



IB-8000B Nonsegregated-Phase Bus

600V to 38kV, 1200A to 4000A



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 **WARNING**

THE EQUIPMENT DESCRIBED IN THIS DOCUMENT CONTAINS HIGH VOLTAGES AND CURRENTS WHICH CAN CAUSE SERIOUS INJURY OR DEATH.

THE EQUIPMENT IS DESIGNED FOR USE, INSTALLATION, AND MAINTENANCE BY KNOWLEDGEABLE USERS OF SUCH EQUIPMENT HAVING EXPERIENCE AND TRAINING IN THE FIELD OF HIGH VOLTAGE ELECTRICITY. THIS DOCUMENT, AND ALL OTHER DOCUMENTATION SHALL BE FULLY READ, UNDERSTOOD, AND ALL WARNINGS AND CAUTIONS SHALL BE ABIDED BY.

IF THERE ARE ANY DISCREPANCIES OR QUESTIONS, THE USER SHALL CONTACT POWELL ELECTRICAL MANUFACTURING COMPANY IMMEDIATELY AT 1-800-480-7273.

 **WARNING**

BEFORE ANY ADJUSTMENT, SERVICING, PARTS REPLACEMENT, OR ANY OTHER ACT IS PERFORMED REQUIRING PHYSICAL CONTACT WITH THE ELECTRICAL WORKING COMPONENTS OR WIRING OF THE EQUIPMENT DESCRIBED IN THIS DOCUMENT, THE POWER SUPPLY MUST BE DISCONNECTED. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN INJURY OR DEATH.

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I. INTRODUCTION

Before installing the bus, study this manual and the drawings furnished with the bus. Because bus is highly variable equipment, custom designed for the particular application, these instructions nor the drawings are complete without reference to the other. Follow the recommended procedure for putting into service.

This manual contains:

- 1) Safety Rules.
- 2) A general description of the bus.
- 3) Instructions for putting into service.
- 4) Instructions for maintenance.

These instructions do not purport to cover all details or variations of bus, nor to provide for every possible contingency or hazard to be met in connection with further information be desired or should particular problems arise which are not covered sufficiently for the user's purposes, the matter should be referred to Powell.

II. SAFETY

The bus described in this manual, when in service, will be energized by voltages which will cause severe injury or death if contacted. To insure the safety of personnel associated with the installation, operation and maintenance of bus, the following rules should be observed:

- 1) Only qualified personnel trained in the installation, operation and maintenance of electrical power equipment should be allowed to work on this bus.

- 2) Do not work on an energized bus.
- 3) Do not climb on, walk on or sit on the bus. It is not designed to support the weight of a person.
- 4) Do not use the bus for support of other equipment. It is not designed to support this extra weight.
- 5) For the safety of personnel performing maintenance operations on the bus or on connected equipment, all components should be disconnected by means of a visible break and securely grounded.
- 6) See additional safety precautions in the sections headed "HANDLING" and "INSTALLATION".

III. DESCRIPTION

The bus covered by these instructions is non segregated phase bus designed, built and tested in accordance with ANSI/IEEE Standard C37.23-2003, *IEEE Guide for Metal-Enclosed Bus and Calculating Losses in Isolated Phase Bus*. This standard defines metal-enclosed bus as "An assembly of conductors with associated connections, joints, and insulating supports within a grounded metal enclosure. The conductors may be either rigid or flexible." It further defines nonsegregated phase bus as "One in which all phase conductors are in a common metal enclosure without barriers between the phases."

Bus is normally used to connect two pieces of electrical power equipment, such as two units of metal-enclosed switchgear, a transformer and a switchgear unit, a large rotating machine and a switchgear unit, or a large rotating machine and a transformer. The bus may be located either indoors or outdoors, or a single run of bus may pass from indoors to outdoors one or more times.

Standard ratings of bus are listed in Table 1. Other ratings are available when required.

The standard enclosure of Powell bus for ratings less than 3000A continuous current has sides and bottom made of steel, with the top being aluminum. Higher ratings normally have all aluminum enclosures. All aluminum enclosures are available for lower ratings if required.

Table 1

Standard Bus Ratings				
Rated Voltage kV	BIL kV	60Hz Hipot kV	dc Hipot kV*	Continuous Current Amperes
0.635	---	2.2	3.1	1200, 1600, 3000, 4000
4.76	60	19.0	27.0	1200, 2000, 3000
15.0	95	36.0	50.0	1200, 2000, 3000
25.8	125	60.0	85.0	1200, 2000
38.0	150	80.0	---	1200, 2000

* The presence of the column headed "dc Hipot" does not imply any requirement for a dc withstand test on ac equipment. This column is given as a reference only for those using dc tests and represents values believed to be appropriate and approximately equivalent to the corresponding power frequency withstand test values specified for each class of bus.

