



**Title: Evaluation of SG Blowdown time for
PGSFR SWRPRS**

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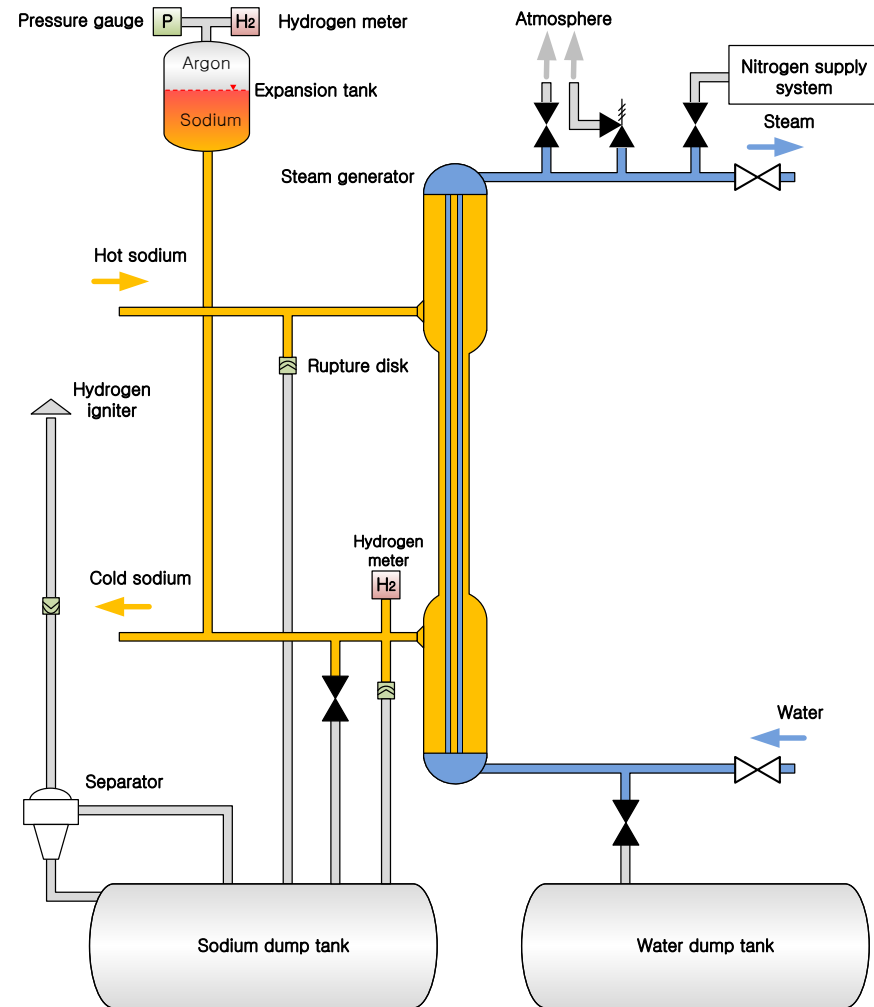
SWRPRS (Sodium Water Reaction Pressure Relief System)

□ Functions of SWRPRS

- SWRPRS is designed to mitigate the pressure spike from sodium water reaction in Steam Generator of Sodium Cooled Reactor

