

Fire Test Report
API Standard 6FB, Third Edition

Performed for

Garlock Pipeline Technologies

<http://www.gptindustries.com>



2 inch Class 300
Thermapure VCXT Gasket

Project Number: 215082
Test Date: March 24, 2015



Performed by

YARMOUTH RESEARCH AND TECHNOLOGY, LLC

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Yarmouth Research and Technology, LLC

API 6FB FIRE TEST REPORT

Customer:	Garlock Pipeline Technologies	Date:	3/24/2015
Project Number:	215082		
Product Code:	2 inch Class 300 Thermapure VCXT Gasket		
Specification:	API 6FB, Third Edition, Nov. 1998 (R 2011)		
	Non-Bending, On-shore Test		
Gasket Thickness:	0.174	inches	
Seal Area OD:	3.660	Seal Area ID:	2.050 inches
Mean Seal Diameter:	2.855	inches	
Mean Circumference:	9.0	inches	
Allowable Leakage:	9.0	ml/min	
Nominal Test Pressure:	555	psig	
YRT Technician:	Matthew J. Wasielewski, P.E.		
	Version of YRT's FIRE-Control 6FB Software: A		
	Equipment Confirmed to be in Calibration to NIST Standards: Yes		

Burn and Cool Down Test

	Burn Start Time:	11:02:00	
	Burn / Cooldown Duration:	60	minutes
	Average Pressure During Burn/Cooldown:	554	psig
	Leak Rate During Burn/Cool Down:	1.3	ml/min
	Allowable External Leak Rate:	9.0	ml/min
	Amount of Time of Avg. Cal. Block > 1200 deg.:	18.0	minutes
	Were Test Conditions Within Compliance?	Yes	
	Was the Leakage Below the Allowable?	Yes	

Depressurization - Repressurization Test

	Average Pressure During Test:	553	psig
	Gasket Leak Rate:	0	ml/min
	Allowable External Leak Rate:	9.0	ml/min
	Was the Leakage Below the Allowable?	Yes	
	Does the Gasket Pass or Fail API 6FB?	PASS	

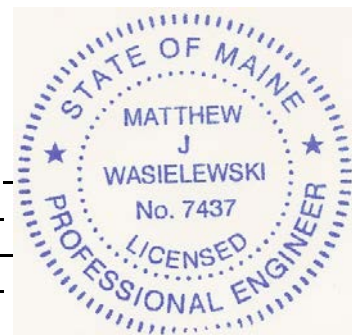
Certified By:



Matthew J. Wasielewski, PE

President and Manager

Yarmouth Research and Technology, LLC



Temperature verses Time Chart

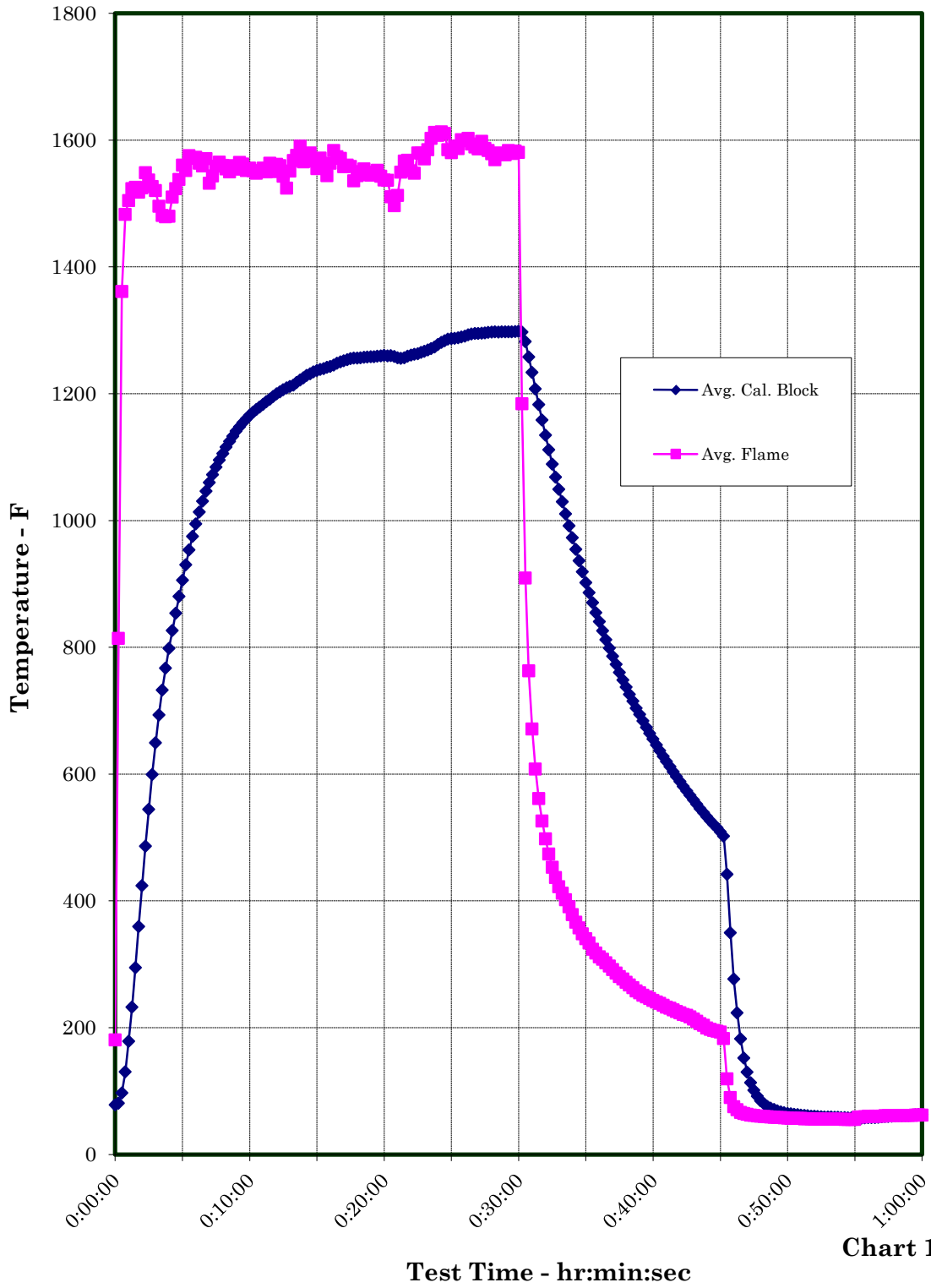
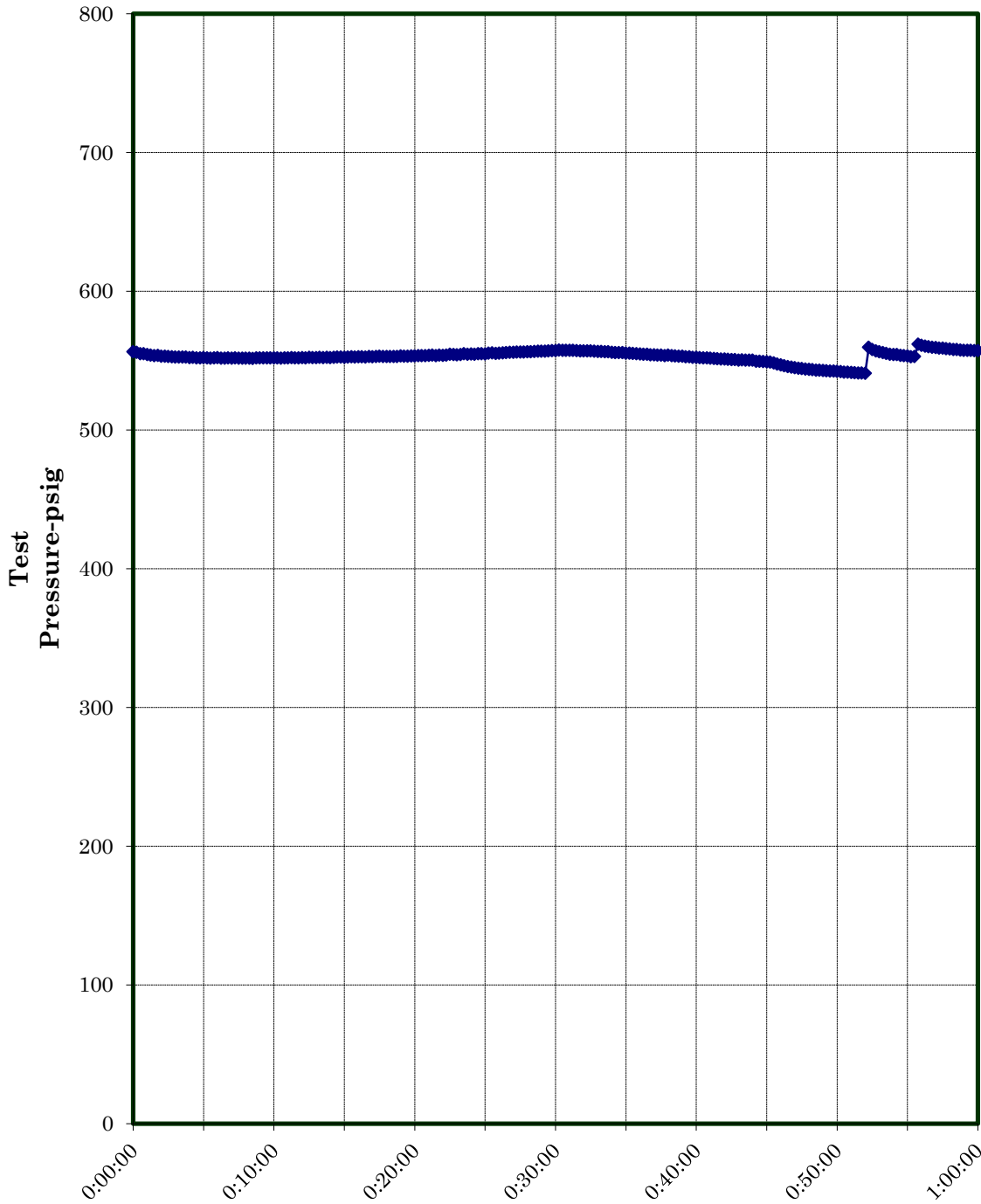


