Larson Electronics LLC
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## MT-UPM-R7-1P-GNF-100KVA-SZ-BF-Z6-BM-CZ-2ZZ-M2

# 100 KVA Pole Mount Distribution Transformer - 2400/4160Y Grounded Wye Primary, 120/240V Secondary - Mineral Oil/ONAN -

**Product ID: 283448**




**Larson Electronics LLC manufactures a wide variety of products, including custom built to spec designs. The pictures displayed for this unit are a general representation of form factor for the product line and may not accurately represent this exact configuration in every detail due to custom builds and changes between similar products in our standard catalog. The specifics for this configuration are listed in the specification table and supporting documentation (CAD files, Dimensional Drawing, Name Plate Diagram, Wiring Diagram, etc.). This means that specific details (receptacles, plugs, wires, connections, mounting brackets, external finishes, etc.) may not be accurately represented in images vs specifications. Please review specifications and do not order based solely on images.**

**MT-UPM-R7-1P-GNF-100KVA-SZ-BF-Z6-BM-CZ-2ZZ-M2 Pole Mount Overhead Transformer**
**Phase: Single Phase**
**Capacity: 100 KVA**
**Primary Voltage: 2400/4160GrdY Grounded Wye (2 Wire)**
**Primary BIL: 95 kV**
**Secondary Voltage: 120/240V (L-L-N)**
**Frequency: 60 Hz**
**Temperature Rise: 65°C**
**Forced Air (Fans): None**
**Tap Changer: -**
**Primary Insulation: Porcelain High Voltage Bushings - Dual Primary Bushings**
**Secondary Insulation: (3) Bushings**
**Well Bushings w/ Inserts: -**
**Efficiency: -**
**Insulation Fluid: Mineral Oil - Non PCB Fluid**
**Fluid Capacity: -**
**Oil Level Marking: Internal**
**Cooling Class: ONAN**
**Liquid Level Gauge: -**
**Temperature Gauge: -**
**Pressure/Vacuum Gauge: -**
**Pressure Relief Device: Automatic**
**Fill Valve: Included**
**Drain Valve w/ Sampler: -**
**Surge Arrestors: Lightning Arrestor on H1 Primary Terminal**
**Surge Arrestor Mounting Provision: Mounting Provisions for Installing Lightning Arrestor on H2 Primary Terminal**
**Protection Fuses: -**

**Ratings**

Conforms to ANSI / IEEE Standard C57.12.20
Lifting Lugs Included

**Load Break Switch: -**
**Front: -**
**Feed: -**
**No Load Loss: 210W**
**Full Load Loss: 850W**
**Efficiency @ 100% Load: 98.95%**
**Impedance (approx): 3%**
**Winding Material: Copper**
**Core Material: Grain Oriented Steel**
**Terminals: Tin Plated Primary and Secondary - Accepts Copper or Aluminum Connections**
**Ambient Temperature Rating: -**
**Housing: Coated Steel w/ Corrosion Resistant Cover Band, Removable Top Cover**
**Paint Type: Munsell™ 10bg 6/1 Blue Grey**
**Mounting: Pole Mount via Hangar Brackets**
**Lifting Lugs: Included**
**Grounding: Tank Grounding Provisions**
**Dimensions: 33" x 27" x 55"**
**Weight: 1,100 lb**

**Special Orders- Requirements**
Contact us for special requirements
**Toll Free: 1-800-369-6671**
**Intl: 1-214-616-6180**
**Fax: 1-903-498-3364**
**E-mail:sales@larsonelectronics.com**

**The MT-UPM-R7-1P-GNF-100KVA-SZ-BF-Z6-BM-CZ-2ZZ-M2 Pole Mount Distribution Transformer from Larson Electronics offers powerful, reliable and efficient power distribution in outdoor and public locations. The low operating costs, low heat emissions and low cost of ownership makes this transformer ideal for a wide range of applications and businesses. This power distribution system is designed for overhead, pole mount installations and use.**

***PLEASE NOTE: ANY FREE SHIPPING OFFERS DO NOT APPLY TO POWER DISTRIBUTION PANELS, TRANSFORMERS, OR SUBSTATIONS****

**Transformer Features:** With a transformer rating of 100 kVA, the industrial transformer features a primary voltage of single-phase 2400/4160Y Grounded Wye (2 wire) and a secondary voltage of single-phase 120/240V (L-L-N). This pole mount transformer features porcelain high-voltage, dual bushings on the primary side and three bushings on the secondary side. Equipped with copper windings and a grain oriented steel core, this single-phase transformer consists of one coil and two core loops. Tin plated terminals on the primary and secondary side accepts copper or aluminum connections.

