

Sealing Hot Boiler Feed Water

The Challenge

Sealing hot boiler feed water challenges mechanical seals in ways not seen when sealing other hot liquids. These problems relate to viscosity, pressure, chemistry and specific gravity. The most important consideration is temperature because it affects both the physical and chemical properties of water. As water temperature increases, viscosity dramatically decreases (i.e., 1.0cp at 70°F to .3cp at 212°F) as does specific gravity, while corrosiveness increases. All this causes water to lose most of its lubricating properties leading to increased seal face wear and decreased seal life. Cooling hot boiler feed water is the key to long seal life. The energy lost in cooling can be very expensive; however it is commonly known that cooling the seal chamber to below 170°F can greatly increase seal life.

The Chesterton Solution

We often control the sealed temperature and pressure to allow seals to operate properly. There are several methods, some of which reduce system efficiency. The Chesterton "PR" family of products are designed specifically for hot water, using piping plan 23 as a proven hot water or boiler feed water sealing solution.

The PR seal uses a built-in pumping ring to move hot water in the seal chamber out of the chamber, through a heat exchanger, then back into the seal chamber to continuously cool only the seal rather than reduce the temperature of the boiler feed (hot) water in the pump casing. The pump shaft rotation uses the seals pumping ring to circulate the boiler feed water to and from the seal chamber. Since there is no mixing of cooled water between the seal chamber and the pump, the heat exchanger only removes the heat generated by the seal and a small portion of heat absorbed from the pump (heat soak). This results in long, reliable, economical seal life.

The Hot Water Solution

A Midwest power plant was suffering with poorly performing boiler feed water seals. These seals were exceedingly large, heavy and difficult to install resulting in long downtime and installation errors. Standard Chesterton PR seals were fitted to a one-time installed adapter allowing for much easier handling during installation and repair. The seals were engineered to accommodate the pumps .050 axial shaft movement with success so dramatic, 16 additional pump are budgeted for retrofit.



From this...



To this...



180PR



442PR Split Seal



Using this:

[Chesterton is the ONLY company with successful split seal history in boiler feed.](#)

Why Use Chesterton PR/BF Seals?

- ◆ Seal chambers under constant high temperature
- ◆ Large, difficult to handle competitor seals
- ◆ AWC Pumping Ring Seals Provide:
- ◆ Split Seal = No pump disassembly
- ◆ Custom engineering to simplify installation
- ◆ Nominal 5 year MTBR on hot water
- ◆ Efficient pumping ring for maximum cooling

A.W. Chesterton Company

500 Unicorn Park Drive,
Woburn, MA. 01801-3343

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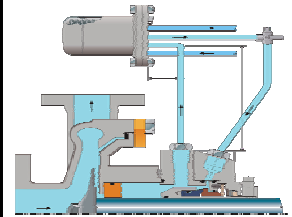
Telephone: 1-781-438-7000

Fax: 1-781-438-8971

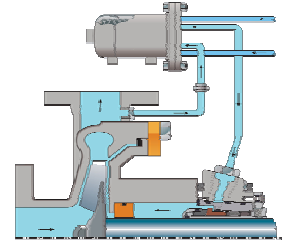
ChestertonMarketingServices@chesterton.com

