hammond
POWER SOLUTIONS

NORTH AMERICAN CAPABILITIES

HPS CAPABILITIES

COMPANY

Hammond Power Solutions (HPS) enables electrification through its broad range of dry-type transformers, power quality solutions and related magnetics. HPS' standard and custom-designed solutions are essential and ubiquitous in electrical distribution networks within an extensive range of industries including renewable energy, e-mobility, data centers, microgrids, and industrial/commercial settings.

HPS has manufacturing plants in Canada, the United States (U.S.), Mexico and India and sells products around the globe.

Founded: 1917
Number of employees: 1,532
Ownership: Hammond Power Solutions (HPS) is a public company traded on the Toronto Stock Exchange ("HPS.A")

GLOBAL PRESENCE

HPS offers a broad range of dry-type and liquid filled transformer capabilities through our International Companies:

North America

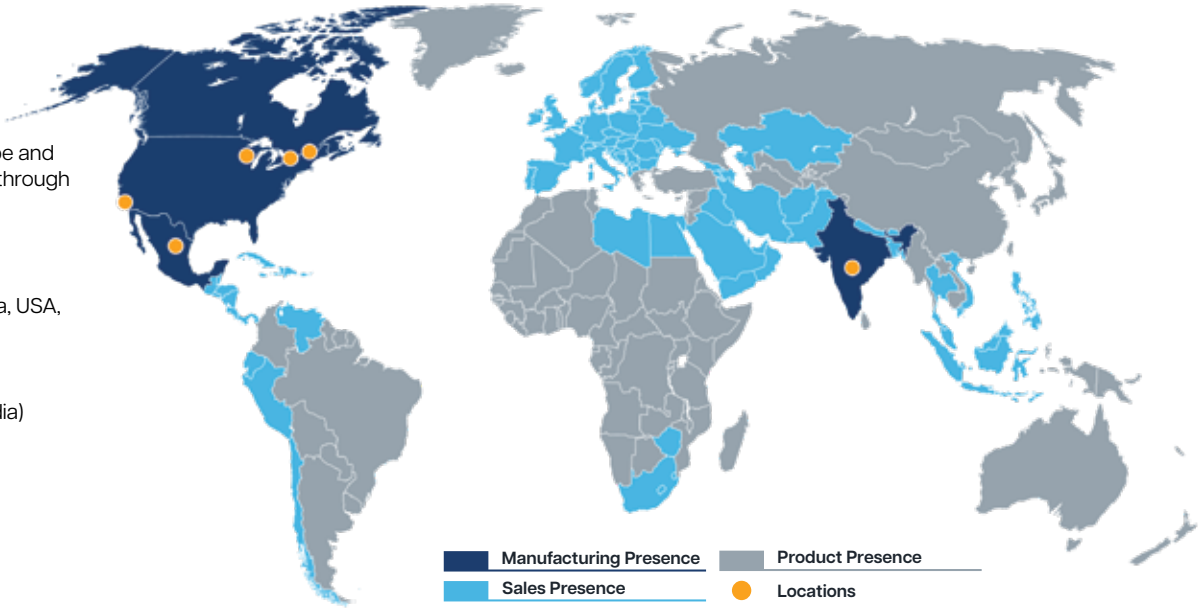
Hammond Power Solutions (Canada, USA, Mexico)

Asia

Hammond Power Solutions Pvt. (India)

EMEA

Hammond Power Solutions SpA



COMPETITIVE EDGE

- Global manufacturing presence
- Multiple channels to market
- Extensive engineering expertise
- Customer service
- High-value products which can be offered to meet any global design/ regulatory requirements

MARKETS

Construction | Mining | Petrochemical | Industrial and Commercial

Microgrids | Power Storage | Renewable Energy | e-Mobility

CUSTOMER SERVICE

HPS customer service personnel are dedicated to providing the information you need as quickly as possible.

Our teams are technically trained to provide solutions to meet your specifications and are able to answer most questions over the phone. Stock checks, expediting, quotations or technical information are always readily available. Our modern business systems allow most quotation requests to be completed in less than 24 hours.

Our commitment to customer service means you will be an informed and satisfied customer.

DELIVERY

We meet or exceed the lead times expected within our markets.

Our business systems, engineering capabilities and multiple manufacturing locations have enabled HPS to have some of the best lead times in the industry. We can deliver specialty transformers in as little as one week.

