

**Fire Test Report**  
**API Standard 6FB, Third Edition**

*Performed for*

**FMI, Spa**

<http://www.fmi-spa.com/>



**6 inch Class 300 316L Spiral Wound Gasket  
With Micatherm FMI Filler**

Project Number: 215132

Test Date: July 2, 2015



*Performed by*

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**YARMOUTH RESEARCH AND TECHNOLOGY, LLC**

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434 Walnut Hill Road  
North Yarmouth, ME 04097 USA  
(207) 829-5359

[info@yarmouthresearch.com](mailto:info@yarmouthresearch.com)

[www.yarmouthresearch.com](http://www.yarmouthresearch.com)

# Yarmouth Research and Technology, LLC

## API 6FB FIRE TEST REPORT

<b>Customer:</b>	FMI Spa	<b>Date:</b>	7/2/2015
<b>Project Number:</b>	215132		
<b>Product Code:</b>	6 inch Class 300 316L Spiral Wound Gasket with Micatherm Gasket		
<b>Specification:</b>	API 6FB, Third Edition, Nov. 1998 Non-Bending, On-shore Test		
<b>Gasket Thickness:</b>	0.190	inches	
<b>Seal Area OD:</b>	8.250	<b>Seal Area ID:</b>	7.125 inches
<b>Mean Seal Diameter:</b>	7.69	inches	
<b>Mean Circumference:</b>	24.2	inches	
<b>Allowable Leakage:</b>	24.2	ml/min	
<b>Nominal Test Pressure:</b>	555	psig	
<b>YRT Technician:</b>	Matthew J. Wasielewski, P.E.		
<b>Version of YRT's FIRE-Control 6FB Software: A</b>			
<b>Equipment Confirmed to be in Calibration to NIST Standards: Yes</b>			

### *Burn and Cool Down Test*

Burn Start Time:	15:52:00	
Burn / Cooldown Duration:	60	minutes
Average Pressure During Burn/Cooldown:	558	psig
Leak Rate During Burn/Cool Down:	0	ml/min
Allowable External Leak Rate:	24.2	ml/min
Amount of Time of Avg. Cal. Block > 1200 deg.:	15.0	minutes
Were Test Conditions Within Compliance?	Yes	

Was the Leakage Below the Allowable?	Yes
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### *Depressurization - Re-pressurization Test*

Average Pressure During Test:	557	psig
Gasket Leak Rate:	0	ml/min
Allowable External Leak Rate:	24.2	ml/min
Was the Leakage Below the Allowable?	Yes	