Chart 1

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Pressure verses Time Chart



Test Time - hr:min:sec

Chart 2

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Test Gasket Prior to Burn

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Test Setup Prior to Burn



Test Gasket During Burn

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Test Gasket During Burn



Test Gasket Post-Burn

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Fire Test Information

Customer: Garlock Pipeline Technologies

Test Date: 3/24/2015

Product Code: 2 inch Class 300 Thermapure VCXT Gasket

Project Number: 215082

Fire Test Raw Data

Time	Pressure (psig)	Water Volume (mls)	Cal. 1 Block Temp - F	Cal. 2 Block Temp - F	Cal. 3 Block Temp - F	Average Block Temp - F	Flame 1 Temp - F	Flame 2 Temp - F	Flame 3 Temp - F	Average Flame Temp - F
11:02:00	556	38531	78	80	76	78	152	248	142	181
11:02:15	556	38700	81	83	78	81	884	984	574	814
11:02:30	555	38647	103	100	88	97	1396	1519	1169	1361
11:02:45	555	38588	142	137	111	130	1510	1619	1320	1483
11:03:00	554	38574	196	193	146	178	1536	1644	1334	1505
11:03:15	554	38542	249	260	188	232	1536	1658	1376	1523
11:03:30	554	38547	309	340	234	294	1547	1658	1371	1525
11:03:45	554	38552	371	425	282	359	1530	1663	1361	1518
11:04:00	553	38568	432	510	330	424	1537	1673	1364	1525
11:04:15	553	38557	490	593	375	486	1514	1698	1434	1549
11:04:30	553	38568	544	669	420	544	1522	1684	1405	1537
11:04:45	553	38602	593	741	464	599	1512	1680	1388	1527
11:05:00	552	38596	637	805	505	649	1504	1673	1384	1520
11:05:15	553	38617	675	861	544	693	1459	1665	1363	1496
11:05:30	553	38464	707	910	580	732	1435	1670	1338	1481
11:05:45	553	38597	736	952	613	767	1436	1667	1334	1479
11:06:00	552	38648	761	991	643	798	1416	1679	1345	1480
11:06:15	552	38632	784	1024	671	826	1464	1695	1371	1510
11:06:30	552	38623	807	1056	698	854	1503	1700	1367	1523
11:06:45	552	38702	832	1085	723	880	1522	1718	1374	1538
11:07:00	552	38407	856	1113	748	906	1534	1741	1406	1560
11:07:15	552	38459	880	1139	771	930	1518	1746	1392	1552
11:07:30	552	38769	903	1162	795	953	1551	1748	1427	1575
11:07:45	552	38628	924	1183	817	975	1551	1745	1418	1571
11:08:00	552	38599	943	1203	837	994	1559	1747	1413	1573
11:08:15	552	38482	962	1222	856	1013	1548	1736	1406	1563
11:08:30	552	38800	979	1239	873	1030	1548	1741	1388	1559

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11:08:45	552	38480	995	1255	888	1046	1556	1743	1413	1571
11:09:00	552	38819	1008	1269	903	1060	1502	1719	1374	1532
11:09:15	552	38826	1019	1282	916	1072	1538	1727	1365	1543
11:09:30	552	38817	1031	1293	928	1084	1552	1751	1373	1559
11:09:45	552	38619	1042	1304	940	1095	1552	1744	1400	1565
11:10:00	552	38668	1052	1314	951	1106	1541	1734	1405	1560
11:10:15	552	38706	1061	1324	962	1116	1533	1742	1389	1555
11:10:30	552	38710	1069	1333	972	1125	1538	1748	1363	1550
11:10:45	552	38677	1077	1341	980	1133	1550	1745	1384	1560
11:11:00	552	38727	1085	1349	989	1141	1521	1745	1396	1554
11:11:15	552	38498	1091	1355	997	1148	1547	1754	1393	1565
11:11:30	552	38775	1097	1361	1005	1154	1542	1756	1388	1562
11:11:45	552	38823	1103	1365	1012	1160	1534	1743	1379	1552
11:12:00	552	38690	1109	1370	1018	1166	1551	1733	1383	1556
11:12:15	552	38652	1114	1374	1024	1171	1523	1751	1380	1551
11:12:30	552	38917	1118	1377	1030	1175	1509	1753	1381	1548
11:12:45	552	38926	1120	1381	1036	1179	1532	1756	1366	1551
11:13:00	552	38925	1124	1385	1041	1183	1544	1764	1359	1556
11:13:15	552	38871	1128	1389	1045	1187	1548	1751	1351	1550
11:13:30	552	38585	1133	1392	1049	1191	1554	1761	1375	1563
11:13:45	552	38631	1137	1397	1053	1196	1538	1754	1359	1550
11:14:00	552	38669	1141	1401	1057	1200	1557	1754	1374	1562
11:14:15	552	38897	1144	1405	1060	1203	1558	1754	1367	1560
11:14:30	552	38651	1148	1408	1063	1206	1537	1750	1342	1543
11:14:45	552	38947	1151	1411	1066	1209	1502	1748	1322	1524
11:15:00	552	38633	1152	1414	1068	1211	1513	1755	1385	1551
11:15:15	552	38736	1153	1417	1070	1213	1529	1771	1403	1568
11:15:30	552	38705	1156	1423	1074	1218	1550	1767	1411	1576
11:15:45	552	38956	1160	1427	1078	1222	1555	1775	1441	1590
11:16:00	552	39041	1163	1430	1082	1225	1527	1765	1405	1566
11:16:15	552	38686	1166	1434	1086	1229	1540	1763	1414	1572
11:16:30	552	39000	1167	1437	1090	1231	1558	1765	1416	1580
11:16:45	553	38706	1170	1440	1093	1234	1539	1760	1402	1567
11:17:00	552	38972	1172	1443	1095	1237	1525	1759	1381	1555
11:17:15	553	38989	1172	1445	1098	1238	1534	1757	1424	1572
11:17:30	553	38708	1173	1446	1100	1240	1541	1749	1380	1557
11:17:45	553	38695	1174	1449	1102	1242	1518	1741	1372	1544
11:18:00	553	38971	1174	1451	1104	1243	1530	1756	1405	1564

