

6. HEAT TRANSPORT SYSTEM

- 6.1. No of coolant loops
 - 6.1.1. Primary (or for pool reactors, the number of primary pumps)
 - 6.1.2. Secondary
- 6.2. Sodium inventory (t)
 - 6.2.1. Primary
 - 6.2.2. Secondary

Experimental Fast Reactors

Plant	6.1.1.	6.1.2.	6.2.1.	6.2.2.
Rapsodie (France)	2	2	36.8	20
KNK-II (Germany)	2	2	27	50
FBTR (India)	2	2	26.7	44
PEC (Italy)	2 (1*)	2 (1*)	118 (14*)	67 (3.4*)
JOYO (Japan)	2	2	126	73
DFR (UK)	24	12	51	63
BOR-60 (Russia)	2	2	16	25
EBR-II (USA)	2	1	286	41
Fermi (USA)	3	3	160	102
FFTF (USA)	3	3	406	199
BR-10 (Russia)	2	2	1.7	5
CEFR (China)	2	2	260	48.2

Demonstration Prototype Fast Reactors

Phénix (France)	3	3	800	381
SNR-300 (Germany)	3	3	550	402
PFBR (India)	4	4	1200	660
MONJU (Japan)	3	3	760	760
PFR (UK)	3	3	850	240
CRBRP (USA)	3	3	630	580
BN-350 (Kazakhstan)	6**	6**	470	450
BN-600 (Russia)	3	3	770	830
ALMR (USA)	1	1	700	300

Commercial Size Reactors

Super-Phénix 1 (France)	4	4	3200	1500
Super-Phénix 2 (France)	4	4	3300	800
SNR 2 (Germany)	4	8	3300	1250
DFBR (Japan)	3	3	1700	570
CDFR (UK)	4	4	3000	1600
BN-1600 (Russia)	3	6	2600	2700
BN-800 (Russia)	3	3	820	1025
EFR	3	6	2200	1300
ALMR (USA)	1	1	700	30

* test channel

** one loop is a reserve loop

Note: All loops have one pump except the EBR-II primary and DFR secondary loops

HEAT TRANSPORT SYSTEM

- 6.3. Coolant flow rate (kg/s)
 6.3.1. Primary: total
 6.3.2. per loop
 6.3.3. Secondary: total
 6.3.4. per loop

Experimental Fast Reactors

Plant	6.3.1	6.3.2.	6.3.3.	6.3.4.
Rapsodie (France)	230	115	204	102
KNK-II (Germany)	280	140	260	130
FBTR (India)	230	115	138	69
PEC (Italy)	630 (15.8*)	315 (15.8*)	624 (15.8*)	312 (15.8*)
JOYO (Japan)	600	300	600	300
DFR (UK)	450	19	450	38
BOR-60 (Russia)	270	135	220	110
EBR-II (USA)	500	250	297	297
Fermi (USA)	1185	395	1200	400
FFTF (USA)	2180	727	2180	727
BR-10 (Russia)	48	24	50	25
CEFR (China)	396	198	274	137

Demonstration or Prototype Fast Reactors

Phénix (France)	3000	1000	2319	773
SNR-300 (Germany)	3550	1180	3270	1090
PFBR (India)	6392	1598	6172	1543
MONJU (Japan)	4250	1420	3090	1030
PFR (UK)	3090	1030	2925	975
CRBRP (USA)	5240	1747	4836	1612
BN-350 (Kazakhstan)	3950	790	4400	880
BN-600	6600**	2200	6090	2030
ALMR (USA)	4762	4762	4409	4409

Commercial Size Reactors

Super-Phénix 1 (France)	15700		13100	3270
Super-Phénix 2 (France)	19700	4925	15700	3920
SNR 2 (Germany)	18000	4500		4000
DFBR (Japan)	8160	2720	6780	2260
CDFR (UK)	15400	3860	15000	3747
BN-1600 (Russia)	19500**	6500	17800	2970
BN-800 (Russia)	8600**	2900	8400	2780
EFR	19300	6433	15300	2550
ALMR (USA)	4762	4762	4409	4409

