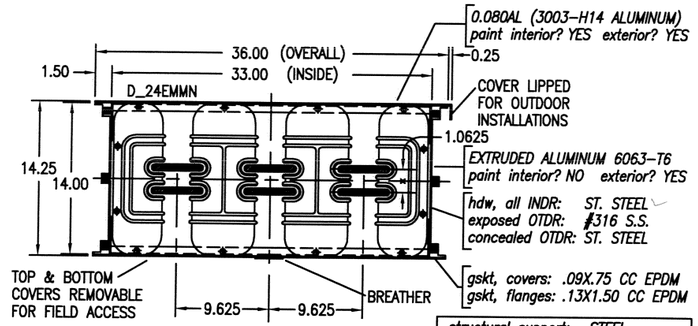
TCEC ISO-Phase Bus Preventative Maintenance
RFP# 2026-202
Questions & Answers – *Revised 4/30/26*

1Q: Could the items below be made available - Drawing number U-12628 Sheet 1 of 4 for the STG?
1A: Yes, please see attached missing drawing.

2Q: The complete DUB Installation Manual, or at least all of the bolted flex connection details.
2A: See attached; IPB_InstructionManual.pdf (172 pages) is all we have in record.

3Q: NSB drawings for the option to add NSB inspection
3A: At this time, no drawings are available. Any determination of potential Non-Segregated Bus (NSB) work shall be made by the bidder and will require a site visit. A mandatory site visit is scheduled for May 14th. Please see details in the RFP.
3A – Revised – Drawings have been provided. Please see attached.



structural support: STEEL
INDR support finish: HOT-DIP GALV.
OTDR support finish: HOT-DIP GALV.

Product code: 1540HC3TA1433M *name plate: STD*
Rated Voltage: 5000 VOLTS.
BIL rating: 75 KV
ONE MINUTE DRY WITHSTAND TEST LEVEL: 19 kv.
Amperage: 4000 AMPERES CONTINUOUS
Momentary: 78000 AMPERES (asym.) / 50322 AMPERES (sym.)
Frequency: 60Hz
Temp. rise: CONDUCTOR: 65°C } MAX. RISE @ RATED LOAD IN A 40°C AMBIENT
HOUSING: 40°C }

Enclosure:	Outdoor:	Indoor:
	NON-VENTILATED - (BREATHERS ONLY)	NON-VENTILATED - (BREATHERS ONLY)
	material: ALUMINUM	material: ALUMINUM
	finish: 2.5 MIL	finish: 1.5 MIL
	color: ANSI-61	color: ANSI-61
	weight: 112lbs/foot	weight: 112lbs/foot

Phase bars: (2)- 0.63 X 6.00 BUS BAR(S) PER PHASE *joint hdw: ST. STEEL*
material: COPPER - WITH SILVER CONTACTS
Supports: POLYESTER *support spacing: 48 (min) 48 (max)*
Insulation: phase bars/neutral: EPOXY INSULATION *thickness: 0.09 TO 0.13 THK.*
@ shipping splits: INSULATING TAPES
@ equipment terms: INSULATING TAPES
Neutral bar: NOT REQUIRED
material: N/A
rating: N/A

Grounding: CONTINUOUS GROUND BUS (MOUNTED INTERNALLY) *ground hdw: ST. STEEL*
Size/matl: (1)- 0.25 X 2.00 BAR
material: COPPER

Heater sys: NOT REQUIRED
location: N/A
element: N/A
N/A
wiring: N/A
conduit: N/A
Control: N/A
Supply: voltage: N/A
source: N/A

Add'l notes: GENERAL NOTES: Crating Info
1) FOR SHIP LOOSE LIST SEE DWG: (LATER)

M012525-APDE076 S01 R0 10/2/2006
TREASURE COAST

NO EXCEPTIONS NOTED
Release for manufacture

EXCEPTIONS NOTED
Release for manufacture
Revise and resubmit for distribution

RETURNED FOR CORRECTION
Do not proceed
Revise and resubmit for authorization

Review does not relieve contractor from responsibility for errors or deviations from contract requirements

UTILITY ENGINEERING

LYT10.00
MICROFILMED:

REVISION		
0	26SEP06	kk
0		

All changes to be made on the CAD system.
No manual changes permitted on this drawing.

project:	3475
drn by:	kk
date:	26SEP06
scale:	NTS
chk'd:	
app'd:	

ABB POWER T & D
TREASURE COAST ENERGY
P.O. # PK00209

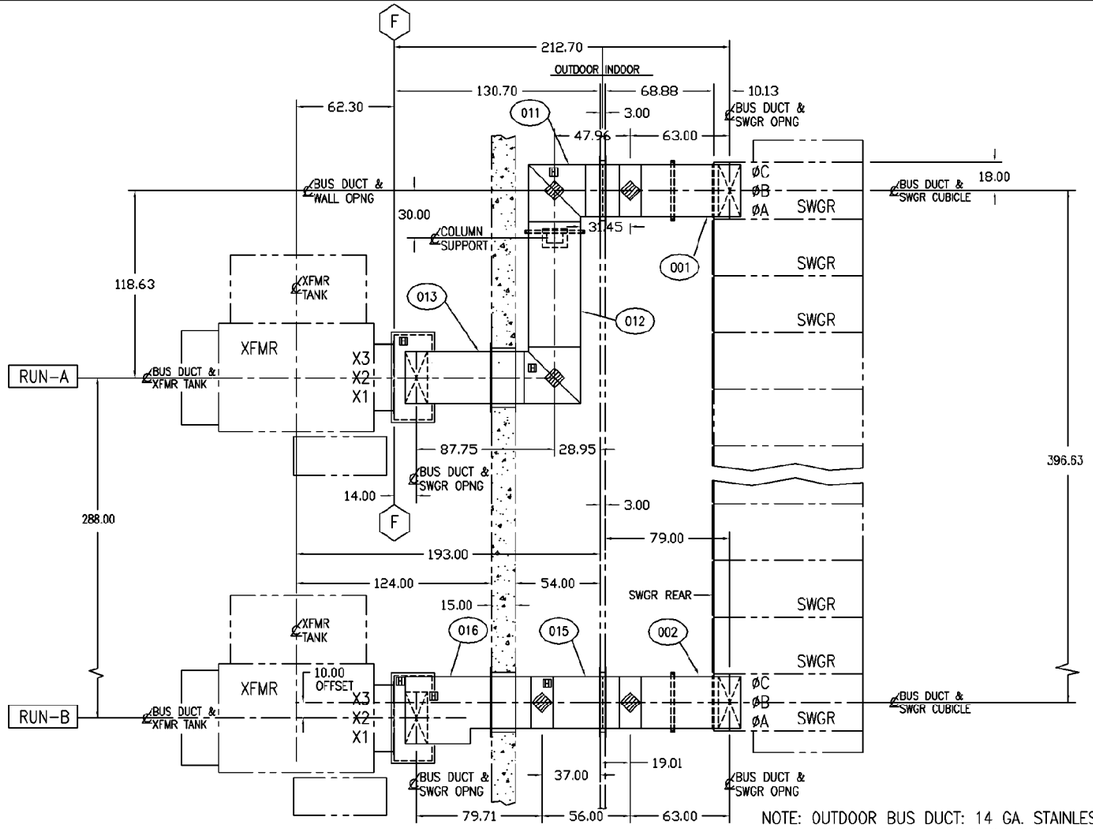
FOR SHOP USE ONLY
(NOT FOR EXTERNAL USE)
For Approval

☐ supercedes ☐ supeceded by:

TECHNIBUS
METAL ENCLOSED BUS SYSTEMS

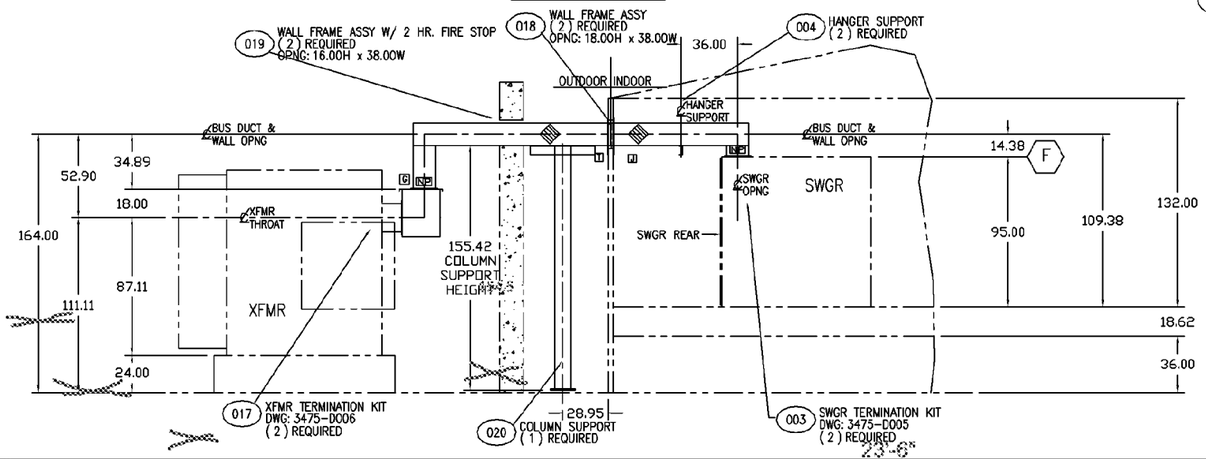
5kV 4000A 3P 3W
INDOOR BUS DUCT CROSS SECTION

3475-B002S	sh: 1	cont: -	rev: 0



PLAN VIEW

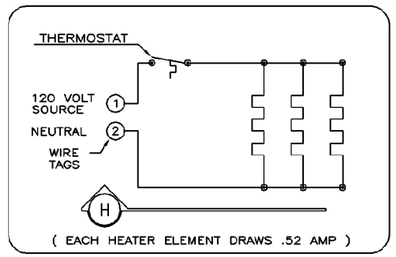
NOTE: OUTDOOR BUS DUCT: 14 GA. STAINLESS STEEL
INDOOR BUS DUCT: ALUMINUM

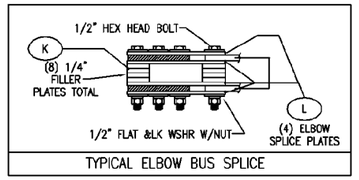


ELEVATION VIEW

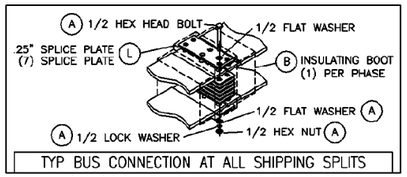
SHIP LOOSE KITS

- (025) INDR HSG SPLIT KIT (2) REQUIRED
- (026) OTDR HSG KIT W/ HEATER (1) REQUIRED
- (027) OTDR ELBOW KIT W/ HEATER (2) REQUIRED
- (028) BUS BAR SPLIT KIT-3ø (3) REQUIRED
- (029) ELBOW BUS SPLIT KIT-3ø (2) REQUIRED

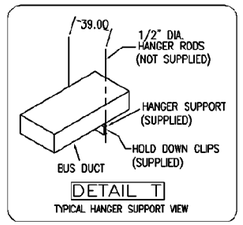




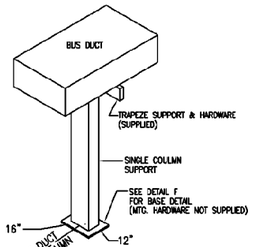
TYPICAL ELBOW BUS SPLICE



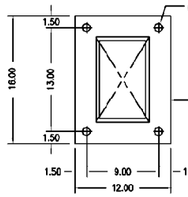
TYP BUS CONNECTION AT ALL SHIPPING SPLITS



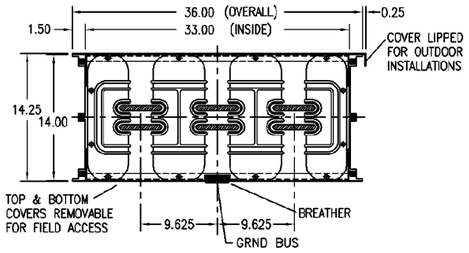
DETAIL T
TYPICAL HANGER SUPPORT VIEW



DETAIL E
SINGLE COLUMN SUPPORT



DETAIL F



Rated Voltage: 5000 VOLTS.
BIL rating: 75KV
ONE MINUTE DRY WITHSTAND TEST LEVEL: 19kv.
Amperage: 4000 AMPERES CONTINUOUS
Momentary: 78000 AMPERES (osym.) /50322 AMPERES (sym.)
Frequency: 50Hz
Temp. rise: CONDUCTOR: 65°C, HOUSING: 40°C } MAX. RISE @ RATED LOAD IN A 40°C AMBIENT

Enclosure:

Outdoor:	Indoor:
NON-VENTILATED - (BREATHERS ONLY)	NON-VENTILATED - (BREATHERS ONLY)
material: STAINLESS STEEL	material: STAINLESS STEEL
finish: 2.5 MIL	finish: 1.5 MIL
color: ANSI 61	color: ANSI 61
weight: 125lbs/foot	weight: 125lbs/foot

Phase bars: (2)- 0.63 X 6.00 BUS BAR(S) PER PHASE
material: COPPER - WITH SILVER CONTACTS
Supports: POLYESTER
Insulation: phase bars/neutral: EPOXY INSULATION
@ shipping splits: MOLDED INSULATING BOOTS
@ equipment terms: MOLDED INSULATING BOOTS
Neutral bar: NOT REQUIRED
material: N/A
rating: N/A
Grounding: CONTINUOUS GROUND BUS (MOUNTED INTERNALLY)
Size/matl: (1) - 0.25 X 2.00 BAR
material: COPPER
Heater sys: REQUIRED - INDOOR AND OUTDOOR
location: NON-HAZARDOUS AREA
element: STANDARD ELEMENT (RATED 250W / 240V) WIRED TO OPERATE AT 120V/ 63W
wiring: STRANDED COPPER W/600V SIS INSULATION
conduit: BRAIDED METALLIC SHIELD
Control: THERMOSTAT
Supply: voltage: 120VAC (REQUIRES .52 AMP PER ELEMENT)
source: INDOOR JUNCTION BOX FOR CUSTOMER'S 120V. SUPPLY
Add'l notes: GENERAL NOTES:
1) FOR SHIP LOOSE LIST SEE DWG: 3475-A016

Field notes: INSTALLATION SHOULD NOT BE ATTEMPTED WITHOUT A THOROUGH UNDERSTANDING OF THE BUS DUCT DRAWINGS AND THE INSTALLATION INSTRUCTIONS. DO NOT TIGHTEN HOUSING AND BUS BAR JOINTS AT THE SHIPPING SPLITS UNTIL ALL THE EQUIPMENT TERMINATIONS ARE ALIGNED AND CONNECTED.
PLEASE CONSULT THE BUS DUCT INSTRUCTION MANUAL FOR HOUSING AND BUS BAR JOINT ASSEMBLY INSTRUCTIONS.
Supports: THE BUS DUCT SUPPORT LOCATIONS SHOWN MAY BE ADJUSTED TO ACCOMMODATE SITE VARIATIONS. IT IS RECOMMENDED THAT SUPPORTS BE SPACED APPROXIMATELY 12 TO 15 FEET CENTER-TO-CENTER ALONG STRAIGHT LENGTHS AND WITHIN 4 FEET OF ELBOWS, EQUIPMENT CONNECTIONS AND WALL FRAME ASSEMBLIES. CONSULT THE FACTORY FOR CONDITIONS BEYOND THESE RECOMMENDATIONS.
Dwg Units: ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE SPECIFIED.
Patent: BUS DUCT SHOWN ON THIS DRAWING IS PROTECTED UNDER U.S. PATENT #5053584.

Legend:
(001) SHIPPING I.D. NUMBER — H HEATER — NP NAME PLATE
SHIPPING SPLIT ASSEMBLY — T THERMOSTAT — G GROUND PAD
(1) ACCESS COVER & BUS BAR JOINT LOCATION (FACTORY INSTALLED) — F FLANGE LOCATION — J JUNCTION BOX
SUGGESTED BUS DUCT SUPPORT LOCATION

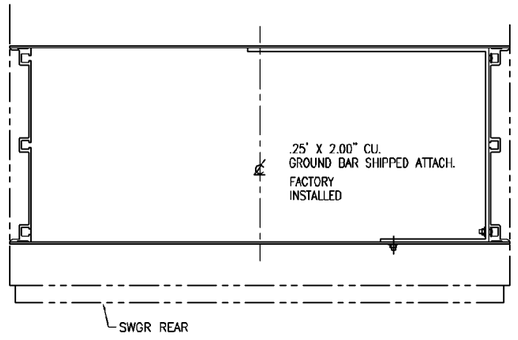
REVISION		
0	26SEP06	kk
01	15NOV06	kk
	REVISED PER CUST COMMENTS	
02	18DEC06	kk
	REVD. LOCATION OF SWGR	

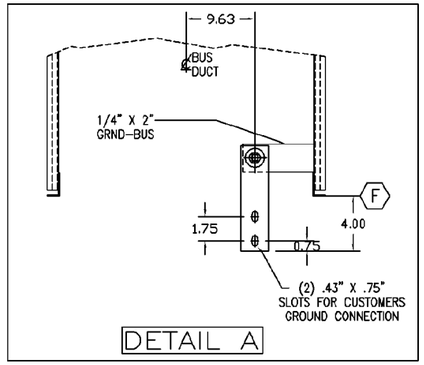
MICROFILMED:

project: 3475	ABB POWER T & D TREASURE COAST ENERGY P.O. # PK00209	☐supercedes ☐supeceded by:
drn by: kk		TECHNIBUS METAL ENCLOSED BUS SYSTEMS
date: 26SEP06	CERTIFIED	5kV 4000A 3P 3W BUS DUCT LAYOUT
scale: NTS		3475-D001 sh: 1 cont: - rev: 3
chk'd:		
app'd:		

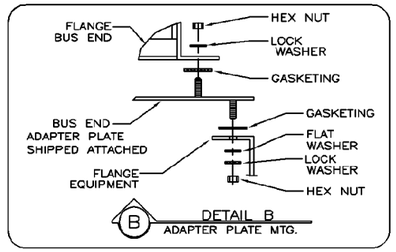
EXCEPTIONS NOTED
Release for manufacture
Revise and resubmit for distribution

Review does not relieve contractor from responsibility for errors or deviations from contract requirements.





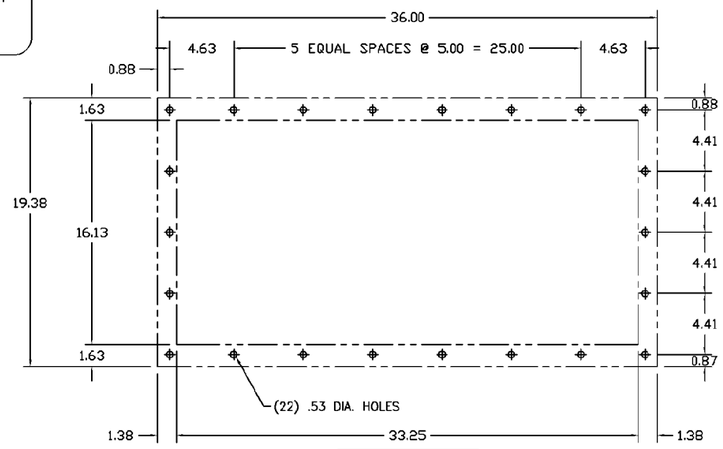
DETAIL A



Notes:
1) ALL CONTACT SURFACES TO BE PLATED AS NOTED ON THE BUS DUCT LAYOUT.
2) REFER TO THE BUS DUCT INSTRUCTION MANUAL FOR HARDWARE TORQUE VALUES, PROCEDURES AND INSULATING INSTRUCTIONS.
3) REFER TO THE BUS DUCT LAYOUT DRAWING FOR PHASING ORDER.
4) ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE SPECIFIED.