In addition to our quick deliveries, HPS stocks a broad selection of standard control, potted, reactor and low voltage distribution products.

SALES

Our sales team are ready for your inquiries. No matter where you are located, someone knowledgeable is close by to provide assistance.

We have technically capable quotation staff located in various locations who are trained in helping to find a solution to your specification and deliver the required quotation quickly.

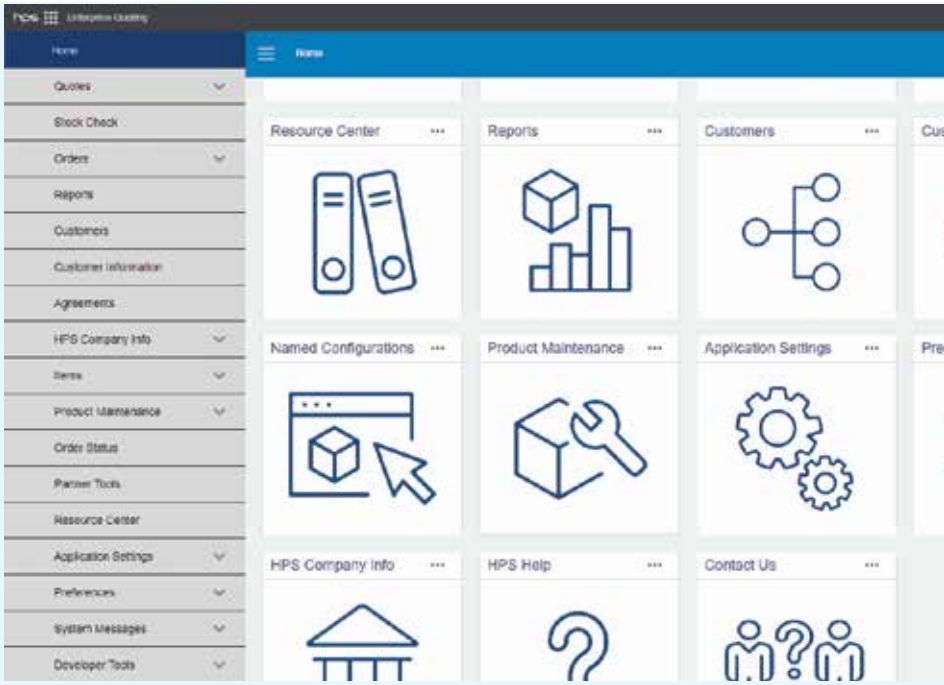
E-PORTAL

Our partners have access to an Online Partner Portal we call E-Portal. The E-Portal system provides 24 hours, 7 days a week access to an array of tools that allow our partners to work efficiently in meeting the needs of end customers.

Our on-line systems differentiate us from other transformer manufacturers by providing our partners with a competitive advantage. Distributors are able to respond to their customer's needs quicker, more accurately, and in greater detail than ever before.

This on-line system offers 24/7 access to the following features:

- Specify and quote standard or custom products
- Check stock and order status
- Nameplate and product specification data
- Additional HPS and product information



HPS ACADEMY

www.hpsacademy.com

An interactive Online training site that allows you to participate in HPS training modules on your own time (24 hours a day, 7 days a week), right from the comfort of your desk.

Widely recognized as an invaluable tool to enhance knowledge related to our products, with industry awards that demonstrate the benefits of this training system.

HPS TOOLBOX

www.hammondpowersolutions.com/hps-toolbox/

HPS offers many different tools to assist you in selecting an HPS Transformer.

Simply go to www.hammondpowersolutions.com and select the HPS Toolbox from the Online Tools. You can choose from the following three tools: **Efficiency Calculator**, **Current Calculator**, and **Buck-Boost Selector**. Choosing an HPS Transformer has never been easier with the HPS Toolbox.

