

# **API 6FB Gasket Fire Test Report**

*Performed for*

**Klinger (Australia) Ltd**

<http://klinger.com.au>



**Klinger Maxiprofile Type 109**

**Style LA1 316/Graphite**

**4 inch Class 300 Gaskets**

**Project Number: 205102**

**December 2005**



*Performed by*

**YARMOUTH RESEARCH AND TECHNOLOGY**

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# Yarmouth Research and Technology

## API 6FB Third Edition Fire Test Data

<b>Customer:</b> Klinger (Australia) Ltd		<b>Date:</b> 12/1/2005
<b>Project Number:</b> PN205102		
<b>Specification:</b> API 6FB Third Edition On-Shore Non-Bending Test		
<b>Product Code:</b> Klinger Maxiprofile Type 109 Style LA1 316/Graphite		
<b>Flange Size:</b> 4 inch Class 300		
<b>Gasket Sealing Surface:</b>	4.33 <-ID	OD-> 5.15
<b>Raised Face Sealing Surface:</b>	4.58 <-ID	OD-> 6.24
<b>Mean Seal Circumference:</b>	15.3	inches - based on contact area
<b>Comments:</b> New bolts/nuts, Used but good condition flanges.		
<b>YRT Technician:</b> Matthew J. Wasielewski, P.E.		

### Fire and Cooldown Data:

Start Time:	12:29 PM	(EST)
Initial Bolt Torque:	200	ft-lb
Average Test Pressure:	545	psig
Time Average Cal. Block Temp >1200F	18.5	15 minute min.
Gasket Leak Rate:	3.8	ml/min
Allowable Leakage:	15.3	ml/min
Is Leakage Below Allowable?:	YES	

### Post Burn Leakage Test

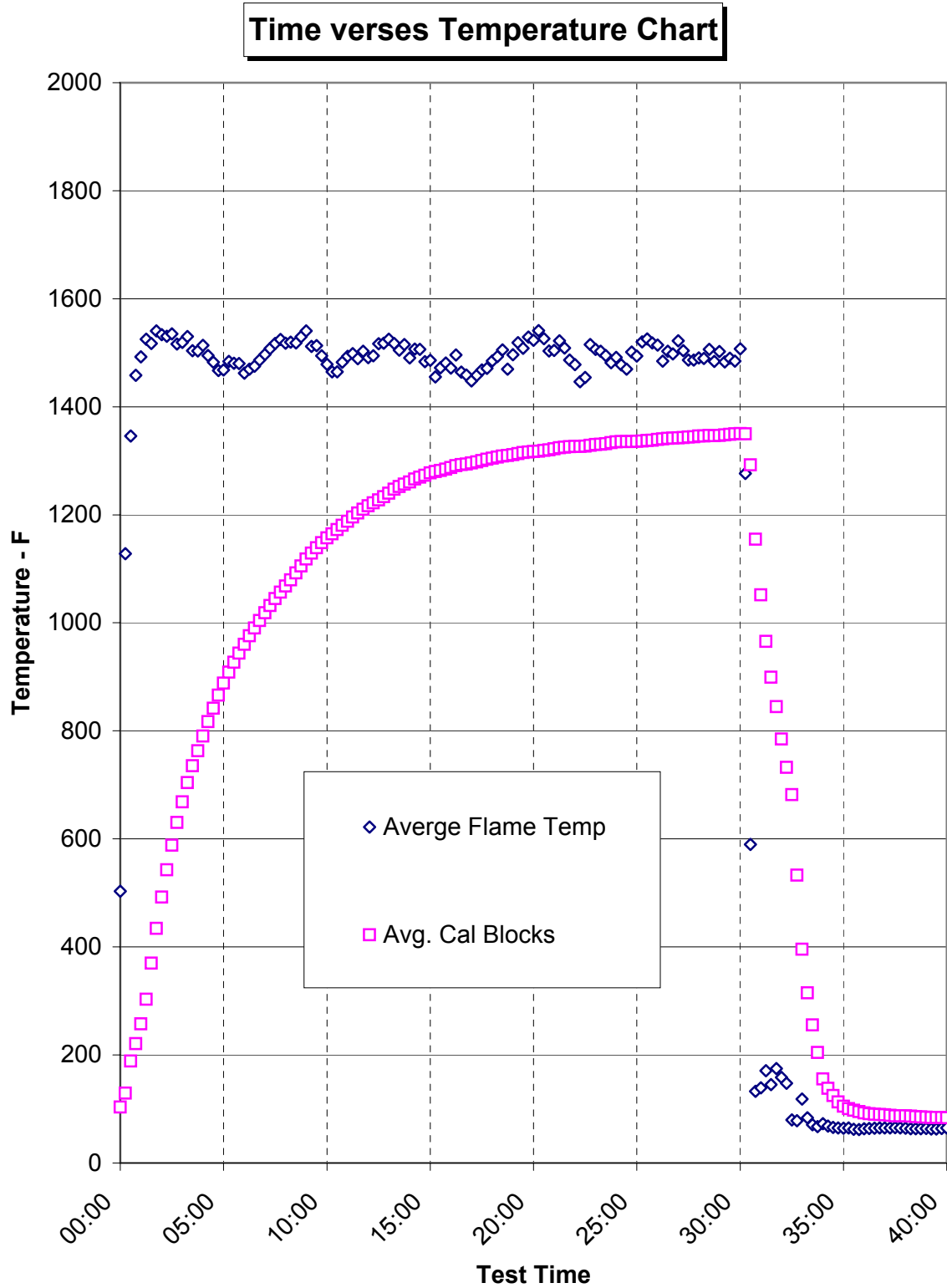
Pressure Vented and Repressurized:	Yes	
Average Test Pressure:	538	psig
Gasket Leak Rate:	0.0	ml/min
Allowable Leakage:	15.3	ml/min
Is Leakage Below Allowable?:	YES	

