

# LENNTECH

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## Zeta Plus™ U & UW Series

Insulation Oil Filtration Used in Power Generation

Zeta Plus Utility Series filter cartridges have long been the industry standard for reconditioning dielectric oil. The Performance Series builds upon that standard, providing significant enhancements to ease of use, filtration performance and moisture removal. In addition, two new grades, 10U and 10UW, provide the superior ultrafine particulate removal demanded by today's sophisticated power generation and transmission equipment.

### Charge-Modified Media

Zeta Plus U & UW Performance Series filter media are specifically designed for the reconditioning of insulating oils used in the utility industry. The patented\*, charge-modified filter media in Zeta Plus uses electro-kinetic adsorption to remove contaminants and colloid materials smaller than those removed by mechanical sieving alone.

### High Efficiency Grades

Zeta Plus Performance Series filters are available in two formulations, U & UW. The U formulation is recommended for use with oils contaminated mainly with carbon particles while the UW formulation is specially formulated for use with oils contaminated with both carbon particles and moisture. In addition, two grades of media, 05 and 10, are available. The 05 grade provides efficient removal of contaminants in most applications while the new 10 grade achieves greater removal of ultrafine particles in technically demanding applications.



## Features & Benefits

### Patented, charge-modified depth media

- Extremely high contaminant removal efficiencies and longer service life

### Water absorbent formulation (UW Grade)

- Superior water removal capabilities

### New, tighter (10U & 10UW) grades available

- Enhanced removal of very fine particles

### Integral, multiple length cartridges

- Minimal operator exposure to contaminated oils

### Zeta Plus Lifting Device handles and cartridge removal baskets

- Easy installation and removal for faster and more convenient operation

### UW grades stop flow when water-saturated

- Prohibits recontamination of filtrate with water and identifies filter service life

### Pretensioned cartridge assembly

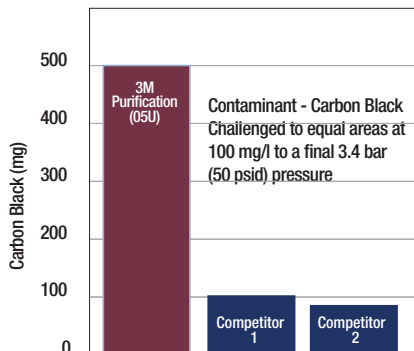
- Strong, integral cartridge under the most severe operating conditions

### Filters are pre-dried and packaged with desiccant in water-impervious foil packaging

- Ensures that water removal capability is not compromised prior to use

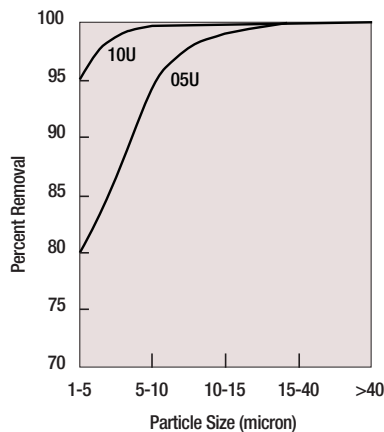
\*U.S. Patent Number 4,007,199





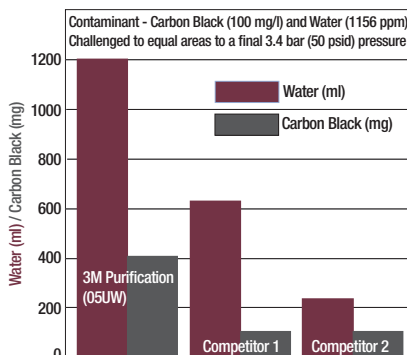
**Chart 1**

Zeta Plus 05U formulation media exhibits up to 5 times the contaminant removal capacity of competitive products.



**Graph 1**

Typical removal efficiencies for the 05U and 10U grades of Zeta Plus U Series Media



**Chart 2**

Zeta Plus 05UW formulation media provides superior particulate and water removal when compared to competitive products.

## User-Friendly Design

A number of innovations enhance the convenience of Zeta Plus cartridge systems for easier operation, fast turn-around time and operator protection.

Zeta Plus Lifting Device handles and integral, double height cartridges have been developed for more convenient cartridge installation and removal and minimising operator contact with dielectric fluids. Cartridge removal baskets are available as an option for manually or mechanically installing or removing cartridges.

Clean oil means both proper insulation of transmission devices and quenched arcs in circuit breakers and other devices. The build-up of contaminants in the oil is one of the major reasons for loss of dielectric strength, equipment malfunction and eventual breakdown. Zeta Plus Performance Series 05U and 10U formulations remove contaminating particles in insulating oil.

