MESILLA VALLEY TRANSPORTATION SOLUTIONS CERTIFIED
Fuel Economy Experts

TEST REPORT

MVT SOLUTIONS CERTIFIED™ FUEL ECONOMY TEST

SEPTEMBER 2020

MICHELIN TRAILER END SOLUTION (TES) AND ENERGY GUARD (MEG)

TES (WITH SKIRTS)

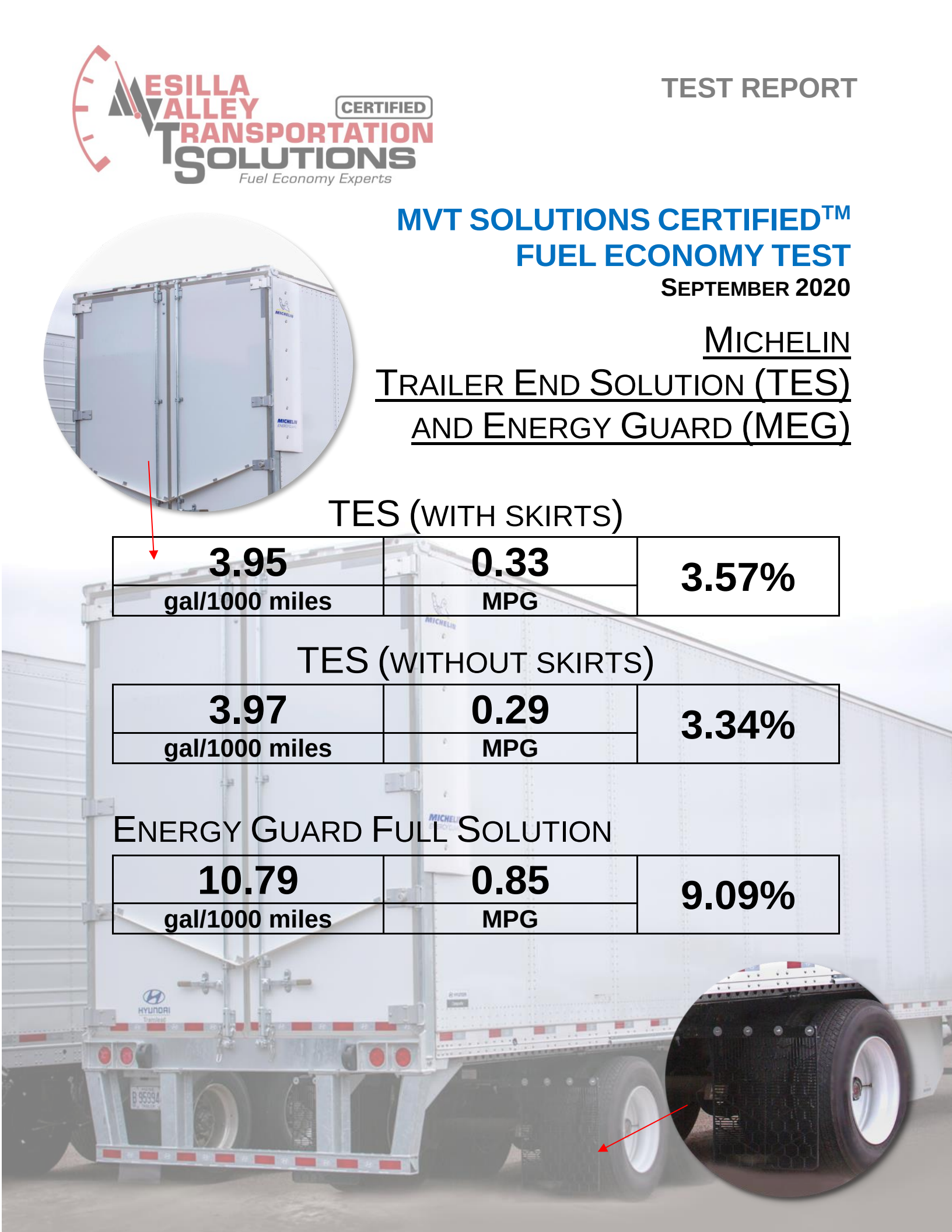
3.95	**0.33**	**3.57%**
gal/1000 miles	**MPG**	

TES (WITHOUT SKIRTS)

3.97	**0.29**	**3.34%**
gal/1000 miles	**MPG**	

ENERGY GUARD FULL SOLUTION

10.79	**0.85**	**9.09%**
gal/1000 miles	**MPG**	



1.0: INTRODUCTION

Mesilla Valley Transportation Solutions ("MVTS" or "MVT Solutions") certifies the fuel savings described in this report. **Note:** this report was designed for carriers and providing information relevant to their needs. Therefore, the format varies from traditional fuel economy and technical reports. The Report Summary provides the reader a quick synopsis of the fuel savings. Following the Summary is the body of the report and further details on the subjects. This fuel economy test was performed using MVTS proprietary fuel economy test methods. These test methods were developed from race car engineering and advanced vehicle test methods, which the Mesilla Valley Transportation ("fleet" or "MVT") has relied on since 2012 to identify substantial fuel savings. The MVTS methods provide highly accurate and reliable answers on real-world fuel savings in comparison to other test methods, which enables carriers to make the best decisions for their company. Contact MVTS with any questions regarding the product or test. As part of an MVTS Certified™ test, MVTS supports product inquiries, which we encourage carriers to utilize.

Note: blue text indicates a link to the topic. Click to follow. Alt + ← returns the reader to the initial location.

2.0: TEST SUMMARY

The Michelin Energy Guard (MEG) system for trailer aerodynamics was tested as the rear components only, which include side fairings, top fairing, wake reducer, and mud flaps. This system is called the Trailer End Solution (TES) and was tested with and without trailer skirts installed. The MEG full solution was also tested, which was the third MVTS Certified test of that system. The fuel savings of the **Michelin Trailer End Solution without skirts was 3.95 gal/1000 miles (3.57%).** The fuel savings of the **Trailer End Solution with skirts was 3.97 gal/1000 miles (3.34%).** The fuel savings of the **Michelin Energy Guard full solution was 10.79 gal/1000 miles (9.09%).** This value was slightly higher than the 2019[1] test of 10.00 gal/1000 miles (8.75%) and the March 2020 test of 10.31 gal/1000 miles (7.62%). The small variation in fuel savings can be related to slight changes in vehicle specifications.

