

**CURTISS -
WRIGHT**

Valve Group



Photo courtesy of the Nuclear Energy Institute



Nuclear Pressure Relief Valves

Farris Engineering



Our Company

Farris Engineering, a business unit of Curtiss-Wright, has designed and manufactured pressure relief valves since the early 1940s. With over 70 years of proven performance, our valves have provided automatic and positive protection

against overpressure situations in industrial plants around the world.

A pioneer in PRV design, Farris Engineering has created many products that remain industry standards. Integrating its core hardware technology with the digital age,

Farris Engineering created SizeMaster, computer software to assist customers in the sizing and selection of valves. Farris continues this tradition today with iPRSM® engineering software, assisting users in both the design and audit of pressure relief systems.

History of Nuclear Service

Starting with CANDU plants in 1984, Farris has served the nuclear power industry with Section III PRVs. In 2001, Farris' Brantford facility received an ASME NV stamp and has supplied valves into the US, Canadian, UK, French and Chinese markets for both the nuclear island and balance of plant. More recently, Farris has received an NPT stamp for Section III parts and appurtenances.

Farris is backed by the resources of Curtiss-Wright and its nuclear products group. Curtiss-Wright is a worldwide leader in delivering solutions that improve safety, plant flexibility, reliability, and efficiency. The businesses of Curtiss-Wright pioneer highly

engineered solutions to deliver profound value to their customers and enable them to transform the way their business is done.

Our nuclear products group is a leader in developing innovative technologies that transform the way nuclear power plants are designed, operated and maintained. Our offerings span a broad range of products and solutions that meet the complex and evolving needs of the global nuclear power industry.

Our quality programs meet 10CFR50, Appendix B, 10CFR21, NQA-1, and ASME Section III. We maintain ASME certifications with N, NPT, NV, NS, NA, UV, V, VR designators; ASME, NUPIC, and NIAC Audited. We also meet international standards: CSAZ299.3 (Canada), RCCM Code (France) and are audited by foreign utilities including Canada, South Korea, China, Mexico, Spain, Slovenia, Belgium and Taiwan.



Brantford, Ontario, Canada





Farris Nuclear Applications Selection Guide

Steam or Vapor Service

Valve Series	ASME code	Blowdown type	Balanced design	Orifice/Size
1890/1896M	III and VIII	fixed	no	D
2700/3700	III and VIII	fixed	yes	C to G
2600/2600S	III and VIII	adjustable	yes	D to T
2600L	III and VIII	fixed	yes	D to T
2600 super cap	III and VIII	adjustable	yes	U to Z
3800 PORV (snap acting)	III and VIII	adjustable	yes	D to T
3800 PORV (modulating)	III and VIII	fixed	yes	D to T
4200	I and VIII	adjustable	no	F to Q
4700	III and VIII	adjustable	yes	B to E
6400/6600	I and VIII	adjustable	no	D to P

Liquid Service

Valve Series	ASME Code	Blowdown type	Balanced design	Orifice/size
1890/1896M	III and VIII	fixed	no	D
2700/3700	III and VIII	fixed	yes	C to G
2600L	III and VIII	adjustable	yes	D to T
3800 PORV (snap acting)	III and VIII	fixed	yes	D to T
3800 PORV (modulating)	III and VIII	fixed	yes	D to T
4700L	III and VIII	fixed	yes	B to E

Farris Nuclear Valves

FARRIS 2600 SERIES SUPERCAPACITY PRESSURE RELIEF VALVES

Farris Engineering offers a complete line of large orifice, spring loaded PRV's for applications that require capacity larger than the API "T" orifice. Available in sizes U-Z, the supercapacity valves have the same superior design, construction, metallurgy and options as the standard 2600 Series:

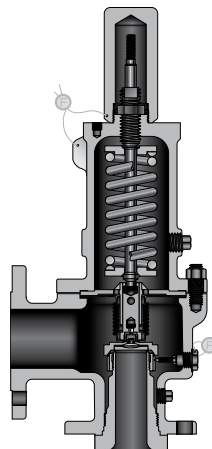
- Inlet Sizing: 8" x 10" to 20" x 24"
- Orifice Sizes: U, V, W, W2, X, Y, Z
- Effective Orifice Area: 31.5 in² to 176.7 in²
- Pressure Range:
20 to 300 psig, 1.3 to 20.7 barg

Supercapacity valves can be designed for specific application requirements, including customized center to face and inlet and outlet dimensions.