Does Gasket Pass API 6FB Leakage Requirements?:	YES
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Witnesses





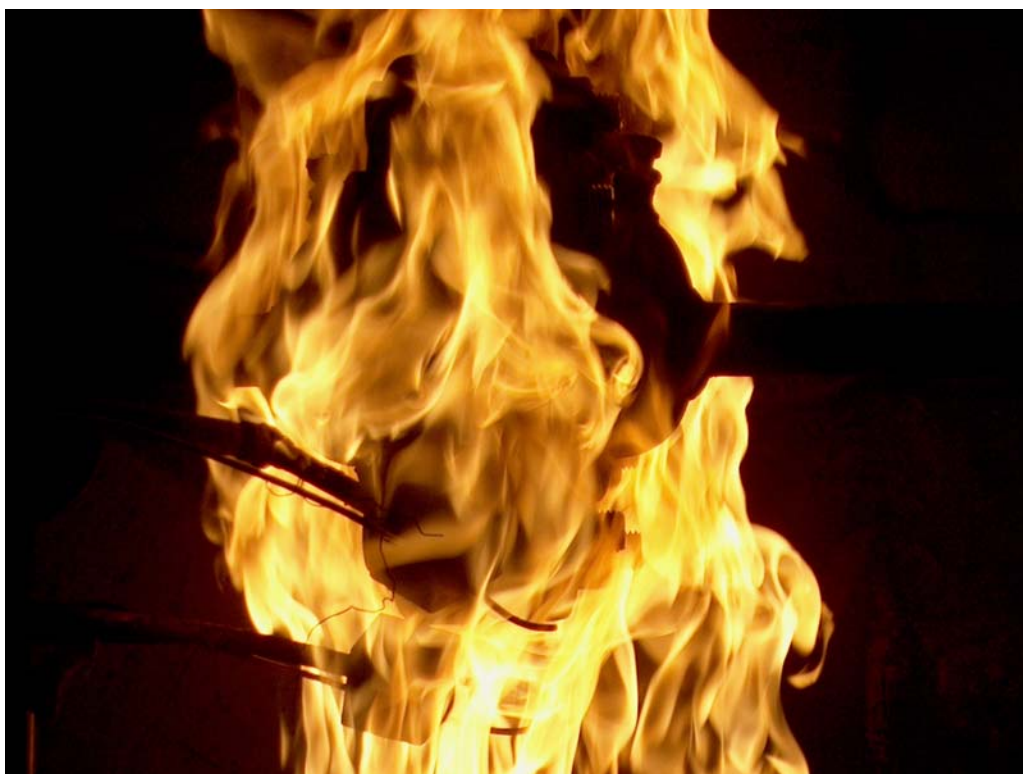
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Gasket Before Test

