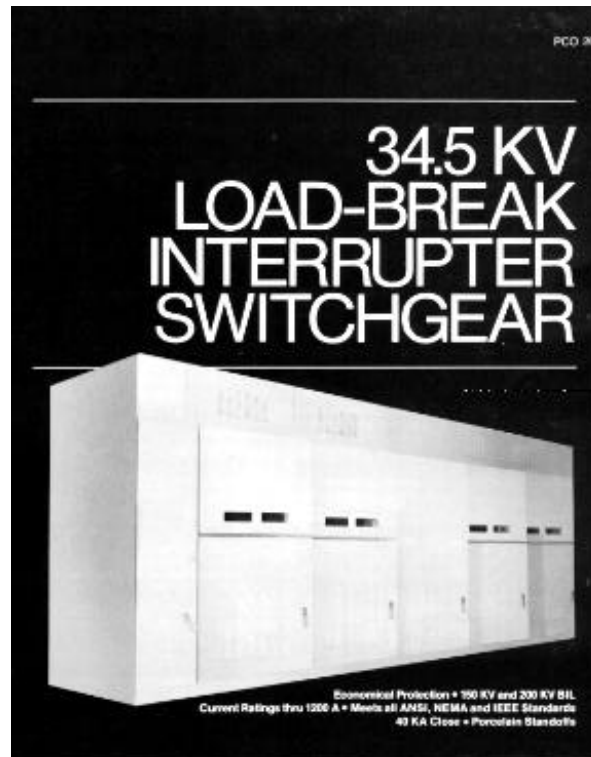


POWERCON CORPORATION



Powercon Corp
SEVERN, MARYLAND

34.5 kV LOAD-BREAK INTERRUPTER SWITCHGEAR

BROCHURE #PC-020

ELECTRONIC VERSION CREATED: 6/30/96

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LOAD BREAK INTERRUPTER SWITCHGEAR

APPLICATION

Powercon Load Break Interrupter Switches are applied in the control and switching of Power Distribution Systems having nominal a.c. voltage ratings from 2.4 KV to 34.5 KV. They are capable of switching 600 & 1200 amperes. Table #1 lists the applicable limits and conditions of switching. These switches are available with either electrical or mechanical operators. When used in conjunction with fuses they will afford overload, short circuit and disconnect services. These switches are used:

- On the primary of transformers for their protection and isolation.
- For the protection and isolation of single circuit systems.
- For the protection and isolation of multi-circuit systems.
- For automatic transfer schemes where their ratings are not exceeded.

APPLICABLE INDUSTRY STANDARDS

NEMA	SG-5	-	Power Switchgear Assemblies
NEMA	SG-6	-	Power Switching Equipment
ANSI	C37.20	-	Switchgear Assemblies
ANSI	C37.30	-	Requirements for High Voltage Air Switches
ANSI	C37.31	-	Indoor Apparatus Insulators (For High Voltage Switches)
ANSI	C37.32	-	Preferred Ratings and Mfgr Specs for High Voltage Switches
ANSI	C37.33	-	Rated Control Voltages and Ranges for High Voltage Switches
ANSI	C37.34	-	Test Code for High Voltage Air Switches

TABLE #1
INDOOR AIR INTERRUPTER SWITCH RATINGS

(These ratings apply to Switches & Equipments with Stored Energy Operated Switches)
(Special Ratings Available - Consult Factory)

Voltage Ratings				Current Ratings				
Nominal KV RMS	Max. Design Kv RMS	1 MIN. Power Withstand KV RMS	1.2 x 50 Impulse Freq. Withstand KV BIL	Continous AMP RMS	Contact Interrupting Rating AMP RMS	Momentary Assym. KA RMS	3 Sec. KA RMS	Fault Close Assym. KA RMS
4.16	4.76	19	60	600	600	40	25	40
				1,200	1,200	61	38	61
7.2	8.25	26	75	600	600	40	25	40
				1,200	1,200	61	38	61
13.8	15.0	36	95	600	600	40	25	40
				1,200	1,200	61	38	61
14.4	15.5	50	110	600	600	40	25	40
				1,200	1,200	61	38	61
23.0	25.8	60	125	600	600	40	25	40
				1,200				
34.5	38.0	80	150	600	600	40	25	40
				1,200				
34.5	38.0	95	200	600	600	40	25	40
				1,200				

METAL ENCLOSED SWITCHGEAR - AN ECONOMICAL METHOD FOR POWER DISTRIBUTION

PIF FRAME MOUNTED *HEAVY DUTY RUGGED INDUSTRIAL LOAD BREAK SWITCHES WITH SUPERIOR FEATURES PROVIDE:*

ARCING CHAMBERS

Tungsten material stationary arcing contacts are located inside the arc chutes. They remain at the same potential as the main stationary contact. As the quick break blade is withdrawn from the arc chute it parts with the stationary arcing contacts inside the chute. The chute is made from a specially prepared compound that evolves a gas to quickly extinguish the arc. Clean consistent interruptions result. No appreciable amounts of gas are evolved.

MAIN MOVEABLE BLADES

These blades are made of 99% conductivity hard drawn ETP copper bars and they are heavily silver-plated at the contact points for long dependable operation.

QUICK BREAK BLADE

The quick break arcing blade is made of a special high strength, hi conductivity material tipped with a tungsten arcing material. A quick break spring charging mechanism is mounted on the blade that with an assist from the arcing chamber stationary contacts prevents the opening until after the main contacts part at the proper clearance spacing.

PORCELAIN SWITCH INSULATORS

The near ULTIMATE in insulation

Wet process porcelain is used as the insulating support for the main hinge and jaw contacts. Porcelain is a tried and true material proven in service as *the near ultimate in insulation*. It has excellent dielectric characteristics, is non-tracking, non-combustible, non-hygroscopic, won't age, and is easy to clean. No *organic materials* can compare to the performance of porcelain.

A SUPER STRUCTURE

Powercon's all welded frame design provides a ruggedness and greater structural strength which is in a class b@ itself. The jig welded structural members form an assembly to provide **ii** plumb and square switch unit. This assures interchangeability of units **and** results in a minimum of installation time.

