

Fire Test Report
API Standard 607, Fourth Edition

Performed for

SGL Carbon GmbH

www.sglgroup.com



6 inch Class 300
Sigraflex APX2 Hockdruck Gasket

Project Number: 214232
Test Date: August 20, 2014



Performed by

YARMOUTH RESEARCH AND TECHNOLOGY, LLC

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Yarmouth Research and Technology

API 607 4th Edition Fire Test Data

Customer: SGL Carbon GmbH	Date: 8/20/2014
Project Number: 214232	
Specification: API 607 4th Edition	
Product Description: 6 inch Class 300 Sigraflex APX2 Hockdruck	
Gasket Thickness: 2 mm (0.079 inches)	
Flange Mfgr: Weldbend	
YRT Technician: Matthew J. Wasielewski, P.E.	

Bolt Torques (ft-lbs)

Bolt Location	At Start of Test	At End of Test
Upstream #1	200	60
Upstream #2	200	175
Upstream #3	200	75
Upstream #4	200	150
Downstream #1	200	200
Downstream #2	200	200
Downstream #3	200	200
Downstream #4	200	200

Fire and Cooldown Data:

Start Time:	2:58 PM	(EST)
Average Test Pressure:	30	psig
Combined Leak Rate of Both Gaskets:	27	ml/min
Allowable Leakage:	300	ml/min
Is Leakage Below Allowable?:	Yes	

Post Burn Leakage Test

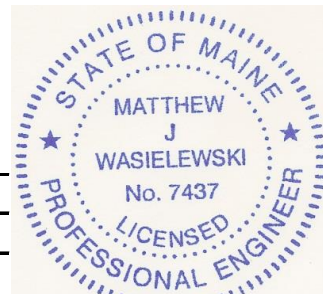
Start Time:	3:42 PM	(EST)
Average Test Pressure:	30	psig
Leak Rate Side A:	19	ml/min
Leak Rate Side B:	2.8	ml/min
Combined Leak Rate of Both Gaskets:	22	ml/min
Allowable Leakage:	300	ml/min
Is Leakage Below Allowable?:	Yes	
Does Gasket Pass API 607 Leakage Requirements?:	Yes	

