



Steam and Process Control Solutions

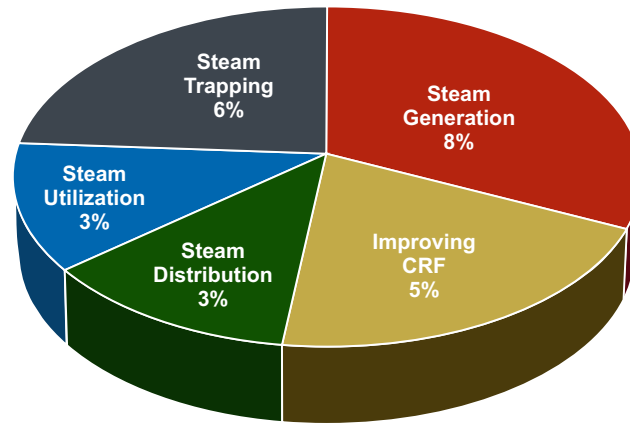
Pharmaceutical Industry



Pharma Industry

For over 70 years, we have partnered the Industry in providing solutions in control instrumentation, energy conservation and environmental monitoring. Our teams of the finest engineers are dedicated to serve the process industry across diverse sectors. World class manufacturing facilities and technology enable us deliver quality solutions globally. Our unique complimentary expertise enables us to engineer customised systems that improve manufacturing processes, conserve energy and are environmentally sustainable. We partner customers with our knowledge, comprehensive range of services, products and solutions for utilities and process control.

Gaps and Energy Saving Opportunities in Steam Systems



Energy Savings Potential

25%

Improving Steam to Fuel Ratio

13%

Reducing Process Steam Consumption

12%

Optimising Boiler Efficiency

5%

Condensate Recovery

8%

Steam Trapping

6%

Arresting Leakages

2%

Right Pressure

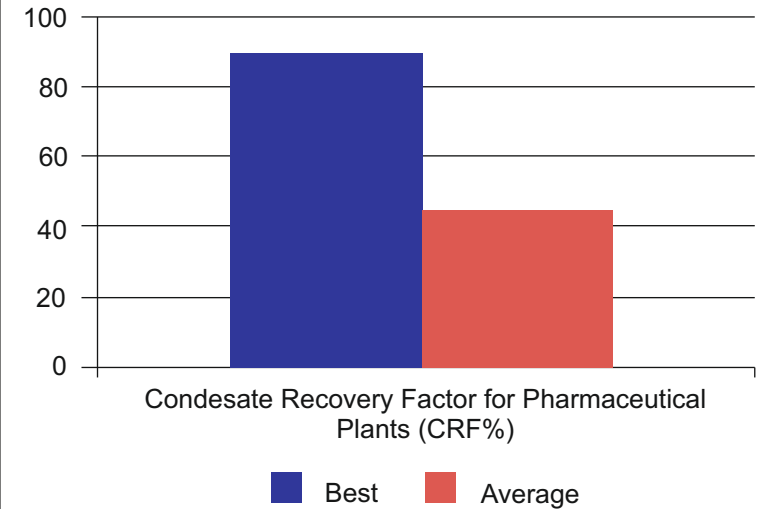
2%

Temperature Control

2%

Potential to Improve Condensate Recovery Factor

Providing services that contribute towards a sustainable energy systems by continuously creating new benchmarks as leaders in building reliable and energy efficient utility systems for process industry by empowering people as change-agents.



There is potential to improve the CRF across the pharmaceutical industry segment by 45%. This gap can be bridged by