□ System Configuration

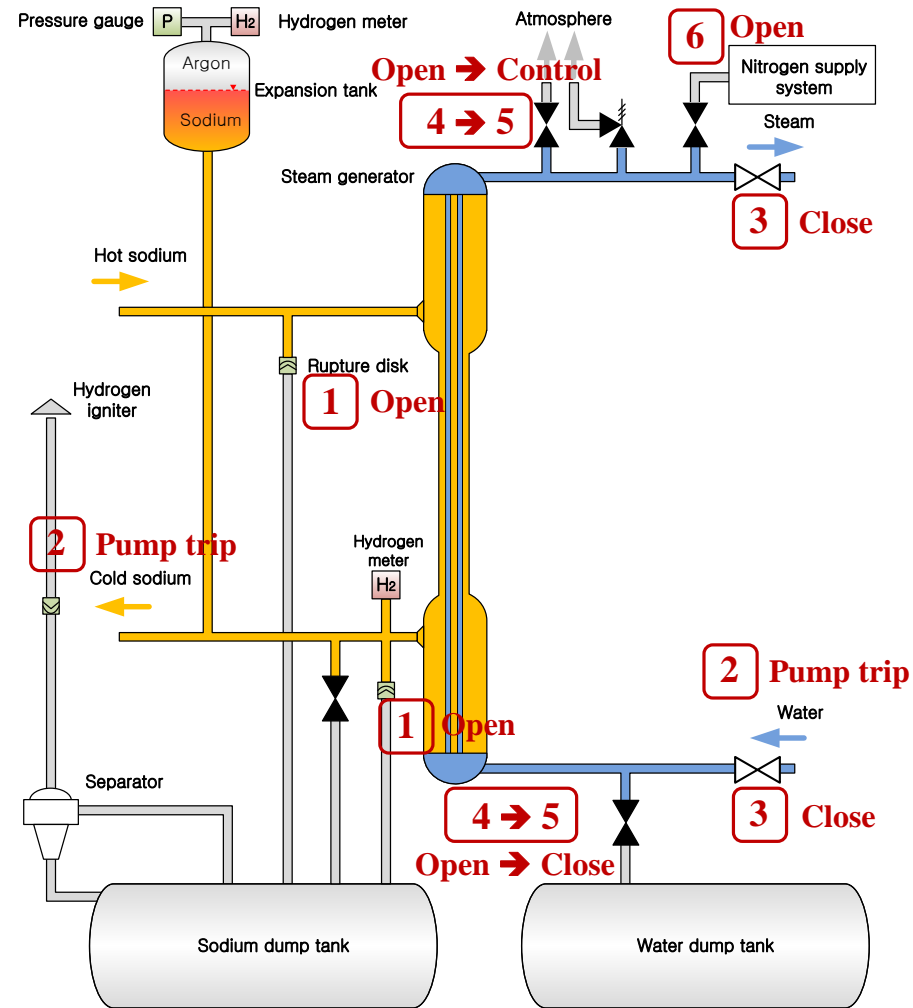
- SWRPRS is consist of Sodium Dump System and Steam/Water Blowdown System
- Steam/Water Blowdown System ceases sodium water reaction through depressurizes steam system and feed water system by blowdown steam and water into water dump tank
- Sodium dump system ceases sodium water reaction by removing sodium from Steam Generator to Sodium Dump Tanks



<System Configuration of SWRPRS >

Operation of Sodium Dump System

- Sodium dump system consists of rupture disks, sodium dump tanks, hydrogen igniting devices and connection pipes
- Rupture disks burst as the internal pressure of SG or IHTS higher than the RD set-pressure and sodium of IHTS and SG is transferred to sodium dump tanks
- The gas reaction product moves to gas liquid separator