Testing was conducted on a 9-mile test track at 65 miles per hour and a Gross Vehicle Weight (GVW) of 45,000 lbs. Vehicles were modern Class-8 with 53-foot dry van trailers. Test results can be found below in Table 1.

[1] http://www.m-v-t-s.com/company/michelin/

Table 1: Results Summary

	Fuel Economy Improvement		
	Gal/1000 miles	MPG	Percent
MEG Trailer End Solution (with skirts)	**3.95**	0.33	3.57%
MEG Trailer End Solution (without skirts)	**3.97**	0.29	3.34%
MEG Full System	**10.79**	0.85	9.09%

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3.0: TEST PROCEDURE

The two (2) vehicles ran simultaneously, at 65 mph, on the 9-mile circle track near Pecos, Texas. The vehicles were 1-minute apart, avoiding any aerodynamic influence on either vehicle during testing. The vehicles were termed “Compare Vehicle” and “Test Vehicle”. The Compare Vehicle remained unchanged throughout testing; it was used solely for comparison. The Test Vehicle had modifications made during the test (*i.e.* Michelin technologies changed).

The test procedure may appear similar to the SAE J1321 method traditionally used in the trucking industry; however, the MVTS methods are a much more advanced and precise form of on-road and track testing. The vehicles are equipped with sensors and data recording systems that collect data on fuel consumption, aerodynamics, rolling resistance, driver behavior and many other variables that affect fuel consumption. The data is analyzed using MVTS proprietary methods, which provide very accurate answers on fuel savings. Additionally, the test results can be scientifically translated to a carrier’s real-world daily operations and long-term savings, which is a feature unique to these methods. Overall, the MVTS test methods are a much more advanced and reliable tool for predicting fuel savings than the trucking industry has used previously.

3.1: TEST VEHICLES

Test vehicles were 2019 International LT 625’s with Cummins X15 15-Liter engines and Eaton Endurant 12-speed Automated Manual Transmissions (AMT). Trailers were 53-foot Hyundai dry vans. Gross Vehicle Weight (GVW) was 45,000 lbs. Both trucks were equipped with Ex-Guard grill guards, which were previously tested and showed no negative influence on fuel consumption. The Compare vehicle remained unchanged throughout all tests. The Test vehicle configuration was changed between test runs. Trucks and trailers used dual tires. Tire pressures were set at 110 psi in the morning, prior to incurring any effect of daytime heat. Vehicle info can be found in the Appendix.

Vehicles were thoroughly inspected and received regular maintenance prior to testing. It should also be noted, for the reader’s piece of mind, Mesilla Valley Transportation (MVT) and MVT Solutions are 100% confident in the reliable condition of the test vehicles. MVT fleet uses the same vehicle data and test procedures for their own internal purchase decisions.

Figure 1: Test Vehicles

Figure 2: Test Trailers

Test runs were conducted in the order as shown in Table 2.

Table 2: Test Runs

Run	Run Description	Start	End
Run 4	MEG Full Kit	3:12 PM	5:12 PM
Run 5	MEG TES (With skirts)	5:42 PM	7:27 PM
Run 6	Baseline (No trailer aero)	8:27 PM	9:57 PM
Run 7	MEG TES (Without skirts)	10:42 PM	12:12 AM

3.2: MICHELIN ENERGY GUARD (MEG) FULL SOLUTION

Testing began with the MEG full solution installed (Figure 7, Run 4). The Michelin Energy Guard kit has several components: trailer end fairings top (A) and sides (B), wake reducer (C), mud flaps (D) and trailer skirts (E) (Figure 3 - Figure 6). Components A-D comprised the Trailer End Solutions (TES).

Figure 3: End Fairings (Top)

Figure 4: End Fairings (Side) and Wake Reducer

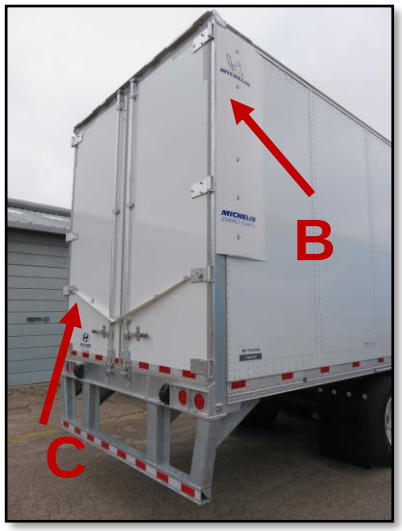


Figure 5: Mud Flaps

Figure 6: Trailer Skirts

Figure 7: Michelin Energy Guard Installed

3.3: TRAILER END SOLUTION (TES) WITH SKIRTS

Run 5 consisted of removing the TES, which left only the MEG trailer skirts installed. Comparing Run 4 versus Run 5 provided fuel savings of the TES with trailer skirts value. Figure 3 through Figure 5 show the TES components.

Figure 8: TES Removed

3.4: BASELINE (NO TRAILER AERODYNAMICS)

Run 6 consisted of removing the MEG skirts, which left the trailer with no aerodynamic components. This acted as a Baseline comparison run for the TES without skirts (Run 7) and the MEG Full solution (Run 4).

Figure 9: No Trailer Aerodynamics

3.5: TRAILER END SOLUTIONS WITHOUT SKIRTS

Run 7 consisted re-installing the TES, this time without trailer skirts. Comparing Run 6 and 7 provided the TES without skirts fuel savings results (Figure 10).

Figure 10: TES without Skirts

4.0: VEHICLE FUEL ECONOMY TEST EQUIPMENT

MVT Solutions fuel economy testing utilizes a data acquisition system and sensors specifically for this testing. This style of testing is derived from race car engineering where reliable sensor data is critical to understanding vehicle modifications.

