



QUALITY • RELIABILITY • COMMITMENT

THOMSON
POWER SYSTEMS

REGAL[®]

THE THOMSON BRAND |

A REGAL BELOIT COMPANY



Thomson Power Systems was formed in 1973 and is now one of the leading manufacturers of electrical products and systems for use in the Power Generation Industry. The company specializes in the design and manufacturing of power generation systems and automatic transfer switches for low and medium voltage applications.

Thomson Power Systems provides their control systems to an ever-expanding customer base across the globe driven by:

- Customer focus and commitment
- Custom and standard engineered product designs
- Ingrained quality control

From the early days as Schmidtec Power, to Thomson Technology through to Thomson Power Systems today; the Thomson brand stands as a name that can be trusted in the Power Generation Industry. Whether it is a stand alone system that efficiently manages one generator or multiple generators, a paralleling switchgear system that operates in a critical emergency power application, Thomson can be relied on to deliver "Power on Demand".

Thomson Power Systems is a leading specialist in the design and manufacturing of power generation control products that deliver electrical power on demand.

THE THOMSON POWER |

COMPANY OVERVIEW

Thomson Power Systems custom designs and manufactures switchgear systems to meet the stringent performance and reliability requirements of mission critical applications such as data centers, airports, hospitals and waste water treatment facilities.

Thomson Power Systems' production and engineering design capability and field service expertise combine to provide our customers with quality, state-of-the-art systems.

TECHNOLOGY

Thomson Power Systems engineers are dedicated to the design and development of products and systems for the power generation industry. Our engineering team expertise includes mechanical, electrical, electronic and hardware/software design and implementation.

All designs are developed using CAD systems and follow strict design control methodologies in accordance with our ISO 9001 quality system. Designs are developed from a large database of engineered applications that have evolved from over 40 years of field experience. For many applications, Thomson Power Systems' standard designs can be applied to meet client requirements.

NEW PRODUCT DEVELOPMENT

New Product Development is a critical function of our Technology Group. The NPD team has the capability to handle electronic embedded control system design as well as electrical and mechanical design experience. Design input to NPD projects is obtained from market research as well as direct field experience.

FACTORY FIELD SERVICE

Thomson Power Systems' designs are supported by trained engineers and technicians who can be mobilized 24/7 to commission and service any of our systems around the world.

VIRTUAL TECH™

Thomson Power Systems Series 2400 Switchgear comes fully equipped with "Virtual Tech" remote monitoring and control feature capability. Virtual Tech is an internet based software application which provides real-time remote monitoring and control capability of a Switchgear system through a pre-authorized, secure and encrypted, Virtual Private Network (VPN) utilizing a high speed Ethernet network.

Virtual Tech™ provides facility owners and operators of emergency power systems, the ability to quickly troubleshoot and diagnose critical site problems. By utilizing remotely located factory trained technical resources, the costs and time associated with requiring field technicians to travel and attend their sites are diminished. In addition, Virtual Tech™ can allow regularly scheduled testing and preventative maintenance processes to be remotely monitored and controlled by factory trained technicians to ensure operation is trouble free and to provide immediate assistance, as may be required.

SALES SUPPORT

We have developed a team of highly skilled sales engineers and project managers who take pride in their workmanship by being involved with every project from start to finish and by ensuring quality products are delivered on time to our customers.

Our people are the heart of what we do.

THE THOMSON WAY |

PRODUCT CERTIFICATION & QUALITY ASSURANCE



STANDARDS

Thomson Power Systems’ products are certified by OSHA’s nationally recognized testing laboratories such as the Canadian Standards Association (CSA) and the Underwriters Laboratories (UL).

Our systems and products meet or exceed applicable UL, ANSI, CSA, and IEC standards and can be supplied to meet other appropriate standards.

For offshore or marine applications, specific standards such as Lloyds, DNV or ABS can be applied to meet your project needs.

QUALITY ASSURANCE

For over 40 years Thomson Power Systems has used internal quality programs to help exceed our customer needs for product quality, service, and support.

