

# STAR™ Super Seal Key-Lock

## Applications

- Potable Water
- Produced Water
- Waste Water
- Seawater
- Crude Oil & Gas
- Hydrogen & CO2 Transport
- Brine
- Drainage Systems
- Sewage
- Brackish Water
- Pipe Rehabilitation
- General Industrial Service

## Product Description

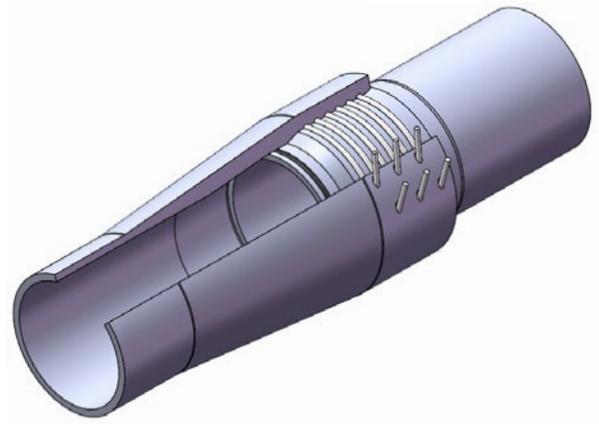
- **Sizes** - 8 through 40 inches (200-1000 mm)
- **Pressure** - 300 to 3,000 psi (2.1-20.7 MPa)
- **Temperature** - Up to 212°F (100°C)
- **Resin System** - Aromatic Amine
- **Reinforcement** - Premium Fiberglass
- **Joining Systems** - Filament-wound glass-fiber reinforced epoxy (GRE) with integral Key-Lock (KL) male and female mechanical joining system.
- **Joint Length** - 39 ft (11.9 m), 49 ft (14.9 m) or 60 ft (18.3 m)
- **Fittings** - Filament-wound glass-fiber reinforced fittings with integral KL female bells. A wide range of fittings are available.

## High Pressure Design

- **Design Life** - 20 years at full rating
- **Reinforced Wall Thickness** - Minimum
- **Hoop Stress** - 95% Lower Confidence Limit (LCL) of Long-Term Hydrostatic Strength (LTHS), ASTM D2992-B
- **Factory Hydro Test** - All sizes 1.25 times the series pressure rating.

## Joining System

- **Key-Lock** - A self-restrained joint that enables quick assembly using ductile locking keys for mechanical restraint. The joint is inserted directly without rotation and is available with one or more locking keys, depending on pressure requirements. A hydrostatic seal is achieved through an elastomeric O-ring.
- **Flanges** - Filament-wound GRE stub flanges with integral KL male spigot ends are available. Flange hole patterns comply with ASME B16.5 or ASME B16.47 standards and are available in Class 300, 600, 900, or 1500 ratings.



Super Seal Key-Lock

## Benefits

- Corrosion Control
- Reduced Installation Costs
- Improved Flow Efficiency
- Reduced Paraffin & Scale Build-Up
- Reduced Maintenance Costs