Test Dept: TEST DEPT. TO CONFIRM DIMENSIONS MARKED: ✱ PRIOR TO SHIPMENT.

Reference: CUSTOMER DRAWING(S): ABB #961967 Rev.3

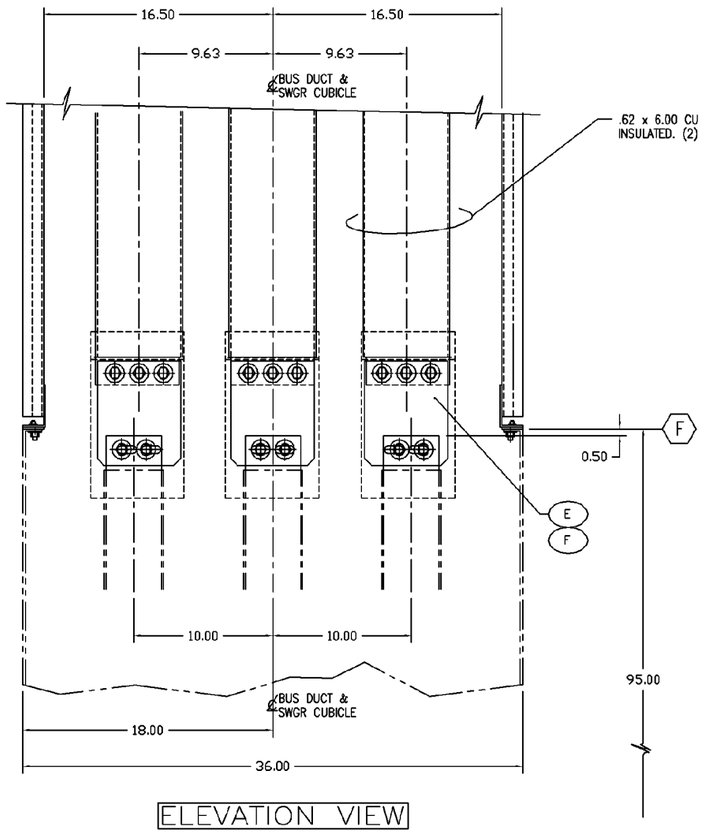


DETAIL D

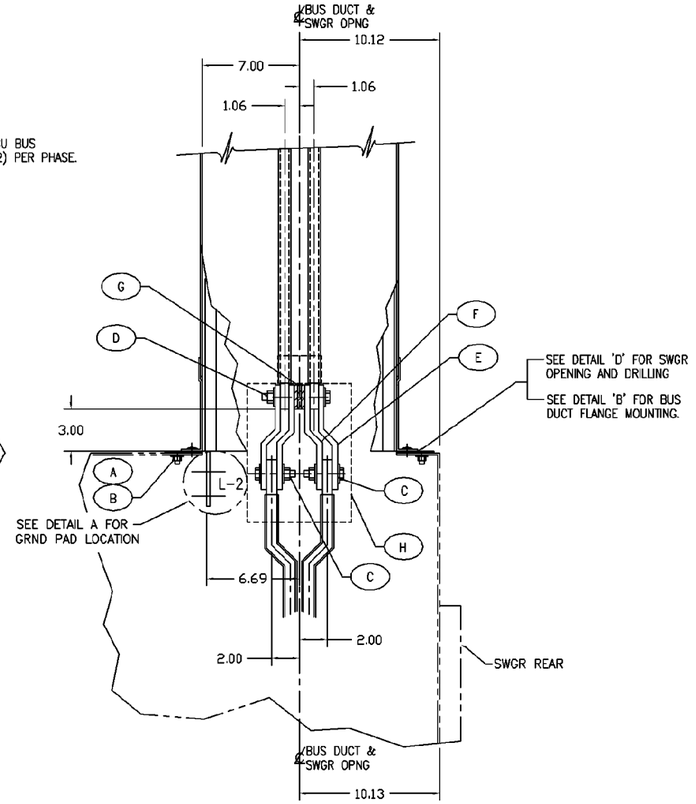
SWGR OPENING AND MOUNTING HOLE LOCATIONS.

REFER TO CROSS SECTION ON LAYOUT FOR GROUND BUS REQUIREMENT.

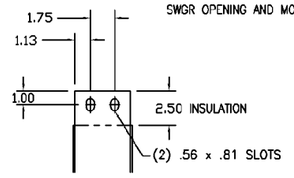
GROUND BUS REVERSAL



ELEVATION VIEW



SIDE VIEW



SWGR BUS: .75 x 4.00
COPPER BAR. INSULATED
(2) BARS PER PHASE

DETAIL C

LTR	QTY	UOM	PART NUMBER	PART DESCRIPTION
H	3	EACH	3467-B090	MOLDED TERMINATION BOOT
G	9	EACH	256CEN	FILLER BUS
F	6	EACH	386CSN-D005	OFFSET ADAPTER BUS
E	6	EACH	386CSN-D005	OFFSET ADAPTER BUS
D	9	EACH	HFL5042T	1/2 x 4 1/2 HEX BOLT SET (S.S.)
C	12	EACH	HFL5022T	1/2 x 2 1/2 HEX BOLT SET (S.S.)
B	10	FEET	GSK1315	1/8 X 1 1/2 GASKET, EPDM w/PSA
A	22	EACH	HNL38103	3/8 HEX NUT SET (316S.S.)

MICROFILMED:

REVISION		
0	25SEP06	kk
01	06JAN07 CERTIFIED PER CUSTOMER	kk

All changes to be made on the CAD system.
No manual changes permitted on this drawing.

project: 3475
drn by: kk
date: 25SEP06
scale: NTS
chk'd:
app'd:

ABB POWER T & D
TREASURE COAST ENERGY
P.O. # PK00209

CERTIFIED

☐supercedes ☐supeceded by:

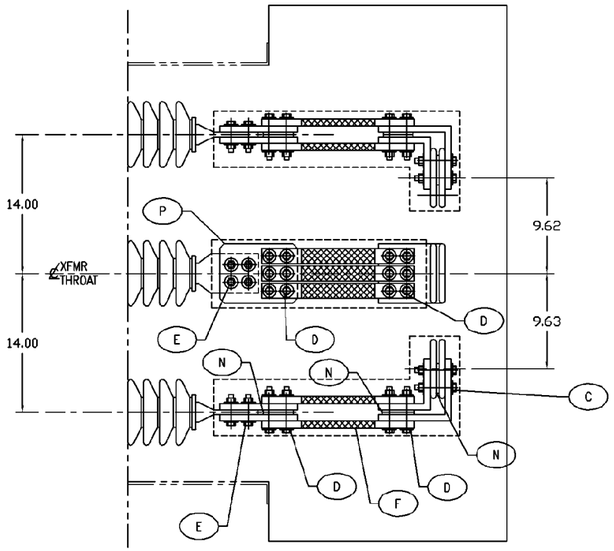
TECHNIBUS METAL ENCLOSED BUS SYSTEMS

5kV 4000A 3P 3W
SWITCHGEAR TERMINATION

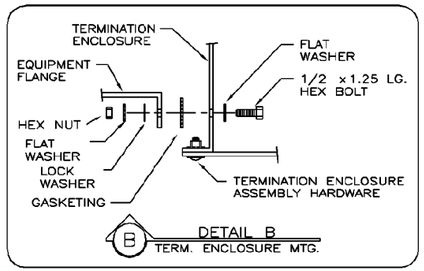
3475-D005 | sh: 1 | cont: - | rev: 1

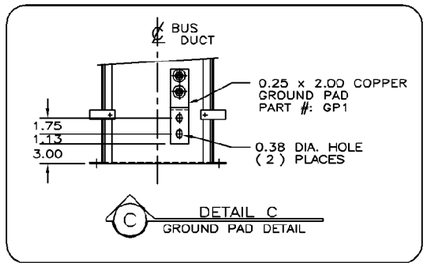
Review does not relieve contractor from responsibility for errors or deviations from contract requirements.

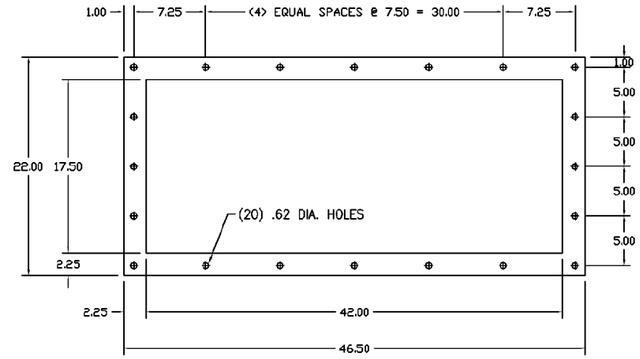
NO EXCEPTIONS NOTED
Release for manufacture



PLAN VIEW

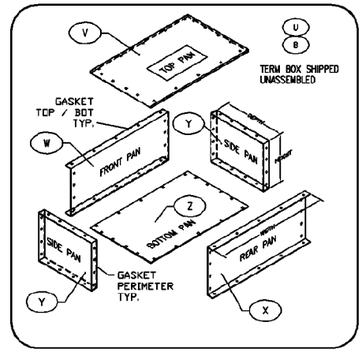






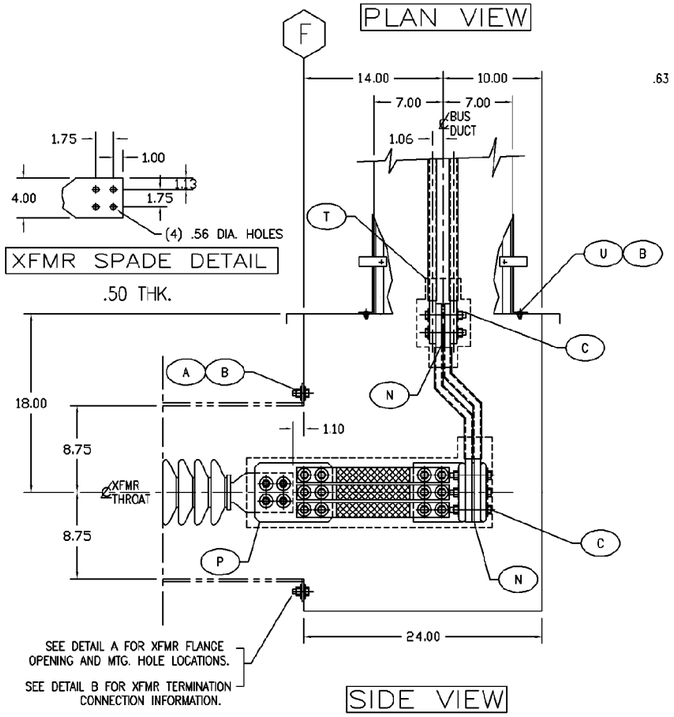
DETAIL A

XFMR FLANGE OPENING AND PROPOSED MOUNTING HOLE LOCATIONS



XFMR SPADE DETAIL

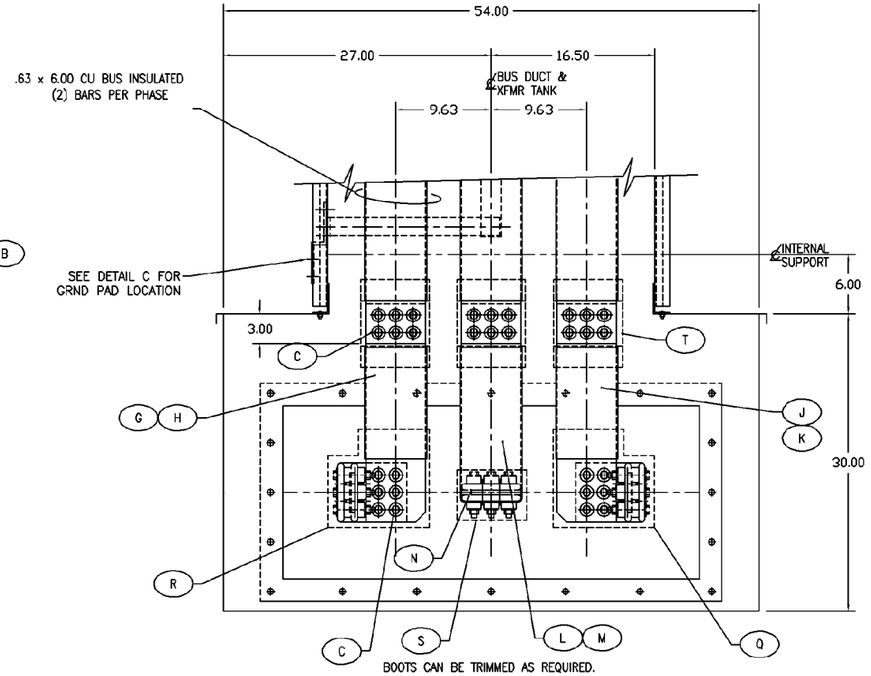
.50 THK.



SEE DETAIL A FOR XFMR FLANGE OPENING AND MTG. HOLE LOCATIONS.

SEE DETAIL B FOR XFMR TERMINATION CONNECTION INFORMATION.

SIDE VIEW



BOOTS CAN BE TRIMMED AS REQUIRED.

ELEVATION VIEW

LTR	QTY	UOM	PART NUMBER	PART DESCRIPTION
Z	1	EACH	X-120-0025-4/5	BOTTOM PANEL
Y	2	EACH	X-120-0026-4/2	SIDE PANELS
X	1	EACH	X-120-0023-4/17	REAR PANEL
W	1	EACH	3475-B051	FRONT PANEL
V	1	EACH	3475-B050	TOP COVER
U	76	EACH	CBF31113	5/16 x 1 1/4 CARR. BOLT SET (316 S.S.)
T	3	EACH	X-106-0003-2/39	MOLDED TERMINATION BOOT
S	1	EACH	709851-A080	MOLDED TERMINATION BOOT
R	1	EACH	3475-B091	MOLDED TERMINATION BOOT RH
Q	1	EACH	3475-B090	MOLDED TERMINATION BOOT
P	6	EACH	636CEN	ADAPTER BUS
N	17	EACH	256CEN	FILLER BUS
M	1	EACH	636CSI-B080/M	ADAPTER BUS
L	1	EACH	636CSI-B080/L	ADAPTER BUS
K	1	EACH	636CSI	OFFSET ADAPTER BUS
J	1	EACH	636CSI	OFFSET ADAPTER BUS
H	1	EACH	636CSI	OFFSET ADAPTER BUS
G	1	EACH	636CSI	OFFSET ADAPTER BUS
F	18	EACH	TYPE 2	4000A FLEX CONNECTOR KIT (6 PER PHASE)
E	12	EACH	HFL5023T	1/2 x 2 3/4 HEX. BOLT SET (S.S.)
D	36	EACH	HFL5041T	1/2 x 4 1/4 HEX. BOLT SET (S.S.)
C	30	EACH	HFL5033T	1/2 x 3 3/4 HEX. BOLT SET (S.S.)
B	58	FEET	GSK1315	1/8 X 1 1/2 GASKET, EPDM w/PSA
A	20	EACH	HFL5011T	1/2 x 1 1/4 HEX. BOLT SET (316 S.S.)

MICROFILMED:

REVISION		
0	25SEP06	kk
01	06JAN07	kk
	CERTIFIED PER CUSTOMER	

project: 3475
drn by: kk
date: 25SEP06
scale: NTS
chk'd:
app'd:

ABB POWER T & D
TREASURE COAST ENERGY
P.O. # PK00209

☐supercedes ☐supeceded by:

TECHNIBUS METAL ENCLOSED BUS SYSTEMS

CERTIFIED

5kV 4000A 3P 3W
TRANSFORMER TERMINATION

3475-D006 | sh: 1 – | cont: | rev: 1

Review does not relieve contractor from responsibility for errors or deviations from contract requirements.

NO EXCEPTIONS NOTED
Release for manufacture

TECHNIBUS
1501 RAFF RD. S.W.
CANTON, OH 44708

TELEPHONE: (330) 478-6395
FAX. (330) 478-6377

TITLE: BUS DUCT INSPECTION REPORT

CUSTOMER NAME: ABB Power T&D — DATE: 2/28/07

PROJECT NUMBER: 3475 — UNIT UNDER TEST: 1 — RUN: A

INSPECTED BY: CO. — SPECIAL COMMENTS: SS thru bolt

REFERENCE DRAWINGS: D001/D005

VOLTAGE: 5KV — [X] ASM #'S ON EACH END — [X] WARNING LABELS — [ ] NAMEPLATE

AMPERAGE: 4000

CONSTRUCTION:

[-] OUTDOOR ASM — [X] INDOOR ASM – IF INDOOR, — [-] VENTILATED — [X] NON-VENTILATED

[-] HORIZONTAL — [X] VERTICAL UPPER — [-] VERTICAL ASM HAS REQUIRED ANGLES OR CHANNELS INSTALLED

[-] VERTICAL LOWER

[-] WEATHER SEALS — [X] GASKETING — [X] CONFIG. — [X] ENCL. DIM. H 21 3/8 W 36.0 L 71 7/8

[-] EXTRUSION HOLES PLUGGED?

[X] TERMINATION TYPE: SWGR. — [-] ATT. BOX DIM. H — W — L —

[X] BUS SUPT. LOCATION — MAX. ALLOWED — [-] VAPOR BARRIER

[-] BUS BRACED FOR VERT. INSTALLATION — NOMINAL 48 — (LOCATION, CAULKING OK)

[-] ACCESS COVER LOC. — [X] FLANGE — [X] FLANGE ADAPTER — [X] CORRECT HOLE PATTERN @ TERMINATION

[X] EXTERNAL ENCLOSURE HARDWARE — [X] INTERNAL ENCLOSURE HARDWARE

BUS POSITION: — [-] ALUMINUM BUS — [X] COPPER BUS

[X] @ SHIPPING SPLITS — [X] @ TERMINATIONS — [X] CENTERLINE — [X] PHASE TO PHASE

[X] BUS DRILLING — [X] BUS PLATING TYPE: silver — [X] BUS INSULATION

[-] BUS JOINT TORQUES AND INSULATION — [-] HARDWARE, TYPE —

GROUND PAD: [X] YES [-] NO, IF YES [X] INTERNAL [-] EXTERNAL

GROUND BUS: [X] YES [-] NO, IF YES [X] LOCATION [X] DRILLING [X] HARDWARE

[X] BUS PHASING IS CORRECT INSIDE ASSEMBLY — [X] BUS PHASING IS CORRECT TERM TO TERM

CLEARANCES: STRIKE -- [X] PHASE TO PHASE — [X] PHASE TO GROUND

CREEP -- [X] PHASE TO PHASE — [X] PHASE TO GROUND

HEATER SYSTEM: [-] YES — [X] NOT APPLICABLE

[-] HEATER — [-] SPECIAL CONDITIONS: —

[-] LOCATION, ATTACHMENT AND CONNECTIONS — [-] EXTENSION LENGTH AND LUG TYPE

[-] TERMINAL BLOCK LOC. — [-] THERMOSTAT LOC. — [-] JUNCTION BOX LOC. AND TYPE —

APPEARANCE: [X] CLEAN — [X] PAINT CURED — [X] EXT. PAINT FINISH ANSI 61 — [-] INT. PAINT

[-] SPECIAL ATTACHMENTS: —

PACKAGING:

SHIPPING BRACE REQUIRED [-] YES [X] NO

ASSEMBLED BY:
CLOCK # 1732
CLOCK #

Review does not relieve contractor from responsibility for errors or deviations from contract requirements.

