with the knurled end up.

2. Insert the tip of the epoxy applicator until it bottoms against the ferrule. See Figure 4, Detail A.

3. Inject epoxy until a small bead, approximately 0.76 [.030] in diameter, appears at the ferrule. Do not let the bead smear or get too large.

4. Withdraw the applicator while simultaneously injecting epoxy in the connector until it is approximately half full.

5. Apply a small drop of epoxy to the outside of the knurled end of the connector. See Figure 4, Detail B.

CAUTION

Do not get any epoxy on or inside the nut area.

6. Fan out the strength members.

7. Carefully insert the fiber into the connector until it bottoms. Use a twisting motion while inserting the fiber. Make sure the strength members are outside the knurled end of the connector. The fiber must extend out the front of the connector.

CAUTION

Do not force the fiber. The fiber could break if forced. If the fiber does break, remove the broken fiber from the connector and repeat Paragraph 3.3,A.

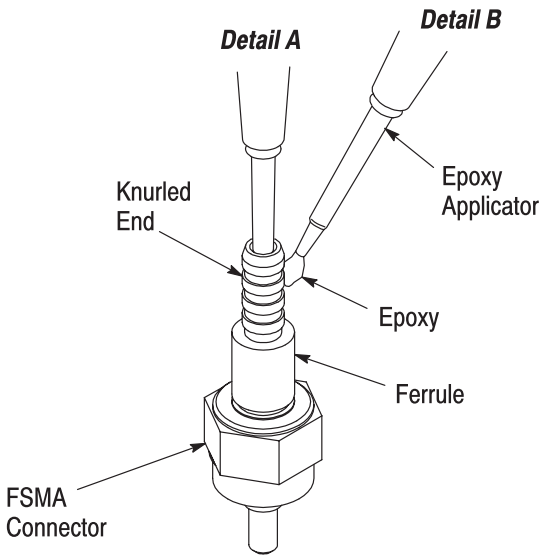


Figure 4

8. Slide crimp sleeve over the strength members until it bottoms on the connector shoulder.

B. For Jacketed Cable Without Strength Members, For Bare Buffered Fiber, and For Plastic Fiber

1. Hold the connector with the knurled end up.

2. Insert the tip of the epoxy applicator until it bottoms against the ferrule. See Figure 4, Detail A.

3. Inject epoxy until a small bead, approximately 0.76 [.030] in diameter, appears at the ferrule. Do not let the bead smear or get too large.

4. Withdraw the applicator while simultaneously injecting epoxy in the connector until it is approximately half full.

5. Carefully insert the fiber into the connector until it bottoms. Use a twisting motion while inserting the fiber. The fiber must extend out the front of the connector.

CAUTION

Do not force the fiber. The fiber could break if forced. If the fiber does break, remove the broken fiber from the connector and prepare the fiber according to Paragraph 3.3,B, 3.3,C, or 3.3,D.

6. Apply a piece of masking tape to the nut and the cable. This will hold the connector onto the cable while the epoxy cures.

NOTE

For cable without strength members, skip to Paragraph 4.2. for cable protection assembly. Crimping is not required.

4. ASSEMBLY PROCEDURE

4.1. Crimping Fiber

NOTE

For detailed information concerning the hand tool assembly, refer to 408–4090.

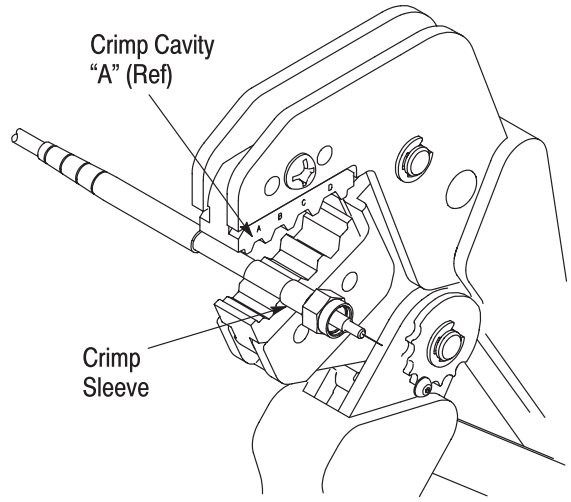
1. Squeeze the tool handles until the ratchet releases. Allow the handles to open fully.

2. Place the connector body into the first crimp cavity according to Figure 5. Make sure that the connector body rests against the side of the die. This will crimp the sleeve toward the mating end.

3. Squeeze the handles until the ratchet releases.

4. Reposition the connector into the second crimp cavity according to Figure 5. Push connector forward so that uncrimped portion of sleeve is now inside the cavity. This will crimp the sleeve toward the cable end.