* test channel

** core excluding flowrate to the vessel cooling system

HEAT TRANSPORT SYSTEM

- 6.4. Coolant velocity in core (m/s)
 - 6.4.1. Maximum
 - 6.4.2. Average
- 6.5. Pressure drop across core (MPa)

Experimental Fast Reactors

Plant	6.4.1.	6.4.2.	6.5.
Rapsodie (France)	5.5		
KNK-II (Germany)			
FBTR (India)	6.2	5.4	0.3
PEC (Italy)	6.1	5.0	
JOYO (Japan)	6.6	5.3	0.33
DFR (UK)	6.0	6.0	
BOR-60 (Russia)	8.0	near 0.5	
EBR-II (USA)	7.23	4.74	
Fermi (USA)		4.8	
FFTF (USA)	7.4	6.8	
BR-10 (Russia)	4.0		0.1
CEFR (China)	5.0	3.7	0.25

Demonstration or Prototype Fast Reactors

Phénix (France)	12.0	9.0	0.45
SNR-300 (Germany)		5.0	
PFBR (India)	8.0	7.7	0.5
MONJU (Japan)	6.9	5.8	0.25
PFR (UK)	9	7.3	
CRBRP (USA)	7.3	6.7	
BN-350 (Kazakhstan)	7.4	6.5	0.69
BN-600 (Russia)	8.0	7.5	0.70
ALMR (USA)	5.3	4.7	0.5

Commercial Size Reactors

Super-Phénix 1 (France)	7.7	6.1	0.47
Super-Phénix 2 (France)			
SNR 2 (Germany)			
DFBR (Japan)			0.5
CDFR (UK)	7.0	6.5	
BN-1600 (Russia)	5.7	5.3	0.45
BN-800 (Russia)	7.3	6.7	0.68
EFR	7.8	6.7	0.5
ALMR (USA)	5.3	4.7	0.5

HEAT TRANSPORT SYSTEM

6.6.	Coolant temperature (°C)	
6.6.1.	Primary:	hot leg
6.6.2.		cold leg

Experimental Fast Reactors

Plant	6.6.1.	6.6.2.
Rapsodie (France)	515	400
KNK-II (Germany)	525	360
FBTR (India)	515	380
PEC (Italy)	545 (600 Max. *)	400 (450 Max. *)
JOYO (Japan)	500**	370
DFR (UK)	350	230
BOR-60 (Russia)	545	330
EBR-II (USA)	473	371
Fermi (USA)	427	288
FFTF (USA)	503	360
BR-10 (Russia)	470	350
CEFR (China)	514	360

Demonstration or Prototype Fast Reactors

Phénix (France)	560	395
SNR-300 (Germany)	546	377
PFBR (India)	530	380
MONJU (Japan)	529	397
PFR (UK)	560	399
CRBRP (USA)	535	388
BN-350 (Kazakhstan)	430	280
BN-600 (Russia)	535	365
ALMR (USA)	498	358

Commercial Size Reactors

Super-Phénix 1 (France)	545	395
Super-Phénix 2 (France)	544	397
SNR 2 (Germany)	540	390
DFBR (Japan)	550	395
CDFR (UK)	540	370
BN-1600 (Russia)	550	395
BN-800 (Russia)	547	354
EFR	545	395
ALMR (USA)	498	358

* test channel

** MK-II; (465 in MK-I, 75 MWt)

HEAT TRANSPORT SYSTEM

6.6.	Coolant temperature (°C)
6.6.3.	Secondary: hot leg
6.6.4.	cold leg

Experimental Fast Reactors

Plant	6.6.3.	6.6.4.
Rapsodie (France)	485	360
KNK-II (Germany)	504	322
FBTR (India)	510	284
PEC (Italy)	495 (470-585*)	350 (320-435*)
JOYO (Japan)	470**	350**
DFR (UK)	335	195
BOR-60 (Russia)	480	210
EBR-II (USA)	467	306
Fermi (USA)	408	269
FFTF (USA)	459	316
BR-10 (Russia)	380	270
CEFR (China)	495	310