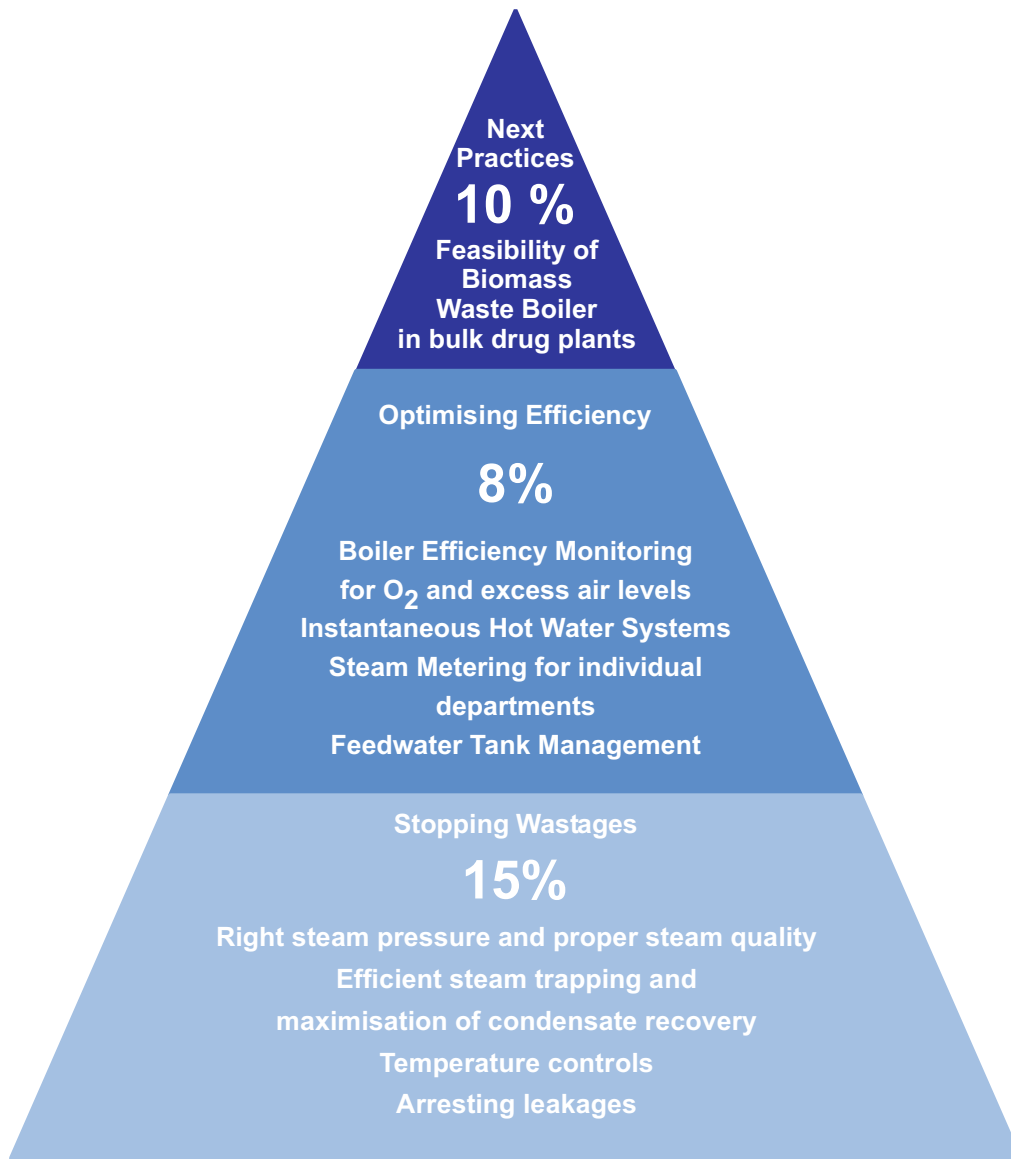
Utility automation module integral to steam trapping to recover maximum condensate from multi-utility reactors

Block wise condensate recovery system

Steam operated pumping traps to prevent stalling condition on heat exchangers and solvent recovery / distillation unit









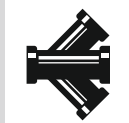



Condensate contamination detection system for condensate recovery from solvent recovery plant

Improving Steam Systems in the Pharmaceutical Industry



Energy Services for the Pharmaceutical Industry

Forbes Marshall provides services to help build reliable, energy efficient utility systems for the process industry thereby achieving new benchmarks.

- | | | | | | |
|---|---|---|----|---|---------------------------------|
| 1 |  | Basic and Detail Engineering | 7 |  | Steam System Training |
| 2 |  | Project Management | 8 |  | Energy Audits |
| 3 |  | Steam System Design Hazop | 9 |  | Safety Audits |
| 4 |  | Cogen Feasibility and Engineering | 10 |  | De-bottleneck Audits |
| 5 |  | Stress Analysis | 11 |  | Energy Management System Audits |
| 6 |  | Process Energy Optimisation with Automation | 12 |  | Steam System Management |

Forbes Marshall Helps Reduce Energy Consumption

We have achieved savings of over 22% in fuel with improvement in condensate recovery factor by 20% We have installed utility automation and instantaneous hot water systems designed and supplied by Forbes Marshall. Process heat from the Forbes Marshall solar cogeneration system has helped to reduce carbon foot print by delivering cleaner and greener energy.