MOLDED STYLE CONTROL TRANSFORMERS

HPS molded style control transformers are designed for high inrush applications such as relays, solenoids, and magnetic starters. Their molded construction adds durability and protects from moisture, dirt, and other industrial airborne contaminants. Standard features include:

- VA range from 50 VA to 2000 VA
- Available with standard secondary fuse kits (>100 VA) and optional primary fuse blocks
- Patent pending single-point grounding connection
- Lifetime warranty
- cULus Listed, CE Marked and RoHS Compliant
- Vacuum impregnated and epoxy encapsulated coil

OPEN STYLE CONTROL TRANSFORMERS

HPS open style control transformers offer a versatile, cost-effective solution for installations inside a separate enclosure. They are ideal for OEMs, panel builders, and applications where space is limited and a compact footprint is needed. Standard features include:

- VA range from 50 VA to 5000 VA
- Molded terminal blocks for connections up to 3000 VA and 1/4" copper lugs over 3000 VA
- Vacuum impregnated
- Patent pending single-point ground connection
- 20 voltage combinations available
- CSA Certified, UL Listed, CE Marked and RoHS Compliant

GENERAL PURPOSE ENCLOSED CONTROL TRANSFORMERS

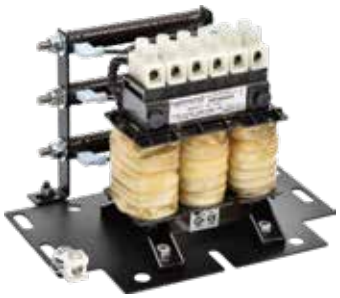
HPS general purpose enclosed control transformers come ready to install with a metal enclosure, making them well-suited for light-duty industrial and commercial use. They are a great choice where no panel or enclosure exists and a clean, compliant installation is required. Standard features include:

- VA range from 50 VA to 5000 VA
- Molded terminal blocks for connections up to 3000 VA and 1/4" copper lugs over 3000 VA
- Easy mounting and installation via four mounting slots and two keyhole slots
- Enclosed in a Type 1 enclosure
- CSA Certified, UL Listed and RoHS Compliant

REACTORS

HPS reactors provides a unique blend of improved performance and reliability while reducing the product footprint. Standard features include:

- Sizes available for 0.5 to 1200 HP motors
- Maximum system voltage is 600/690V
- Standard core & coil (optional Type 1 or 3R enclosure)
- 50/60 Hz
- UL Listed, CSA Certified and CE Marked



DV/DT FILTERS

HPS dV/dT filters are specifically designed for use between variable frequency drives (VFDs) and motors. It combines an inductor and parallel resistor network to mitigate both high frequency components and voltage spikes between the VFD and motor. Standard features include:

- System Voltage Rating up to 600V (480V-600V applications)
- Current Rating of 2A to 750A
- Inverter Switching Frequency 2kHz to 4kHz
- Inverter Operating Frequency up to 60Hz
- Insulation System of 130°C (2A - 54A), 180°C (>55A)
- Standard core & coil (optional Type 1 or 3R enclosure)

DRIVE ISOLATION TRANSFORMERS

HPS drive isolation transformers are suitable for both AC and DC variable speed drives. They are sized to match standard motor horsepower and voltage ratings.

HPS offers two standard lines of drive isolation transformers, with one that meets TP1 and/or NRCan2019 energy efficiency standards. Standard features for the two lines include:

- Three phase ratings from 7 kVA to 660 kVA
- Copper and aluminum available
- Optional shield available
- UL Listed and CSA Certified
- Type 3R enclosure (optional Type 4, 12 or stainless)

SINEWAVE MOTOR PROTECTION FILTER

HPS SineWave Motor Protection Filter is a robust solution to condition the pulse width modulated (PWM) output of a variable frequency drive (VFD) into a nearly perfect sinusoidal waveform. Motor drive systems with extended cable lengths may encounter elevated high frequency currents and voltage spikes. HPS SineWave Motor Protection Filters effectively filters out high-frequency components, mitigating both common mode and differential mode noise. The result is enhanced protection for the motor and feeder cable insulation systems as well as reduced wear on the motor bearings.

Electrical Product Characteristics

- Voltage Rating: 380V – 480V and/or 600V (consult HPS for other voltage requirements)
- Current Rating: 9A to 600A

Technical Product Characteristics

- Harmonic Voltage Distortion: 5%
- Inverter Switching Frequency (Carrier Frequency): 2kHz to 8kHz
- Inverter Operating Frequency (Output Frequency): maximum 90Hz
- Insertion Loss (Voltage Drop): 5%
- Maximum Cable Length (motor lead): up to 15,000 feet (4572 meters)

HPS TRUWAVE ACTIVE HARMONIC FILTER

Power quality problems are one of the major causes of unscheduled down time, equipment malfunction, and damage. The majority of power quality issues are a result of harmonic distortion.