NO EXCEPTIONS NOTED
Release for manufacture

Form 10-02-27 (Rev. 6, 10/11/04)

TECHNIBUS
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CANTON, OH 44708
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FAX. (330) 478-8377

TITLE: BUS DUCT INSPECTION REPORT — PAGE 1 OF 1

CUSTOMER NAME ABB Power T&D — DATE 3/2/07

PROJECT NUMBER 3475 — UNIT UNDER TEST 2 — RUN B

INSPECTED BY CO — SPECIAL COMMENTS

REFERENCE DRAWINGS D001/D005

VOLTAGE 5KV — [X] ASM #'S ON EACH END — [X] WARNING LABELS — [X] NAMEPLATE
AMPERAGE 4000

CONSTRUCTION:
[ ] OUTDOOR ASM — [X] INDOOR ASM – IF INDOOR, [ ] VENTILATED — [X] NON-VENTILATED
[ ] HORIZONTAL — [X] VERTICAL UPPER — [ ] VERTICAL ASM HAS REQUIRED
[ ] VERTICAL LOWER — ANGLES OR CHANNELS INSTALLED

[ ] WEATHER SEALS [ ] GASKETING [X] CONFIG. [X] ENCL. DIM. H 21 3/8 W 36.0 L 71 1/2
[ ] EXTRUSION HOLES PLUGGED?
[X] TERMINATION TYPE SWGR. — [ ] ATT. BOX DIM. H — W — L —

[X] BUS SUPT. LOCATION — MAX. ALLOWED — [ ] VAPOR BARRIER
[ ] BUS BRACED FOR VERT. INSTALLATION — NOMINAL 5/8 — (LOCATION, CAULKING OK)

[ ] ACCESS COVER LOC. [X] FLANGE [X] FLANGE ADAPTER [X] CORRECT HOLE PATTERN @ TERMINATION

[X] EXTERNAL ENCLOSURE HARDWARE — [X] INTERNAL ENCLOSURE HARDWARE

BUS POSITION: — [ ] ALUMINUM BUS — [X] COPPER BUS
[X] @ SHIPPING SPLITS [X] @ TERMINATIONS [X] CENTERLINE [X] PHASE TO PHASE
[X] BUS DRILLING [X] BUS PLATING TYPE: Silver [X] BUS INSULATION
[ ] BUS JOINT TORQUES AND INSULATION — [ ] HARDWARE, TYPE —

GROUND PAD: [X] YES [ ] NO, IF YES [X] INTERNAL [ ] EXTERNAL
GROUND BUS: [X] YES [ ] NO, IF YES [X] LOCATION [X] DRILLING [X] HARDWARE
[X] BUS PHASING IS CORRECT INSIDE ASSEMBLY — [X] BUS PHASING IS CORRECT TERM TO TERM

CLEARANCES: STRIKE -- [X] PHASE TO PHASE [X] PHASE TO GROUND
CREEP -- [X] PHASE TO PHASE [X] PHASE TO GROUND

HEATER SYSTEM: [ ] YES — [X] NOT APPLICABLE
[ ] HEATER — [ ] SPECIAL CONDITIONS:
[ ] LOCATION, ATTACHMENT AND CONNECTIONS — [ ] EXTENSION LENGTH AND LUG TYPE
[ ] TERMINAL BLOCK LOC. [ ] THERMOSTAT LOC. — [ ] JUNCTION BOX LOC. AND TYPE —

APPEARANCE: [X] CLEAN [X] PAINT CURED [X] EXT. PAINT FINISH ANSI 61 [ ] INT. PAINT
[ ] SPECIAL ATTACHMENTS: —

PACKAGING:
SHIPPING BRACE REQUIRED [ ] YES [X] NO

ASSEMBLED BY:
CLOCK # 1355
CLOCK # 1819

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TITLE: BUS DUCT INSPECTION REPORT **PAGE 1 OF 1**

CUSTOMER NAME ABB Power T&D DATE 3/1/07

PROJECT NUMBER 3425 UNIT UNDER TEST 11 RUN A

INSPECTED BY MAC SPECIAL COMMENTS 3/8 SS COVER SCREWS (THRU BOLT)

REFERENCE DRAWINGS D001

VOLTAGE 5,000 [X] ASM #'S ON EACH END [X] WARNING LABELS [ ] NAMEPLATE
AMPERAGE 4,000

CONSTRUCTION:
[X] OUTDOOR ASM [X] INDOOR ASM – IF INDOOR, [ ] VENTILATED [X] NON-VENTILATED
[X] HORIZONTAL [ ] VERTICAL UPPER [ ] VERTICAL ASM HAS REQUIRED
ELBOW [ ] VERTICAL LOWER ANGLES ORCHANNELS INSTALLED

[ ] WEATHER SEALS [X] GASKETING [X] CONFIG. [X] ENCL. DIM. H 14" W 27" L A=64 1/8" B=29 5/8
[X] EXTRUSION HOLES PLUGGED?
[ ] TERMINATION TYPE — [ ] ATT. BOX DIM. H — W — L —

[X] BUS SUPT. LOCATION MAX. ALLOWED, [X] VAPOR BARRIER GLASTIC 1/2 HR
[ ] BUS BRACED FOR VERT. INSTALLATION NOMINAL 48" (LOCATION, CAULKING OK)

[ ] ACCESS COVER LOC. [ ] FLANGE [ ] FLANGE ADAPTER [ ] CORRECT HOLE PATTERN @ TERMINATION

[X] EXTERNAL ENCLOSURE HARDWARE [X] INTERNAL ENCLOSURE HARDWARE

BUS POSITION: [ ] ALUMINUM BUS [X] COPPER BUS
[X] @ SHIPPING SPLITS [ ] @ TERMINATIONS [X] CENTERLINE [X] PHASE TO PHASE
[X] BUS DRILLING [X] BUS PLATING TYPE: SILVER [X] BUS INSULATION
[ ] BUS JOINT TORQUES AND INSULATION [ ] HARDWARE, TYPE —

GROUND PAD: [ ] YES [X] NO, IF YES [ ] INTERNAL [ ] EXTERNAL
GROUND BUS: [X] YES [ ] NO, IF YES [X] LOCATION [X] DRILLING [X] HARDWARE
[X] BUS PHASING IS CORRECT INSIDE ASSEMBLY [X] BUS PHASING IS CORRECT TERM TO TERM

CLEARANCES: STRIKE -- [X] PHASE TO PHASE [ ] PHASE TO GROUND
CREEP -- [X] PHASE TO PHASE [X] PHASE TO GROUND

HEATER SYSTEM: [X] YES [ ] NOT APPLICABLE
[ ] HEATER [ ] SPECIAL CONDITIONS: —
[ ] LOCATION, ATTACHMENT AND CONNECTIONS [X] EXTENSION LENGTH AND LUG TYPE
[X] TERMINAL BLOCK LOC. [X] THERMOSTAT LOC. [X] JUNCTION BOX LOC. AND TYPE OUT/IN

APPEARANCE: [X] CLEAN [X] PAINT CURED [X] EXT. PAINT FINISH ANSI 61 [ ] INT. PAINT
[ ] SPECIAL ATTACHMENTS: —

PACKAGING:
SHIPPING BRACE REQUIRED [ ] YES [X] NO

ASSEMBLED BY:
CLOCK # 1790
CLOCK #

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TITLE: BUS DUCT INSPECTION REPORT — **PAGE 1 OF 1**

CUSTOMER NAME ABB Power T&D DATE 3/5/07

PROJECT NUMBER 3475 UNIT UNDER TEST 12 RUN A

INSPECTED BY MAC SPECIAL COMMENTS 316ss Cover Thru-Bolts / 3S Housing

REFERENCE DRAWINGS D001

VOLTAGE 5,000 [X] ASM #'S ON EACH END [X] WARNING LABELS [ ] NAMEPLATE
AMPERAGE 4,000

CONSTRUCTION:
[X] OUTDOOR ASM [ ] INDOOR ASM – IF INDOOR, [ ] VENTILATED [X] NON-VENTILATED
[X] HORIZONTAL [ ] VERTICAL UPPER [ ] VERTICAL ASM HAS REQUIRED
ELBOW [ ] VERTICAL LOWER ANGLES ORCHANNELS INSTALLED

[X] WEATHER SEALS [ ] GASKETING [X] CONFIG. [X] ENCL. DIM. H 18" W 36" L 119.5" CENTER TO CENTER
[X] EXTRUSION HOLES PLUGGED?
[ ] TERMINATION TYPE — [ ] ATT. BOX DIM. H — W — L —

[X] BUS SUPT. LOCATION MAX. ALLOWED, [ ] VAPOR BARRIER
[ ] BUS BRACED FOR VERT. INSTALLATION NOMINAL 4/8" (LOCATION, CAULKING OK)

[ ] ACCESS COVER LOC. [ ] FLANGE [ ] FLANGE ADAPTER [ ] CORRECT HOLE PATTERN @ TERMINATION

[X] EXTERNAL ENCLOSURE HARDWARE [X] INTERNAL ENCLOSURE HARDWARE

BUS POSITION: [ ] ALUMINUM BUS [X] COPPER BUS
[X] @ SHIPPING SPLITS [ ] @ TERMINATIONS [X] CENTERLINE [X] PHASE TO PHASE
[ ] BUS DRILLING [X] BUS PLATING TYPE: SILVER [ ] BUS INSULATION
[ ] BUS JOINT TORQUES AND INSULATION [ ] HARDWARE, TYPE —

GROUND PAD: [ ] YES [X] NO, IF YES [ ] INTERNAL [ ] EXTERNAL
GROUND BUS: [X] YES [ ] NO, IF YES [X] LOCATION [X] DRILLING [ ] HARDWARE
[X] BUS PHASING IS CORRECT INSIDE ASSEMBLY [X] BUS PHASING IS CORRECT TERM TO TERM

CLEARANCES: STRIKE -- [X] PHASE TO PHASE [ ] PHASE TO GROUND
CREEP -- [X] PHASE TO PHASE [ ] PHASE TO GROUND

HEATER SYSTEM: [X] YES [ ] NOT APPLICABLE
[ ] HEATER [ ] SPECIAL CONDITIONS: —
[ ] LOCATION, ATTACHMENT AND CONNECTIONS [ ] EXTENSION LENGTH AND LUG TYPE
[ ] TERMINAL BLOCK LOC. [ ] THERMOSTAT LOC. [ ] JUNCTION BOX LOC. AND TYPE —

APPEARANCE: [X] CLEAN [X] PAINT CURED [X] EXT. PAINT FINISH ANSI61 [ ] INT. PAINT
[ ] SPECIAL ATTACHMENTS: —

PACKAGING:
SHIPPING BRACE REQUIRED [ ] YES [X] NO

ASSEMBLED BY:
CLOCK # 1814
CLOCK #

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TITLE: BUS DUCT INSPECTION REPORT **PAGE 1 OF 1**

CUSTOMER NAME ABB Power T&D DATE 3/3/07

PROJECT NUMBER 3475 #2 UNIT UNDER TEST 13 RUN 4

INSPECTED BY MAC SPECIAL COMMENTS SS THRU BOLTS + BUS HDWR

REFERENCE DRAWINGS D001, D006

VOLTAGE 5,000 [X] ASM #'S ON EACH END [ ] WARNING LABELS [ ] NAMEPLATE
AMPERAGE 4,000

CONSTRUCTION:
[X] OUTDOOR ASM [ ] INDOOR ASM – IF INDOOR, [ ] VENTILATED [X] NON-VENTILATED
[ ] HORIZONTAL [X] VERTICAL UPPER [X] VERTICAL ASM HAS REQUIRED
[ ] VERTICAL LOWER ANGLES ORCHANNELS INSTALLED

[ ] WEATHER SEALS [X] GASKETING [X] CONFIG. [X] ENCL. DIM. H 41 7/8" W 36" L A= 112 5/8" B= 78 1/4"
[X] EXTRUSION HOLES PLUGGED?
[X] TERMINATION TYPE XFMR2 [ ] ATT. BOX DIM. H — W — L —

[X] BUS SUPT. LOCATION MAX. ALLOWED, [X] VAPOR BARRIER 2 HR FIRESTOP
[ ] BUS BRACED FOR VERT. INSTALLATION NOMINAL 48" (LOCATION, CAULKING OK)

[ ] ACCESS COVER LOC. [X] FLANGE [X] ~~FLANGE~~ ADAPTER [X] CORRECT HOLE PATTERN @ TERMINATION

[X] EXTERNAL ENCLOSURE HARDWARE [X] INTERNAL ENCLOSURE HARDWARE

BUS POSITION: [ ] ALUMINUM BUS [X] COPPER BUS
[X] @ SHIPPING SPLITS [X] @ TERMINATIONS [ ] CENTERLINE [ ] PHASE TO PHASE
[X] BUS DRILLING [X] BUS PLATING TYPE: SILVER [X] BUS INSULATION
[X] BUS JOINT TORQUES AND INSULATION [X] HARDWARE, TYPE

GROUND PAD: [X] YES [ ] NO, IF YES [X] INTERNAL [X] EXTERNAL
GROUND BUS: [X] YES [ ] NO, IF YES [X] LOCATION [X] DRILLING [X] HARDWARE
[X] BUS PHASING IS CORRECT INSIDE ASSEMBLY [X] BUS PHASING IS CORRECT TERM TO TERM

CLEARANCES: STRIKE -- [X] PHASE TO PHASE [X] PHASE TO GROUND
CREEP -- [X] PHASE TO PHASE [X] PHASE TO GROUND

HEATER SYSTEM: [X] YES [ ] NOT APPLICABLE
[ ] HEATER [ ] SPECIAL CONDITIONS:
[X] LOCATION ATTACHMENT AND CONNECTIONS [X] EXTENSION LENGTH AND LUG TYPE
[ ] TERMINAL BLOCK LOC. [ ] THERMOSTAT LOC. [ ] JUNCTION BOX LOC. AND TYPE —

APPEARANCE: [X] CLEAN [X] PAINT CURED [X] EXT. PAINT FINISH ANSI 61 [ ] INT. PAINT
[ ] SPECIAL ATTACHMENTS:

PACKAGING:
SHIPPING BRACE REQUIRED [ ] YES [X] NO

ASSEMBLED BY:
CLOCK # 1801
CLOCK #

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TITLE: BUS DUCT INSPECTION REPORT

CUSTOMER NAME ABB Power T&D DATE 3/3/07

PROJECT NUMBER 3475 UNIT UNDER TEST 15 RUN B

INSPECTED BY MAC SPECIAL COMMENTS —

REFERENCE DRAWINGS —

VOLTAGE 5kV [X] ASM #'S ON EACH END [X] WARNING LABELS [ ] NAMEPLATE
AMPERAGE 4,000

CONSTRUCTION:

[X] OUTDOOR ASM [X] INDOOR ASM – IF INDOOR, [ ] VENTILATED [X] NON-VENTILATED
[X] HORIZONTAL [ ] VERTICAL UPPER [ ] VERTICAL ASM HAS REQUIRED
[ ] VERTICAL LOWER ANGLES ORCHANNELS INSTALLED

[X] WEATHER SEALS [X] GASKETING [X] CONFIG. [ ] ENCL. DIM. H 140 W 36.0 L 55 3/4
[X] EXTRUSION HOLES PLUGGED?
[ ] TERMINATION TYPE — [ ] ATT. BOX DIM. H — W — L —

[X] BUS SUPT. LOCATION MAX. ALLOWED [X] VAPOR BARRIER
[ ] BUS BRACED FOR VERT. INSTALLATION NOMINAL 48 (LOCATION, CAULKING OK)

[ ] ACCESS COVER LOC. [ ] FLANGE [ ] FLANGE ADAPTER [ ] CORRECT HOLE PATTERN @ TERMINATION

[X] EXTERNAL ENCLOSURE HARDWARE [X] INTERNAL ENCLOSURE HARDWARE

BUS POSITION: [ ] ALUMINUM BUS [X] COPPER BUS
[X] @ SHIPPING SPLITS [ ] @ TERMINATIONS [X] CENTERLINE [X] PHASE TO PHASE
[X] BUS DRILLING [X] BUS PLATING TYPE: Silver [X] BUS INSULATION
[ ] BUS JOINT TORQUES AND INSULATION [ ] HARDWARE, TYPE —

GROUND PAD: [ ] YES [X] NO, IF YES [ ] INTERNAL [ ] EXTERNAL
GROUND BUS: [X] YES [ ] NO, IF YES [X] LOCATION [X] DRILLING [ ] HARDWARE
[X] BUS PHASING IS CORRECT INSIDE ASSEMBLY [X] BUS PHASING IS CORRECT TERM TO TERM

CLEARANCES: STRIKE -- [X] PHASE TO PHASE [X] PHASE TO GROUND
CREEP -- [X] PHASE TO PHASE [X] PHASE TO GROUND

HEATER SYSTEM: [X] YES [ ] NOT APPLICABLE
[ ] HEATER [ ] SPECIAL CONDITIONS: —
[X] LOCATION, ATTACHMENT AND CONNECTIONS [X] EXTENSION LENGTH AND LUG TYPE
[ ] TERMINAL BLOCK LOC. [X] THERMOSTAT LOC. [X] JUNCTION BOX LOC. AND TYPE Indoor

APPEARANCE: [X] CLEAN [X] PAINT CURED [X] EXT. PAINT FINISH ANSI 61 [X] INT. PAINT
[ ] SPECIAL ATTACHMENTS: —

PACKAGING:
SHIPPING BRACE REQUIRED [ ] YES [X] NO

ASSEMBLED BY:
CLOCK # 1790
CLOCK #

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TITLE: BUS DUCT INSPECTION REPORT **PAGE 1 OF 1**

CUSTOMER NAME ABB Power T+D DATE 3/6/07

PROJECT NUMBER 3475 UNIT UNDER TEST 16 RUN B

INSPECTED BY MAC SPECIAL COMMENTS 316 SS THRU BOLTS @ COVER

REFERENCE DRAWINGS D001, D006

VOLTAGE 5KV [X] ASM #'S ON EACH END [X] WARNING LABELS [X] NAMEPLATE
AMPERAGE 4000

CONSTRUCTION:
[X] OUTDOOR ASM [ ] INDOOR ASM – IF INDOOR, [ ] VENTILATED [X] NON-VENTILATED
[ ] HORIZONTAL [X] VERTICAL UPPER [ ] VERTICAL ASM HAS REQUIRED
[ ] VERTICAL LOWER ANGLES OR CHANNELS INSTALLED

