

Oil Seal Compatibility Test (OSCT) Surveillance Panel Meeting Minutes

August 7, 2019

Don Bell

Participants listed on attachment in Appendix.

An OSCT Surveillance Panel Skype meeting at PRI in Warrendale, PA was called to order by D. Bell at 2:40 pm on 8/7/2019.

- The 11 OSCT Surveillance Panel voting member list was reviewed. M. Cabaj (Linamar) and D. Rabinowitz (Meritor) were added to the voting list, and J. Rucker was removed since she left Meritor. The voting member list was deemed acceptable and well representative of industry members.

A motion made by W. Venhoff and 2nd by M. Cabaj was unanimously approved with 10 votes to approve the three OSCT minutes posted to the TMC website for the dates of 5/8/2019, 6/13/2019, and 6/28/2019.

The polyacrylate (PA) qualification status and Test Engineering Institute's (TEI) elastomer inventory were reviewed.

- PA 360 Approved, TEI has 42 slabs. TEI was instructed to sell this older lot prior selling newer lots
- PA361 Failed reference, so rejected
- PA362/363 Approved, but TEI sold out
 Labs to run TMC 171 side-by-side as non-jeopardy oil
- PA 364 Approved, TEI has 130 slabs
 Labs to run TMC 171 side-by-side as non-jeopardy oil
- PA365/366 Sent to labs for qualification testing in TMC 169/171,
 TEI has 278 non-approved slabs of each lot
- PA367 TEI Ordered 6/29/2019

The fluoroelastomer (FL) qualification status and TEI elastomer inventory were reviewed.

- FL407/408/409 Approved, but TEI is sold out. TMC 171 run as a non-jeopardy oil
- FL410 TEI has 178 unapproved slabs, and sent to both labs for qualification testing, along with TMC 171 to be run side-by-side as a non-jeopardy oil
- FL411 TEI has 200 unapproved slabs, and sent to both labs for qualification testing, along with TMC 171 to be run side-by-side as a non-jeopardy oil
- FL412 Requested TEI to order

The nitrile (NI) qualification status and TEI's elastomer inventory was reviewed.

- NI349 Approved, TEI has 82 slabs
- NI350 Approved, TEI has 278 slabs
- NI351 TEI has 278 unapproved slabs and sent to both labs for qualification testing

If a new lot of elastomer is rejected by the Surveillance Panel, then TEI will pass along the cost of the rejected lot to the participating labs with an upcharge for the next available lot of the same elastomer until the full cost of the rejected lot is recouped.

Lab C was requested to submit their annual (September 2018) TMC 155-1 test results for PA and FL to TMC since Lab G already submitted passing data. Once all results are received, TMC will graph them for the Panel to review for approval to ensure the test is in control. A reminder was given to both labs to conduct TMC 155-1 annual testing in September 2019.

In May 2019 OSCT Surveillance Panel requested TMC to investigate what the history of tests would look like if acceptance bands were used as the statistical criteria instead of the Shewhart severity method. This was in response to a test that failed because the SAHA results were required to be rounded to the nearest whole number for test review. If the SAHA results weren't rounded-up to the nearest whole number the Y(i) value would have been within the acceptable limits. Tables I-III in the Appendix show the test history data for un-rounded acceptance bands and Tables IV-VI show the data of whole number acceptance bands. The data is summarized below to compare the results of using un-rounded to whole number acceptance bands vs. Shewhart limits.

Un-rounded Acceptance Bands:

Summary				
Oil	Elastomer	Number of Tests	Number of Fails Using Shewhart	Number of Fails if Acceptance Bands were Introduced
168	NI	174	3	3
169	FL	107	6	6
	NI	58	0	0
170	PA	111	2	2
	NI	21	4	4
171	PA	8	1	1
	FL	6	3	3
160-1	FL	263	14	14
	PA	245	25	25
Totals		993	58	58

Whole Number Acceptance Bands:

Summary				
Oil	Elastomer	Number of Tests	Number of Fails Using Shewhart	Number of Fails If Acceptance Bands were Introduced
168	NI	174	3	2
169	FL	107	6	6
	NI	58	0	0
	PA	111	2	2
170	NI	21	4	1
171	PA	8	1	2
	FL	6	3	4
160-1	FL	263	14	18
	PA	245	25	43
Totals		993	58	78

The data shows that whole number acceptance bands increases the number of fails by 20 or 34.5% more.