STATIONARY ARCING TIPS

Powercon arcing blades and tips are designed to prevent arcing blades from hanging up in the stationary arcing contacts. Successful tests with welded stationary contacts have been made and it has been successfully demonstrated that these tips do not hang up.

Powercon Load Break Switches Provide:

- **Unequaled Dependability**
- *Minimum Maintenance*
- **Long Interrupting Life**
- **Greater Safety**
- ***Simple to Install and Operate***

STATIONARY CONTACTS

Both hinge and jaw contacts are heavy copper castings capable of absorbing and dissipating the heating from the large short circuits which may be encountered. The contact pressure is maintained on these contacts with selected spring washers especially adapted to maintain suitable pressure for many operations and over many years of operational performance. The retaining nuts are Elastic-Stop-nuts to prevent vibration, shock, and operation loosening the joint.

Special dirt sealing designs effectively prevent the entrance of dust or dirt into the contact making area.

The contact area is silver to silver to maintain optimum current carrying ability and decrease heating.

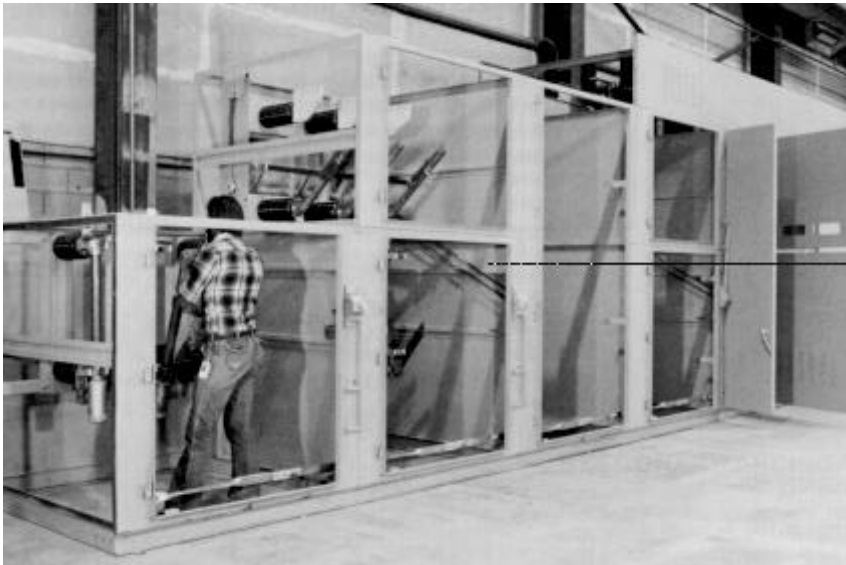
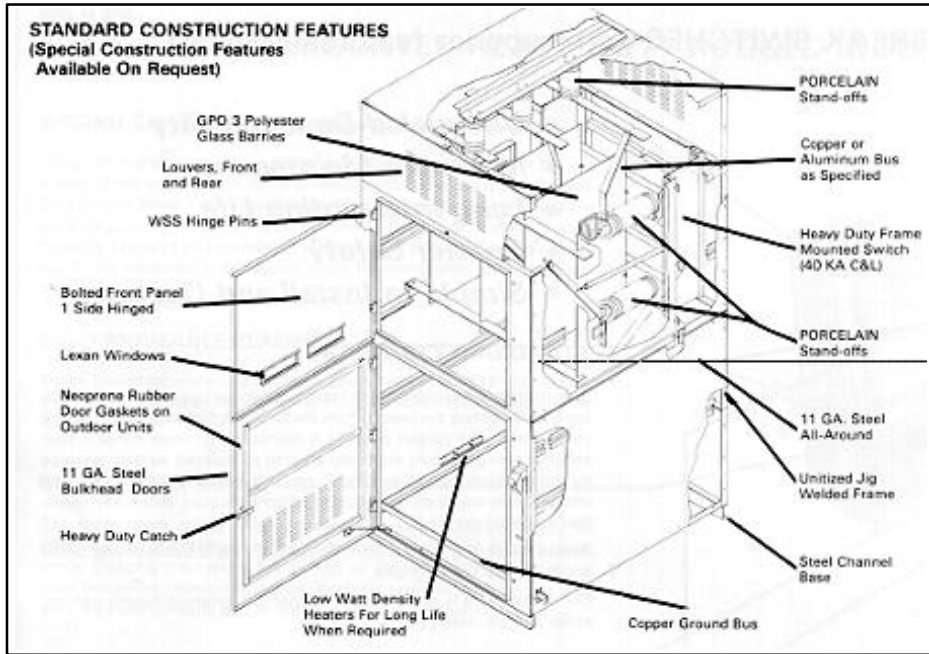
STORED ENERGY MECHANISM

The powerful opening and closing springs of Powercon's off-center stored energy mechanism provides for quick make (rated fault closing) and quick break (rated load interruption). The switch mechanism shaft is driven by a chain and sprocket from the front operating handle. As the handle is rotated, it is directly connected to a sprocket which in turn, chain drives the opening spring to a "charged" position. As the operator continues to rotate the handle, the charged spring is driven off-center by the chain and releases its energy into rotating the operating shaft to operate. The switch blades will not move, in either a closing or opening direction, until the closing spring causes rotation in the operating shaft. It should be noted, that once the springs are moved off-center, the operator has no further control of the opening and closing operation. *He therefore has a fault closing and rated load break feature independent of his performance.* ANTI FRICTION BEARINGS provide for a smooth operating performance.