5. Squeeze the tool handles until the ratchet releases; then remove the connector from the tool.



CABLE OD (Max)	1ST CRIMP CAVITY	2ND CRIMP CAVITY
3.1 [.12]	A	A
4.3 [.17]	C	C
5.3 [.21]	D	D

Figure 5

4.2. Cable Protection

A. Heat Shrink Tubing

1. Slide the heat shrink tubing over the crimped sleeve as far as possible.

2. Using the heat gun, apply heat until tubing is snug around connector and cable.

DANGER

Refer to the instructions packaged with the heat gun for important safety precautions.

B. Strain Relief

If applicable, slide the strain relief over the crimped sleeve.

4.3. Curing Connectors

1. Screw the curing sleeve onto the connector to protect the fiber during curing.

2. Hang the connector vertically with the tip down, making sure the masking tape is in place to hold the connector during curing.

3. Cure assembly according to Paragraph 3.4. Use the cure oven if epoxy requires temperature elevation.

CAUTION

It is NOT recommended to cure plastic fiber at a temperature above 65°C [149°F]; elevated temperatures can damage plastic fiber.

CAUTION

When using cure oven, connector assemblies will be hot. Make sure assemblies have properly cooled before continuing.

4.4. Cleaving Fiber

A. For Jacketed Cable and Bare Buffered Cable

CAUTION

DO NOT saw or cut the fiber off with cleave tool. This could fracture the fiber, making the connector unusable. Also, DO NOT contact the epoxy with the blade. This could chip or dull the blade.

DANGER

Be very careful to dispose of the fiber ends properly. The fibers create slivers that can easily puncture the skin and cause irritation.

1. Remove the curing sleeve.

2. Attach a piece of masking tape to the workbench for use of easy disposal of the fiber ends.

3. Hold the connector firmly in an upright position.

4. Place the cleave tool directly above the epoxy. See Figure 6. Lightly draw the beveled edge across the fiber parallel to the tip of the connector.

5. Gently pull the fiber straight away from connector. If the fiber does not easily pull off, recleave the fiber and try again.

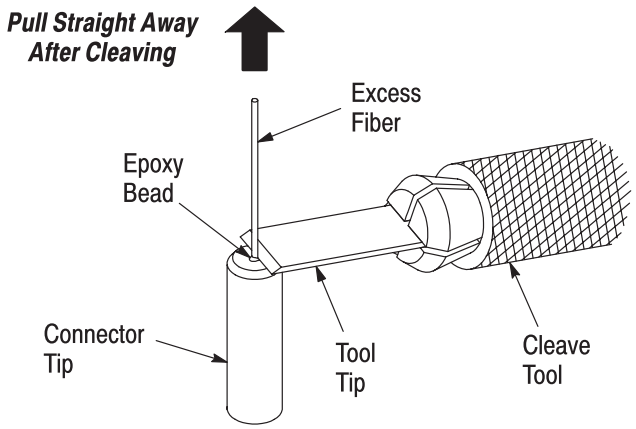


Figure 6

B. For Plastic Fiber

1. Remove the curing sleeve.

2. Cut the plastic fiber above the epoxy bead using a sharp utility knife.

NOTE

DO NOT cut the fiber flush to the end of the connector. Leave a small amount of fiber protruding to be removed during polishing.

4.5. Polishing Fiber

Cut a small piece (50x50 mm [2x2 in.]) of 15–µm polishing film. While holding the film in the air, form a concave shape, and air polish the connector tip by gently rubbing the tip of the connector in small circles or figure–8 motions. Repeat several times until the fiber is smooth. Then proceed as follows:

1. Screw the polishing bushing onto threaded end of connector. See Figure 7. Make sure connector is bottomed inside the polishing bushing.

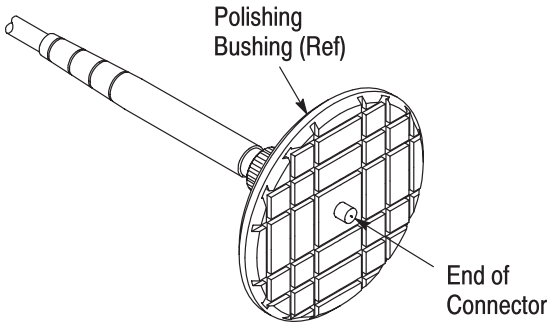


Figure 7

2. Place a sheet of 15–µm polishing film on the polishing plate. See Figure 8.

NOTE

A few drops of water can be applied to the polishing film to allow for easier polishing.