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11:18:15	553	38984	1175	1453	1107	1245	1574	1763	1414	1584
11:18:30	553	38893	1178	1456	1110	1248	1553	1767	1401	1574
11:18:45	553	38956	1180	1458	1113	1250	1556	1762	1395	1571
11:19:00	553	39047	1182	1460	1114	1252	1552	1757	1365	1558
11:19:15	553	38963	1184	1462	1115	1254	1551	1763	1367	1560
11:19:30	553	38752	1186	1464	1116	1255	1550	1758	1367	1558
11:19:45	553	38755	1187	1465	1116	1256	1493	1753	1361	1536
11:20:00	553	38799	1187	1466	1116	1256	1499	1761	1372	1544
11:20:15	553	39128	1186	1467	1117	1257	1522	1761	1368	1550
11:20:30	553	38798	1186	1468	1118	1257	1519	1762	1382	1554
11:20:45	553	39103	1186	1469	1119	1258	1527	1755	1355	1546
11:21:00	553	39060	1186	1470	1119	1258	1512	1754	1368	1545
11:21:15	553	38950	1186	1471	1118	1258	1510	1754	1384	1549
11:21:30	553	38990	1186	1472	1119	1259	1531	1755	1371	1552
11:21:45	553	38992	1187	1473	1119	1260	1520	1753	1356	1543
11:22:00	553	38979	1187	1474	1120	1260	1512	1755	1344	1537
11:22:15	554	39039	1186	1474	1119	1260	1497	1750	1363	1537
11:22:30	554	39070	1186	1474	1120	1260	1480	1728	1324	1511
11:22:45	554	39049	1185	1472	1119	1259	1468	1728	1293	1496
11:23:00	554	39088	1183	1468	1119	1257	1484	1731	1323	1513
11:23:15	554	38992	1182	1464	1121	1256	1514	1754	1380	1549
11:23:30	554	38866	1182	1464	1124	1257	1534	1754	1412	1567
11:23:45	554	39136	1184	1466	1127	1259	1503	1755	1447	1568
11:24:00	554	39061	1185	1467	1131	1261	1495	1750	1409	1551
11:24:15	554	38946	1184	1468	1134	1262	1472	1759	1412	1548
11:24:30	555	38979	1183	1469	1137	1263	1528	1760	1451	1580
11:24:45	554	38928	1184	1470	1141	1265	1540	1758	1440	1579
11:25:00	554	39212	1185	1472	1144	1267	1541	1761	1409	1570
11:25:15	554	39258	1187	1474	1146	1269	1548	1758	1449	1585
11:25:30	555	38945	1188	1476	1149	1271	1537	1769	1502	1603
11:25:45	554	38978	1190	1477	1154	1274	1563	1767	1507	1612
11:26:00	555	38929	1193	1479	1160	1277	1575	1757	1490	1607
11:26:15	555	39141	1197	1481	1165	1281	1570	1760	1509	1613
11:26:30	555	39271	1200	1482	1169	1284	1565	1764	1502	1610
11:26:45	555	39024	1202	1483	1173	1286	1522	1762	1470	1585
11:27:00	555	39338	1203	1483	1175	1287	1533	1763	1444	1580
11:27:15	555	38953	1203	1483	1176	1287	1533	1764	1474	1590
11:27:30	556	39073	1203	1483	1178	1288	1523	1765	1472	1587