Certified by

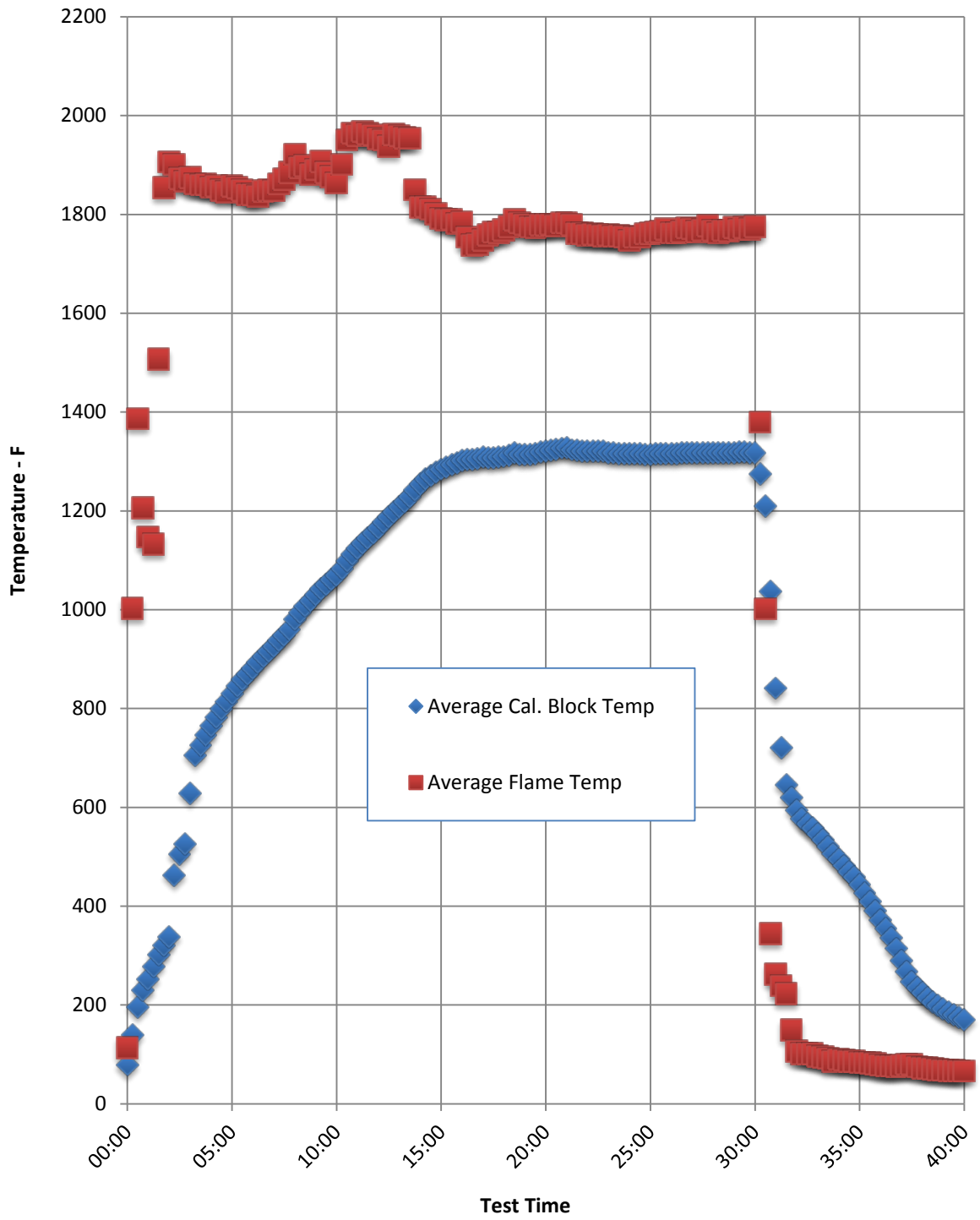
Matthew J. Wasielewski, PE

President and Manager

Yarmouth Research and Technology, LLC



Time vs Temperature Chart



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Gaskets Prior to Burn



Test Set Up Prior to Burn

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Test During Burn

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Fire Test Information

Customer: SGL Carbon GmbH

Date: 8/20/2014

Project Number: 214232

Product Code: 6 inch Class 300 Sigraflex APX2 Hockdruck

Burn and Cooldown Raw Data

Time	Pressure (psig)	Water Volume (mls)	Upstream Flange 1 Temp - F	Upstream Flange 2 Temp - F	Downstrm Flange 3 Temp - F	Downstrm Flange 4 Temp - F	Upstream Flame 5 Temp - F	Downstrm Flame 6 Temp - F
14:58:00	30	43197	67	96	88	62	113	114
14:58:15	30	43185	179	222	88	65	843	1162
14:58:30	30	43211	274	348	88	75	1191	1581
14:58:45	30	43210	329	419	89	80	933	1479
14:59:00	30	43230	370	465	90	84	853	1440
14:59:15	30	43278	416	518	91	88	824	1440
14:59:30	30	43303	454	561	92	97	1323	1690
14:59:45	30	43311	488	600	92	99	1787	1920
15:00:00	30	43340	520	636	93	102	1856	1955
15:00:15	30	43392	549	669	548	85	1847	1954
15:00:30	30	43442	576	700	660	86	1811	1934
15:00:45	30	43478	600	730	683	87	1800	1932
15:01:00	30	43548	625	758	706	425	1811	1938
15:01:15	30	43638	645	784	728	666	1794	1929
15:01:30	31	43688	664	808	747	683	1791	1928
15:01:45	30	43777	685	831	766	700	1791	1930
15:02:00	31	43937	704	855	785	715	1782	1928
15:02:15	31	44127	722	875	801	730	1786	1928
15:02:30	31	44427	740	895	817	743	1774	1924
15:02:45	32	44559	753	914	833	755	1768	1922
15:03:00	31	44982	770	933	847	769	1783	1932
15:03:15	31	45111	785	950	862	784	1778	1930
15:03:30	30	45497	799	965	876	794	1770	1926
15:03:45	31	45576	806	981	888	803	1760	1920
15:04:00	31	45639	818	996	898	813	1760	1920
15:04:15	32	45391	831	1009	910	823	1753	1920
15:04:30	30	46058	845	1023	921	834	1767	1927
15:04:45	31	46453	855	1035	931	843	1768	1928
15:05:00	31	46734	862	1047	942	852	1766	1929
15:05:30	32	47096	882	1067	955	865	1786	1937
15:05:45	32	47536	888	1078	965	876	1798	1944
15:06:00	31	47515	907	1100	983	893	1814	1955
15:06:15	31	47512	920	1117	1003	912	1853	1989
15:06:30	31	46849	932	1130	1015	925	1816	1974
15:06:45	31	47484	942	1143	1029	936	1821	1976
15:07:00	31	47688	954	1156	1040	947	1799	1964