The conductors in Powell bus are usually solid rectangular copper bars with full rounded edges, although in higher ratings round or square tubes may be used. At connections to apparatus bushings, flexible connectors are used to avoid placing undue strain on the bushings. For bus rated 4.76kV and above, the conductors are insulated. The conductors in bus rated 635V are normally uninsulated, but may be insulated on request.

The conductors in Powell bus are usually supported by milled slabs of glass-reinforced polyester laminate,

with or without inserts of either cycloaliphatic epoxy or porcelain. See Figure 1 for a cross section of this style of bus. Alternate methods of support are supports of molded glass-reinforced polyester (Figure 2) or standoff insulators of glass-reinforced polyester, cycloaliphatic epoxy or porcelain (Figure 3). Refer to the drawings provided with the bus for detailed cross sections, including dimensions.

Space heaters are furnished in all outdoor bus rated 5kV and above, and may be furnished in other bus when required. These heaters are designed to minimize condensation in the bus by keeping the air inside the bus at a temperature above the dew point. Special heaters designed to operate at a low surface temperature are furnished to insure a long life for the heater elements. These heaters may be furnished with thermostatic control on request.

Illustration 1: Typical Cross Section Bus with Polyester Glass Bus Supports

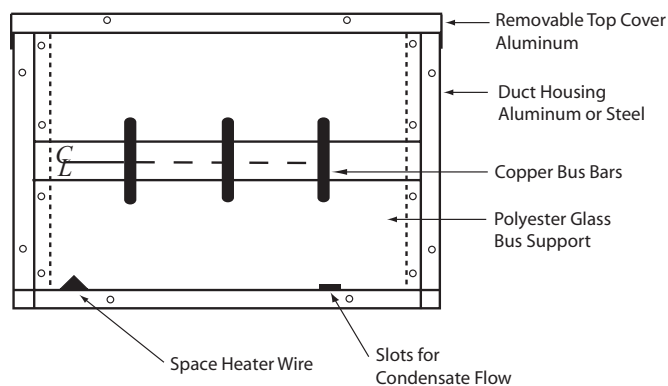


Illustration 2: Typical Cross Section Bus with Molded Bus Supports

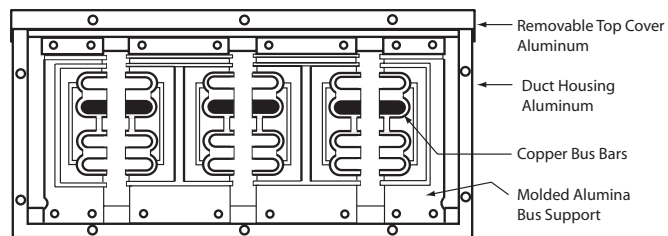
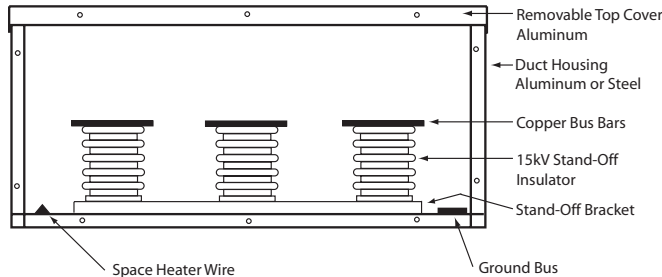


Illustration 3: Typical Cross Section Bus with Porcelain Standoff Bus Supports



In addition to the items described in the definition of non segregated phase bus, bus frequently includes other special features such as vapor barriers, fire barriers, or termination sections to match switchgear, transformers, or rotating machines. The bus or the termination section may include such items as removable links in the conductors, current transformers, voltage transformers, surge arresters or surge capacitors, if required by the installation.

Bus is not self-supporting, but must be supported at installation. Indoor bus is normally supported by hanging from the ceiling, but may also be supported from floors or walls or from other pieces of equipment, such as switchgear units. Outdoor bus are normally supported from the ground. Supports for bus sections are normally furnished by the user or the installing contractor, but may be included with the bus when specified. See the section headed "INSTALLATION" for further information on bus supports.

IV. RECEIVING, UNPACKING HANDLING AND STORAGE

A. RECEIVING

When the bus is received, unpack it sufficiently to inspect it for concealed damage and to determine that the shipment is complete and correct. If damage is found or suspected, file claims as soon as possible with the transportation company, and notify the nearest representative of Powell.

B. UNPACKING

- 1) Carefully unpack all sections of the bus. To avoid damage to the bus, band cutters should be used on all banding securing the packages and nail pullers should be used for unpacking wooden crates.
- 2) Carefully remove any support blocks or other temporary fasteners which may have been used for shipping.
- 3) If the bus is not to be installed immediately, save all packing and wrapping materials for reuse while the bus is in storage.