Certified since 1994, Thomson Power Systems’ corporate commitment to quality is evident in our ISO 9001 registration. The scope of Thomson’s registration includes design, manufacture and service of equipment for electrical apparatus used in the power generation industry.

Product Certification	
Switchgear	<ul style="list-style-type: none"> UL 891 (LV Switchgear) UL 1558 (LV Switchgear) CSA C22.2 No. 31 (LV & MV switchgear) IEC 60439-1 (LV Switchgear) ANSI C37.20.1 (LV Switchgear) ANSI C37.20.2 (MV Switchgear) ANSI C37.20.3 (Metal-Enclosed Interrupter Switchgear) ANSI C37.20.7 (Arc Resistant MV Switchgear) IBC 156 Seismic Certification
Industrial	<ul style="list-style-type: none"> UL 508 (Control) CSA 22.2 No.14 (Control)

SYSTEM 2000 |



The System 2000 product family can provide a complete integrated control and power switching solution to meet any Power Generation System application.

The industry leading System 2000 Digital Paralleling Systems from Thomson Power Systems provides more robust functionality and control than any other paralleling system in the industry.

Numerous types of industry standard power switching equipment can be applied into a Series 2000 Switchgear System including main power circuit breakers for service entrance applications, disconnect switches, distribution feeder breakers, and transfer switches. This equipment can be integrated into various switchboard configurations such as singled-ended or doubled-ended substations with tie- breakers.

System 2000 Switchgear can be supplied with a full range of integrated control and protection equipment including, generator and utility protective relaying, metering, engine/generator controls, governor/excitation systems, remote monitoring and control communication devices.

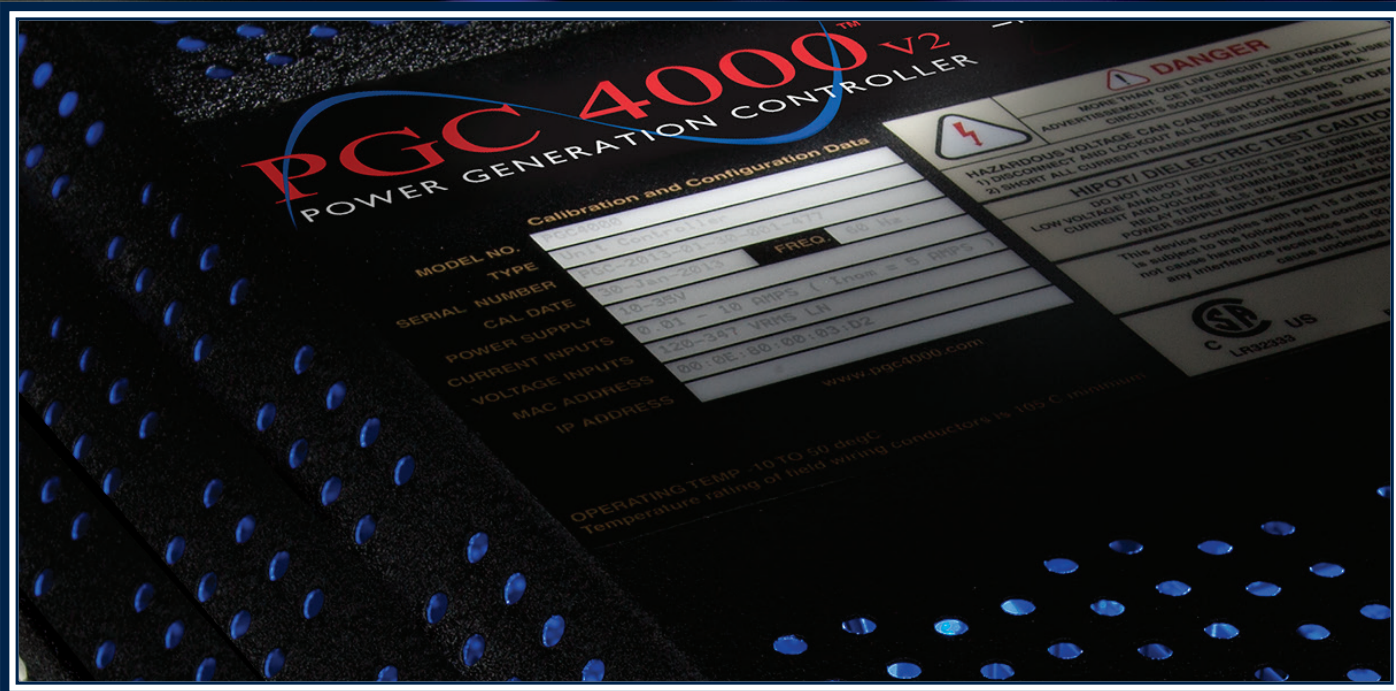
The System 2000 product family of Power Generation Control System switchgear is available in the following key system application types:

- Distributed Generation (DG)
 - Cogeneration/Peak Shave
- Emergency Standby (ES)
- Prime Power (PP):

All application types and features of our switchgear systems are designed for single or multiple generator applications and are available in low or medium voltage configurations.

All System 2000 Switchgear Systems are designed and manufactured in accordance with applicable UL, ANSI and CSA standards and in accordance with our ISO 9001 quality assurance certifications.

PGC 4000v2 |



The PGC 4000 is an intelligent, integrated, full feature Power Generation Controller. The PGC 4000 controller is the power behind the Thomson Power Systems Series 2400 Paralleling Switchgear System which provides flexible standard designs that allow automatic paralleling of single or multiple generators for applications including Distributed Generation, Automatic Standby and Prime Power. The new PGC 4000v2 provides industry leading processing power with dual 1 Gbps Ethernet Network Communication ports for superior communication, reliability and speed.

The PGC 4000 can be configured to operate on low or medium voltage systems and can be applied with a variety of generator set manufacturers and prime movers including diesel or gas reciprocating engines and gas or steam driven turbines. The PGC 4000 integrates a vast array of advanced control and monitoring features with Thomson Power Systems unique run-time configurability feature. Some of the advanced integrated features include utility/generator revenue grade power metering, protective relaying, engine control, automatic synchronizing and automatic kW/kVAR load sharing.

The PGC 4000's full color, touch screen, graphical operator interface display combined with Thomson's Internet/web ready Ethernet communications make it the most user friendly, integrated power generation system controller on the market. By incorporating advanced communication interfaces, the PGC 4000 can operate in harmony with any PLC or building management system, providing maximum equipment utilization and total energy management.

The PGC 4000 is comprised of a door mounted operator interface display and the PGC 4000 controller, which is mounted in the switchgear control compartment. The operator interface display and control module are interconnected with a high speed Ethernet communication cable. One controller module is required for each generator set. One operator interface display is provided for the complete system. Additional operator interface screens can be supplied as required.

Power Metering/Power Quality: The PGC 4000 provides digital and analog display of power metering and power quality data for both the generator and utility sources

via the operator interface display. In addition, load voltage and frequency metering data are monitored and displayed which is utilized for synchronizing and dead bus closing logic. The Power Metering data complies with revenue accuracy standards as per ANSI C12.20 Class 0.5 accuracy.

Protective Relaying: The PGC 4000 provides configurable protective relaying functions for both Generator and Utility supplies via the operator interface graphical display. Two cycle calculations are used to drive output relays allowing fast protection operation when required. Protective Relaying provided for both generator and utility supplies includes IEEE designated functions 25, 27, 47, 51, and 81 O/U.

Automatic Load Sharing: The PGC 4000 provides Automatic kW & kVAR load sharing control when generators are paralleled to a utility supply. Automatic load sharing utilizes the PGC's high precision digital power data to ensure fast and reliable operation. The PGC 4000 is able to interface with industry standard engine electronic governors and alternator excitation systems for paralleling power control. Standard load sharing features include kW Load ramping, kW Base Loading, kVAR (Power Factor) Control, and Import kW Control.