<SWRPRS 운전절차>

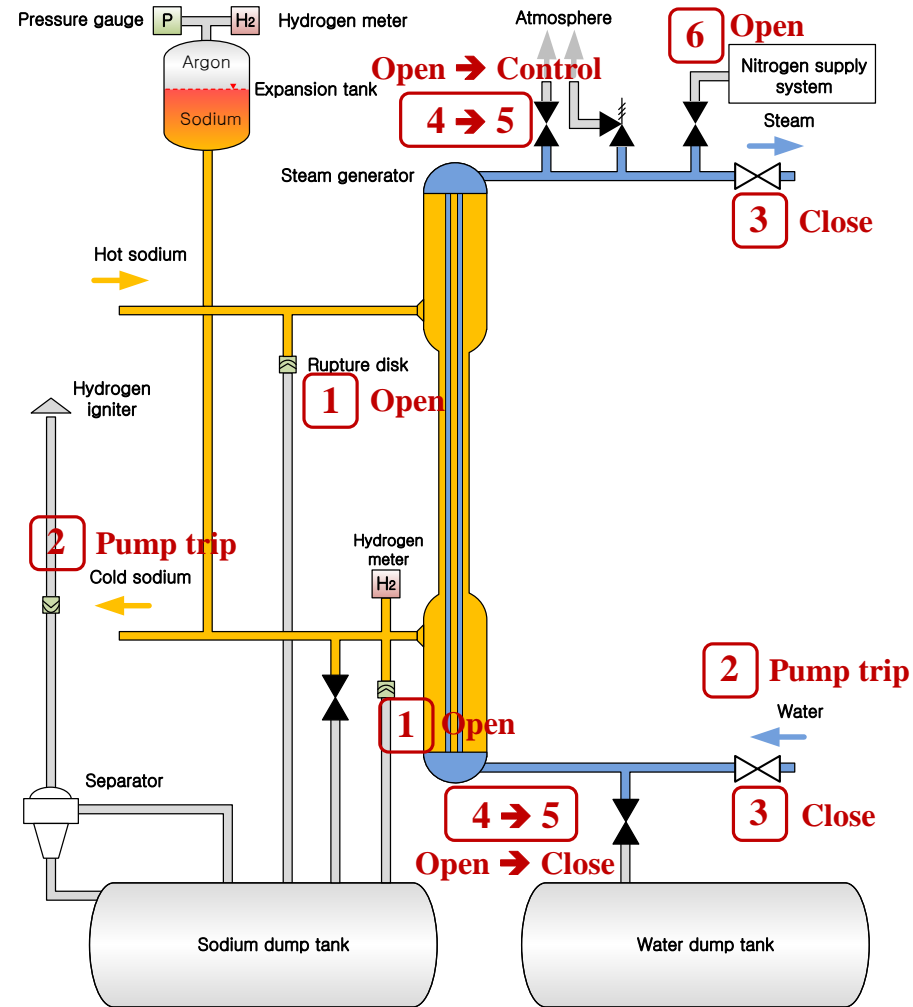
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□ 운전 절차

1. 설정압력에서 파열 및 계통 작동신호 제공
2. 주급수 펌프 및 중간열전달계통 펌프 정지
3. 주증기 및 급수 밸브 차단
4. 주증기 및 급수 배출 밸브를 열어 감압
5. 1.25MPa로 감압되었을 때 급수 배출 밸브를 차단, 주증기 배출 밸브는 물/증기 측 압력을 유지하도록 제어 (1.25MPa ~ 1.5MPa)
6. 전열관 측에 질소 가스 주입