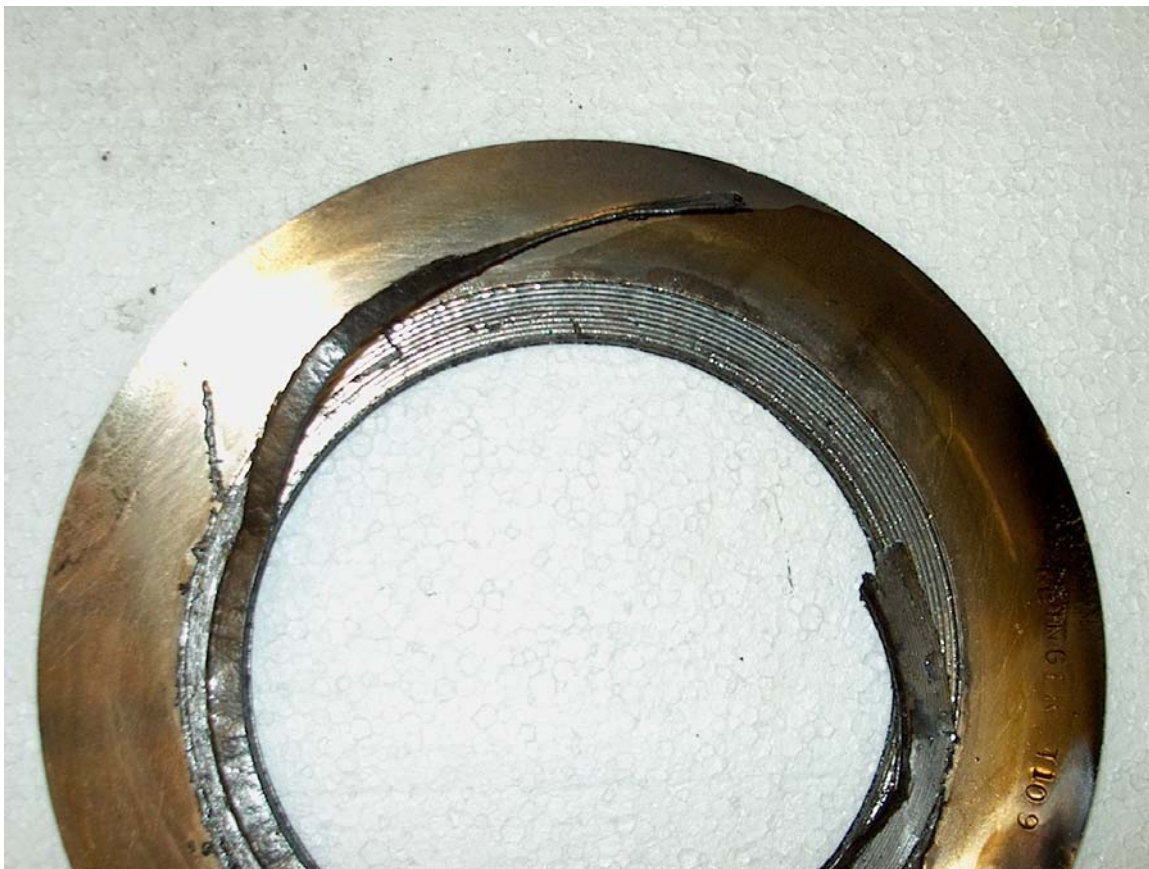


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Flange Assembly During Burn

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Gasket After Test.