MVTS test sensors include:

- Data acquisition system (records sensor data)
- Fuel flow meter (accurate to 0.2%)
- Fuel temperature sensor
- Tire temperature sensor (infrared, mounted on left-front drive tire)
- Ground/road temperature sensor (infrared, mounted ahead of left-front drive tire)
- Wind speed air pressure sensor (truck hood)
- Wind direction sensor (truck hood)
- Ambient air temperature sensor (truck hood)
- Ambient air pressure sensor (truck cab)
- High Precision GPS (latitude, longitude, altitude, time)

Click this link to see a video of MVTS sensors and testing: How We Test

Figure 11: Aerodynamic Sensors

Figure 12: Data Acquisition System

Figure 13: Fuel Flow Meter

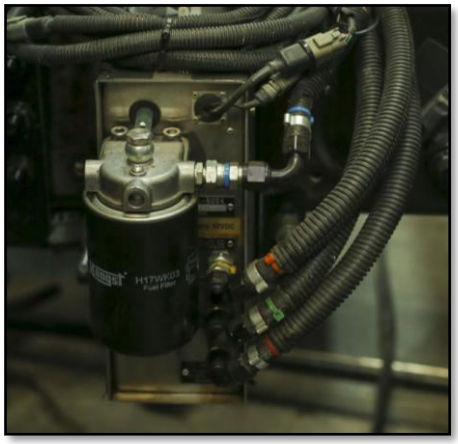
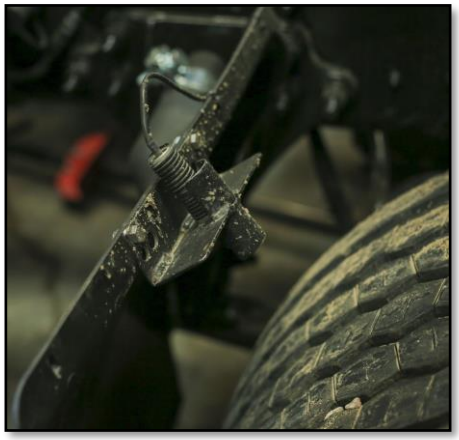


Figure 14: Tire Temp. Sensor



5.0: TEST RESULTS

Testing showed the Michelin Trailer End Solution with skirts saved 3.95 gal/1000 miles (3.57%). The Trailer End Solution without skirts was 3.97 gal/1000 miles (3.34%). The Michelin Energy Guard full solution was 10.79 gal/1000 miles (9.09%). Test results with accuracy are shown below in Table 3. Graphical bar graphs are shown in gal/1000 miles and percent fuel savings in Figure 15 and Figure 16, respectively.

The TES test values were very similar with and without trailer skirts, indicating the TES can be a valuable fuel saving technology in either configuration.

Note: the reader may notice that although the gal/1000 miles savings of the TES without skirts was higher than the TES with skirts, the percent values are opposite. This is due to an inherent flaw in measuring fuel savings as a percent. The test without skirts resulted in a lower Baseline fuel economy due to the trailer being less aerodynamic. Therefore, more fuel was consumed. Since percent fuel saved is a product of fuel saved divided by fuel consumed, and the test without skirts consumed more fuel, the percent test results was lower. This is an example of why MVTS measures fuel savings in gal/1000 miles and not percent.

Table 3: Test Results with Accuracy

	Fuel Economy Improvement		
	Gal/1000 miles	MPG	Percent
MEG Trailer End Solution (with skirts)	**3.95**	0.33	3.57%
Accuracy	**+/- 0.33**	+/- 0.03	+/- 0.30%
MEG Trailer End Solution (without skirts)	**3.97**	0.29	3.34%
Accuracy	**+/- 0.29**	+/- 0.02	+/- 0.25%
MEG Full System	**10.79**	0.85	9.09%
Accuracy	**+/- 0.42**	+/- 0.03	+/- 0.36%

Figure 15: Test Results (gal/1000 miles)

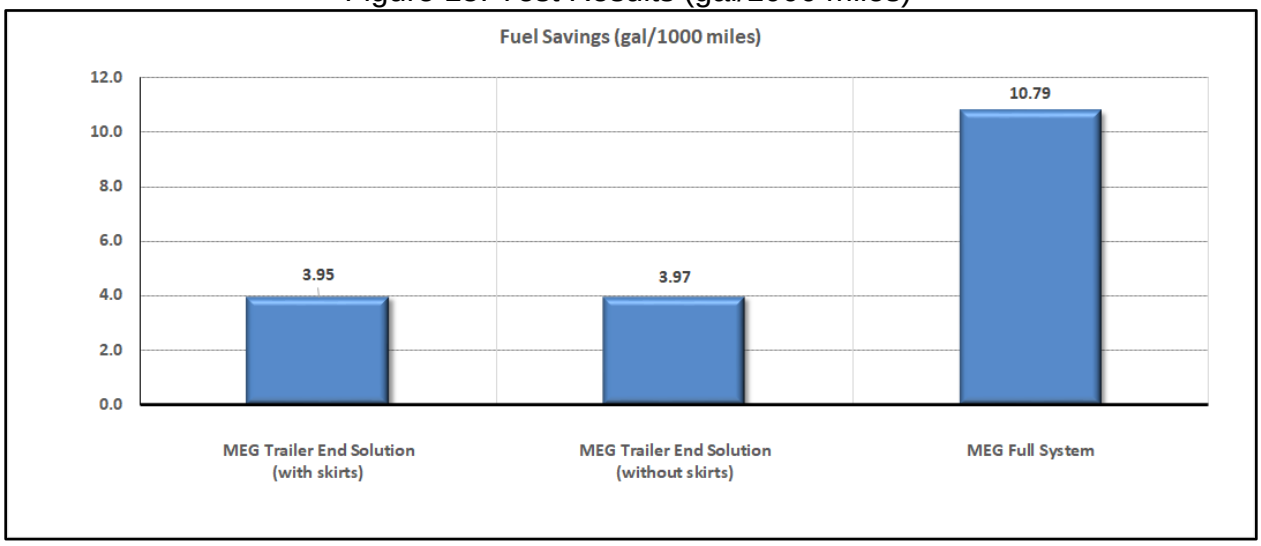
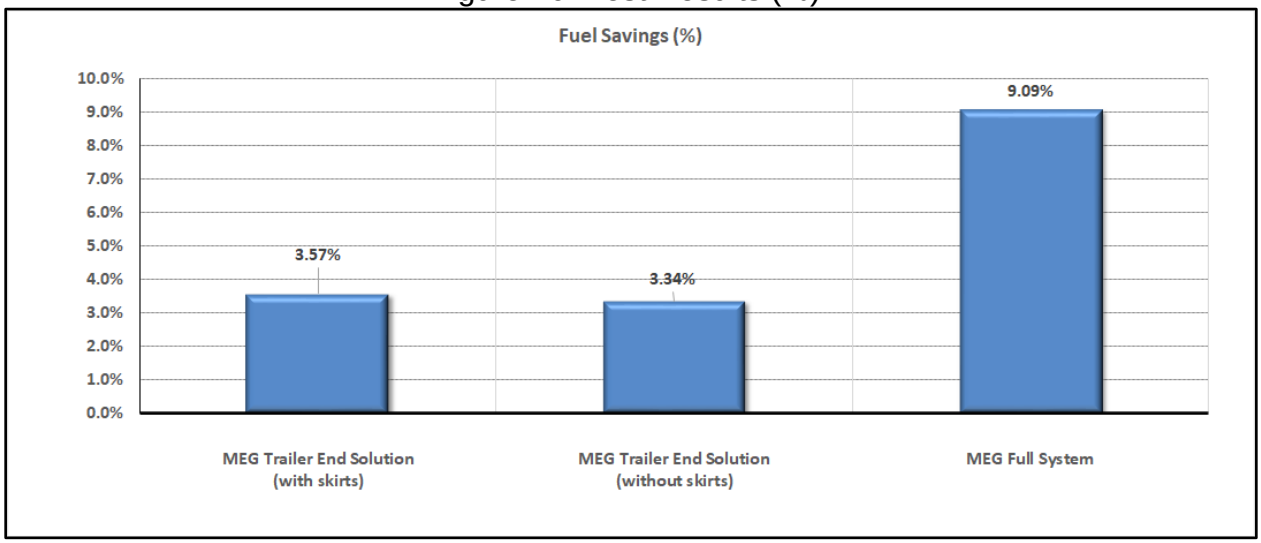