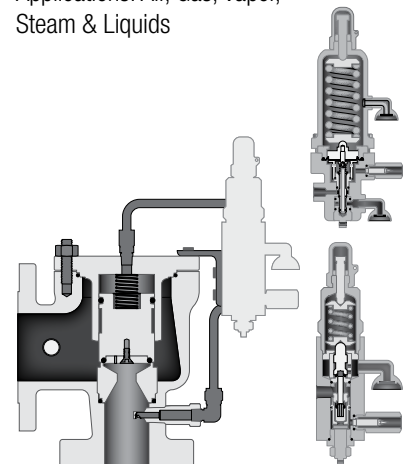
SERIES 2600/2600L

- ASME Section VIII and III NB Certified: Air, Steam & Water
- 2600L – Single Trim Design for Multiple Services: Air, Steam, Water & Two-Phase Flow
- Conforms to API Standard 526
- Sizes: 1" x 2" to 8" x 10"
- Pressure Range: 15 to 6000 psig, 1.0 to 413 barg
- Temperature Range: -450 to 1500°F, -268 to 815°C
- Materials: Carbon or Stainless Steel Body & Bonnet, Stainless Steel Trim
- Options: Balanced Bellows, O-Ring Seat
- Applications: Air, Gas, Vapor, Steam & Liquids



SERIES 3800

- ASME Section VIII and III NB Certified: Air, Steam & Water
- Conforms to API Standard 526; also available with Full Port Nozzle
- Sizes: 1" x 2" to 12" x 16"
- Pressure Range: 15 to 6170 psig, 1.0 to 425 barg
- Temperature Range: -450 to 500°F, -268 to 260°C
- Materials: Carbon or Stainless Steel Body, Stainless Steel Trim
- Actuation: Snap or Modulating
- Options: Dual Outlets, Field Test Connections, Reverse Flow Preventer, Remote Depressurizing & Auxiliary Filters
- Applications: Air, Gas, Vapor, Steam & Liquids

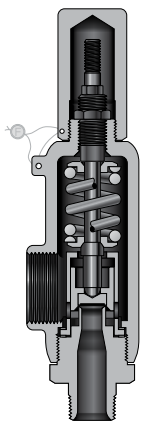


Optional materials of construction, pressure/temperature ranges, connections and accessories are available. Contact the factory with your special request.

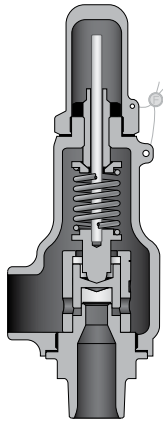


SERIES 2700/3700

- ASME Section VIII and III NB Certified: Air, Steam & Water
- Sizes: 1/2" x 3/4" to 1-1/2" x 2-1/2"
- Pressure Range: 15 to 6500 psig, 1.0 to 448 barg
- Temperature Range: -450 to 750°F, -268 to 399°C
- Materials: Carbon or Stainless Steel Bonnet, Stainless Steel Body, Stainless Steel Trim
- Options: O-Ring Seat, Balanced Design (C&D Orifices), Flanged, Socket Weld, Welding Nipple & Connections
- Applications: Air, Gas, Vapor, Steam & Liquids



2700 Series

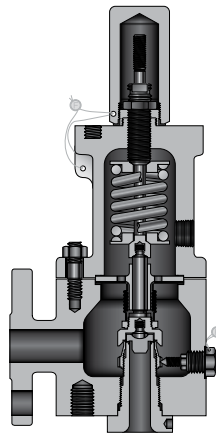


3700 Series



SERIES 4700/4700L

- ASME Section VIII and III NB Certified: Air, Steam & Water
- Sizes: 1/2" x 3/4" to 3/4" x 1" & 1" x 1"
- Pressure Range: 15 to 6000 psig, 1.0 to 413 barg
- Temperature Range: -450 to 1000°F, -268 to 538°C
- Materials: Carbon or Stainless Steel Body & Bonnet, Stainless Steel Trim
- Options: Balanced Bellows Design
- Applications: Air, Gas, Vapor, Steam & Liquids



OBSOLESCENCE SUPPORT

Obsolescence is one of the most challenging issues facing the nuclear power industry today. We support plants in overcoming the challenges of sourcing replacement valves and parts.