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### Fire Test Information

**Customer:** Klinger (Australia) Ltd

**Date:** 12/1/2005

**Product Code:** Klinger Maxiprofile Type 109 Style LA1 316/Graphite

**Project Number:** PN205102

### *Burn and Cooldown Raw Data*

Time	Pressure (psig)	Water Volume (mls)	Cal. Block 1 Temp - F	Cal. Block 2 Temp - F	Cal. Block 3 Temp - F	Average Block Temp Temp - F	Flame Probe 1 Temp - F	Flame Probe 2 Temp - F	Flame Probe 3 Temp - F	Average Flame Temp - F
12:29:00	534.7	1875	85	132	93	103	613	375	522	503
12:29:15	534.8	1917	106	167	114	129	1037	1051	1296	1128
12:29:30	534.9	1894	184	219	164	189	1339	1306	1393	1346
12:29:45	534.7	1880	221	239	202	221	1554	1386	1435	1458
12:30:00	534.6	1926	242	298	232	257	1677	1374	1426	1492
12:30:15	534.4	1918	302	363	244	303	1738	1377	1461	1525
12:30:30	534.8	1907	381	426	302	370	1747	1383	1422	1517
12:30:45	534.5	1893	460	486	356	434	1769	1387	1465	1540
12:31:00	534.9	1884	532	542	403	492	1733	1405	1462	1533
12:31:15	534.7	1889	596	591	441	543	1752	1415	1425	1531
12:31:30	534.7	1912	653	637	475	588	1762	1393	1450	1535
12:31:45	534.8	1946	703	680	509	631	1732	1360	1457	1516
12:32:00	534.7	1966	747	720	539	669	1728	1380	1450	1519
12:32:15	534.6	1910	787	758	567	704	1738	1386	1466	1530
12:32:30	534.9	1925	822	791	594	736	1626	1419	1466	1504
12:32:45	534.7	1917	853	821	615	763	1672	1404	1434	1503
12:33:00	534.6	1927	882	851	637	790	1691	1429	1421	1514
12:33:15	534.5	1936	911	879	662	817	1662	1385	1438	1495
12:33:30	535.0	1939	937	906	683	842	1638	1351	1458	1482
12:33:45	534.9	1918	962	932	704	866	1617	1337	1448	1467
12:34:00	535.1	1908	985	955	725	888	1611	1354	1440	1468
12:34:15	535.1	1970	1007	977	742	909	1594	1403	1455	1484
12:34:30	534.7	1925	1027	997	756	927	1606	1385	1450	1480
12:34:45	534.9	1953	1046	1016	770	944	1612	1366	1462	1480