# STAR Super Seal Key-Lock - Specification Guide

## 8 in. (200 mm) Diameter

### 8.22 in. (208.8 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating			Keys
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN	EA	
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	8.46	215	10.7	271	0.12	3.0	0.10	2.5	2.9	4.3	5600	25	1	
500	500	34.5	425	29.3	380	26.2	345	23.8	8.56	217	10.9	277	0.17	4.3	0.15	3.8	4.4	6.6	8600	38	2	
750	750	51.7	640	44.1	565	39.0	520	35.9	8.71	221	11.2	285	0.25	6.3	0.23	5.8	6.8	10.1	13100	58	3	
1000	1000	68.9	850	58.6	755	52.1	695	47.9	8.87	225	11.5	293	0.32	8.3	0.31	7.8	9.2	13.7	17800	79	3	
1250	1250	86.2	1065	73.4	945	65.2	865	59.6	9.03	229	12.0	306	0.40	10.3	0.39	9.8	11.7	17.4	22600	101	4	
1500	1500	103.4	1275	87.9	1135	78.3	1040	71.7	9.19	233	12.6	320	0.49	12.3	0.47	11.8	14.3	21.3	27700	123	4	
1750	1750	120.7	1490	102.7	1325	91.4	1215	83.8	9.36	238	13.1	334	0.57	14.5	0.55	14.0	17.0	25.3	32900	146	5	
2000	2000	137.9	1700	117.2	1510	104.1	1385	95.5	9.53	242	13.7	349	0.65	16.6	0.63	16.1	19.8	29.5	38400	171	6	
2250	2250	155.1	1915	132.0	1700	117.2	1560	107.6	9.70	246	14.4	365	0.74	18.8	0.72	18.3	22.7	33.8	44000	196	6	
2500	2500	172.4	2125	146.5	1890	130.3	1730	119.3	9.88	251	15.0	382	0.83	21.0	0.81	20.5	25.7	38.3	49900	222	7	
2750	2750	189.6	2340	161.3	2080	143.4	1905	131.3	10.05	255	15.7	399	0.92	23.3	0.90	22.8	28.9	43.0	55900	249	7	
3000	3000	206.8	2550	175.8	2270	156.5	2080	143.4	10.24	260	16.4	416	1.01	25.6	0.99	25.1	32.1	47.8	62300	277	8	

## 10 in. (250 mm) Diameter

### 10.35 in. (262.9 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating			Keys
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN	EA	
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	10.61	270	12.9	329	0.13	3.4	0.11	2.9	4.1	6.2	8000	36	2	
500	500	34.5	425	29.3	380	26.2	345	23.8	10.77	273	13.2	336	0.21	5.3	0.19	4.8	7.0	10.4	13600	60	2	
750	750	51.7	640	44.1	565	39.0	520	35.9	10.96	278	13.6	347	0.31	7.8	0.29	7.3	10.7	15.9	20800	92	3	
1000	1000	68.9	850	58.6	755	52.1	695	47.9	11.16	283	14.4	365	0.40	10.3	0.38	9.8	14.6	21.7	28200	125	4	
1250	1250	86.2	1065	73.4	945	65.2	865	59.6	11.36	289	14.8	376	0.50	12.8	0.48	12.3	18.5	27.6	35900	160	5	
1500	1500	103.4	1275	87.9	1135	78.3	1040	71.7	11.56	294	15.5	393	0.61	15.4	0.59	14.9	22.7	33.7	43900	195	5	
1750	1750	120.7	1490	102.7	1325	91.4	1215	83.8	11.77	299	16.2	411	0.71	18.1	0.69	17.6	27.0	40.1	52200	232	6	
2000	2000	137.9	1700	117.2	1510	104.1	1385	95.5	11.99	304	16.9	430	0.82	20.8	0.80	20.3	31.4	46.7	60800	271	7	
2250	2250	155.1	1915	132.0	1700	117.2	1560	107.6	12.20	310	17.7	451	0.93	23.5	0.91	23.0	36.0	53.6	69800	310	7	
2500	2500	172.4	2125	146.5	1890	130.3	1730	119.3	12.42	316	18.6	472	1.04	26.3	1.02	25.8	40.8	60.7	79000	352	8	
2750	2750	189.6	2340	161.3	2080	143.4	1905	131.3	12.65	321	19.4	494	1.15	29.2	1.13	28.7	45.8	68.1	88700	394	9	
3000	3000	206.8	2550	175.8	2270	156.5	2080	143.4	12.88	327	20.4	517	1.27	32.1	1.25	31.6	51.0	75.8	98700	439	10	