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11:27:45	555	39025	1204	1484	1180	1289	1551	1766	1485	1601
11:28:00	555	39028	1205	1485	1182	1291	1551	1765	1481	1599
11:28:15	556	39395	1207	1486	1185	1293	1552	1772	1484	1603
11:28:30	556	39399	1209	1486	1187	1294	1532	1771	1478	1594
11:28:45	556	39045	1210	1487	1188	1295	1524	1765	1478	1589
11:29:00	556	39367	1210	1486	1189	1295	1540	1764	1454	1586
11:29:15	556	39397	1210	1487	1189	1295	1542	1772	1480	1598
11:29:30	556	39329	1210	1488	1190	1296	1524	1769	1468	1587
11:29:45	556	39402	1211	1488	1191	1297	1531	1766	1454	1584
11:30:00	556	39171	1210	1488	1193	1297	1520	1765	1450	1578
11:30:15	556	39381	1211	1488	1194	1298	1514	1759	1434	1569
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11:30:45	557	39227	1210	1489	1194	1298	1523	1764	1446	1578
11:31:00	557	39212	1210	1489	1194	1298	1521	1755	1454	1577
11:31:15	557	39243	1210	1488	1195	1298	1539	1766	1445	1583
11:31:30	557	39336	1210	1488	1195	1298	1528	1767	1441	1579
11:31:45	557	39336	1210	1488	1196	1298	1542	1763	1443	1583
11:32:00	557	39309	1210	1488	1197	1298	1524	1776	1442	1581
11:32:15	558	39338	1209	1486	1197	1297	1202	1276	1074	1184
11:32:30	557	39355	1196	1462	1188	1282	990	928	809	909
11:32:45	557	39347	1175	1428	1170	1258	877	745	666	763
11:33:00	557	39352	1152	1399	1149	1233	801	633	579	671
11:33:15	557	39358	1128	1368	1127	1208	750	556	518	608
11:33:30	557	39337	1105	1338	1105	1183	709	502	473	561
11:33:45	557	39350	1083	1309	1083	1158	679	460	439	526
11:34:00	557	39344	1061	1280	1062	1134	653	429	411	498
11:34:15	557	39324	1040	1252	1042	1111	630	403	388	474
11:34:30	557	39309	1020	1226	1021	1089	610	382	367	453
11:34:45	557	39326	1000	1203	1002	1068	592	367	351	437
11:35:00	557	39313	981	1183	983	1049	574	354	339	422
11:35:15	557	39321	963	1161	964	1029	560	345	331	412
11:35:30	556	39372	945	1139	947	1010	549	335	321	402
11:35:45	556	39297	928	1116	930	991	535	324	313	391
11:36:00	556	39372	912	1093	913	973	518	312	304	378
11:36:15	556	39273	896	1070	897	954	506	301	292	366
11:36:30	556	39289	880	1048	881	936	497	290	285	357
11:36:45	556	39309	865	1026	866	919	482	283	278	348
11:37:00	555	39324	850	1005	851	902	469	280	271	340