The MT-UPM-R7-1P-GNF-100KVA-SZ-BF-Z6-BM-CZ-2ZZ-M2 is air cooled and does not have fans or mounting provision for fans. This unit features a 65°C temperature rise for reduced heat waste, increased reliability and longer life. The combination of low temperature rise and high efficiency makes this unit suitable for use in electrical rooms, air conditioned spaces in buildings, underground vaults and similar locations, in addition to outdoor areas.

**Insulation Fluid:** The MT-UPM-R7-1P-GNF-100KVA-SZ-BF-Z6-BM-CZ-2ZZ-M2 features mineral oil insulation fluid. Internal marking is available for proper oil level monitoring. We offer transformers with FR-3 oil fluid, if needed.

**Gauges:** There are no gauges on this transformer. We can add liquid level, temperature and pressure/vacuum gauges at an additional cost. Standard liquid level, temperature and pressure/vacuum gauges are analog, manual reading types.

**Pressure Relief Device:** An automatic pressure relief device is included with this transformer.

**Rapid Rise Relay:** There are no rapid rise relays on the unit. This safety component is designed for protection when a rapid increase in tank pressure occurs. The relay is suitable for detecting sudden pressure fluctuations above predetermined safe limits.

**Surge Arrestors:** This system comes with a lightning arrestor on the H1 primary terminal. Mounting provisions for installing lightning arrestor on the H2 primary terminal are available. Designed for over-voltage and transient voltage protection, the components prevent damage caused by lightning, internal switching or voltage surges. We can offer models without high elbow surge arrestors that have mounting provisions for customer-provided surge arrestors.

**Load Breaker Switch:** The MT-UPM-R7-1P-GNF-100KVA-SZ-BF-Z6-BM-CZ-2ZZ-M2 does not have a load breaker switch.
**Valves:** The MT-UPM-R7-1P-GNF-100KVA-SZ-BF-Z6-BM-CZ-2ZZ-M2 is not equipped with a fill valve and drain valve with sampler port.
**Protection Fuses:** This transformer does not contain fuses or circuit breakers. For units without protection fuses, up stream protection is provided. We recommend provisions for protection fuses when possible, as blown fuses may require more frequent oil changes.
**Mount:** The heavy-duty enclosure makes the unit suitable for and outdoor applications. Equipped with hangar brackets and lifting lugs, this overhead power distribution system can be mounted on poles.
**Benefits:** The MT-UPM-R7-1P-GNF-100KVA-SZ-BF-Z6-BM-CZ-2ZZ-M2 heavy-duty transformer offers many benefits to consumers. This transformer provides owners with significant energy savings, as well as offering environmental benefits. Higher efficiency not only extends the life of the transformer, but also turns into cost savings for owners in the form of lower energy bills and decreased cost of ownership.
We offer completely self protected (CSP) pole mount overhead transformers at an additional cost.
**Applications:** General purposes, industrial sites, electrical rooms, public locations, manufacturing facilities, steel plants, offshore, commercial, military, processing plants, electric power distribution, utilities, public locations and more. Larson Electronics is a manufacturer and as such can build stationary and portable transformer systems to your specifications. Although we carry several models of power distribution transformer systems, we can deliver custom ordered units almost as quickly as our prebuilt units. If this model does not meet your needs, please contact us at 1-800-369-6671 or sales@larsonelectronics.com to discuss your specific requirements.


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## 1. CHEMICAL PRODUCT AND COMPANY INFORMATION

**Product Name:** Transformer Oil **(0826)**

**Manufacturer Information**:

Tulco Oils, Inc.