To enable maintenance to continue on obsolete series, replacement parts are available for most Farris obsolete valve designs. These can be made in accordance with any required quality or construction program.

Curtiss-Wright has extensive experience working with utilities to upgrade obsolete components to the most current model while still maintaining all form, fit, and function requirements. By providing this value added service, we are able to help plants minimize modification costs.

Curtiss-Wright has an extensive portfolio of advanced valves to help eliminate reoccurring maintenance and enhance overall equipment reliability. Our design and application engineers will be able to support these complex projects to ensure the scope of the modification is minimized while maximizing the improvement in equipment reliability.

Farris Quality Programs

Farris pressure relief valves for nuclear applications are designed and manufactured according to these quality programs:

American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel Code:

- Section III, Division 1, Subsection NB, Class 1 Components
- NC, Class 2 Components
- ND, Class 3 Components
- NV, UV, V and VR stamps

This includes the subsections NCA-4000, NCA-3800, NQA-1 and also includes the requirements of 10 CFR Part 50 Appendix B and 10 CFR Part 21.

Canadian Standards Association:

- N285.0, General Requirements for Pressure Retaining Systems and Components in CANDU Nuclear Power Plants
- CAN3-Z299.2, Quality Assurance Program – Category 2

Farris's nuclear programs are audited regularly by ASME, NUPIC, NIAC, and CANPAC.

Software Solutions



iPRSM® is a patented, web-enabled software for intelligent pressure relief system management. iPRSM provides cost-effective management of safety system documentation and assures compliance with regulatory codes.

iPRSM delivers features and benefits beyond anything available in the nuclear industry today:

- NQA-1-2008, 1a-2009 Compliant for Safety Related Systems
- Web Enabled / LAN Software Application
- Data Import / Export Capability
- Centralized Document Repository
- Integration to Flash Calculation Engine and Fluid Thermophysical Properties Package
- Management of Change
- Cause of Overpressure Analysis
- Maintenance/Scheduler Database

- Navigation Through P&IDs
- Relief Load Calculations
- Inlet / Outlet Pipe Calculations
- Two-phase Flow Calculations
- Blow Down Systems

More Information

View a detailed tutorial video on the web of iPRSM and how it works. Scan the code below with your smart phone to view.



iPRSM's Core Features:

- Compliance with Standards (ASME, OSHA, NEP, DIERS, ISA, NQA-1)
- Workflow Support
- History Tracking
- Multi-User Architecture
- Platform/Hardware Independence