Synchronizing: The PGC 4000 provides fully automatic or manual synchronization control. Automatic synchronization utilizes the PGC's high precision digital frequency, voltage and phase angle data to ensure fast and reliable

operation. Manually initiated synchronization allows user initiated breaker closure with integral out-of-phase sync check protection. Synchronization is possible between any 3 voltage measurement sources and utilizes 3 phase voltage data. Synchronizing controls are designed to interface with industry standard engine electronic governors and alternator excitation systems. Standard synchronizing features include Dual Dynamic Speed Matching Synchronizers, Graphical Waveform Synchroscope, Voltage Matching, Auto/Test/Manual Sync Modes, Fail to Sync Alarming, and Voltage Monitoring.

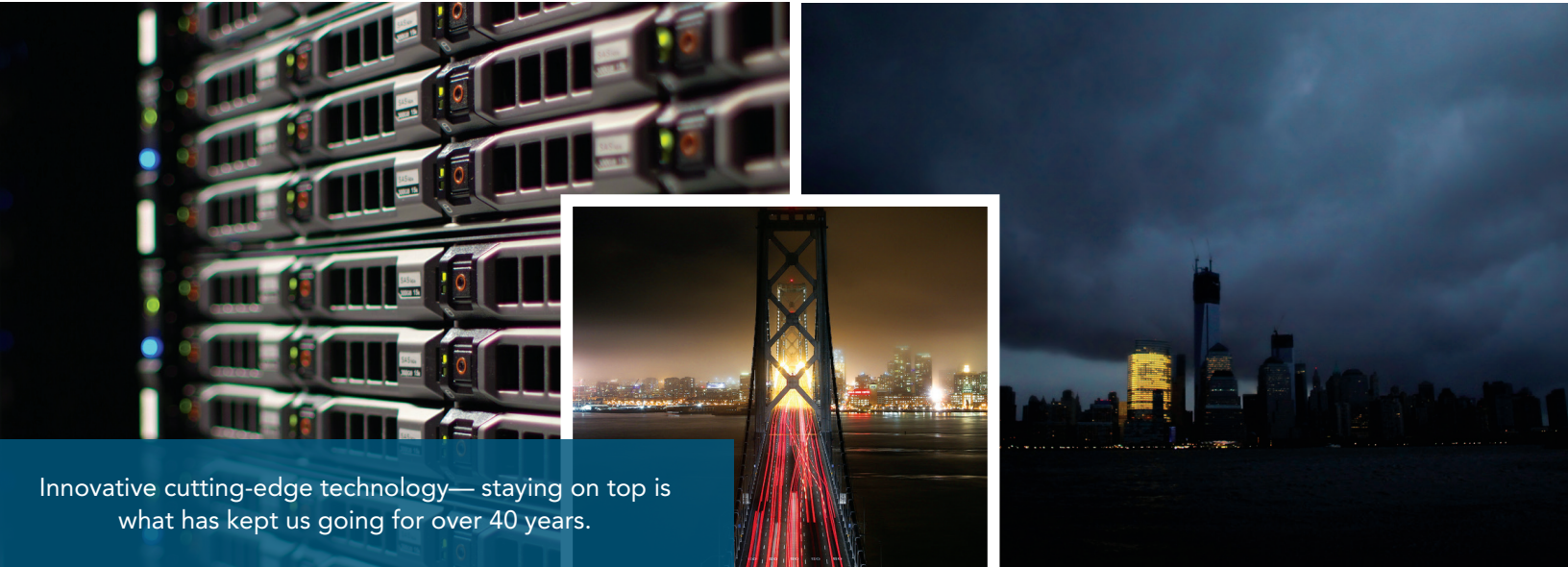
Engine Control: The PGC 4000 can be configured to operate with external unit mounted engine control systems or with its own internal engine controller feature set. When the PGC 4000's own internal engine controller is utilized, the following standard features include Auto Start Control, 16 Output Contacts, 16 Digital/Analog Fault Alarms/ Shutdown Inputs, Configurable Set Points/Time Delays, and Engine Parameter Display.