C. HANDLING

To help avoid personal injury and equipment damage during handling, and to facilitate moving the bus sections and fittings at the job site, follow these guidelines:

- 1) Bus sections are quite heavy, weighing up to several hundred pounds per section. To avoid personal injury, do not attempt to lift, carry, or otherwise move bus sections by hand. Use appropriate mechanical means to handle bus. Be sure that the handling equipment used is capable of safely handling the bus sections.
- 2) Handle bus with care to avoid damage to internal components. Avoid subjecting bus to twisting, denting, impact, and any rough handling. Avoid damaging protruding objects such as flanges, drain and vent fittings, heater boxes, etc.
- 3) When setting bus sections on the ground or on a floor, the main body of the enclosure should be set on a support to protect flanges and other protruding objects. A short length of 2"x4" or 4"x4" lumber makes a good support.

- 4) Do not drag bus sections across the floor or the ground.
 - 5) Do not use bus bar ends for lifting bus sections or fittings. Lift only the bus enclosure, using support means such as slings or lift truck forks which extend under the full width of the enclosure.
 - 6) Keep the bus enclosure level when lifting. Unsecured bus bar may slide out of its insulating sleeve or supports if the enclosure is tilted during lifting.
 - 7) If a section of bus must be lifted vertically, be sure that the bus bars are secured to the housing to prevent sliding.
 - 8) Platform dollies provide a simple method of moving bus on one floor level if there is little or no incline. Balance the load carefully and secure it to the dolly.
 - 9) If a crane is used to install bus, use nylon straps and distribute or balance the weight of each lift. If cables are used, spreaders should be used to avoid damage to metal housing. Lifting straps and cables must have sufficient strength to hold the load of the section to be lifted.
 - 10) If a fork or similar hoist is used, properly position the bus enclosure on the forks to distribute its weight. Secure the load to the forks while lifting.
- 2) Bus sections should not be stored outdoors because of possible moisture damage. If bus must be stored outdoors, it must be securely covered for protection from weather and dirt. Temporary electrical heating should be installed beneath the cover to prevent condensation. At least 3 watts per cubic foot is adequate for the average environment. If internal bus heaters are used during storage, remove all combustible materials from the area of the heaters before energizing.
 - 3) Weatherproof bus must be treated exactly the same as indoor bus until after it is installed. It is not weatherproof until completely and properly installed.
 - 4) Do not expose bus sections and fittings to high concentrations of hydrocarbon-based solvent vapors. Such vapors may damage or destroy the bus bar insulation.

D. STORAGE

- 1) To prevent condensation, bus sections and fittings which are not to be installed and energized immediately should be stored in a clean dry space having a moderate, uniform temperature, in the range of 40° - 100°F. Preferably, bus sections should be stored in a heated building having adequate air circulation, and protected from dirt, fumes, water, and physical damage.

V. INSTALLATION

A. ALIGNMENT OF APPARATUS

Before installing a run of bus, carefully check the location of the apparatus to be connected by the bus. The relative location of the two ends of the bus run must be as shown on the bus layout drawing for the bus to fit properly. For a typical bus run of about 20 feet, the relative locations of the two end connections should not deviate from the bus arrangement by more than ½" total. Location of walls which are penetrated by a bus run should also be checked. The center lines of the wall cutout should not deviate from the center lines of the bus run by more than ½", and the location of the wall along the length of the bus run should not deviate from its position on the bus layout drawing by more than ¼ of the thickness of the wall, to insure that vapor barriers fall within the thickness of the wall, where they will be effective.

If the terminal points of the bus are not aligned

within these limits, corrective action must be taken. If at all possible, the apparatus to which the bus connects should be moved so that the alignment is within limits. If this is not possible, contact Powell with all necessary dimensions, so that corrective action can be taken.

Do not rely on flexible connectors at the terminations of a bus to correct misalignment problems beyond the limits given above. Flexible connectors are furnished to limit stress on apparatus terminations caused by thermal expansion and vibration, and to correct very minor (<1/4") misalignments.

Bus must have sufficient horizontal and vertical clearance from walls and ceilings to provide easy access to joints, both for original installation and for maintenance, including the possible removal of a section.

B. INSTALLATION CHECKLIST

This checklist lists the steps necessary for installation of bus in the order in which they should be performed. More detail about many of these steps is given in subsequent sections, which should be reviewed before doing the installation.

- 1) Check the material received, including loose items such as hardware, splice plates, insulating material and gaskets, against the drawings and shipping documents. Notify Powell of any discrepancies.
- 2) Lay out the bus on the ground where it will be installed. See Section C for further details.
- 3) Install gaskets on outdoor flanges as needed. See Section C for further details.
- 4) Lay out the mounting supports for the bus. See Section D for information on required supports.
- 5) Install the bus sections. See Section D for additional information. Temporary support may be needed during the installation process.