Figure 16: Test Results (%)



5.1: Units of Measurement

The reader may not be familiar with units of gal/1000 miles (gallons per 1000 miles) since it is not traditionally used in the trucking industry. The following paragraphs briefly explain the reasons for these units and how they help carriers better calculate fuel savings.

Units of gal/1000 miles are a more reliable means to calculate fuel savings when compared to other units such as miles-per-gallon (MPG) or percent (%). Those units are prone to error from changing variables such as vehicle baseline fuel economy, load, driver behavior, and duty cycle. For example, a vehicle achieving 9 MPG with a highly aerodynamic configuration will save the same gal/1000 miles as a vehicle achieving 6 MPG. However, the percent fuel savings will be different since percent is based on the baseline fuel economy and the 6 MPG vehicle will use more fuel, which will result in the percent savings value lower. **Note:** this was shown in the Test Results section comparing TES with and without skirts.

5.2: Weather Conditions Summary

Ambient temperature during testing ranged from 52°F to 54°F with winds ranging from 0-9mph. Weather data was acquired from a local Weather Underground weather station and complete data can be found in the Appendix.

The reader should be aware that MVTS methods include instantaneous and constant weather data acquisition on each vehicle, and this testing has minimal dependency on external weather data collection. MVTS test data accounts for changes in wind, temperature, and other pertinent variables instantaneously.

5.3: Measurement Accuracy

The accuracy of fuel economy measurements is critical in determining the trustworthiness of test results. Historically, this has been a major difficulty in the trucking industry with fuel economy testing, which has led to confusion and misleading results. The MVTS test methods overcome this issue by achieving better accuracy, which is one of the ways it provides more reliable test results.

Accuracy for all the tests was calculated using a 95% confidence interval, a common standard for testing measurement. 95% confidence interval indicates that if the test were repeated 100 times, values would fall within the range in 95 out of the 100 tests (*i.e.* the reader would be 95% confident the value would be within that range).

Figure 17 below shows the statistical bell curves of the Michelin Trailer End Solution (TES) with skirts. The graph shows two very distinct curves, indicating a confident difference in fuel savings. The arrow pointing to the left illustrating less fuel used with the TES installed (*i.e.* fuel savings). The distance between the peaks of the bell curves is the test result average, which was 3.95 gal/1000 miles. Minimum and maximum values were calculated as the test result plus or minus the accuracy values (3.95 +/- 0.33), which were 3.62 and 4.28 gal/1000 miles.

