SEBIM® & SARASIN-RSBD®
NUCLEAR SAFETY VALVES

TRILLIUM FLOW TECHNOLOGIES™

TRILLIUMFLOW.COM

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SEBIM History

2000-2020

2019 — WEIR P&I France becomes TRILLIUM FLOW TECHNOLOGIES™

2017 — Launch of the implementation of the pressurizer safety valves modernization PRG2000 on the main French electricity company fleet

2015 — Development and qualification of a New MSIV control panel

2014 — India MSSV for 4 indigenous PHWR reactors

2012 — Moving in a new nuclear dedicated factory in Saint Victoret (Marseille)

2009 — Collaboration with one of our major Chinese customer for 6 reactors in Fuqing, FangJiashan, Changjiang

2008 — Collaboration with one of our major Chinese customer for 14 reactors in HongYanHe, Ningde, Yangjiang

2003 — WEIR Valves & Controls FRANCE : SEBIM, CUIP, GITRAM & SARASIN Merging

2001 — Diversification in MSIV maintenance and repair activities

2000 — Contract for the First Hot solution in China (Tianwan 1&2)

1968-1999

1998 — Sebim Group joins the WEIR GROUP

1997 — First reference in Russia (Kola 1&2)

1994 — First installation of the Sebim MSSV on Russian design reactors (Kozloduy 1 to 4 and Ignalina 1&2)

1989 — SARASIN Co. joins SEBIM Group

1983 — Nuclear contracts awarded to SEBIM for export to : Belgium, China, England, Korea, South Africa, Switzerland

1982 — Main French electricity company decides to protect nuclear power plant primary circuit (RCS) with 3 SEBIM pilots valves. SEBIM GROUP sets up with:
- R.S.B.D. (spring loaded valve)
- C.U.I.P (Precision Mechanical Center)
- GITRAM (Installation and maintenance on NPP)

1981 — Purchase of RSBD society & creation of C.U.I.P society

1980 — Main French electricity company decides to fit French nuclear power plant Residual Heat Removal (RHR) systems with SEBIM valves

1979 — Main French electricity company valves tests on two-phases burst type installation - INDIRA loop (Chatou)

1975 — Tests at US research center & decision to fit conventional powered ships

1974 — Boilers fitted with SEBIM valves

1969 — French NAVY decides to install SEBIM valves on all conventional military ships

1968 — Development of autonomous pilot safety valve

Sarasin-RSBD History

2000-2020

2019 — WEIR Flow Control France becomes TRILLIUM FLOW TECHNOLOGIES™

2017 — Signature of EPR Hinkley Point contract

2010 — Signature of EPR Taishan contract

2008 — WEIR Valves & Controls France becomes WEIR Power and Industrial France

2007 — Signature of EPR Flamanville contract

2006 — Signature of OL3 contract (Finland)

2003 — A new line of product is created: Sarasin-RSBD®

1848-1999

1998 — SARASIN is grouped under the WEIR Valves & Controls France Division

1992 — SARASIN INDUSTRIE moves into a modern factory at Vendin-le-Vieil, France

1989 — SEBIM HOLDINGS purchases the company and creates the company SARASIN INDUSTRIE

1987 — SARASIN becomes KEYSTONE France

1983 — SARASIN & Co at this point becomes AGCO SARASIN and manufactures Pilot Operated Pressure Relief Valves (AGCO) for the French market whilst being able to promote its Spring Loaded Pressure Relief Valves into the US.market

1978 — SARASIN becomes the first French supplier of Pressure Relief Valves into the nuclear power industry, by equipping all Belgian and French nuclear sites and also developing this market segment into South Africa, China and Korea

1956 — SARASIN develops a range of Spring Loaded Pressure Relief Valves which would comply with the American standards intended for the oil industry

1921 — The company becomes a limited company and is named as SARASIN & Co

1905 — Two associates (DEFAYS and SARASIN) purchase the mill in order to incorporate a copper alloy foundry and thus create the company DEFAYS & SARASIN

1848 — A local master blacksmith (DESCHAMPS), installs a forging mill in the town of Wazemmes, close to the city of Lille, France

Benefits of SEBIM® Products

For more than 50 years, SEBIM® nuclear pilot operated safety valves have provided high and low overpressure protection on liquid, steam, gas and steam/water mix applications in all types of nuclear reactors (PWR, BWR, CANDU, PHWR, RBMK LWGR, HTGR, etc.)