If acceptance bands were rounded to whole numbers it would require a change to the LTMS document as well as to the method of evaluation of Shewhart to acceptance bands.

To avoid this, the TMC proposed a solution to allow shore hardness values to be reported to one decimal point instead of a whole number. This is considered best practice by Statisticians and the change will reduce the number of fails due to rounding by an order of magnitude.

Pre-test Elastomer Properties (as measured by lab)													From Manufact.	
Specimen	1	2	3	4	5	6	7	8	9	10	11	12	Avg.	Std. Dev.
Elongation (%)	S123	S123	S123	S123	S123	S123	S123	S123	S123	S123	S123	S123	S123	S123
Hardness (SH)	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12
Volume (g)	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123

Post-test Elastomer Properties (as measured by lab)														
Specimen	1	2	3	4	5	6	7	8	9	10	11	12	Avg.	Std. Dev.
Elongation (%)	S123	S123	S123	S123	S123	S123	S123	S123	S123	S123	S123	S123	S123	S123
Hardness (SH)	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12
Volume (g)	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123	S1.123

Best Practice would be to allow averages to be reported one additional level of precision.

Avg.	Std. Dev.
S123.1	S123.1
S12.1	S12.1
S1.1234	S1.1234

	% Elongation Change	Shore A Hardness Change Points	% Volume Change
Std. Dev.	S123.1	S123.1	S12.12
Average	S123.1	S123.1	S123.1

Change shore hardness change average to be reportable to one decimal value.

S1234.1

A motion made by D. Bell and 2nd by W. Venhoff was unanimously approved with 10 votes that effective October 1, 2019 the TMC will revise the report forms and data dictionary to allow averages to be reported one additional level of precision and change shore hardness changes average to be reportable to one decimal value.

The initial Shewhart limits for TMC 171 were established only with a very small sampling of n = 3, so TMC compiled additional TMC 1171 data on FL and PA as shown below, especially since both labs were using it as a non-jeopardy oil. In blue on each table below is the initial data with n=3.

TMC 117 with FL:

testkey	lmslab	val	ind	lmsdate	dtcomp	CHART	com1	com2	com3	com4	PVCA	SAHA	PELA	ETYP	EBC		
135237-OSCT	C	OC	171	20190627	20190627	Y	PELAL				1.4	0	-56.2	FL	FL407		
143068-OSCT	C	NI	171	20190627	20190627	N	171	INFO RUN			1.4	2	-49.6	FL	FL407		
143066-OSCT	C	NI	171	20190625	20190625	N	171	INFO RUN			1.4	3	-50	FL	FL407		
143063-OSCT	C	MI	171	20190607	20190607	N	FL407	APPROVAL	SAHAH		1.3	3	-44	FL	FL407		
143064-OSCT	C	MI	171	20190607	20190607	N	FL408	APPROVAL	SAHAH		1.2	3	-45.2	FL	FL408		
143065-OSCT	C	MI	171	20190607	20190607	N	FL409	APPROVAL	SAHAH		1.4	4	-45.1	FL	FL409		
143107-OSCT	G	MI	171	20190531	20190531	N	FL407	APPROVAL	PVCAH	SAHAH	3.5	1	-41.9	FL	FL407		
143108-OSCT	G	MI	171	20190531	20190531	N	FL408	APPROVAL	SAHAH	PVCAH	3.6	2	-42.7	FL	FL408		
143109-OSCT	G	MI	171	20190531	20190531	N	FL409	APPROVAL	PVCAH		3.9	0	-40.4	FL	FL409		
143103-OSCT	G	MI	171	20190429	20190429	N	FL407	APPROVAL	BAD REF		3.4	0	-33.9	FL	FL407		
143104-OSCT	G	MI	171	20190429	20190429	N	FL408	APPROVAL	BAD REF		3.6	1	-40.1	FL	FL408		
143105-OSCT	G	MI	171	20190429	20190429	N	FL409	APPROVAL	BAD REF		3	1	-38.9	FL	FL409		
143106-OSCT	G	OC	171	20190429	20190429	Y	FL407	REF	PELAL	PVCAH	3.5	0	-53.9	FL	FL406		
135236-OSCT	C	OC	171	20190408	20190408	Y	PELAL				1.3	0	-57.2	FL	FL406		
127584-OSCT	G	AC	171	20190408	20190408	Y	PREVIU	UPLOAD	ERROR		2.1	-1	-49.2	FL	FL406		
135235-OSCT	C	AC	171	20190307	20190307	Y					1.4	-1	-50.2	FL	FL406		
127581-OSCT	G	OC	171	20190301	20190301	Y	SAHAL	PVCAH			3.5	-2	-48	FL	FL406		
127587-OSCT	C	AC	171	20181029	20181029	Y					1.5	-1	-44.7	FL	FL405		
127577-OSCT	G	NI	171	20180614	20180614	N	171	INFO RUN			1.8	-1	-47.4	FL	FL405		
127586-OSCT	C	NI	171	20180407	20180407	N	171	INFO RUN			1.2	0	-40.8	FL	FL404		
127595-OSCT	B	NI	171	20180406	20180406	N	171	INFO RUN			1.4	-1	-39.6	FL	FL403		
											Average	2.229	0.619	-45.667	N Size	21	
											Std.	1.050	1.658	5.992			
											<i>Current</i>						
											<i>171</i>	<i>Average</i>	<i>1.467</i>	<i>-0.667</i>	<i>-42.6</i>	<i>N Size</i>	<i>3</i>
											<i>Targets</i>	<i>Std.</i>	<i>0.306</i>	<i>0.577</i>	<i>42</i>		