Demonstration or Prototype Fast Reactors

Phénix (France)	550	343
SNR-300 (Germany)	520	335
PFBR (India)	505	350
MONJU (Japan)	505	325
PFR (UK)	540	370
CRBRP (USA)	502	344
BN-350 (Kazakhstan)	415	260
BN-600 (Russia)	510	315
ALMR (USA)	477	325

Commercial Size Reactors

Super-Phénix 1 (France)	525	345
Super-Phénix 2 (France)	525	345
SNR 2 (Germany)	510	340
DFBR (Japan)	520	335
CDFR (UK)	510	335
BN-1600 (Russia)	515	345
BN-800 (Russia)	505	309
EFR	525	340
ALMR (USA)	477	324

* test channel

** MK-II; (445, 355, respectively, in MK-I)

HEAT TRANSPORT SYSTEM

6.6.	Coolant temperature (°C)
6.6.5.	Steam (water):steam generator outlet
6.6.6.	steam generator inlet

Experimental Fast Reactors

Plant	6.6.5.	6.6.6.
Rapsodie (France)		
KNK-II (Germany)	485	
FBTR (India)	480	200
PEC (Italy)		
JOYO (Japan)		
DFR (UK)	274	22
BOR-60 (Russia)	430	200
EBR-II (USA)	433	301
Fermi (USA)	407	171
FFTF (USA)		
BR-10 (Russia)		
CEFR (China)	480	190

Demonstration or Prototype Fast Reactors

Phénix (France)	512	246
SNR-300 (Germany)	495	230
PFBR (India)	480	252
MONJU (Japan)	487	240
PFR (UK)	515	342
CRBRP (USA)	482	242
BN-350 (Kazakhstan)	410	158
BN-600 (Russia)	505	240
ALMR (USA)	454	215

Commercial Size Reactors

Super-Phénix 1 (France)	490	237
Super-Phénix 2 (France)	490	237
SNR 2 (Germany)		
DFBR (Japan)	495	240
CDFR (UK)	490	196
BN-1600 (Russia)	495	240
BN-800 (Russia)	490	217
EFR	490	240
ALMR (USA)	454	215

HEAT TRANSPORT SYSTEM

- 6.7. Piping
- 6.7.1. Primary circuit material: hot leg
- for pool reactors, there is no hot leg piping
- 6.7.2. Primary circuit material: cold leg
- for pool reactors, this is the piping connecting the primary pumps to the diagrid

Experimental Fast Reactors

Plant	6.7.1.	6.7.2.
Rapsodie (France)	316	316
KNK-II (Germany)	1.6770	1.6770
FBTR (India)	316	316
PEC (Italy)	316 (316 B.F.*)	316 (316*)
JOYO (Japan)	304	304
DFR (UK)	18/8/1	18/8/1
BOR-60 (Russia)	1 Cr 18 Ni 9	Cr 18 Ni 9
EBR-II (USA)	304	304
Fermi (USA)	304	304
FFTF (USA)	316	304
BR-10 (Russia)	Cr 18 Ni9	Cr 18 Ni9
CEFR (China)	316	316

Demonstration or Prototype Fast Reactors

Phénix (France)	316	316
SNR-300 (Germany)	1.4948	1.4948
PFBR (India)	316	316
MONJU (Japan)	304	304
PFR (UK)	321	321
CRBRP (USA)	316	304
BN-350 (Kazakhstan)	Cr 18 Ni 9	Cr 18 Ni 9
BN-600 (Russia)	Cr 18 Ni 9	Cr 18 Ni 9
ALMR (USA)	316	316

Commercial Size Reactors

Super-Phénix 1 (France)	Cr18 Ni12 Mo2.5 Mn1.8 Si Cr18 Ni10	
Super-Phénix 2 (France)		
SNR 2 (Germany)	304	304
DFBR (Japan)	316 FR	304
CDFR (UK)	316	304
BN-1600 (Russia)	Cr 18 Ni 9	Cr 18 Ni 9
BN-800 (Russia)	Cr 18 Ni 9	Cr 18 Ni 9
EFR	Cr 18 Ni13	Cr18 Ni13
ALMR	316	316