5240 E. Pine Street
Tulsa, Oklahoma 74115

**Product Use**:

Industrial Oil

**Emergency Phone Numbers**:

| | |
|---|---|
| Chemtrec | N/A |
| Tulco Oils, Inc. | (800) 375-2347 |

**Information**:

| | |
|---|---|
| Product Safety Information | (800) 375-2347 |

## 2. COMPOSITION/INFORMATION ON INGREDIENTS

| Component | CAS No. | Amount (Vol%) |
|---|---|---|
| Light Naphthenic Hydrotreated Distillates | 64742-53-6 | >98% |
| BHT Blend Additives | Proprietary | >1% |

**EXPOSURE GUIDELINES (SEE SECTION 15 FOR ADDITIONAL EXPOSURE LIMITS)**

| | CAS No. | Governing Body | Exposure Limits |
|---|---|---|---|

## 3. HAZARDS IDENTIFICATION

- **EMERGENCY OVERVIEW**
  Little or no immediate hazard.

  **Hazards Ratings:**
  *Key: 0 = least, 1 = slight, 2 = moderate, 3 = high, 4 = extreme*

| | Health | Fire | Reactivity | PPI |
|---|---|---|---|---|
| NFPA | 1 | 1 | 0 | |
| HMIS | 1 | 1 | 0 | X |

- **POTENTIAL HEALTH EFFECTS**
  - **PRE-EXISTING MEDICAL CONDITIONS**
    The following diseases or disorders may be aggravated by exposure to this product: Skin,
  - **INHALATION**
    No acute effects expected.

    **LC50 (mg/l):** no data
    **LC50 (mg/m3):** no data
    **LC50 (ppm):** no data

- **SKIN**
  Practically non-toxic if absorbed through the skin. May cause minimal skin irritation.

  **Draize Skin Score:** no data Out of 8.0
  **LD50 (mg/kg):** no data

- **EYES**
  No eye effect expected.
- **INGESTION**
  Practically non-toxic if ingested.
  **LD50 (g/kg):** no data

## 4. FIRST AID MEASURES

- **INHALATION**
  No specific treatment is necessary since this material is not likely to be hazardous by inhalation. If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough of other symptoms develop.
- **SKIN**
  Wash with soap and water. Get medical attention if irritation develops or persists. Wash clothing before reuse.
- **EYES**
  Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. If eye irritation persists, obtain medical treatment.
- **INGESTION**
  Material is practically non-toxic. Induction of vomiting is not required. Get medical attention immediately.

## 5. FIRE FIGHTING MEASURES

- **EXTINGUISHING MEDIA**
  Water spray Regular foam Dry chemical Carbon dioxide
- **FIRE FIGHTING INSTRUCTIONS**
  Wear structural fire fighting gear. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

**FLAMMABLE PROPERTIES**

| | Typical | Minimum | Maximum | Text Result | Units | Method |
|---|---|---|---|---|---|---|
| Flash Point | | 300 | | | F | COC |
| Autoignition Temperature | | | | N/A | F | N/A |
| Lower Explosion Limit | | | | no data | % | N/A |
| Upper Explosion Limit | | | | no data | % | N/A |

## 6. ACCIDENTAL RELEASE MEASURES

Contain spilled liquid with sand or earth. DO NOT use combustible materials such as sawdust. Use appropriate personal protective equipment as stated in Section 8 of this MSDS. Advise the Environmental Protection Agency (EPA) and appropriate state agencies, if required. Absorb spill with inert material (e.g., dry sand or earth), then place in a chemical waste container. Vacuum or sweep up material and place in a disposal container.

## 7. HANDLING AND STORAGE

- **HANDLING**
  Wash thoroughly after handling.
- **STORAGE**
  NFPA class IIIB storage. Flash point is greater than 200 degrees F.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Consult With a Health and Safety Professional for Specific Selections

- **ENGINEERING CONTROLS**
  Use with adequate ventilation. Ventilation is normally required when handling or using this product to keep exposure to airborne contaminants below the exposure limit. Mechanical ventilation recommended.
- **PERSONAL PROTECTION**