A US Based Global Pharmaceutical Company

Forbes Marshall rectified the existing steam system without interrupting production. We were able to achieve 100% condensate recovery factor and save 26 million litres of water annually with a reduction of 15% in fuel consumption.

A Leading Indian Multinational Pharmaceutical Company

We are recovering 100% of the recoverable condensate with Forbes Marshall's condensate recovery systems. This has resulted in an improved Steam:Fuel ratio of the boiler and an achievement of 15% in fuel savings.

A Leading Multinational Pharmaceutical Plant

Single fluid system supplied by Forbes Marshall has help us to gain precise control of complete heating – cooling cycle in reactors. We were also able to recover 100% of the recoverable condensate.

A Global Healthcare Company

Forbes Marshall helped us solve our problem of coil leakages. Their steam solutions have helped us sustain a condensate recovery factor of 80%

A Fully Integrated Global Healthcare Provider

Forbes Marshall designed and revamped our complete steam distribution network. We have achieved 26% reduction in a 46km distribution network - 14% fuel reduction, 200 million litres of water and about 3600 tons of CO₂ reduction.

One of the Largest Producers of Benzene Based Products



Forbes Marshall Pvt. Ltd.
Opp. 106th Milestone, CTS No. 2220, Mumbai-Pune Road,
Kasarwadi, Pune – 411034 INDIA
Tel : +91(0)20-68138555 Fax : +91(0)20-68138402

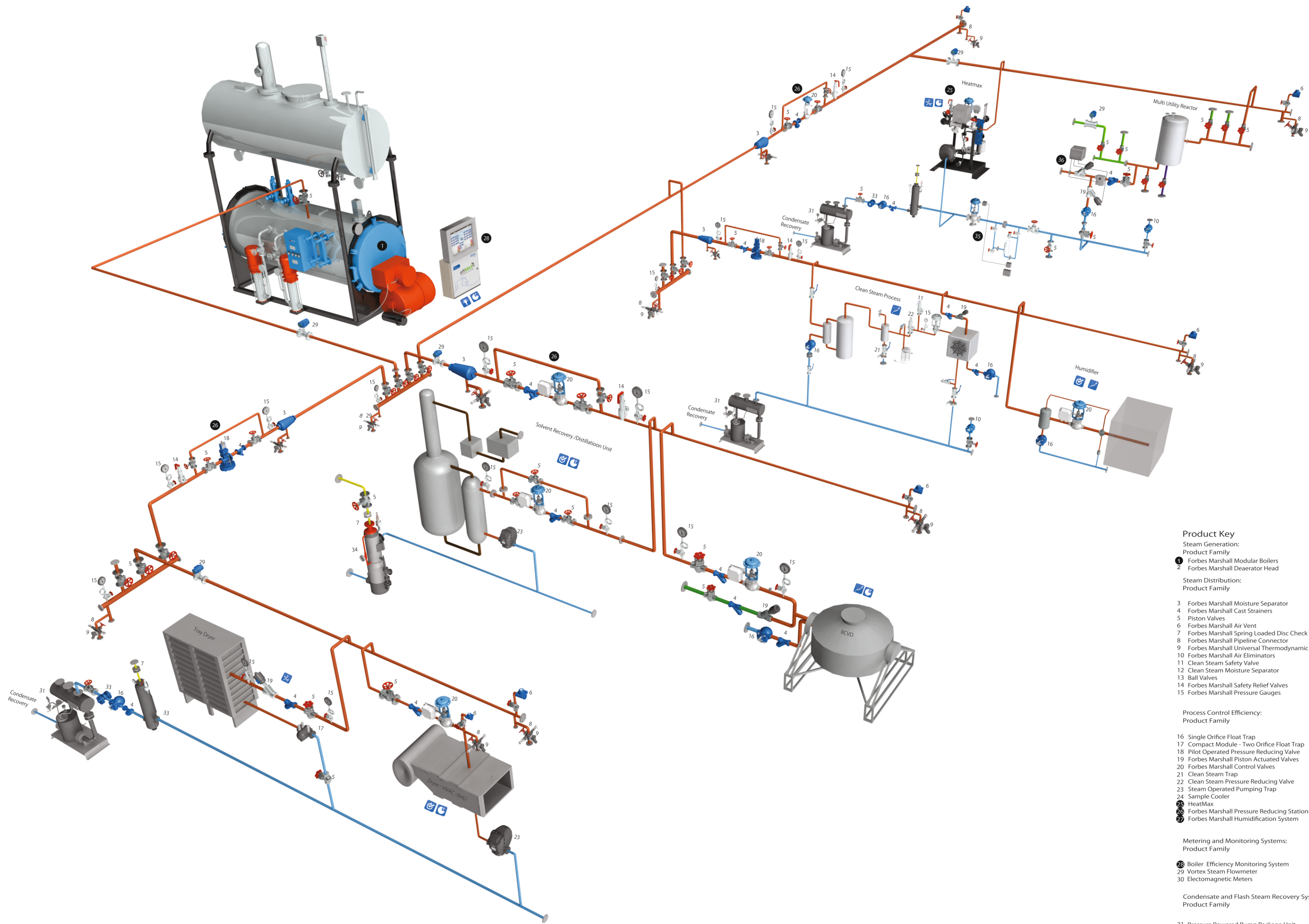
Forbes Marshall
Krohne Marshall
Forbes Marshall Arca
Codel International
Forbes Vyncke
Forbes Marshall Steam Systems

