



Voltage Regulator Process Workflow

- Coil Winding
- Lace and Clamp
- Internal Assembly
- Metal Fab
- Tank and Oil
- Control Finish Assembly
- Electrical Test
- Final Paint
- Regulator Sign-Off

Paper Market

- The process start with the preparation of the coil kits, (ducts, end strips, winding forms, tubes) proceed to prepare the kits.



Coil Winding

- Machine & Mandril setup
- Coil winding
- Paddle Welding



Compression Bounding & Oven

- Compression bounding using a press machine
- Heat treatment



Cable Welding

- The final step is to ensure that the cables are welded and covered with tape



COIL WINDING MATERIAL PICTURES



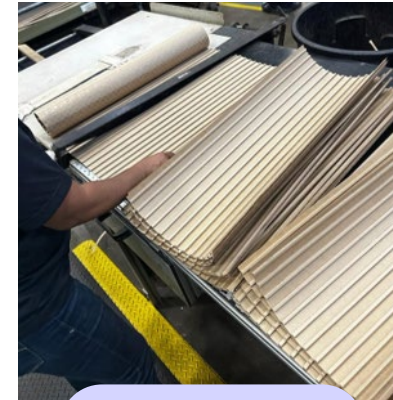
Forms



Paper



End Strips



End Ducts



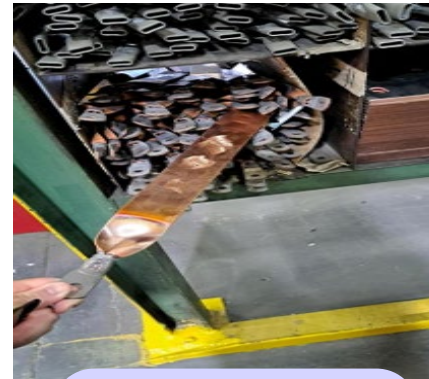
Tubes Insulation



Coil Strip



Aluminum Paddle



Copper Paddle



Braid Cable

Coil – Core Assembly

1. Cores & Coil setup
2. Start to lacing core stacks on a coil
3. Core ground install
4. Final coil band wrap



Clamp Fabrication

1. Laser cut of metal sheets
2. Bending process
3. Bending process inspection



Clamp Assembly

1. Top clamp & bolt installation
2. Bottom & End clamps mounting
3. Holes alignment & bolt tightened
4. Clamp angle installation