SEBIM® NUCLEAR PILOT OPERATED SAFETY VALVES BENEFITS :

- Large temperature range of application
- Accuracy of pilot set pressure value with repeatability better than 1%
- Low or high pressure in-situ test during operation for preventive maintenance
- Perfect stability even when flow capacities are well below the maximum rate
- No erosion of sealing faces, no chattering and reduced maintenance
- Non-flowing pilot valve minimises mechanism's rate of ageing
- Proven perfect reliability
- Compact design, reduced size and weight
- Interfaces (upstream & downstream pipes) customized to special specifications

TSV 2000 - TANDEM SAFETY VALVE

Sizes

4” x 6” or 6” x 2*6”
(N4 stage version with 6” double outlet)

Pressure

From 10 to 20 MPa (1450 to 2900 PSI)

Temperature

High Temperature Applications up to 360°C (680° F)

Applications

- Primary circuit

Features and Benefits

- Unique design for redundant safe closure in over pressure protection of cooling circuits

PRG 2000 - TANDEM SAFETY VALVE

Sizes

4” x 6” or 6” x 2*6”
(N4 stage version with 6” double outlet)

Pressure

From 10 to 20 MPa (1450 to 2900 PSI)

Temperature

High Temperature Applications up to 360°C (680° F)

Applications

- Primary circuit

Features and Benefits

- Unique design for redundant safe closure in over pressure protection of cooling circuits
- PRG2000 valves are able to stay opened at very low pressure (8 bars) in emergency situation (feed and bleed)

CSSV 3000 - COMPACT SINGLE SAFETY VALVE

Sizes

DN 100 – DN 400 (4”- 16”)

Pressure

From 1 to 40 MPa (145 to 5800 PSI)

Temperature

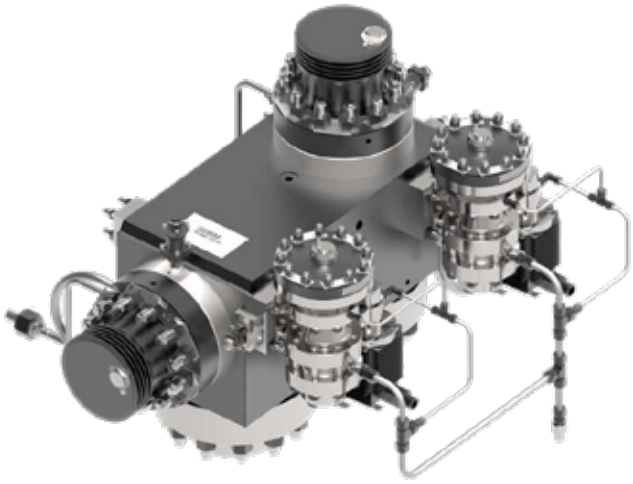
High Temperature Applications up to 600°C (1100° F)

Applications

- On all type of nuclear reactors (PWR, BWR, CANDU, PHWR, BMK LWGR, HTGR, etc.)

Features and Benefits

- Qualified for inside & outside reactor containment
  Safety functions during accidental conditions (Feed & bleed)
- Excellent operation whatever the type of medium : steam, gas, liquid or two phases
- Prevent LOCA (Loss of Coolant Accident)



CTSV 3000 - COMPACT TANDEM SAFETY VALVE

Sizes

DN 100 – DN 400 (4”- 16”)

Pressure

From 1 to 40 MPa (145 to 5800 PSI)

Temperature

High Temperature Applications up to 600°C (1100° F)

Applications

- On all type of nuclear reactors (PWR, BWR, CANDU, PHWR, RBMK LWGR, HTGR, etc.)
- High & low pressure overpressure protection on steam, water, gas or mixture lines

Features and Benefits

- Qualified for inside & outside reactor containment
- Safety functions during accidental conditions (Feed & bleed)

DSM 3000 - SMALL SIZE REACTOR SAFETY VALVE

Sizes

DN 15 – DN 65 (½"- 2 ½")

Pressure

From 1 to 20 MPa (145 to 2900 PSI)

Temperature

High Temperature Applications up to 600°C (1100° F)

Applications

- On all type of nuclear reactors (PWR, BWR, CANDU, PHWR, RBMK, LWGR, HTGR, etc.)
- SMR primary and secondary coolant safety valves

Features and Benefits

- Leak tightness up to the set-pressure minimises the mechanism's rate of ageing
- Qualified for inside & outside reactor containment
- Safety functions during accidental conditions (Feed & bleed)

GVG 3000 - SUPER COMPACT STEAM GENERATOR SAFETY VALVE

Sizes

DN 100 – DN 400 (4"- 16")

Pressure

From 1 to 20 MPa (145 to 2900 PSI)

Temperature

High Temperature Applications up to 600°C (1100° F)

Applications

- Steam generator safety valves for PWR,VVER, EPR & CANDU
- Flow rate up to 1600t/h (saturated steam)

Features and Benefits

- Forged body carbon steel - Special material upon request
- Leak tightness up to the set - pressure minimises the mechanism's rate of ageing
- Soft opening/closing decreases load on surrounding equipment