<b>Does the Gasket Pass or Fail API 6FB?</b>	<b>PASS</b>
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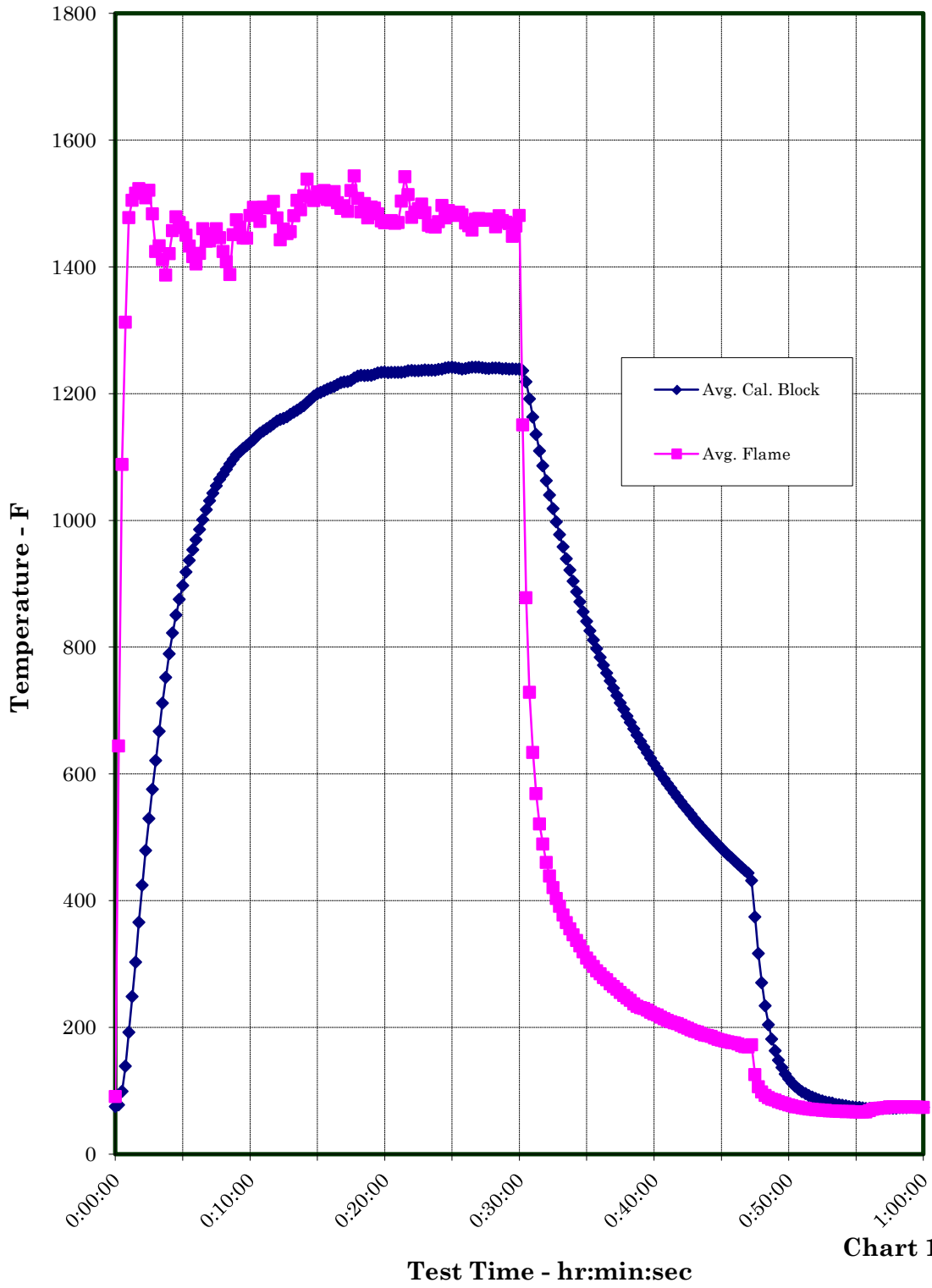
Certified By:



Matthew J. Wasielewski, PE  
President and Manager  
Yarmouth Research and Technology, LLC