CAUTION

BE CAREFUL with the first few strokes. Protruding rough fiber can easily shatter with too much pressure.

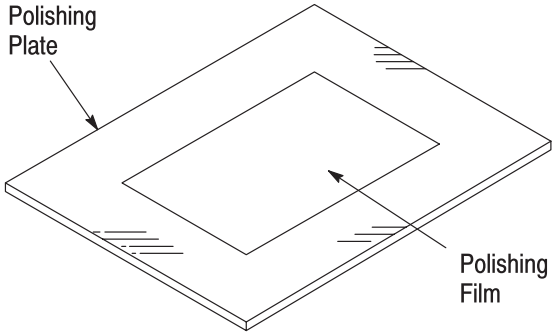


Figure 8

3. Hold connector and bushing firmly between thumb and forefinger; lightly polish in an elongated figure–8 motion to a length of approximately 9.837 [.3873]. See Figure 9.

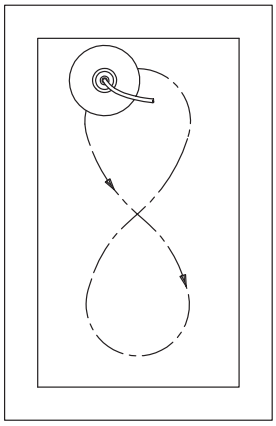


Figure 9

4. Clean the connector face with an alcohol fiber wipe. This prevents heavy debris from contaminating the finer polishing films.

5. Change to 5–µm polishing film.

6. Polish connector in an elongated figure–8 pattern to a length of approximately 9.817 [.3865].

7. Clean the connector face.

8. Change to 1–µm polishing film.

9. Polish connector in an elongated figure–8 pattern to a finished length of 9.812–9.799 [.3863–.3858].

NOTE

DO NOT overpolish. Check the fiber tip frequently.

10. If an exceptional polish is required, polish again using .3–μm polishing film.

5. INSPECTION

DANGER

Never inspect or look into the end of a fiber when optical power is applied to the fiber. The infrared light used, although it can not be seen, can cause injury to the eyes or blindness.

CAUTION

Make sure the ferrule length is within the polishing length of 9.812–9.799 [.3863–.3858]. The fiber or an ADM could be damaged if polishing length is too long.

1. Remove polishing bushing from connector.

2. Clean the connector face with an alcohol fiber wipe.

3. Inspect the polished ferrule tip using the inspection microscope kit. Compare fiber end to examples shown in Figure 10 and take any recommended action.

4. Place the dust cover over the connector if the connector is not going to be used immediately.

6. REVISION SUMMARY

Revisions to this document include:

- Updated document to corporate requirements
- Deleted and added part numbers in Figure 1 and Paragraphs 3.1.A and B
- Deleted text in Paragraph 3.1.C

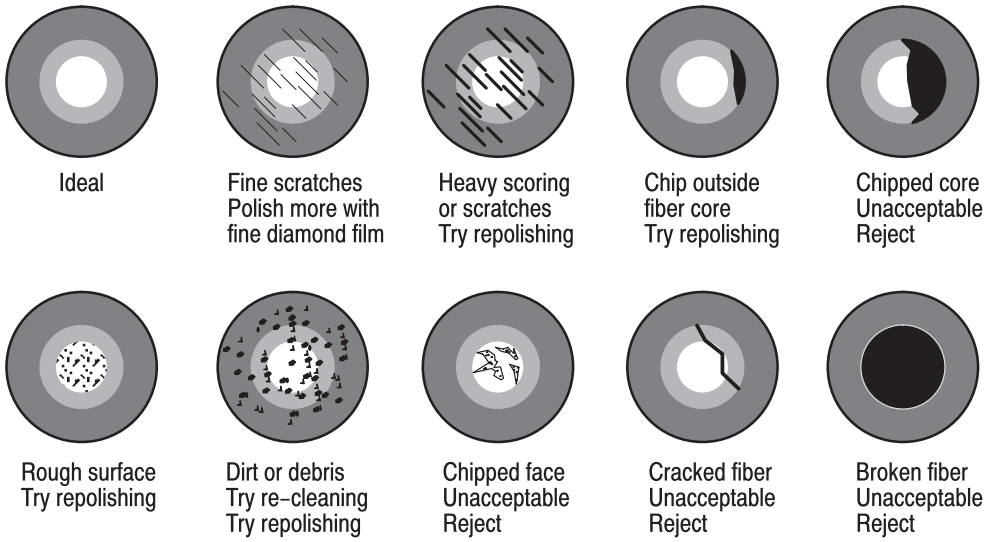


Figure 10