* test channel

HEAT TRANSPORT SYSTEM

- 6.7. Piping
- 6.7.3. Secondary piping material: hot leg
- 6.7.4. Secondary piping material: cold leg

Experimental Fast Reactors

Plant	6.7.3.	6.7.4.
Rapsodie (France)	316	316
KNK-II (Germany)	1.6770	1.6770
FBTR (India)	316	316
PEC (Italy)	316	316
JOYO (Japan)	2 1/4 Cr-1 Mo	2 1/4 Cr-1 Mo
DFR (UK)	18/8/1	18/8/1
BOR-60 (Russia)	Cr 18 Ni 9	Cr 18 Ni 9
EBR-II (USA)	304*	304*
Fermi (USA)	2 1/4 Cr-1 Mo	2 1/4 Cr-1 Mo
FFTF (USA)	316	304
BR-10 (Russia)	Cr 18 Ni9	Cr 18 Ni9
CEFR (China)	316	316

Demonstration or Prototype Fast Reactors

Phénix (France)	321	304
SNR-300 (Germany)	1.4948	
PFBR (India)	316 LN	316 LN
MONJU (Japan)	304	304
PFR (UK)	321	321
CRBRP (USA)	316H	304H
BN-350 (Kazakhstan)	Cr 18 Ni 9	Cr 18 Ni 9
BN-600 (Russia)	Cr 18 Ni 9	Cr 18 Ni 9
ALMR (USA)	316	316

Commercial Size Reactors

Super-Phénix 1 (France)	Cr18 Ni12 Mo 2.5 Mn1.8 Si	Cr18 Ni12 Mo 2.5 Mn1.8 Si
Super-Phénix 2 (France)	316	316
SNR 2 (Germany)	304	304
DFBR (Japan)	304	304
CDFR (UK)	316	316
BN-1600 (Russia)	Cr 18 Ni 9	Cr 18 Ni 9
BN-800 (Russia)	Cr 18 Ni 9	Cr 18 Ni 9
EFR	Cr 18 Ni 13	Cr 18 Ni 13
ALMR (USA)	316	316

* 2 1/4 Cr-1 Mo used for connection to steam generator components

HEAT TRANSPORT SYSTEM

- 6.7. Piping
- 6.7.5. Steam (water) piping material: hot leg
- 6.7.6. Steam (water) piping material: cold leg

Experimental Fast Reactors

Plant	6.7.5.	6.7.6.
Rapsodie (France)		
KNK-II (Germany)		
FBTR (India)	A335 Gr.P2	SA106 Gr.B
PEC (Italy)		
JOYO (Japan)		
DFR (UK)	18/8/1 in Cu Bond	mild steel
BOR-60 (Russia)	12 Cr 1 Mo	12 Cr 1 Mo
EBR-II (USA)	2¼ Cr-1 Mo	2¼ Cr-1 Mo
Fermi (USA)		
FFTF (USA)		
BR-10 (Russia)		
CEFR (China)	2¼ Cr-1Mo	2¼ Cr-1Mo

Demonstration or Prototype Fast Reactors

Phénix (France)	1 and 2% Cr	A42
SNR-300 (Germany)	X20 Cr Mo 12	15 Ni Cu Mo Nb 5
PFBR (India)	A335 Gr P22	SA106 Gr.C
MONJU (Japan)	low alloy steel	carbon steel
PFR (UK)	2¼ Cr-1 Mo and 18/8/1	mild steel
CRBRP(USA)	2¼ Cr-1 Mo	SA106 Gr. B
BN-350 (Kazakhstan)	12 Cr 1Mo, V	Carbon steel
BN-600 (Russia)	12 Cr 1Mo, V	Carbon steel Mn1
ALMR (USA)	2¼ Cr-1 Mo	2¼ Cr - 1 Mo

