

ASTM D-7038 (L-33-1) MOISTURE CORROSION TEST  
SURVEILANCE PANEL MEETING

November 13, 2019  
SWRI Ann Arbor  
Ann Arbor, Michigan

## Agenda

I. Call to Order

II. Approval of Minutes

August 8, 2019 PRI Headquarters, Warrendale, PA

Motion:

Second:

Vote:

III. Business

a. Membership review Voting Members

<b>Name</b>	<b>Company</b>
Banas, Rob	ExxonMobil
Beck, Dylan	TMC
Cabaj, Michael	Linamar
Comfort, Allen	US Army CCDC-GVSC
Drlja, Kristijan	Lubrizol
Muranski, Troy	AAM
Goyal, Arjun	BASF
Rabinowitz, Danial	Meritor
Sangpeal, Matt	Afton
Smith, Dale	Intertek
Stevens, Mary	SWRI
Ved, Chintan	Ford Motors
Zreik, Khaled	General Motors
Zyski, Amy	Dana

b. New Hardware Update Test discussion on two axles per lab.

i. Hardware differences presentation

Pinion seal part number

ii. Pinion flange difference

c. Correction presentation for areas 2 and 3

IV. Additional Discussion / New Business?

V. Summary of Action Items

VI. Adjourn

Thank you,  
Dale B. Smith  
ASTM D-7038 Chairman

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## Minutes

### I. Call to Order

### II. Approval of Minutes

August 8, 2019 PRI Headquarters, Warrendale, PA

Motion: Wes Venhoff

Second: Daniel Rabinowitz

Vote: Unanimous

### III. Business

#### a. Membership review Voting Members

Remove Mary Stevens from the member list and add Rebecca Warden to replace her.

Motion: Wes Venhoff

Second: Arjun Goyal

Vote: Unanimous

Danial Jessica La Bond requested as alternate for Daniel Rabinowitz Meritor

<b>Name</b>	<b>Company</b>
Banas, Rob	ExxonMobil
Beck, Dylan	TMC
Cabaj, Michael	Linamar
Comfort, Allen	US Army CCDC-GVSC
Drlja, Kristijan	Lubrizol
Muranski, Troy	AAM
Goyal, Arjun	BASF
Rabinowitz, Daniel	Meritor alternate: Jessica La Bond
Sangpeal, Matt	Afton
Smith, Dale	Intertek
Warden, Rebecca	SWRI
Ved, Chintan	Ford Motors
Zreik, Khaled	General Motors
Zyski, Amy	Dana

#### b. New Hardware Update Test discussion on two axles per lab.

##### i. Hardware differences presentation Attached

#### c. Correction presentation for areas 2 and 3 Attached CF presentation

The group discussed how this is a strong method of correction of areas that are driving severity on the K2XX axles so a motion to approve was entered:

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Motion: Remove the 0.6 correction to the K2XX hardware. Use a new +1 correction to areas #2 and #3 only on the K2XX going forward with implementation scheduled January 2,2020.

Motion: Wes Venhoff

Second: Daniel Rabinowitz

Vote: 11 In favor, 1 abstain, 0 Negatives

IV. Additional Discussion / New Business?

- a. Labs agree that the T1XX hardware prototype is appropriate and discussed a new batch. The chair is to coordinate the orders and timing with AAM. A 5-year order was deemed appropriate based on timing, history and industry usage. The labs are to get their needs for a T1XX 5-year order to the chair before December 6 so the chair can coordinate quotes and timing with AAM for the new year.

Motion: Wes Venhoff

Second: Arjun Goyal

Vote: Unanimous

V. Summary of Action Items

- a) Approve a new +1 correction to areas 2 & 3 and remove the overall +0.6 from the K2XX hardware beginning 1/2/20
- b) Order a new batch or T1XX hardware targeting 2020 ASAP to begin deliveries

VI. Adjourn

Thank you,  
Dale B. Smith  
ASTM D-7038 Chairman

# ASTM D7038 (L-33-1) AXLE DESIGN CHANGE DIFFERENCES

**AAM K2XX Axle replaced by T1XX Axle**

The T1XX axle has some minor external changes from the K2XX axle



# 01

## THE OVERALL INTERNAL AXLE IS THE SAME AS K2XX

There are no changes in tools or preparation for this unit



**02**

**THE REAR COVER IS THE SAME  
WITH TWO MINOR CHANGES  
TO THE HOUSING OUTSIDE THE  
TEST AREA**



# 03

## THE PINION FLANGE IS THE MAJOR MOTORING INSTALL CHANGE

This pinion flange is an 8 bolt piloted flange instead of a yoke end. Based on the Intertek motoring stand the new flange can be used without modifications to our motoring stand.