Email : corpmtg@forbesmarshall.com

CIN No.: U28996PN1985PTC037806

www.forbesmarshall.com

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- Icon Key**
- Reliability
 - Productivity
 - Energy Efficiency
 - Environmental Awareness
 - Ease of Operation

- Utility Key**
- Steam
 - Condensate
 - Flash Steam
 - Product / Process Fluid
 - Hot / Cold Water

- Product Key**
- Steam Generation:**
Product Family
 1 Forbes Marshall Modular Boilers
 2 Forbes Marshall Deaerator Head
- Steam Distribution:**
Product Family
- | | |
|--|--------------------------------------|
| 3 Forbes Marshall Moisture Separator | FMSEP34, FMSEP54 |
| 4 Forbes Marshall Cast Strainers | FMSTR31, FMSTR34, FMSTR51/52, FMSTR5 |
| 5 Piston Valves | PSVAL |
| 6 Forbes Marshall Air Vent | FMAV53 |
| 7 Forbes Marshall Spring Loaded Disc Check Valve | FMDCVD, FMDCVA |
| 8 Forbes Marshall Pipeline Connector | FMPC50, FMPC51, FMPC52, FMPC53 |
| 9 Forbes Marshall Universal Thermodynamic Trap | FMTTD64-U |
| 10 Forbes Marshall Air Eliminators | FMAE31, FMAE53 |
| 11 Clean Steam Safety Valve | CSSEV |
| 12 Clean Steam Moisture Separator | CSSEP |
| 13 Ball Valves | Sanitary Ball Valves |
| 14 Forbes Marshall Safety Relief Valves | FMSRV, VSR series |
| 15 Forbes Marshall Pressure Gauges | PG |
- Process Control Efficiency:**
Product Family
- | | |
|---|--------------------------------|
| 16 Single Orifice Float Trap | SOFT31, SOFT53 |
| 17 Compact Module - Two Orifice Float Trap | CM-TOFT |
| 18 Pilot Operated Pressure Reducing Valve | FMPRV41, FMPRV53, DSPRV41 |
| 19 Forbes Marshall Piston Actuated Valves | FMPAV |
| 20 Forbes Marshall Control Valves | Ecotrol Series |
| 21 Clean Steam Trap | CST |
| 22 Clean Steam Pressure Reducing Valve | CSPRV |
| 23 Steam Operated Pumping Trap | SOPT |
| 24 Sample Cooler | CoolMax series |
| 25 HeatMax | HeatMax |
| 26 Forbes Marshall Pressure Reducing Stations | FMPRS-PO, FMPRS-ROB, FMPRS-PID |
| 27 Forbes Marshall Humidification System | Humidifiers |
- Metering and Monitoring Systems:**
Product Family
- | | |
|--|---|
| 28 Boiler Efficiency Monitoring System | Effimax 500, 1000, 2000, 3000, 4000, Xmax |
| 29 Vortex Steam Flowmeter | Flowirl 8700, Accuflow |
| 30 Electromagnetic Meters | Optiflux 4000, Aquamag |
- Condensate and Flash Steam Recovery System:**
Product Family
- | | |
|--|----------------------|
| 31 Pressure Powered Pump Package Unit | PPPPU-C, PPPPU, MV55 |
| 32 Forbes Marshall Flash Vessel | FMEV |
| 33 Forbes Marshall View Glass | VU10, VU30, Vu50 |
| 34 Flash Jet Pump | FJP |
| 35 Condensate Contamination Detection System | CCDS-C, CCDS-PC |
| 36 Utility Automation Module | UAM |