Figure 17: Trailer End Solutions with Skirts Bell Curve

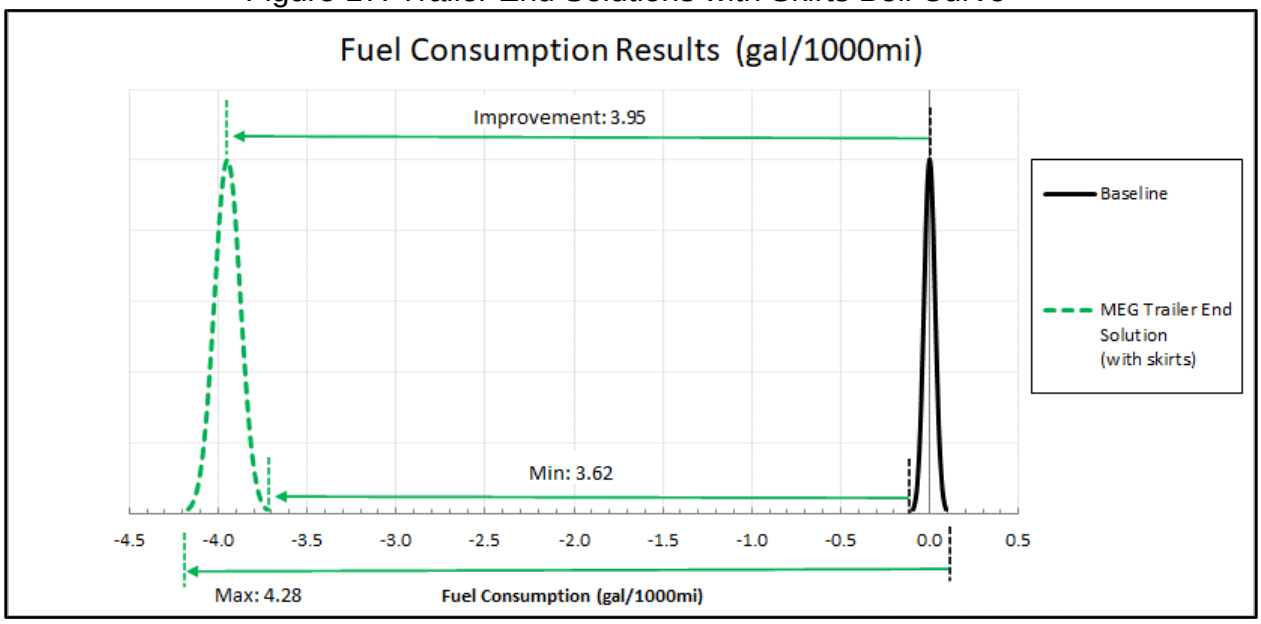


Figure 18 below illustrates the statistical bell curves of the Michelin TES without skirts. The average value was 3.97 gal/1000 miles saved, as indicated by the arrow pointing to the left. Once again, the minimum and maximums are the test result plus or minus the accuracy vales (3.97 +/- 0.29), which were 3.68 and 4.27 gal/1000 miles.

Figure 18: Trailer End Solutions without Skirts Bell Curve

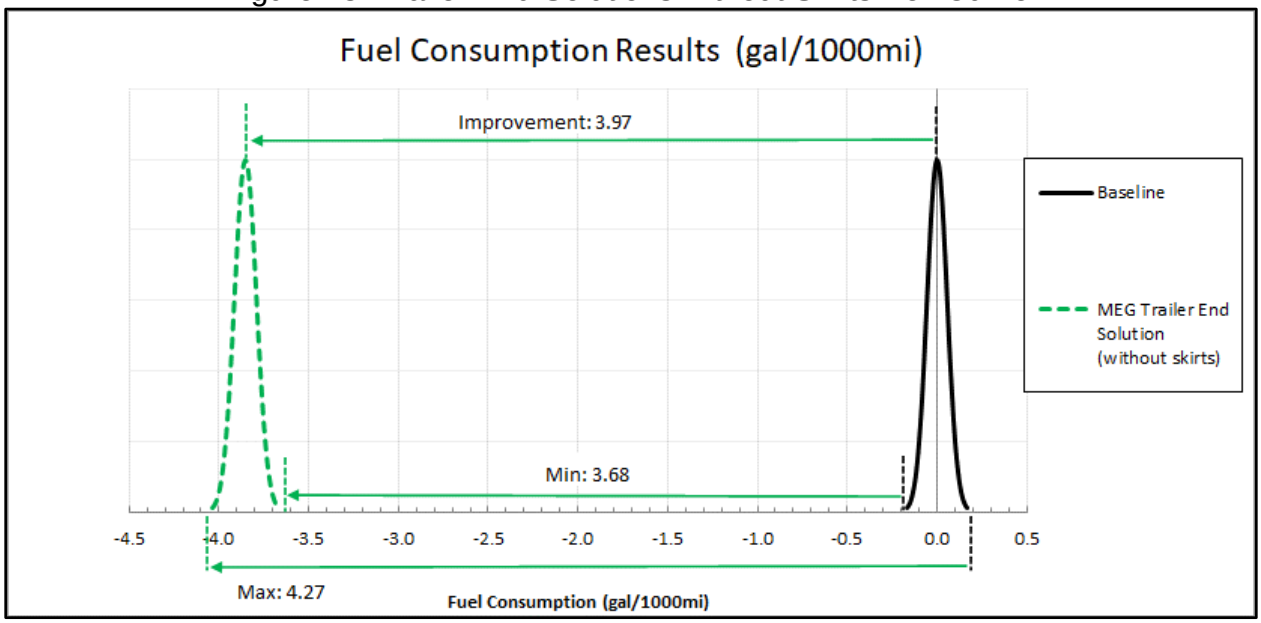
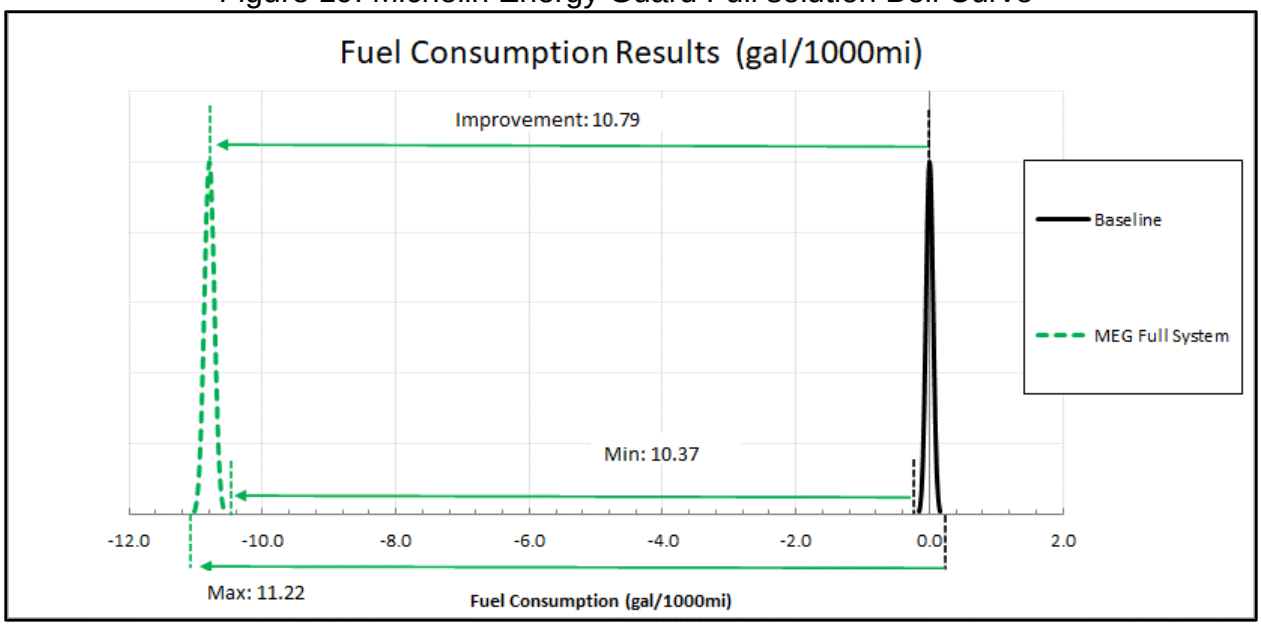