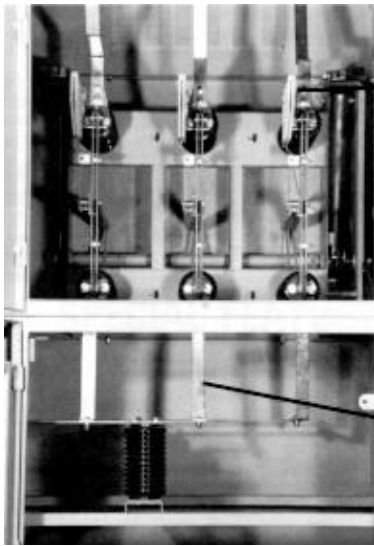
HANDLE HOUSING

Powercon's cast aluminum handle housing has provisions for multiple-, padlocking. These handles are non-removable, self-latching, and padlockable in the open and closed positions. Telltale indicators advise operator of switch position.

CONSTRUCTION



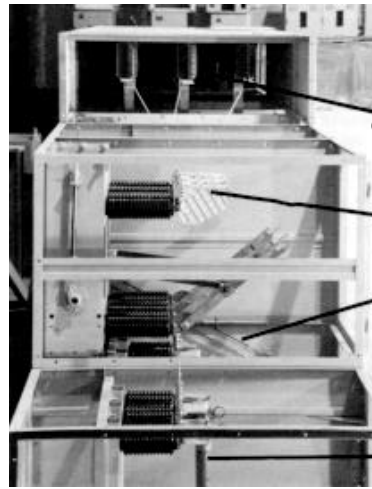
FINAL ASSEMBLY LINE



Tie Copper Bus to Section 'B'

Tie Copper Bus to Section 'A'

Bus Tie Unit
(Close Up)



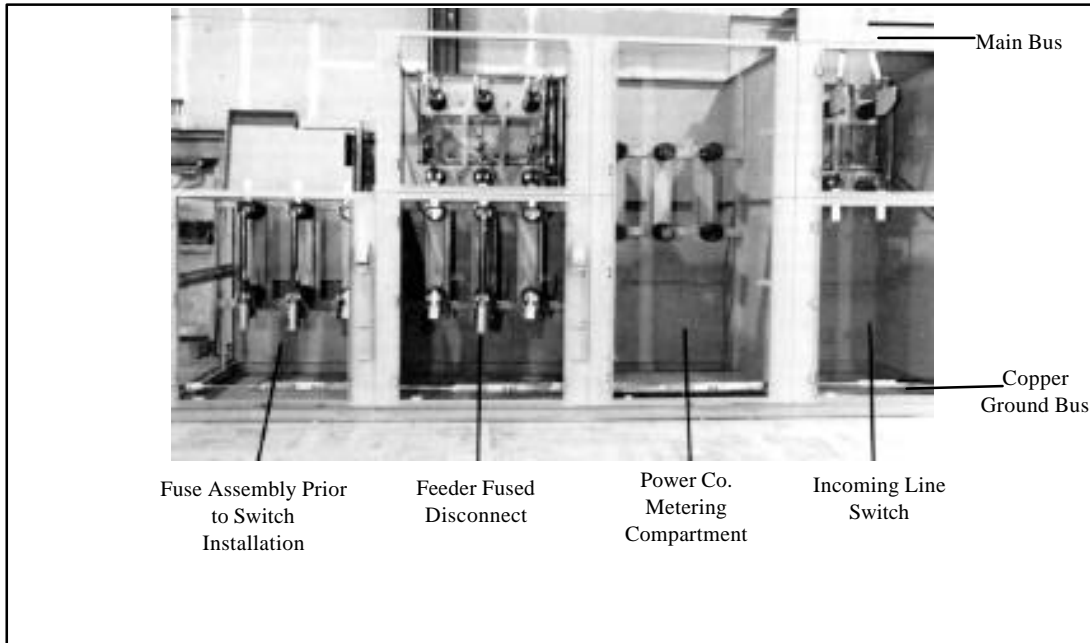
Main Bus
Compartment

Arc Chutes

Chain Drive

Fuses

CONSTRUCTION SIDE VIEW
(Note: Porcelain Supports Thru-out)
The Ultimate Insulation



Main Bus

Copper
Ground Bus

Fuse Assembly Prior
to Switch
Installation

Feeder Fused
Disconnect

Power Co.
Metering
Compartment

Incoming Line
Switch

SPECIFICATIONS

FOR STATIONARY SWITCHGEAR

SCOPE

These specifications describe either indoor or outdoor metal enclosed, load break interrupter switch equipments consisting of fused and/or unfused load interrupter switches and auxiliary devices as described and as indicated on attached single-line diagram. It shall consist of one unit or multiple units in accordance with the specific requirements outlined below.

APPLICABLE STANDARDS AND RATINGS

The interrupter switches covered by these specifications shall be designed, tested, manufactured, installed and/or stored in accordance with the latest applicable standards of NEMA, ANSI and IEEE, and NEC.

CERTIFIED TEST REPORTS

Certified Test Reports from an established reputable high current test laboratory will be provided, on request, on similar pre production models of similar load interrupter switches in their enclosures satisfactorily withstanding the requirements outlined in the applicable standards.

DRAWINGS AND INSTRUCTION BOOKS

Arrangement, wiring, and floor-plans drawings shall be furnished with the equipment. Suitable instruction books shall be shipped with the switchgear. Three copies of IB should be supplied.

ENCLOSURE DESIGN

Each unit of the metal enclosed load interrupter switch equipment shall be independently constructed of structural or rolled sheet steel and shall be welded into a solid framing. Each unit shall be adequately braced, with adequate venting to prevent distortion of the cubicle doors and/or windows under operating conditions, which includes short circuits and fuse operation on interruption of short circuit currents up to the specified rating.

All equipment shall be front connected and front accessible, unless special requirements dictate differently.

Steel doors with concealed hinges shall have a handle that operates latch to secure the door in the closed position. The steel door shall be a minimum of 1 gauge and all other sheet steel of the equipment shall be a minimum of 13 gauge or as required by the standards.

Each front steel door shall contain the necessary safety protected observation windows that allow sufficient viewing for observation of switch contact position.

All housings shall be chemically cleaned inside and out and then treated with a phosphoric acid, etched and cleaned. All

surfaces shall be finished in ANSI No. 61 medium light gray finish for the indoor switchgear.

The complete equipment for outdoor equipment shall be painted with a suitable finish coat of ANSI No. 70 and shall be weatherproofed.