LACE & CLAMP MATERIAL PICTURES



Core



Coil



Ground



Steel Bands



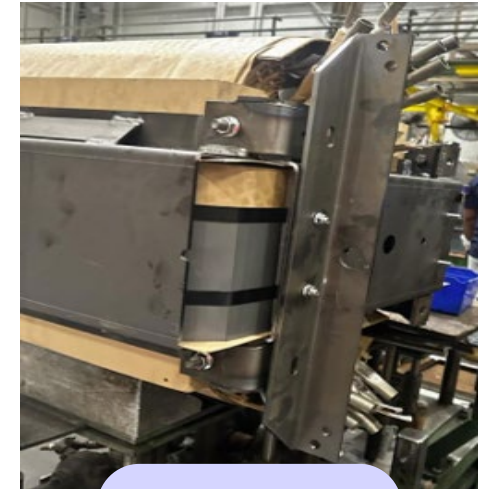
Steel Sheets



Top Clamp



Bottom & End Clamps



Angle Clamp

GENERAL PROCESS OVERVIEW

Switch
Preparation &
Cut Leads

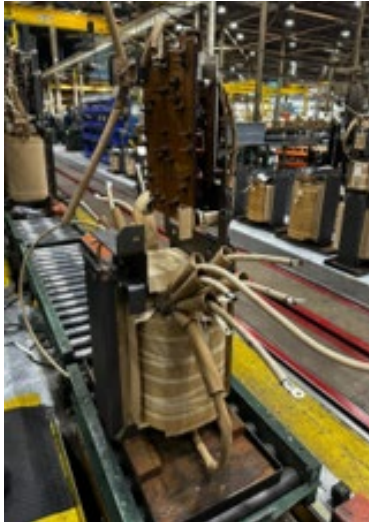
Crimp Leads &
Mount Switch

Route Switch
Leads

Connect
Reactor

Connect PT &
Bushing Leads

Testing &
Diagnostics



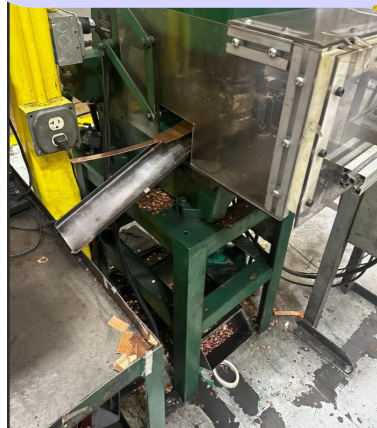
Switch Preparation & Cut Leads

Crimp Leads & Mount Switch

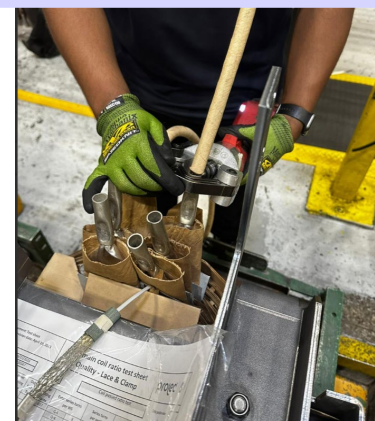
Tap straps from copper are unrolled



Tap straps from copper are cut



Tap straps are crimped to the coil leads



Result



Route Switch Leads

Switch is mounted, and coil leads are connected



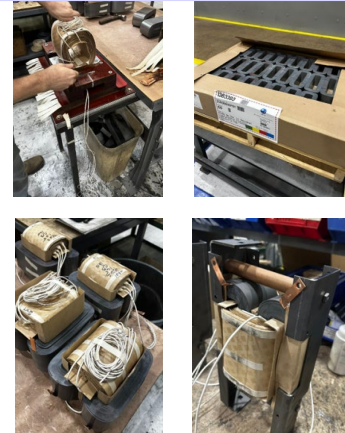
Connect Reactor

Reactor is mounted and connected to the switch and the coil leads.



Connect PT & Bushing Leads

Make the fully assembly of the PT, mount to the IA and connect it.



Testing & Diagnostics

Connect the bushing leads and set it for testing.



Metal Fab – Casing

The metal sheets arrive to the area and are classified according their dimensions.



The sheet metal is moved with a crane and place it on the laser marking machine bed.



After the laser process, the sheets are placed ready with the marks & holes.



Connect the bushing leads and set it for testing.



VR Process Workflow – Metal Fab – Radiator

Material unrolled



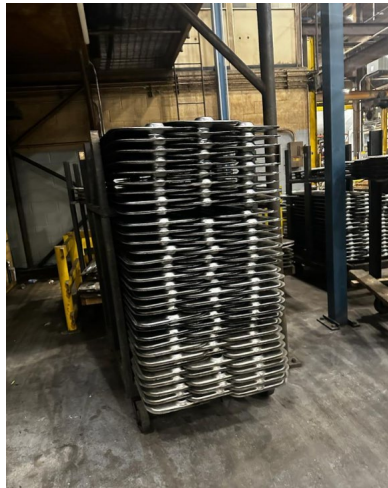
Press Punches the Pattern



After washing



Stacked



Metal Fabrication – Tank Weld

Tank Roller Machine



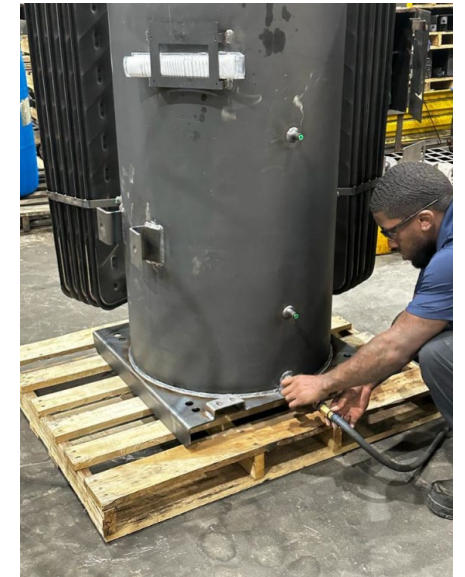
Diameter of the tank is measured



Tank is welded to the base



Leak test



All the parts needed for the Cover fabrication are done in different workstations separate as below:

Cover



Elbow



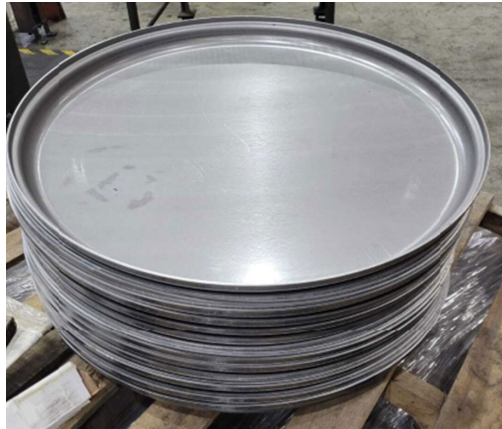
Lifting Bars



Welding



Cover Blank material received and gets the shape with a punching process



It gets all the required punching holes for bushings, lugs, handhole and PI



Elbow is assembled on a different area and welded to the cover



Cover Assembly is painted and ready for next area



- Required cover assembly is selected, to start the assembly.



- Bushing assemblies are mounted to the cover.



- CT is installed.



- When the cover is ready, the operator takes it with a crane by the lifting lugs and this help him to connect the leads to the bushings. The uprights are mounted too.

- Once all the leads and cables are of the IA are connected to the Cover & PI, the next step is put the IA & Cov inside the tank, the tank should be already painted and with the accessories.



Crane & Lifting Lugs

Leads to Bushings



Control Final Assembly

Operator receives boxes with all needed for the control assembly.

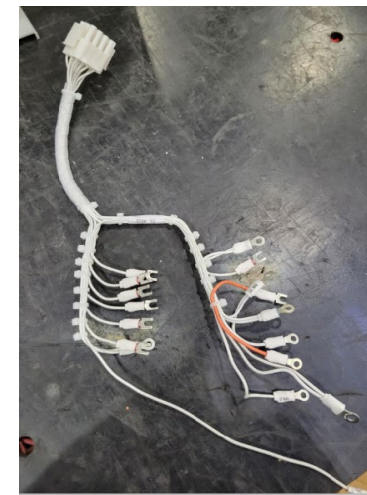
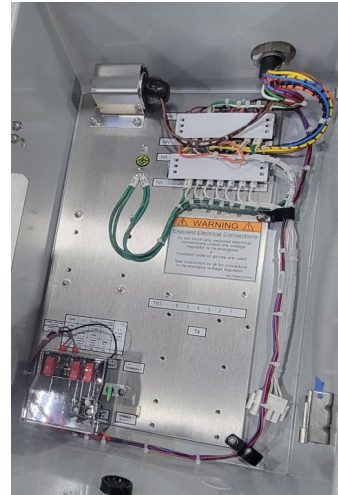
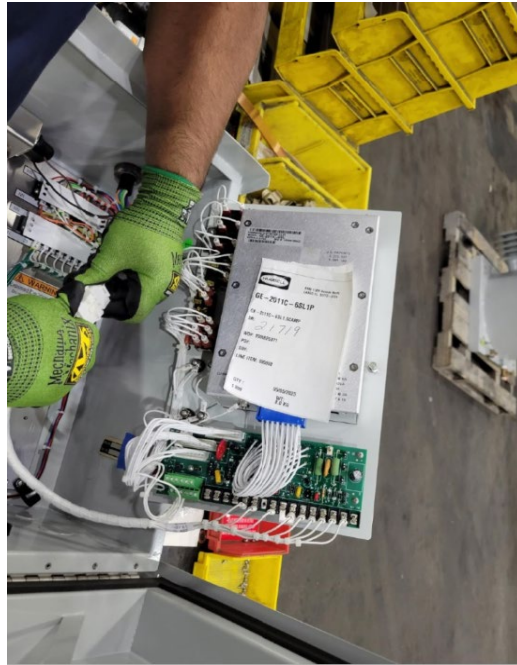
1. Control Cabinet
2. Cable
3. Control module

- Ground is installed in the side of the Cabinet.



- Module is installed inside the Cabinet and harness is connected.