<SWRPRS 운전절차>

Design Concept of SWRPRS

□ 주요 설계요건

- 압력완화를 통해 증간열교환기 전열관의 일차소듐에 대한 경계 건전성 유지

→ 설계기준누설에서 최대 압력 << 설계압력

□ 구성

- 파열관

- 대규모 소듐-물 반응에 의한 계통의 과도한 압력 증가 시 설정압력에서 피동 작동

- 급수덤프탱크 및 소듐덤프탱크

- 전열관 손상부의 반응물을 제거하여 추가적인 소듐-물 반응 억제

- 질소주입계통

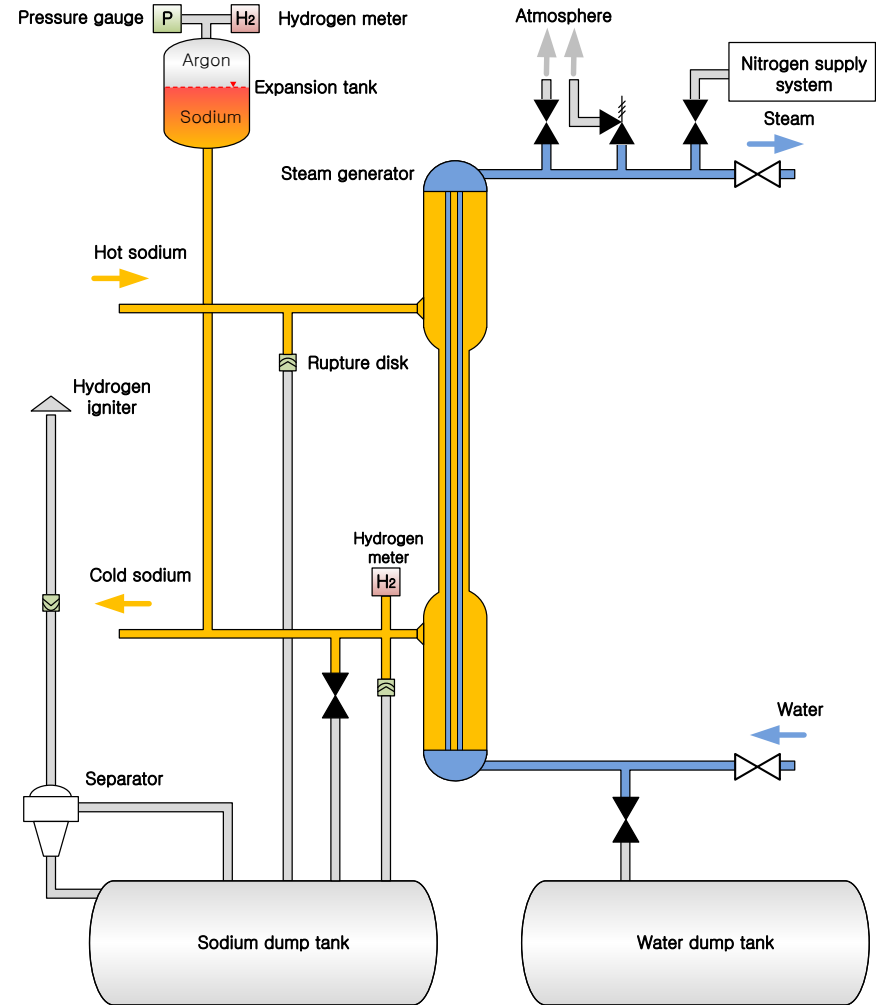
