# Type ICX Fused Cutout

## Description

The ICX interchangeable cutout is designed for use on the overhead distribution system. It may be used to provide overcurrent protection, to provide visible ind cation of fuse operation, to provide a visible break sectionalizing point for maintenance personnel, and as a loadbreak switch when used in conjunction with a portable loadbreak tool. In addition the ICX cutout incorporates the quality approach to design prevalent in the Westinghouse line of cutouts.

### Ratings and Application

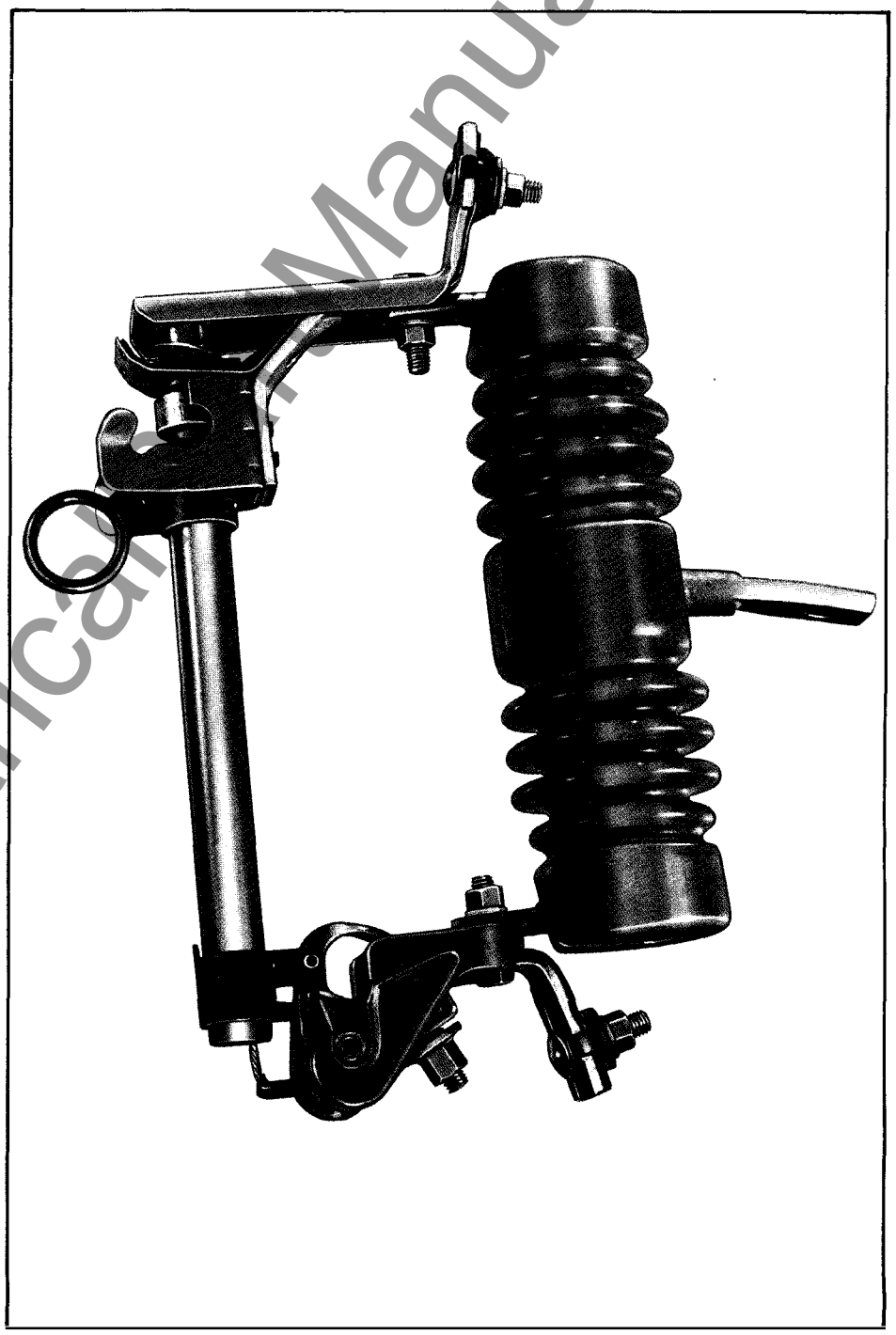
The ICX cutout is offered in three frame (BIL) sizes. Each of these frames accommodate fuseholders with various ratings. The ICX fuse tube is made of a fiber liner with a high strength filament wound outer wrap. All ratings are accomplished by expelling gases during interruption from the bottom of the fuse tube. For the highest interrupting rating a link extender rod is attached to the fuse tube cap to improve the efficiency of gas expulsion and arc interruption. Fuse tubes with more than one rating are clearly labeled to indicate each interrupting capability. This minimizes the number of styles that must be stocked by providing the broadest range of application flexibility.