PORV in Farris' ASME certified liquid test lab

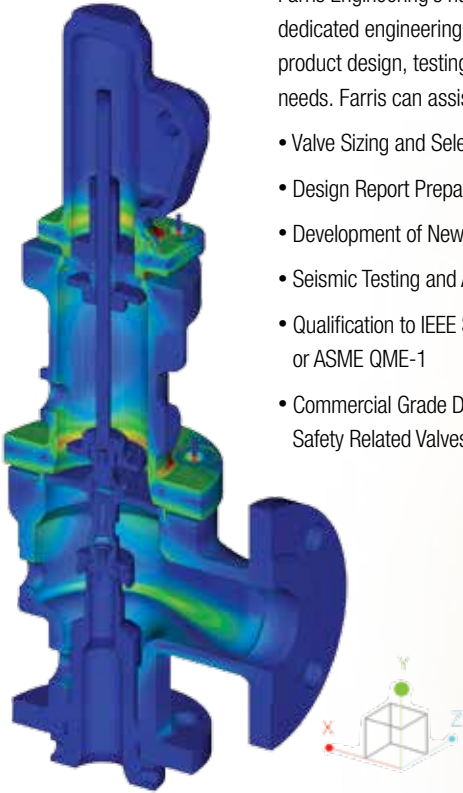


Solutions for the Nuclear Industry

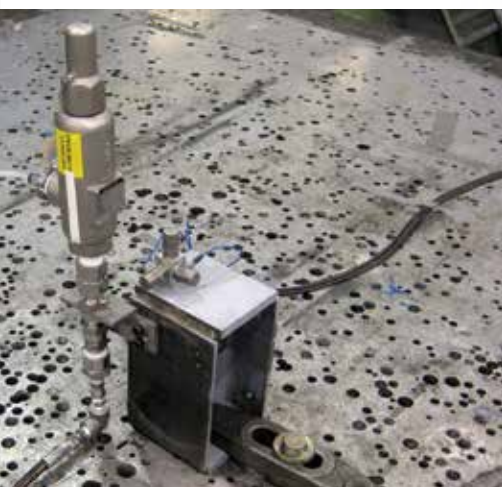
Farris Engineering's nuclear group has a dedicated engineering team to support your product design, testing and certification needs. Farris can assist you with:

- Valve Sizing and Selection
- Design Report Preparation
- Development of New Valve Designs
- Seismic Testing and Analysis
- Qualification to IEEE Standard 344 or ASME QME-1
- Commercial Grade Dedication of Farris Safety Related Valves and Parts

- Destructive and Non-Destructive Testing, including:
 - Radiography (RT)
 - Ultrasonic Testing (UT)
 - Liquid Penetrant Testing (PT)
 - Magnetic Particle Inspection (MPI)
 - Positive Material Identification (PMI)
- National Board & ASME Accepted Test Lab, Air and Water
- Fabrication of Valve Replacement Parts



PRV Stress Analysis



2700 series on seismic table



2600 series seismic testing

Farris Engineering Products and Services

Pressure Relief Valves

Series 2600	ASME NB Certified for Air and Steam
Series 2600L	ASME NB Certified for Air, Steam and Water
Series 3800	ASME NB Certified for Air, Steam and Water
Series 2700/3700	ASME NB Certified for Air, Steam and Water
Series 1890/1896M	ASME NB Certified for Air, Steam and Water
Series 2850/2856	ASME NB Certified for Air and Steam
Series 4700	ASME NB Certified for Air and Steam
Series 4700L	ASME NB Certified for Liquid

Steam Safety Valves

Series 4200	ASME NB Certified for Steam – Section I & VIII
Series 6400/6600	ASME NB Certified for Steam – Section I & VIII

Changeover Valves

Series 320B & 370B

Certifications and Approvals:

- ASME V, UV, NV, NPT and VR stamps
- National Board “NB” approval
- ISO 9001-2008
- US Coast Guard
- PED 97/23/EC (European Pressure Equipment Directive)
- ATEX 94/9/EC (European Potentially Explosive Atmospheres)
- CSA B51 (Canadian Registration)
- CSQL (China Safety Quality License)
- Russian GOST-R Certification and RTN Permit
- First Point Assessment Limited
- Nuclear – 10 CFR 50 Appendix B, NCA-4000, NQA-1, N285.0



SizeMaster

Pressure Relief Valve Engineering Software for Sizing and Selection

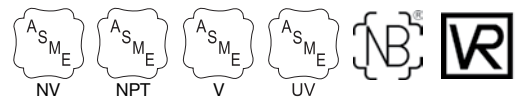
FAST Centers (Farris Authorized Service Team)

- Worldwide Network of Service Centers with Factory Trained Technicians
- Local Inventory and Support, 24 Hours a Day, 7 Days a Week
- Access to Worldwide Farris Inventory through the Web
- ASME/National Board Approved Assembly, Repair & Test Facilities
- Application, Sizing & Selection Support

PSM Engineering Services

- Pressure Relief System Design Services
- Pressure Relief System Audit Services
- iPRSM Pressure Relief System Management Software

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Farris Engineering, a business unit of Curtiss-Wright

Nuclear Inquires: Contact Farris' Nuclear Group in Brantford, ON by phone at **519-756-4800** or by email at **NucQA@CurtissWright.com**

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Facilities: Brecksville, OH, USA; Brantford, Ontario and Edmonton, Alberta, CA; Corby, Northants, UK; São Carlos-SP, Brazil; Tianjin and Beijing, China; Delhi, India

Offices Worldwide: For a listing of our global sales network, visit our website at www.cw-valvegroup.com/farris.

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