The HPS TruWave active harmonic filter is a true Active Filter and is a comprehensive solution for harmonic mitigation and power factor correction. It provides the advanced control and proven reliability that your facility needs to solve power quality issues. Standard features include:

- Voltage Rating: 208-480 VAC; +12%/-15% (600 VAC with the use of autotransformer)
- Current Rating: 50A, 100A, 150A, 200A, 300A, 400A, 500A, 600A @208-480VAC (40A, 80A, 120A, 60A, 240A @600VAC)
- Frequency: 50Hz or 60Hz, ±5Hz
- System Configuration: 3 phase, 3 wire, plus ground (consult HPS for use on 4-wire systems with significant line-to-neutral loading)
- Harmonic Attenuation: < 5% TDD as per IEEE 519-2014 (typically requires either 3% line reactor or 4% DC choke)
- Actively reduces harmonic distortion to below 5% complying with IEEE-519 recommendation
- Optional seismic compliance to IBC 2018 and ASCE 7-16 standards (SDS = 2.0, Ip = 1.5, z/h = 1)

PASSIVE HARMONIC FILTER

HPS passive harmonic filter is specifically engineered to mitigate harmonic currents created by non-linear loads. Standard features include:

- Voltage Rating: 480VAC or 600VAC +/-10%
- Input Power Rating: 480VAC: 8 - 2000A (5-1500HP); 600VAC: 6-505A (5-500HP)
- Total Current Distortion (THDi) typically, <5% @ full load; <8% @ 30% load when operated within designed parameters
- Harmonic Mitigation: 5th, 7th, 11th, 13th, etc. (major 6-pulse rectifier harmonics)
- Open or Type 3R enclosure
- cUL listed
- Capacitor contactor available as an option

BUCK-BOOST TRANSFORMERS

The HPS buck-boost transformer offers an economical solution to the adjustment of line voltages that are slightly above or below normal. Standard features include:

- VA range from 50 VA to 5000 VA
- Single phase, welded core construction
- Made with high quality, high permeability silicon steel laminations
- Encapsulated core & coils in a combination silica sand and resin compound
- UL Listed and CSA Certified
- Type 3R enclosure (optional Type 4, 4X and 12 enclosures)

ENCAPSULATED TRANSFORMERS FOR COMMERCIAL APPLICATIONS

HPS encapsulated transformers for commercial applications are an innovative design that provides the ideal solution for commercial applications where quality, ease of installation, and low cost are key. Standard features include:

- Ratings: Single phase from 0.50 kVA to 37.5 kVA, Three phase from 6 kVA to 75 kVA
- Enclosure: Single phase Type 3R (optional Type 4, 12), Three phase Type 4 (optional Type 4X)
- UL Listed and CSA Certified
- Standard shield on all three phase units and single phase units 750VA and up
- 10kV BIL standard on all three phase units

ENCAPSULATED TRANSFORMERS FOR HAZARDOUS APPLICATIONS

The HPS encapsulated transformer for hazardous applications are specifically designed for installation in harsh environments. Typical applications are oil & gas plants, marine and shipboard installations, steel mills, mining, etc. Standard features include:

- Ratings: Single phase from 0.50 kVA to 37.5 kVA, Three phase from 6 kVA to 150 kVA
- Enclosure: Single phase Type 3R (optional Type 4, 12 or 4X), Three phase Type 4 (Type 4X)
- Standard shield on all units
- 10kV BIL standard on all three phase units
- cULus Listed Units - UL Listed for "Class 1, Division 2, Group A, B, C, D and Class I, Zone 2, Group IIC, T3 Hazardous Locations, ABS Type Approval for "Marine Duty Service and Offshore Applications - Electrical Distribution and Propulsion" and a North American Temperature Classification of T3C/T3A.
- **IECEx, ATEX, UKEx Certified Units - IEC 60079-0, IEC 60079-7,5.1 - Hazardous Locations Class I, Zone 2, Group IIC, T3**

AUTOTRANSFORMERS

Autotransformers are available for applications where small voltage corrections are necessary in a distribution system. They are frequently used to adjust the supply voltage to match specific load requirements when load isolation from the supply line is not required. This product can be used as either a step-up or step-down transformer. Standard features include:

- Three phase from 3 kVA to 500 kVA
- Copper available
- UL Listed and CSA Certified
- Type 3R Enclosure
- Neutral terminals standard

HPS also offers a line of Motor Starting Autotransformers

GENERAL PURPOSE DISTRIBUTION TRANSFORMERS

Generally used for supplying appliance, lighting, heating, motorized machine and power loads from electrical distribution systems.