Outdoor equipment shall be built on a minimum of 3" at 4.1 lb/ft channels and shall be gasketed and weatherproofed and equipped with long life tubular heaters. Control power for heaters shall be provided from an external service.

Lifting angles or other suitable means for lifting shall be provided.

BUS DESIGN

The three-phase aluminum or copper bare main bus shall have a continuous rating of (600), (1200), or (2000) amperes and shall be braced to withstand the full effect of a short circuit within the ratings of the interrupter switch and/or fuses applied to the equipment. All bus bar joints shall be plated using tin on aluminum bus and silver on copper bus. Supports for the main bus shall be porcelain.

Each unit shall also contain a copper ground bus, accessible for connection to ground and at least one lug shall be provided for such connection.

Both ground bus and main bus shall have provisions for extension in either direction for future additions.

Where bus bars are insulated to allow closer spacing such insulation shall be (Lexclad*) extruded sleeving. Where joints are made they shall be sealed with molded covers, or a non-oil void free filler, covered with suitable layers of insulation tape and a mechanical protective tape.

*Proprietary to Powercon

AIR INTERRUPTER SWITCHES

Air interrupter switches shall be group operated of the stored energy type, 3 pole single throw, utilizing a direct acting spring charged mechanism for both closing and opening functions. Switch mechanisms shall be operable externally from the front or side of the cubicle and shall be equipped with a quickmake quick-break mechanism to open and close the switch independent of the speed with which the operating handle is moved. "Teasing" of the switch poles will not be permitted.

They shall have main and arcing contacts and be designed to provide maximum endurance for load interrupting and fault closing. The arcing contacts shall be spring loaded on break and shall be last in last out. They shall operate in an arc chute designed to assist in interruption, and liberate no appreciable gases on interruption.

All components except operating handle system shall be mounted on a jig welded frame to form a rugged unitized assembly accomplished in jigs and fixtures to insure all parts function as required. A strict quality control program shall be instituted and followed.

The main blades shall be made of electrolytically pure cold rolled copper. All contact points shall be heavily silver plated on blades as well as the hinge and jaw castings. These contacts each will be one piece castings to provide maximum heat dissipation and continuous current transfer.

Wet process porcelain insulators shall be used to insulate the hinge and jaw castings from the frame on all rating.

Rating of interrupter switches shall be as outlined in table page 1 of this publication. When used with fuses ratings shall be dependent upon specified fuse characteristics.

The switch shall conform to or exceed ANSI Standards for high voltage air switches and switchgear assemblies C37.30-1971, C37.32-1972, C37.34-1970, C37.20C-1974. Upon request, certified test reports shall be provided, proving published interrupting, short-time, momentary, BIL, dielectric and fault-closing ratings.

All components of the switch shall be completely checked and operated in compliance with documented quality assurance procedure to insure that all parts function as intended after manufacture and assembly. Testing shall consist of power frequency withstand and mechanical operations.

Interphase and barriers shall be GPO 3 polyester glass.

INTERLOCKING

Provision shall be included for locking the switch in the open or closed position. The door shall be mechanically interlocked with the air interrupter switch to prevent closing the switch with the door open and to prevent opening the door with the switch closed.

POWER FUSES

Fuses shall be self-contained current limiting or boric acid type to provide fast clean interruption. They shall be coordinated to meet the overload and short circuit rating specified and shall have continuous current rating as specified.

DANGER SIGNS

All units shall have appropriate hazardous danger signs prominently displayed on the exterior and interior of each unit.

TERMINATIONS

Terminations shall be as specified under detailed specific requirements.

HANDLES

Load Interrupter operating handles shall be externally mounted, non removable (except for electric operators), self leveling, and padlockable with multiple padlocks in either the closed or open position. Telltale indicators shall advise operator of switch position.

MISCELLANEOUS

Protective hinged screen barriers, retained with captive thumb screws shall be provided as stipulated in the applicable codes and standards.

Ventilation shall be adequately provided to prevent condensation and equipment over heating.

SPECIAL FEATURES AND AVAILABLE ACCESSORIES

The following accessories are available for fused-interrupting switchgear equipment. Auxiliary compartments may be required being dependent upon the accessories specified. Other accessories are available or will be designed to meet special requirements.

INSTRUMENTATION

Voltmeter, Single Phase Indicating
Ammeter, Single Phase Indicating
Transfer Switch for Above
Watt-hour Meters
Wattmeters
Varmeters
Other Instruments Including Recording

METERING AND CONTROL-POWER TRANSFORMERS

Current Transformers
Potential Transformers (Fused Primary) (Stationary Mounted)
Potential Transformers (Drawout Arrangement)*
Control Power Transformer

ELECTRICAL OPERATORS

Standard Close-Standard Open
Quick Close - Standard Open
Standard Close - Quick Trip**
Quick Close - Quick Trip**

MANUAL OPERATORS

Manual Close - Quick Trip (Electric)**
Manual Quick Close - Standard Open**
Manual Close - Manual Quick Trip**

HANDLES INSULATION

Removeable Insulated Bus
Left Side
Direct Drive
Drilling for Keylocks

ACCESSORIES

Ground Bales
Key Interlocks

LIGHTNING ARRESTORS

Districtuion
Intermediate
Station

MIMIC BUS

Painted, plastic, steel, or anodized aluminum

TERMINATIONS

Bus Duct
Pothead, 3 Conductor
Potheads, Single Conductor
Terminators
Roof Entrance Bushings for Outdoor
Equipment
Clamp Type Terminals

WEATHER PROOFING

Includes Space Heaters
Walk-In Unit
Insulated Walk-In

AUTOMATIC THROWOVER

Primary, 2 Mains, No Tie Switch with:

1 Phase Detection

3 Phase Detection

Primary, 2 Mains, with Tie Switch
with:

1 Phase Detection

3 Phase Detection

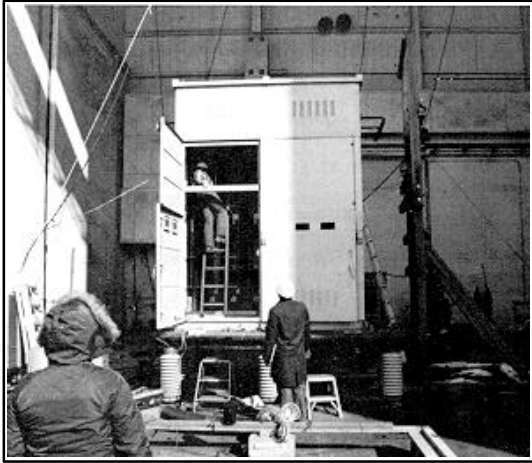
**SECONDARY CONTROL POWER
THROWOVER**

Uses Control Power from 2 Sources

Consult Factory for special
arrangements and applications

**In accord with industry standards, a deliberate time delay between closing and opening must be provided in these switches. Accordingly, in order to open the switch, the opening springs must be charged after the switch is closed and vice versa to introduce this delay.

PROOF TESTING



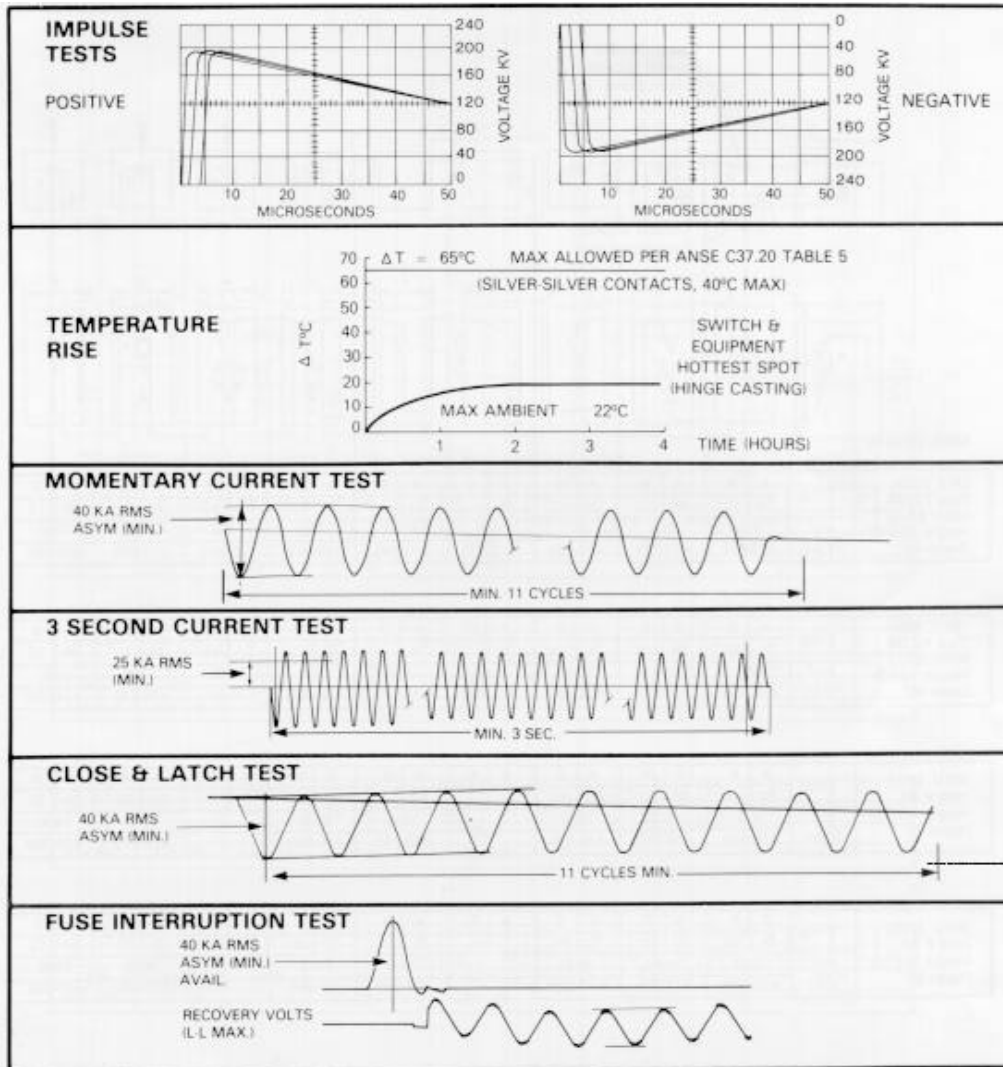
Testing of Powercon Switchgear. Product design, materials, and construction methods are proof tested on prototype models. The photo taken at Westinghouse's high power laboratory tested the adequacy of the total equipment (switches, bus system, insulation, enclosures, etc.) to withstand the rigors of circuit abnormalities.



POWERCON'S HIGH VOLTAGE TEST LAB

INTERRUPTER SWITCH TESTS

REPRESENTATIVE CURVES



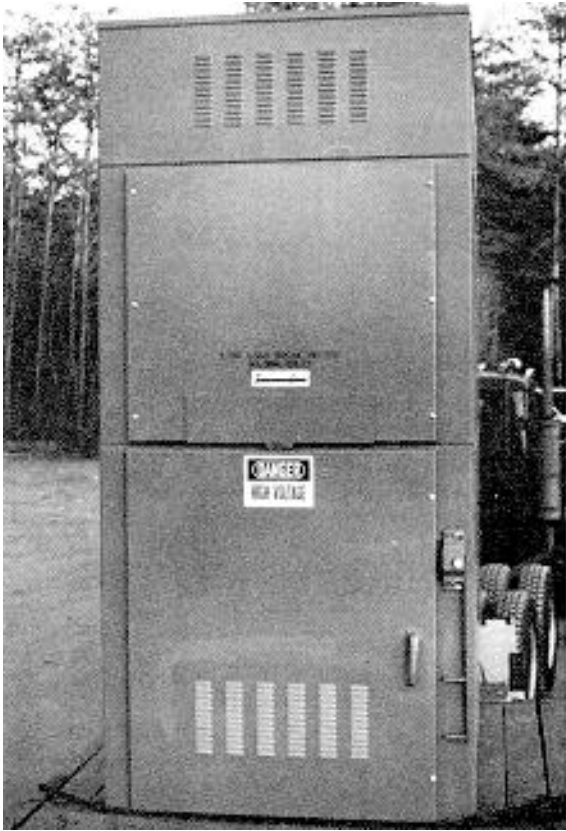
All certified Test Reports are available for inspection at Powercon Factory.