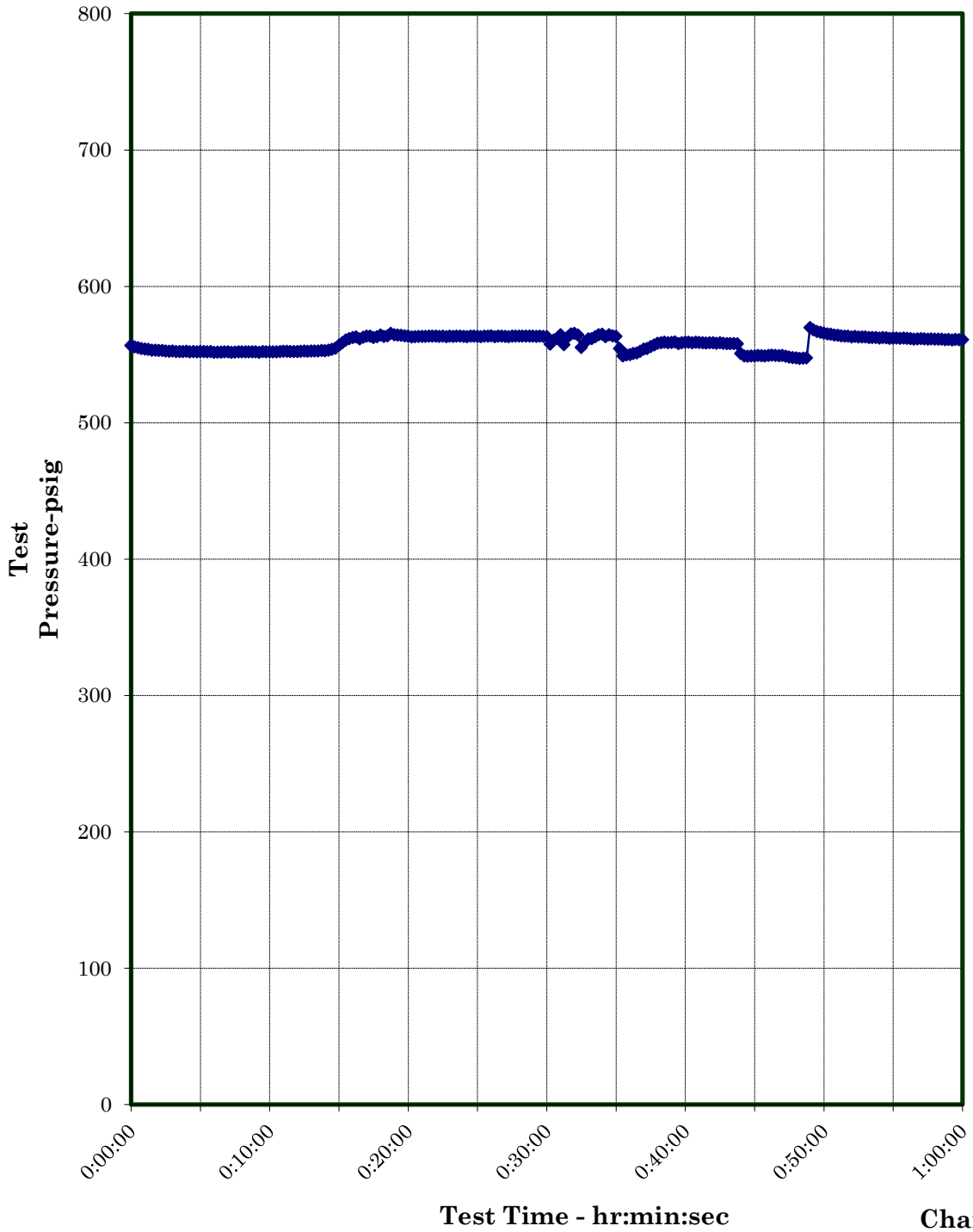
**Temperature verses Time Chart**



**Chart 1**

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**Pressure versus Time Chart**



**Chart 2**

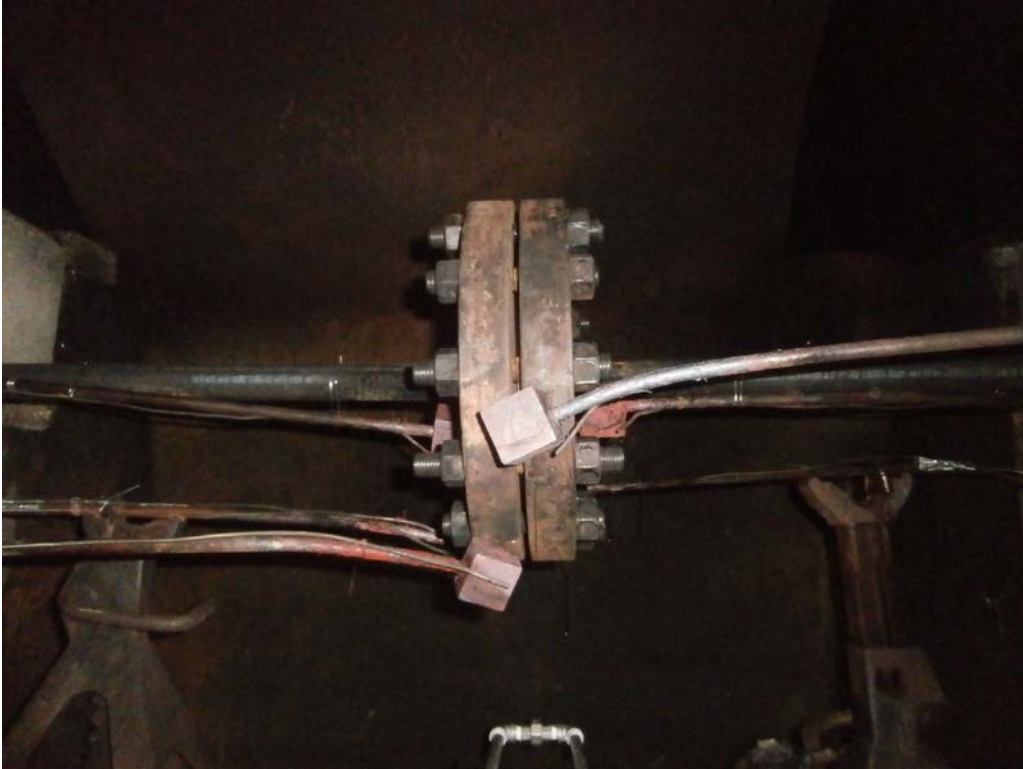
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Test Gasket Prior to Burn