For FL, the table above shows the sample size has increased to 21 with difference averages and standard deviations for all three measured parameters.

For PA, the table below shows the sample size increased to 22 also with different averages and standard deviations.

TMC 117 with PA:

testkey	flmslab	val	ind	flmsdate	dtcomp	CHART	com1	com2	com3	com4	PVCA	SAHA	PELA	ETYP	EBC		
143067-OSCT	C	NI	171	20190709	20190709	N	171	INFORUN			1.2	-3	23	PA	PA362		
143110-OSCT	G	NI	171	20190621	20190621	N	PA364	APPROVAL			0.1	1	31.6	PA	PA364		
143111-OSCT	G	MI	171	20190621	20190621	N	PA361	APPROVAL SAHAL			-0.7	-1	17.9	PA	PA361		
145314-OSCT	G	NI	171	20190621	20190621	N	PA365	APPROVAL			0.3	1	31	PA	PA365		
135238-OSCT	C	AC	171	20190506	20190506	Y					-0.8	1	10.7	PA	PA360		
135239-OSCT	C	MI	171	20190506	20190506	N	PA361	APPROVAL SAHAL	PVCA		-1.4	-2	31.8	PA	PA361		
143062-OSCT	C	AC	171	20190503	20190503	Y					0.4	0	-2.1	PA	PA360		
143100-OSCT	G	NI	171	20190429	20190429	N	PA363	APPROVAL			0.2	1	-5.1	PA	PA363		
143101-OSCT	G	MI	171	20190429	20190429	N	PA364	APPROVAL SAHAL			-0.1	-1	43.7	PA	PA364		
143102-OSCT	G	AC	171	20190429	20190429	Y	PA364	REF			-0.7	0	41.7	PA	PA362		
127592-OSCT	C	NI	171	20190325	20190325	N	PA363	APPROVAL			-0.2	1	31	PA	PA363		
135234-OSCT	C	NI	171	20190325	20190325	N	PA364	APPROVAL			0	0	24.4	PA	PA364		
127582-OSCT	G	MI	171	20190218	20190218	N	PA364	APPROVAL PVCAH			1.1	0	34.1	PA	PA364		
127583-OSCT	G	MI	171	20190218	20190218	N	PA363	APPROVAL 171 OIL	PVCAH		1.1	-1	31.2	PA	PA363		
127591-OSCT	C	AC	171	20190211	20190211	Y					-0.5	0	24.9	PA	PA362		
127580-OSCT	G	OC	171	20190211	20190211	Y	PVCAH				0.5	0	20	PA	PA362		
127590-OSCT	C	AC	171	20190201	20190201	Y					-0.4	0	34.4	PA	PA362		
127589-OSCT	C	AC	171	20190119	20190119	Y					-0.4	0	38.1	PA	PA362		
127588-OSCT	C	AC	171	20181117	20181117	Y					-0.6	0	19.8	PA	PA362		
127585-OSCT	C	NI	171	20180716	20180716	N	171	INFORUN			-0.3	0	36.4	PA	PA362		
127578-OSCT	G	NI	171	20180614	20180614	N	171	INFORUN			0.1	0	36.1	PA	PA362		
127596-OSCT	B	NI	171	20180406	20180406	N	171	INFORUN			-0.5	1	0	PA	PA358		
											Average	-0.073	-0.091	25.209	N Size	22	
											Std.	0.662	1.019	13.802			
											Current 171	Average	-0.233	0.333	24.167	N Size	3
											Targets	Std.	0.306	0.577	20.929		