  - **EYE PROTECTION**
    Safety glasses (with side shields) recommended. Splash proof chemical goggles are recommended to protect against the splash of product.
  - **GLOVES or HAND PROTECTION**
    Protective gloves are recommended when prolonged skin contact cannot be avoided. The glove(s) listed below may provide protection against permeation. Gloves of other chemically resistant materials may not provide adequate protection. Neoprene; Nitrile; Viton;
  - **RESPIRATORY PROTECTION**
    Concentration in air determines the level of respiratory protection needed. Use only NIOSH certified respiratory equipment. Respiratory protection is not usually needed unless product is heated or misted.. Half-mask air purifying respirator with dust / mist filters or HEPA filter cartridges is acceptable for exposures to ten (10) times the exposure limit. Full-face air purifying respirator with dust / mist filters or HEPA filter cartridges is acceptable for exposures to fifty (50) times the exposure limit. Protection by air purifying respirators is limited. Use a positive pressure-demand full-face supplied air respirator or SCBA for exposures greater than fifty (50) times the exposure limit. If exposure is above the IDLH (Immediately Dangerous to Life and Health) or there is the possibility of an uncontrolled release, or exposure levels are unknown, then use a positive pressure-demand full-face supplied air respirator with escape bottle or SCBA. Wear a NIOSH/MSHA-approved (or equivalent) full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.
  - **OTHER**
    Where splashing is possible, full chemically resistant protective clothing (e.g., acid suit) and boots are required. Polyvinyl alcohol (PVA); The following materials are acceptable for use as protective clothing: Polyvinyl chloride (PVC); Neoprene; Nitrile; Viton; Polyurethane; Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Remove contaminated clothing and wash before reuse. For non-fire emergencies, respiratory protection may be necessary and wear appropriate protective clothing to avoid contact with material.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| Physical Property | Typical | Units | Text Result | Reference |
|---|---|---|---|---|
| Appearance | | N/A | Pale Straw/White | |
| Boiling Point | | F | no data | |
| Bulk Density | | lb/gal | no data | |
| Melting Point | | F | no data | |
| Molecular Weight | | g/mole | No data | |
| Octanol/Water Coefficient | | N/A | no data | |
| pH | | N/A | no data | |
| Specific Gravity | | N/A | | |
| Solubility In Water | | wt % | NIL | |
| Odor | | N/A | Light Bland | |
| Odor Threshold | | ppm | no data | |
| Vapor Pressure | | mmHg | <0.0001 | @ 20 C |
| Viscosity (F) | | SUS | | @ 100 F |
| Viscosity (C) | 9.01 | CsT | | @ 40 C |

| | | | | |
|---|---|---|---|---|
| % Volatile | | wt % | NIL | |

## 10. STABILITY AND REACTIVITY

- **STABILITY**
  Stable
- **CONDITIONS TO AVOID**
  Avoid heat, sparks and open flame.
- **INCOMPATIBILITY**
  Strong oxidizers
- **HAZARDOUS DECOMPOSITION PRODUCTS**
  Combustion may produce carbon monoxide, carbon dioxide and other asphyxiants.
- **HAZARDOUS POLYMERIZATION**
  Will not polymerize.

## 11. ECOLOGICAL INFORMATION

No data available

## 12. DISPOSAL CONSIDERATIONS

Follow federal, state and local regulations. This material is not a RCRA hazardous waste, if not contaminated. If material has been "used", RCRA criteria (ignitability, reactivity, corrosivity and toxicity) must be determined. Do not flush material to drain or storm sewer. Contract to authorized disposal service.

## 13. TRANSPORT INFORMATION

| Governing Body | Mode | Proper Shipping Name |
|---|---|---|
| DOT | Ground | Not Regulated |

| Governing Body | Mode | Hazard Class | UN/NA No. | Label |
|---|---|---|---|---|
| DOT | Ground | N/A | N/A | Not Regulated |

## 14. REGULATORY INFORMATION

| Regulatory List | Component | CAS No. |
|---|---|---|

**Title III Classifications Sections 311,312:**

- Acute: **NO**
- Chronic: **NO**
- Fire: **NO**
- Reactivity: **NO**
- Sudden Release of Pressure: **NO**

## 15. OTHER INFORMATION

Limits for the product- 5mg/m3, Oil Mist Limit, (OSHA PEL/ACGIH TLV)  WHMIS Classification:  not controlled.
Please refer to the material safety data sheet for complete information.

# Certification

Manufacturer: Larson Electronics LLC
Address: 9419 US-HWY 175
Kemp, Texas 75143

**Declare the following equipment conforms to the standard(s) as listed:**

Model: MT-PML & MT-UPM Series
Description: Overhead & Pad Mounted Distribution Transformers

The MT-PML & MT-UPM series complies with the below standards set forth by the listed Association's requirements. Purchased and manufactured components are evaluated to Larson Electronics LLC Quality Control Management system per ISO 9001:2015. This certification applies to all specimens manufactured in accordance to the manufacture's drawings and options configured per the specification data sheet.