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Test Setup Prior to Burn



Test Gasket During Burn



Test Gasket During Burn



Test Gasket Post-Burn

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### Fire Test Information

Customer: FMI Spa

Date: 7/2/2015

Product Code: 6 inch Class 300 316L Spiral Wound Gasket with Micatherm Gasket

Project Number: 215132

### Fire Test Raw Data

Time	Pressure (psig)	Water Volume (mls)	Cal. 1	Cal. 2	Cal. 3	Cal. 4	Average	Flame 1	Flame 2	Flame 3	Flame 4	Average
			Block	Block	Block	Block	Block	Block	Temp - F	Temp - F	Temp - F	Temp - F
			Temp - F	Temp - F	Temp - F	Temp - F	Temp - F	Temp - F	Temp - F	Temp - F	Temp - F	Temp - F
15:52:00	557	34001	79	71	76	74	75	88	96	85	94	91
15:52:15	556	34029	81	73	78	78	77	662	616	648	650	644
15:52:30	555	34011	98	90	106	101	99	1212	921	1101	1119	1088
15:52:45	554	34055	131	124	160	139	139	1382	1188	1337	1344	1313
15:53:00	554	34013	172	177	234	185	192	1434	1491	1476	1509	1478
15:53:15	554	34027	213	246	314	221	249	1411	1572	1491	1546	1505
15:53:30	553	34046	256	320	387	247	303	1423	1600	1473	1569	1516
15:53:45	553	34023	297	393	452	320	366	1452	1597	1524	1521	1524
15:54:00	553	34049	337	462	512	385	424	1438	1600	1534	1491	1516
15:54:15	553	34045	376	528	565	446	479	1411	1595	1501	1529	1509
15:54:30	552	34034	413	590	610	504	529	1420	1617	1508	1539	1521
15:54:45	552	34047	448	648	651	556	576	1386	1565	1472	1511	1484
15:55:00	553	34058	486	702	695	600	621	1402	1539	1363	1393	1424
15:55:15	552	34040	527	752	747	641	667	1420	1587	1355	1371	1433
15:55:30	552	34050	569	796	801	680	711	1401	1529	1460	1255	1411
15:55:45	552	34055	608	836	849	715	752	1424	1463	1459	1202	1387
15:56:00	552	34061	645	873	891	747	789	1441	1552	1451	1239	1421
15:56:15	552	34031	681	907	922	779	822	1427	1554	1445	1403	1457
15:56:30	552	34079	717	940	939	805	850	1434	1602	1435	1444	1479
15:56:45	552	34090	752	969	950	829	875	1440	1596	1391	1452	1470
15:57:00	552	34075	785	995	958	850	897	1450	1600	1367	1431	1462
15:57:15	552	34073	814	1019	969	872	918	1416	1556	1391	1436	1450
15:57:30	552	34098	840	1041	976	891	937	1402	1538	1377	1414	1433
15:57:45	552	34086	864	1062	980	908	953	1373	1467	1420	1405	1416
15:58:00	552	34090	884	1080	989	924	969	1333	1470	1425	1390	1405
15:58:15	552	34088	904	1098	1001	938	985	1352	1415	1472	1445	1421
15:58:30	552	34088	923	1113	1016	952	1001	1390	1522	1477	1451	1460