Commercial Size Reactors

Super-Phénix 1 (France)	Cr 1 Mo Mn Si	Mn 1.2 Si
Super-Phénix 2 (France)		
SNR 2 (Germany)		
DFBR (Japan)	2¼ Cr-1 Mo	carbon steel
CDFR (UK)	9 Cr-1 Mo	mild steel
BN-1600 (Russia)	not yet determined	
BN-800 (Russia)	12 Cr1 Mo,V	Carbon steel, Mn1
EFR	20 Cr Mo 121	15 Ni Cu Mo Nb 5
ALMR (USA)	2¼ Cr - 1 Mo	2¼ Cr - 1 Mo

HEAT TRANSPORT SYSTEM

- 6.7. Piping
 6.7.7. Outer diameter of primary piping (mm): hot leg
 6.7.8. Thickness of primary piping (mm): hot leg

Experimental Fast Reactors

Plant	6.7.7.	6.7.8.
Rapsodie (France)	302	4
KNK-II (Germany)	200	
FBTR (India)	300	4
PEC (Italy)	609 (114*)	9.5 (6*)
JOYO (Japan)	510	9.5
DFR (UK)	101	3.5
BOR-60 (Russia)	300	12
EBR-II (USA)	356	6.35
Fermi (USA)	760	9.5
FFTF (USA)	710	10
BR-10 (Russia)	127	8
CEFR (China)		

Demonstration or Prototype Fast Reactors

Phénix (France)		
SNR-300 (Germany)	610	
PFBR (India)		
MONJU (Japan)	810	11
PFR (UK)		
CRBRP (USA)	914	13
BN-350 (Kazakhstan)	630	13
BN-600 (Russia)		
ALMR (USA)		

Commercial Size Reactors

Super-Phénix 1 (France)		
Super-Phénix 2 (France)		
SNR 2 (Germany)	900	
DFBR (Japan)	965	15.9
CDFR (UK)		
BN-1600 (Russia)		
BN-800 (Russia)		
EFR		
ALMR (USA)		

* test channel

HEAT TRANSPORT SYSTEM

- 6.7. Piping
- 6.7.9. Outer diameter of secondary piping (mm): hot leg
- 6.7.10. Thickness of secondary piping (mm): hot leg

Experimental Fast Reactors

Plant	6.7.9.	6.7.10.
Rapsodie (France)	208	4
KNK-II (Germany)	200	
FBTR (India)	200	8
PEC (Italy)	355.6 (114*)	8 (6*)
JOYO (Japan)	300	10.3
DFR (UK)	152	3.5
BOR-60 (Russia)	200	8
EBR-II (USA)	305	6.35
Fermi (USA)	305	9.5
FFTF (USA)	405	10
BR-10 (Russia)	127	8
CEFR (China)	300	7

Demonstration or Prototype Fast Reactors

Phénix (France)	510	6
SNR-300 (Germany)	610	
PFBR (India)	711/508/406	10/8/8
MONJU (Japan)	560	9.5
PFR (UK)	360	10
CRBRP (USA)	610	13
BN-350 (Kazakhstan)	529/377	12/12
BN-600 (Russia)	630	13
ALMR (USA)	711	13

Commercial Size Reactors

Super-Phénix 1 (France)	700	11
Super-Phénix 2 (France)	760	
SNR 2 (Germany)	800	
DFBR (Japan)	711	12.7
CDFR (UK)	864	10
BN-1600 (Russia)	820	13
BN-800 (Russia)	820	24
EFR	711	11
ALMR (USA)	711	13

* test channel

HEAT TRANSPORT SYSTEM

- 6.7. Piping
- 6.7.11. Outer diameter of steam (water) piping (mm): hot leg
- 6.7.12. Thickness of steam (water) piping (mm): hot leg

Experimental Fast Reactors

Plant	6.7.11.	6.7.12.
Rapsodie (France)		
KNK-II (Germany)		
FBTR (India)	100	13.5
PEC (Italy)		
JOYO (Japan)		
DFR (UK)	20	2
BOR-60 (Russia)	100*	
EBR-II (USA)	273	21.4
Fermi (USA)	305	
FFTF (USA)		
BR-10 (Russia)		
CEFR (China)	159	20.0