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Time	Pressure (psig)	Water Volume (mls)	Cal. Block 1 Temp - F	Cal. Block 2 Temp - F	Cal. Block 3 Temp - F	Average Block Temp Temp - F	Flame Probe 1 Temp - F	Flame Probe 2 Temp - F	Flame Probe 3 Temp - F	Average Flame Temp - F
12:35:00	534.8	1947	1063	1034	783	960	1543	1363	1481	1462
12:35:15	534.8	1969	1080	1052	796	976	1548	1367	1494	1470
12:35:30	534.8	1940	1095	1067	809	990	1549	1369	1508	1475
12:35:45	535.1	1949	1110	1082	820	1004	1563	1359	1537	1486
12:36:00	534.7	1948	1124	1097	834	1018	1588	1367	1535	1497
12:36:15	535.1	1985	1138	1111	847	1032	1626	1393	1504	1508
12:36:30	535.2	1994	1150	1124	860	1045	1641	1395	1516	1517
12:36:45	535.5	2008	1161	1136	873	1057	1639	1408	1527	1525
12:37:00	535.2	1998	1171	1147	887	1068	1601	1414	1538	1518
12:37:15	535.3	2000	1180	1157	901	1079	1615	1399	1545	1520
12:37:30	535.9	1996	1190	1167	920	1092	1602	1411	1541	1518
12:37:45	535.1	2013	1199	1177	940	1105	1600	1421	1568	1530
12:38:00	535.6	2045	1208	1187	959	1118	1650	1434	1537	1540
12:38:15	535.7	2076	1216	1196	975	1129	1572	1437	1526	1512
12:38:30	535.5	2028	1223	1203	991	1139	1590	1433	1516	1513
12:38:45	535.6	2059	1230	1210	1005	1148	1543	1396	1544	1494
12:39:00	535.9	2019	1237	1218	1016	1157	1518	1387	1531	1479
12:39:15	535.9	2079	1244	1225	1025	1165	1478	1345	1571	1465
12:39:30	536.0	2086	1251	1232	1034	1172	1467	1327	1600	1465
12:39:45	536.0	2105	1257	1238	1046	1180	1486	1355	1606	1482
12:40:00	536.4	2103	1262	1245	1057	1188	1508	1361	1611	1493
12:40:15	536.7	2094	1267	1251	1070	1196	1550	1356	1589	1498
12:40:30	537.0	2206	1272	1257	1081	1203	1531	1376	1560	1489
12:40:45	537.6	2294	1276	1261	1094	1210	1548	1383	1578	1503
12:41:00	539.6	2369	1281	1267	1102	1217	1539	1373	1561	1491
12:41:15	541.7	2475	1285	1272	1109	1222	1529	1372	1583	1495
12:41:30	543.4	2585	1289	1276	1118	1228	1532	1383	1635	1517
12:41:45	545.3	2768	1292	1281	1128	1234	1609	1386	1558	1518
12:42:00	545.9	2823	1295	1284	1140	1240	1652	1401	1523	1525
12:42:15	546.8	2890	1298	1288	1156	1247	1603	1408	1540	1517
12:42:30	548.9	3058	1300	1291	1166	1252	1540	1404	1571	1505
12:42:45	551.7	3233	1303	1294	1173	1257	1527	1406	1613	1515
12:43:00	553.7	3408	1305	1296	1182	1261	1548	1374	1550	1491