- 6) Align the bus sections and bolt the enclosures together. Be sure all outdoor sections are bolted with stainless steel hardware, and that there are gaskets at all outdoor enclosure joints.
- 7) Attach and adjust all bus supports, levelling and plumbing the bus as necessary. See Section D for additional information.
- 8) Remove the covers from the bus if not previously removed.
- 9) Loosely connect all bus joints, installing hardware, splice plates and flexible connectors as shown on the bus drawings. See Section E for additional information.
- 10) Tighten all connections using torque values given in Table II.
- 11) If bus conductors are insulated, insulate joints as necessary. See Section F for further information.
- 12) Connect space heater wiring if required. See Section G for additional information.
- 13) Check all insulation for cleanliness. If necessary, clean with denatured alcohol.
- 14) Replace all covers and tighten cover bolts.

Table II

Bolt Torque Values for Bus		
Bolt Size	Torque, Pound-Feet	Material
1/4" - 20	5 - 7	Steel Copper Aluminum Compound
3/8" - 16	20 - 30	
1/2" - 13	35 - 50	
5/8" - 11	55 - 70	

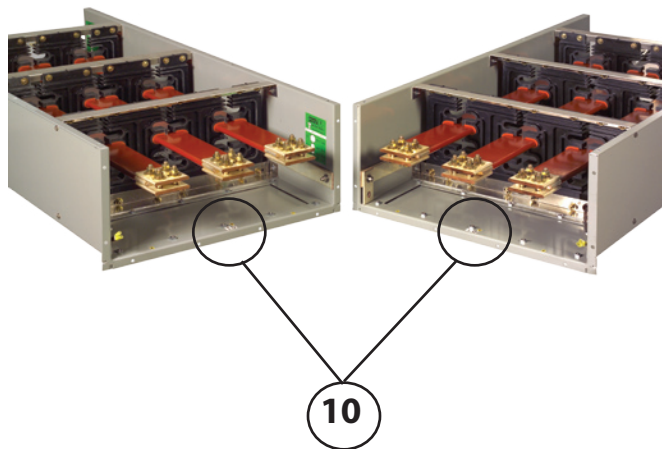
C. PRELIMINARY STEPS

Before installing any section of bus, the entire bus should be laid out on the ground in the same position as the final assembly. Powell bus is marked with alignment numbers to allow for rapid matching and aligning of bus sections. See Illustration 4. These alignment numbers are marked on the Powell arrangement drawings to show how and where each piece of bus should be located. Refer to Powell arrangement drawings for the proper placement of bus. Care should be taken in laying out the bus that the mating numbers are matched and that the layout matches the Powell arrangement drawings.

After the duct has been laid out on the ground the access covers should be removed. The cover provides needed support for handling some larger bus, and should not be removed before this stage of installation.

Install gaskets on one flange of all mating joints in the outdoor section of the bus, including the flange on the cover. This gasket is not installed in the factory in order to prevent damage during shipping and handling.

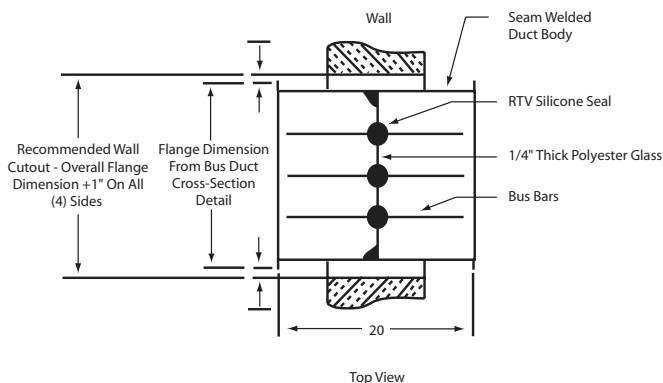
Illustration 4: Bus Section End, Showing Matching Alignment Numbers and Heater Wiring Connections


D. MECHANICAL INSTALLATION AND SUPPORT

After the covers are removed the bus should be lifted into place a section at a time. Each section should be properly supported during assembly and attached to the next piece by finger tightening the flange bolts. Connections of bus bars should not be made at this time.

Wall penetration sections containing fire barriers or vapor barriers must be positioned so that the barrier is within the thickness of the wall it passes through. See Illustration 5. While the wall section may be supported temporarily by the lower part of the wall flange, do not complete the installation of the wall flange at this time.

Illustration 5: Typical Bus Wall Section with Vapor Barrier



Bus runs are not self-supporting, and must be properly supported for trouble-free service. Some bus runs, such as those connecting switchgear lineups located close to each other, may be completely supported from the apparatus at the ends of the run. Other runs of bus, even though receiving some support from apparatus at the ends of the run and from wall penetrations, will require additional support.