Other tests, such as Mechanical Life Tests, Timing Tests, Magnetizing Tests, Load Switching Tests, etc., have been completed and are available at the Powercon Factory.

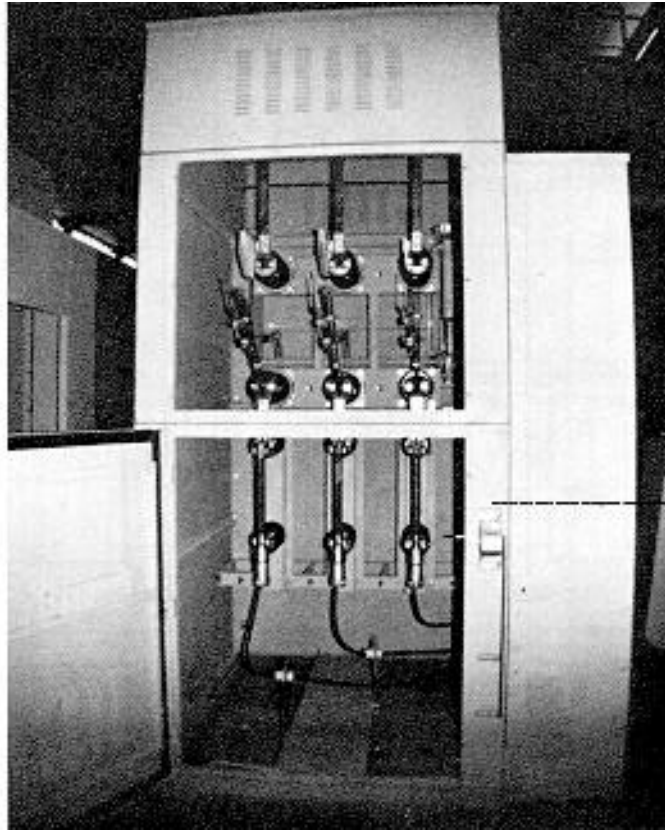
All High Power Tests made at G.E. or Westinghouse Hi-Power Laboratories.

Product design, materials, and construction methods are proof tested on prototype models. This test illustrates the thoroughness of Powercon's effort to assure that the product exceeds the applicable user and ANSI specification requirements. The switch being tested is closing in on a 3 phase fault in excess of 45,000 amperes which is in excess of its close and latch rating. A test such as this is only one of a long series providing valuable design techniques. Some of these are the metallurgy of the metals, the strength and temper of materials, close and latch force requirements, cubical and withstand design parameters.

34.5kV Switchgear



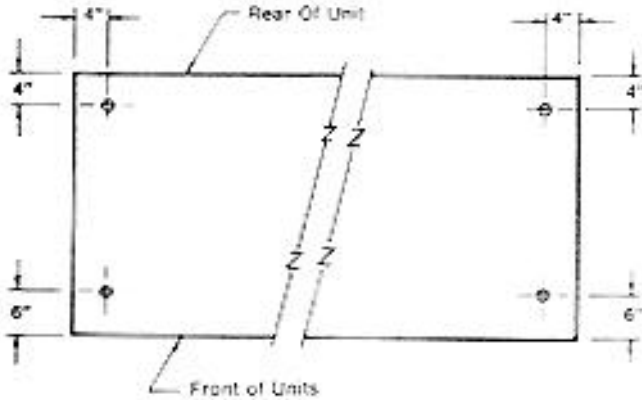
Outdoor Service Entrance Equipment



Interior View, Switchgear

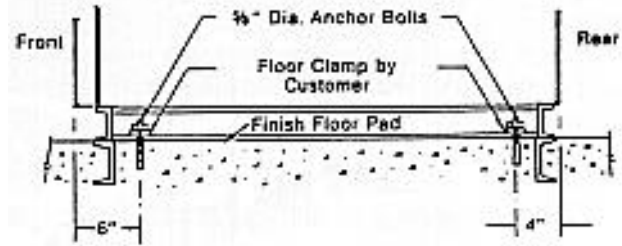
ANCHORING DETAILS

Floor Plan - Indoor and Outdoor 5/8 Inch Anchor Bolt Layout



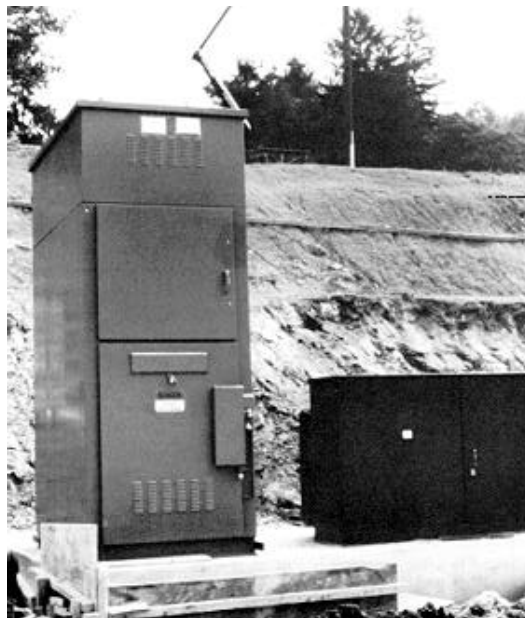
**All Outdoor Lineups of Equipment:
See Channel Diagram for Method of Anchoring**