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Time	Pressure (psig)	Water Volume (mls)	Cal. Block 1 Temp - F	Cal. Block 2 Temp - F	Cal. Block 3 Temp - F	Average Block Temp Temp - F	Flame Probe 1 Temp - F	Flame Probe 2 Temp - F	Flame Probe 3 Temp - F	Average Flame Temp - F
12:43:15	555.9	3609	1308	1300	1190	1266	1550	1389	1582	1507
12:43:30	557.8	3748	1310	1302	1196	1269	1565	1393	1561	1506
12:43:45	559.0	3872	1312	1305	1203	1273	1538	1357	1555	1483
12:44:00	558.4	3907	1314	1308	1210	1277	1556	1362	1540	1486
12:44:15	558.6	3901	1316	1311	1213	1280	1511	1376	1479	1455
12:44:30	559.3	3916	1318	1313	1215	1282	1523	1375	1519	1472
12:44:45	558.8	3990	1319	1316	1219	1285	1593	1408	1442	1481
12:45:00	558.7	3982	1321	1317	1224	1287	1565	1393	1457	1472
12:45:15	559.1	3984	1323	1320	1229	1291	1588	1388	1512	1496
12:45:30	559.7	4052	1324	1322	1233	1293	1528	1385	1480	1464
12:45:45	559.6	4030	1325	1323	1234	1294	1496	1389	1492	1459
12:46:00	559.8	4108	1326	1325	1236	1296	1476	1362	1505	1448
12:46:15	559.9	4136	1328	1327	1239	1298	1542	1361	1472	1458
12:46:30	560.1	4078	1329	1328	1244	1300	1537	1394	1474	1468
12:46:45	560.5	4168	1329	1330	1249	1303	1506	1394	1513	1471
12:47:00	560.6	4221	1331	1331	1252	1305	1535	1386	1534	1485
12:47:15	560.8	4182	1332	1333	1255	1307	1528	1371	1580	1493
12:47:30	560.7	4177	1333	1335	1258	1309	1519	1403	1594	1505
12:47:45	561.4	4214	1333	1336	1260	1310	1485	1392	1532	1470
12:48:00	561.3	4174	1334	1338	1262	1311	1515	1381	1593	1496
12:48:15	559.9	4103	1335	1339	1265	1313	1538	1398	1620	1519
12:48:30	555.0	3868	1336	1340	1269	1315	1543	1408	1574	1508
12:48:45	556.1	3826	1336	1341	1271	1316	1596	1420	1571	1529
12:49:00	556.4	3876	1337	1342	1273	1317	1516	1435	1619	1523
12:49:15	556.3	3839	1337	1342	1274	1318	1532	1396	1695	1541
12:49:30	556.7	3836	1338	1343	1277	1319	1534	1375	1669	1526
12:49:45	557.1	3909	1339	1344	1277	1320	1509	1366	1635	1503
12:50:00	557.8	3873	1341	1346	1279	1322	1498	1348	1667	1504
12:50:15	557.6	3868	1342	1347	1283	1324	1538	1371	1658	1522
12:50:30	557.4	3861	1342	1348	1285	1325	1510	1392	1624	1509
12:50:45	557.4	3908	1343	1349	1286	1326	1482	1380	1598	1487
12:51:00	557.1	3890	1344	1350	1285	1326	1443	1358	1633	1478
12:51:15	557.0	3905	1345	1351	1284	1327	1431	1322	1586	1446

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Time	Pressure (psig)	Water Volume (mls)	Cal. Block 1 Temp - F	Cal. Block 2 Temp - F	Cal. Block 3 Temp - F	Average Block Temp Temp - F	Flame Probe 1 Temp - F	Flame Probe 2 Temp - F	Flame Probe 3 Temp - F	Average Flame Temp - F
12:51:30	557.8	3904	1345	1352	1284	1327	1470	1352	1541	1454
12:51:45	557.4	3886	1346	1353	1287	1329	1490	1412	1644	1515
12:52:00	557.8	3886	1346	1354	1290	1330	1554	1412	1553	1506
12:52:15	557.7	3886	1346	1354	1292	1331	1537	1424	1547	1503
12:52:30	557.5	3874	1347	1354	1294	1332	1567	1435	1483	1495
12:52:45	557.6	3887	1347	1354	1299	1333	1525	1436	1483	1481
12:53:00	557.7	3870	1348	1354	1303	1335	1496	1410	1569	1492
12:53:15	558.0	3898	1349	1355	1303	1336	1463	1364	1606	1478
12:53:30	557.6	3882	1349	1356	1301	1335	1444	1355	1610	1470
12:53:45	557.6	3891	1350	1356	1300	1335	1473	1387	1644	1501
12:54:00	557.7	3930	1351	1357	1300	1336	1485	1389	1608	1494
12:54:15	558.2	3871	1350	1357	1302	1336	1506	1397	1657	1520
12:54:30	557.8	3931	1351	1358	1303	1337	1508	1388	1681	1526
12:54:45	558.0	3896	1352	1359	1303	1338	1467	1365	1723	1518
12:55:00	557.8	3890	1353	1359	1307	1340	1465	1367	1711	1514
12:55:15	557.8	3924	1354	1361	1307	1341	1470	1371	1613	1485
12:55:30	558.0	3918	1355	1361	1308	1341	1482	1355	1672	1503
12:55:45	558.1	3928	1356	1362	1308	1342	1479	1391	1624	1498
12:56:00	558.3	3910	1356	1363	1308	1342	1476	1411	1680	1522
12:56:15	558.0	3904	1357	1363	1308	1343	1484	1395	1633	1504
12:56:30	557.8	3932	1357	1364	1310	1344	1528	1402	1529	1486
12:56:45	557.7	3889	1357	1365	1311	1344	1486	1381	1593	1487
12:57:00	557.7	3883	1358	1366	1313	1346	1471	1410	1591	1491
12:57:15	557.6	3916	1359	1366	1313	1346	1498	1422	1549	1490
12:57:30	557.7	3899	1360	1367	1314	1347	1504	1414	1601	1506
12:57:45	558.3	3910	1360	1367	1312	1346	1505	1390	1557	1484
12:58:00	558.1	3946	1360	1368	1312	1347	1567	1399	1541	1502
12:58:15	558.0	3886	1360	1368	1315	1348	1514	1382	1553	1483
12:58:30	558.1	3914	1361	1369	1316	1349	1486	1392	1592	1490
12:58:45	558.1	3901	1362	1370	1317	1350	1485	1389	1580	1485
12:59:00	558.4	3970	1362	1370	1319	1350	1564	1426	1532	1507
12:59:15	557.8	3901	1361	1371	1317	1350	1314	1232	1283	1276
12:59:30	555.7	3675	1325	1357	1195	1292	721	381	667	590

