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## DEHN INDIA PVT. LTD.

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### **Need of the hour – Lightning & Surge protection of Industrial infrastructure and equipments.**

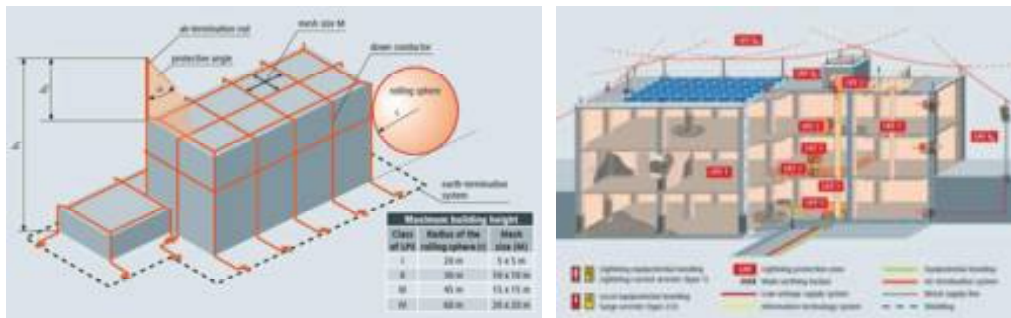
In recent times, we are witnessing a major technological upgrade in both small and large - scale industries. Factories are becoming completely automated and process intensive. This has led to a dramatic increase in effective usage of electronic equipment, instruments and controls for processes in most of the industrial units. Thus, the robustness, reliability and productivity of the equipment is an inevitable factor for longevity of these setups. Since a large number of these electronics are sensitive to lightning impulses and switching voltage variations; a demand for clean power apart from their protection and workability in adverse operating condition is a matter of prime focus today.

Realising the importance of this scenario, our Indian government has taken a proactive step by setting guidelines for safe operation of all electrical & electronic systems in addition to the need of human safety and fire protection. We, at Dehn also resonate with this initiative in order to spread awareness about the importance of Indian Standards for protection of new age mechanisms against lightning and related risks.

Bureau of Indian Standard has introduced new Lightning & Surge protection standard IS/IEC 62305 in early 2015 and now they have published new National Building Code 2016 (based on IS/IEC 62305).

This new Indian Standard IS/IEC 62305 provides appropriate guidelines for determining the protection against lightning by using following basic parameters and steps:

- a) Risk assessment is quintessential as it helps to identify the need and economic benefits of selecting and installing adequate protection measures. IEC 62305-2 describes risk management as a means to objectify and quantify the potential risk to structures and their contents as a result of direct and indirect lightning strikes.
  
- b) The IS/IEC 62305-3 which defines measures to reduce physical damage to structures, imparts four Lightning protection levels (LPL I to IV) for determining the system parameters as per risk assessment result of the infrastructure. The standard advocate the use of ONLY Franklin rods (and discard other technologies like ESE, Early Streamer Emission and DAS, Dissipation system) with tables indicating protection range and angles specifically as per scientific/laboratory result of lightning behaviours.



- c) Protection of electrical and electronic system is also considered important in IS/IEC 62305-4 because insulation breakdown from lightning electromagnetic pulse can lead to frequent failures. The power line protection is very fundamental, however, protection of data, communication and instrumentation of supply lines are equally required. The measures can be adopted in accordance with lightning protection zone concept and the system parameters.

A comprehensive protection concept is indispensable for safeguarding sensitive electrical and electronic devices and systems. In this context, the coordinate use of **Surge Protective Devices** (lightning current, surge and combined arresters) is paramount. **Lightning current arresters** discharge high energies (10/350 $\mu$ s lightning impulse current) without being destroyed and must be installed as close as possible to the entry point of the electrical system into the building. **Surge arresters** (8/20 $\mu$ s nominal current) protect terminal devices and are installed as close as possible to the device they are supposed to protect. Combined arresters combine the high discharge capacity of lightning current arresters and the low voltage protection level of surge arresters, thus being capable of protecting terminal devices. Therefore, they are used to protect compact installations.