The TMC was requested to graphically plot the FL and PA data above to compare the results for TMC 117 with n=3 vs. the n=21 for FL and n=22 for PA. Once graphed, the Panel will review the data to determine the next steps for revising TMC 117 limits.

A motion made by D. Bell and 2nd by B. Grinfield was unanimously approved with 10 votes to adjourn the OSCT Panel meeting at 3:08 pm on 8/7/2019.

Respectfully Submitted,



Donald Bell/OSCT Chairman

Appendix

Table I: OSCT Acceptance Bands –Test History % Volume Increase

Oil	Elastomer	N Size	PVCA					Start Date	End Date
			Mean	Standard Dev.	K Value	Lower Limit	Upper Limit		
168	NI	138	1.326	1.473	2.2	-1.915	4.567	20090311	99999999
	NI	38	1.326	0.1388	2.2	1.021	1.631	20090301	20090310
	NI	13	1.424	0.1295	2.2	1.139	1.709	20060707	20090228
169	FL	18	4.4	0.71	2.2	2.838	5.962	20120307	99999999
	NI	22	11.8	1.71	2.2	8.038	15.562	20120307	99999999
	PA	19	13.1	1.43	2.2	9.954	16.246	20120307	99999999
	FL	18	4.4	0.2	2.2	3.960	4.840	20111118	20120306
	NI	22	11.8	0.21	2.2	11.338	12.262	20111118	20120306
	PA	19	13.1	0.77	2.2	11.406	14.794	20111118	20120306
	FL	141	6.199	0.708	2.2	4.641	7.757	19000000	20111117
	NI	119	18.444	1.7057	2.2	14.691	22.197	19000000	20111117
	PA	144	19.624	1.4348	2.2	16.467	22.781	19000000	20111117
170	NI	12	2.275	0.449	2.2	1.287	3.263	20160124	20180821
	NI	32	1.5	0.718	2.2	-0.080	3.080	20180822	99999999
171	PA	3	-0.233	0.306	2.2	-0.906	0.440	20180821	99999999
	FL	3	1.467	0.306	2.2	0.794	2.140	20180821	99999999
160-1	FL	141	2.053	0.4075	2.2	1.157	2.950	19000000	99999999
	PA	144	0.343	0.4473	2.2	-0.641	1.327	19000000	99999999

