

---

# **Advanced Vacuum Pressure Impregnation (VPI) System**

---



Solidstate Controls Incorporated  
875 Dearborn Drive  
Columbus, Ohio 43085  
Tel : (614) 846-7500  
Fax: (614) 885-3990

# Advanced Vacuum Pressure Impregnation (VPI) System

## Abstract

During normal operation, transformers are subjected to the failure of the insulation system. How long an insulation system will be serviceable depends on the materials chosen and the service environment. Thermal, mechanical, voltage and environmental stresses all combine to reduce the service life of the transformer.

Solidstate Controls, Inc. (SCI) manufactures all of its transformers using the Vacuum Pressure Impregnation (VPI) process. This system strengthens the insulation system and extends the service life of the transformer. The VPI process is the most advanced system in use today.

The VPI process is the most effective way known to eliminate the dead air spaces that cause hot spots within the transformer coils. These hot spots can be 20\* higher than the average coil temperature. The VPI process, along with a good resin, provides a low thermal resistance path that lowers the average operating temperature of the transformer.

During the VPI process, the resin seals the transformer against environmental conditions and bonds all components of the insulation system together for good mechanical strength. This is very effective in reducing mechanical vibrations. This greatly reduces the audible noise level of the transformer.

The VPI process and resin also enhances the dielectric capability between windings and between the windings and ground. This allows the transformer to survive higher voltage stress levels without failure.

SCI follows strict procedures during the VPI process to obtain a consistently high quality product. Each stage of the process is monitored and records are maintained. A brief description of the VPI process that SCI follows in the manufacture of its transformers is as follows:

1. Transformers are placed in the vacuum chamber and a vacuum pulled to a minimum of two torr and held for 20 minutes.
2. The resin is then allowed to flow into the chamber until the transformers are completely covered. The vacuum is maintained at two torr for a minimum of 20 minutes.
3. The vacuum is then released and the chamber is allowed to pressurize to one atmosphere for a minimum of 20 minutes.
4. Transformers are then removed from the chamber and placed in the bake oven for 12 to 14 hours at 150°C.