**Evaluated Standards:**

- **ANSI C12.1 (2014; E2016)**: Electric Meters - Code for Electricity Metering
- **ANSI C12.10 (2011):** Physical Aspects of Watthour Meters - Safety Standards
- **ANSI C12.7 (2014):** Requirements for Watthour Meter Sockets
- **ASTM A240/A240M (2020a):** Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
- **ASTM D117 (2018)**: Standard Guide for Sampling, Test Methods, and Specifications for Electrical Insulating Liquids
- **ASTM D1535 (2014; R2018):** Standard Practice for Specifying Color by the Munsell System
- **ASTM D3487 (2016; E2017):** Standard Specification for Mineral Insulating Oil Used in Electrical Apparatus
- **ASTM D6871 (2017):** Standard Specification for Natural (Vegetable Oil) Ester Fluids Used in Electrical Apparatus
- **ASTM D877/D877M (2019):** Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes
- **ASTM D92 (2012a):** Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
- **ASTM D97 (2017b):** Standard Test Method for Pour Point of Petroleum Products
- **D4059-00 (2018):** Standard Specifications for Analysis of Polychlorinated Biphenyls in Mineral Insulating Oils By Gas Chromatography.
- **EPA 712-C-98-075 (1998):** Fate, Transport and Transformation Test Guidelines - OPPTS 835.3100- "Aerobic Aquatic Biodegradation"
- **EPA 821-R-02-012 (2002):** Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms
- **IEEE C57.106-1991 (R1998):** Guide for Acceptance and Maintenance of Insulating Oil in Equipment.
- **IEEE 386 (2016):** Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV
- **IEEE C2 (2017; E2017; INT 2017):** National Electrical Safety Code


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- **IEEE C37.47 (2011):** Standard for High Voltage Distribution Class Current-Limiting Type Fuses and Fuse Disconnecting Switches
- **IEEE C57.12.00 (2015):** General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
- **IEEE C57.12.25 (1990):** Requirements for Pad-Mounted Compartmental-Type Single-Phase Distribution Transformers with Separable Insulated High-Voltage Connectors, High-Voltage, 34500 Grd. Y/19920 Volts and Below; Low Voltage, 240/120; 167 KVA and Smaller.
- **IEEE C57.12.28 (2014):** Standard for Pad-Mounted Equipment - Enclosure Integrity
- **IEEE C57.12.29 (2014):** Standard for Pad-Mounted Equipment - Enclosure Integrity for Coastal Environments
- **IEEE C57.12.34 (2015):** Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 10 MVA and Smaller; High Voltage, 34.5 kV Nominal System Voltage and Below; Low Voltage, 15 kV Nominal System Voltage and Below
- **IEEE C57.12.38 (2014):** Standard for Pad-Mounted-Type, Self-Cooled, Single-Phase Distribution Transformers; High Voltage, 34 500 GrdY/19 920 V and Below, Low Voltage, 240/120 V; 167 kVA and Smaller
- **IEEE C57.12.70 (2020):** Terminal Markings And Connections For Distribution And Power Transformers
- **IEEE C57.12.80 (2010):** Standard Terminology for Power and Distribution Transformers
- **IEEE C57.12.90 (2015; C2017):** Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
- **IEEE C57.13 (2016):** Requirements for Instrument Transformers
- **IEEE C57.91 (2011):** Guide for Loading Mineral-Oil-Immersed Transformers
- **IEEE C57.98 (2011):** Guide for Transformer Impulse Tests
- **IEEE C57.106 (2015):** Guide for Acceptance and Maintenance of Insulating Oil in Equipment
- **IEEE C57.109 (2018):** Guide for Liquid-Immersed Transformer Through-Fault-Current Duration
- **IEEE C57.147 (2018):** Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers
- **IEEE C57.154 (2012):** Standard for the Design, Testing, and Application of Liquid-Immersed Distribution, Power, and Regulating Transformers Using High-Temperature Insulation Systems and Operating at Elevated Temperatures
- **IEEE C62.11 (2020):** Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits (>1kV)
- **NARA 10 CFR 431:** Energy Efficiency Program for Certain Commercial and Industrial Equipment
- NEMA 260 (1996; R2004): Safety Labels for Pad-Mounted Switchgear and Transformers Sited in Public Areas
- **NEMA C12.10 (2011):** Physical Aspects of Watthour Meters - Safety Standards
- **NEMA Z535.4 (2011; R2017):** Product Safety Signs and Labels
- **TR-1 (2013):** Transformers, Regulators and Reactors
- **NETA ATS (2021):** Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