### Interchangeability

The ICX cutout is designed to be electrically and mechanically interchangeable with the S&C type "XS" and A.B. Chance type "C" cutouts. Testing has confirmed the performance of the ICX fuseholder and fuse support with these cutouts.

## Standards and Design Testing

The ICX cutout meets or exceeds all applicable requirements of EEI, NEMA, and ANSI standards.



## Design Features

### Reliable Performance

(1) **Continuous All Copper Current Path**
The ICX is designed to provide the most reliable and efficient method of current transfer from the terminals to the contacts on the fuseholder. Both the top and bottom contacts are continuous copper straps which extend to the terminal connectors. There are no riveted joints to become loose and result in excessive heating. Stainless steel springs provide mechanical support for the contacts. Thus the contacts can be made from high conductivity copper, not a compromise alloy which must provide structural support as well as conductivity.

(2) **Universal Contacts**
The contacts of the ICX are silver plated to provide for the lowest contact resistance possible. In addition the stainless steel suport springs insure good contact pressure. This provides for the coolest operation possible for the full range of currents through 300 amps continuous.

(3) **Bronze Castings for Precision and Durability**
Bronze castings provide for high strength, excellent corrosion resistance and precision tolerance control. The use of bronze castings for the critical moving parts and contact surfaces insures good operation and reliable drop out action.

(4) **Stainless Steel Pivot Pins**
The pivot points of the ICX cutout are established with stainless steel spring pins which insure reliable uniform pivot operation for the life of the cutout. Due to hydraulic insertion there is no chance of these pins being deformed (i.e. like a bent axle) during assembly.

(5) **Solid Porcelain Insulator**
The insulator of the ICX cutout is a solid piece wet process porcelain coated with a compressive non-tracking glaze to provide strength and long life.

(6) **Potted Construction**
Cementing of the back strap, top assembly, and bottom assembly into the porcelain insures reliable attachment in spite of differences in thermal expansion between ceramic and metal components. This method of attachment also eliminates the need for special sometimes unreliable bird proofing precautions.

(7) **Sleet Shield Protection**
An impervious galvanized steel top hood is an integral part of the ICX design. In addition to providing mechanical support the top hood provides excellent protection for the top contact and top contact spring against ice and sleet build up.

(8) **High Quality Flipper**
A stainless steel flipper is provided to insure withdrawal of the fuselink pigtail during operation. The long lever arm of the flipper and a stainless steel coil spring insure reliable withdrawal of the fuse link pigtail even for low energy low current faults. The flipper is grooved with a large radius to hold the link in the proper position and has a smooth rolled surface so that there is no possibility of a sharp edge cutting the fuselink.

### Ease of Installation

(9) **Centered Terminals**
The terminal connectors of the ICX are mounted on the centerline of the cutout. This provides for convenient connection from either direction. The terminals are tin plated to accommodate the use of either copper or aluminum conductors. All standard terminal options are single wrench operable such that only one wrench is required to secure the terminal connections.

