

3M Fiber Optic Polishing



# Total Solutions

for Your  
Polishing Needs



**3M**

# Innovative products for your unique polishing system

3M offers complete solutions for fiber optic connector polishing – with a full line of high performance precision abrasives, backed by the technical service and support of our experienced, knowledgeable fiber optics specialists. We're ready to help you generate the finish you need on a wide variety of connectors. We can optimize your polishing operation to produce cost-effective results. Call the 3M Fiber Optic Applications Laboratory today to learn more: 866-866-0922. Or visit us on the web: [www.3M.com/electronics](http://www.3M.com/electronics)



### 3M™ Lapping Film

Precisely graded minerals are coated on a high strength, 3 mil polyester backing to provide a uniform, consistent finish. Available in silicon carbide film for glass and epoxy removal, and in aluminum oxide for leveling and polishing steps. Available in 0.05 - 30 micron grades, with or without PSA (Pressure Sensitive Adhesive) backing.

### 3M™ Diamond Lapping Film 661X / 668X

This standard Diamond Lapping Film is comprised of tightly graded diamond minerals uniformly coated on a polyester film backing. It is able to cut and polish hard ceramic ferrules and glass fibers at the same rate and to the same level. Used to radius ferrule connectors or to refine the finish in preparation for the final polish. Available in 0.1 - 30 micron grades, with or without PSA backing.

### 3M™ Diamond Lapping Film 661XU / 661XU-PSA

Tightly graded diamond mineral is precision coated on a polyester film backing. This durable construction provides consistent processing and superior finishes throughout the life of the product. Available in 0.5, 1, 3 and 6 micron grades, with or without PSA backing.

### 3M™ Diamond Lapping Film - Type H - 662XW / 666XW

Designed for radiusing and leveling operations that require added durability. Diamond Lapping Film - Type H has a thicker diamond coating with a higher diamond concentration and a tougher resin for an increased cut rate and longer life. Type H lasts 2 to 3 times longer than standard DLF. Available in 0.5, 1, 1.5, 3, 6 and 9 micron grades, with or without PSA backing.



### 3M™ Diamond Lapping Film 660XV

This long life, precision coated 3M™ Diamond Lapping Film is the most durable and newest in 3M's Diamond Lapping Film product family. It combines a high cut rate with a great finish, and is designed for use on slower rpm polishing machines. Available in 1, 3, 6, and 9 micron grades.

### 3M™ Trizact™ Diamond Lapping Film 661XA / 661XA-PSA

Micron graded diamond particles contained in a precisely microreplicated structure provide longer life, aggressive cut and superior finish over standard lapping film products. Available in 0.5, 2 and 9 micron grades, with or without PSA.

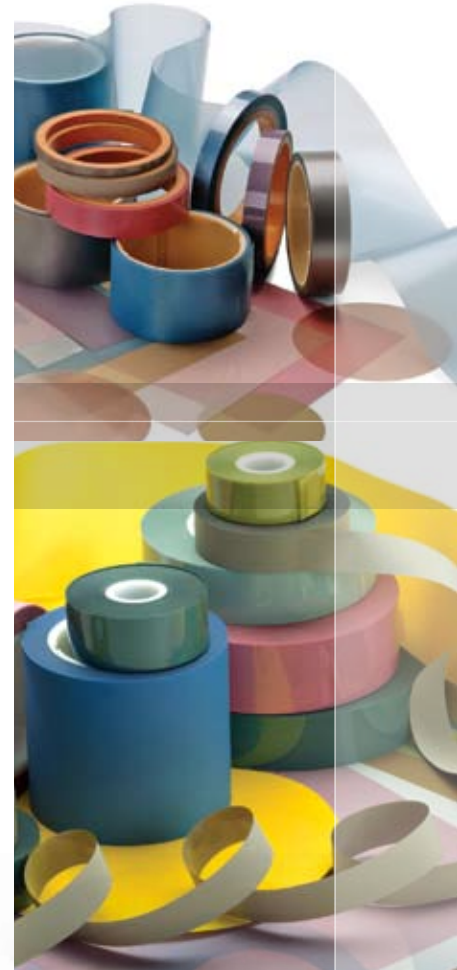
### 3M™ Lapping Film 863X, 863XW / 869X, 869XW

These products are precision coated on a 3 mil backing for the final step in polishing fiber optic connectors. 863XW has a higher mineral content than 863X, providing easier breakdown and faster polishing. Available with or without PSA backing.

### 3M™ Polishing Film 291X, 491X, 591X / 298X, 498X, 598X

Comprised of micron graded mineral that has been coated onto a fibrous (flocked) polyester film backing. Designed to break down into a slurry during use with water for MT-style fiber optic connectors. Available plain or with PSA. (961M/968M are available with no mineral coating.)