All bus should be supported every ten feet with no more than two joints between supports. Extra supports should be used at all corners. Apparatus at the ends of bus runs should be checked to be sure that it can carry the weight of the attached bus without difficulty. If it cannot, the bus should be supported separately as close to the termination as possible.

Supports for indoor bus may be either from the floor or from above. Outdoor bus are normally supported from below. Powell bus normally will be furnished with angle clips attached to the bus body for the attachment of supports. The location of these clips will show on the bus layout drawing, and may be adjusted to meet the user's needs on request. Unless required by the purchase order, Powell will not supply the supports, so they must be supplied by either the user or the installing contractor. A typical design for a support from beneath the bus is shown in Illustration 6 and a typical design for a hanging support is shown in Illustration 7.

Illustration 7: Typical Hanging Bus Support

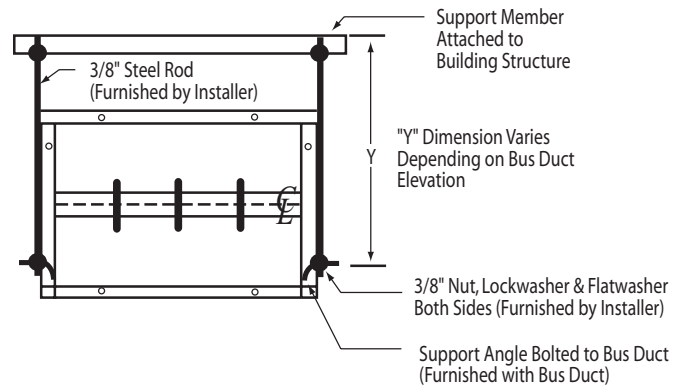
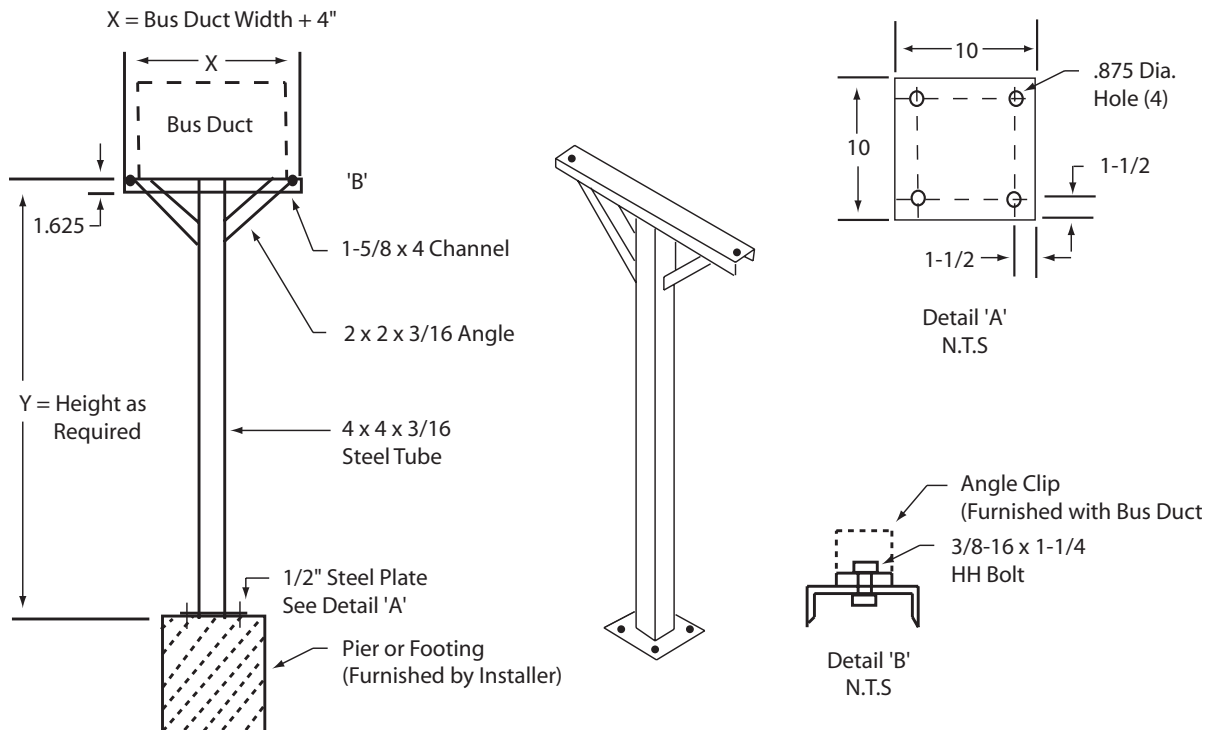


Illustration 6: Typical Floor Mounted Bus Support



E. CONNECTION OF BUS BARS

Before beginning the assembly of bus bar connections, clean all contact surfaces and remove any contamination or corrosion. Wipe surface clean. Do not use sandpaper or any abrasive on the plated surface. Avoid handling of cleaned surface as much as possible. If a hydrocarbon-based solvent is used in the cleaning process, be sure that it does not come into contact with the bus bar insulation. These solvents may damage or destroy the insulation.