# 04

## PINION FLANGE INSTEAD OF PINION YOKE PINION SEAL CHANGES TOO!!!

Compound U-joint needed

A Spicer 5-460X combination u-joint can be used to fit the historic dana model 30 driveshafts. This is the same U-joint that the current K2XX axle uses to mount.

A Spicer parts option!

Spicer 3-2-1859 flange 4.750 bolt circle exact match only uses 4 bolts instead of 8 bolt flanges, not a problem for L-33 as it is run without load. Pilot for axle flange slightly smaller. Pinion flange has a 2.956 pilot flange yoke has a 2.953 pilot. This will need about 0.003" machined from the ID of the piece to fit the axle. This fits the same u-joint size as the K2XX yoke and leaves similar length for clearance to the axle on the motoring stand.

Pinion seal for the T1XX is **Not** the same as the K2XX

OEM GM 84428304 pinion seal was found to fit this new T1XX flange. The OD of the flange is smaller than the K2XX yoke.



05

**THE VENT HOLE LOCATION  
HAS CHANGED 45DEG ANGLE  
TO THE FRONT OF THE AXLE**



# 06

## THE VENT HOLE ANGLE 45DEG

### Vent Tube Placement Change

The vent is at a 45deg and a ¼” NPT SS street L can be used to modify the event system.

We used McMaster 48805K28 Precision Extreme-Pressure 316SS fitting 45degree Elbow adapter, 1/4” NPT street “L”, Female x Male. Mainly for the small size to turn into the housing.

I did ask my mechanic if the 45 gave him problems with the water add and it worked fine.

# 07

## CURRENT RATINGS T1XX AXLE

Preliminary numbers for review

LTMSLAB	IND	LTMSDATE	SPECIAL	RUST	RCDCPINC	RCDCDFGC	RCDCDFGS	RCDCAXHC	RCDCDGR	RCDCDPIN	RCBDPNR	RCBDPNC	RCBDFCR	RCBDFCC
G	155-1	20190828	T1XX	9.6	10	10	10	8	9	10	10	10	10	10
B		20191106	T1XX	9.6	10	10	10	8	10	9	10	10	10	10
A1	155-1	20191016	K2XX	9	10	8	8	8	10	10	10	9	10	10
B1	123-2	20191030	T1XX	8.4	10	8	9	8	8	8	8	10	8	8
A1	123-2	20191029	K2XX	8.4	9	8	8	8	8	9	8	10	8	9
G	123-2	20191112	T1XX	8.4	9	8	8	8	8	8	10	10	8	9



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# L-331 SP Meeting



Correction Factor Investigation –  
Areas 2 and 3

*Test Monitoring Center*

<http://astmtmc.cmu.edu>



A Program of ASTM International

# L-331 Area 2 & 3 Correction Factor Investigation

- During the August surveillance panel meeting the panel reviewed the results of the 7 rating investigation from the last few workshop
  - The use of a 7 was concentrated mainly in rating areas 2 and 3
- The Panel asked TMC to investigate what the historical results would look like if a correction factor of 1 was applied to areas 2 and 3 for AAM hardware and compared to the results of the Dana hardware.
  - It was asked that the 0.6 total correction factor not be used
    - This is not used for reference tests and only candidates
  - Dana hardware result will not have any correction factors applied

# L-331: Correction Factor Calculation Example

Areas	Rust Rating	Weighting Factor	Weighted Rust
1	10	* 0.087	0.870
2	8 (+1=9)	* 0.193	1.544 (1.737)
3	8 (+1=9)	* 0.094	0.752 (0.846)
4	8	* 0.169	1.352
5	10	* 0.079	0.790
6	10	* 0.079	0.790
7	10	* 0.051	0.510
8	10	* 0.083	0.830
9	10	* 0.071	0.710
10	10	* 0.094	0.940
		Total Rust =	9.1 (9.4)