Indoor and Outdoor Anchoring Method



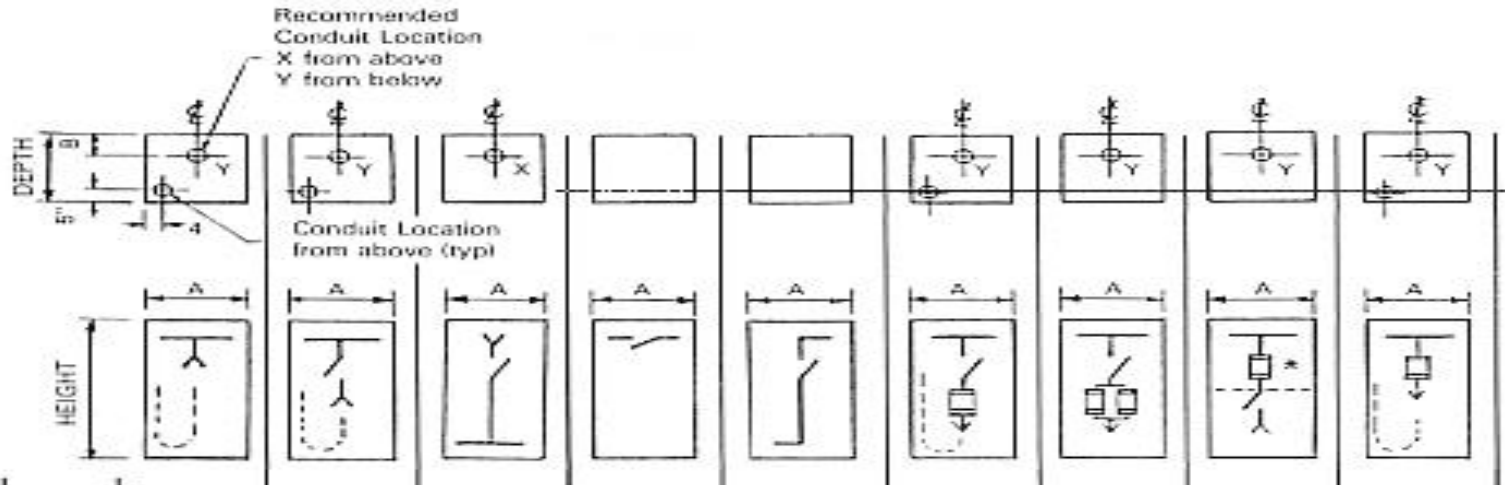
Foundation Data

Equipment is unfurnished with built-in channel, thus eliminating the need for the floor steel when mounting directly on smooth, level floor. If embedded channels are desired, these should be set level with each other and should be level over their entire length. 4" x 5.4"/ft. channels are recommended for levelling purposes. Finish floor should have slight pitch away from mounting channels and in no case should the finish floor be higher than mounting channels.



**34.5 kV PIF Fused Switch Feeding
Industrial Distribution System**

**TYPICAL DIMENSIONS AND WEIGHTS FOR STATIONARY SWITCHGEAR
MODULE SELECTION ALL UNITS FRONT ACCESSIBLE**



5Kv, 600A Thru 1200A 60kV BIL Ht. 93-1/8 Depth 44"		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B		
	DIM.	24	22	30	12	30	12	30	-	30	-	30	12	54	12	30	12	30	12
	WT.	600		950		950		950		1000		1150		1600		1150		1000	
CAT.	473-009		473-019		473-029		473-039		473-049		473-059		473-069		473-079		473-089		

15Kv, 600A Thru 1200A 95kV BIL Ht. 93-1/8 Depth 44"		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B		
	DIM.	24	22	36	15	36	15	36	-	36	-	36	15	54	15	36	15	36	15
	WT.	600		1000		1000		1000		1050		1200		1600		1200		1000	
CAT.	474-009		474-109		474-029		474-039		474-049		474-059		474-069		474-079		474-089		

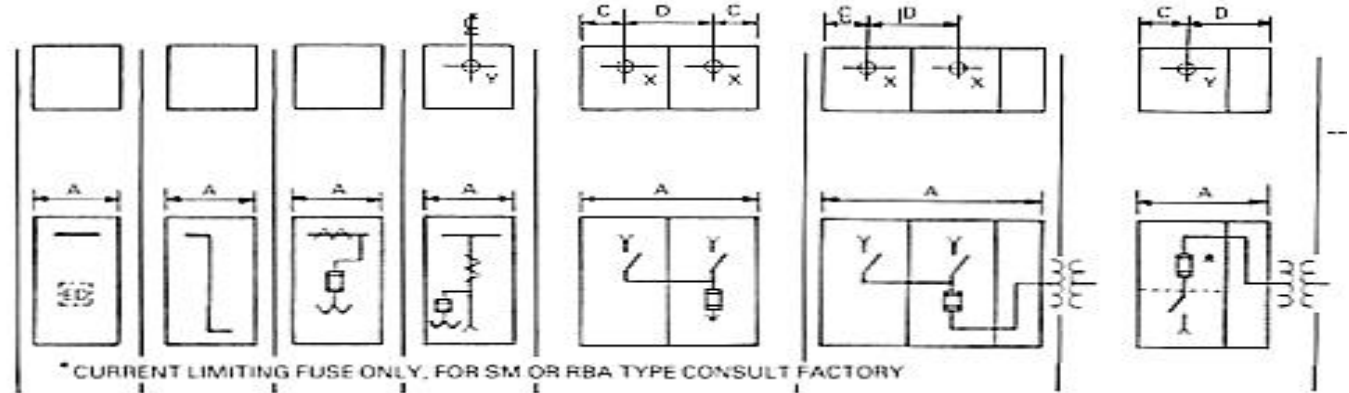
38Kv, 600A 150kV BIL Ht. 133-1/8 Depth 70"		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B		
	DIM.	24	35	60	32	60	32	36	-	60	-	60	45	-	-	60	32	60	32
	WT.	900		1500		1500				1500		2000				2000		1600	
CAT.	476-009		476-019		476-029		474-039		476-049		476-059		474-069		476-079		476-089		

38Kv, 600A 200kV BIL Ht. 167-1/8 Depth 84"		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B		
	DIM.	36	42	70	32	70	32	A	-	70	-	70	45	-	-	70	32	70	32
	WT.	1000		2000		2000				2000		2600				2600		2000	
CAT.	477-009		477-019		477-029				477-049		477-059				477-079		477-089		

TYPICAL DIMENSIONS AND WEIGHTS FOR STATIONARY SWITCHGEAR - CONT'D
MODULE SELECTION ALL UNITS FRONT ACCESSIBLE

NOTE: Dim. Include std. 3" channel base thru 25kV and 4" base for 38kV units, all 2" for outdoor roof caps.
Roof entrance bushing, bus duct and flange mounted potheads are available, for height above units consult factory.