The PGC 4000 with Series 2400 Paralleling Switchgear can be provided with the following communication ports for customer connection with local and remote communication interface systems:

- RS 485 MODBUS™ Serial
- Ethernet MODBUS™ TCP
- USB (4) peripheral communication ports
- Remote Display HDMI/VGA/DVI ports
- Ethernet Remote Access (LAN/Internet)



DISTRIBUTED GENERATION | SWITCHGEAR



Innovative cutting-edge technology— staying on top is what has kept us going for over 40 years.

System 2000 Distributed Generation (DG) Switchgear provides the capability of synchronizing single or multiple generators to the utility grid to allow peak shaving or co-generation operation with local or remote communicative control. Distributed Generation Systems can be supplied with fully automatic operation and closed transition, soft power transferring control.

Standard designs are available to fit most applications and can be adapted to fit an owner's specific requirement. Custom engineered systems and design recommendations are available for those applications requiring a unique design approach. The System 2000 series of products can be utilized with diesel or gas engine generator sets, as well as gas, steam or hydro-electric turbines. By incorporating advanced communication interfaces, System 2000 products can operate in harmony with any site or building management system, providing maximum equipment utilization and total energy management.

The System 2000 Distributed Generation Switchgear can be applied to many types of applications in the power generation industry such as hospitals, data centers, water/wastewater treatment plants, casinos, correctional facilities and many more. Thomson Power Systems DG Switchgear can be applied to new installations as well as existing systems where generators are upgraded for parallel operation with the utility supply.

EMERGENCY STANDBY | SWITCHGEAR



Reliable, Reputable and Responsive Power Solutions—
for moments when it matters most.

Automatic Standby Switchgear Systems provide control of single or multiple generator sets to provide automatic standby power during a utility power failure. Emergency standby switchgear can be designed with integral transfer systems between the utility supply and emergency bus or with an external distributed transfer switch scheme.

Numerous standard transfer control schemes are available to meet your specific project requirements. Manual synchronizing is provided in the event of failure of automated control.

Load demand starting can be incorporated to maintain optimal efficiency and reliability of your gen-sets during a power failure. Load management schemes are provided to prevent costly and dangerous downtime by limiting potential over load conditions.

Design features can be incorporated to meet specific industry standards such as:

Uptime Institute certified Tier II, III and IV Data Centers:

- Primary Power System Design Philosophy
- Concurrently Maintainable
- Multiple, Independent, Physically Isolated

UL/CSA Critical Care Health Facilities:

- CSA Z800-11
- Vital Branch Transfer to Emergency Power in 10 Seconds
- Delayed Vital Branch Transfer to Emergency Power in 2 Minutes

Marine Standards:

- Det Norske Veritas (DNV)
- Lloyds Registry
- American Bureau of Shipping

PRIME POWER | SWITCHGEAR



....because no one should get left in the dark.

Prime Power Switchgear Systems provide power and control for applications where local utility is unreliable, unavailable, or uneconomical to install. Prime power sites require unique control solutions because of their critical nature. These systems can incorporate automatic synchronizing, soft transfer, fuel economizing, or run time hour balancing. The systems can also be provided with modem communication for remote monitoring, control, data-logging, and alarming.

Applications include:

- Marine - on board power generation
- Village or island applications system acts as the utility
- Mining, offshore platforms, gas plants, and remote refineries, providing on-site power for production.

In locations such as remote mining or gas plant operations, utility power is nonexistent. A multiple-unit, auto-synchronizing system will provide continuous reliable power for site operations and production systems. The system can control multiple units for auto-synchronizing, and protections. The controls can automatically start and stop generators as required, based on plant demand, improving system downtime and facilitating maintenance.

Thomson Power Systems' Marine Switchgear is designed to meet the additional requirements of the applicable marine standards such as Lloyds, DNV, or ABS. These standards deal with issues like extreme temperature ranges, vibration, serviceability, and fire proofing.