Signed for and on behalf of: Larson Electronics, LLC
Place of issue: Kemp, TX

Signature: James Thomas

Name: James Thomas
Position: Operations Manager



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# Certification

Manufacturer: Larson Electronics LLC
Address: 9419 US-HWY 175
Kemp, Texas 75143

**Declare the following equipment conforms to the standard(s) as listed:**

Model: MT-PML, MT-UPM
Description: Liquid Filled Distribution Transformers

**Evaluated Listings:**

**FCC:** Radio Frequency Emission & Authorization Status

The MT-PML and MT-UPM Series of industrial liquid filled power distribution transformers complies with Federal Communications Commission requirements for Radio Frequency Emission & Authorization Status. This product is not capable of emitting rf energy and does not require FCC authorization. This certification applies to all specimens manufactured in accordance to the manufacture's drawings.

Signed for and on behalf of: Larson Electronics, LLC
Place of issue: Kemp, TX

Signature: James Thomas

Name: James Thomas
Position: Operations Manager



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# Frequently Asked Questions (FAQ)

**Q. What type of transformers does Larson Electronics offer?**

A. Larson Electronics offered dry type transformers and liquid filled transformers. For liquid filled transformers, Larson Electronics' offers overhead distribution transformers (utility pole mount), pad mounted distribution transformers (mounts to a concrete pad), pad mounted power transformers, underground submersible distribution transformers, and substation transformers.

**Q. What are the main benefits of a liquid filled transformer?**

A. Liquid filled transformers have higher energy efficiency, durability, short circuit strength, low sound level, lower maintenance costs, and longer useful life expectancy compared to dry type transformers.

**Q. What types of transformer liquids does Larson Electronics use?**

A. Larson Electronics offered mineral oil fluid (ONAN) and biodegradable fluid (KNAN). On request we can provide brand name FR3 fluid or other brand name fluids for additional cost and lead time. All fluids offered by Larson Electronics are non-PCB containing fluids.

**Q. What is the difference between mineral oil (ONAN) and biodegradable fluid (KNAN)?**

A. Mineral oil has a flash point of 147-165°C. Biodegradable insulation fluids have a higher flash point up to 350°C. Using biodegradable fluids reduce the risk of potential fire due to the transformer overheating. Utilizing biodegradable fluids extends the lifespan on the transformer due to better insulation, higher flash point, better moisture resistance, and higher maximum voltage breakdown points over mineral oils.

**Q. What is the difference between FR3 fluid and biodegradable fluid?**

A. Envirotemp FR3 is a brand name of biodegradable ester oils made by Cargill. Cargill is not the only manufacturer of biodegradable ester fluids used for cooling liquid filled transformers. Larson Electronics stocks RAPO biodegradable fluid that exceeds testing for ASTM D6871. Cargill Envirotemp FR3 can be used in substitution of the standard biodegradable fluid. This substitution will increase cost and lead times.

**Q. Do Larson Electronics transformers contain PCB?**

A. All dry-type and liquid filled transformers manufactured by Larson Electronics are PCB (polychlorinated biphenyl) free at the time of shipment. Mixtures of polychlorinated biphenyls (PCB's) were banned commercially for use as transformers cooling fluids in 1977 due to being toxic, bio-accumulative, not at all biodegradable, and difficult to dispose of safely. None of Larson Electronics transformers contain PCB and only use PCB-free fluids.

**Q. What are the transformer ratings?**

A. IEEE Std C57.12.20 (Overhead Type), IEEE Std C57.12.34 (Three-Phase Pad-Mounted Compartmental), IEEE Std C57.12.38 (Single-Phase Pad-Mounted), IEEE Std C57.12.36 (Distribution Substation Transformers). For more detailed list of standards, please see the ASTM Certificate 1 link.

**Q. Is this transformer UL Listed? Is this transformer CSA Listed?**

A. By default, no. The majority of medium voltage transformer installations do not require certification by a Nationally Recognized Testing Laboratory (NRTL) unless being installed inside a building. Medium voltage equipment is built to and complies to ANSI, ASTM, DOE, IEEE, and NETA standards. UL is one of multiple NRTLs per OSHA certification for testing

facilities for USA standards. CSA is one of multiple NRTLs per Canada certification standards. For an additional fee, we can submit your order for NRTL testing after completion of build. This testing service is per order, requires payment of testing fees, and will increase lead time.