www.chesterton.com

Drawing	Item #	Seal Model	Description	Manufacturer	Model
34837	697254	155BF	-12 SSC/9723/316/ AFLAS	AHLSTROM	APT BEARING UNIT
34923	626659	155BF	-14 SSC/CB/AFLAS	INGERSOLL RAND	14 VEM
35043	697639	155BF	-14 SSC/9732/316/EP962-90	INGERSOLL RAND	4X11 DAD
35048	633120	155BF	-20 SA SSC/CB/316SS/EP	CHESTERTON	FRAME S
35070	35868	155BF	-21 RSC/CB/E962-90	BYRON JACKSON	DVMX
35140	643906	155BF	-22 TC/9723/K1050/EP/S	BYRON JACKSON	8X10-15H
35214	800703	155BF	-24 SSC/9723/AFLAS/S/BRZ/215	INGERSOLL DRESSER	4GT
35415	128425	155BF	70MM SSC/9723/S/AFLAS	GOULDS	3196MTX STD BORE
35230	803146	180BF	-26 CB/SC/316/EP	INGERSOLL DRESSER	10X19 HVC
35259	804625	180BF	-4.510 CB/SSC/316/EP962-90	NUCLEAR APPLICATION	
35371	165851	180BF	-4.760 CB/SSC/316/EP962-90 VIRGINIA POWER	INGERSOLL RAND	
35372	131862	180BF	-4.760 CB/SSC/316/EP962-90 VIRGINIA POWER	INGERSOLL RAND	
36273	802461	180BF	70MM SA CB/SSC/E962-90/316SS	INGERSOLL DRESSER	RV8B 8TH EDITION
35311	177718	180PR	110MM 180PR P10356/SSC/316/EP962-90	BLACKMER	FRAME A
35374	810682	180PR	-12 CB/TC/316/AFLAS	INGERSOLL RAND	
35429	128516	180PR	-15 TC/SSC/316/K615	LAWRENCE	VORTEX
35439	120103	180PR	170MM 180PR P10356/SSC/316/EP962-90	INGERSOLL-DRESSER	8WCS-3
35452	129080	180PR	-18 CB/SSC/316/CHEM550	BINGHAM	
35563	168905	180PR	-18 CB/SSC/316/EP	INGERSOLL-RAND	
35594	171103	180PR	2.635 CB/SSC/316/EP	INGERSOLL-RAND	14 VEM
36328	802509	180PR	2.635 CB/TC/316/EP	PACIFIC	JTC
36692	242828	180PR	-20 CB10356/SSC/316/EP962-90	LPI	12 X 20 LEC
36694	242508	180PR	-22 CB/SSC/316/EP962-90	KSB	HGC
36798	264426	180PR	-23 CB/SSC/316 EP962	INGERSOLL RAND	
36823	158111	180PR	-23 CB/SSC/316 EP962	BINGHAM	MSD HORIZONTAL
51654	808877	180PR	-28 CB/SSC/316/EP962-90		
51654	800894	180PR	-28 CB/SSC/316/EP962-90		
51670	805272	180PR	3.010 CB/SSC/316/EP		
36798-1	264426	180PR	3.010 CB/SSC/316/EP	INGERSOLL RAND	
36561	237819	180PR	3.260 CB/SSC/316/EP	DRESSER PACIFIC	BFI
36561	237844	180PR	3.260 SA CB/TCE962-90/316SS	DRESSER PACIFIC	BFI
35483	106919	180PR	-32 SA CB/TC/E962/316SS	INGERSOLL DRESSER	
36543	218955	180PR	-37 CB/SSC/316/EP	SCAN	
51564	131732	180PR	-37 CB/SSC/316/EP		
35592	171045	180PR	-4.760 CB/SSC/316/EP962-90 VIRGINIA POWER	DAVID BROWN	3X6X9C
35212	804752	180PR	60MM SSC/SSC/316/EP	WORTHINGTON	5WCS-2
36693	242416	180PR	70M SSC/9723/S/AFLAS	WORTHINGTON	5WCS-2
51670	809996	180PR	70M SSC/9723/S/AFLAS		
51654	802521	180PR	70M TC/SC/TC/SC/316/FKM (TANDEM)		
36650	242177	180PR	72MM CB/SSC/316/EP962-90	EBARA	
36648	242170	180PR	80MM CB/TC/316/EP	EBARA	
36653	294637	180PR	90MM CBB/SSC/316/EP962-90	EBARA	16X16X18 HSB
36810	265123	180PR/OS	-19 TC/SSC/316/EPP962-90	INGERSOLL RAND	
36810-1	265123	180PR/OS	-19 TC/SSC/316/EPP962-90	INGERSOLL RAND	
35363	131457	442PR	1.435 RSC/CB/316/EP	PACIFIC	
35373	131864	442PR	1.690 RSC/CB/316/EP	UNITED	6X9X12 DVMKD
35461	134666	442PR	1.690 RSC/CB/316/EP		
35474	134724	442PR	1.690 RSC/CB/316/EP	IDP	6X21A
35474	134724	442PR	-11.5 RSC/CB/316/EP	INGERSOLL-RAND CO.	
35478	135163	442PR	-16 RSC/CB/316/EP	INGERSOLL-RAND	6X26 J
35564	168889	442PR	-18 RSC/CB/316/EP		
35632	294309	442PR	-18 RSC/CB/316/EP	INGERSOLL-RAND	6X21A
36323	107010	442PR	-20 RSC/CB/316/AFLAS	IDP	CNTA
36522	218767	442PR	-20 RSC/CB/316/AFLAS	KSB	KSB
36609	295330	442PR	-20 RSC/CB/316/FKM	BYRON JACKSON	4X6X9D
36630	295467	442PR	-25 RSC/CB/316/EP	GOULDS	
36630	295467	442PR	-25 RSC/CB/316L/EP	GOULDS	
36666	242272	442PR	-25RSC/CB/316L/EP	GOULDS	3316M
36738	263618	442PR	-28 CB/SSC/316/EP	INGERSOLL-RAND	IDX17-J
36750	263569	442PR	-29 SC/CB/316/FKM	INGERSOLL-RAND	UNKNOWN
50879	106995	442PR	3.005 RSC/CB/316/EP		
50879	168210	442PR	3.505 RSC/CB/316/EP		
50879	171772	442PR	-31 RSC/CB/316/EP		
36750-1	263569	442PR	-34 RSC/CB/316/EP	INGERSOLL-RAND	UNKNOWN

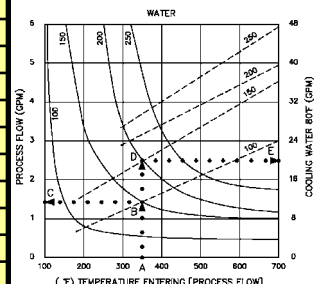
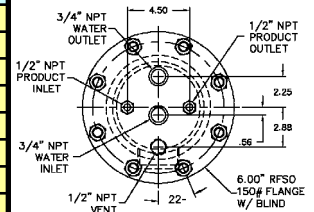
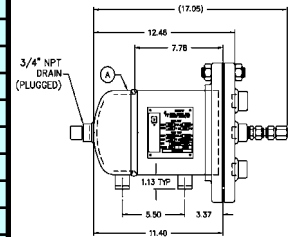
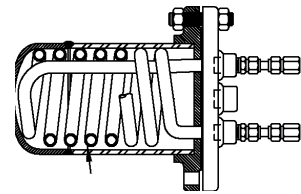


PLAN 23 SEAL PIPING



PLAN 21 SEAL PIPING

Item # 688018 Heat Exchanger



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Telephone: 1-781-438-7000

Fax: 1-781-438-8971

ChestertonMarketingServices@chesterton.com

www.chesterton.com