Table II: OSCT Acceptance Bands –Test History Shore Hardness

Oil	Elastomer	N Size	SAHA					Start Date	End Date
			Mean	Standard Dev.	K Value	Lower Limit	Upper Limit		
168	NI	138	3	1.89	2.2	-1.158	7.158	20090311	99999999
	NI	38	3	0.79	2.2	1.262	4.738	20090301	20090310
	NI	13	3	1.49	2.2	-0.278	6.278	20060707	20090228
169	FL	18	0.1	1.3	2.2	-2.760	2.960	20120307	99999999
	NI	22	-8.6	2.18	2.2	-13.396	-3.804	20120307	99999999
	PA	19	-16	2.83	2.2	-22.226	-9.774	20120307	99999999
	FL	18	0.1	0.83	2.2	-1.726	1.926	20111118	20120306
	NI	22	-8.6	1.43	2.2	-11.746	-5.454	20111118	20120306
	PA	19	-16	1.73	2.2	-19.806	-12.194	20111118	20120306
	FL	141	1.6	1.3	2.2	-1.260	4.460	19000000	20111117
	NI	119	-16.1	2.18	2.2	-20.896	-11.304	19000000	20111117
	PA	144	-24.9	2.83	2.2	-31.126	-18.674	19000000	20111117
170	NI	12	1.5	0.674	2.2	0.017	2.983	20160124	20180821
	NI	32	2.325	0.341	2.2	1.575	3.075	20180822	99999999
171	PA	3	0.333	0.577	2.2	-0.936	1.602	20180821	99999999
	FL	3	-0.667	0.577	2.2	-1.936	0.602	20180821	99999999
160-1	FL	141	1.6	1.36	2.2	-1.392	4.592	19000000	99999999
	PA	144	-1.8	1.16	2.2	-4.352	0.752	19000000	99999999

Table III: OSCT Acceptance Bands –Test History % Elongation Change

Oil	Elastomer	N Size	PELA					Start Date	End Date
			Mean	Standard Dev.	K Value	Lower Limit	Upper Limit		
168	NI	138	-74.52	6.965	2.2	-89.843	-59.197	20090311	99999999
	NI	38	-74.52	1.599	2.2	-78.038	-71.002	20090301	20090310
	NI	13	-74.22	2.422	2.2	-79.548	-68.892	20060707	20090228
169	FL	18	-39.5	6.99	2.2	-54.878	-24.122	20120307	99999999
	NI	22	-16.2	10.69	2.2	-39.718	7.318	20120307	99999999
	PA	19	49.2	21.82	2.2	1.196	97.204	20120307	99999999
	FL	18	-39.5	6.85	2.2	-54.570	-24.430	20111118	20120306
	NI	22	-16.2	5.37	2.2	-28.014	-4.386	20111118	20120306
	PA	19	49.2	21.82	2.2	1.196	97.204	20111118	20120306
	FL	141	-34.57	6.989	2.2	-49.946	-19.194	19000000	20111117
	NI	119	10.43	10.691	2.2	-13.090	33.950	19000000	20111117
170	NI	12	-72.75	3.416	2.2	-80.265	-65.235	20160124	20180821
	NI	32	-70.68	3.007	2.2	-77.295	-64.065	20180822	99999999
171	PA	3	24.167	20.929	2.2	-21.877	70.211	20180821	99999999
	FL	3	-42.6	4.2	2.2	-51.840	-33.360	20180821	99999999
160-1	FL	141	-47.65	5.506	2.2	-59.763	-35.537	19000000	99999999
	PA	144	23.04	14.289	2.2	-8.396	54.476	19000000	99999999

Table IV: OSCT Acceptance Bands –Test History % Volume Increase

Oil	Elastomer	N Size	PVCA					Start Date	End Date
			Mean	Standard Dev.	K Value	Lower Limit	Upper Limit		
168	NI	138	1.326	1.473	2.2	-2	5	20090311	99999999
	NI	38	1.326	0.1388	2.2	1	2	20090301	20090310
	NI	13	1.424	0.1295	2.2	1	2	20060707	20090228
169	FL	18	4.4	0.71	2.2	3	6	20120307	99999999
	NI	22	11.8	1.71	2.2	8	16	20120307	99999999
	PA	19	13.1	1.43	2.2	10	16	20120307	99999999
	FL	18	4.4	0.2	2.2	4	5	20111118	20120306
	NI	22	11.8	0.21	2.2	11	12	20111118	20120306
	PA	19	13.1	0.77	2.2	11	15	20111118	20120306
	FL	141	6.199	0.708	2.2	5	8	19000000	20111117
	NI	119	18.444	1.7057	2.2	15	22	19000000	20111117
170	NI	12	2.275	0.449	2.2	1	3	20160124	20180821
	NI	32	1.5	0.718	2.2	0	3	20180822	99999999
171	PA	3	-0.233	0.306	2.2	-1	0	20180821	99999999
	FL	3	1.467	0.306	2.2	1	2	20180821	99999999
160-1	FL	141	2.053	0.4075	2.2	1	3	19000000	99999999
	PA	144	0.343	0.4473	2.2	-1	1	19000000	99999999