# L-331: Correction Factor – AAM Total Rust Results

testkey	ltmslab	val	ind	ltmsdate	CHART	RUST	SPECIAL	Total Rust (CF Applied)	
109626-L331	B1	AC	123-2	20160726	Y	8.2	K2XX	8.5	
114328-L331	G	AC	123-2	20160920	Y	8.2	K2XX	8.5	
109627-L331	B1	AC	123-2	20161215	Y	8.2	K2XX	8.5	
109212-L331	A1	AC	123-2	20170131	Y	8.3	K2XX	8.6	
119050-L331	A1	AC	123-2	20170214	Y	7.4	K2XX	7.7	
109628-L331	B1	AC	123-2	20170406	Y	8.1	K2XX	8.4	
109629-L331	B1	AC	123-2	20170511	Y	7.7	K2XX	8.0	
119051-L331	A1	AC	123-2	20170530	Y	8.3	K2XX	8.5	
119052-L331	A1	AC	123-2	20170919	Y	8.3	K2XX	8.6	
122902-L331	B1	AC	123-2	20170928	Y	8.3	K2XX	8.5	
124980-L331	G	AC	123-2	20171011	Y	8.4	K2XX	8.7	
124973-L331	A1	AC	123-2	20171206	Y	8.6	K2XX	8.9	
124974-L331	A1	AC	123-2	20180116	Y	8	K2XX	8.3	
124981-L331	G	AC	123-2	20180213	Y	8.5	K2XX	8.8	
124975-L331	A1	AC	123-2	20180619	Y	8.1	K2XX	8.3	
122903-L331	B1	AC	123-2	20180628	Y	8.5	K2XX	8.8	
122904-L331	B1	AC	123-2	20180925	Y	8.7	K2XX	9.0	
130594-L331	A1	AC	123-2	20190404	Y	8.2	K2XX	8.5	
124983-L331	G	AC	123-2	20190524	Y	8.4	K2XX	8.7	
139983-L331	A1	AC	123-2	20190607	Y	8.5	K2XX	8.8	
					AVG:	8.2			
								Total Rust Avg.	8.5
								N Size	20

# L-331: Correction Factor – AAM Total Rust Results

testkey	ltmslab	val	ind	ltmsdate	CHART	RUST	SPECIAL	Total Rust (CF Applied)		
109208-L331	A1	OC	155-1	20160720	Y	9.7	K2XX	9.9		
109209-L331	A1	OC	155-1	20160729	Y	9.1	K2XX	9.4		
119047-L331	A1	AC	155-1	20160805	Y	9.1	K2XX	9.4		
119048-L331	A1	AC	155-1	20160810	Y	9.1	K2XX	9.4		
119049-L331	A1	OC	155-1	20161124	Y	9.4	K2XX	9.7		
119641-L331	A1	OC	155-1	20161222	Y	9.5	K2XX	9.8		
119640-L331	A1	OC	155-1	20161227	Y	8.9	K2XX	9.2		
119642-L331	A1	AC	155-1	20170117	Y	9.1	K2XX	9.4		
123084-L331	A1	AC	155-1	20170126	Y	9.1	K2XX	9.4		
108361-L331	G	AC	155-1	20170317	Y	9.3	K2XX	9.5		
112370-L331	B1	AC	155-1	20170502	Y	9.1	K2XX	9.4		
123085-L331	A1	AC	155-1	20170627	Y	9.1	K2XX	9.4		
123086-L331	A1	OC	155-1	20170907	Y	9.8	K2XX	10.1		
123087-L331	A1	AC	155-1	20171013	Y	9.1	K2XX	9.4		
122898-L331	B1	AC	155-1	20171031	Y	9.5	K2XX	9.8		
122899-L331	B1	AC	155-1	20171114	Y	9.1	K2XX	9.4		
108362-L331	G	AC	155-1	20180613	Y	9.1	K2XX	9.4		
123088-L331	A1	AC	155-1	20180814	Y	9.3	K2XX	9.5		
123089-L331	A1	OC	155-1	20181016	Y	9.7	K2XX	9.9		
130595-L331	A1	OC	155-1	20181107	Y	9	K2XX	9.3		
130596-L331	A1	AC	155-1	20181126	Y	9.6	K2XX	9.9		
114325-L331	G	AC	155-1	20181128	Y	9.3	K2XX	9.6		
130597-L331	A1	AC	155-1	20181224	Y	9.4	K2XX	9.7		
122900-L331	B1	AC	155-1	20190409	Y	9.1	K2XX	9.4		
122901-L331	B1	OC	155-1	20190709	Y	9	K2XX	9.3		
139385-L331	B1	AC	155-1	20190724	Y	9.3	K2XX	9.6		
139984-L331	A1	OC	155-1	20190815	Y	9.7	K2XX	9.9		
139985-L331	A1	OC	155-1	20190827	Y	9.1	K2XX	9.4		
					<b>AVG.</b>	<b>9.3</b>			<b>Total Rust Avg.</b>	<b>9.5</b>
									<b>N Size</b>	<b>28</b>

# L-331: Correction Factor Investigation – Summary

<b>Hardware</b>	<b>Oil</b>	<b>N Size</b>	<b>Average of Total Rust Numbers without CF</b>	<b>Average of Total Rust with CF</b>
AAM K2XX	123-2	20	8.2	8.5
	155-1	28	9.3	9.5
Dana V01.1	123-2	93	8.7	Not Applied
	155-1	29	9.4	Not Applied

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November 13, 2019

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