[X] WEATHER SEALS [X] GASKETING [X] CONFIG. [X] ENCL. DIM. H 42" W 36" (46") L 88 1/4"
[X] EXTRUSION HOLES PLUGGED?
[X] TERMINATION TYPE X FMR [ ] ATT. BOX DIM. H — W — L —

[X] BUS SUPT. LOCATION MAX. ALLOWED
[ ] BUS BRACED FOR VERT. INSTALLATION NOMINAL 48" [X] VAPOR BARRIER 2 HR FIRESTOP (LOCATION, CAULKING OK) FIAM

[ ] ACCESS COVER LOC. [X] FLANGE [ ] FLANGE ADAPTER [X] CORRECT HOLE PATTERN @ TERMINATION

[X] EXTERNAL ENCLOSURE HARDWARE [X] INTERNAL ENCLOSURE HARDWARE

BUS POSITION: [ ] ALUMINUM BUS [X] COPPER BUS
[X] @ SHIPPING SPLITS [X] @ TERMINATIONS [X] CENTERLINE [X] PHASE TO PHASE
[X] BUS DRILLING [X] BUS PLATING TYPE: SILVER [ ] BUS INSULATION
[X] BUS JOINT TORQUES AND INSULATION [X] HARDWARE, TYPE STAINLESS

GROUND PAD: [X] YES [ ] NO, IF YES [X] INTERNAL [X] EXTERNAL
GROUND BUS: [X] YES [ ] NO, IF YES [X] LOCATION [X] DRILLING [ ] HARDWARE
[X] BUS PHASING IS CORRECT INSIDE ASSEMBLY [X] BUS PHASING IS CORRECT TERM TO TERM

CLEARANCES: STRIKE -- [X] PHASE TO PHASE [X] PHASE TO GROUND
CREEP -- [X] PHASE TO PHASE [X] PHASE TO GROUND

HEATER SYSTEM: [X] YES [ ] NOT APPLICABLE
[ ] HEATER [ ] SPECIAL CONDITIONS: —
[ ] LOCATION, ATTACHMENT AND CONNECTIONS [X] EXTENSION LENGTH AND LUG TYPE
[ ] TERMINAL BLOCK LOC. [ ] THERMOSTAT LOC. [ ] JUNCTION BOX LOC. AND TYPE —

APPEARANCE: [X] CLEAN [X] PAINT CURED [X] EXT. PAINT FINISH ANSI 61 [ ] INT. PAINT
[ ] SPECIAL ATTACHMENTS: —

PACKAGING:
SHIPPING BRACE REQUIRED [ ] YES [X] NO

ASSEMBLED BY:
CLOCK # 1771
CLOCK #

TECHNIBUS
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Title: Bus Duct Dielectric Test

POWER FREQUENCY WITHSTAND - HIPOT
(ANSI C37.23 -2003 -5.2.3, TABLE 1, 2, 3, 4)

JOB #: T3475 CUSTOMER: ABB DATE: 3-6-07
PROJECT: Treasure Coast Energy Center RATING: 5K
HIPOT MAKE Hospital HIPOT S/N 2004 LAST CAL. DATE: 12-7-06
RELATIVE HUMIDITY 28 % BAROMETRIC PRESSURE 743 mm HG
TEMPERATURE WET BULB 7 Degrees C TEMPERATURE DRY BULB 16 Degrees C

ALL PHASES NOT BEING TESTED ARE GROUNDED DURING TEST.	TEST VOLTAGE (kv 1 min.) / LEAKAGE CURRENT (ma) **						
ASSY'S	Φ 1-G	Φ 2-G	Φ 3-G	Φ 4-G	Φ 5-G	Φ 6-G	WIRES
skid three							
run A	19 KV	19 KV	19 KV	— KV	— KV	— KV	1.5 KV
asm 013	1.8 ma	1.8 ma	1.8 ma	— ma	— ma	— ma	1.2 ma
skid four							
run B	19 KV	19 KV	19 KV	— KV	— KV	— KV	1.5 KV
asm 016	1.8 ma	1.8 ma	1.8 ma	— ma	— ma	— ma	1.1 ma
—	— KV	— KV	— KV	— KV	— KV	— KV	— KV
	— ma	— ma	— ma	— ma	— ma	— ma	— ma

** CURRENT READING MAY NOT ALWAYS REFLECT LEAKAGE OF AN INDIVIDUAL ASSEMBLY. MULTIPLE ASSEMBLIES MAY BE TESTED AT ONCE.

TESTED BY Ronald Nadeau CUSTOMER WITNESS Y (N) —
LOCATION IN SHOP bus duct test area ACCEPTED Y/N —
CUSTOMER SIGNATURE

CONTROL WIRING INSULATION DIELECTRIC TEST
DISCONNECT ALL CIRCUIT GROUNDS AND ANY ELECTRONIC OR OTHER CIRCUIT COMPONENTS THAT MAY BE DAMAGED.
CHECKING TO BE SURE THAT THE CIRCUITS ARE NOT GROUNDED WITH AN OHMMETER, PROCEED TO CLEAR ANY GROUNDS FOUND WITH THIS CHECK.
THIS MUST BE CHECKED POINT TO POINT UNTIL ALL CIRCUITS CHECKED.
[X] APPLY 1500 VOLTS A.C. 60HZ FROM CONTROL WIRING TO GROUND FOR ONE MINUTE.
[ ] ~~APPLY 1800 VOLTS A.C. 60HZ ON EACH WIRE FOR ONE SECOND UNTIL ALL WIRES AND TERMINALS HAVE BEEN TESTED.~~

COMMENTS: stdr 304 ss hsg

PASSED ✓ Ronald J Nadeau
TESTER SIGNATURE

Review does not relieve contractor from responsibility for errors or deviations from contract requirements.

NO EXCEPTIONS NOTED
Release for manufacture

TECHNIBUS
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Title: Bus Duct Dielectric Test

POWER FREQUENCY WITHSTAND - HIPOT

(ANSI C37.23 -2003 -5.2.3, TABLE 1, 2, 3, 4)

JOB #: T3475 CUSTOMER: ABB DATE: 3-6-07

PROJECT: Treasure Coast Energy Center RATING: 5K

HIPOT MAKE Hipotronics HIPOT S/N 204 LAST CAL. DATE: 12-7-06

RELATIVE HUMIDITY 28 % BAROMETRIC PRESSURE 743 mm HG

TEMPERATURE WET BULB 7 Degrees C TEMPERATURE DRY BULB 16 Degrees C

ALL PHASES NOT BEING TESTED ARE GROUNDED DURING TEST.	TEST VOLTAGE (kv 1 min.) / LEAKAGE CURRENT (ma) **						
~~ASSY'S~~	Φ 1-G	Φ 2-G	Φ 3-G	Φ 4-G	Φ 5-G	Φ 6-G	WIRES
skid three run A asm 011	19 KV	19 KV	19 KV	— KV	— KV	— KV	1.5 KV
	1.1 ma	1.0 ma	0.9 ma	— ma	— ma	— ma	0.6 ma
skid three run A asm 012	19 KV	19 KV	19 KV	— KV	— KV	— KV	1.5 KV
	1.6 ma	1.6 ma	1.6 ma	— ma	— ma	— ma	0.5 ma
skid four run B asm 015	19 KV	19 KV	19 KV	— KV	— KV	— KV	1.5 KV
	1.0 ma	1.0 ma	1.0 ma	— ma	— ma	— ma	0.6 ma

** CURRENT READING MAY NOT ALWAYS REFLECT LEAKAGE OF AN INDIVIDUAL ASSEMBLY. MULTIPLE ASSEMBLIES MAY BE TESTED AT ONCE.

TESTED BY Ronald Nadeau CUSTOMER WITNESS Y / (N) —

LOCATION IN SHOP bus duct test area ACCEPTED ~~Y/N~~ —

CUSTOMER SIGNATURE

CONTROL WIRING INSULATION DIELECTRIC TEST

DISCONNECT ALL CIRCUIT GROUNDS AND ANY ELECTRONIC OR OTHER CIRCUIT COMPONENTS THAT MAY BE DAMAGED.
CHECKING TO BE SURE THAT THE CIRCUITS ARE NOT GROUNDED WITH AN OHMMETER, PROCEED TO CLEAR ANY GROUNDS FOUND WITH THIS CHECK.
THIS MUST BE CHECKED POINT TO POINT UNTIL ALL CIRCUITS CHECKED.

[X] APPLY 1500 VOLTS A.C. 60HZ FROM CONTROL WIRING TO GROUND FOR ONE MINUTE.

[ ] ~~APPLY 1680 VOLTS A.C. 60HZ ON EACH WIRE FOR ONE~~ SECOND UNTIL ALL WIRES AND TERMINALS HAVE BEEN TESTED.

COMMENTS: otctr. 304 ss assy

PASSED _____

TESTER SIGNATURE

TECHNIBUS
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Canton, Ohio 44708

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Fax: (330) 478-8377

Title: Bus Duct Dielectric Test

POWER FREQUENCY WITHSTAND - HIPOT
(ANSI C37.23 -2003 -5.2.3, TABLE 1, 2, 3, 4)

JOB #: T3475 CUSTOMER: ABB DATE: 3-3-07
PROJECT: Treasure Coast Energy Center V. RATING: 5K
HIPOT MAKE: Hipotronics HIPOT S/N: 20A LAST CAL. DATE: 12-7-06
RELATIVE HUMIDITY: 28 % BAROMETRIC PRESSURE: 726 mm HG
TEMPERATURE WET BULB: 8 Degrees C TEMPERATURE DRY BULB: 17 Degrees C

ALL PHASES NOT BEING TESTED ARE GROUNDED DURING TEST.	TEST VOLTAGE (kv 1 min.) / LEAKAGE CURRENT (ma) **						
ASSY'S	Φ 1-G	Φ 2-G	Φ 3-G	Φ 4-G	Φ 5-G	Φ 6-G	WIRES
skid one run A asm 001	19 KV	19 KV	19 KV	— KV	— KV	— KV	— KV
	1.2 ma	1.2 ma	1.2 ma	— ma	— ma	— ma	— ma
skid two run B asm 002	19 KV	19 KV	19 KV	— KV	— KV	— KV	— KV
	1.2 ma	1.2 ma	1.2 ma	— ma	— ma	— ma	— ma
	— KV	— KV	— KV	— KV	— KV	— KV	— KV
	— ma	— ma	— ma	— ma	— ma	— ma	— ma

** CURRENT READING MAY NOT ALWAYS REFLECT LEAKAGE OF AN INDIVIDUAL ASSEMBLY. MULTIPLE ASSEMBLIES MAY BE TESTED AT ONCE.

TESTED BY Ronald J. Nadeau CUSTOMER WITNESS Y ~~N~~ —
LOCATION IN SHOP bus duct test area ACCEPTED ~~Y/N~~ —
CUSTOMER SIGNATURE

CONTROL WIRING INSULATION DIELECTRIC TEST
DISCONNECT ALL CIRCUIT GROUNDS AND ANY ELECTRONIC OR OTHER CIRCUIT COMPONENTS THAT MAY BE DAMAGED.
CHECKING TO BE SURE THAT THE CIRCUITS ARE NOT GROUNDED WITH AN OHMMETER, PROCEED TO CLEAR ANY GROUNDS FOUND WITH THIS CHECK.
THIS MUST BE CHECKED POINT TO POINT UNTIL ALL CIRCUITS CHECKED.
[ ] ~~APPLY 1500~~ VOLTS A.C. 60HZ FROM CONTROL WIRING TO GROUND FOR ONE MINUTE.
[ ] ~~APPLY 1800~~ VOLTS A.C. 60HZ ON EACH WIRE FOR ONE SECOND UNTIL ALL WIRES AND TERMINALS HAVE BEEN TESTED.

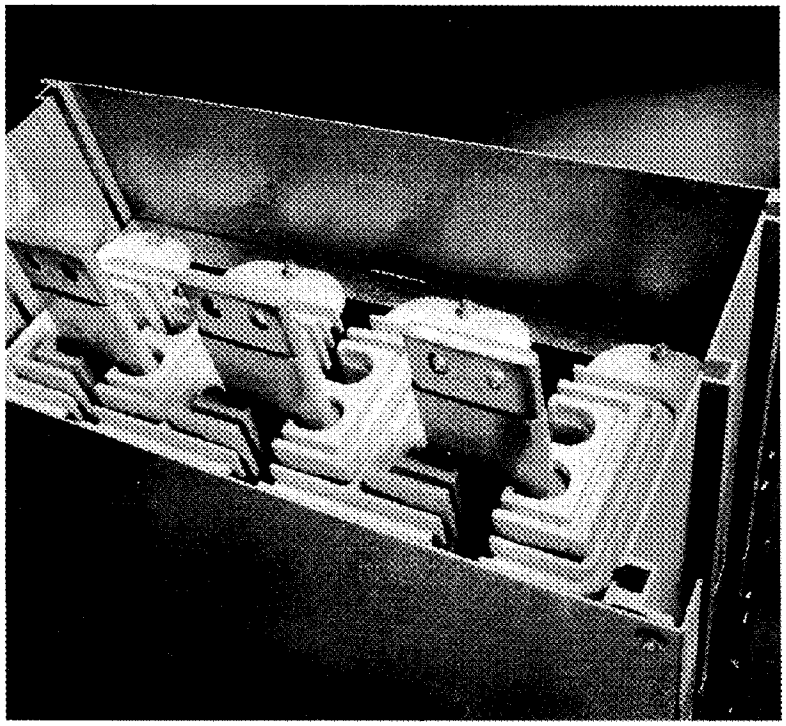
COMMENTS: indr alum bus

PASSED Ronald J. Nadeau
TESTER SIGNATURE

Review does not relieve contractor from responsibility for errors or deviations from contract requirements.

NO EXCEPTIONS NOTED
Release for manufacture

Technibus™



Instruction Manual

TECHNIBUS

Metal Enclosed Bus Systems

Review does not relieve contractor from responsibility for errors or deviations from contract requirements.

NO EXCEPTIONS NOTED
Release for manufacture

Utility Engineering TREASURE COAST ENERGY CENTER, PB1 M012525-APDZ007 RP JeffY 7/16/2007

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TECHNIBUS

Metal Enclosed Bus Systems

Introduction

All aspects of installation, operation and maintenance of the Technibus™ Metal Enclosed Bus System must be thoroughly understood and performed under the supervision of qualified personnel.

Responsible personnel should establish procedures which insure the safety of personnel and equipment. Specific safety-related procedures are not covered by this manual. Please refer to all installation drawings, other equipment manufacturers' specifications, appropriate ANSI or NEMA requirements and your own company's safety rules.

Information contained in this manual is to be used in conjunction with installation drawings provided for each system. Installation drawings typically include the drawings listed below which establish ratings and identify specific project requirements - which may vary from standard product features described in this manual.

Installation Drawings

- Bus Duct Layout Plan and elevation views of duct routing. This drawing also lists and identifies all assemblies provided by the factory. Typical cross-sectional view of duct, providing ratings, housing size, weight per foot, material descriptions, and bus duct structural support locations.

- Equipment Terminations
  Details of the bus and enclosure connection to the equipment.

- Ship Loose Bill of Materials
  Lists and identifies all parts required for field assemblies.

Product Description

Ratings

Each Technibus system is designed to meet the voltage, amperage, and fault level requirements specified on the drawing(s) provided.

Conductors

Copper or aluminum is sized in accordance with the specified ratings to operate within ANSI C37.23 temperature rise limitations.

Conductor Joints

Contact surfaces are prepared and plated to satisfy the specific application. Refer to our equipment termination drawings and shipping split assembly illustrations for specific hardware requirements.

Insulation

Factory insulation is not required on 600 volt conductors. The 5-38 kV conductors are insulated with 130° C epoxy coating.

Bus Support Insulators

Technibus bus support insulators are furnished to suit the electrical and mechanical requirements specified for each installation. Molded glass polyester is standard for systems rated up to 15,000 volts. Porcelain is optional for 5 & 15 kV. Porcelain is standard for 34,000 volt systems.

Enclosure

Painted, non-magnetic aluminum enclosures eliminate hysteresis losses. Due to it's inherent high conductivity, it also minimizes induced I^2R losses.

Technibus's high conductivity aluminum enclosures also shield external steel members from undesirable magnetic heating.

Outdoor installations

- Top and sides are not ventilated
- Screened breather/drains are provided along enclosure bottom to prevent accumulation of moisture
- All exposed hardware is stainless steel
- Gaskets are concealed to prevent deterioration
- Electric space heaters are provided to prevent the formation of internal condensation

Indoor installations

- Non-ventilated or ventilated enclosures may be provided as specified
- All hardware is plated steel

Expansion

Provisions for the bus and enclosure expansion are furnished as required by the configuration and lengths of each system.

Grounding

The entire length of the enclosure must be properly grounded. Mating surfaces of ground bonds are unpainted to assure continuity. External or internal pads are provided for connection to the station ground. When specified, a separate ground bus attaching to the equipment ground may be provided as an option.

Structural Supports

Our Indoor and Outdoor structures will be painted to match the enclosure. Refer to illustration drawings and the Bus Duct Layout drawing for the suggested support locations and source of supply.

Shipping and Crating

Standard crating is suited for shipment via common carrier, motor freight, and indoor storage. Crates may be marked to indicate special handling and/or storage procedures. Each crate will be marked with job number, customer purchase order number, special markings, shipping address, description, and weight (see diagram). A ship loose bill of materials will be supplied with each job that will show all assemblies, assembly kits, and accessories. Ship Loose Bill of Material examples are shown on page 8

Sample Crate Markings

TECHNIBUS

Metal Enclosed Bus Systems

Job No. _____

P.O. No. _____

Ship To: _____

Description: _____

Weight: _____

Lifting

Sling the bus package with lifting slings and a spreader bar so the weight is distributed equally as shown on page 9.

Caution Caution Caution Caution Caution
Do not stack any of the shipping crates as damage may occur.

Long Term Indoor Storage

The storage area must be clean and dry to prevent condensation and corrosion. ***Note: Equipment should be subjected to a power frequency withstand test (see test section) prior to storage exceeding three (3) months.***

Temporary Outdoor Storage

Place timbers between the package and the ground. The Package should be covered with tarpaulin immediately after unloading. The area must be well drained to prevent flood damage. Weatherproof coverings which will minimize condensation will be supplied.