Demonstration or Prototype Fast Reactors

Phénix (France)	330	25
SNR-300 (Germany)	291	20.5
PFBR (India)	596	60
MONJU (Japan)	510	50
PFR (UK)	325	65
CRBRP (USA)	406	40.5
BN-350 (Kazakhstan)	350*	
BN-600 (Russia)	219	25
ALMR (USA)	508	38.1

Commercial Size Reactors

Super-Phénix 1 (France)	458	42
Super-Phénix 2 (France)		
SNR 2 (Germany)		
DFBR (Japan)	508	72
CDFR (UK)	300	64
BN-1600 (Russia)	500*	
BN-800 (Russia)	495	34
EFR	500*	
ALMR (USA)	507	38.1

* internal diameter

HEAT TRANSPORT SYSTEM

6.7.	Piping
6.7.13.	Outer diameter of primary piping (mm): cold leg
6.7.14.	Thickness of primary piping (mm): cold leg
6.7.15.	Outer diameter of secondary piping (mm): cold leg

Experimental Fast Reactors

Plant	6.7.13.	6.7.14.	6.7.15.
Rapsodie (France)	300		200
KNK-II (Germany)	200		200
FBTR (India)	300	4	200
PEC (Italy)	355.6 (114*)	8 (6*)	355.6 (114*)
JOYO (Japan)	450/300	7.9/6.5	300/250/200
DFR (UK)	101		152
BOR-60 (Russia)	200	8	200/100
EBR-II (USA)	324*	10.3	324
Fermi (USA)	760	9.5	460/305
FFTF (USA)	405	10	405
BR-10 (Russia)	127**	8**	127
CEFR (China)	313.	7	300

Demonstration or Prototype Fast Reactors

Phénix (France)			510
SNR-300 (Germany)	560		560
PFBR (India)	670	10	711/508/406***
MONJU (Japan)	610	9.5	560
PFR (UK)			610
CRBRP (USA)	610	13	457,610
BN-350 (Kazakhstan)	630/529	13/12	529/377
BN-600 (Russia)	636****	16	820
ALMR (USA)			

Commercial Size Reactors

Super-Phénix 1 (France)			1000
Super-Phénix 2 (France)			1000
SNR 2 (Germany)	900		800
DFBR (Japan)	762	15.9	711
CDFR (UK)			864
BN-1600 (Russia)	1020****	20	920
BN-800 (Russia)	636****	16	820
EFR	885	14.5	711
ALMR (USA)			711

* test channel

** for each of two primary pipes

*** full flow in pump/1/2 flow in IHX/1/3 flow in steam generator evaporator

**** two pipes per loop

HEAT TRANSPORT SYSTEM

<u>6.7.</u>	Piping
6.7.16.	Thickness of secondary piping (mm): cold leg
6.7.17.	Outer diameter of steam (water) piping (mm): cold leg
6.7.18.	Thickness of steam (water) piping (mm): cold leg

Experimental Fast Reactors

Plant	6.7.16.	6.7.17.	6.7.18.
Rapsodie (France)			
KNK-II (Germany)			
FBTR (India)	8	114.3	13.5
PEC (Italy)	8 (6*)		
JOYO (Japan)	10.3/9.3/8.2		
DFR (UK)			
BOR-60 (Russia)	8/6	100**	
EBR-II (USA)	6.35	168	14.3
Fermi (USA)	9.5	200	
FFTF (USA)	10		
BR-10 (Russia)	8		
CEFR (China)	7	102	14.0

Demonstration or Prototype Fast Reactors

Phénix (France)	7	219	29
SNR-300 (Germany)		395	22.5
PFBR (India)	10	349	53
MONJU (Japan)	9.5		
PFR (UK)	12	575	100
CRBRP (USA)	13	254	28.6
BN-350 (Kazakhstan)	12	250**	
BN-600 (Russia)	13	219	25
ALMR (USA)	13	406	36.5