## 12 in. (300 mm) Diameter

### 12.35 in. (313.7 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating			Keys
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN	EA	
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	12.66	322	15.4	392	0.15	3.9	0.13	3.4	5.9	8.8	11400	51	2	
500	500	34.5	425	29.3	380	26.2	345	23.8	12.84	326	15.8	401	0.24	6.2	0.23	5.7	10.0	14.9	19300	86	2	
750	750	51.7	640	44.1	565	39.0	520	35.9	13.07	332	16.3	413	0.36	9.2	0.34	8.7	15.3	22.7	29600	131	3	
1000	1000	68.9	850	58.6	755	52.1	695	47.9	13.31	338	16.9	428	0.48	12.1	0.46	11.6	20.7	30.8	40100	179	4	
1250	1250	86.2	1065	73.4	945	65.2	865	59.6	13.55	344	17.6	448	0.60	15.2	0.58	14.7	26.4	39.3	51100	227	5	
1500	1500	103.4	1275	87.9	1135	78.3	1040	71.7	13.79	350	18.4	468	0.72	18.3	0.70	17.8	32.3	48.0	62500	278	5	
1750	1750	120.7	1490	102.7	1325	91.4	1215	83.8	14.04	357	19.3	490	0.85	21.5	0.83	21.0	38.4	57.1	74300	331	6	
2000	2000	137.9	1700	117.2	1510	104.1	1385	95.5	14.29	363	20.2	514	0.97	24.7	0.95	24.2	44.7	66.5	86600	385	6	
2250	2250	155.1	1915	132.0	1700	117.2	1560	107.6	14.55	370	21.2	537	1.10	28.0	1.08	27.5	51.3	76.3	99300	442	7	
2500	2500	172.4	2125	146.5	1890	130.3	1730	119.3	14.82	376	22.1	562	1.23	31.3	1.21	30.8	58.1	86.5	112500	501	8	
2750	2750	189.6	2340	161.3	2080	143.4	1905	131.3	15.09	383	23.2	589	1.37	34.8	1.35	34.3	65.2	97.0	126300	562	9	
3000	3000	206.8	2550	175.8	2270	156.5	2080	143.4	15.36	390	24.3	616	1.51	38.2	1.49	37.7	72.5	108.0	140500	625	10	

# STAR Super Seal Key-Lock - Specification Guide

## 14 in. (350 mm) Diameter

### 13.56 in. (344.4 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating		Keys	
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN		EA
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	13.89	353	16.9	429	0.17	4.2	0.15	3.7	7.1	10.6	13800	61	2	
500	500	34.5	425	29.3	380	26.2	345	23.8	14.09	358	17.3	439	0.27	6.8	0.25	6.3	12.0	17.9	23300	104	2	
600	600	41.4	510	35.2	455	31.4	415	28.6	14.19	361	17.5	444	0.32	8.1	0.30	7.6	14.6	21.7	28200	125	3	
750	750	51.7	640	44.1	565	39.0	520	35.9	14.35	364	17.8	452	0.39	10.0	0.37	9.5	18.4	27.4	35600	158	3	
900	900	62.1	765	52.7	680	46.9	625	43.1	14.50	368	18.2	461	0.47	12.0	0.45	11.5	22.3	33.2	43200	192	4	
1000	1000	68.9	850	58.6	755	52.1	695	47.9	14.61	371	18.4	467	0.52	13.3	0.50	12.8	25.0	37.2	48400	215	4	
1100	1100	75.8	935	64.5	830	57.2	760	52.4	14.71	374	18.9	480	0.58	14.6	0.56	14.1	27.7	41.2	53600	239	5	
1250	1250	86.2	1065	73.4	945	65.2	865	59.6	14.87	378	19.2	488	0.65	16.6	0.64	16.1	31.8	47.4	61600	274	5	
1400	1400	96.5	1190	82.0	1060	73.1	970	66.9	15.03	382	19.9	505	0.74	18.7	0.72	18.2	36.0	53.6	69800	311	6	
1500	1500	103.4	1275	87.9	1135	78.3	1040	71.7	15.14	385	20.1	511	0.79	20.0	0.77	19.5	38.9	57.9	75400	335	6	
1600	1600	110.3	1360	93.8	1210	83.4	1110	76.5	15.25	387	20.7	526	0.84	21.4	0.82	20.9	41.8	62.2	81000	360	6	
1750	1750	120.7	1490	102.7	1325	91.4	1215	83.8	15.41	391	21.0	535	0.93	23.5	0.91	23.0	46.3	68.8	89600	399	6	
1900	1900	131.0	1615	111.4	1435	98.9	1315	90.7	15.58	396	21.8	554	1.01	25.6	0.99	25.1	50.8	75.6	98400	438	7	
2000	2000	137.9	1700	117.2	1510	104.1	1385	95.5	15.69	399	22.0	560	1.07	27.1	1.05	26.6	53.9	80.2	104400	464	7	
2100	2100	144.8	1785	123.1	1585	109.3	1455	100.3	15.80	401	22.7	577	1.12	28.5	1.10	28.0	57.0	84.9	110500	491	8	
2250	2250	155.1	1915	132.0	1700	117.2	1560	107.6	15.98	406	23.1	587	1.21	30.7	1.19	30.2	61.8	92.0	119700	533	8	
2400	2400	165.5	2040	140.7	1815	125.1	1665	114.8	16.15	410	23.9	608	1.29	32.9	1.27	32.4	66.7	99.3	129200	575	9	
2500	2500	172.4	2125	146.5	1890	130.3	1730	119.3	16.27	413	24.2	614	1.35	34.4	1.33	33.9	70.0	104.2	135700	604	9	
2600*	2600	179.3	2210	152.4	1965	135.5	1800	124.1	16.38	416	24.9	633	1.41	35.8	1.39	35.3	73.4	109.3	142200	633	10	
2750*	2750	189.6	2340	161.3	2080	143.4	1905	131.3	16.56	421	25.3	643	1.50	38.1	1.48	37.6	78.6	117.0	152200	677	10	