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11:37:15	555	39254	836	985	837	886	461	274	265	333
11:37:30	555	39284	823	965	823	870	446	267	258	324
11:37:45	555	39325	809	946	809	855	442	260	251	318
11:38:00	555	39251	797	928	796	840	435	255	245	312
11:38:15	555	39232	784	910	784	826	430	252	241	308
11:38:30	555	39218	772	893	771	812	423	248	236	302
11:38:45	554	39282	760	877	759	799	417	241	233	297
11:39:00	554	39294	749	860	748	786	410	234	231	292
11:39:15	554	39278	738	845	736	773	404	228	226	286
11:39:30	554	39214	727	829	725	760	397	223	221	280
11:39:45	554	39226	716	815	714	748	392	219	219	277
11:40:00	554	39284	706	801	704	737	386	215	214	272
11:40:15	554	39169	696	787	694	726	380	211	211	267
11:40:30	553	39182	687	774	684	715	374	206	209	263
11:40:45	553	39217	677	760	674	704	369	201	204	258
11:41:00	553	39204	668	749	665	694	365	198	201	255
11:41:15	553	39216	659	736	656	684	359	196	198	251
11:41:30	553	39191	650	724	647	674	355	193	197	248
11:41:45	552	39214	641	713	639	664	352	190	195	246
11:42:00	552	39159	633	702	630	655	347	190	192	243
11:42:15	552	39166	625	691	621	646	342	189	190	240
11:42:30	552	39225	617	680	613	637	338	187	189	238
11:42:45	552	39157	609	670	605	628	334	185	187	235
11:43:00	552	39129	601	660	598	620	329	184	184	232
11:43:15	552	39169	594	651	590	612	326	183	183	231
11:43:30	551	39144	586	641	583	603	321	182	181	228
11:43:45	551	39162	579	632	576	596	316	180	180	225
11:44:00	551	39146	572	623	569	588	311	180	179	223
11:44:15	551	39126	565	615	562	581	305	181	176	221
11:44:30	551	39120	559	606	555	573	303	180	175	219
11:44:45	551	39131	552	598	549	566	299	179	173	217
11:45:00	550	39120	546	590	542	559	295	174	171	213
11:45:15	551	39106	539	582	536	552	292	169	169	210
11:45:30	550	39099	533	574	530	546	287	165	166	206
11:45:45	550	39073	527	567	523	539	284	163	164	204
11:46:00	550	39131	521	560	517	533	277	160	161	199
11:46:15	550	39078	515	553	511	526	273	160	159	197
11:46:30	550	39097	510	546	506	521	269	161	157	196

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11:46:45	549	39081	504	540	501	515	269	159	155	194
11:47:00	549	39109	498	533	495	509	267	158	154	193
11:47:15	549	39072	492	525	489	502	223	164	161	183
11:47:30	548	39040	429	458	438	442	122	118	117	119
11:47:45	548	39016	333	360	356	350	85	89	95	90
11:48:00	547	38937	258	284	288	277	66	76	83	75
11:48:15	546	38933	202	228	240	223	61	70	80	70
11:48:30	546	38940	161	186	200	182	58	65	76	66
11:48:45	545	38852	132	155	169	152	58	62	73	64
11:49:00	545	38846	111	132	146	130	57	61	71	63
11:49:15	545	38850	96	115	128	113	56	60	70	62
11:49:30	544	38798	85	103	115	101	56	59	69	61
11:49:45	544	38802	78	92	105	92	56	59	67	61
11:50:00	544	38792	72	85	97	85	56	58	66	60
11:50:15	544	38756	68	80	92	80	56	58	65	60
11:50:30	543	38747	65	75	87	76	56	58	64	59
11:50:45	543	38749	63	72	84	73	55	58	64	59
11:51:00	543	38746	62	69	81	71	56	57	63	59
11:51:15	543	38737	60	67	79	69	55	57	62	58
11:51:30	542	38715	59	65	77	67	55	57	62	58
11:51:45	542	38715	59	63	75	66	55	57	61	58
11:52:00	542	38721	58	62	74	65	55	57	60	57
11:52:15	542	38697	58	61	73	64	55	56	59	57
11:52:30	542	38694	58	61	71	63	54	56	60	57
11:52:45	542	38691	57	60	71	63	55	56	59	57
11:53:00	542	38679	57	59	70	62	55	56	59	57
11:53:15	541	38672	57	59	69	62	54	56	58	56
11:53:30	541	38661	57	58	68	61	54	56	59	56
11:53:45	541	38650	56	58	67	60	54	56	58	56
11:54:00	541	38691	56	58	67	60	54	55	58	56
11:54:15	560	38633	56	57	66	60	54	55	59	56
11:54:30	558	38638	56	57	65	59	54	55	58	56
11:54:45	557	38529	56	57	64	59	54	55	58	56
11:55:00	556	38518	56	57	64	59	54	55	57	55
11:55:15	556	38534	56	57	64	59	54	55	57	55
11:55:30	555	38518	56	57	63	59	54	55	57	55
11:55:45	555	38622	56	56	63	58	54	55	57	55
11:56:00	554	38674	56	56	62	58	54	55	57	55