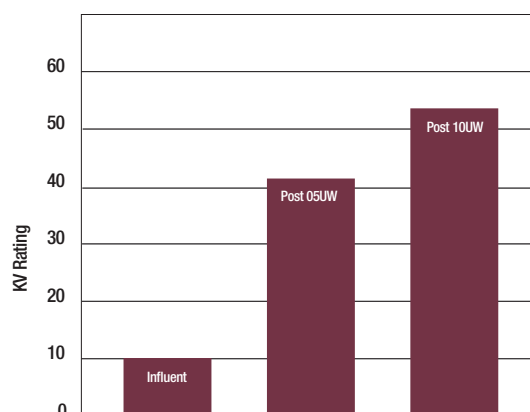
As depicted in Chart 1, Zeta Plus 05U removes significantly more carbon than competitive products. The greater capacity and longer life of Zeta Plus 05U mean longer filter life and reduced filtration costs.

## Higher Efficiency 10U Grades

As device dimensions get smaller and oil specifications tighter, finer filtration is required. 3M Purification has developed the 10U formulation to meet the demands of customers in these critical applications. The 10U formulation exhibits higher removal efficiencies of smaller contaminants as shown in Graph 1.

In arduous applications where fine carbon particulate build-up can effect dielectric performance, the more efficient 10U grade can be utilised on all filtration cycles. In other applications where the fine carbon particulate build-up occurs more slowly, the higher efficiency of the 10U can be used on an alternating filtration cycle with the 05U grades to economically minimise the build-up.

Water contaminates the dielectric oil either from the atmosphere or breakdown of the oil itself. This results in loss of dielectric strength, equipment malfunction and increased maintenance levels. Water contamination is usually accompanied by particulate contamination increasing both the filtration and water removal workloads. 3M Purification has developed the Performance Series Zeta Plus UW formulations to solve both problems. This formulation, available in both the 05UW and 10UW grades, combines efficient removal of particulates with high performance moisture reduction. Chart 2 demonstrates the superiority of Zeta Plus 05UW.



Representative of numerous field and laboratory trials in which service aged oil with <10 KV values were significantly improved by filtration with Zeta Plus U Series filter cartridge.

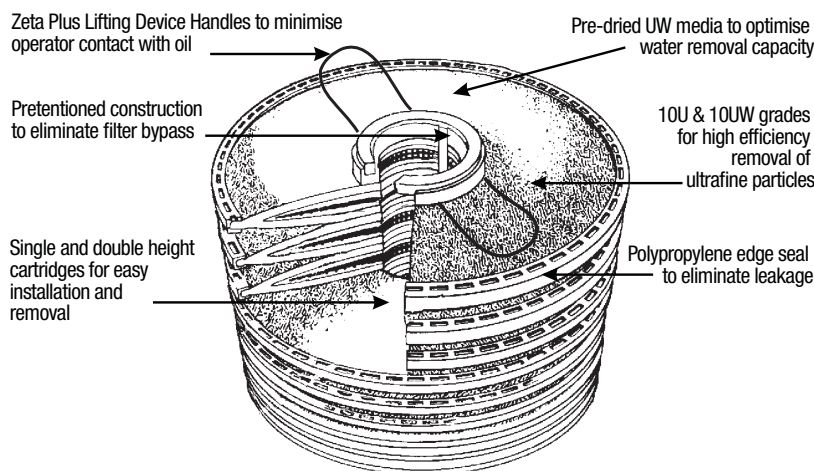
### Automatic Shut-off on Saturation

Because of its special construction, Zeta Plus 05UW and 10UW cartridges will plug on saturation with water, effectively shutting off flow. This feature is important for two reasons. First, it provides the user with a clearly defined end-point to filter life. Second, unlike the competitive products, the automatic shut-off prevents recontamination of the filtrate with water.

### Enhanced Manufacturing and Packaging

Humid site conditions limit the effectiveness of competitive products when their construction and packaging does not prevent absorption of water from the air during storage and transit. Performance Series Zeta Plus UW cartridges, however, reach the customer site at optimum water removal capacity because the cartridges are convection dried and sealed in water impervious foil packaging with a desiccant pouch.

### Zeta Plus Performance Series Provide Superior Construction and Ease of Use



Zeta Plus Lifting Device Handles, above, for easier cartridge installation and removal and to minimise operator contact with oil-laden cartridges.



Double Length Cartridges, shown above, for fast cartridge change-out, operator protection and convenience.

Combination Packaging available for better inventory management and easier transportation. Special packaging is available for three-high housings (1 double-height and 1 single-height cartridge.)