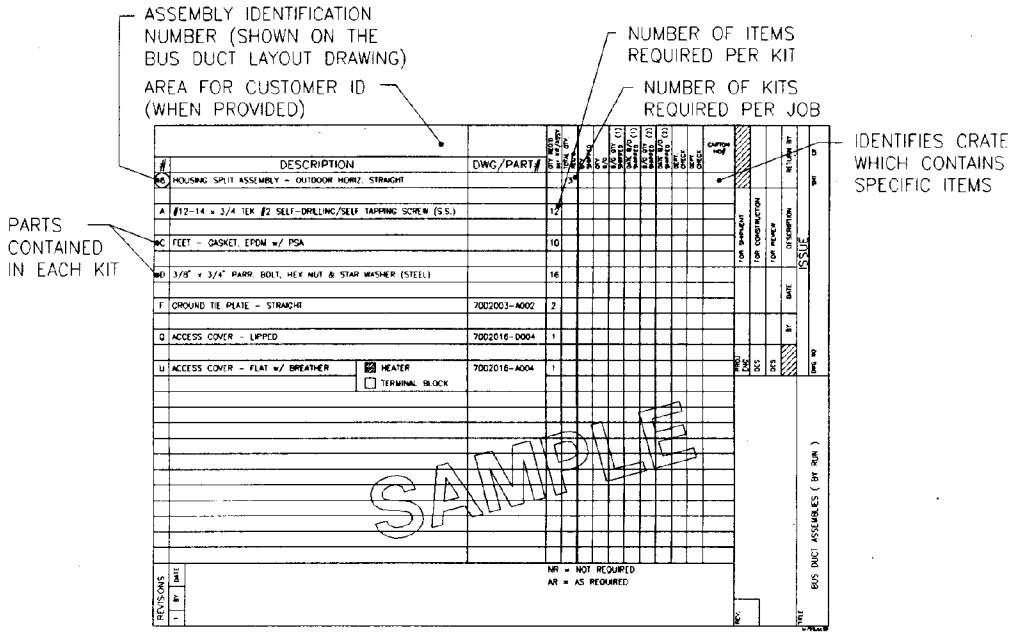
Damages

Any evidence of damage must be reported and a claim filed with the carrier. Contact Technibus to initiate corrective action.

Shortages

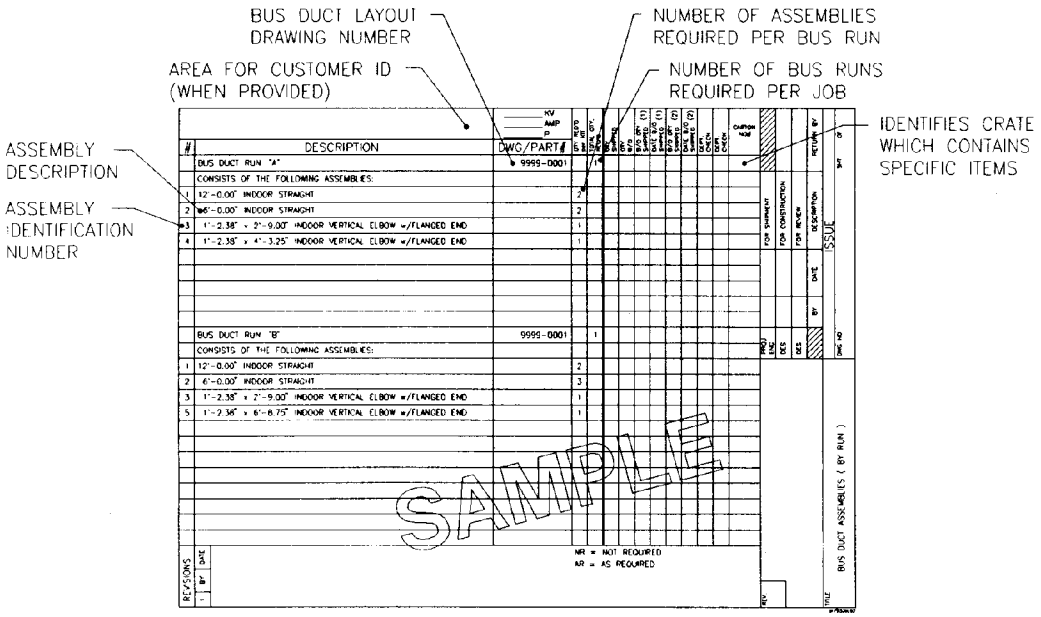
Verify that all shipping manifest items have been received. Report shortages to the carrier and Technibus immediately. ***Failure to report shortages may result in an increased cost which is not the responsibility of Technibus.***

Ship Loose Bill of Material Examples



Ship Loose Bill-of-Material

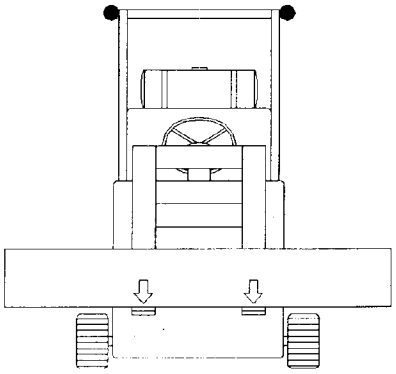
FOR FIELD ASSEMBLY KITS
(EQUIPMENT TERMINATIONS, HOUSING AND BUS BAR SPLITS, ETC.)



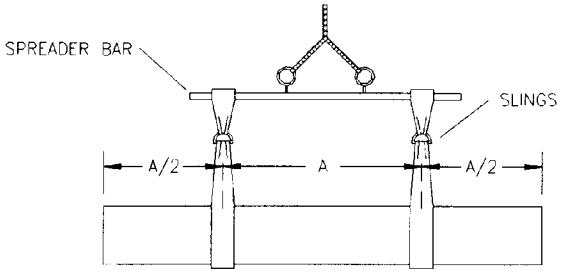
Ship Loose Bill-of-Material

FOR BUS DUCT SECTIONS AND ACCESSORIES

Equipment Handling Illustrations



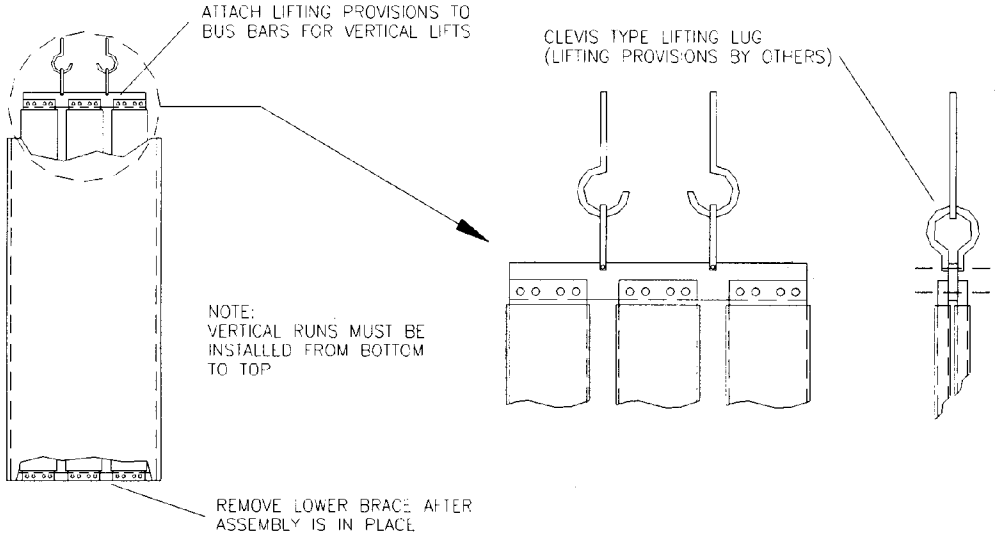
Fork Lift



24'-0" MAX.

Sling

(SLING BUS SECTION SO WEIGHT IS DISTRIBUTED EQUALLY)



Lifting Vertical Sections

Drawings

Installation drawings described in the introduction of the manual are essential to identify and assemble the bus system.

Warning Warning Warning Warning
Installation should not be attempted without a complete understanding of the information provided by the drawings.

Identification

Each assembly is marked with the corresponding item and shipping split orientation numbers which appear on the Bus Duct Layout drawing(s). Packages containing miscellaneous loose parts required to assemble shipping splits and equipment terminations are identified using this same method.

Lifting Individual Assemblies

Care must be taken to avoid damaging the enclosure and finish when lifting and handling the equipment. Forklifts and slings are most commonly used for this purpose. Typical illustrations are provided on page 9.

Shipping Fixtures

Some assemblies require fixtures to prevent bus movement or damage during handling and installation. Fixtures must be removed after the assembly has been positioned and properly secured.

Contamination

Steps must be taken to avoid entry of dirt and contaminates during installation.

Prior to testing or operation of system:

- Remove all foreign objects and tools from enclosure
- Consult Technibus concerning contaminated insulation system
- Mask breathers and louvers when applying touch-up paint or using solvents on or near the enclosure
- Operate heaters to eliminate moisture from interior components

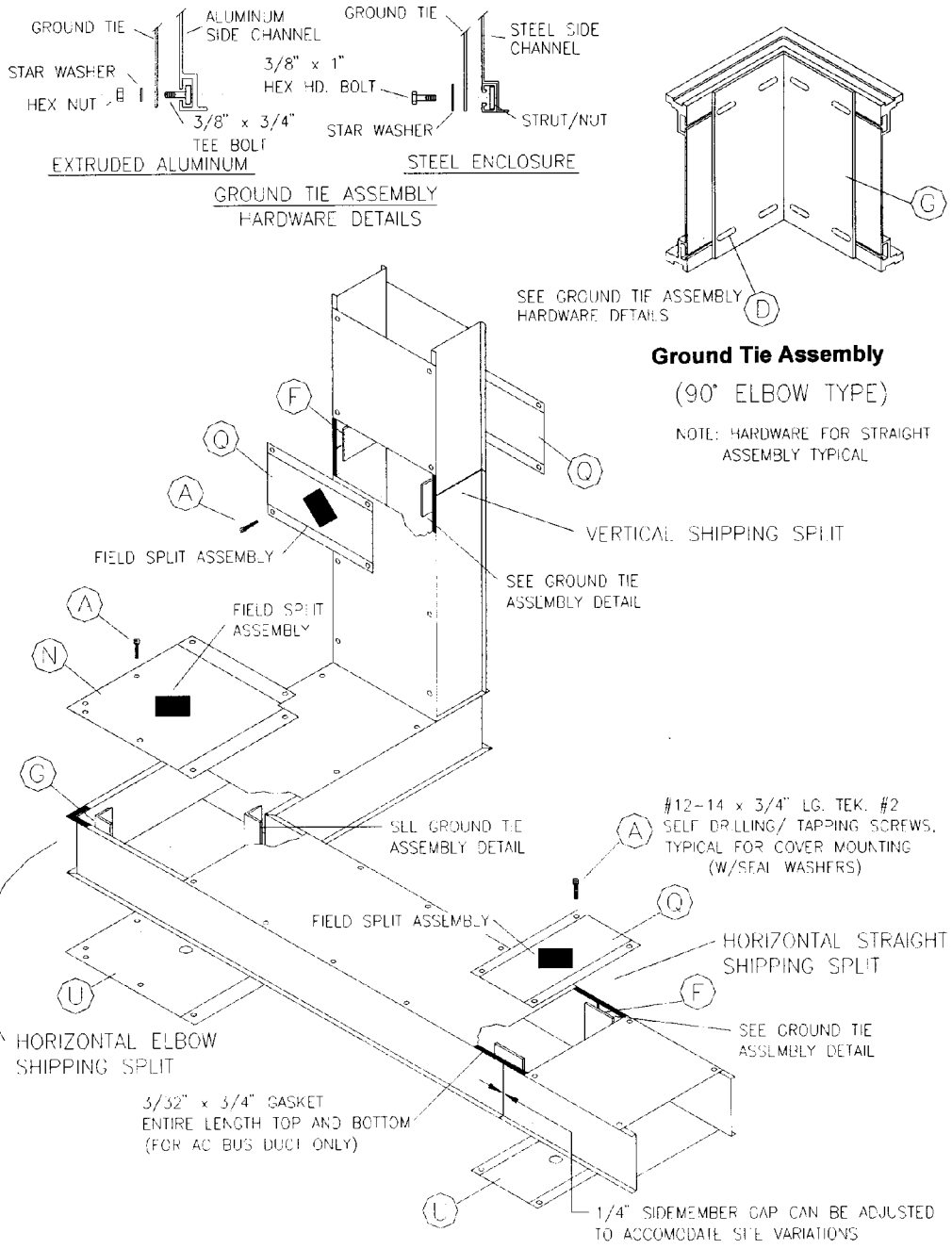
Assembly

All assemblies should be in place and the bus duct properly positioned at the equipment terminals **before** housing and conductor hardware are torqued to the proper levels and insulation is applied to the bus bar joints. **Note: Bus Duct enclosures are designed based on a 1/4" adjustment gap between side members. This gap may be increased or decreased to accommodate specific site variations.**

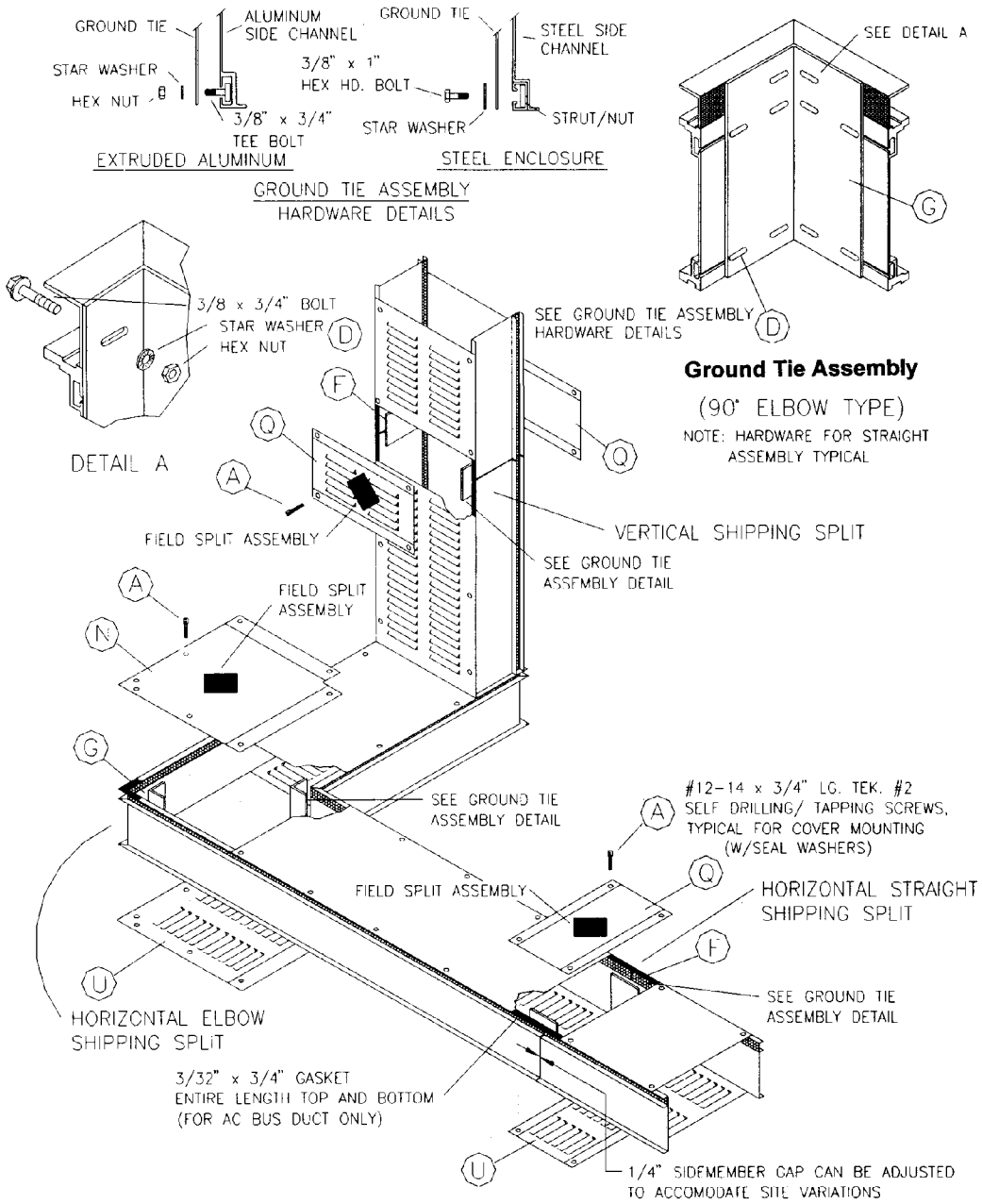
Modifications

Any alterations or field modifications made to the Technibus bus duct systems which deviate from the installation drawings or this manual require written authorization by Technibus before work is performed. Failure to obtain written approval will result in the voiding of the equipment warranty.