The modular Surge Protective Devices of the **DEHN's Red/Line** product line for power supply systems and the **DEHN's Yellow/Line** product line for data and information technology systems allow implementing technically and economically sound made-to-measure protection concepts.

In industries, automation systems are standard and if the automation system fails, production comes to a halt. To increase operational safety, lines extending beyond the building should be located and protected at both field end and control end as well. The following applies to PLCs, DCSs, Drives, Motors, AS interfaces, field sensors, actuators, network switches, Ex barriers etc.

The picture at the side illustrates the basic composition of an industry/factory. Here, the protection principle applied is the power line protection at Main distribution, sub-distribution boards and terminal equipments and data line protection for different interfaces like measuring and control circuit, industrial Ethernet or Profibus communication of field control units, intrinsically safe circuits in potentially explosive atmospheres, fire safety control circuits etc.



**Surge arrester for Control panels and Ethernet eqpt**



**Surge arrester for field instruments**



We, at Dehn have been designing system based on IEC 62305 since long and have rendered our services to various industrial verticals like oil & gas, metals, cement, railways, airports, power, automobiles, FMCG, pharmaceuticals, banking, telecom, defence, infrastructures, buildings etc.

- Risk Assessment
- Lightning Adequacy study
- Design, consultancy, Supply and installation of lightning protection system
- Surge protection solution for electrical/electronic device
- Design, supply and installation of earthing system
- Trainings and Workshops

We also realise the growing pace of industrialization stressing upon the need for improvement in the power network. Our understanding about the utility corridor is that High Voltage electric lines, water pipes, gas pipes, oil pipes and communication lines that are being laid create threats to various safety aspects. The electrical interference caused by high voltage lines, earth faults and lightning effects leads to faster corrosion rate of the pipes resulting in leakage which may cause enormous material and environmental damage.

The majority of transmission network holds true for alternating current over high voltage in India. Thus, mitigation of ac interference on these pipelines which are cathodically protected has to be given due consideration.

DEHN brings advanced ac mitigation product named **Voltage Controlled Smart DC Decoupling (VCSD)** device. The intelligent d.c. decoupling device VCSD 40 IP65 limits long-duration, temporary and transient overvoltage. DEHN VCSD offers added advantage over conventional ac mitigation products.

- Remote monitoring of interference level by measuring AC discharge current
- Single product for protection in case of transient, temporary and long-duration overvoltage
- Remote controlling (Switching ON/OFF) of device (No physical disconnection required) during AC/DC voltage gradient measurement
- Continuous monitoring of AC discharge current from remote location with capacity up to 40A
- No acid, no environmental pollution, No chemical hazard to the operators.....fully electronic device.
- No maintenance required, No periodic expenses.
- Adjustable response threshold for flexible use in a wide range of applications and operating states
- 100KA Lightning impulse (10/350 microsec) discharge capacity



Appropriate protection measures need to be considered after analyzing the risks by using proper mathematical models provided in IS/IEC 62305 standard. Lightning arrester system, earthing, equipotential bonding system and surge protection devices, all need to be installed in tandem to ensure comprehensive protection.



## “New Ways of Steam Water Sampling System & Analysis in Power Plants”

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## Forbes Marshall : Introduction



- 1926 : Company Started
- 2015 : US\$ 150 Million Sales.
- 5 Manufacturing Facilities in India.
- 300+ Engineering Products & Solutions.
- 1400 Trained Professionals with 300 Sales & Services Engineers.
- 90 R&D Professionals.
- 3 Joint Venture Companies.
- 15000+ Customers in India & Globally.