Align the bus bar ends of adjoining sections and verify proper phase alignment. After the entire bus is properly positioned and aligned the bus bars should be loosely bolted together with the splice plates and hardware provided. To insure that the joints are made up without unnecessary strain, it may be necessary in some cases to loosen the joints and support insulators on either side of the joint being made.

Take special care with the installation of the connections to other apparatus at the ends of the bus run. These connections frequently make use of flexible connectors. Refer to the drawings furnished with the bus for the proper installation of the flexible connectors. Do not use these flexible connectors to correct misalignment problems. Flexible connectors are furnished to limit stress caused by thermal expansion and vibration on apparatus terminations, and to correct very minor ($<1/4"$) misalignments. If their flexing capability is used to correct installation misalignments, they cannot do the job they were designed to do.

Level and plumb bus (align vertically and horizontally) before the final tightening of all joints. After the bus and bus bars are aligned, tighten all bolts in both the enclosure and the bus bar joints to the torque values given in Table II. Check bolt torque values on all unwrapped joints and connections. If a major deflection of bus bars is noted at the joints, recheck for proper alignment of bus and bus bars before proceeding with tightening of the bus bar joints.

F. INSULATION OF BUS JOINTS

All bus joints, including joints using flexible connectors, must be insulated if the bus bars in the bus are insulated. All bus bars in bus rated above 635V are insulated, but bus bars in bus rated 635V are only insulated on request. Standard bus joints will be insulated with molded PVC boots furnished with the bus. Non standard joints must be wrapped, using taping materials furnished with the bus.

1) Boot Installation

Place the PVC boot over the joint. Secure the open edges with the nylon fasteners provided.

2) Wrapping of Joints

Fill all cavities around the contact nuts and connection bars with Solarite KM1592 compound. Form a smooth surface for taping, thus preventing air voids. The compound is not an insulating material and should not be used for that purpose.

Wrap joint with Scotch Super 33+ black insulating tape, 1 inch wide, maintaining tension on the tape while wrapping. Where there are sharp angles, apply additional layers to obtain equivalent of the insulation on the flat surfaces. One layer $2/3$ lap requires three turns around the bus bar in one width of tape. See Illustration 8. Finish taping with one layer, $1/2$ lap, of Scotch 35 red insulating tape.

Note: The package of Scotch Super 33+ tape, as part of its UL listing information, includes the phrase "Suitable for use at not more than 600V". This is the UL listed voltage rating for a single layer of this tape. When applied as described in the preceding paragraph, this tape is suitable for use at 5kV or 15kV, depending on the number of layers applied.

G. FINAL INSTALLATION STEPS

Space heaters are provided as standard equipment in all outdoor bus rated 5kV or higher, and in other bus when requested by the customer. It is recommended that the heaters be energized at all times. No switch or thermostat is provided in the heater circuit unless specified.

Heaters providing 250 watts of heat are furnished for each 10 feet of bus. Powell space heater wiring is a braid covered copper wire. Space heater wires should be connected at shipping breaks after the bus is in place and the assembly bolts have been properly tightened.

A power supply of the proper voltage and capacity must be connected to the space heater circuits. Refer

