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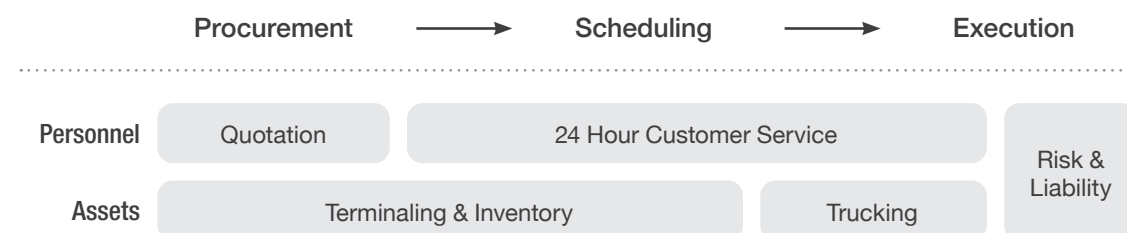
# Transformer Field Fills

## Introduction

While the majority of electrical transformers are filled with insulating liquid at the plant where they are manufactured, units built overseas or those simply too large to transport fully loaded with insulating liquid are filled in the field at their final installed location. The process of efficiently coordinating and executing a field fill is complex, and poor execution can incur both time and financial penalties. Manufacturers and suppliers of insulating oil work in tandem to coordinate delivery and filling in the field. **Although the transformer oil delivered to the site is identical to the one found at the plant, the service level, assets involved, and variable risks combine to make field fills costlier than traditional purchases of insulating oil.**

## Service of Field Fills

The primary difference between plant and field fills is the service components necessary to consistently deliver prompt and reliable responsiveness to customer requests. The ability to mobilize large volumes of material quickly and coordinate the delivery to an unfamiliar location at an exact time, all the while ensuring that a sensitive product is protected and retains its performance characteristics, is the very definition of service. **Accurate and open communication between the producer, the purchaser, and the installer are vital to field fills being successfully completed as planned.**





## Field Fill Infrastructure

### Quotations

Despite having sufficient time during construction to procure insulating oil and arrange for its delivery, obtaining current material and delivery costs are often left undone until the manufacturer is preparing to ship the transformer to its final destination. The need for quick turnaround increases the importance of prompt pricing responses so that sourcing and scheduling decisions can be finalized because, literally, every hour counts in this phase. A customer's ability to make timely decisions is greatly improved when dealing with a supplier able to provide dedicated contacts focused on responding to customer requests within 24 hours.

### Customer Service

Installations do occur every day of the week and at all hours of the day. Jobsite and transformer conditions along with weather dynamics can impact the scheduled delivery and processing of oil. Unpredictable changes to the schedule are commonplace, and financial penalties can accrue quickly as a result. Should the need arise, a supplier offering access to 24-hour live customer service offers customers the best possible chance to respond to unexpected changes to orders or delivery.

### Material Inventory

Installations occur across the country and with little to no predictable pattern. Suppliers with a significant investment in product inventory levels in multiple locations offer the ability to schedule deliveries from terminals close to installation sites, reducing the time from order to delivery as well as a lower total delivered cost for the product.

### Trucking Inventory

The utilization rate for trucks dedicated to hauling insulating oil hovers around 100%, and instances of equipment malfunction or driver availability are inevitable and can cause unexpected delays. Investment in a large enough fleet of dedicated trucks that can be called upon to fulfill orders and scheduling commitments as needed provides customers another layer of protection against costly delays related to delivery.

### Risk Premium

No two installations are the same, and variations may include physical jobsite conditions, installation crew experience, congestion amongst multiple contractors, weather, and the time of day when a delivery occurs. Suppliers are responsible for maintaining the quality of the product and the safety of the trucking equipment until it has been transferred. These unpredictable factors add a level of risk that suppliers must measure, quantify, and accept.

## Field Fill Execution

### Site Contact

Requiring the purchaser to identify a site contact with accurate contact information allows the supplier to promptly establish communication with the site to confirm details and to finalize delivery. This step is critical to completing field fills successfully. Often, purchase orders are produced at remote locations by people with limited understanding of the exact needs on site. Adjustments at the site could include the quantity of oil required, the amount of time necessary to stage deliveries, or firsthand directions to the site location. Making contact and confirming these order details should be completed prior to scheduling trucks for loading and delivery. **There is no substitute for the information provided by those who have their eyes on the unit in the field.**

### Material Loading

All insulating oil is loaded at a terminal before being delivered via semi-truck. Safety regulations limit the amount of time a driver can remain active, sometimes causing trucks to be loaded days in advance of requested delivery times. Before trucking assets are mobilized to the terminal, confirmation from the site contact must be made to ensure that there have been no unexpected changes on site. Material will not be loaded until confirmation has been received from the designated site contact. It is very common for an unexpected delay on site to not be communicated to the insulating oil supplier. **Obtaining a final confirmation from the designated sight contact before material is loaded into trucks for transport helps ensure the material is delivered when expected, avoiding the expense of demurrage for trucks waiting on site to offload insulating oil.**

### Material Unloading

Transformers are installed every day of the year and at all hours of the day. Each utility, manufacturer, and third-party service provider may have their own procedures related to how quickly oil is offloaded at site, so deliveries are usually staged at staggered intervals. Quotations will outline the amount of time allowed to offload material before the trucking company will begin to collect demurrage. **The allotted offloading time will begin to count either at the moment of the requested delivery or once the material has been touched, whichever occurs first.**

### Material Testing

Occasionally, end users require specific tests be performed on insulating oil before it is processed and put into the transformer. These tests are sometimes performed on site, and other times samples are collected and sent to a third-party lab for analysis. Depending on the proximity of the lab and the exact tests being performed, this process can take a matter of hours or several days. During these periods of time, the material will remain inside the trailers, and demurrage will be collected. **Any effort to minimize the amount of time collecting demurrage on site is encouraged so that the trucking assets can deliver material quickly and return to the terminal to prepare for the next project.**

### Unused Material

The amount of product ordered and delivered to project site is determined by the purchaser alone. Occasionally, the calculations are in excess of the actual needs and result in unused product being left in the delivery truck. Purchasers have the option to either take possession of the unused material, which is sometimes off-loaded into smaller storage vessels, or to shift the burden of disposal to the producer. **This material has no alternative value to the producer because of the possibility of contamination and is disposed of at the trucking company's convenience.**

## Summary

The coordination of delivering thousands of gallons of highly sensitive insulating liquid to unfamiliar locations at specifically requested times is a complicated service. While the product delivered to a field site is the same as what is delivered to the manufacturing facility, the service level required to coordinate and deliver on site requires an infrastructure of both people and assets to accomplish it consistently. When the service aspect is not performed as expected, the results can incur penalties of both time and money. **The evaluation of insulating oil suppliers should include a review of the service model, the infrastructure in place to support field fills, and a financial evaluation that includes the control of product quality, dependability, and the total delivered cost.**