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Time	Pressure (psig)	Water Volume (mls)	Upstream Flange 1 Temp - F	Upstream Flange 2 Temp - F	Downstrm Flange 3 Temp - F	Downstrm Flange 4 Temp - F	Upstream Flame 5 Temp - F	Downstrm Flame 6 Temp - F
15:07:15	32	46148	964	1169	1063	968	1830	1984
15:07:30	30	45040	972	1180	1072	976	1800	1970
15:07:45	30	47601	984	1192	1081	984	1788	1963
15:08:00	30	47589	994	1202	1090	991	1773	1954
15:08:15	30	48254	1006	1216	1105	1004	1822	1980
15:08:30	31	47507	1020	1233	1120	1022	1886	2015
15:08:45	30	48036	1031	1247	1132	1035	1902	2026
15:09:00	28	47588	1046	1260	1145	1046	1897	2023
15:09:15	31	47509	1054	1271	1158	1057	1905	2030
15:09:30	30	47326	1063	1283	1168	1066	1899	2028
15:09:45	31	46992	1074	1294	1178	1075	1896	2025
15:10:00	30	47012	1086	1304	1187	1084	1885	2020
15:10:15	30	47084	1097	1316	1199	1095	1884	2017
15:10:30	32	47457	1107	1327	1209	1106	1868	2008
15:10:45	29	46334	1118	1337	1219	1118	1897	2026
15:11:00	31	47313	1127	1348	1229	1129	1892	2026
15:11:15	30	47004	1137	1357	1238	1139	1888	2022
15:11:30	31	48292	1145	1365	1251	1152	1906	2002
15:11:45	31	47663	1154	1375	1270	1170	1771	1928
15:12:00	30	47107	1166	1384	1282	1181	1730	1898
15:12:15	31	47393	1179	1393	1293	1191	1733	1898
15:12:30	30	47245	1181	1400	1304	1201	1730	1890
15:12:45	30	45847	1188	1408	1311	1207	1720	1882
15:13:00	30	46732	1191	1416	1317	1211	1702	1880
15:13:15	31	47086	1188	1424	1322	1216	1699	1879
15:13:30	29	45835	1192	1433	1326	1221	1695	1884
15:13:45	30	46603	1189	1439	1332	1228	1705	1858
15:14:00	31	47672	1183	1442	1343	1241	1723	1846
15:14:15	30	46924	1173	1444	1348	1247	1695	1812
15:14:30	30	46625	1170	1448	1348	1249	1675	1800
15:14:45	31	48063	1166	1451	1350	1254	1687	1792
15:15:00	31	46878	1163	1456	1354	1260	1691	1804
15:15:15	30	46898	1147	1467	1352	1261	1678	1838
15:15:30	32	47906	1129	1475	1354	1267	1685	1843
15:15:45	31	46204	1138	1486	1348	1262	1657	1869
15:16:00	30	47887	1146	1495	1341	1256	1651	1886
15:16:15	30	46836	1158	1499	1339	1253	1651	1900
15:16:30	32	48424	1164	1506	1342	1258	1666	1911
15:16:45	31	47876	1156	1497	1343	1260	1666	1900
15:17:00	31	47111	1155	1494	1343	1262	1663	1896
15:17:15	30	46687	1155	1494	1345	1263	1657	1892
15:17:30	32	48403	1158	1495	1346	1266	1655	1892
15:17:45	31	46854	1165	1496	1346	1268	1661	1896
15:18:00	32	48213	1167	1498	1348	1270	1660	1897
15:18:15	31	47947	1168	1500	1350	1271	1662	1898
15:18:30	31	47354	1170	1503	1351	1274	1658	1896