STARFLOW®

Sizes
15mm to 400mm (1” to 16”)

Pressure
Up to 431 barg (6251 PSIG)

Temperature
270°C to 538°C (454°F to 1000°F)

Applications
- Suitable for all types of nuclear reactors (PWR, BWR, CANDU, PHWR, RBMK, LWGR, HTGR, SMR, etc.)
- High and low pressure overpressure protection on steam, water and gas lines
- Nuclear Steam Supply System (NSSS) and balance of nuclear island

Features and Benefits
- Full lift
- Semi or full nozzle design
- Metal or soft seat
- Cast or forged body
- Carbon, alloy or stainless steel
- Flanged, threaded, and welded connections
- Available with a damping system to prevent acoustic vibration phenomena in liquid (alternative to hydraulic dampers)

9 SERIES (WITH FORGED BODY)

Sizes
15mm to 40mm (½” to 1 ½”)

Pressure
Up to 431 barg (6251 PSIG)

Temperature
196°C to 400°C (320°F to 752°F)

Applications
- Suitable for all types of nuclear reactors (PWR, BWR, CANDU, PHWR, RBMK, LWGR, HTGR, SMR, etc.)
- High and low pressure overpressure protection on steam, water and gas lines
- Nuclear Steam Supply System (NSSS) and balance of nuclear island

Features and Benefits
- Full lift
- Semi or full nozzle design
- Metal or soft seat
- Cast or forged body
- Carbon, alloy or stainless steel
- Flanged, threaded, and welded connections
- Available with a damping system to prevent acoustic vibration phenomena in liquid (alternative to hydraulic dampers)

STARSTEAM®

Starsteam® uses the large experience return on SEBIM® pilot operated pressure relief valves technology :

No wearing, jamming : Thermoglide™ guiding, meaning no metal contact in between the disc-holder (piston) and the guide. This unique design eliminates friction i.e. potential wearing, jamming

Response time improvement : The use of the Thermoglide ™ rings improves response times of the valve in both the opening and closing direction

Avoid leakage : Stardisc™ is a proven reliable disc design combined with key materials. The lip of the disc guarantees the perfect tightness due to its flexibility in steam

Reliable reseating : a spindle loading point lower than the seating surface guarantees repeated and accurate positioning of the disc i.e. a repeatable leaktightnes

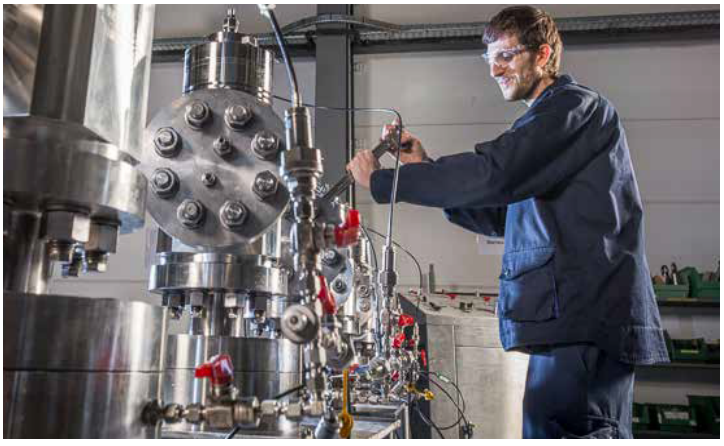
SERVICES AND TRAINING

SPECIAL TOOLS

- Mobil Adjustment and Testing System (MATS) uses latest version of software and highest equipment standard in order to maintain our piloted safety valves
- Operational setting verification can be done on line with or without pressure in the protected system
- Set pressure checking report is done automatically

SERVICES AND TRAINING

- Worldwide support for onsite service, annual outage and maintenance
- Life extension upgrade and expansion
- Training for Trillium France valves servicing
- Training for expert in system design



Other Trillium Flow Technologies™ partners with nuclear projects throughout their operational lifecycles

- ATWOOD & MORRILL®
- BATLEY VALVE®
- BLAKEBOROUGH®
- HOPKINSONS®
- TRICENTRIC®

CERTIFICATIONS AND MAP

VENDIN-LE-VIEIL PREMISES

- ISO 9001
- ISO 14001
- OHSAS 18001
- RCC- M Class 2 & 3 valves
- ASME I & VIII (UV stamp)
- HAF604 China

SAINT-VICTORET PREMISES

- ISO 9001
- ISO 14001
- OHSAS 18001
- RCC-M Class 1,2,3 valves
- TSSA N285.0 / CSA Z299.2
- ASME Sect III, Div. 1 class 1 to 3: Certificates of Authorization “NV”, “NPT” & MO
- HAF604 China

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Certified: ISO 9001:2015, ISO 14001:2015, OHSAS 18001:2007