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Time	Pressure (psig)	Water Volume (mls)	Cal. Block 1 Temp - F	Cal. Block 2 Temp - F	Cal. Block 3 Temp - F	Average Block Temp Temp - F	Flame Probe 1 Temp - F	Flame Probe 2 Temp - F	Flame Probe 3 Temp - F	Average Flame Temp - F
12:59:45	542.2	2804	1088	1316	1060	1155	123	144	131	133
13:00:00	537.2	2477	879	1263	1013	1052	117	160	141	139
13:00:15	535.4	2228	746	1198	953	966	181	186	146	171
13:00:30	533.0	2026	650	1147	900	899	152	144	139	145
13:00:45	533.2	1955	566	1111	858	845	172	195	157	175
13:01:00	533.3	1912	454	1077	823	785	172	157	146	158
13:01:15	533.2	1901	360	1047	790	732	148	168	127	148
13:01:30	533.4	1901	281	1011	754	682	91	60	88	80
13:01:45	533.5	1879	217	769	612	533	84	81	70	78
13:02:00	533.9	1871	170	549	468	396	143	88	124	118
13:02:15	533.3	1838	138	438	369	315	92	70	89	84
13:02:30	533.6	1816	117	345	304	255	83	63	67	71
13:02:45	533.3	1843	101	259	253	204	72	63	67	67
13:03:00	533.5	1806	90	166	210	155	61	63	94	73
13:03:15	533.0	1810	81	155	179	138	64	60	81	68
13:03:30	533.2	1804	74	143	158	125	68	58	71	66
13:03:45	533.2	1789	69	127	143	113	69	60	66	65
13:04:00	532.9	1759	66	117	132	105	72	57	64	64
13:04:15	533.3	1773	63	113	125	100	74	58	62	65
13:04:30	533.0	1771	62	112	119	98	74	57	56	62
13:04:45	533.0	1757	61	109	115	95	72	58	56	62
13:05:00	532.7	1775	60	107	111	93	71	60	59	63
13:05:15	532.8	1756	60	106	108	91	70	61	60	64
13:05:30	532.8	1766	60	104	106	90	70	62	61	64
13:05:45	532.9	1733	61	104	104	90	69	63	63	65
13:06:00	532.9	1736	61	103	103	89	68	63	64	65
13:06:15	532.7	1741	61	102	102	88	68	63	64	65
13:06:30	532.3	1747	61	101	100	87	68	64	64	65
13:06:45	532.8	1767	62	101	99	87	67	64	64	65
13:07:00	532.4	1714	62	100	99	87	66	63	64	64
13:07:15	532.6	1735	62	100	98	87	64	62	64	63
13:07:30	532.7	1720	62	99	96	86	65	62	63	63
13:07:45	532.4	1759	62	98	96	85	64	62	64	63