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Time	Pressure (psig)	Water Volume (mls)	Upstream Flange 1 Temp - F	Upstream Flange 2 Temp - F	Downstrm Flange 3 Temp - F	Downstrm Flange 4 Temp - F	Upstream Flame 5 Temp - F	Downstrm Flame 6 Temp - F
15:18:45	31	47231	1173	1505	1353	1275	1666	1900
15:19:00	31	47077	1175	1506	1353	1278	1667	1898
15:19:15	29	46434	1168	1495	1352	1278	1673	1884
15:19:30	29	45454	1165	1491	1353	1278	1651	1872
15:19:45	32	48196	1162	1487	1354	1279	1653	1869
15:20:00	32	48881	1160	1484	1355	1280	1650	1866
15:20:15	32	48628	1161	1483	1355	1282	1652	1868
15:20:30	32	48614	1160	1482	1356	1284	1650	1868
15:20:45	29	45529	1159	1481	1357	1285	1647	1866
15:21:00	32	48186	1155	1473	1357	1285	1660	1857
15:21:15	29	45963	1155	1469	1357	1286	1657	1854
15:21:30	31	46118	1153	1466	1357	1287	1658	1855
15:21:45	30	46960	1153	1463	1358	1288	1657	1852
15:22:00	32	48360	1152	1462	1359	1290	1646	1848
15:22:15	30	45228	1151	1460	1360	1290	1653	1854
15:22:30	32	47791	1150	1458	1360	1291	1654	1854
15:22:45	31	47987	1149	1456	1361	1292	1663	1858
15:23:00	31	47886	1149	1455	1361	1293	1665	1858
15:23:15	31	47591	1150	1455	1363	1295	1666	1862
15:23:30	31	47258	1149	1454	1363	1298	1666	1864
15:23:45	32	47380	1147	1452	1365	1300	1674	1867
15:24:00	32	49205	1145	1452	1366	1300	1662	1863
15:24:15	32	48903	1146	1450	1367	1302	1662	1862
15:24:30	31	48034	1147	1449	1367	1304	1665	1864
15:24:45	32	48116	1146	1448	1369	1305	1677	1868
15:25:00	31	46937	1144	1448	1369	1306	1674	1868
15:25:15	31	47121	1142	1447	1370	1308	1666	1864
15:25:30	31	47228	1144	1446	1370	1308	1671	1866
15:25:45	31	47816	1142	1443	1371	1310	1684	1870
15:26:00	32	49810	1146	1442	1371	1311	1670	1864
15:26:15	29	47359	1146	1441	1372	1312	1665	1860
15:26:30	29	45697	1147	1439	1372	1313	1673	1862
15:26:45	30	46386	1146	1438	1373	1314	1672	1861
15:27:00	30	47370	1144	1438	1373	1315	1680	1866
15:27:15	31	47545	1146	1436	1374	1317	1675	1864
15:27:30	30	47222	1146	1434	1375	1318	1683	1865
15:27:45	30	46130	1145	1432	1375	1319	1677	1863
15:28:00	31	47726	1141	1431	1375	1320	1686	1865
15:28:15	31	47452	1105	1393	1327	1271	1340	1418
15:28:30	32	48452	1057	1332	1251	1197	986	1017
15:28:45	31	47888	1009	1294	877	967	207	482
15:29:00	32	48095	981	1262	487	634	149	376
15:29:15	30	47233	959	1236	278	407	150	328
15:29:30	30	46767	937	1176	238	230	153	293
15:29:45	31	47385	922	1130	228	196	106	192
15:30:00	30	46919	905	1113	199	156	93	120