Figure 19 below illustrates the statistical bell curves of the Michelin Energy Guard full solution at 10.79 gal/1000 miles. Accuracy was +/- 0.42 and the minimum and maximum values were 10.37 and 11.22 gal/1000 miles.

Figure 19: Michelin Energy Guard Full solution Bell Curve



6.0: SAVINGS CALCULATIONS

Below is a brief outline of how to use the test results to calculate savings. For more detail or assistance contact MVT Solutions.

6.1: FUEL SAVINGS CALCULATIONS

Fuel savings resulting from this test can be calculated as follows:

$$Fuel\ Savings\ (gal/year) = (Test\ result)\ x\ \frac{(Thousands\ of\ miles\ travelled\ per\ year)}{1000}$$

Test result must be in units of gal/1000 miles (*i.e.* not percent or MPG)

Example: Michelin Trailer End Solutions (TES) with skirts fuel savings of 3.95 gal/1000 miles and 125,000 miles travelled annually:

$$Fuel\ Savings = (3.95\ gal/1000\ miles)x\ \frac{(125{,}000\ miles/year)}{1000} = 494\ gal/year$$

Therefore, the Michelin TES when installed with skirts would save 494 gallons of fuel per year for this vehicle travelling 125,000 miles.

6.2: FINANCIAL SAVINGS CALCULATIONS

Financial calculations can be made by multiplying the fuel saved by the fuel price:

$$Savings\ (\$/year) = (Fuel\ Savings)\ x\ (Price\ of\ fuel)$$

Example: Using the example above and U.S. average retail price of diesel fuel in 2019, $3.056[2] /gal

$Savings\ (\$/year) = \left(494\ \frac{gal}{year}\right)\ x\ \left(\frac{\$3.056}{gal}\right) = \$1{,}510\ /year$ in fuel savings

Therefore, the Michelin TES when installed with skirts would save $1,510 per year in fuel for the vehicle travelling 125,000 miles.

[2] Source: https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD_EPD2DXL0_PTE_NUS_DPG&f=W

6.3: TECHNOLOGY PAYBACK AND RETURN-ON-INVESTMENT

Buyers of fuel economy technologies are highly interested in saving money. For a technology supplier to be successful, their technology must save their potential customers money and many fleets consider the number of months required for the technology to pay for itself as a buying qualification, which is referred to as 'payback' in trucking or sometimes ROI.

$$Payback\ (months) = \frac{(Product\ cost)}{(Savings\ (\$/year)}\ x\ (12\ months/year)$$

Example @$800 Product cost, 2:1 trailer to tractor ratio: **Note**: the Product Cost is fictitious and used only for example purposes. Contact a Michelin sales representative or trailer OEM for pricing.

$$Payback\ (months) = \frac{(Product\ Cost)}{(Savings\ (\$/year)}\ x\ (12\ months/year)$$

$$Payback\ (months) = \frac{2x\ (\$800)}{(\$1{,}510\ /year)}\ x\ \left(12\frac{months}{year}\right) = 12.7\ months$$

Note: '2x' is used in the Product Cost to account for a 2:1 trailer ratio.

Therefore, with a Product Cost of $800 and 2:1 trailer ratio, the Michelin TES when installed with trailer skirts would pay for itself (*i.e.* payback or ROI) in 12.7 months.

6.4: TECHNOLOGY PROFIT

Since saving money is the end goal, calculating profit is another important factor. **Note**: these calculations will consider fuel and purchase price only and not maintenance.

$$Profit\ (\$) = (Savings) - (Cost)$$

Example @$1,000 Product cost, 2:1 trailer ratio: Using annual values from above and a 5 year trailer life.

$Profit\ (\$) = (\$1{,}510) - \frac{2x\ (\$800)}{5\ year}$ = $1,190 saved per year, per vehicle.

If this were translated to a 1000-truck fleet, the profits would be $1.19M annual.

Therefore, the Michelin TES when installed with skirts would add $1,190 in profit per vehicle with 125,000 miles in travel. For a fleet of 1000 vehicles, this would equate to $1.19M.

6.5: CO_2 Reduction Calculations

Carbon Dioxide (CO_2) is directly related to diesel fuel consumption in the amount of 10,180[3] grams CO_2 per gallon of diesel consumed (0.01018 metric tons CO_2 per gallon of diesel). Therefore, the same value applies to the amount of fuel saved and correlates to a reduction in CO_2.

$$CO_2\ Reduction\ (metric\ tons) = (Fuel\ Savings)\ x\ (0.01018\ metric\ tons)$$

Where:

- Fuel Savings must be measured in gallons
- 0.01018 metric tons is the amount of CO_2 resulting from one gallon of diesel fuel

Example: Using the values from 6.1: and a fuel savings of 494 gallons per year.

$CO_2\ Reduction\ (metric\ tons) = (494)\ x\ (0.01018\ metric\ tons)$ = 5.03 metric tons CO_2

Therefore, the Michelin TES when installed with skirts would save 5.03 metric tons of CO_2 per year for this vehicle travelling 125,000 miles.

7.0: Conclusion

The fuel savings of the Michelin Trailer End Solutions (TES) with skirts and without skirts was 3.95 gal/1000 miles (3.57%) and 3.97 gal/1000 miles (3.34%), respectively. The Michelin Energy Guard (MEG) full solution fuel savings were 10.79 gal/1000 miles (9.09%). This was slightly more than previous testing, which was a result of some small variances in vehicle condition. Since this was the third test of the MEG on similar equipment and producing similar results, it illustrates validity of the MEG technology.