### Zeta Plus Cartridges are available in a wide variety of configurations

| Cartridge Catalogue Number | Nominal Diameter | Height (cm) | Number of Cells | Approx. Media Area (m <sup>2</sup> ) | Standard Package Units per Carton | Available Media      |
|----------------------------|------------------|-------------|-----------------|--------------------------------------|-----------------------------------|----------------------|
| Z8UE1                      | 8"               | 16.99       | 8               | 0.33                                 | 15                                | 05U/10U<br>05UW/10UW |
| Z2UA1                      | 12"              | 19.53       | 9               | 0.84                                 | 2                                 | 05U                  |
|                            |                  |             | 10              | 0.93                                 |                                   | 10U                  |
| Z2UB1                      |                  | 18.73       | 8               | 0.74                                 |                                   | 05UW<br>10UW         |
| Z2UA2                      | 12"              | 39.05       | 18              | 1.67                                 | 1                                 | 05U                  |
|                            |                  |             | 20              | 1.86                                 |                                   | 10U                  |
| Z2UB2                      |                  | 37.47       | 16              | 1.49                                 |                                   | 05UW<br>10UW         |

**System Sizing** - The recommended flow for Zeta Plus U and UW grades is 2400 l/hr/m<sup>2</sup>. At this flow, a 16 cps oil will show an initial differential pressure drop of about 0.25 bar. When used with a 1 cps oil, an initial differential pressure of well under 0.07 bar can be expected.

**Housings and Mobile Systems** - 3M Purification offers a broad range of cartridge housings and mobile filtration units to fit a wide variety of applications. Cartridge removal baskets, for easy removal of an entire stack of cartridges, are available. For more information on 3M Purification filter housings, contact your local 3M Purification distributor.

| Operating Parameters                    |                          |
|-----------------------------------------|--------------------------|
| Maximum Operating Temperature           | 60 °C                    |
| Maximum Operating Differential Pressure | 2.1 - 2.5 bar            |
| Recommended Flow Rate                   | 2400 l/hr/m <sup>2</sup> |

# Zeta-Plus™ U & UW Series

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## US Zeta Plus U & UW Series Ordering Guide

| Cartridge Diameter            | Cartridge Height                                           | Construction                                       | Gasket Material                                              | Packaging                                  | Media Grade            | Media Formulation                                                 |
|-------------------------------|------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------|--------------------------------------------|------------------------|-------------------------------------------------------------------|
| <b>U Grade Cartridges</b>     |                                                            |                                                    |                                                              |                                            |                        |                                                                   |
| <b>Z8UE</b><br>(8" Diameter)  | 1 - Single Height                                          | <b>2P</b><br>W/Zeta Plus Lifting<br>Device Handles | <b>D</b> - Nitrile<br><b>F</b> - Neoprene<br><b>H</b> - Cork | 2 - Premium<br>(water-impervious foil bag) | <b>05</b><br><b>10</b> | <b>U</b> - Particulate removal from<br>dielectric oils            |
| <b>Z2UA</b><br>(12" Diameter) | 1 - Single Height<br>2 - Double Height<br>3 - Combination* | <b>2P</b><br>W/Zeta Plus Lifting<br>Device Handles | <b>D</b> - Nitrile<br><b>F</b> - Neoprene<br><b>H</b> - Cork | 2 - Premium<br>(water-impervious foil bag) | <b>05</b><br><b>10</b> | <b>U</b> - Particulate removal from<br>dielectric oils            |
| <b>UW Grade Cartridges</b>    |                                                            |                                                    |                                                              |                                            |                        |                                                                   |
| <b>Z8UE</b><br>(8" Diameter)  | 1 - Single Height                                          | <b>2P</b><br>W/Zeta Plus Lifting<br>Device Handles | <b>D</b> - Nitrile<br><b>F</b> - Neoprene<br><b>H</b> - Cork | 2 - Premium<br>(water-impervious foil bag) | <b>05</b><br><b>10</b> | <b>UW</b> - Particulate and water<br>removal from dielectric oils |
| <b>Z2UB</b><br>(12" Diameter) | 1 - Single Height<br>2 - Double Height<br>3 - Combination* | <b>2P</b><br>W/Zeta Plus Lifting<br>Device Handles | <b>D</b> - Nitrile<br><b>F</b> - Neoprene<br><b>H</b> - Cork | 2 - Premium<br>(water-impervious foil bag) | <b>05</b><br><b>10</b> | <b>UW</b> - Particulate and water<br>removal from dielectric oils |

\*Combination packaging consists of a single box containing one 1-high cartridge and one 2- high cartridge.

### Important Notice

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