POWERING THE WORLD |

PROJECT OVERVIEWS



Thomson Power Systems' Emergency Stand By, Distributed Generation, Prime Power and Co-Generation systems have been ensuring our customers around the world receive reliable power on demand for more than 40 years.

Our technical services team provides 24/7 support to our worldwide customer base through direct, on site

start up, operator training and extended preventative maintenance programs. The Thomson Engineering and Technical Service teams extend factory support throughout the world with our on line remote monitoring and control software, Virtual Tech. Virtual Tech can effectively put our technical team on your site with a phone call.



SuperNAP houses the world's most advanced Colocation center and most sophisticated technology ecosystem



Supplying backup power for government embassies around the globe.



The world's largest water treatment plant

SWITCHGEAR AND CONTROL | PROJECT OVERVIEWS

SWITCH NAP7

Project: SuperNAP 7
Location: Las Vegas, Nevada
Standby Power Generation Capacity: 140MW @ 15kV

Owner: SwitchNAP
Consulting Engineer: Meade Engineering Inc
15kV Engine Generators: W.W.Williams (MTU Onsite Energy)
15kV Utility Service Switchgear Boards:
Thomson Power Systems Series 2200 15kV Paralleling
Switchgear Boards:
Thomson Power Systems Series 2400 15kV Distribution Switchgear
Boards: Thomson Power Systems Series 2400
480V Unit Substations: Thomson Power Systems Series 2200



Description: Switch Super NAP7 covers an area larger than eleven football fields. Thomson Power Systems equipment controls utility supplies and medium voltage generators throughout the campus. Each generator control system provides automatic standby operation complete with closed transition soft load transfer control. Thomson Power Systems PGC4000 Power Generation Controller is provided for each generator in paralleling switchgear boards and provides automatic synchronizing, load control and advanced power metering. Hot Swap Redundant PLC architecture is designed to control the power systems. PLC systems are connected using dedicated self-healing fiber optic networks. Thomson Power Systems Advanced HMI systems control monitors the power systems throughout the site.

GOVT EMBASSY PROJECT

Project: Government Embassy
Customer: W.W. Williams Southeast Inc.
Consulting Engineer: WSP Flack + Kurtz

Description: The Series 2400 switchgear is built to UL1558, NEMA 1 metal enclosed, 4000A, 380V, 3phase, 4-wire, 50Hz, 85kAl rated. The system consists of two main incoming supplies and (3) 680kW, 380V, 50Hz diesel driven generators and feeds the load through the Series 2400 paralleling switchgear.



ATOTONILCO WASTE WATER TREATMENT PLANT

Project: Atotonilco WWTP
Location: Atotonilco, Hidalgo, Mexico
Standby Power Generation Capacity: 32MW @ 13.8kV

Owner: CONAGUA
Consulting Engineer: Green Gas (CH2M Hill)
13.8kV Engine Generators: Smith Power Products (GE
Jenbacher Bio Gas)
13.8kV Paralleling Switchgear Boards: Thomson Power Systems Series 2200
480V Master Controls and HMI Systems: Thomson Power Systems Series 2200



Description: Atotonilco Waste Water Treatment Plant is the largest WWTP plant on the planet. Thomson Power Systems equipment controls and parallels 14 medium voltage GE Jenbacher bio gas generators. Hot Swap Redundant PLC architecture is designed to control the co-generation power system. Thomson Power Systems Advanced HMI system control and monitors the power systems throughout the plant.

ARC RES | SWITCHGEAR CONFIGURATION



Protecting your employees and your investment

PROJECT PROFILE: Christina Lake Waste Water Treatment Plant

“The ecological wastewater treatment facility, which uses the power of the sun, will mimic a wetland system. It will use fish, snails, microbes and plants to treat sewage and wastewater without the use of chemicals,” said Grace McGregor, Regional District Kootenay Boundary Area C Christina Lake Director.

For this innovative project, Thomson Power supplied:
FOUR SECTION NEMA1 FREESTANDING 4.16kV 350MVA ARC RESISTANT TYPE 2B EMERGENCY GENERATOR BLACK START PROTECTION AND TRANSFER CONTROL SWITCHGEAR.