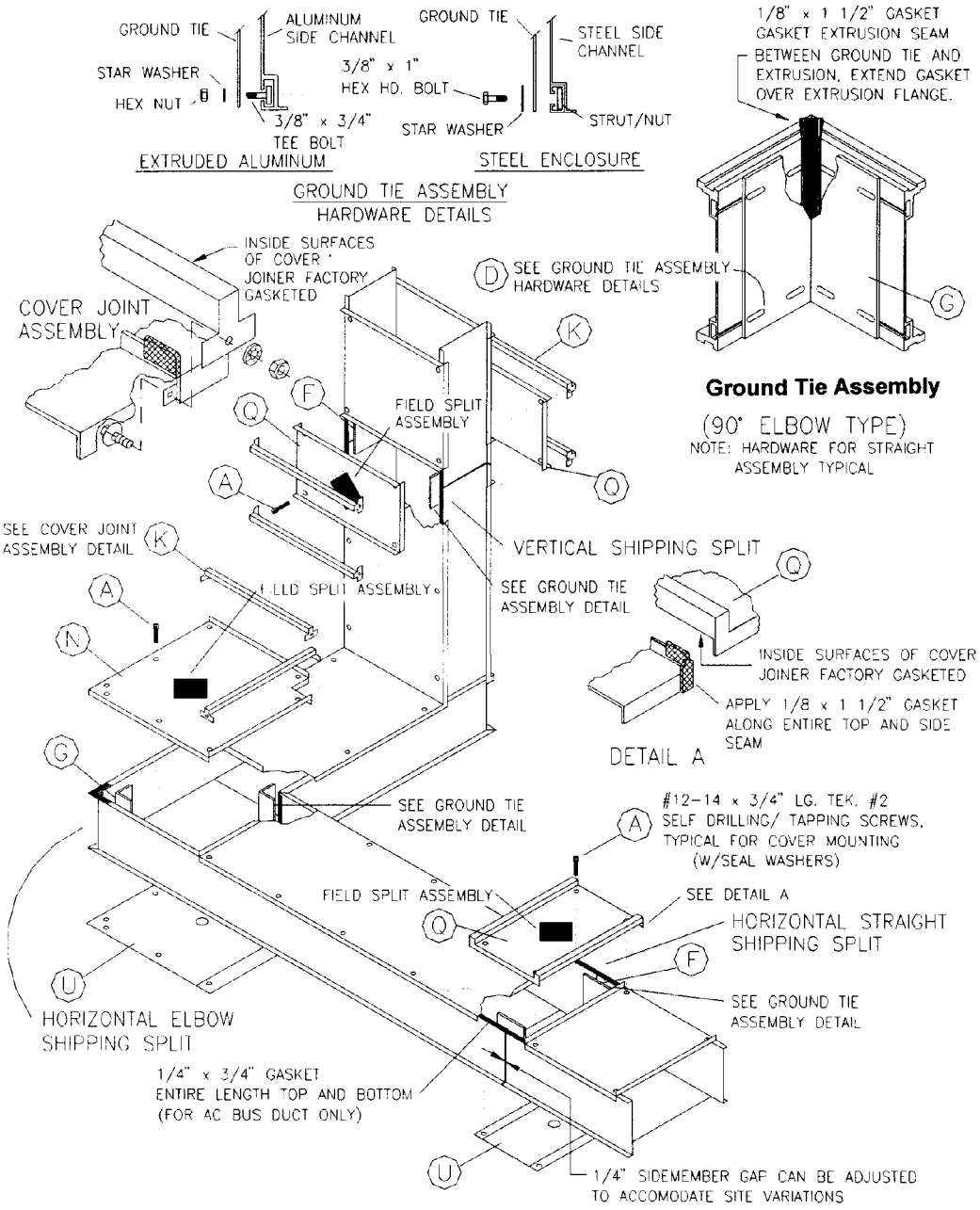
Indoor Non-Vented Enclosure Assembly Illustration



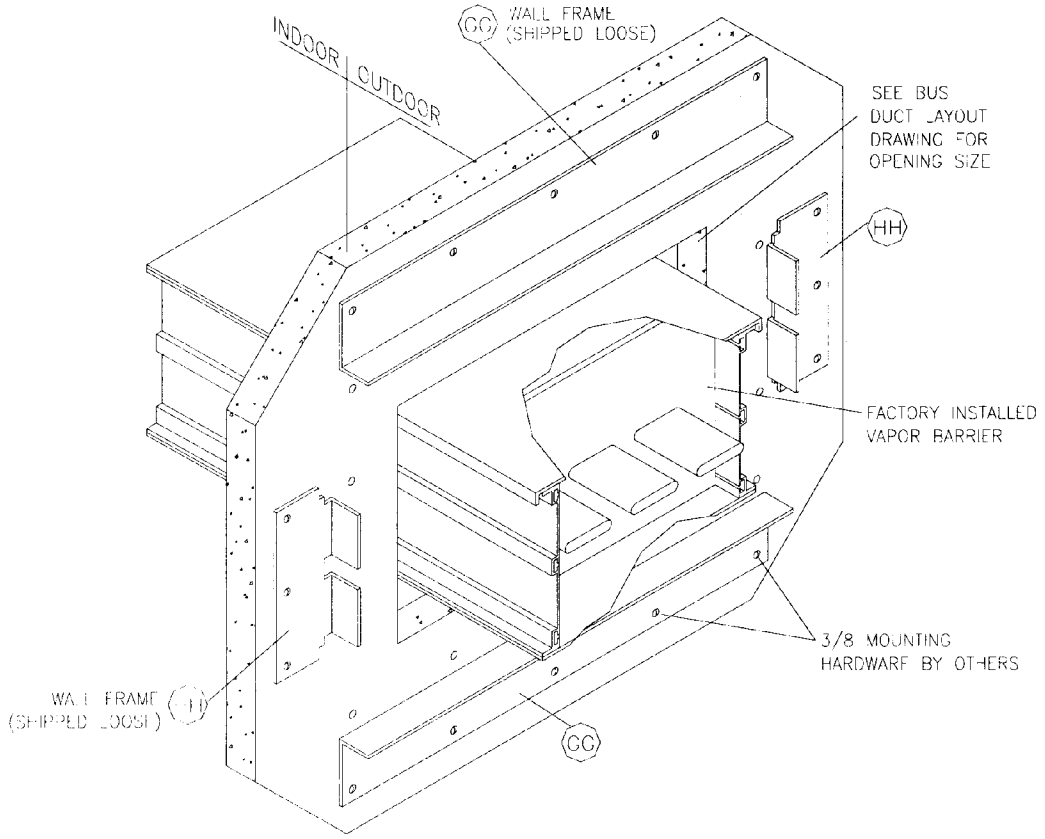
Indoor Vented Enclosure Assembly Illustration



Outdoor Non-Vented Enclosure Assembly Illustration

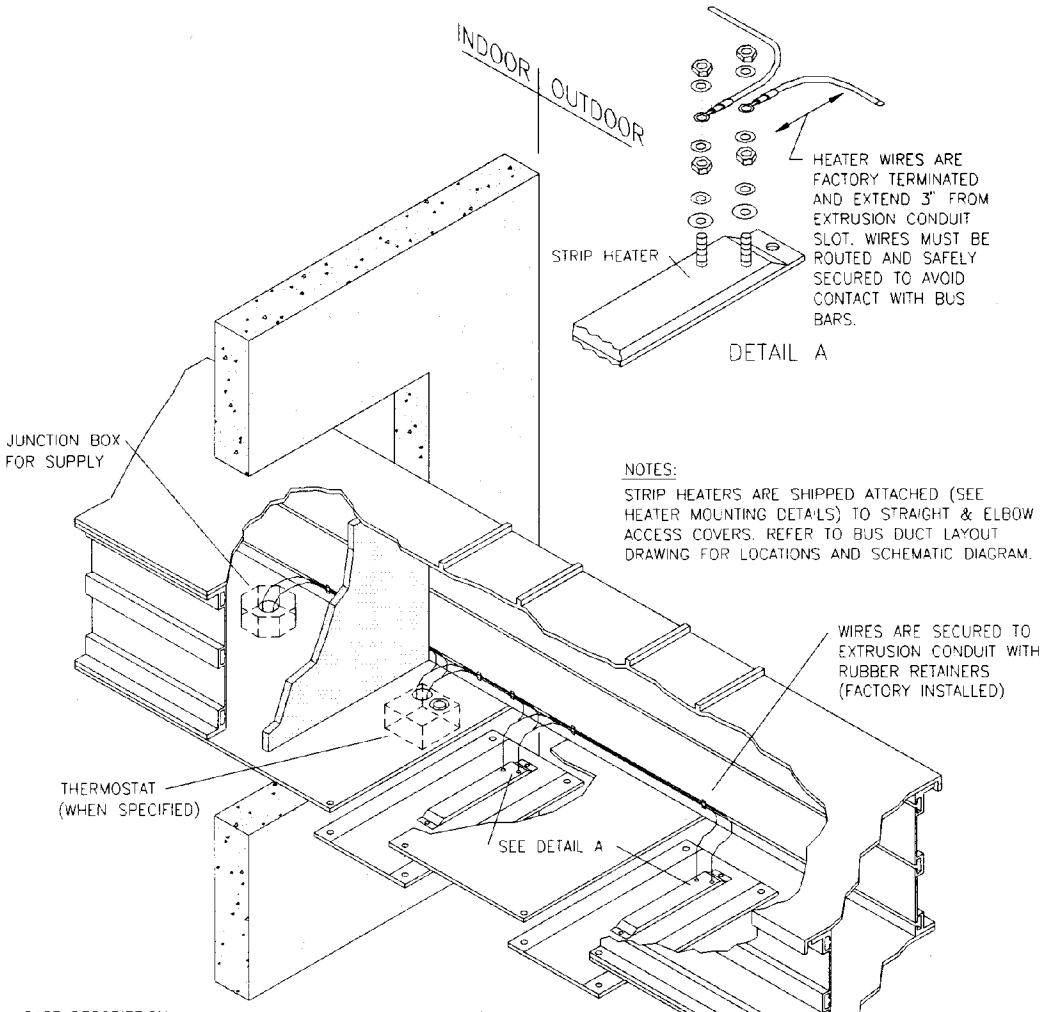


Wall Entrance Assembly Illustration



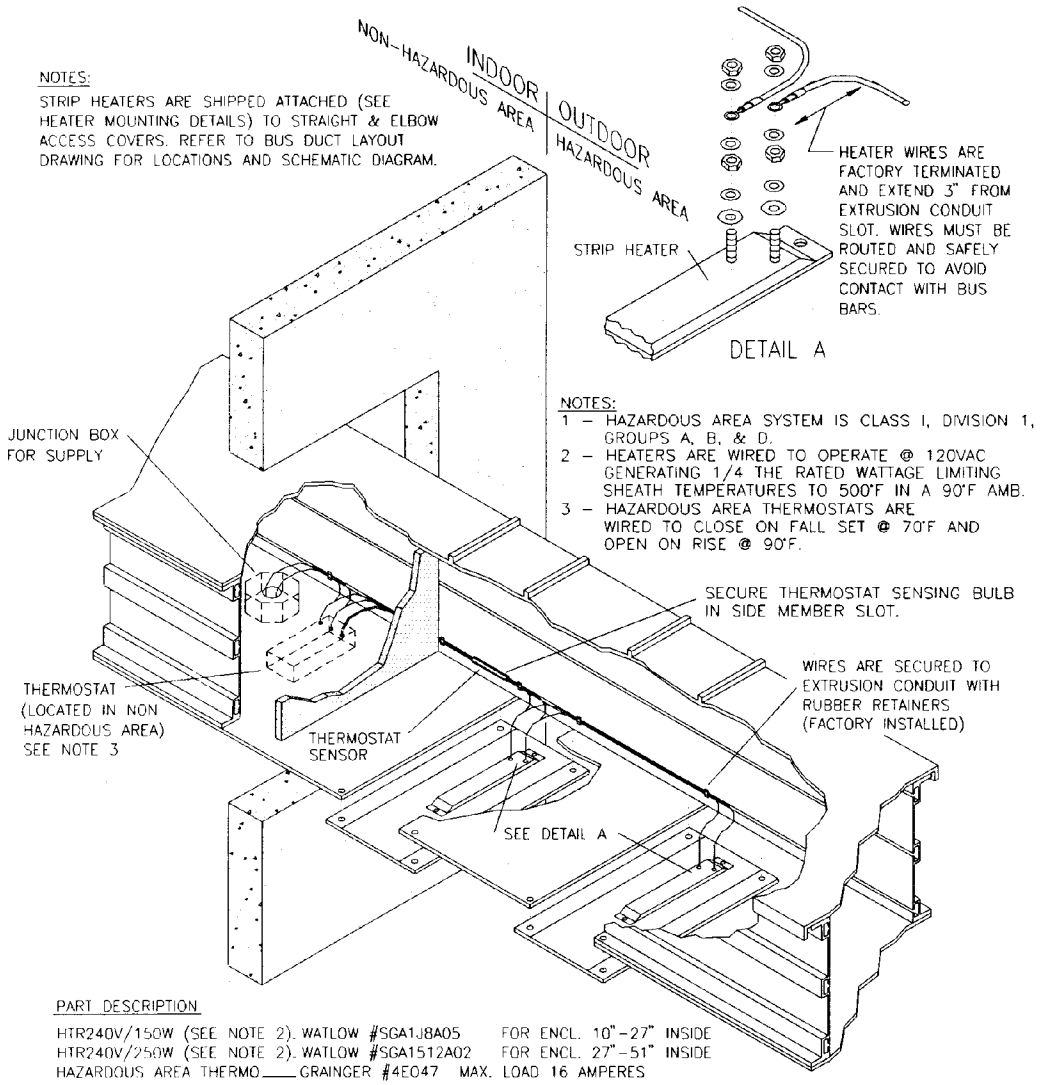
Installation Note: Flash and caulk to suit during installation.

Heater System Assembly Illustration - Standard



PART DESCRIPTION	
HTR240V/150W (SEE NOTE 2)	WATLOW #SGA1J8A05 FOR ENCL. 10"-27" INSIDE
HTR240V/250W (SEE NOTE 2)	WATLOW #SGA1512A02 FOR ENCL. 27"-51" INSIDE
STD THERMO	THERMODISC 202877 MAX. LOAD 25 AMPERES PRESET TO CLOSE @ 95°F & OPEN @ 110°F
OUTDOOR JUNCT BOX	APPLETON JIC-2
INDOOR JUNCT BOX	1-1/2 X 4 X 4
WIRE RETAINER	AKRON GASKET 3/16 X 5/8 X 5/8 NEOPRENE
LUGS	PENN UNION YA25-2N
TERMINAL BLOCK TRW 2-150	NEWARK 29F731
WIRE	#12 SHIELDED UNLESS OTHERWISE SPECIFIED

Heater System Assembly Illustration - Hazardous Area



PART DESCRIPTION

HTR240V/150W (SEE NOTE 2).	WATLOW #SGA1J8A05	FOR ENCL. 10"-27" INSIDE
HTR240V/250W (SEE NOTE 2).	WATLOW #SGA1512A02	FOR ENCL. 27"-51" INSIDE
HAZARDOUS AREA THERMO	GRAINGER #4E047	MAX. LOAD 16 AMPERES
OUTDOOR JUNCT BOX	APPLETON JIC-2	
INDOOR JUNCT BOX	1-1/2 X 4 X 4	
WIRE RETAINER	AKRON GASKET 3/16 X 5/8 X 5/8 NEOPRENE	
LUGS	PENN UNION YA25-2N	
TERMINAL BLOCK TRW 2-150	NEWARK 29F731	
WIRE	#12 SHIELDED UNLESS OTHERWISE SPECIFIED	

Ground System Assembly Illustration

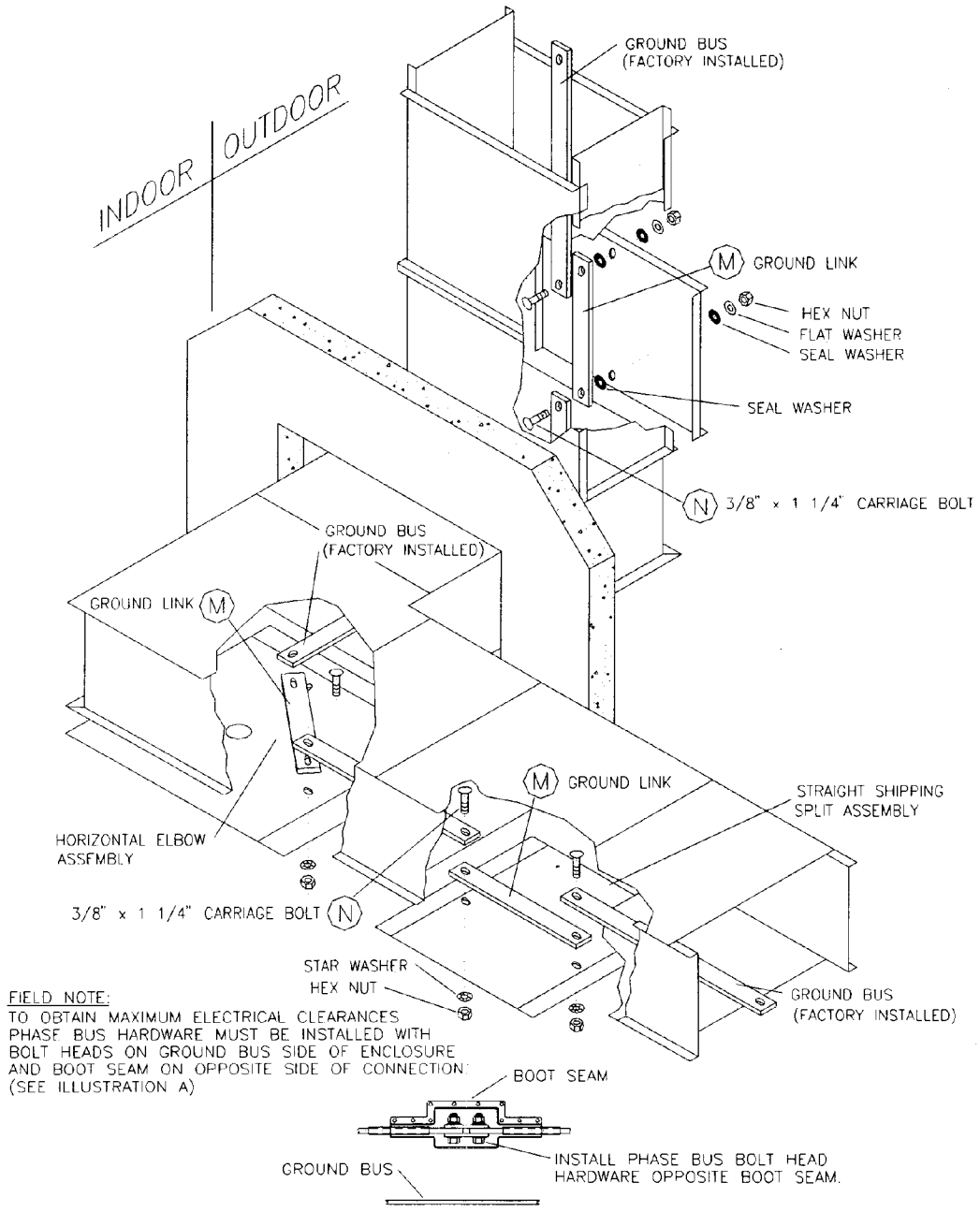
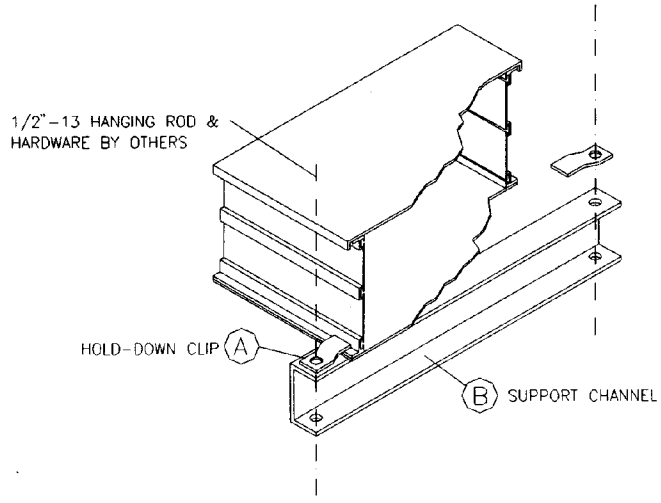
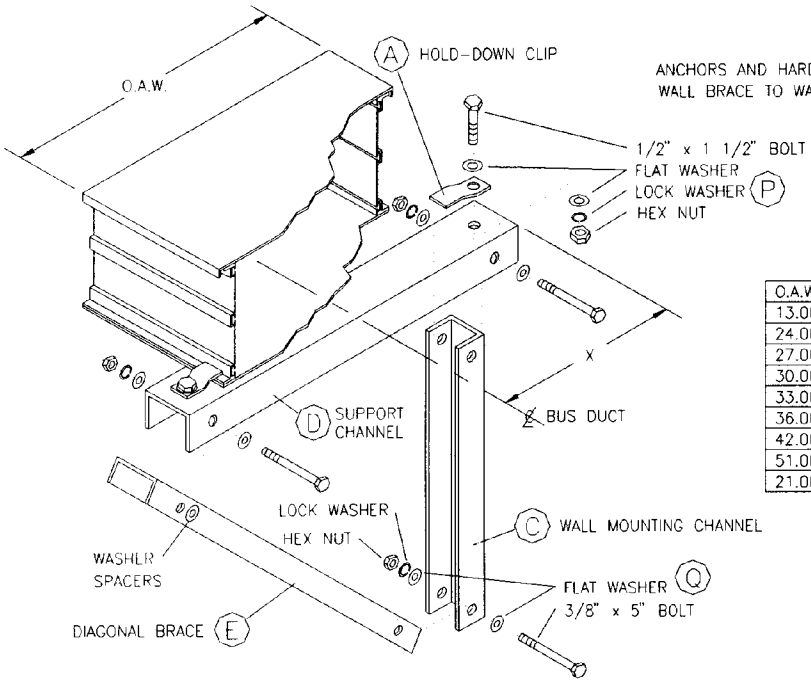