3M™ Lapping Films are available in sheets, discs and rolls for use on any type of polishing equipment. These films are especially designed for use in factory or field applications.



# Selection Guide

3M's Technical Service Representatives suggest using these polishing guidelines for polishing ceramic singlemode or multimode fiber optic connectors. In the top chart, locate your connector type, then refer to tables A, B and C below to select one of the options for each step. These recommended sequences provide typical starting points. Your actual sequences may vary depending on your polishing equipment and finish requirements.



- GRY** (Gray)
- GRN** (Green)
- BRN** (Brown)
- YEL** (Yellow)
- ORN** (Orange)
- OFW** (Off-White)
- PNK** (Pink)
- BLU** (Blue)
- LAV** (Lavender)
- TL** (Teal)
- MNL** (Manila)
- EGS** (Eggshell)
- WHT** (White)
- TRL** (Translucent)

**Mineral Key**  
**A/O** = Aluminum Oxide  
**S/C** = Silicon Carbide  
**D** = Diamond  
**SiO<sub>2</sub>** = Silicon Dioxide

## Polishing Processes for Ceramic Fiber Optic Connectors

| Connector Type                          | Step                  | See Table for Recommended Products | Time (sec.)          | Pressure (g/conn) |
|---|-----------------------|------------------------------------|----------------------|-------------------|
| Ceramic, Ultra PC, Pre-radiused ferrule | Remove Glass (De-nub) | A                                  | Until nub is removed | By hand           |
|   | Remove Epoxy          | A                                  | 30 - 60              | 200 - 350         |
|   | Refine                | B                                  | 30 - 120             | 200 - 350         |
|   | Refine                | B                                  | 30 - 120             | 200 - 350         |
|   | Polish                | C                                  | 15 - 45              | 150 - 250         |
| Ceramic, Angle PC                       | Grind Angle           | A                                  | 40 - 120             | 200 - 350         |
|   | Radius Ferrule        | B                                  | 60 - 180             | 200 - 350         |
|   | Refine                | B                                  | 30 - 120             | 200 - 350         |
|   | Refine                | B                                  | 30 - 120             | 200 - 350         |
|   | Polish                | C                                  | 15 - 60              | 150 - 250         |
| Ceramic, Super PC, Pre-radiused ferrule | Remove Glass (De-nub) | A                                  | Until nub is removed | By hand           |
|   | Remove Epoxy          | A                                  | 30 - 60              | 200 - 350         |
|   | Refine                | B                                  | 30 - 120             | 200 - 350         |
|   | Polish                | C                                  | 15 - 45              | 150 - 250         |
| 1.25 mm LC and MU Connectors            | De-nub-Epoxy Removal  | A                                  | 30 - 60              | 75 - 125          |
|   | Refine                | B                                  | 30 - 60              | 100 - 150         |
|   | Polish                | C                                  | 90 - 120             | 100 - 150         |

Recommended Lubricant: DI water

**TABLE A - De-Nub and Epoxy Removal**

|  | Mineral | Available Micron Sizes |   |     |     |      |      |
|--|---------|------------------------|---|-----|-----|------|------|
|  |         | 5                      | 6 | 9   | 12  | 15   | 30   |
| 3M™ Diamond Lapping Films, 661X, 662XW, 661XU, 660XV | D       |                        |   | BLU |     | ORN* |      |
| 3M™ Trizact™ Diamond Lapping Film, 661XA             | D       |                        |   | GRY |     |      |      |
| 3M™ Lapping Film, 461X                               | S/C     | GRY                    |   | GRY |     | GRY* | GRN* |
| 3M™ Lapping Film, 261X                               | A/O     | BRN                    |   | BLU | YEL |      | GRN  |

\*Common for angle grinding

**TABLE B - Refine (Level Connector)**

|  | Mineral | Available Micron Sizes |     |     |     |   |     |   |
|--|---------|------------------------|-----|-----|-----|---|-----|---|
|  |         | 0.5                    | 1   | 2   | 3   | 4 | 6   | 9 |
| 3M™ Diamond Lapping Films, 661X, 662XW, 661XU, 660XV | D       | MNL                    | LAV |     | PNK |   | BRN |   |
| 3M™ Trizact™ Diamond Lapping Film, 661XA             | D       | GRY                    |     | GRY |     |   |     |   |
| 3M™ Lapping Film, 462X, 463X or 452X                 | S/C     |                        | GRY |     | GRY |   |     |   |
| 3M™ Lapping Film, 261X, 262X or 263X                 | A/O     |                        | GRN | TL  | PNK |   |     |   |

\*Common for angle grinding

**TABLE C - Polish (Finish)**

|                                 | Mineral          | Available Micron Sizes |      |     |     |
|---------------------------------|------------------|------------------------|------|-----|-----|
|                                 |                  | 0.02                   | 0.05 | 0.1 | 0.3 |
| 3M™ Lapping Film, 863X or 863XW | SiO <sub>2</sub> | TRL                    |      |     |     |
| 3M™ Lapping Film, 263X          | A/O              |                        | EGS  |     | WHT |
| 3M™ Lapping Films 261X          | A/O              |                        |      |     | OFW |

Available with PSA backing.