(10) **Fuse Link Nut**
The ICX cutout incorporates a superior fuseholder nut design for securing the pig tail of the fuse link. Special recessed threads keep smaller fuse links from being frayed during tightening. The large lower clamping surface insures a strong grip on fuse links of all sizes. The upper nut design provides an accessible surface in excess of 1/2'' which conveniently accommodates wrench tightening.

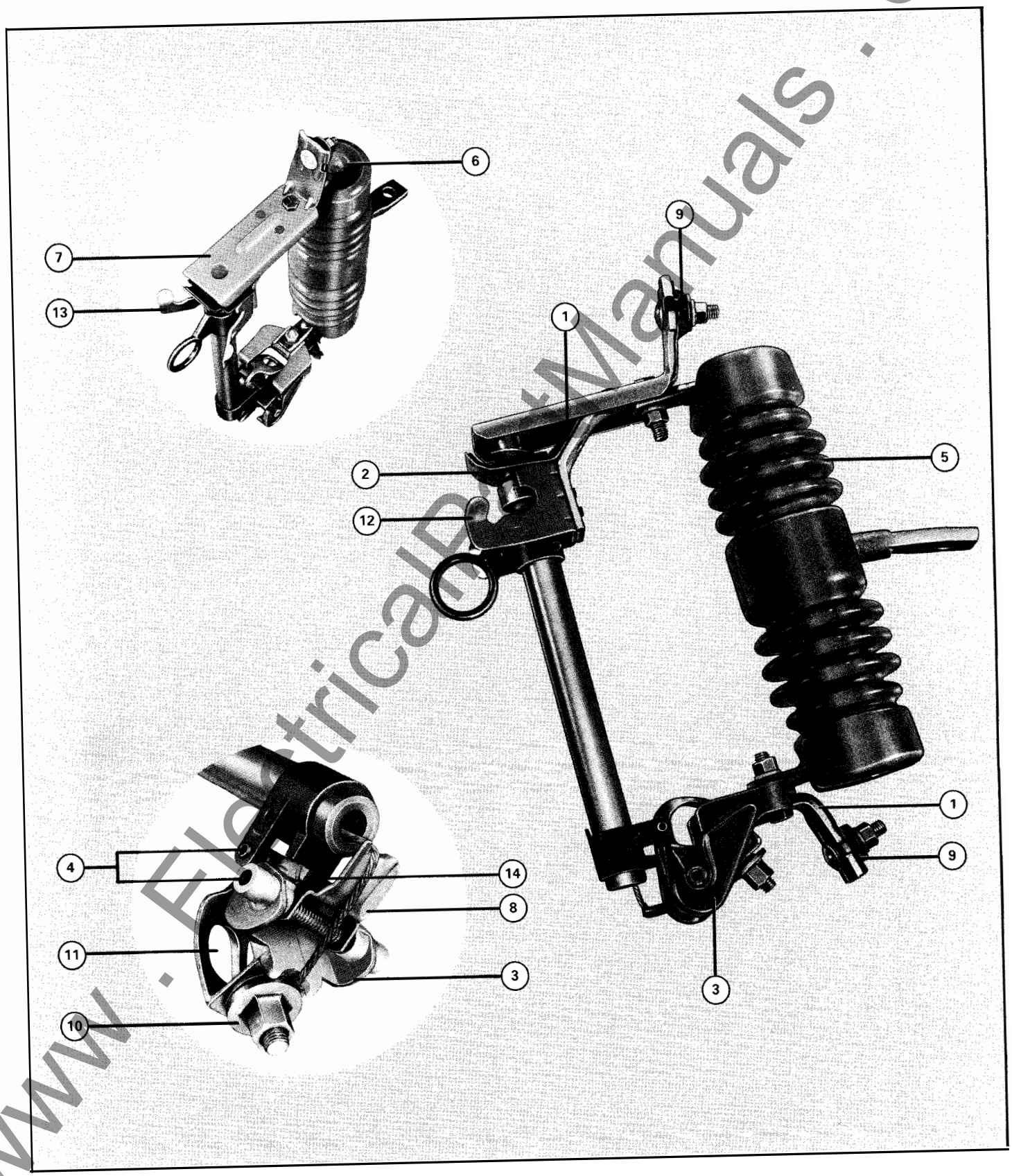
### Safe Operation

(11) **Lifting Eye**
The dual direction lifting eye design of the ICX fuseholder makes it easy to insert the hookstick and remove the fuseholde from the cutout from either the side or the front. The oblong shapes of the lifting eye openings make sure that the fuseholder stays on the hookstick during removal and insertion.

(12) **Loadbreak Hooks**