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11:56:15	554	38617	56	56	62	58	54	55	56	55
11:56:30	554	38533	56	56	61	58	54	55	56	55
11:56:45	554	38582	56	56	61	58	54	55	56	55
11:57:00	553	38644	56	55	61	57	54	55	56	55
11:57:15	553	38661	56	56	61	58	55	56	66	59
11:57:30	553	38483	55	56	60	57	55	57	65	59
11:57:45	562	38448	56	56	61	58	56	58	64	59
11:58:00	561	38593	56	56	62	58	57	59	64	60
11:58:15	560	38459	56	56	62	58	57	59	63	60
11:58:30	560	38434	56	56	62	58	57	60	64	60
11:58:45	560	38449	56	56	64	59	57	60	63	60
11:59:00	559	38551	57	57	64	59	57	60	63	60
11:59:15	559	38613	57	57	65	60	58	61	64	61
11:59:30	559	38499	57	57	65	60	58	61	64	61
11:59:45	559	38701	57	57	66	60	58	61	64	61
12:00:00	558	38655	58	57	67	61	58	61	64	61
12:00:15	558	38441	58	58	67	61	59	61	64	61
12:00:30	558	38423	58	58	67	61	59	62	64	62
12:00:45	558	38552	58	58	68	61	59	62	64	62
12:01:00	557	38730	58	58	69	62	59	62	64	62
12:01:15	557	38398	59	58	69	62	59	62	64	62
12:01:30	557	38389	59	59	69	62	60	62	64	62
12:01:45	557	38404	59	59	70	63	60	62	65	62
12:02:00	557	38450	60	59	70	63	60	62	64	62

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Leakage Summary for Burn and Cool Down Periods

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

External leakage was collected electronically.

Test Duration:	60	min
Tank Water Loss:	81	ml
System Relief Water Collected:	0	ml
Calculated Water Loss:	81	ml
Average Leak Rate:	1.3	ml/min
Average Seal Circumference:	9.0	in
Allowable Leak Rate:	9.0	ml/min

Was the Leakage Below the Allowable?	Yes
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Summary of Test Parameters During Burn and Cool Down Periods

Amount of Time of Average Cal. Block > 1200 deg.:	18.0	min
Minimum Allowable Time at Temperature:	15	min
Average Cal. Block Temperature During Burn:	1092	F
Maximum Average Cal. Block Temperature During Burn:	1298	F
Minimum Average Cal. Block Temperature During Burn:	78	F
Average Flame Temperature During Burn:	1538	F
Maximum Average Flame Temperature During Burn:	1613	F
Minimum Average Flame Temperature During Burn:	181	F

Notes

Were Test Conditions Within Compliance?	Yes
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Yarmouth Research and Technology, LLC

Depressurization - Repressurization Test Information

Customer: Garlock Pipeline Technologies

Date: 3/24/2015

Product Code: 2 inch Class 300 Thermapure VCXT Gasket

Project Number: 215082

System pressure was lowered to 0 and then repressurized.

Operational Test Raw Data

Time	Pressure (psig)	Average Block Temp-F
12:08:55	555	69
12:09:10	554	69
12:09:25	554	69
12:09:40	554	69
12:09:55	554	69
12:10:10	554	69
12:10:25	554	69
12:10:40	554	69
12:10:55	554	69
12:11:10	553	68
12:11:25	553	69
12:11:40	553	69
12:11:55	553	68
12:12:10	553	69
12:12:25	553	68
12:12:40	553	68
12:12:55	553	68
12:13:10	553	68
12:13:25	553	68
12:13:40	553	68
12:13:55	552	68

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:	9.0	ml/min

Was the Leakage Below the Allowable?	Yes
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