3M™ Polishing Film helps you consistently meet geometry and fiber height requirements in your MT connector polishing operation. Precisely graded minerals coated on a fibrous backing enable you to generate fiber protrusion and attain the proper ferrule geometry.

3M Polishing Film can provide:

- Control of fiber protrusion
- High throughput
- Less cleaning than a slurry process
- Low rejects

### Suggested Process for Polishing MT Fiber Optic Connectors

3M Technical Service Engineers recommend using the following sequences for polishing MT fiber optic connectors. These sequences provide typical starting points. Your actual process may vary depending on your polishing equipment and finish requirements.

#### 3M™ Polishing Film

| Product I.D. | Mineral         | Micron Grade | Color |
|--------------|-----------------|--------------|-------|
| 298X         | Aluminum Oxide  | 0.5          | Pink  |
| 298X         | Aluminum Oxide  | 1            | Green |
| 498X         | Silicon Carbide | 3            | Gray  |
| 598X         | Cerium Oxide    | 0.5          | Peach |

#### Thermoset MT (Singlemode or Multimode)

| Step         | Micron Grade | Mineral         | Product I.D. | Description        | Color |
|--------------|--------------|-----------------|--------------|--------------------|-------|
| Remove Epoxy | 15           | Silicon Carbide | 468X         | 3M™ Lapping Film   | Gray  |
| Step 2       | 3            | Silicon Carbide | 468XW        | 3M™ Lapping Film   | Gray  |
| Step 3       | 3            | Silicon Carbide | 498X         | 3M™ Polishing Film | Gray  |

Repeat Step 3 with fresh abrasive for increased protrusion

|        |     |                |      |                    |       |
|--------|-----|----------------|------|--------------------|-------|
| Step 4 | 1   | Aluminum Oxide | 298X | 3M™ Polishing Film | Green |
| Step 5 | 0.5 | Cerium Oxide   | 598X | 3M™ Polishing Film | Peach |

#### Thermoplastic MT (Singlemode or Multimode)

| Step         | Micron Grade | Mineral         | Product I.D. | Description        | Color |
|--------------|--------------|-----------------|--------------|--------------------|-------|
| Remove Epoxy | 15           | Silicon Carbide | 468X         | 3M™ Lapping Film   | Gray  |
| Step 2       | 3            | Silicon Carbide | 468XW        | 3M™ Lapping Film   | Gray  |
| Step 3       | 1            | Aluminum Oxide  | 298X         | 3M™ Polishing Film | Green |
| Step 4       | 0.5          | Cerium Oxide    | 598X         | 3M™ Polishing Film | Peach |

#### Thermoplastic Angled MT

| Step               | Micron Grade | Mineral         | Product I.D. | Description        | Color |
|--------------------|--------------|-----------------|--------------|--------------------|-------|
| Remove Epoxy*      | 15           | Silicon Carbide | 468X         | 3M™ Lapping Film   | Gray  |
| Step 2 (cut angle) | 15           | Silicon Carbide | 468X         | 3M™ Lapping Film   | Gray  |
| Step 3             | 3            | Silicon Carbide | 468XW        | 3M™ Lapping Film   | Gray  |
| Step 4             | 3            | Silicon Carbide | 498X         | 3M™ Polishing Film | Gray  |

Repeat Step 4 with fresh abrasive for increased protrusion

|        |     |                |      |                    |       |
|--------|-----|----------------|------|--------------------|-------|
| Step 5 | 1   | Aluminum Oxide | 298X | 3M™ Polishing Film | Green |
| Step 6 | 0.5 | Cerium Oxide   | 598X | 3M™ Polishing Film | Peach |

\*Remove epoxy in flat fixture

For multimode, add or replace last step with Final Polish Film 863X or 863XW for 5 seconds. All products listed above are available without PSA.



# 3M Final Polish Products for Fiber Optic Connectors

## 3M™ Lapping Films 863X and 863XW offer a clean break from slurries

3M™ Lapping Film final polish products can deliver high yields, reducing the need for costly rework in final polishing of ceramic fiber optic connectors. The film easily produces optimal fiber height and minimal visual defects. It helps finished connectors meet Telecordia GR-326 standards.

These high-performing films feature micron-graded silicon dioxide particles coated on a 3 mil, high-strength polyester backing. 3M final polish products are part of a complete lineup of lapping films designed for fiber optic connector polishing. They provide precision polishing alternatives to messy slurries that require time-intensive cleanup.