An extra harness that comes with the module is discarded because the connections are already done inside the cabinet.



- The first thing the operator checks is that the Oil Level is correct and that the Dial is connected at the correct position (for Type A – 16L and for the Type B – 16R).



- Routine tests are divided in LV & HV area.
- It is evaluated that the regulator pass all the test successfully per IEEE C57.15 Routine Test, fully described on the Test Section in this document.

- The painting of the Cover Asm and outside of the Tank are completed by suppliers and the painting inside of the Tank is made in-house Prolec GE.



- After the mix of the paint is ready, the operator prepares himself with proper PPE (Personal Protective Equipment).



Regulator Sign Off

- At this stage, units have already passed through Electrical Tests. After passing through this area, units are completed done ready for shipping.
- Format “Regulator Final Inspection” sheet must be check and fill.

Regulator Final Inspection Serial Number Q814841

Regulator Final Inspection

Purchased Part Tracking
Switch Serial No. HM2-0804-23

Serial No.	Model No.
<u>022806</u>	<u>8105M449G20</u>
<u>21694</u>	<u>GE-211C</u>

Control Box Serial No. 2305-0031

Control Module

Final Indicator Serial No.

Entered above items on-line? YES OR NO

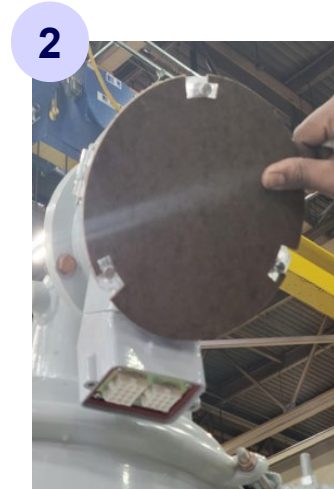
CTQ's

Has ECN been issued?	<input checked="" type="checkbox"/> YES OR NO
Electrical Test Complete?	<input checked="" type="checkbox"/> YES OR NO
Does the Paint Appearance meet the Spec (WI-08-14-21)?	<input checked="" type="checkbox"/> YES OR NO
Drain Valve: correct per outline / EN	<input checked="" type="checkbox"/> YES OR NO
Drain Valve: (run finger underneath drain where connects to pipe)	<input checked="" type="checkbox"/> YES OR NO
Orange Jumper Connection per Nameplate?	<input checked="" type="checkbox"/> YES OR NO
Cable Connections per Wiring diagram?	<input checked="" type="checkbox"/> YES OR NO
Are All Terminal Board Connections Tight?	<input checked="" type="checkbox"/> YES OR NO
Books & Diagram per EN?	<input checked="" type="checkbox"/> YES OR NO
Control Box & Dial Operate OK?	<input checked="" type="checkbox"/> YES OR NO
Witness mark added to cover band bolt	<input checked="" type="checkbox"/> YES OR NO
Control Box Mounting Height per Outline?	<input checked="" type="checkbox"/> YES OR NO
Shrink Wrapping for Control Box Cable Required?	<input checked="" type="checkbox"/> YES OR NO
If Yes, is the Shrink Wrapping Done Properly?	<input checked="" type="checkbox"/> YES OR NO
Accessories OK per Dwg & EN?	<input checked="" type="checkbox"/> YES OR NO
Is customer Bri-Tech?	<input checked="" type="checkbox"/> COMPLETE OR NO
If YES, complete Bri-Tech Sign-off sheet (FM-06-0C-04) also	<input checked="" type="checkbox"/> YES OR NO
Is customer GE Canada?	<input checked="" type="checkbox"/> COMPLETE OR NO
If YES, complete GE Canada Sign-off sheet (FM-08-0C-08) also	<input checked="" type="checkbox"/> YES OR NO
Is customer PacifiCorp or Virginia Power?	<input checked="" type="checkbox"/> YES OR NO
If YES, ensure Equipment number is on nameplate	<input checked="" type="checkbox"/> YES OR NO
Have all D-track entries been closed for this serial number?	<input checked="" type="checkbox"/> YES OR NO

Equip No. N/A

Sign-Off Approved

19993 12/4/22



1. Sign off labels
2. Place the Dial Cover – PI.
3. Zip Tie cabinet.
 - Unit is ready for Shipping Area.