Commercial Size Reactors

Super-Phénix 1 (France)	20	444	52
Super-Phénix 2 (France)			
SNR 2 (Germany)			
DFBR (Japan)	12.7	356	
CDFR (UK)			
BN-1600 (Russia)	14	200	25
BN-800 (Russia)	20	273	20
EFR	11	800**	
ALMR (USA)	13	406	36.5

* test channel

** internal diameter

HEAT TRANSPORT SYSTEM

- 6.7. Piping
 6.7.19. Provision of leak jacket: primary
 6.7.20. secondary

Experimental Fast Reactors

Plant	6.7.19.	6.7.20.
Rapsodie (France)	yes	no
KNK-II (Germany)	yes*	no
FBTR (India)	yes	no
PEC (Italy)	yes (yes**)	no (no**)
JOYO (Japan)	yes	no
DFR (UK)	yes	no
BOR-60 (Russia)	yes	no
EBR-II (USA)	yes	no
Fermi (USA)	no	no
FFTF (USA)	guard vessels	guard vessels
BR-10 (Russia)	yes	no
CEFR (China)	not applicable	yes

Demonstration or Prototype Fast Reactors

Phénix (France)	not applicable	no
SNR-300 (Germany)	yes*	
PFBR (India)	not applicable	yes
MONJU (Japan)	guard vessels	no
PFR (UK)	not applicable	yes
CRBRP (USA)	guard vessels	guard vessels, catch pans
BN-350 (Kazakhstan)	yes	no
BN-600 (Russia)	not applicable	no
ALMR (USA)	not applicable	yes

Commercial Size Reactors

Super-Phénix 1 (France)	not applicable	no
Super-Phénix 2 (France)	not applicable	yes
SNR 2 (Germany)	not applicable	
DFBR (Japan)	yes	yes
CDFR (UK)	not applicable	yes
BN-1600 (Russia)	yes	no
BN-800 (Russia)	yes	no
EFR	not applicable	yes
ALMR (USA)	not applicable	yes

* below min. Na level

** test channel

HEAT TRANSPORT SYSTEM

- 6.8. Valving
- 6.8.1. Primary: hot leg stop
- 6.8.2. Primary: cold leg stop
- 6.8.3. Primary: check
- 6.8.4. Secondary: steam generator isolation

Experimetnal Fast reactors

Plant	6.8.1.	6.8.2	6.8.3	6.8.4
Rapsodie (France)	no	no	yes	---
KNK-II (Germany)	yes	yes	yes	no
FBTR (India)	no	no	yes	yes
PEC (Italy)	no (no)	no (no)	yes (yes)	
JOYO (Japan)	no	no	yes	
DFR (UK)	no	no	no	no (yes)
BOR-60 (Russia)	yes	yes	yes	yes
EBR-II (USA)	no	no	no	no
Fermi (USA)	no	no	yes	no (yes)
FFTF (USA)	yes	yes	yes	---
BR-10 (Russia)	yes	yes	yes	
CEFR (China)	no	no	n/a	yes

Demonstration or Prototype Fast Reactors

Phénix (France)	no	no	yes	yes
SNR-300 (Germany)	no	no	yes	no
PFBR (India)	no	no	yes	yes
MONJU (Japan)	no	no	yes	yes
PFR (UK)	yes	yes	no	yes
CRBRP (USA)	no	no	yes	yes
BN-350 (Kazakhstan)	yes	yes	yes	no
BN-600 (Russia)	no	no	yes	yes
ALMR (USA)	no	no	no	yes

Commercial Size Reactors

Super-Phénix 1 (France)	no	no	no	no isolation valve on the sodium circuit
Super-Phénix 2 (France)				no
SNR 2 (Germany)		yes		
DFBR (Japan)	no	no	no	no
CDFR (UK)	yes	yes		yes
BN-1600 (Russia)	no	no	not determined	not determined
BN-800 (Russia)	no	no	yes	yes
EFR	no	no	no	no isolation valve on the sodium circuit
ALMR (USA)	no	no	no	yes