### Lapping Films 863X vs. 863XW

With a choice of two film variations designed for the final step in the polishing sequence, 3M lets you select the film based on your requirements.

863X and 863XW are available in discs, sheets and rolls. Maximum width: 12 inches.

#### Film 863X

##### Performance Characteristics

- Offers superior fiber height control
- Polishes more slowly than 863XW
- More controlled cut rate

##### Polishing Machine Compatibility/ Backings

- For use on most polishing machines and fixtures, including machines that run at higher speeds and higher pressure
- Available with pressure sensitive adhesive backing. Product ID is 869X

#### Film 863XW

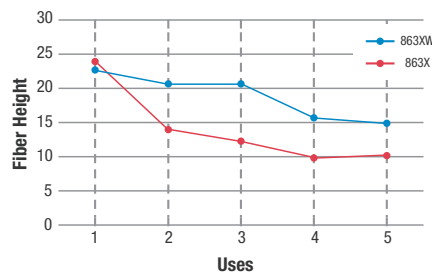
##### Performance Characteristics

- Higher mineral content than 863X enables faster polishing

##### Polishing Machine Compatibility/ Backings

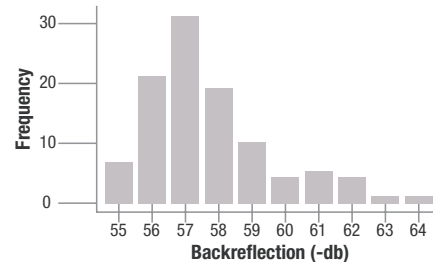
- Designed for use on machines that run at lower speeds and lower pressures
- Designed for use on fixtures with individual pressure control that allow connectors to float independently
- Available with pressure sensitive adhesive backing. Product ID is 869XW

### Fiber Height at Number of Uses



Actual usage could be longer or shorter depending on equipment, connectors, and process conditions.

### Backreflection Results



Using 3M™ Lapping Film 863X/863XW for your final polishing step helps you easily meet Telecordia back reflection standards.

## 3M™ Novec™ Contact Cleaner for Fiber Optic Connector Cleaning

3M™ Novec™ Contact Cleaner combines fast, effective cleaning performance with an excellent safety and environmental profile. Designed for a variety of assembly level and field maintenance cleaning tasks, Novec contact cleaner uses an advanced 3M solvent technology that offers a number of significant advantages over many conventional spray cleaners, including:

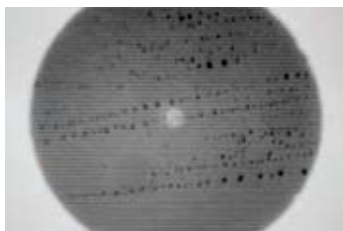
- Fast drying
- Low in toxicity
- Streak free
- Non-flammable

Novec Contact Cleaner also features an excellent environmental profile. The product is non-ozone depleting, is exempt from the U.S. EPA's and most state and district definitions of a volatile organic compound (VOC) and contains no nPB or HAPS. It is based on a sustainable technology and offers an alternative for cleaners containing HCFC-141b or HCFC-225.

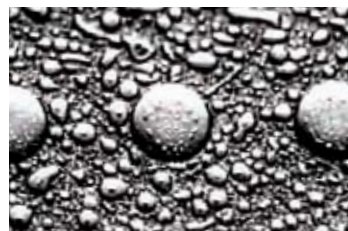
- Removes particulates, oils, light grease, silicones, dust and other soils from connector end faces
- Quick drying and non-corrosive
- Safe for plastics and metals

### Performance

The photos below compare identical connectors that were wiped with isopropanol (IPA) and Novec Contact Cleaner. The Novec Contact Cleaner does not leave residual contamination on the surface that can affect fiber optic circuit performance.



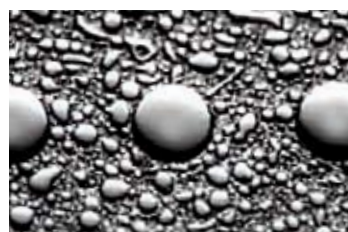
Ceramic Connector Cleaned with IPA



MT Connector Cleaned with IPA



Ceramic Connector Cleaned with Novec Contact Cleaner



MT Connector Cleaned with Novec Contact Cleaner





## For Additional Information

To request additional product information or to arrange for sales assistance, call toll free: 1-800-251-8634.

Address correspondence to: 3M Electronics Markets Materials Division, Building 21-1W-10, 900 Bush Avenue, St. Paul, MN 55144-1000. Our fax number is 651-778-4244 or 1-877-369-2923. In Canada, phone: 1-800-364-3577. In Puerto Rico, phone: 1-787-750-3000. In Mexico, phone: 52-70-04-00.

For technical assistance call the Fiber Optics Applications Development Lab Toll-free, 1-866-866-0922

**Important Notice:** Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use.

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