Product Specifications	
Applications:	<ul style="list-style-type: none"> • Utilities • Oil & Gas • Mines & Metals • Medium & Heavy Industries • Power Plants • Transportation
Main Features:	<ul style="list-style-type: none"> • Air insulated switchgear • Arc resistant design according to IEEE C37.20.7 • Metal-clad (according to IEEE standards) • Single busbar configuration • Single and two-high module designs available • Both modules can be fitted with circuit breaker, contactor, VT, CPT, ... • Fully designed and tested according to IEEE C37.20.2 and other relevant standards

SEISMIC | SWITCHGEAR CONFIGURATION



Reinforced to withstand mother nature

Thomson Power Systems Switchgear and automatic transfer switches have been tested to withstand seismic events as defined by the International Code Council Evaluation Service (i.e. ICC-ES) AC156 Standard. This test standard was developed specifically for non-structural components such as electrical equipment that must withstand specific forces of a seismic event when simulated in a shaker table test environment. The AC156 Seismic test standard has been developed in accordance with the International building Code (i.e IBC) section 104-11.

Testing Specifications	
Desing Regions	S _s = 342%
Shake Table	Uni-Axial, 3 orthogonal directions
Sine Wave Tests	multi-direction, 0.1g amplitude, 33.3 hz to 1.3hz Range
Operation Tests	Pass = Positve high potential test, continuity test and functional operation

1. Thomson Power Systems has seismically certified their Switchgear Series 2200 and 2400 both Low Voltage and Medium Voltage, in accordance with AC 156. This document applies to all design regions up to a value of S_s=342%
2. AC156 is a nationally recognized standard for certification for non-structural components by means of shaking table testing. It considers requirements and loads as per IBC 2006 and ASCE705
3. The shake table testing was performed at Alpha Seismic and Environmental Test (ASET) Laboratory, Bellingham, WA, and at the Earthquake Engineering Research Facility, The University of British Columbia, Vancouver BC
4. The tests were witnessed by all analytical evaluation was provided by TVP Engineering Ltd, of Vancouver, BC Canada
5. The tests were performed by uni-axial shake table testing in three orthogonal directions in accordance with AC156 Cl. 6.4.2 and 6.4.1.3
6. Swept-sine tests were performed in each direction with shaking amplitude of 0.1g and in the range of 33.3Hz to 1.3Hz in accordance with AC156 Cl.6.4.5
7. Prior to start of the testing program, and immediately after each test, each cabinet was subjected to a hi-post test, continuity test and operation test to demonstrate performance in accordance with AC 156 Cl.6.7
8. The products are certified according to the Maximum Considered Earthquake Short Period Response Acceleration, S_s=342% according to 2003 NEHRP Seismic Design Provisions⁹
9. A value of S_s =342% translates to value A_{riix} = 3.65g, A_{rig} =2.72g as plotted for the Required Response Spectrum (RRS)

* OSHPD Seismic Certification Pending

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* Request additional information or specifications on any of the System 2000 products from your local Thomson Power Systems office, Manufacturing's Representatives or Distributor.
PG-UPT® is a registered trademark of Thomson Power Systems

NOTE: Specifications subject to change without notice.

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MANUFACTURING/ ENGINEERING

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APPLICATION CONSIDERATIONS

The proper selection and application of power generation products and components, including the related area of product safety, is the responsibility of the customer. Operating and performance requirements and potential associated issues will vary appreciably depending upon the use and application of such products and components. The scope of the technical and application information included in this publication is necessarily limited. Unusual operating environments and conditions, and other factors can materially affect the application and operating results of the products and components and the customer should carefully review its requirements. Any technical advice or review furnished by Regal Beloit America, Inc. and its affiliates with respect to the use of products and components is given in good faith and without charge, and Regal assumes no obligation or liability for the advice given, or results obtained, all such advice and review being given and accepted at customer's risk.

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