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Time	Pressure (psig)	Water Volume (mls)	Upstream Flange 1 Temp - F	Upstream Flange 2 Temp - F	Downstrm Flange 3 Temp - F	Downstrm Flange 4 Temp - F	Upstream Flame 5 Temp - F	Downstrm Flame 6 Temp - F
15:30:15	30	47117	892	1100	181	135	86	116
15:30:30	29	46532	884	1086	170	125	88	115
15:30:45	30	46706	883	1072	160	116	87	115
15:31:00	30	46664	879	1059	145	103	78	114
15:31:15	28	45023	870	1037	135	93	77	112
15:31:30	32	44091	858	1013	126	86	70	113
15:31:45	33	44554	841	986	117	79	67	105
15:32:00	33	45332	826	965	111	75	71	109
15:32:15	32	44910	810	938	107	73	71	105
15:32:30	30	44329	798	907	104	71	69	103
15:32:45	30	44018	790	873	101	70	69	102
15:33:00	30	43800	766	838	100	69	67	99
15:33:15	29	43515	741	798	98	68	67	100
15:33:30	29	43249	715	754	97	67	66	98
15:33:45	29	42727	689	709	96	66	65	96
15:34:00	28	42399	663	665	95	66	66	90
15:34:15	28	42342	637	621	94	65	64	88
15:34:30	29	42330	611	572	93	65	64	88
15:34:45	29	42306	587	512	93	64	64	86
15:35:00	29	42298	564	440	92	64	63	91
15:35:15	29	42289	541	370	92	63	64	96
15:35:30	29	42275	518	318	92	62	64	95
15:35:45	29	42231	497	287	91	62	62	87
15:36:00	29	42231	476	266	91	62	62	82
15:36:15	29	42223	457	248	90	61	63	80
15:36:30	29	42210	437	236	90	61	62	78
15:36:45	30	42293	420	227	90	61	62	76
15:37:00	30	42158	403	217	90	60	61	75
15:37:15	30	42160	386	207	89	60	61	74
15:37:30	30	42170	371	200	89	60	61	74
15:37:45	29	42122	355	194	89	60	60	72
15:38:00	29	42108	340	189	89	59	60	73

End of 30 minute Burn and 10 minute Cooldown

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Leakage Summary for Burn and Cool Down Periods

Leakage was collected electronically.

Start Water Volume:	43197	mls
End Water Volume:	42108	mls
Total Water Lost During 40 Minute Burn and Cooldown:	1089	mls
Water Collected in System Relief:	0.0	mls
Calculated Water Leakage:	1089	mls
Calculated Average Leak Rate Over 40 Minute Duration:	27	ml/min

Summary of Test Parameters During Burn and Cool Down Periods

Pressure Information

Amount of Time Pressure Dropped Below 15 psig:	0.0	minutes
Maximum Allowable Low Pressure Time:	2.0	minutes
Average Pressure During Burn:	30.5	psig
Maximum Pressure During Burn/Cool Down:	32.8	psig
Minimum Pressure During Burn/Cool Down:	28.0	psig

Flange Temperature Information

Three out of four times must be greater than 15:00.

Flange Number	Time Temp > 1200 deg.	Max Temp-F	Min Temp-F	Average Temp-F
1	21	1192	67	932
2	20	1506	96	1127
3	16.5	1375	88	899
4	15.5	1320	60	826

Flame Temperature Information

Maximum Upstream Flame Temperature During Burn:	1906	deg. F
Average Upstream Flame Temperature During Burn:	1313	deg. F
Maximum Downstream Flame Temperature During Burn:	2030	deg. F
Average Downstream Flame Temperature During Burn:	1466	deg. F
Average of Both Flame Temperatures During Burn:	1389	deg. F

Notes

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Post Burn Test Information

Customer: SGL Carbon GmbH

Date: 8/20/2014

Project Number: 214232

Product Code: 6 inch Class 300 Sigraflex APX2 Hockdruck

Test Pressure: 30

Raw Data

Time	Pressure (psig)	Flange 1 Temp - F	Flange 2 Temp - F	Flange 3 Temp - F	Flange 4 Temp - F
15:42:27	29	142	70	70	70
15:42:42	29	142	70	70	70
15:42:57	29	142	70	70	70
15:43:12	29	142	70	70	70
15:43:27	29	143	70	70	70
15:43:42	30	144	70	70	70
15:43:57	30	144	70	70	70
15:44:12	30	144	70	70	70
15:44:27	30	144	70	70	70
15:44:42	30	144	70	70	70
15:44:57	30	145	70	70	70
15:45:12	30	145	70	70	70
15:45:27	30	145	70	70	70
15:45:42	30	145	70	70	70
15:45:57	30	146	70	70	70
15:46:12	30	145	70	70	70
15:46:27	30	146	70	70	70
15:46:42	30	146	70	70	70
15:46:57	30	146	70	70	70
15:47:12	30	146	70	70	70
15:47:27	30	146	70	70	70

Leakage Collected from Upstream Flange Gasket A:	94	mls
Average Leak Rate Over 5 Minute Duration:	19	ml/min
Leakage Collected from Downstream Flange Gasket B:	14	mls
Average Leak Rate Over 5 Minute Duration:	3	ml/min
Were Both Flange Leakages Below 150 ml/min?	Yes	