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15:58:45	552	34092	942	1127	1032	966	1017	1400	1454	1471	1437	1441
15:59:00	552	34112	959	1141	1046	977	1031	1404	1439	1468	1452	1441
15:59:15	552	34100	974	1152	1057	988	1043	1385	1472	1469	1484	1453
15:59:30	552	34115	988	1163	1067	1000	1054	1422	1531	1447	1440	1460
15:59:45	552	34127	1001	1174	1073	1010	1065	1397	1538	1417	1432	1446
16:00:00	552	34116	1013	1184	1074	1019	1073	1326	1507	1464	1399	1424
16:00:15	552	34151	1023	1193	1080	1026	1081	1314	1481	1446	1391	1408
16:00:30	552	34132	1033	1201	1087	1035	1089	1330	1421	1441	1360	1388
16:00:45	552	34129	1042	1209	1093	1041	1096	1431	1472	1463	1436	1451
16:01:00	552	34153	1049	1216	1102	1046	1103	1510	1520	1433	1433	1474
16:01:15	552	34159	1056	1222	1103	1051	1108	1529	1508	1418	1396	1463
16:01:30	552	34151	1063	1229	1105	1056	1113	1546	1499	1391	1346	1446
16:01:45	552	34149	1070	1236	1104	1061	1118	1564	1470	1411	1336	1445
16:02:00	552	34153	1076	1241	1106	1066	1122	1523	1559	1415	1428	1481
16:02:15	552	34169	1083	1246	1110	1070	1127	1519	1584	1424	1448	1494
16:02:30	552	34178	1089	1252	1116	1075	1133	1524	1580	1417	1408	1482
16:02:45	552	34195	1093	1256	1122	1079	1137	1536	1551	1412	1388	1472
16:03:00	552	34191	1096	1261	1125	1083	1141	1499	1597	1426	1455	1494
16:03:15	552	34215	1099	1265	1127	1087	1144	1467	1610	1422	1473	1493
16:03:30	552	34208	1103	1269	1132	1090	1148	1458	1611	1429	1479	1494
16:03:45	552	34184	1107	1272	1138	1093	1152	1492	1618	1412	1491	1503
16:04:00	552	34218	1110	1276	1144	1096	1156	1488	1558	1443	1420	1477
16:04:15	552	34204	1114	1279	1145	1099	1159	1493	1490	1417	1371	1443
16:04:30	553	34217	1117	1283	1142	1102	1161	1508	1535	1418	1377	1460
16:04:45	552	34223	1120	1287	1142	1105	1163	1445	1520	1448	1397	1453
16:05:00	553	34255	1123	1290	1147	1109	1167	1500	1508	1457	1356	1455
16:05:15	553	34262	1127	1294	1150	1111	1171	1590	1428	1483	1421	1481
16:05:30	553	34261	1131	1296	1153	1114	1174	1629	1410	1519	1462	1505
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16:06:15	553	34291	1151	1307	1162	1124	1186	1578	1567	1498	1511	1539
16:06:30	554	34358	1158	1310	1167	1128	1191	1596	1465	1499	1479	1510
16:06:45	555	34411	1164	1314	1173	1132	1196	1576	1480	1502	1460	1505
16:07:00	557	34546	1169	1317	1177	1135	1200	1578	1540	1480	1475	1518
16:07:15	559	34584	1173	1319	1178	1138	1202	1602	1477	1473	1487	1510
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16:07:45	562	34936	1180	1324	1181	1142	1207	1596	1491	1483	1455	1506
16:08:00	562	35025	1184	1326	1182	1144	1209	1587	1508	1464	1462	1505

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16:08:15	563	35770	1187	1328	1183	1147	1211	1574	1516	1513	1471	1519
16:08:30	561	34622	1190	1330	1188	1149	1214	1566	1493	1507	1439	1501
16:08:45	563	34486	1194	1332	1191	1151	1217	1587	1467	1497	1418	1492
16:09:00	564	35084	1196	1333	1191	1154	1219	1610	1466	1484	1426	1497
16:09:15	563	34884	1198	1334	1187	1157	1219	1611	1436	1487	1416	1488
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16:10:15	563	35392	1207	1341	1201	1166	1229	1614	1468	1458	1407	1487
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16:10:45	566	36007	1208	1345	1195	1168	1229	1603	1446	1467	1392	1477
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16:11:30	564	35336	1213	1349	1197	1172	1233	1571	1462	1482	1420	1484
16:11:45	564	35266	1216	1350	1196	1173	1234	1567	1446	1453	1424	1473
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16:12:30	563	35236	1221	1351	1189	1174	1234	1557	1485	1440	1410	1473
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16:13:15	563	35291	1224	1353	1183	1175	1234	1555	1533	1452	1475	1504
16:13:30	563	35269	1225	1353	1185	1175	1234	1516	1609	1451	1593	1542
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16:14:00	563	35302	1227	1355	1188	1177	1237	1564	1461	1452	1435	1478
16:14:15	563	35307	1228	1355	1185	1177	1236	1586	1480	1442	1437	1486
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16:16:15	563	35311	1232	1356	1185	1182	1239	1568	1538	1455	1427	1497
16:16:30	563	35283	1233	1358	1187	1183	1240	1546	1521	1431	1411	1477
16:16:45	563	35298	1234	1358	1189	1184	1241	1534	1570	1427	1424	1489
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16:17:15	563	35282	1234	1360	1184	1186	1241	1568	1486	1465	1406	1481
16:17:30	563	35295	1233	1361	1179	1187	1240	1569	1469	1488	1419	1486