\* Consult FGS Application Engineering for Availability

## 16 in. (400 mm) Diameter

### 15.50 in. (393.7 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating		Keys	
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN		EA
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	15.88	403	19.0	484	0.19	4.8	0.17	4.3	9.3	13.8	18000	80	2	
500	500	34.5	425	29.3	380	26.2	345	23.8	16.10	409	19.5	496	0.30	7.7	0.28	7.2	15.7	23.4	30500	136	2	
600	600	41.4	510	35.2	455	31.4	415	28.6	16.22	412	19.7	502	0.36	9.1	0.34	8.6	19.0	28.3	36800	164	3	
750	750	51.7	640	44.1	565	39.0	520	35.9	16.39	416	20.1	511	0.45	11.4	0.43	10.9	24.0	35.8	46600	207	3	
900	900	62.1	765	52.7	680	46.9	625	43.1	16.57	421	20.5	521	0.54	13.6	0.52	13.1	29.2	43.4	56500	251	4	
1000	1000	68.9	850	58.6	755	52.1	695	47.9	16.69	424	20.8	527	0.60	15.1	0.58	14.6	32.6	48.6	63200	281	4	
1100	1100	75.8	935	64.5	830	57.2	760	52.4	16.81	427	21.4	543	0.66	16.6	0.64	16.1	36.2	53.8	70100	312	5	
1250	1250	86.2	1065	73.4	945	65.2	865	59.6	16.99	432	21.7	552	0.75	18.9	0.73	18.4	41.6	61.9	80500	358	5	
1400	1400	96.5	1190	82.0	1060	73.1	970	66.9	17.18	436	22.5	571	0.84	21.3	0.82	20.8	47.1	70.1	91200	406	6	
1500	1500	103.4	1275	87.9	1135	78.3	1040	71.7	17.30	439	22.7	578	0.90	22.8	0.88	22.3	50.8	75.7	98500	438	6	
1600	1600	110.3	1360	93.8	1210	83.4	1110	76.5	17.42	443	23.4	596	0.96	24.4	0.94	23.9	54.6	81.3	105800	471	7	
1750	1750	120.7	1490	102.7	1325	91.4	1215	83.8	17.61	447	23.8	605	1.06	26.8	1.04	26.3	60.4	90.0	117100	521	7	
1900	1900	131.0	1615	111.4	1435	98.9	1315	90.7	17.80	452	24.7	627	1.15	29.2	1.13	28.7	66.4	98.8	128600	572	8	
2000	2000	137.9	1700	117.2	1510	104.1	1385	95.5	17.93	455	25.0	634	1.22	30.9	1.20	30.4	70.4	104.8	136400	607	8	
2100	2100	144.8	1785	123.1	1585	109.3	1455	100.3	18.06	459	25.7	654	1.28	32.5	1.26	32.0	74.5	110.9	144300	642	9	
2250	2250	155.1	1915	132.0	1700	117.2	1560	107.6	18.26	464	26.2	665	1.38	35.0	1.36	34.5	80.8	120.2	156500	696	9	
2400*	2400	165.5	2040	140.7	1815	125.1	1665	114.8	18.45	469	27.1	689	1.48	37.5	1.46	37.0	87.2	129.7	168900	751	10	
2500*	2500	172.4	2125	146.5	1890	130.3	1730	119.3	18.59	472	27.4	696	1.54	39.2	1.52	38.7	91.5	136.2	177300	789	10	