Table V: OSCT Acceptance Bands –Test History Shore Hardness

Oil	Elastomer	N Size	SAHA					Start Date	End Date
			Mean	Standard Dev.	K Value	Lower Limit	Upper Limit		
168	NI	138	3	1.89	2.2	1	7	20090311	99999999
	NI	38	3	0.79	2.2	1	5	20090301	20090310
	NI	13	3	1.49	2.2	0	6	20060707	20090228
169	FL	18	0.1	1.3	2.2	-3	3	20120307	99999999
	NI	22	-8.6	2.18	2.2	-13	-4	20120307	99999999
	PA	19	-16	2.83	2.2	-22	-10	20120307	99999999
	FL	18	0.1	0.83	2.2	-2	2	20111118	20120306
	NI	22	-8.6	1.43	2.2	-12	-5	20111118	20120306
	PA	19	-16	1.73	2.2	-20	-12	20111118	20120306
	FL	141	1.6	1.3	2.2	-1	4	19000000	20111117
	NI	119	-16.1	2.18	2.2	-21	-11	19000000	20111117
	PA	144	-24.9	2.83	2.2	-31	-19	19000000	20111117
170	NI	12	1.5	0.674	2.2	0	3	20160124	20180821
	NI	32	2.325	0.341	2.2	2	3	20180822	99999999
171	PA	3	0.333	0.577	2.2	-1	2	20180821	99999999
	FL	3	-0.667	0.577	2.2	-2	1	20180821	99999999
160-1	FL	141	1.6	1.36	2.2	-1	5	19000000	99999999
	PA	144	-1.8	1.16	2.2	-4	1	19000000	99999999

Table VI: OSCT Acceptance Bands –Test History % Elongation Change

Oil	Elastomer	N Size	PELA					Start Date	End Date
			Mean	Standard Dev.	K Value	Lower Limit	Upper Limit		
168	NI	138	-74.52	6.965	2.2	-90	-59	20090311	99999999
	NI	38	-74.52	1.599	2.2	-78	-71	20090301	20090310
	NI	13	-74.22	2.422	2.2	-80	-69	20060707	20090228
169	FL	18	-39.5	6.99	2.2	-55	-24	20120307	99999999
	NI	22	-16.2	10.69	2.2	-40	7	20120307	99999999
	PA	19	49.2	21.82	2.2	1	97	20120307	99999999
	FL	18	-39.5	6.85	2.2	-55	-24	20111118	20120306
	NI	22	-16.2	5.37	2.2	-28	-4	20111118	20120306
	PA	19	49.2	21.82	2.2	1	97	20111118	20120306
	FL	141	-34.57	6.989	2.2	-50	-19	19000000	20111117
	NI	119	10.43	10.691	2.2	-13	34	19000000	20111117
	PA	144	68.88	17.85	2.2	30	108	19000000	20111117
170	NI	12	-72.75	3.416	2.2	-80	-65	20160124	20180821
	NI	32	-70.68	3.007	2.2	-77	-64	20180822	99999999
171	PA	3	24.167	20.929	2.2	-22	70	20180821	99999999
	FL	3	-42.6	4.2	2.2	-52	-33	20180821	99999999
160-1	FL	141	-47.65	5.506	2.2	-60	-36	19000000	99999999
	PA	144	23.04	14.289	2.2	-8	54	19000000	99999999

OIL SEAL COMPATIBILITY SURVEILLANCE PANEL

Date: August 7, 2019

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OIL SEAL COMPATIBILITY SURVEILLANCE PANEL

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OIL SEAL COMPATIBILITY SURVEILLANCE PANEL

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OIL SEAL COMPATIBILITY SURVEILLANCE PANEL

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