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16:17:45	564	35329	1233	1360	1176	1186	1239	1555	1449	1497	1426	1482
16:18:00	564	35300	1235	1360	1178	1186	1240	1544	1471	1452	1410	1469
16:18:15	563	35318	1236	1360	1181	1187	1241	1536	1487	1441	1395	1465
16:18:30	563	35283	1236	1360	1182	1188	1241	1518	1467	1439	1408	1458
16:18:45	563	35295	1236	1360	1181	1189	1241	1551	1466	1475	1408	1475
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16:20:00	563	35290	1235	1360	1175	1191	1240	1545	1527	1422	1401	1474
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16:20:30	564	35269	1234	1361	1174	1192	1240	1538	1519	1465	1401	1481
16:20:45	563	35281	1233	1361	1173	1190	1239	1532	1513	1440	1406	1473
16:21:00	563	35297	1234	1361	1174	1190	1240	1542	1458	1472	1409	1470
16:21:15	563	35301	1233	1360	1173	1189	1239	1527	1507	1455	1384	1468
16:21:30	564	35282	1232	1360	1174	1190	1239	1537	1495	1412	1349	1448
16:21:45	563	35289	1231	1360	1173	1191	1239	1537	1515	1423	1383	1465
16:22:00	563	35324	1230	1360	1173	1192	1239	1531	1561	1432	1401	1481
16:22:15	558	34829	1228	1359	1167	1191	1236	1205	1247	1077	1074	1151
16:22:30	561	34966	1214	1342	1143	1176	1219	948	948	788	827	878
16:22:45	562	34463	1190	1311	1111	1154	1192	802	781	640	691	729
16:23:00	565	36083	1165	1279	1078	1130	1163	702	674	552	607	634
16:23:15	557	34948	1140	1248	1048	1106	1135	636	598	493	547	569
16:23:30	563	35033	1116	1220	1019	1084	1110	580	545	452	507	521
16:23:45	565	36255	1094	1194	994	1062	1086	549	502	425	481	489
16:24:00	565	35327	1072	1168	969	1040	1062	513	468	402	457	460
16:24:15	564	35190	1051	1142	946	1020	1040	492	442	385	436	439
16:24:30	555	34270	1031	1118	925	1000	1018	469	418	372	422	420
16:24:45	559	34975	1011	1094	904	981	997	449	398	360	406	403
16:25:00	561	34957	993	1070	884	963	977	440	380	348	396	391
16:25:15	562	34225	975	1048	865	944	958	421	361	339	387	377
16:25:30	563	36589	957	1026	847	927	939	407	346	330	378	365
16:25:45	565	35680	940	1005	830	910	921	396	335	322	369	356
16:26:00	565	35651	923	985	814	894	904	383	324	316	360	346
16:26:15	563	35782	908	965	798	878	887	374	313	310	351	337
16:26:30	565	35946	893	946	783	864	871	365	302	304	342	328
16:26:45	564	35273	877	928	768	848	855	352	292	297	335	319
16:27:00	563	35242	863	911	754	834	841	334	284	291	327	309