Every ICX cutout is equipped with high strength hooks for use with a portable loadbreak tool. The hooks are designed to provide proper clearance and accessibility for such a device.

(13) **Guides**
The special hook design of the ICX provides guiding surfaces that insure that the fuseholder is guided into the proper closed position even when the closing force is applied from an extreme angle.

(14) **Fuse Link Tension Control**
An extension of the spring loaded flipper is designed to engage with the bottom ferrule casting when the cutout is properly fused. This action limits the tension exerted on the fuse link during closing thus protecting fragile small ampere links from breaking.



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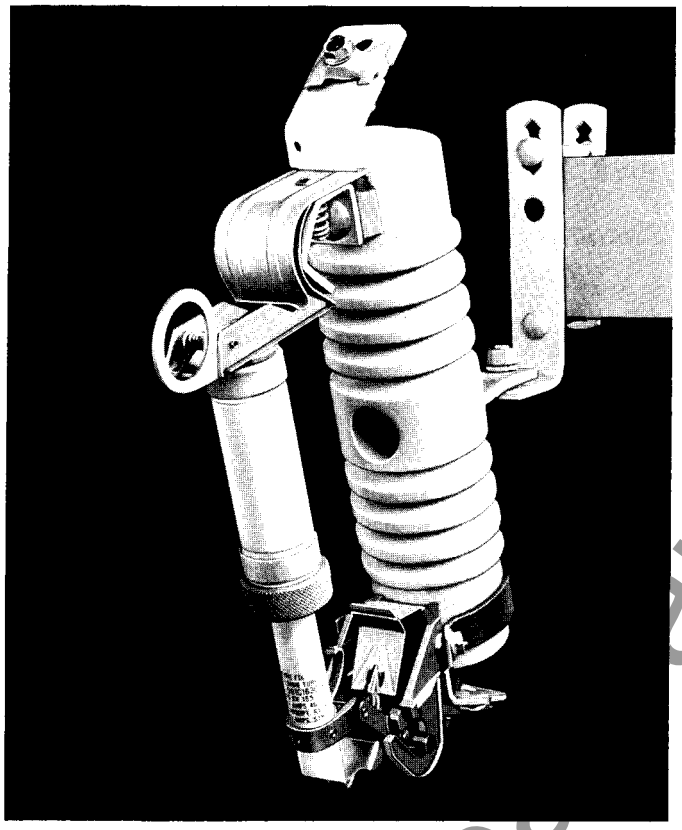
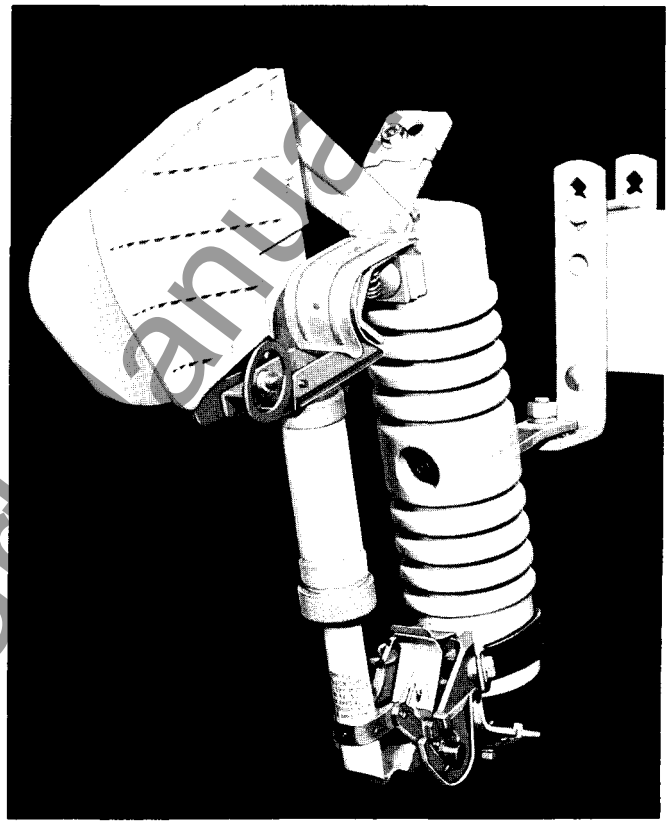
# Current Limiting Open Fuse Cutouts