\* Consult FGS Application Engineering for Availability

# STAR Super Seal Key-Lock - Specification Guide

## 18 in. (450 mm) Diameter

### 17.08 in. (433.8 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating		Keys	
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN		EA
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	17.49	444	20.8	529	0.21	5.2	0.19	4.7	11.3	16.8	21900	97	2	
500	500	34.5	425	29.3	380	26.2	345	23.8	17.74	451	21.3	542	0.33	8.4	0.31	7.9	19.1	28.4	37000	165	2	
600	600	41.4	510	35.2	455	31.4	415	28.6	17.87	454	21.6	549	0.39	10.0	0.37	9.5	23.1	34.4	44700	199	3	
750	750	51.7	640	44.1	565	39.0	520	35.9	18.06	459	22.0	559	0.49	12.5	0.47	12.0	29.2	43.4	56500	251	3	
900	900	62.1	765	52.7	680	46.9	625	43.1	18.26	464	22.7	576	0.59	14.9	0.57	14.4	35.4	52.7	68600	305	4	
1000	1000	68.9	850	58.6	755	52.1	695	47.9	18.39	467	22.9	583	0.65	16.6	0.63	16.1	39.6	59.0	76800	342	4	
1100	1100	75.8	935	64.5	830	57.2	760	52.4	18.52	470	23.6	600	0.72	18.3	0.70	17.8	43.9	65.4	85100	378	5	
1250	1250	86.2	1065	73.4	945	65.2	865	59.6	18.72	475	24.0	610	0.82	20.8	0.80	20.3	50.5	75.1	97800	435	5	
1400	1400	96.5	1190	82.0	1060	73.1	970	66.9	18.92	481	24.9	632	0.92	23.4	0.90	22.9	57.2	85.1	110800	493	6	
1500	1500	103.4	1275	87.9	1135	78.3	1040	71.7	19.06	484	25.2	639	0.99	25.1	0.97	24.6	61.7	91.9	119600	532	6	
1600	1600	110.3	1360	93.8	1210	83.4	1110	76.5	19.19	488	25.9	659	1.06	26.9	1.04	26.4	66.3	98.7	128500	572	6	
1750	1750	120.7	1490	102.7	1325	91.4	1215	83.8	19.40	493	26.4	669	1.16	29.5	1.14	29.0	73.4	109.2	142200	632	6	
1900	1900	131.0	1615	111.4	1435	98.9	1315	90.7	19.61	498	27.3	694	1.27	32.2	1.25	31.7	80.6	120.0	156100	695	7	
2000	2000	137.9	1700	117.2	1510	104.1	1385	95.5	19.75	502	27.6	701	1.34	34.0	1.32	33.5	85.5	127.3	165600	737	7	
2100*	2100	144.8	1785	123.1	1585	109.3	1455	100.3	19.90	505	28.5	723	1.41	35.8	1.39	35.3	90.5	134.7	175300	780	8	
2250*	2250	155.1	1915	132.0	1700	117.2	1560	107.6	20.11	511	28.9	735	1.52	38.5	1.50	38.0	98.1	146.0	190000	845	8	