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## Forbes Marshall Solutions

### Process Automation and Control Instrumentation

- Flow, Level, Pressure, Temperature.
- Valves, Water Quality, Emission Monitoring, Condition Monitoring.
- Control Systems : DCS , PLC & Special solutions.
- Gauges & Special Audits of Instrumentation.

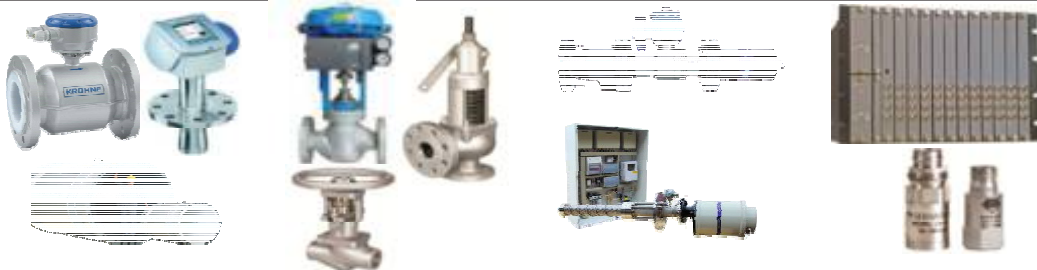
### Energy Conservation

- Steam Engineering: Generation, Distribution, Utilization & Heat recovery
- Boilers & Boiler Efficiency.
- Condensate & Heat Recovery.
- Steam Accessories.
- Energy Audit & Consultancy.



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## Process Automation and Control Instrumentation



### Flow & Level

Flow Meters : Magnetic , Ultrasonic, Mass Flow, Variable Area & Vortex.  
Level : Radar, Magnetic, Ultrasonic & Vibration.

### Valves

Control & Process Valves, Safety Valves, DeSuperheater, Stop and Check Valves, High Pressure Valves, Turbine Bypass Valves

### Emission Monitoring

Insitu CO,SO2, Nox Gas Monitors & Dust Monitors for Online stack Emission Monitoring

### Condition Monitoring

Vibration Sensors Monitoring System Analysis & Diagnosis Software Vibration Audit Services.



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## Process Automation and Control Instrumentation



**Water Quality Analysis Analyzers :** single / multichannel silica, single / multichannel sodium, dissolved oxygen, hydrazine, phosphate, chloride, and TOC & Sample extraction till analysis



**Special Systems** Oxygen Enrichment System for Furnace Application. Pressure Control Valve with Dual Controller for Inertisation in Pulverised Coal Injection System In Blast Furnace



**DCS & PLC**  
Modular and Expandable  
Choice of various redundancy configurations  
Ease of configuration



**Gauges**  
Pressure gauges & transmitters  
Differential pressure & Temperature gauges, Circular chart recorders & Comparison test pump



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## Energy Conservation



### Steam Engineering

Complete Steam engineering solutions & Steam traps for every application in all types, sizes and materials.



### Boilers

Packaged Steam Boilers, Smart Boilers, Burners, Biomass Operated Solid Fuel Fired Boilers, Deaerators, Boiler Blowdown Control Systems.



### Energy Efficiency System

Effimax, helps plants save energy in every aspect of boiler efficiency.



### Energy Audits & Services

Design Consultancy, Energy Audits, Steam System Management, Steam Trap Analysis and Optimization, e-Learning



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## Power Plant Maintenance Team Expectations



## Significance of SWAS



A failure takes place in power plant..