The TES fuel saving values were very close in gal/1000 miles. The value without skirts was slightly higher at 3.97 gal/1000 miles; however, its percent fuel savings was lower. The lower percent value was due to its Baseline run consuming more fuel due to a less aerodynamic trailer since it did not include trailer skirts.

The TES results showed that the system is a viable fuel saving technology when combined with trailer skirts or not.

All testing was conducted on dry vans.

Contact MVTS with questions about the test or results.

[3] https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references

8.0: APPENDIX

8.1: TEST VEHICLE DETAILS

Figure 20: Vehicle Info, Modified "Test" Vehicle

Date	September 10, 2020			
Company	Mesilla Valley Transportation Solutions			
Location	Pecos, Texas			
Test Route	Pecos 9-mile Test Track			
TRUCK ID:	**Veh. A**			
Brand	International			
Year	2019			
Model	LT 625			
Engine	Cummins X15			
VIN	3HSDZAPR4KN562972			
Mileage (miles):	1,833			
Transmission	Eaton Endurant 12-speed AMT			
Rear Gear	2.79 : 1			
Fuel Load	Full at start of test			
Fuel Type & Batch	No. 2 Diesel			
Axle Weights	11,800	16,860	14,980	
Total weight	43,640			
Photo/Video/Audio folder name:				
TRAILER ID:	**T-1**			
Model	Hyundai			
VIN	3H3C532C6MR248009			
Year	2020			
Size	53' Dry Van			
Trailer Gap (inches)	35" from cab extender to trailer			
Add-ons	Michelin Energy Guard			

Figure 21: Tire Info, Modified “Test” Vehicle

		Truck	Veh. A		
LF:		**Front Axle Tires**			RF: Same
Michelin X Line Energy Z		Type			Michelin X Line Energy Z
275/80R22.5		Size			275/80R22.5
19/32		Tread Depth (32nds)			18/32
110		Pressure (psi)			110
LF-Outer Drive:	LF-Inner Drive:	**Drive Axle Tires**		RF-Inner Drive:	RF-Outer Drive
Michelin X Line Energy D	Michelin X Line Energy D	Type		Michelin X Line Energy D	Michelin X Line Energy D
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
23/32	23/32	Tread Depth (32nds)		23/32	23/32
110	110	Pressure (psi)		110	110
LR-Outer Drive:	LR-Inner Drive:	**Drive Axle Tires**		RR-Inner Drive:	RR-Outer Drive
Michelin X Line Energy D	Michelin X Line Energy D	Type		Michelin X Line Energy D	Michelin X Line Energy D
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
23/32	23/32	Tread Depth (32nds)		23/32	23/32
110	110	Pressure (psi)		110	110
Wide-Based-Singles (WBS)		Trailer	T-1		
LF-Outer Trailer:	LF-Inner Trailer:	**Tandem Front**		RF-Inner Trailer	RF-Outer Trailer
General HT	General HT	Type		General HT	General HT
295/75R22.5	295/75R22.5	Size		295/75R22.5	295/75R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110
LR-Outer Trailer:	LR-Inner Trailer:	**Tandem Rear**		RR-Inner Trailer	RR-Outer Trailer
General HT	General HT	Type		General HT	General HT
295/75R22.5	295/75R22.5	Size		295/75R22.5	295/75R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110

8.2: COMPARE VEHICLE DETAILS

Figure 22: Vehicle Info, Compare Vehicle

Date	September 10, 2020					
Company	Mesilla Valley Transportation Solutions					
Location	Pecos, Texas					
Test Route	Pecos 9-mile Test Track					
TRUCK ID:	**Veh. B**					
Brand	International					
Year	2019					
Model	LT 625					
Engine	Cummins X15					
VIN	3HSDZAPR3KN562087					
Mileage (miles):	1,842					
Transmission	Eaton Endurant 12-speed AMT					
Rear Gear	2.79 : 1					
Fuel Load	Full at start of test					
Fuel Type & Batch	No. 2 Diesel					
Axle Weights	11,040		17,620		14,980	
Total weight	43,640					
Photo/Video/Audio folder name:						
TRAILER ID:	**V511326**					
Model	Stoughton					
VIN	1DW1A5328LSA43051					
Year	2019					
Size	53' Dry Van					
Trailer Gap (inches)	35" from cab extender to trailer					
Add-ons	GreenWing skirts					

Figure 23: Tire Info, Compare Vehicle

		Truck	Veh. B		
LF:		**Front Axle Tires**			RF: Same
Michelin X Line Energy		Type			Michelin X Line Energy
275/80R22.5		Size			275/80R22.5
18/32		Tread Depth (32nds)			18/32
110		Pressure (psi)			110
LF-Outer Drive:	LF-Inner Drive:	**Drive Axle Tires**		RF-Inner Drive:	RF-Outer Drive
Michelin X Line Energy D	Michelin X Line Energy D	Type		Michelin X Line Energy D	Michelin X Line Energy D
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
23/32	23/32	Tread Depth (32nds)		23/32	23/32
110	110	Pressure (psi)		110	110
LR-Outer Drive:	LR-Inner Drive:	**Drive Axle Tires**		RR-Inner Drive:	RR-Outer Drive
Michelin X Line Energy D	Michelin X Line Energy D	Type		Michelin X Line Energy D	Michelin X Line Energy D
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
23/32	23/32	Tread Depth (32nds)		23/32	23/32
110	110	Pressure (psi)		110	110
		Trailer	V511326		
LF-Outer Trailer:	LF-Inner Trailer:	**Tandem Front**		RF-Inner Trailer	RF-Outer Trailer
Michelin X Line Energy	Michelin X Line Energy	Type		Michelin X Line Energy	Michelin X Line Energy
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110
LR-Outer Trailer:	LR-Inner Trailer:	**Tandem Rear**		RR-Inner Trailer	RR-Outer Trailer
Michelin X Line Energy	Michelin X Line Energy	Type		Michelin X Line Energy	Michelin X Line Energy
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110

8.3: TEST ROUTE

Pecos, Texas 9-mile circle track. Counter-clockwise direction, middle lane (of 3).