\* Consult FGS Application Engineering for Availability

## 20 in. (500 mm) Diameter

### 18.98 in. (482.1 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating		Keys	
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN		EA
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	19.43	494	22.8	580	0.23	5.7	0.21	5.2	14.0	20.8	27000	120	2	
500	500	34.5	425	29.3	380	26.2	345	23.8	19.71	501	23.4	594	0.37	9.3	0.35	8.8	23.6	35.1	45700	203	3	
600	600	41.4	510	35.2	455	31.4	415	28.6	19.85	504	23.7	602	0.44	11.1	0.42	10.6	28.5	42.4	55200	246	3	
750	750	51.7	640	44.1	565	39.0	520	35.9	20.07	510	24.1	613	0.54	13.8	0.52	13.3	36.0	53.6	69800	311	4	
900	900	62.1	765	52.7	680	46.9	625	43.1	20.28	515	25.0	635	0.65	16.6	0.63	16.1	43.7	65.1	84700	377	4	
1000	1000	68.9	850	58.6	755	52.1	695	47.9	20.43	519	25.3	642	0.72	18.4	0.70	17.9	49.0	72.8	94800	422	4	
1100	1100	75.8	935	64.5	830	57.2	760	52.4	20.58	523	26.0	661	0.80	20.3	0.78	19.8	54.2	80.7	105100	467	5	
1250	1250	86.2	1065	73.4	945	65.2	865	59.6	20.80	528	26.5	672	0.91	23.1	0.89	22.6	62.3	92.8	120700	537	5	
1400	1400	96.5	1190	82.0	1060	73.1	970	66.9	21.02	534	27.4	697	1.02	25.9	1.00	25.4	70.6	105.1	136800	608	6	
1500	1500	103.4	1275	87.9	1135	78.3	1040	71.7	21.17	538	27.7	705	1.10	27.9	1.08	27.4	76.2	113.4	147600	657	6	
1600	1600	110.3	1360	93.8	1210	83.4	1110	76.5	21.33	542	28.6	727	1.17	29.8	1.15	29.3	81.9	121.9	158700	706	7	
1750	1750	120.7	1490	102.7	1325	91.4	1215	83.8	21.56	548	29.1	739	1.29	32.7	1.27	32.2	90.6	134.9	175600	781	7	
1900*	1900	131.0	1615	111.4	1435	98.9	1315	90.7	21.79	553	30.1	766	1.40	35.7	1.39	35.2	99.5	148.1	192800	858	8	
2000*	2000	137.9	1700	117.2	1510	104.1	1385	95.5	21.95	557	30.5	774	1.48	37.7	1.46	37.2	105.6	157.1	204500	910	8	