- Meets DOE 2016, NRCan 2019 and NMX-J-351-1-ANCE-2021 energy efficiency standards
- 10kV BIL on all three phase transformers

K-RATED DISTRIBUTION TRANSFORMERS

The use of K-Factor distribution transformers has become a popular means of supplying power for non-linear loads such as electronic ballasts, drives, personal computers, telecommunications equipment, broadcasting equipment and other similar power electronics. These non-linear loads generate harmonic currents which can substantially increase transformer losses. Our K-rated transformers have been specifically designed to allow some overheating. Standard features include:

- Meets DOE 2016, NRCan 2019 and NMX-J-351-1-ANCE-2021 energy efficiency standards
- K-Factor ratings of K4, K9, K13 and K20
- 10kV BIL on all transformers

HARMONIC MITIGATING TRANSFORMERS

HPS Harmonic Mitigating Transformers reduce voltage distortion (flat-topping) and power losses due to current harmonics created by single-phase, non-linear loads such as computer equipment. They treat sequence harmonics (3rd, 9th and 15th) within the secondary windings and 5th and 7th harmonics upstream with appropriate phase shifting. Typical applications of severe non-linear loading conditions include data centers, Internet service providers, telecom sites, call centers, broadcast centers, etc. Standard features include:

- Meets DOE 2016, NRCan 2019 and NMX-J-351-1-ANCE-2021 energy efficiency standards
- K-Factor rating of K13 offered as standard (others available on request)
- 10kV BIL on all transformers

MINI POWER CENTERS

The HPS mini power center is a convenient prewired power center that saves you time, money, and space. Standard features include:

- 480V Primary, 120/240V Secondary
- 600V Primary, 120/240V Secondary
- Single phase ratings from 5 kVA to 25 kVA
- Shielded transformer
- Type 3R enclosure
- cULus Listed

MEDIUM VOLTAGE VPI TRANSFORMERS

Our medium voltage VPI transformers are designed to step down incoming high-voltage power to usable voltages for commercial, institutional, or industrial applications. Known for their exceptional quality and reliabile performance, HPS transformers are ideal for demanding environments across commerical, industrial and renewable energy applications. Standard features include:

- Meets DOE 2016, NRCan 2019 and NMX-J-351-1-ANCE-2021 energy efficiency standards
- Large variety of standard and custom single phase and three phase voltages and kVA ratings available up to 34 MVA and 46 kV class
- Standard primary voltages of 2400 and 4160 volts
- UL Listed and CSA Certified
- Enclosure options include Types 1, 2, 3R, 3RE Plus, 4, and 12, with finishes in ANSI 61 gray, other paint colors, or stainless steel

MEDIUM VOLTAGE CAST RESIN TRANSFORMERS

HPS medium voltage cast resin transformers are a high-performance cast resin product designed for many demanding and diverse applications. Coils are precision wound with copper or aluminum conductors that are electrically balanced to minimize axial forces during short-circuit conditions. Standard features include:

- kVA Ratings from 300 to 3000 ANN, 4000 AFN, up to 34.5 kV Class
- Enclosure options (Type 1, 2, 3R, 3RE Plus, 4, 12; with finishes in ANSI 61 gray, other paint colors, or stainless steel)
- Multiple standard options
- UL Listed and CSA Certified

SMART TRANSFORMERS

HPS Smart Transformers with integrated power monitor for low and medium voltage transformers provide real-time remote monitoring of key electrical parameters through a secure web interface, where users can review performance, set alerts, and access data remotely. These transformers enable data-driven performance for modern electrical infrastructures.

- Asset Management
- Predictive Maintenance
- Remote Monitoring
- Industrial IoT

SPECIALTY & CUSTOM TRANSFORMERS

HPS has the ability to design to your specifications. Our custom designs range from 10 VA – 34 MVA and up to 46,000 volts in order to address the most demanding applications and extreme working environments. From environmental, energy efficiency and durability improvements to installation and maintenance simplification, we're never satisfied with the status quo.