Illustration A

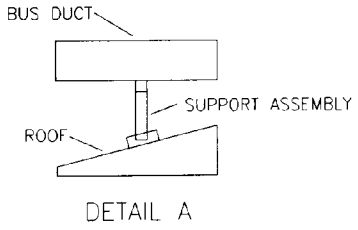
Hanger and Wall Brace Support Assembly Illustrations





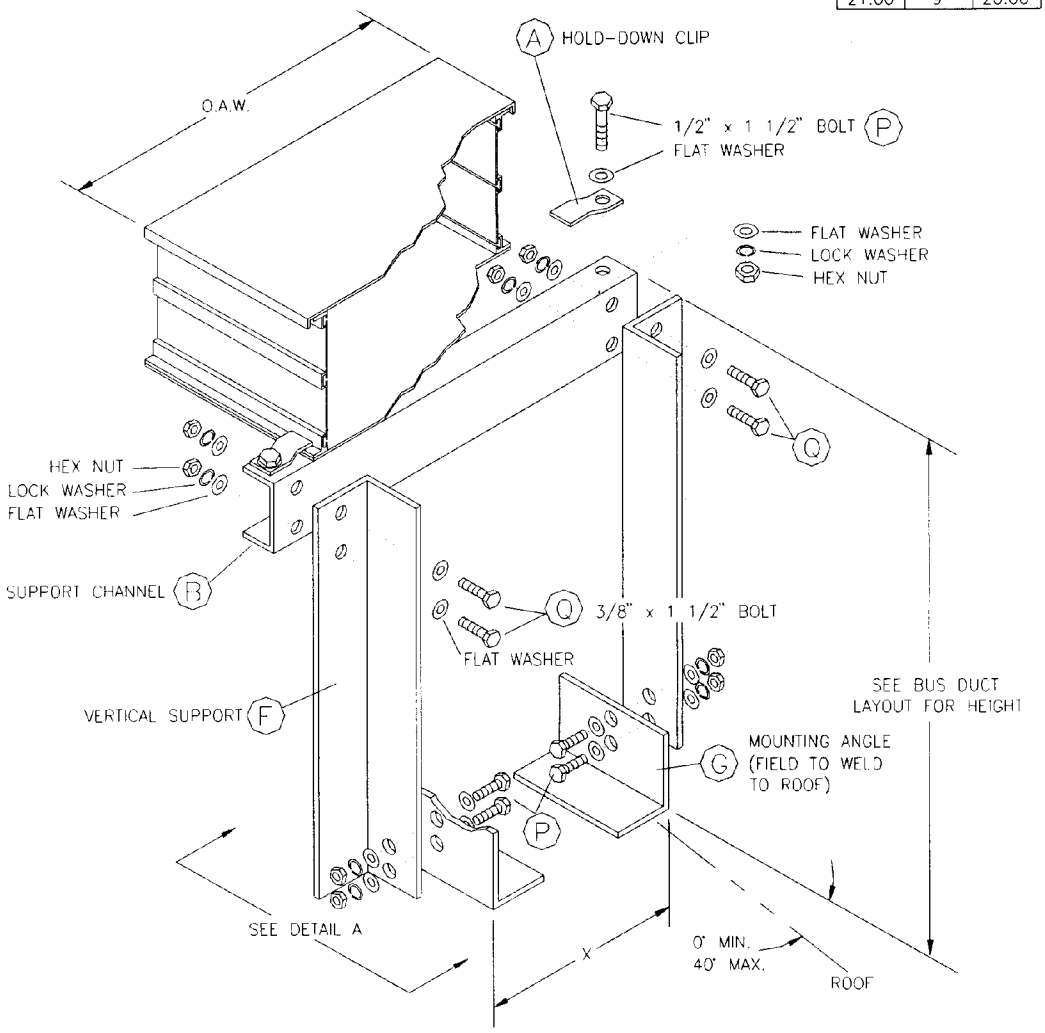
O.A.W.	TYPE	X
13.00	1	13.00
24.00	2	18.00
27.00	3	20.00
30.00	4	21.00
33.00	5	23.00
36.00	6	24.00
42.00	7	27.00
51.00	8	33.00
21.00	9	16.00

Roof Support - Style I Assembly Illustration

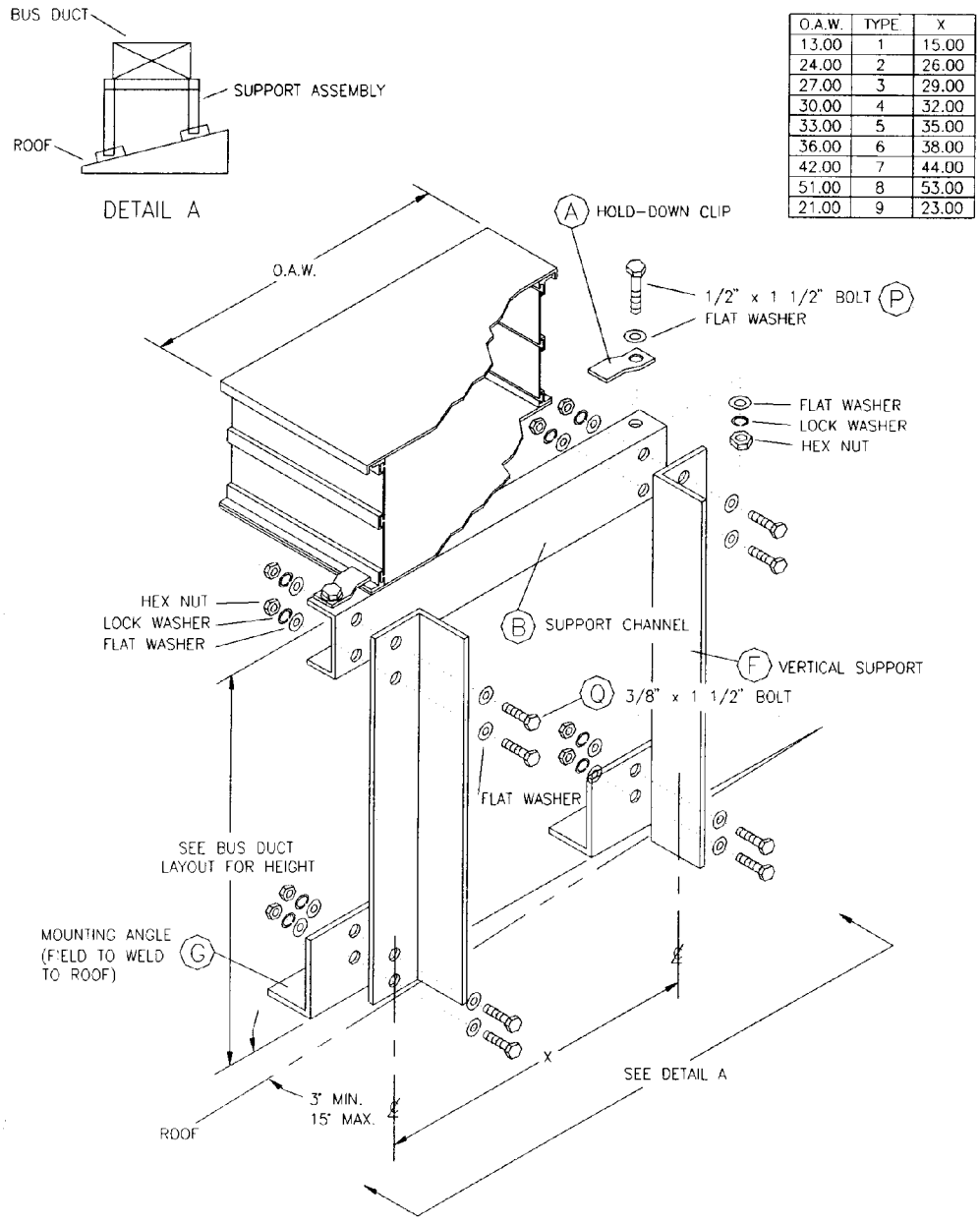


DETAIL A

O.A.W.	TYPE	X
13.00	1	12.00
24.00	2	23.00
27.00	3	26.00
30.00	4	29.00
33.00	5	32.00
36.00	6	35.00
42.00	7	41.00
51.00	8	50.00
21.00	9	20.00

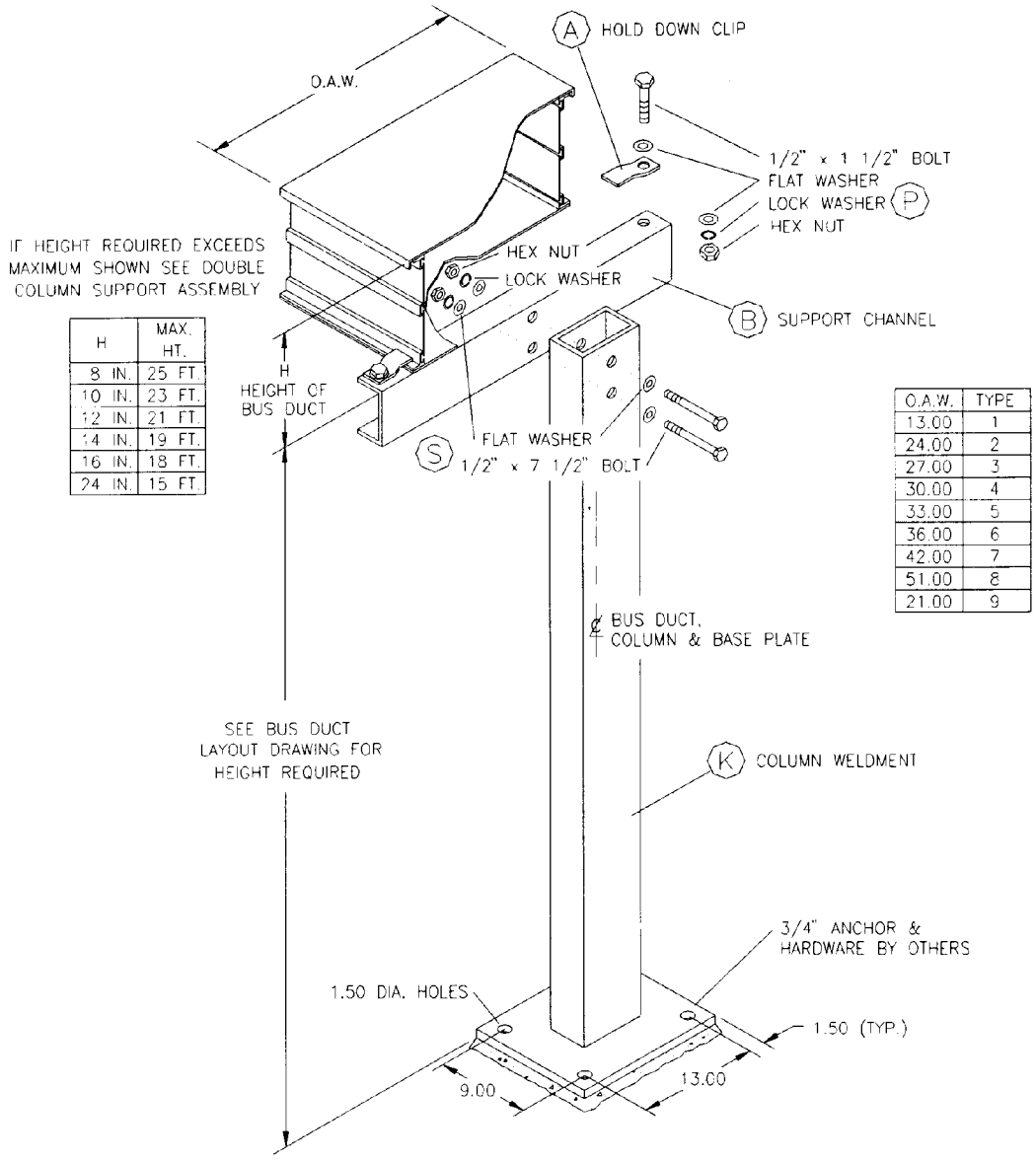


Roof Support - Style II Assembly Illustration



O.A.W.	TYPE	X
13.00	1	15.00
24.00	2	26.00
27.00	3	29.00
30.00	4	32.00
33.00	5	35.00
36.00	6	38.00
42.00	7	44.00
51.00	8	53.00
21.00	9	23.00

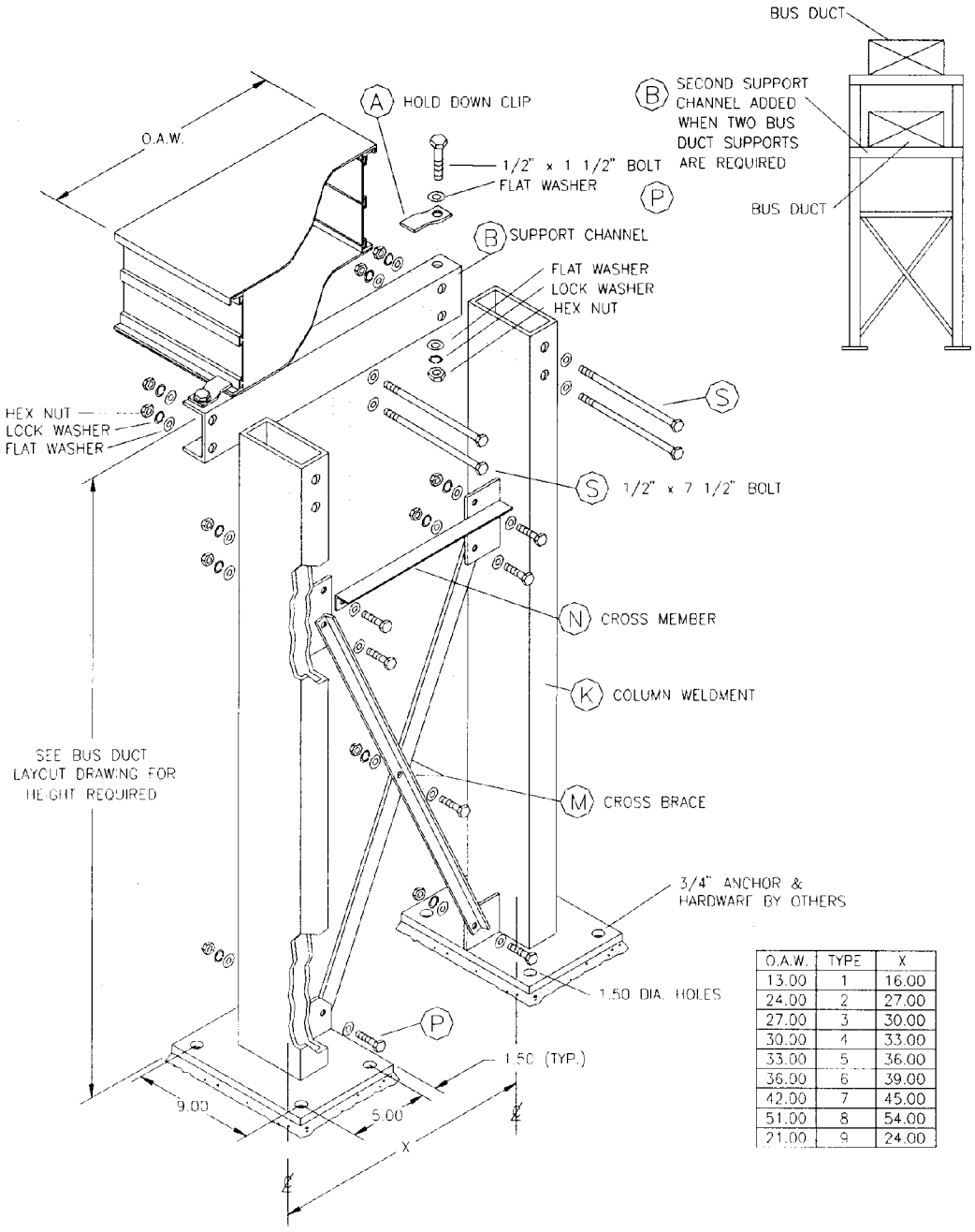
Single Column Support Assembly Illustration



H	MAX. HT.
8 IN.	25 FT.
10 IN.	23 FT.
12 IN.	21 FT.
14 IN.	19 FT.
16 IN.	18 FT.
24 IN.	15 FT.

O.A.W.	TYPE
13.00	1
24.00	2
27.00	3
30.00	4
33.00	5
36.00	6
42.00	7
51.00	8
21.00	9

Double Column Support Assembly Illustration



O.A.W.	TYPE	X
13.00	1	16.00
24.00	2	27.00
27.00	3	30.00
30.00	4	33.00
33.00	5	36.00
36.00	6	39.00
42.00	7	45.00
51.00	8	54.00
21.00	9	24.00

Bus Joint Assembly / Torque Requirements

Alignment

To fully utilize the enclosure and bus alignment provided at each shipping split and equipment connections, do not tighten or insulate connections until the entire system has been installed and properly aligned with equipment terminals.

Contact Surfaces

Prior to assembly of a bus joint, inspect contact surfaces for evidence of contamination. When necessary, a mild, non-metallic abrasive (such as Scotch brite), may be required. However, care must be taken to assure that silver plating is not removed during the cleaning process.

Caution Caution Caution Caution

Application of joint compounds or cleaning agents may result in damage to insulating materials and, for this reason, should not be used for cleaning of assembly or bus joints. Refer to the spare parts list for approved insulation and contact cleaning agent.

Typical Bus Joint

The illustrations shown on the following pages may not represent actual configurations furnished. Refer to specific details shown on the Bus Duct Layout and Termination drawings provided for hardware and splice plate descriptions.

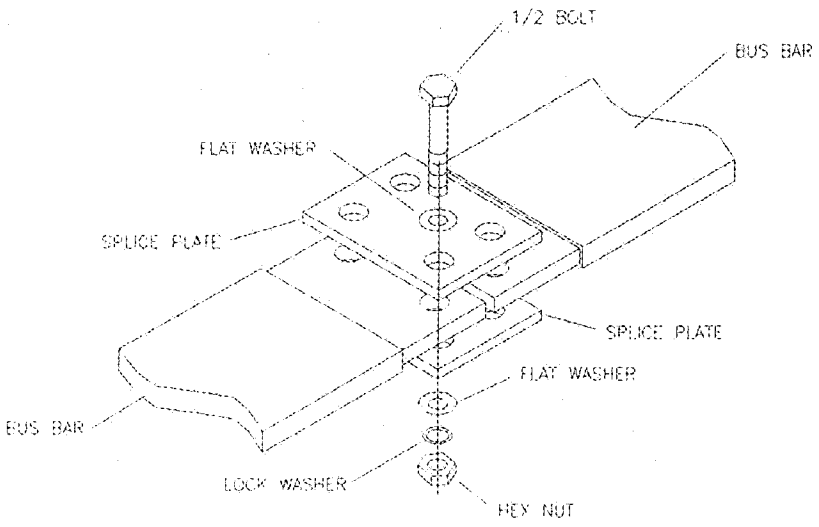
Copper Bus Joints

Copper bus joints will be assembled with split type lock washers. Use the following torque values corresponding to the material furnished. After the hardware has been installed and tightened, re-check torque to assure that loads have been evenly distributed.