\* Consult FGS Application Engineering for Availability

# STAR Super Seal Key-Lock - Specification Guide

## 24 in. (600 mm) Diameter

### 22.78 in. (578.6 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating		Keys	
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN		EA
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	23.31	592	27.1	687	0.27	6.8	0.25	6.3	20.1	29.9	38900	173	2	
500	500	34.5	425	29.3	380	26.2	345	23.8	23.65	601	27.7	704	0.43	11.0	0.42	10.5	34.0	50.6	65800	293	3	
600	600	41.4	510	35.2	455	31.4	415	28.6	23.82	605	28.1	713	0.52	13.2	0.50	12.7	41.1	61.1	79600	354	4	
750	750	51.7	640	44.1	565	39.0	520	35.9	24.08	612	28.6	726	0.65	16.5	0.63	16.0	51.9	77.3	100600	447	4	
900	900	62.1	765	52.7	680	46.9	625	43.1	24.34	618	29.6	752	0.78	19.8	0.76	19.3	63.0	93.7	122000	543	5	
1000	1000	68.9	850	58.6	755	52.1	695	47.9	24.51	623	30.0	761	0.87	22.0	0.85	21.5	70.5	104.9	136600	608	5	
1100	1100	75.8	935	64.5	830	57.2	760	52.4	24.69	627	30.9	784	0.95	24.2	0.93	23.7	78.1	116.3	151400	673	6	
1250	1250	86.2	1065	73.4	945	65.2	865	59.6	24.95	634	31.4	798	1.09	27.6	1.07	27.1	89.8	133.6	173900	774	6	
1400	1400	96.5	1190	82.0	1060	73.1	970	66.9	25.22	641	32.6	828	1.22	31.0	1.20	30.5	101.7	151.4	197000	876	7	
1500	1500	103.4	1275	87.9	1135	78.3	1040	71.7	25.40	645	32.9	837	1.31	33.3	1.29	32.8	109.8	163.4	212700	946	7	

## 30 in. (750 mm) Diameter

### 29.53 in. (750.1 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating		Keys	
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN		EA
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	30.21	767	34.6	879	0.34	8.6	0.32	8.1	33.8	50.3	65400	291	2	
500	500	34.5	425	29.3	380	26.2	345	23.8	30.65	778	35.4	900	0.56	14.2	0.54	13.7	57.1	85.0	110600	492	3	
600	600	41.4	510	35.2	455	31.4	415	28.6	30.87	784	36.2	919	0.67	17.0	0.65	16.5	69.0	102.7	133700	595	4	
750	750	51.7	640	44.1	565	39.0	520	35.9	31.20	792	36.8	935	0.83	21.2	0.81	20.7	87.2	129.8	169000	752	4	
900	900	62.1	765	52.7	680	46.9	625	43.1	31.54	801	38.2	970	1.00	25.5	0.98	25.0	105.9	157.5	205000	912	5	
1000	1000	68.9	850	58.6	755	52.1	695	47.9	31.76	807	38.6	981	1.12	28.4	1.10	27.9	118.5	176.3	229500	1021	5	
1100	1100	75.8	935	64.5	830	57.2	760	52.4	31.99	813	39.9	1012	1.23	31.2	1.21	30.7	131.3	195.4	254400	1131	6	
1250*	1250	86.2	1065	73.4	945	65.2	865	59.6	32.34	821	40.5	1030	1.40	35.6	1.38	35.1	150.9	224.6	292300	1300	6	

\* Consult FGS Application Engineering for Availability

## 36 in. (900 mm) Diameter

### 35.43 in. (900.0 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating		Keys	
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN		EA
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	36.24	921	40.9	1038	0.40	10.3	0.38	9.8	48.6	72.4	94200	419	2	
500	500	34.5	425	29.3	380	26.2	345	23.8	36.76	934	41.9	1063	0.67	16.9	0.65	16.4	82.2	122.4	159300	708	3	
600	600	41.4	510	35.2	455	31.4	415	28.6	37.03	941	43.2	1097	0.80	20.3	0.78	19.8	99.4	147.9	192500	856	4	
750	750	51.7	640	44.1	565	39.0	520	35.9	37.43	951	44.0	1116	1.00	25.3	0.98	24.8	125.6	186.9	243300	1082	4	
900	900	62.1	765	52.7	680	46.9	625	43.1	37.83	961	45.6	1159	1.20	30.5	1.18	30.0	152.4	226.8	295200	1313	5	
1000	1000	68.9	850	58.6	755	52.1	695	47.9	38.10	968	46.1	1172	1.34	33.9	1.32	33.4	170.6	253.9	330400	1470	5	