- These are not very uncommon pictures in any power plant
- There are many locations where we repair or replace old rusted portions

**How much does it cost really ?**

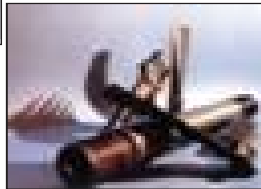




## Significance of SWAS



Stress corrosion cracking takes place at hot surfaces



Various low pressure and high pressure components fail due to corrosion & erosion

**How much does it cost really ?**



## Significance of SWAS



Scaling due to dissolved salts



Silica deposition on turbine blades



Corrosion due to dissolved gases



Stress corrosion cracking

**Water chemistry decides plant performance & Life !**





## Conventional SWAS Systems



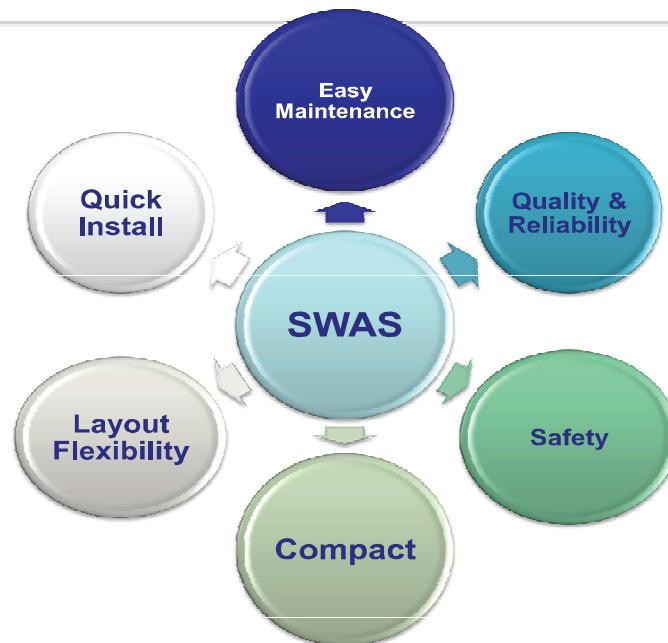
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**Q-SWAS<sup>TM</sup>**



## Power Plant Maintenance Team Expectations



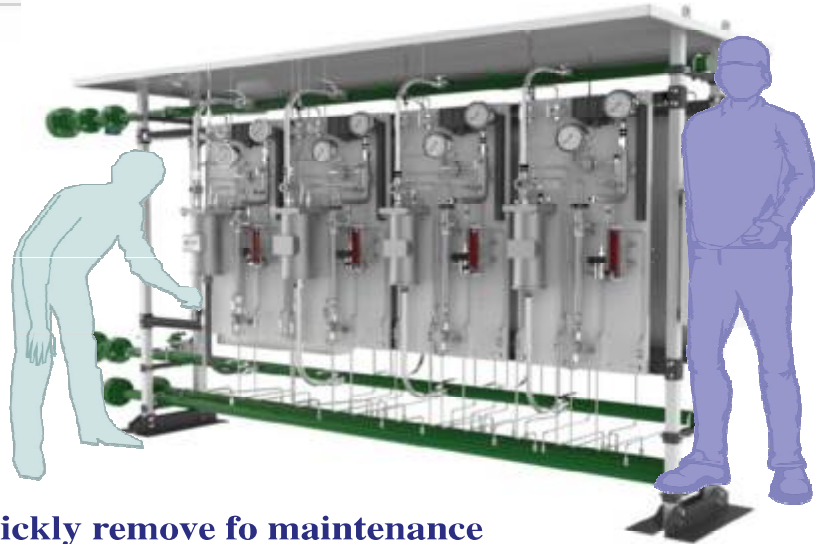
## QSWAS



- Facilitates easy access to all Components
- Modular design provides flexibility for mounting
- Good in terms of maintenance



