LET'S BE PACIFIC™

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Another Large Transformer for a Special Rectifier Application

In this newsletter you will be reading about another transformer built by Federal Pacific that exceeds **7000 kVA**. Previously in April of 2010 Federal Pacific shipped a 24 pulse rectifier transformer rated 7000 kVA. A year later in 2011 we shipped a larger two winding transformer, that was rated 7500/9988 kVA. This transformer was the largest that could be transported over road by motor carrier.

Now we're proud to let you know that we have just shipped four 7500/10000 kVA transformers having a HV rating of 23,900 volts and a LV rating of 3150 volts.

As we proceeded to quote and build this transformer, we encountered some interesting requirements.

First, the transformer would be stepping down a 23 kV distribution voltage system to roughly 3 kV to feed power into a variable speed drive connected to a dynamometer designed for supplying the torque and forces to simulate the mechanical stresses that a large wind turbine must withstand.

The second requirement presented us our biggest challenge. To provide a reduction in short circuit forces that the transformer would encounter, the impedance on a 10 MVA base needed to be approximately 36%. We could easily design the transformer with a 12% impedance. After considerable research, it was decided that we would achieve the additional 24% impedance needed by inserting a reactor into the secondary circuit serving the load.

Figure 1. 7500/10000 kVA Transformer

This led us to a *completely new product offering*, namely a very large medium voltage reactor, which is shown in Figures 2 and 3. This reactor is designed to be connected in series between the main transformer secondary and the variable speed drive.

To better understand how we met the needed 36% impedance on a 10 MVA base, let's look at some calculations referred to the low voltage side of the transformer.

FL Secondary amps	= 1833 A
Base Voltage V_{base}	= 1819 Volts
The base $Z_{Secondary}$	= 0.9923 ohms
Actual $Z_{Transformer}$	= 0.1191 ohms
Actual $Z_{Reactor}$	= 0.262 ohms
Inductance $_{Reactor}$	= 696 µ henries
$\%IZ_{Reactor}$	= 26.4%
$\%IZ_{Trans}$	= 9.63%
$\%IZ_{Trans + Reactor}$	= 36.03%

The values shown above are calculated per standard transformer engineering reference books; and as you can observe Federal Pacific essentially provided almost precisely what the customer wanted to limit the fault current to values that would not cause damage to the transformer or the other system components.

Federal Pacific is very proud of the transformer and reactor system provided for this application. We are especially confident that we can furnish your LV and MV reactor requirements having very nearly the precise values for the applications that are being installed.

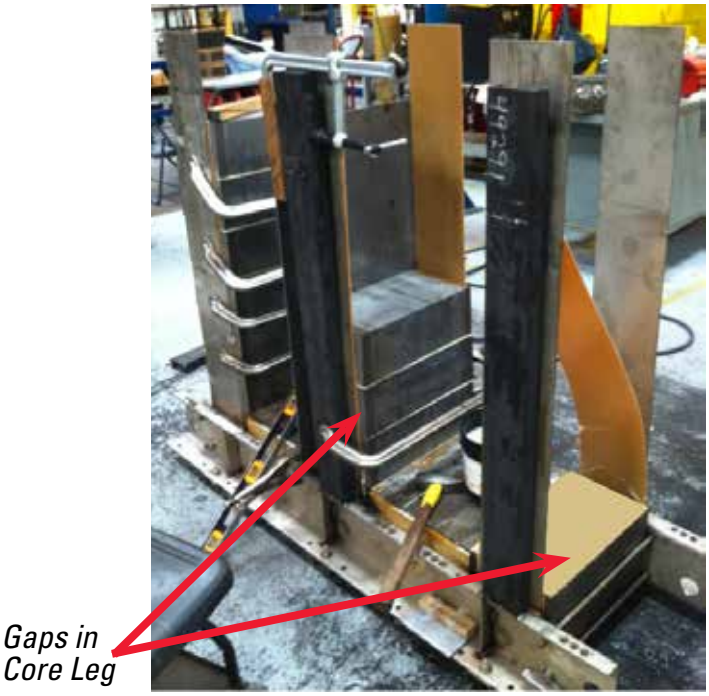

Figure 2

Figure 3