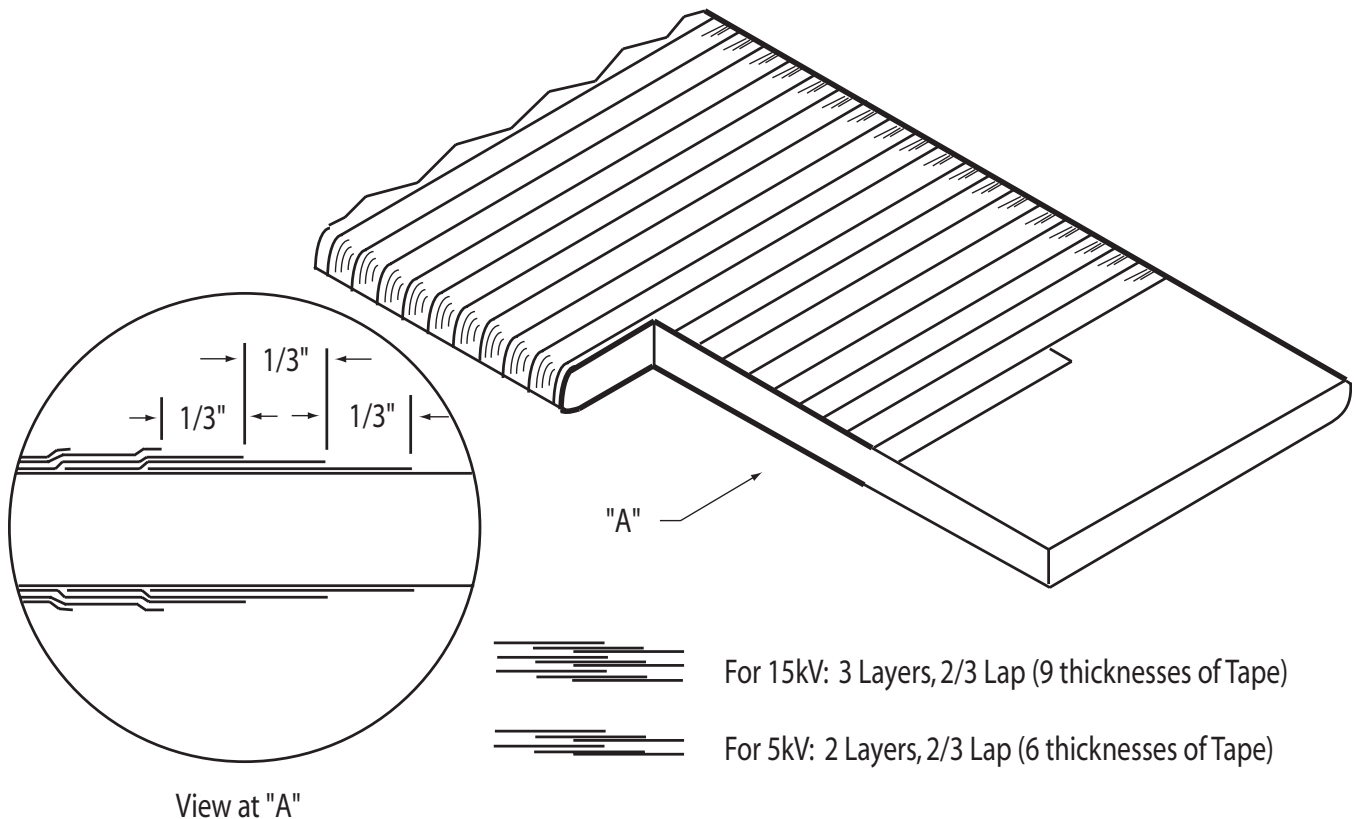
to the drawings supplied with the bus to determine the proper power supply and connection point. If the bus is connected to Powell switchgear, the space heater supply may be provided in the switchgear.

The final installation step is to replace the bus covers and tighten all hardware used to secure these covers.

VI. CHECKS BEFORE ENERGIZING

Before energizing the bus for the first time, there are several checks that should be made. To perform these checks, the bus conductors must be isolated from the remainder of the electrical system. If disconnect switches or circuit breakers are available to isolate the bus run, open these devices. If there are no disconnecting devices available, unbolt the last connecting link at the end of the bus run.

Illustration 8: Wrapping of Bus Bars



First, check the phasing of the bus run from end to end to insure that the connected apparatus is properly phased. This phasing check can be made with a bell set, a buzzer, or an ohmmeter. Check each phase for continuity, and to be sure it is not connected to any other phase or to ground.

The other major check to be made before energizing is an insulation resistance test. Use an insulation resistance tester ("Megger") rated at least 500V. Check each phase by connecting the other two phases to the grounded enclosure and measuring between the phase under test and the enclosure.

Because insulation resistance is a function of the length of a bus, the number of bus supports, the number of conductors per phase, and other factors, there is not a fixed value of insulation resistance which is always acceptable. For a new, dry installation, any resistance less than one megohm per kV of rated voltage should be questioned. Record the values obtained from this test for future use in the maintenance of the bus. See Section VIII, "MAINTENANCE," for further information.

If it is desired to perform a power frequency withstand test (ac "hipot") on the bus conductors, the test voltage should not exceed 75% of the 60Hz hipot voltage given in Table I for the class of bus being tested. DC hipot testing is not recommended for bus, but if it is required, the test voltage should not exceed 75% of the dc hipot voltage given in Table I for the class of bus being tested.

If the bus is equipped with heaters, the heaters and their wiring should be checked for insulation resistance to ground. Disconnect the power source from the heater circuit and remove any deliberate grounds on the heater wiring. Connect all conductors of the heater circuit together and use an insulation resistance tester rated 500V to test between the conductors and ground.

Reconnect the heater circuit and energize it from the proper power source. Check that all heaters are operating. This may be done by calculating the expected heater current from the heater circuits shown on the bus drawings and checking the current with a hook-on ammeter or other appropriate test

instrument. Heater operation may also be checked by feeling near the heater location to note whether or not it is producing heat.

CAUTION

DO NOT TOUCH THE HEATER ELEMENTS. SEVERE BURNS MAY RESULT FROM DIRECT CONTACT WITH AN ENERGIZED HEATER.