Types FDLX Non-Loadbreak and FDLU Loadbreak

40,000 Amps Asymmetrical Interrupting Capacity



FDLX Non-Loadbreak Current Limiting Fuse Cutout



FDLU Loadbreak Current Limiting Fuse Cutout

## Description

The FDLX, non-loadbreak and FDLU, loadbreak current limiting fuse cutouts are of modular design consisting of a partial range current limiting fuse in series with a NEMA standard type "K" link to economically and safely protect systems from high energy faults.

The fused distribution limiter (FDL) is designed in a fuseholder assembly which fits in standard Westinghouse LDX and LBU cutout fuse support mountings. Using the FDL in existing Westinghouse fused cutout support mountings will upgrade the cutout interrupting rating to 40,000 RMS amperes asymmetrical.

The partial range current limiting fuse operates only on large magnitude faults. The "K" link operates in both the low and high current range to provide the low current clearing operation and to assure safe positive dropout action for all faults.

The combination partial range current limiting fuse and "K" link fuse is available in maximum voltage ratings of 8.3 KV and 17.1 KV. The maximum continuous "K" link rating is 40K. The current limiting backup fuse is available in several sizes, from 15 to 40 amperes. The 40 ampere current limiting fuse can be used with 40K links and smaller. The 15 ampere current limiting fuse can be used with 15K links and smaller. The 15 ampere current limiting fuse is available to reduce the ($I^2t$) let-thru energy level to a smaller value than can be realized with the 40 ampere current limiting fuse.

On systems with high available fault currents, the standard cutout or expulsion power fuse either do not have the interrupting capability or permit equipment to be subjected to excessive let-thru energy which may cause catastrophic failures and lengthy outages. Systems with high fault current capacities require the use of current limiting fuses to limit the let-thru energy to safe operating levels.

The FDL provides the economy of the "K" link protection for low fault current operation with the energy limiting performance of the current limiting fuse to protect connected equipment from high fault currents.

Past usage of the standard distribution cutout has shown that in 80% of the cases where a cutout has operated, the interruption was caused by a low magnitude fault. This concept then requires only the replacement of the inexpensive "K" link rather than an expensive current limiting fuse for most operations. The FDL offers the best advantages of both the expulsion and current limiting fuses – economy and current limiting action to provide protection and safety to equipment, personnel, and public property.

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Supersedes DB 38-631, pages 1-2, dated April, 1973
E. D. C/1991, 1971, 1982, 2002, 2061, 2062, 2047, 2048, 2091, 2094, 2095/PL

# Current Limiting Open Fuse Cutouts

Types FDLX Non-Loadbreak
and FDLU Loadbreak

40,000 Amps Asymmetrical
Interrupting Capacity

## Application

The FDLX and FDLU current limiting fuse cutouts can be applied everywhere that conventional non-loadbreak or loadbreak open type cutouts are used. They can be used to protect the following devices and circuits from high energy faults:

1. Pole top distribution transformers
2. Capacitor banks
3. Station Service Potential Transformers
4. URD Dip Pole
5. Sectionalizing protection

The FDL can be used in the same coordinated circuit as the conventional "K" link open type cutout because it possesses the less inverse time current characteristic of the standard NEMA "K" link to achieve easy system coordination. Yet it provides current limiting action without the disadvantage of a very steep inverse time current characteristic that is associated with the conventional full range current limiting fuse.