	Torque in lbs.	Torque in ft. lbs. for each hardware size:			
Material	5/16	3/8	1/2	5/8	3/4
Grade 5 Plated Steel	215-240	25-30	50-55	65-70	75-80
Stainless Steel	165-180	20-25	40-45	50-55	-
Silicone Bronze	140-150	15-20	30-35	40-45	-

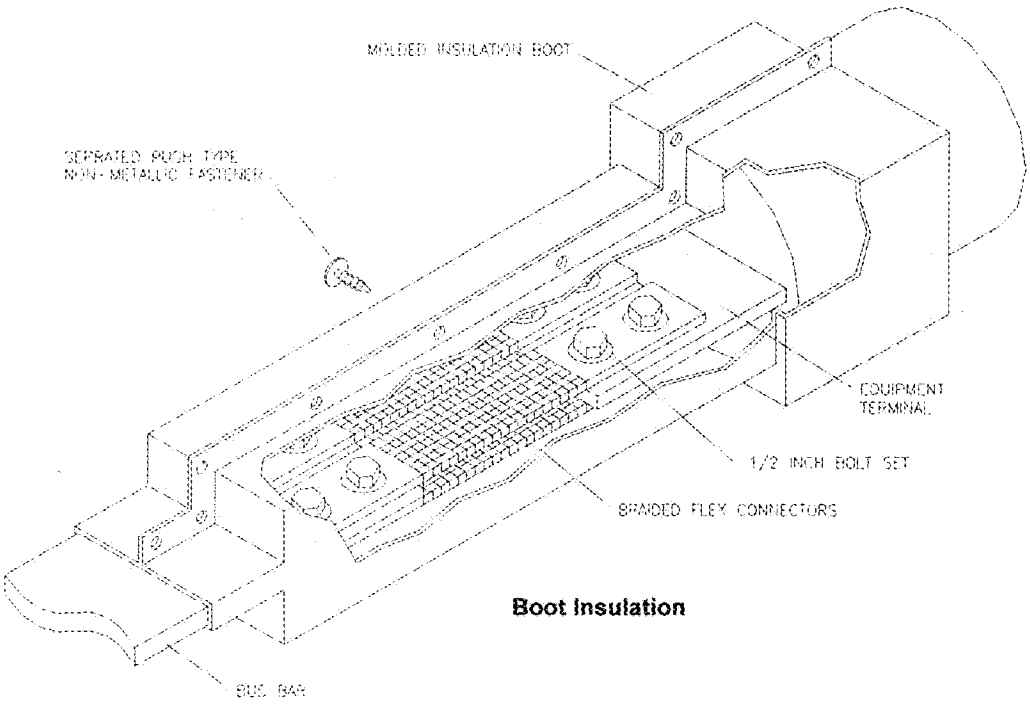
Aluminum Bus Joints

Aluminum bus joints are to be tightened to assure that the belleville has been flattened. DO NOT back off after the belleville has reached the flat condition.



Boot Insulation

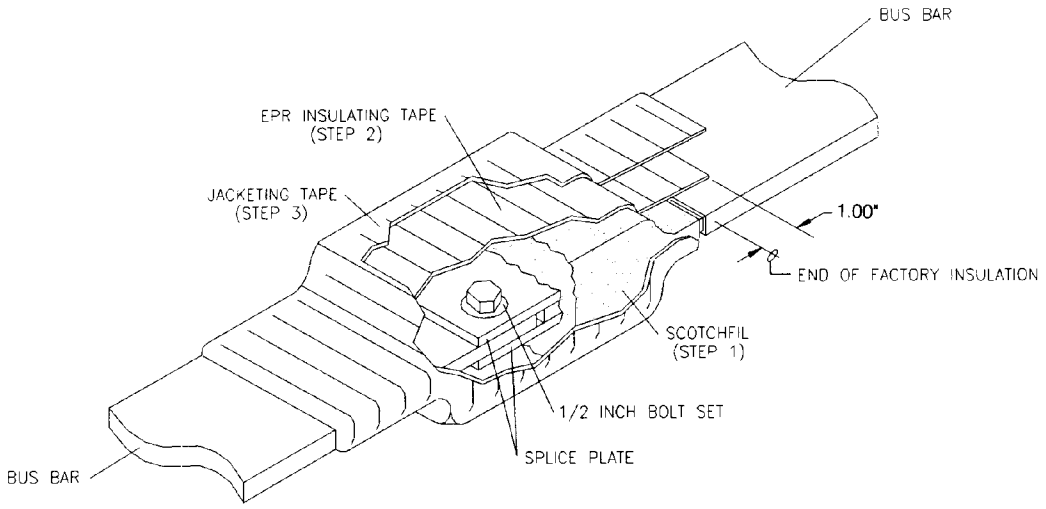
Insulation boots are secured around the bus joint using serrated push-type non-metallic fasteners. ***DO NOT substitute with metallic fasteners or tie-wrap type devices which may contain metallic materials. Boots should be installed to obtain the maximum electrical clearances.***



Boot Insulation

600 - 5000 V Insulating Instructions

1. Apply one (1) half-lapped layer of 1 1/2 inch 3M Brand Scotchfil (or approved equal) over bare conductor and hardware to cover and smooth out the surface. Blend contour into factory insulated surfaces.
2. Wrap joint with (1) half-lapped layer of 1 1/2 inch 3M Brand #130c EPR tape stretching to approximately 2/3 of its original width. Overlap the factory-applied insulation approximately one inch.
3. Wrap one (1) half-lapped layer of 3M Brand #35 jacketing tape over joint completely covering the EPR.



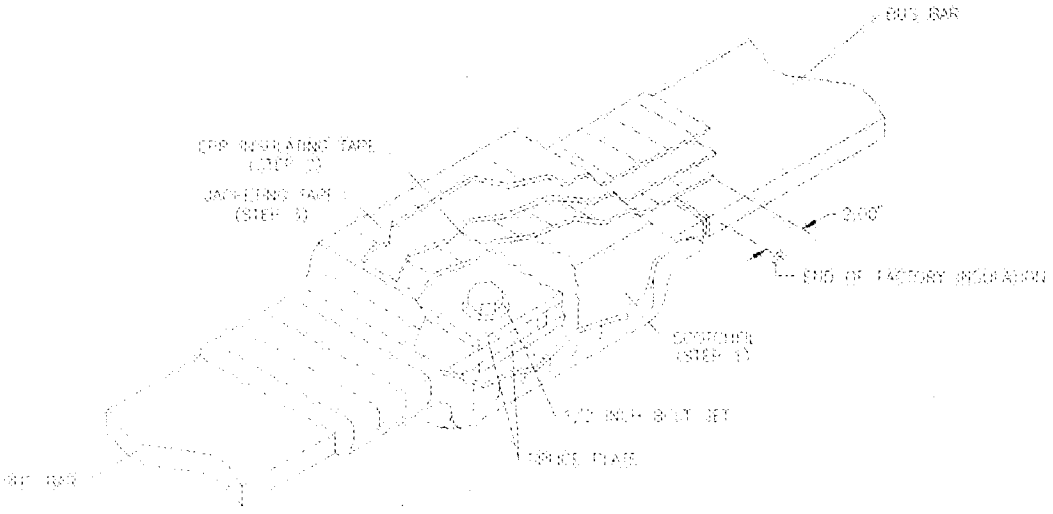
600 - 5000 volt Insulating Illustration

15kv Insulating Instructions

1. Apply one (1) half-lapped layer of 1 1/2 inch 3M Brand Scotchfil (or approved equal) over bare conductor and hardware to cover and smooth out the surface. Blend contour into factory insulated surfaces.

2. Wrap joint with (2) half-lapped layers of 1 1/2 inch 3M Brand #130c EPR tape stretching to approximately 2/3 of its original width. Overlap the factory-applied insulation approximately two inches.

3. Wrap one (1) half-lapped layer of 3M Brand #35 jacketing tape over joint completely covering the EPR.



15kv Insulating Illustration

Insulating Instructions for 25kv and 38kv

Instructions

1. Fill voids between hardware and corners around splice plates with 3M brand Scotchfil Electrical insulation putty then wrap the bus joint area with the putty. Material should be lightly stretched and half-lapped. This material should stop 3/4" to 1" away from the factory-applied insulation.

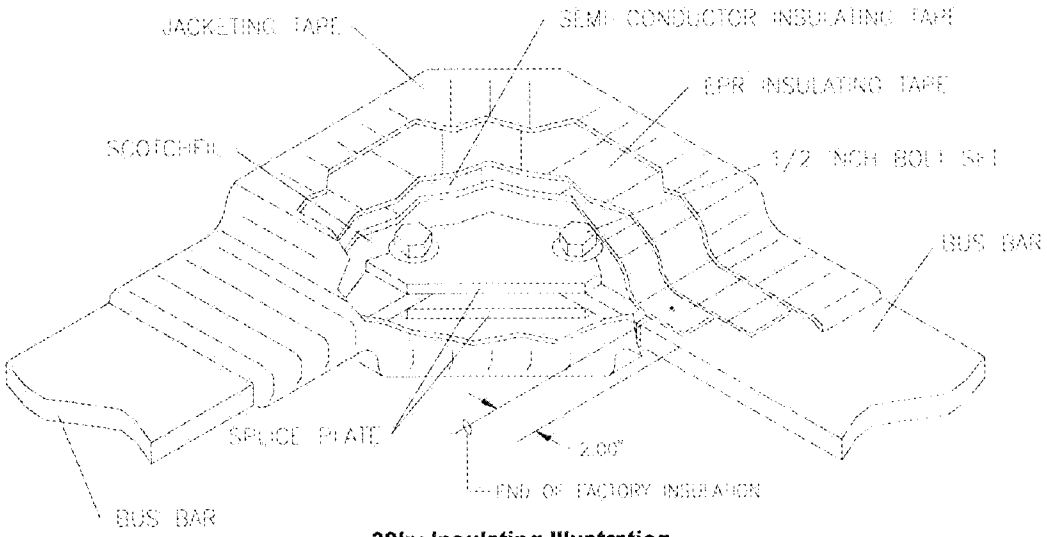
2. Apply one (1) continuous half-lapped layer of Scotch 13 (3/4" wide) semi-conductor tape to the entire joint. This tape must contact bus surface and be extended to meet the end of the factory-applied insulation. ***Do not overlap insulation. Do not cut tape into short lengths.***

3. Clean surface for insulation in joint area (minimum four (4) inches from the end of insulation) with approved agent.

4. Apply five (5) half-lapped layers of EPR tape with the adhesive side down. Extend first layer 4" onto the factory-applied insulation and taper back toward joint one-half lap with each consecutive layer.

   Caution Caution Caution Caution
   EPR MUST BE STRETCHED SUFFICIENTLY (ABOUT 2/3 OF WIDTH) TO AVOID ANY FOLDS OR GAPS. Apply enough 3M #130c, 1 1/2" wide EPR tape to the end of the insulation to create a smooth transition from conductor to factory-applied insulation.

5. Apply one (1) half-lapped layer Scotch 35 brown tape completely jacketing the EPR layer. Extend slightly past EPR onto the factory-applied insulation.



38kv Insulating Illustration

Stud Connector Taping (when required)

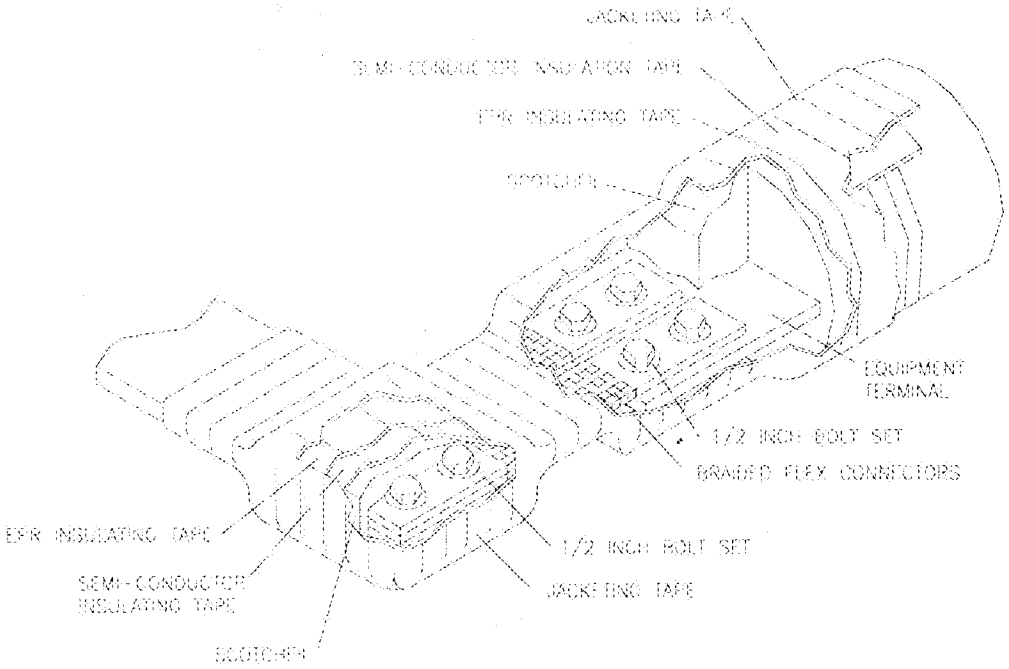
1. Apply Scotchfil putty between bolts and over bolts to eliminate sharp edges. Material may be cut into short lengths to build thickness.
2. Apply one (1) continuous half-lapped layer of Scotch 13 semi-conductor tape. This tape is to be brought down onto metal top of porcelain bushings. **Do not cut this tape into short lengths.**
3. Follow steps 4 and 5 on page 27. EPR tape should not extend beyond the top shed of porcelain insulator.

Flexible Connector Taping

1. Follow the Stud Connector Taping steps for areas where flexible connector attaches to the bus bar.
2. Apply five (5) half-lapped layers of EPR tape (adhesive side down) over the entire connection. Extend first layer four (4) inches beyond factory-applied insulation. Each consecutive half-lapped layer should stop short of the preceding layer by one-half lap.

   Caution Caution Caution Caution
   EPR must be stretched sufficiently (approximately 2/3 of it's original width to avoid any folds or gaps).

3. Cover entire strap and joint area with one (1) half-lapped layer of Scotch 35 Brown tape. Care should be exercised to stretch the tape slightly to avoid folds and gaps.



38kv Flex Connector / Stud Connector Insulating Illustration

Testing

Bus Installation

Check bus and field applied joint insulation from phase to phase using a 1000 volt megger.

Control Wiring

Secondary wiring such as heater circuits are subjected to an over-potential test toground at the factory. A 500 volt megger test is recommended to check field terminal connections.

Power Frequency Withstand

Caution Caution Caution Caution

Insulation and bus supports must be free of contaminants and moisture during testing. Operate heaters prior to testing to assure that moisture is not present. Bus Duct must be disconnected from associated equipment, transformers, potential transformers, etc., prior to withstand test.

In accordance with ANSI C37.23-6.4.2 and tables 3B, 3C, and 3D, a one minute dry power frequency withstand field test can be performed at 75 percent of the factory test levels. Test voltage is applied phase-to-phase and phase-to-ground at the test levels provided in the following tables.

Non-Segregated and *Segregated phase 60Hz System Test Levels

Maximum Operating Voltage	Factory Test Level	Field Test Levels	
kV RMS	kV RMS	kV RMS	DC
0.635	2.2	1.65	2.32
4.76	19.0	14.25	20.25
15.00	36.0	27	37.50
15.50 *	50.0 *	37.5 *	52.50 *
25.80	60.0	45	63.75
38.0	80.0	60	-------

*15.5 KV Class test levels are applicable for segregated phase construction only.

DC Test Levels

DC field test levels are provided for reference only for those using DC testing equipment. Values are believed to be appropriate approximate equivalents to the DC levels listed.

DC Bus Duct Systems

Operating Voltage	Factory Test Level (kV RMS)	Field Test Level (DC)
300	2.2	2.32
800	3.7	3.9
1200	4.6	4.9
1600	5.4	5.7

Operation

The entire system must be completely assembled and insulated in accordance with the installation drawing provided.

Caution Caution Caution Caution

Do not attempt to energize incorrectly assembled, damaged or contaminated systems. Prior to operation, damaged components must be repaired and contaminates removed (consult installation section).

Necessary precautions should be taken to avoid using bus duct as a walk way or as a means of support for associated equipment.

Maintenance

Due to possible variations in site conditions, responsibility for establishing a routine maintenance schedule cannot be assumed by Technibus. Top and/or bottom covers are removable for maintenance and inspection. Please check with other manufacturers of equipment used along with the bus duct as well as the work conditions at your site to determine the appropriate maintenance schedule to be followed.

Caution Caution Caution Caution

System must be de-energized to insure personnel safety during inspection and maintenance.

Recommendations

1. A routine inspection to detect deterioration, contamination (see installation section) or damage of all components.

2. Heater circuits and elements should be tested to assure they are operational.

3. Breathers should be cleaned as required.

4. Years of experience have proven that properly assembled conductor connections do not require routine maintenance when operated under normal conditions. ***Note: Systems subjected to severe operating conditions which generate excessive localized heating at connectiosn such as periodic overloading or system faults should be checked and re-torqued as required.***

Spare Parts List

Spare Parts

Normal operation will not result in replacement of parts. We recommend miscellaneous items. (i.e. hardware, gasket, or insulation) be available during maintenance activity. A list of common spare parts is provided below. For correct replacement part numbers and pricing, consult Technibus at (330) 478-6395.

The factory will not assume responsibility for the use of substitute replacement parts without it's written authorization. ***Substitute replacement parts used without prior written authorization from Technibus will void all warranties.***

Aluminum Extrusions
Access Covers
Extrusion Weather Seal
Joiner Cap
Housing Hardware-Indoor/Outdoor
Enclosure Hardware-Indoor/Outdoor
Housing Gasket
Enclosure/Flange Gasket
Parallelogram Bolts
Screened Breather
Fire Stops
Bus Supports-Thru Porcelain
Bus Supports-3 Phase
Porcelain Supports
Heaters
Thermostat
Thermostat-Explosion Proof
Heater Wire

Cinch Connector TRW 2-150
Junction Box-Indoor
Junction Box-Outdoor
Electrical Insulation Putty
EPR Tape
Jacketing Tape-Red / Brown @ 38kv
Shipping Split Boots
Termination Boots
Boot Hardware
Expansion Joint Bellows
Flexible Connectors
Strain Insulator
Ground Pads
Stand-off Insulators
1/2-13 Concrete Anchors
Power-Strut Hardware Sets

For more information regarding Technibus Metal Enclosed Bus Systems and Technibus™ installation and/or maintenance, please call Technibus at (330) 478-6395.

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