## QSWAS™ –Easy maintenance



**Quick :**

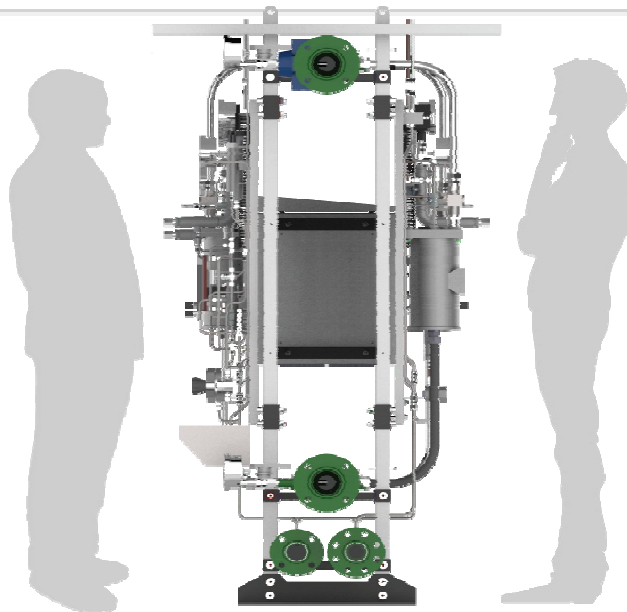
**Any part can be quickly remove fo maintenance**



## Easy to Operate

**Easy to operate:**

**Both valves and gauges accessible from front side by single operator**



## QSWAS™ – Quick install

### Bolted wall mounted design:

Plate mounting independent of skid with Wall mount option

### Easy to expand :

Modular design with easy assembly at site. Easy to add modules for future expansion



## QSWAS™ – Compact

Traditional 6 Line sampling panel- with Front/Back access



4.0m

6 line QSWAS- with Front/Back access



2.5m



**QSWAS™ – Safety & Reliability  
Plate Mounted system (PMS)**

**Sample Cooling  
Module**



**Safety:**

- Inlet valves design and suitable for steam services
- Sample cooler with Safety relief valve

**Quality & Reliability:**

Sample cooler with correct coil material for longer and reliable life



**QSWAS™ – Safety & Reliability  
Plate Mounted system (PMS)**



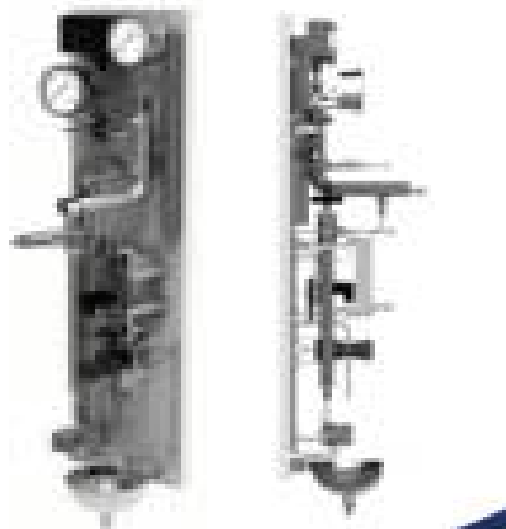
**Sample Conditioning  
Module**

**Safety:**

- Inlet valves design and suitable for steam services
- Sample cooler with Safety relief valve

**Quality & Reliability:**

Sample cooler with correct coil material for longer and reliable life

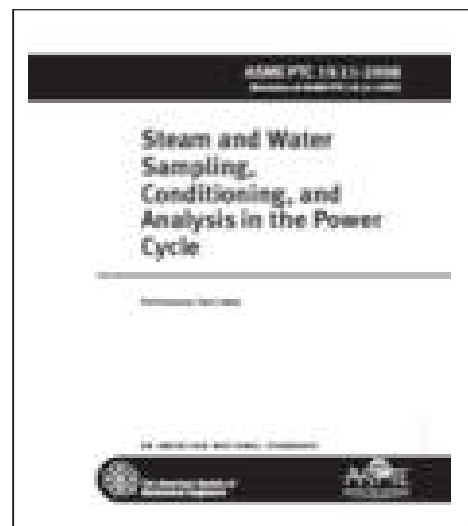


## ASME PTC19.11-2008

### Sampling system

**•Forbes Marshall QSWAS Design is 100% compliant with ASME PTC 19.11-2008 Guidelines:**

- ✓ Isokinetic Probes (nozzles) as per section#3 & ASTM D1066 Standard
- ✓ Relisafe Series Trade marked and designed inline with ASME standards
- ✓ Designs with Third Party Validation for High pressure and temperature applications.
- ✓ USP and competitor comparisons in this presentation