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16:27:15	554	34516	848	894	740	820	826	327	276	286	322	303
16:27:30	549	34362	835	877	727	806	811	323	268	278	315	296
16:27:45	550	34343	821	861	714	793	797	312	260	273	311	289
16:28:00	550	34371	808	846	702	780	784	307	254	267	309	284
16:28:15	551	34354	796	831	690	768	771	300	249	262	303	279
16:28:30	551	34404	784	817	679	755	759	299	244	259	298	275
16:28:45	552	34407	772	803	668	743	747	290	238	255	291	269
16:29:00	554	34561	761	790	657	732	735	285	234	252	286	264
16:29:15	554	34553	748	777	647	721	723	280	229	248	283	260
16:29:30	556	34689	738	764	636	710	712	271	224	245	279	255
16:29:45	557	34732	728	752	626	700	701	266	220	241	274	250
16:30:00	558	34857	717	740	617	690	691	263	216	236	270	246
16:30:15	559	34867	707	729	608	680	681	259	211	233	267	243
16:30:30	559	34949	697	718	598	670	671	249	207	229	263	237
16:30:45	559	34527	687	707	590	660	661	243	204	226	259	233
16:31:00	559	35263	678	696	581	650	651	244	201	224	255	231
16:31:15	559	35120	670	686	572	641	642	246	198	222	253	230
16:31:30	558	34797	660	676	564	633	633	242	195	220	251	227
16:31:45	559	34663	652	667	556	624	625	238	192	216	248	224
16:32:00	559	35154	644	657	548	616	616	239	189	213	244	221
16:32:15	559	35112	635	648	541	608	608	238	186	211	242	219
16:32:30	559	34627	627	639	534	600	600	232	183	209	240	216
16:32:45	559	35052	619	630	527	592	592	227	181	207	238	213
16:33:00	559	34886	613	622	520	584	585	224	178	205	236	211
16:33:15	559	35020	605	614	513	577	577	223	176	202	234	209
16:33:30	558	34875	599	606	506	570	570	222	174	200	232	207
16:33:45	559	35076	592	598	500	563	563	221	172	199	231	206
16:34:00	559	35009	585	590	493	556	556	217	170	197	228	203
16:34:15	558	35014	579	582	487	548	549	213	168	195	226	201
16:34:30	559	35001	573	575	481	541	543	211	167	194	222	199
16:34:45	558	35001	566	568	475	535	536	207	164	192	221	196
16:35:00	558	35005	558	560	470	528	529	203	162	191	219	194
16:35:15	558	34991	552	554	464	522	523	203	161	189	217	193
16:35:30	558	34980	547	547	458	516	517	198	159	188	214	190
16:35:45	558	34962	541	540	453	510	511	195	158	186	212	188
16:36:00	551	34431	535	534	448	504	505	196	156	185	210	187
16:36:15	549	34391	530	528	442	498	499	194	155	183	210	186
16:36:30	549	34321	524	521	437	493	494	192	152	180	208	183

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16:36:45	549	34318	519	515	432	487	488	188	151	178	207	181
16:37:00	549	34308	513	509	427	482	483	185	150	177	206	180
16:37:15	549	34314	508	503	422	477	477	186	148	174	205	178
16:37:30	549	34306	503	497	417	471	472	184	147	173	204	177
16:37:45	549	34275	499	492	413	467	468	183	146	172	202	176
16:38:00	549	34298	493	486	409	462	462	183	145	171	202	175
16:38:15	550	34324	488	481	404	457	457	181	144	170	199	174
16:38:30	549	34304	483	475	400	451	452	177	143	169	196	171
16:38:45	549	34311	478	470	396	446	448	174	142	168	194	170
16:39:00	549	34277	474	465	392	442	443	176	141	167	192	169
16:39:15	549	34276	459	452	378	436	431	133	193	182	181	172
16:39:30	548	34239	385	369	331	412	374	85	110	188	119	126
16:39:45	548	34206	316	285	288	377	316	76	93	159	96	106
16:40:00	548	34210	266	223	251	341	270	75	85	138	93	98
16:40:15	547	34173	227	179	220	309	234	74	82	123	90	92
16:40:30	547	34163	196	149	193	279	204	74	79	113	90	89
16:40:45	547	34141	174	128	171	251	181	73	78	106	88	86
16:41:00	570	34087	157	113	153	229	163	73	78	102	87	85
16:41:15	568	34087	143	102	138	209	148	72	76	98	85	83
16:41:30	567	34067	132	94	127	192	136	70	76	96	82	81
16:41:45	566	34099	123	88	117	177	126	69	74	92	81	79
16:42:00	566	34101	117	83	110	165	119	68	73	89	79	77
16:42:15	565	34086	111	79	104	155	112	67	71	88	78	76
16:42:30	565	34049	106	77	99	146	107	66	70	86	76	75
16:42:45	564	34054	101	75	94	138	102	66	70	85	75	74
16:43:00	564	34087	97	73	91	133	99	65	69	83	74	73
16:43:15	564	34045	94	72	88	128	96	65	68	81	73	72
16:43:30	564	34073	92	71	85	122	93	64	67	80	73	71
16:43:45	563	34081	88	70	83	118	90	64	67	79	72	71
16:44:00	563	34088	86	69	81	115	88	64	66	77	72	70
16:44:15	563	34065	84	68	79	111	86	64	66	78	71	70
16:44:30	563	34070	82	68	78	108	84	64	65	76	71	69
16:44:45	563	34077	81	67	76	105	82	64	65	76	70	69
16:45:00	563	34107	80	67	75	103	81	63	65	74	70	68
16:45:15	563	34095	79	67	74	101	80	63	65	74	70	68
16:45:30	563	34056	77	66	73	98	79	63	65	74	69	68
16:45:45	562	34070	77	65	73	96	78	63	64	72	69	67
16:46:00	562	34055	76	65	72	95	77	63	65	72	69	67