**Q. What is the lifespan of a transformer?**

A. The average lifespan of a liquid filled transformer is 25 years. Many transformers will survive past the 25 year mark and are still in service for up to 35 years.

**Q. What is the difference between Loop Feed and Radial Feed?**

A. Radial feed Transformers will have three high voltage bushings (H1, H2, and H3). There is one bushing for each phase to allow for the incoming high voltage cables. On Wye and Grounded Wye connected Transformers, there will also be an H0 bushing. Loop feed Transformers will have six high voltage bushings (H1A, H2A, H3A, H1B, H2B, and H3B). There are two bushings for each phase. This allows the customer to connect all of their Transformers in a loop configuration. It will also allow the customer to bring two feeds to the Transformer. A four position switch can be used to switch between the A feed and the B feed.

**Q. What is the difference between Dead Front and Live Front?**

A. Live-front: The voltage-carrying parts are exposed. Live-front terminations have high voltage connectors, arresters, or fuses are exposed to the operator after cabinet has been opened. Dead-front: Often referred to as dead-front bushings. Safety is enhanced as there are no current-carrying parts exposed to the operator. For overhead distribution transformers and underground submersible transformers, live front is common. For pad mount transformers, the primary is typically dead front and the secondary is live front. Protection barriers can be added to live front pad mounted transformers.

**Q. What is the difference between copper and aluminum windings inside the transformer?**

A. Transformers wound with aluminum or copper wire have similar losses and performance. The choice of using copper or aluminum windings depends upon the application and the individual preferences. The type of winding material does not affect the transformer's reliability. A transformer's life is defined by the life of its insulation system.

**Q. How many BTU's of heat does a transformer generate?**

A. The heat a transformer generates is dependent upon the transformer losses. To determine air conditioning requirements multiply the sum of the full load losses (obtained from factory or test report) of all transformers in the room by 3.41 to obtain the BTUs/hour. For example: A transformer with losses of 2000 watts will generate 6820 BTUs/hour.

**Q. Do you have to ground this transformer?**

A. In most cases the enclosure of the transformer is grounded for safety reasons. However, a transformer will function properly without being grounded. Be sure to research all grounding requirements for your specific application against the NETA and NEC as well as any local electrical codes.

**Q. What types of transformer protection are available?**

A. For over-current protection, Larson Electronics offers Fuses, breakers and interrupters. For over-voltage protection, Larson Electronics offers arresters. Larson Electronics can provide both Primary and Secondary protection equipment.

**Q. What is required for mounting this transformer?**

A. This unit mounts via hanging brackets to a utilty pole. Additional brackets can be purchased for mounting multiple

transformers to a single pole.

**Q. Does my primary and secondary voltage matter for a transformer?**

A. Yes, this matters greatly. For primary voltage, most transformers will be equipped with a tap changer for small primary voltage changes due to voltage drop for losses experienced in the transmission line. Some transformers will be equipped with dual voltage primaries with a voltage selector switch to choose which voltage to operate the transformer on. In both cases, these are designed to provide a steady output voltage. It is very important to confirm what voltage your primary voltage being delivered from the utility provider and what the required electrical voltage for the building or house is. You cannot only provide the KVA size, or the abbreviated primary voltage as there is not standardized voltage across the country and each region can be different. Once manufacturing has started, these cannot be changed.

**Q. Where is the detailed dimensional drawing for this unit?**

A. We can provide a feature drawing that shows accessories and estimated form factor. Due to the variety of options and varying voltages, an exact dimensional drawing for the specific unit you have ordered is not available until after purchase and engineering has completed the drawing for your sales order. We do not offer completed detailed engineered drawings before purchase. The feature drawings are detailed enough for concrete pad designs and preliminary engineering site designs.

**Q. What is the warranty of this transformer?**

A. 12 months from point of connecting electrical service to the transformer or 18 months from point of ordering, whichever comes first.

**Q. Can this transformer be customized?**

A. Yes, Larson Electronics allows for customization of all transformers. Please send customization requests to sales@larsonelectronics.com. If you have an engineered specification or engineered drawings, please provide those at the time of request.