- 추가적인 소듐-물 반응 억제 및 물/증기 측으로 소듐의 역류 방지

- 기액분리기

- 기체 반응생성물(수소)만 분리하여 대기로 방출

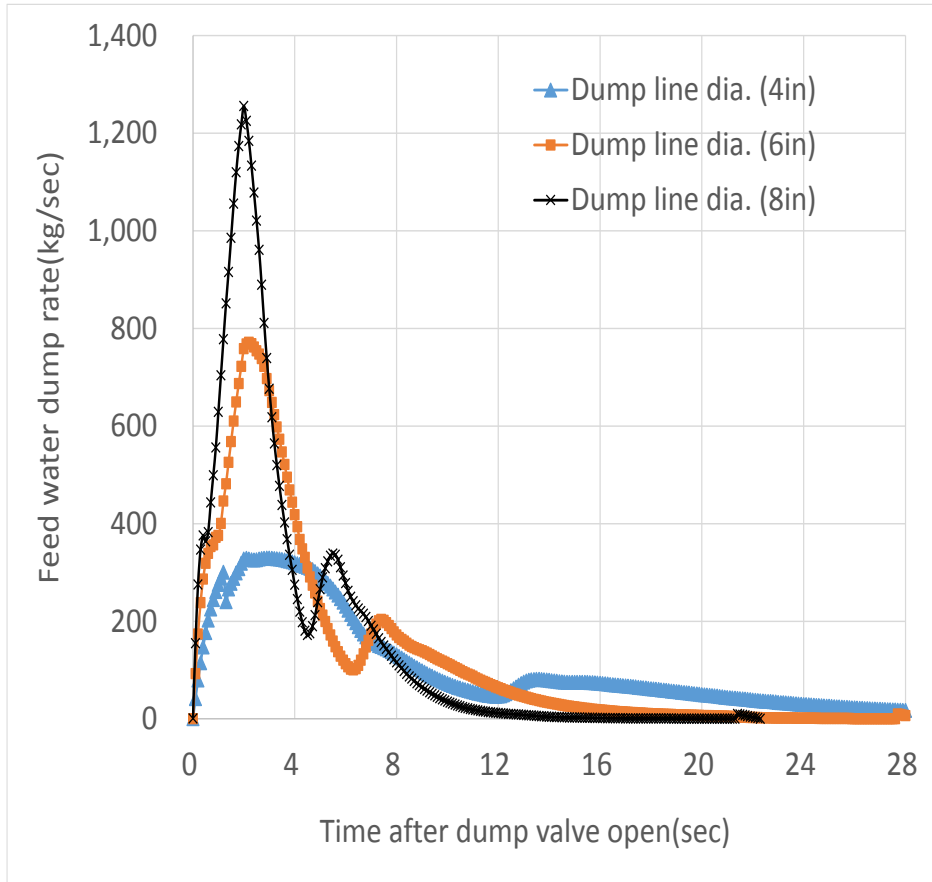
- 수소점화기

- 생성된 수소를 연소하여 대기로 방출

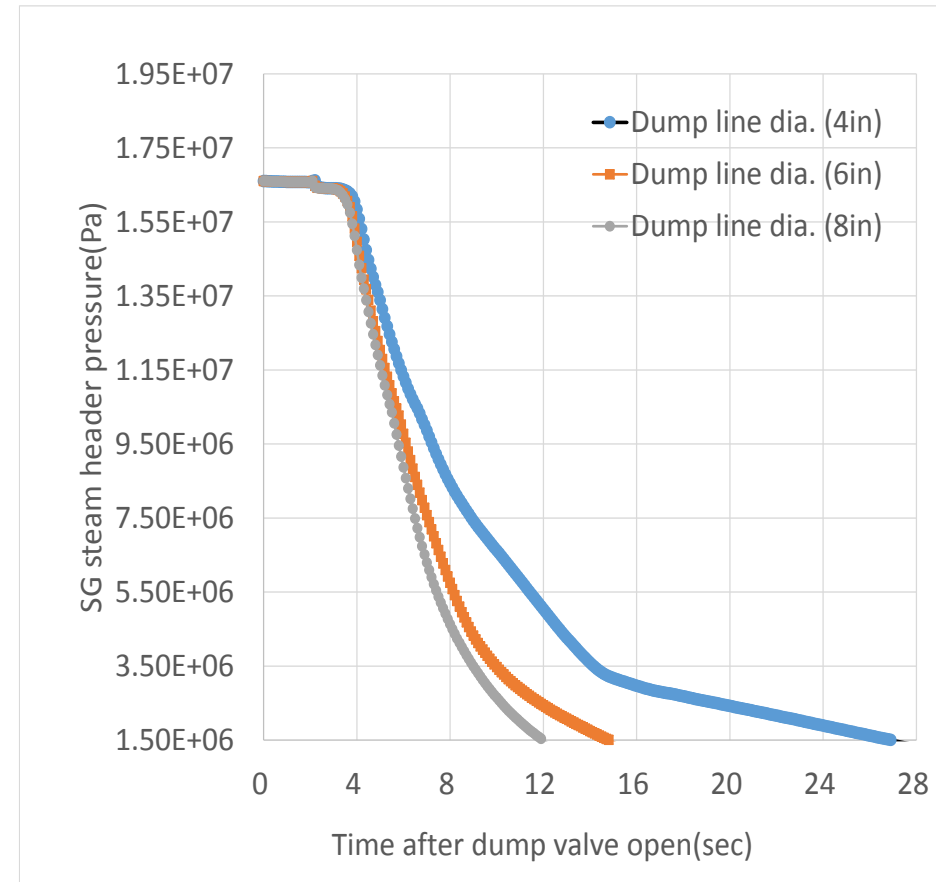


<SWRPRS 계통개념>

2차계통 블로우다운 특성



<증기발생기 블로우다운 유량>



<증기발생기 압력변화>