Figure 24: Pecos Test Track

8.4: WEATHER CONDITIONS

Darkened rows pertain to testing period.

Table 4: Weather Data, September 10, 2020

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Precip.	Condition
12:53 AM	47 F	44 F	90 %	NNE	12 mph	0 mph	27.28 in	0.0 in	Cloudy
1:53 AM	47 F	43 F	86 %	N	10 mph	0 mph	27.28 in	0.0 in	Cloudy
2:53 AM	46 F	45 F	96 %	N	13 mph	0 mph	27.28 in	0.0 in	Cloudy
3:07 AM	46 F	45 F	96 %	N	13 mph	0 mph	27.28 in	0.0 in	Cloudy
3:10 AM	46 F	45 F	96 %	N	13 mph	0 mph	27.28 in	0.0 in	Fog
3:22 AM	46 F	45 F	96 %	N	13 mph	0 mph	27.28 in	0.0 in	Fog
3:38 AM	45 F	45 F	100 %	N	13 mph	0 mph	27.28 in	0.0 in	Cloudy
3:53 AM	46 F	45 F	96 %	N	10 mph	0 mph	27.28 in	0.0 in	Cloudy
4:00 AM	46 F	45 F	96 %	N	13 mph	0 mph	27.28 in	0.0 in	Cloudy
4:40 AM	46 F	44 F	93 %	N	13 mph	0 mph	27.29 in	0.0 in	Cloudy
4:53 AM	45 F	44 F	97 %	N	12 mph	0 mph	27.29 in	0.0 in	Cloudy
5:08 AM	46 F	44 F	93 %	N	14 mph	0 mph	27.29 in	0.0 in	Cloudy
5:41 AM	46 F	44 F	93 %	N	14 mph	0 mph	27.29 in	0.0 in	Cloudy
5:53 AM	45 F	44 F	97 %	N	9 mph	0 mph	27.29 in	0.0 in	Light Rain
6:44 AM	46 F	45 F	96 %	N	9 mph	0 mph	27.30 in	0.0 in	Cloudy
6:53 AM	46 F	45 F	96 %	N	12 mph	0 mph	27.30 in	0.0 in	Cloudy
7:53 AM	46 F	44 F	93 %	N	16 mph	0 mph	27.30 in	0.0 in	Cloudy
8:53 AM	46 F	45 F	96 %	N	14 mph	0 mph	27.32 in	0.0 in	Cloudy
9:27 AM	47 F	44 F	90 %	N	14 mph	0 mph	27.32 in	0.0 in	Cloudy
9:38 AM	47 F	44 F	90 %	NNE	15 mph	0 mph	27.32 in	0.0 in	Cloudy
9:53 AM	48 F	45 F	89 %	NNE	13 mph	0 mph	27.33 in	0.0 in	Cloudy
10:10 AM	48 F	44 F	86 %	NNE	13 mph	0 mph	27.33 in	0.0 in	Cloudy
10:53 AM	48 F	44 F	86 %	N	13 mph	0 mph	27.34 in	0.0 in	Cloudy
11:53 AM	50 F	44 F	80 %	N	10 mph	0 mph	27.34 in	0.0 in	Cloudy
12:53 PM	51 F	45 F	80 %	NE	6 mph	0 mph	27.34 in	0.0 in	Cloudy
1:53 PM	52 F	45 F	77 %	N	7 mph	0 mph	27.33 in	0.0 in	Light Rain
2:53 PM	52 F	46 F	80 %	N	8 mph	0 mph	27.31 in	0.0 in	Cloudy
3:53 PM	52 F	47 F	83 %	N	9 mph	0 mph	27.30 in	0.0 in	Cloudy
4:53 PM	53 F	48 F	83 %	N	7 mph	0 mph	27.29 in	0.0 in	Cloudy
5:53 PM	52 F	49 F	89 %	N	8 mph	0 mph	27.28 in	0.0 in	Light Rain
6:53 PM	52 F	49 F	89 %	N	8 mph	0 mph	27.28 in	0.0 in	Cloudy
7:43 PM	52 F	49 F	89 %	N	6 mph	0 mph	27.28 in	0.0 in	Cloudy
7:53 PM	52 F	49 F	89 %	NNE	8 mph	0 mph	27.28 in	0.0 in	Mostly Cloudy
8:53 PM	52 F	49 F	89 %	N	7 mph	0 mph	27.28 in	0.0 in	Cloudy
9:17 PM	53 F	49 F	86 %	NNE	6 mph	0 mph	27.29 in	0.0 in	Cloudy
9:53 PM	53 F	49 F	86 %	NNE	5 mph	0 mph	27.30 in	0.0 in	Cloudy
10:53 PM	53 F	49 F	86 %	E	5 mph	0 mph	27.30 in	0.0 in	Cloudy
11:25 PM	53 F	49 F	86 %	CALM	0 mph	0 mph	27.30 in	0.0 in	Cloudy
11:42 PM	53 F	49 F	86 %	CALM	0 mph	0 mph	27.30 in	0.0 in	Cloudy
11:53 PM	54 F	49 F	83 %	CALM	0 mph	0 mph	27.30 in	0.0 in	Cloudy

Source: https://www.wunderground.com/history/daily/us/tx/midland/KMAF/date/2020-9-10

8.5: PRODUCT DETAILS

- Michelin Aerodynamic Solutions
  One Parkway South, Greenville, SC 29615 USA
  https://www.michelintruck.com/services-and-programs/aerodynamic-solutions/

8.6: TEST PERSONNEL

8.6a: MVT SOLUTIONS ENGINEERING

- Daryl Bear, Lead Engineer & COO
- Drew Cassidy, Test Engineer

8.6b: MVT SOLUTIONS DRIVERS & TECHNICIANS

- Allan Dahringer, Director of Maintenance, MVT fleet
- Andrew Burnett, Shop Foreman, MVT fleet Las Cruces
- Carlos Aragon
- Jack Burchell

8.6c: MICHELIN

- Calvin Bradley, Aerodynamic Solutions Technical Lead
- Jason Koches, Business Development Manager, Aerodynamic Solutions

8.7: MVT SOLUTIONS CONTACT INFO

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