The interposing of a backup current limiting fuse with the "K" link permits closer coordination with up line expulsion devices where high fault currents are available. This advantage will permit sectionalizing or isolating smaller portions of the distribution system.

## Features

**The series combination of a Westinghouse NEMA "K" link with a partial range current limiting fuse.**

| | |
|---|---|
| 1. Low current faults blow the "K" link and do not affect the current limiting fuse. | Since 80% of the faults are of low current nature, four out of five times the customer merely needs to replace an inexpensive fuse link instead of a full range current limiting fuse for a savings of approximately **$140.00** in replacement costs. |
| 2. Reduces expulsion of gases, flames and melted materials on fault interruption by using the current limiting fuse for high current clearing function. | Operational safety to linemen is increased significantly by limiting the expulsion of gases, flame and melted material. This expulsion of gases is reduced by a factor of four from that of a standard cutout. |
| 3. Provides closer coordination between continuous ratings of other protective devices located closer to the source on high capacity distribution systems. Interposing a backup current limiting fuse permits closer coordination between expulsion type fuses because the current limiting fuse interrupts high magnitude faults in less than ½ cycle. | Permits sectionalizing smaller segments of the line to reduce the number of customer outages. |
| 4. Assures positive dropout action by utilizing the "K" link to initiate the dropout mechanism for faults up to 40,000 RMS Amps Asymmetrical. | Visible dropout operation decreases outage time approximately 30 minutes since linemen can easily find fault location due to visible dropout operation. |
| **Interchangeability with old mountings.** Old cutout mountings can be refused with a new FDLX or FDLU fuseholder. | Eliminates utility costs of replacing the total cutout when uprating the system or limiting the energy. The replacement cost of an FDLX fuseholder of approximately $40 eliminates the necessity of replacing a $60.00 current limiting cutout for a savings of $20.00 per installation. |
| **Station service protection.** Provides short circuit protection for station service potential transformer. | Reduces cost of up to $200 for full range current limiting fuse to cost of $60.00 for FDLX for savings of $140 per fuse. |
| **Fuse tube, boric acid liner.** Clears low fault currents with nominal fuse tube erosion. | Increases life of tube by 300% since it can withstand 20 shots rather than NEMA 5 shot rating. |
| **Partial range current limiting fuse.** 1. Limits the let-thru energy ($I^2t$) on high energy faults to safe operating levels. | Protects pole top and padmounted distribution transformers from violent failures during a primary fault. Safety of operation to the linemen, equipment and public property is significantly increased. |
| | Protects against case rupture of capacitors by limiting the let-thru energy to a safe value which can save up to $100 per capacitor case. |
| 2. Reduces generated arc voltage approximately 20 to 30% under that of a conventional full range current limiting fuse. | Provides improved coordination with distribution type arresters. |
| **Single element current limiting fuse.** 1. Furnishes a non-damageable characteristic at the cross over point between the total clearing curves for the "K" link and the minimum melting curve of the current limiting fuse. The current limiting fuse is either blown or in reusable condition. | Increases safety to lineman by assuring him current limiting fuse is blown or has not been damaged. Proven by a resistance check. |

Further Information:
PL 38-620 LBU, 38-640 LDX
DB 38-621 LBU, 38-641 LDX
PL 38-660 Fuse Links
AD 38-665 K-link Fuse Selection
AD 38-665A Curves for K-link
PL 36-623 Current Limiting Fuse – FDL
AD 36-661 Current Limiting Fuse Selection

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