HPS Custom Transformers include:

- Air core and iron reactors up to 2500 amps
- Cycloconverters
- Excitation Transformers
- Rectifier Duty Transformers
- Traction Duty Transformers
- Mining Duty Excavator Transformers
- Large Indoor/Outdoor Current Limiting Air-Core Reactors
- 18, 24 and 48 Multi-Pulse Drive/Inverter Duty Transformers

CUSTOM DESIGN CAPABILITIES

Some examples of HPS' custom design capabilities include:

- Power Conditioning
- High Efficiency
- Low Noise
- Low Temperature Rise
- Matching Impedance
- K-Factor Rated
- Harmonic Mitigation
- Size/weight constraints
- Custom enclosures
- Unique input and output voltages
- Low Inrush
- Multi-pulse drive transformers
- Custom Drive Isolation transformers for AC and DC Drives
- Inverter and Rectifier Duty

OEM APPLICATIONS

HPS works with some of the most demanding OEMs in the world where "it has to perform". Here are some examples of the OEM applications that we have built:

- Mining
- Transit
- Drilling Rigs
- Elevator
- Robotics
- Motor Control
- Solar Power
- Wind Power
- HVAC
- Medical Equipment
- Power Distribution
- Power Quality
- Plant Automation
- Marine Duty
- Shovel Duty

ENGINEERING CAPABILITIES

HPS' engineering services are located throughout our manufacturing facilities. Our designs are cost-effective and our transformers are built with modern manufacturing techniques. Whether it is prototypes, thermal modeling, harmonic assessment, retrofitting, tight physical dimensional requirements or any other unique magnetic problem, our engineers will work with our customers to develop and deliver the most cost-effective design available.

We particularly emphasize our 'Value Added Engineering' whereby our design staff will interface with your team to produce the optimum transformer. Our 3D modeling design and CAD facilities permit quick and effective communication when time is vital.

Within North America, HPS has multiple design facilities:

- Maintaining standard product lineup
- Tailoring designs for OEM partners
- Overseeing the design and manufacturing of custom transformers

As a result, HPS offers a full-fledged global transformer platform combining design, engineering, manufacturing and services.

DESIGN CAPACITY & TOOLS

- Over 3000 custom designs are engineered and built every year.
- HPS has designed over 250,000 products in over 100 years of business.
- We have over 50 engineers and technicians designing exactly what you need.
- HPS' engineering staff all have the latest software enabling them to assist with the development of designs. These include:
  - Solid Works® (3D Modeling)
  - AutoCAD®
  - P Spice® electrical simulation

MATERIALS & PROCESSES

A wide range selection of standard materials and processes are available, which provide the most cost-effective and rugged designs.

- High grade electrical steel laminations
- Windings are available in copper or aluminum
- High performance insulation system processes - VPI or Cast Resin
- Basic Impulse Level ranges from 10 kV to 250 kV
- Enclosures for indoor, outdoor and harsh environments such as mining and marine duty
- Step lap mitred cores
- Disk or barrel wound coils

Basic Impulse Insulation Level

Temperature Rise Test

Thermo Graphical Analysis

TESTING

HPS has testing facilities in all manufacturing locations to ensure product quality. All transformers are tested at the manufacturing facility prior to shipment. Transformers must meet very specific criteria to be certified acceptable for release. Tests are categorized as Production Tests and Type Tests.

Production Tests are applied to every transformer where Type Tests are required either to qualify a new product or to further certify a production product.

Production Tests

- D.C. Resistance Measurement
- Polarity and Phase-Relation Test
- No-Load and Excitation Current Test
- Voltage Ratio (turns ratio)
- Impedance Voltage and Load Loss Test
- Dielectric Test
- Applied Voltage Test
- Induced Voltage Test
- Partial Discharge (Cast Resin)

Type Tests

- Temperature Rise Test
- Sound Level Test
- Partial Discharge
- Basic Impulse Insulation Level
- Short-Circuit Test

QUALITY

HPS has been highly regarded for quality products and service since inception.

Extensive testing programs and an exemplary field service record ensures that HPS products not only meet all the standards necessary, but more importantly, fulfill customers expectations and requirements.

QUALITY ASSURANCE

- All facilities have implemented a quality management system based on ISO 9001:2015, with Guelph, Ontario; Granby, QC; and Monterrey, Mexico facilities having certification to this quality standard.
- Our units are designed to meet ANSI, CSA, UL, IEC, ABS and NEMA standards required by our customers.
- With our commitment to excellence and continuous improvement, we build value and reliability into every product.
- HPS stands behind its quality with warranties on both standard and special products

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