Once these checks have been made successfully, reconnect and reinsulate any connections that were disconnected for the checks, and replace any covers removed. The bus should now be ready for energizing.

VII. ENERGIZING THE BUS

There should be no load on the bus when it is energized. Since bus typically extends between two pieces of electrical apparatus, care should be taken to see that all devices fed from the bus are switched to the "OFF" position before energizing the bus.

CAUTION

BUS IS A COMPONENT OF A HIGH POWER ELECTRICAL SYSTEM. OPERATION OF ELECTRICAL POWER SYSTEMS SHOULD BE DONE ONLY BY EXPERIENCED PERSONNEL QUALIFIED IN THE OPERATION OF SUCH SYSTEMS.

Be sure that overcurrent protective devices on the source side of the bus are in place and operating properly before energizing the bus.

Energize the bus by closing the switching device which feeds it. Check along the length of the bus to be sure no abnormal operating conditions are evident. The bus is now ready to be loaded by closing switching devices feeding loads through the bus.

Bus, when operating properly, may have a moderate 60Hz hum. Excessive noise may be an indication of hardware that has not been tightened or of metal parts that have been improperly assembled. Occurrence of sparking at any point along the bus is not a normal condition. The bus should be de-energized until the cause of the sparking has been corrected.

VIII. MAINTENANCE

Contact Powell for assistance in performing maintenance or setting up a maintenance program.

Inspect bus in normal service once each year or after any severe electrical fault. Bus operating in severe environments, such as excessive dust, salt spray, chemical vapors, etc., may require more frequent inspection. Bus operating in clean, dry, indoor locations may need inspection less frequently.

WARNING

CONTACT WITH ENERGIZED CONDUCTORS IN BUS MAY LEAD TO PROPERTY DAMAGE, SEVERE INJURY OR DEATH. BEFORE REMOVING ANY COVERS TO SERVICE BUS, DE-ENERGIZE THE BUS, OPEN SWITCHING DEVICES AT BOTH ENDS OF THE BUS RUN, AND GROUND THE SOURCE CONDUCTORS.

Remove the covers from the bus and examine the interior for any moisture or signs of previous wetness. Replace or thoroughly dry and clean any insulating material which is damp or wet or shows accumulation of deposited material from previous wetting. For indoor bus, eliminate the source of any dripping onto the bus and any other source of moisture. For outdoor bus, seal off any cracks or openings which have allowed moisture to enter the bus or its connection boxes.

Thoroughly clean any accumulation of dust and dirt by using a brush, vacuum cleaner, or clean lint-free rags. If the main bus bars are insulated and foreign material cannot be removed by dusting or wiping with a dry rag, only denatured alcohol or isopropyl alcohol should be used as a solvent to remove materials from the insulation surface. **Do not use commercial cleaners or solvents to clean bus insulation. These materials may destroy the insulating sleeving.**

Carefully inspect all visible electrical joints and terminals. Check tightness of hardware in accordance with Table II. If joints or terminations appear to be badly discolored, corroded or pitted, or show evidence of having been subjected to high temperatures, the parts should be disassembled

and replaced or cleaned. The plated surface can be cleaned with a good grade of silver polish. Take care not to remove plating on aluminum or copper parts in joints or terminations. Damaged aluminum or copper parts should be replaced.

Check the insulation resistance prior to re-energizing the bus, using the insulation resistance test described in Section VI. Keep a permanent record of resistance readings. If readings decrease appreciably with time, deterioration is taking place. If this occurs, find and correct the cause of the insulation deterioration before re-energizing the bus.

If the bus is equipped with heaters, check them for proper operation as described in Section VI. Replace any heaters that are not functioning properly. The heaters used in bus are long life, low surface temperature heaters. Replace them only with heaters of the same rating and catalog number.

Replace the covers and secure them properly. Re-energize the bus, observing the precautions given in Section VII.

IX. RECOMMENDED RENEWAL PARTS

Bus enclosures, conductors and insulation systems do not include any parts that are normal subject to wear or that would normally require replacement during the useful life of the bus. If routine maintenance reveals parts that require replacement, they should be ordered at that time.

Order any necessary parts from Powell. Identify the bus for which parts are required by the Powell work order on which it was furnished. The order must be accompanied by a full description of the part or parts needed. If possible, include a copy of the Powell arrangement drawing for the bus with the required parts identified. If this is not possible, a sketch or photograph of the required part should accompany the order.

If the bus is equipped with heaters, Powell recommends keeping spare heaters in stock. A user should stock about 10% of the total number of heaters used in their bus. These heaters should also be ordered from Powell. The catalog number of the heater and the number of the Powell work order on which the bus was furnished should accompany the order.



IB-80000B Nonsegregated-Phase Bus

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