DIMENSIONS SHOWN ARE FOR ESTIMATING PURPOSES ONLY. DO NOT USE FOR CONSTRUCTION OR INSTALLATION.



5Kv, 600A Thru 1200A 60kV BIL Ht. 93-1/8 Depth 44"		A	B	A	B	A	B	A	B	A	B	C	D	A	B	C	D	A	B	C	D
	DIM.	36	-	16	-	36	-	36	6	60	12	15	30	76	12	15	30	46	12	15	31
	WT.	800		500		1200		1200		2000			2500			1700					
CAT.	473-099		473-109		473-119		473-129		473-139			473-149			473-159						
15Kv, 600A Thru 1200A 95kV BIL Ht. 93-1/8 Depth 44"		A	B	A	B	A	B	A	B	A	B	C	D	A	B	C	D	A	B	C	D
	DIM.	36	-	16	-	36	-	36	8	72	15	18	36	88	15	18	36	52	15	18	34
	WT.	800		500		1200		1200		2200			2700			1700					
CAT.	474-099		474-109		474-119		474-129		474-139			474-149			474-159						
38Kv, 600A 150kV BIL Ht. 133-1/8 Depth 70"		A	B	A	B	A	B	A	B	A	B	C	D	A	B	C	D	A	B	C	D
	DIM.	36	-	24	-	60	-	60	32	120	32	30	60	144	32	30	60	84	32	30	54
	WT.	1000		900		1600		1600		3500			4400			2900					
CAT.	476-099		476-109		476-119		476-129		476-139			474-149			476-159						
38Kv, 600A 200kV BIL Ht. 167-1/8 Depth 84"		A	B	A	B	A	B	A	B	A	B	C	D	A	B	C	D	A	B	C	D
	DIM.	36	-	36	-	70	-	70	32	140	32	35	70	176	32	35	70	106	32	35	71
	WT.	1300		1200		2000		2000		4600			5800			3800					
CAT.	477-099		477-109		477-119		477-129		477-139			477-149			477-159						

N.E.C. TABLE 110-34(a)
Minimum Depth of Clear Working Space in Front of Electric Equipment

Nominal Voltage to Ground	Conditions		
	1 (Feet)	2 (Feet)	3 (Feet)
601-2500	3	4	5
2501-9000	4	5	6
9001-25,000	5	6	9
25,001-75kV	6	8	10

DOCUMENTED QUALITY ASSURANCE

The control of quality is a top management function and responsibility. Powercon has established a high quality tradition over many years. Constant vigilance and careful workmanship combine to create rigid requirements for quality. The Quality Control Procedures used by Powercon have been in use since its inception. There have been additions during the intervening years as more information and data was collected and the need arose to be more inclusive. The Quality Control Procedures are fully documented and emanate with the initial engineering designs.

Because final quality must be assured, every complete equipment is tested at the factory for conformity to rigid standards verifying the mechanical and electrical specifications. The following are some of the tests made on Powercon switchgear, among many others.

... final master fixture alignment of all mating and matching points, bushing matching; auxiliary contact mating; grounding shoe contact to assure correct operation.

... auxiliary wiring check to assure correctness and continuity. This includes primary current injection primary voltage application control power to actually operate and synthesize the entire control and protective system, when required. all relays and devices given complete secondary power check by test consoles, when required.

... high potential tests of primary and secondary circuitry in accordance with ANSI standards. final inspection.

Drawings and Instruction Books

Drawings are prepared in accordance with the applicable standards.

Drawings included are:

- A) Dimensional plan, elevation and section views
- B) Plans showing location and details of channels, cell and anchor bolts furnished by customer and termination of the power control cables.
- C) Schematic or elementary wiring diagram
- D) Detail control wiring diagram (These diagrams generally follow the approval drawings.)
- E) Bill of materials, which provide a listing of all devices that are furnished with the equipments.

Instruction books are provided to cover operating and maintenance instructions for each piece of equipment required. The number of instruction books are limited to a maximum of three (3) without charge. Consult Powercon factory for additional books.

WORLD WIDE SERVICE

Powercon Field Service Engineering

Powercon's 24-hours-a-day field service is provided through factory Field Service

Engineers. Our Field Service Engineers are highly skilled SWITCHGEAR experts extremely proficient in providing the highest quality service for switchgear and its components.

Powercon is prepared to provide you with:

- *Emergency Service*
- *Repair and Maintenance Services for Existing or Obsolete Equipment*
- *Installation Supervision of New Equipment*
- *Advice and Instruction of Preventive Maintenance Procedures*
- *Coordination Check of New Equipment*
- *In Warranty Service*
- *Other Required Installation and Engineering Services.*

Powercon Service Engineering is based at the manufacturing facility in Severn, Maryland, only 6 miles from the Baltimore-Washington International Airport.

Our Service Engineering group is in close liaison with other Powercon engineers who create the application, and the mechanical and electrical design of each switchgear equipment. Powercon also maintains detailed records of every part and component manufactured and/or purchased for each project. They have immediate access to the purchasing staff for suppliers service.

Responsibility

Powercon is responsible for the complete product and all services that it provides.

Powercon purchases, assembles, and provides a few components from other suppliers. In those rare instances when supplier component problems occur Powercon will handle and solve these problems. All warranties on such components will be handled by Powercon direct with the original supplier. Any and all repairs are the responsibility of Powercon.