## 40 in. (1,000 mm) Diameter

### 39.37 in. (1,000 mm) Actual Inside Diameter

Series	Pressure Rating								Nominal Outside Diameter		Nominal Connection Diameter		Nominal Wall		Minimum Reinforced Wall		Pipe Weight		Short-Term Tensile Rating		Keys	
	150°F (65°C)		180°F (82°C)		200°F (93°C)		212°F (100°C)		in.	mm	in.	mm	in.	mm	in.	mm	lbs/ft	kg/m	lbs	kN		EA
	psi	bar	psi	bar	psi	bar	psi	bar														
300	300	20.7	255	17.6	225	15.5	210	14.5	40.27	1023	45.2	1149	0.45	11.4	0.43	10.9	60.0	89.3	116300	517	2	
500	500	34.5	425	29.3	380	26.2	345	23.8	40.85	1038	46.4	1178	0.74	18.7	0.72	18.2	101.5	151.1	196600	875	3	
600	600	41.4	510	35.2	455	31.4	415	28.6	41.14	1045	47.7	1213	0.88	22.5	0.86	22.0	122.7	182.6	237700	1057	4	
750	750	51.7	640	44.1	565	39.0	520	35.9	41.59	1056	48.6	1235	1.11	28.1	1.09	27.6	155.1	230.8	300400	1336	4	

# STAR Super Seal Key-Lock - Specification Guide

## Typical Mechanical Properties

Pipe Property		70°F	21°C	150°F	65°C	200°F	93°C	Method
		psi	MPa	psi	MPa	psi	MPa	
Hydrostatic Design Basis	(LTHS)	23,400 <sup>(1)</sup>	161 <sup>(1)</sup>	23,400	161	17,500	121	ASTM D2992, Proc. B (20 yrs)
	(LCL)	20,900 <sup>(1)</sup>	144 <sup>(1)</sup>	20,900	144	15,800	109	
Ultimate Hoop Stress at Weeping		36,000	248	45,400	313	48,400	334	ASTM D1599
<b>Circumferential</b>								
Hoop Tensile Modulus		3.87 x 10 <sup>6</sup>	26,500	2.91 x 10 <sup>6</sup>	19,700	2.31 x 10 <sup>6</sup>	15,500	NOV FGS
Poisson's Ratio $\nu_{ha}$		0.61		0.72		0.79		NOV FGS
<b>Longitudinal</b>								
Axial tensile strength		8,700	60	9,000	62	9,200	63.4	ASTM D2105
Axial Modulus		2.24 x 10 <sup>6</sup>	15,500	1.62 x 10 <sup>6</sup>	11,200	1.27 x 10 <sup>6</sup>	8,550	ASTM D2105
Poisson's Ratio $\nu_{ah}$		0.35		0.40		0.43		ASTM D2105
Axial Bending Strength		8,700	60	-	-	-	-	NOV FGS
Axial Bending Modulus		2.24 x 10 <sup>6</sup>	15,500	1.75 x 10 <sup>6</sup>	12,100	1.43 x 10 <sup>6</sup>	9,900	ASTM D2925
Shear Modulus		1.76 x 10 <sup>6</sup>	12,100	1.65 x 10 <sup>6</sup>	11,400	1.58 x 10 <sup>6</sup>	10,900	NOV FGS

<sup>(1)</sup> Value obtained at 150°F (65°C)

## Typical Physical Properties

Pipe Property	Value	Value	Method
Thermal Conductivity	0.19 BTU/hr·ft·°F	0.33 W/m·°C	NOV FGS
Thermal Expansion - Axial	12.0 x 10 <sup>-6</sup> in/in·°F	21.6 x 10 <sup>-6</sup> mm/mm·°C	ASTM D696
Flow Coefficient, Hazen Williams	150		-
Absolute Roughness	1.7 x 10 <sup>-5</sup> ft	5.3 x 10 <sup>-6</sup> m	-
Density	121 lbs/ft <sup>3</sup>	1940 kg/m <sup>3</sup>	ASTM D792
Specific Gravity	1.95		ASTM D792
Specific Heat	0.22 BTU/lb·°F	910 J/kg·°C	-

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**Fiber Glass Systems**

17115 San Pedro Avenue, Ste. 200,  
San Antonio, Texas 78232, USA

Phone: 210 477 7500

Fax: 210 477 7560