**ASME  
PTC19.11-2008  
Section#3**



**Isokinetic sample extraction**



Steam Sample must be Extracted  
Iso-kinetically as per

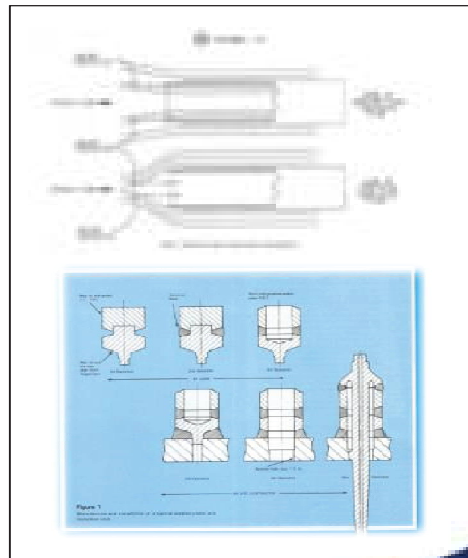
- ASTM D1066
- GDCD codes
- VGA Codes





## Isokinetic sample extraction

- No sampling system & analyzers can produce good results unless sample is extracted & transported properly
- There are special design of sample probes. Forbes Marshall can offer these probes
- A properly designed sample probe insures that the sample enters the probe with constant velocity, thus making the sample truly representative



**ASME  
Relisafe™  
PTC19.11-2008  
Section#4**





## Isolation Valve:

Globe valve designed as per ASME B16.34 standards

- Designed for supercritical boilers 1000MW/ 800MW and 660MW
- Sample pressure & temperature rating ASME 1500#/ 2500# and 4500#
- For easy operation, Thrust bearing / for better leakage protection
- Special Gland Packing rings for High Performance at HT



## DHX- Series Sample Cooler

- It's double Helix design as per ASTM section VIII & ASME PTC 19.11 standards
- It's a coil in shell type construction
- Better in terms of surface area
- Better in terms of cooling water consumption
- Better in terms of heat extraction
- Coil material options for High Chloride applications
- Removable and replaceable coil.
- Cleanable shell



## Relisafe™ Filter



- Filter should withstand high sample pressures, and should be capable of handling fine impurities
- Stainless steel AISI 316 should be used everywhere with easy to remove filter element



## Relisafe™-PR Sample Pressure Reducing Valve-SPRV



- As per ASME PTC 19.11-2008 and ASTM standard
- Single rod patented design overcomes the jamming problem
- Reduction of localized wear and increased product service life achieved by smooth pressure reduction over the entire length of the tube
- Ergonomically designed rotating handle to facilitate manual adjustment
- Arrangement for blow down
- Compact design
- Easy to clean due to retractable rod





## Relisafe™-TP High Temperature Safety Shutoff Valve with Manual Reset

- Self-reliant temperature shut off valve with “manual reset” feature “as per ASME PTC 19.11-2008”
- No electrical power supply required
- Fast response
- Back pressure resistant

### 5-4.1 Thermal Protection Devices

To increase operator safety and prevent analyzer failure due to overheating, the addition of a thermal protection device to interrupt sample flow if an overtemperature condition occurs is highly recommended. Self-manual temperature control valves with a manual reset feature, or temperature controllers with an appropriately rated automatic shutoff valve, are the preferred methods of providing this protection. Some remote indication of this event (such as closure to an alarm and/or computer system) is also recommended.



## Relisafe™-BPR Back pressure regulator

- To get uninterrupted, regulated flow at constant pressure
- To get regulated outlet pressure irrespective of upstream fluctuations, and
- Back pressure regulator is must in case there are more than one analyzer in services