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Time	Pressure (psig)	Water Volume (mls)	Cal. Block 1 Temp - F	Cal. Block 2 Temp - F	Cal. Block 3 Temp - F	Average Block Temp Temp - F	Flame Probe 1 Temp - F	Flame Probe 2 Temp - F	Flame Probe 3 Temp - F	Average Flame Temp - F
13:08:00	532.3	1749	62	97	95	85	65	63	64	64
13:08:15	532.5	1732	62	96	94	84	64	62	63	63
13:08:30	532.6	1788	63	96	93	84	63	62	63	63
13:08:45	532.6	1727	63	96	93	84	65	63	64	64
13:09:00	532.2	1723	63	96	92	84	66	63	65	65

*End of 30 minute Burn and 10 minute Cooldown*

## **Yarmouth Research and Technology**

### **Leakage Summary for Burn and Cool Down Periods**

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Leakage was collected electronically.

Start Water Volume:	1875	mls
End Water Volume:	1723	mls
Total Water Lost During 40 Minute Burn and Cooldown:	152	mls
Calculated Average Leak Rate Over 40 Minute Duration:	3.8	ml/min

### **Summary of Test Parameters During Burn and Cool Down Periods**

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#### **Pressure Information**

Gasket / Flange Rated Pressure:	740	psig
Nominal Test Pressure - 75% of Rated:	555	psig
Average Pressure During Burn:	544.8	psig
Maximum Pressure During Burn/Cool Down:	561.4	psig
Minimum Pressure During Burn/Cool Down:	532.2	psig

#### **Calorimeter Block Temperature Information**

Average Cal. Block 1 Temperature During Burn:	1170	deg. F
Maximum Cal. Block 1 Temperature During Burn:	1362	deg. F
Average Cal. Block 1 Temperature During Burn:	1166	deg. F
Maximum Cal. Block 1 Temperature During Burn:	1370	deg. F
Average Cal. Block 1 Temperature During Burn:	1042	deg. F
Maximum Cal. Block 1 Temperature During Burn:	1319	deg. F

#### **Flame Temperature Information**

Average Flame 1 Temperature During Burn:	1543	deg. F
Maximum Flame 1 Temperature During Burn:	1769	deg. F
Average Flame 1 Temperature During Burn:	1375	deg. F
Maximum Flame 1 Temperature During Burn:	1437	deg. F
Average Flame 1 Temperature During Burn:	1536	deg. F
Maximum Flame 1 Temperature During Burn:	1723	deg. F



## Yarmouth Research and Technology

### Post Burn Test Information

**Customer:** Klinger (Australia) Ltd

**Date:** 12/1/2005

**Product Code:** Klinger Maxiprofile Type 109 Style LA1 316/Graphite

**Project Number:** PN205102

### Pressure vented to 0 and then Repressurized

#### Raw Data

Time	Pressure (psig)	Block 1 Temp - F	Block 2 Temp - F	Block 3 Temp - F
13:13:01	539	65	90	87
13:13:16	539	65	90	87
13:13:31	538	66	89	87
13:13:46	538	66	89	86
13:14:01	538	66	89	86
13:14:16	539	66	88	86
13:14:31	538	66	88	86
13:14:46	538	66	88	85
13:15:01	538	66	88	85
13:15:16	538	66	88	85
13:15:31	538	66	88	85
13:15:46	538	66	88	84
13:16:01	538	67	87	85
13:16:16	538	66	87	85
13:16:31	538	67	87	85
13:16:46	538	67	86	84
13:17:01	538	67	86	84
13:17:16	538	67	86	84
13:17:31	538	67	86	84
13:17:46	538	67	86	84
13:18:01	538	67	85	84

Leakage Collected from Gasket:	0	mls
Average Leak Rate Over 5 Minute Duration:	0	ml/min
Max. Allowable Leakage Rate:	15	ml/min
Was the Leakage Below the Allowable?	Yes	