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16:46:15	562	34069	75	65	72	93	76	63	64	71	69	67
16:46:30	562	34047	74	64	71	91	75	63	64	72	69	67
16:46:45	562	34051	74	64	70	90	75	63	64	71	69	67
16:47:00	562	34045	72	64	70	88	74	63	64	71	68	67
16:47:15	562	34051	73	64	69	88	74	63	64	70	69	67
16:47:30	562	34051	72	64	69	86	73	63	64	70	68	66
16:47:45	562	34055	72	63	68	85	72	63	64	70	68	66
16:48:00	562	34031	71	64	68	84	72	65	66	71	71	68
16:48:15	562	34045	71	64	68	84	72	68	69	72	73	71
16:48:30	561	34056	71	64	69	83	72	69	70	73	75	72
16:48:45	561	34061	71	64	69	83	72	70	71	73	76	73
16:49:00	562	34056	71	64	69	83	72	70	72	73	76	73
16:49:15	561	34075	72	64	70	83	72	71	72	74	76	73
16:49:30	561	34048	72	65	70	83	73	72	73	75	77	74
16:49:45	561	34059	72	65	70	83	73	72	74	74	77	74
16:50:00	561	34042	72	65	71	82	73	72	74	75	77	75
16:50:15	561	34070	73	66	71	83	73	71	74	75	77	74
16:50:30	561	34056	73	66	71	83	73	71	74	75	77	74
16:50:45	561	34072	73	66	71	82	73	72	74	75	77	75
16:51:00	561	34053	73	67	72	83	74	72	74	74	76	74
16:51:15	561	34060	73	67	72	82	74	72	74	74	77	74
16:51:30	561	34054	73	67	72	82	74	72	74	74	76	74
16:51:45	561	34062	74	68	72	82	74	71	73	74	77	74
16:52:00	561	34048	74	67	72	82	74	71	73	74	76	74

## Yarmouth Research and Technology, LLC

### Leakage Summary for Burn and Cool Down Periods

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All pressure transducers and thermocouples are in calibration per YRT's QA program.

External leakage was collected electronically.

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Test Duration:	60	minutes
Tank Water Loss:	-47	mls
System Relief Water Collected:	0	mls
Calculated Water Loss:	0	mls
Average Leak Rate:	0.0	ml/min
Average Seal Circumference	24.2	inches
Allowable Leak Rate:	24.2	ml/min

<b>Was the Leakage Below the Allowable?</b>	<b>Yes</b>
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### Summary of Test Parameters During Burn and Cool Down Periods

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Amount of Time of Average Cal. Block > 1200 deg.:	15.0	minutes
Minimum Allowable Time at Temperature:	15	minutes
Average Cal. Block Temperature During Burn:	1060	deg. F
Maximum Average Cal. Block Temperature During Burn:	1242	deg. F
Minimum Average Cal. Block Temperature During Burn:	75	deg. F
Average Flame Temperature During Burn:	1453	deg. F
Maximum Average Flame Temperature During Burn:	1544	deg. F
Minimum Average Flame Temperature During Burn:	91	deg. F

*Notes*

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<b>Were Test Conditions Within Compliance?</b>	<b>Yes</b>
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# Yarmouth Research and Technology, LLC

## Depressurization - Repressurization Test Information

Customer: FMI Spa

Date: 7/2/2015

Product Code: 6 inch Class 300 316L Spiral Wound Gasket with Micatherm Gasket

Project Number: 215132

System pressure was lowered to 0 and then repressurized.

### *Operational Test Raw Data*

Time	Pressure (psig)	Average Block Temp-F
16:55:34	557	74
16:55:49	557	74
16:56:04	557	74
16:56:19	557	73
16:56:34	557	74
16:56:49	557	74
16:57:04	557	74
16:57:19	557	74
16:57:34	557	74
16:57:49	557	74
16:58:04	557	74
16:58:19	557	74
16:58:34	557	74
16:58:49	556	74
16:59:04	556	74
16:59:19	557	74
16:59:34	557	74
16:59:49	556	74
17:00:04	556	74
17:00:19	556	74
17:00:34	556	74

*Leakage was collected manually.*

Total External Leakage Collected Over 5 Minute Duration:	0	mls
Average Leak Rate Over 5 Minute Duration:	0	ml/min
Allowable Leak Rate:	24.2	ml/min

Was the Leakage Below the Allowable?	Yes
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