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A y 49 U.S.C. 32902; delegation of authority at 49 CFR 1.50.

§ cope

This part establishes average fuel economy standards pursuant to section 502(b) of the Motor Vehicle Information and Cost Savings Act, as amended, for light trucks.

[42 FR 13807, Mar. 14, 1977, as amended at 43 FR 12013, Mar. 23, 1978]

§ po e

The purpose of this part is to increase the fuel economy of light trucks by establishing minimum levels of average fuel economy for those vehicles.

[42 FR 13807, Mar. 14, 1977, as amended at 43 FR 12013, Mar. 23, 1978]

§ App c y

This part applies to manufacturers of light trucks.

[42 FR 13807, Mar. 14, 1977, as amended at 43 FR 12013, Mar. 23, 1978]

§ Def n on

(a) *Statutory terms.* (1) The terms *average fuel economy, average fuel economy standard, fuel economy, import, manufacture, manufacturer,* and *model year* are used as defined in section 501 of the Act.

(2) The term *automobile* is used as defined in section 501 of the Act and in accordance with the determinations in

part 523 of this chapter.

(3) The term *domestically manufactured* is used as defined in section 503(b)(2)(E) of the Act.

(b) *Other terms.* As used in this part, unless otherwise required by the context—

(1) *Act* means the Motor Vehicle Information Cost Savings Act, as amended by Pub. L. 94–163.

(2) *Light truck* is used in accordance with the determinations in part 523 of this chapter.

Captive import means with respect to a light truck, one which is not domestically manufactured but which is imported in the 1980 model year or thereafter by a manufacturer whose principal place of business is in the United States.

4-wheel drive, general utility vehicle means a 4-wheel drive, general purpose automobile capable of off-highway operation that has a wheelbase of not more than 280 centimeters, and that has a body shape similar to 1977 Jeep CJ–5 or CJ–7, or the 1977 Toyota Land Cruiser.

Basic engine means a unique combination of manufacturer, engine displacement, number of cylinders, fuel system (as distinguished by number of carburetor barrels or use of fuel injection), and catalyst usage.

Limited product line light truck means a light truck manufactured by a manufacturer whose light truck fleet is powered exclusively by basic engines which are not also used in passenger automobiles.

[42 FR 13807, Mar. 14, 1977, as amended at 43 FR 12013, Mar. 23, 1978; 43 FR 46547, Oct. 10, 1978; 58 FR 18029, Apr. 7, 1993]

§ 533.4 Requirements.

(a) Each manufacturer of light trucks shall comply with the following average fuel economy standards, expressed in miles per gallon, in the model year specified as applicable:

Table I

Model year	Passenger vehicle		Passenger vehicle		Limited product line manufacturer
	Compact	Other	Compact	Other	
1979		17.2		15.8	
1980	16.0	16.0	14.0	14.0	14.0
1981	16.7	16.7	15.0	15.0	14.5

Table II

Model year	Combined		Passenger vehicle		Passenger vehicle	
	Compact	Other	Compact	Other	Compact	Other
1982	17.5	17.5	18.0	18.0	16.0	16.0
1983	19.0	19.0	19.5	19.5	17.5	17.5
1984	20.0	20.0	20.3	20.3	18.5	18.5
1985	19.5	19.5	19.7	19.7	18.9	18.9
1986	20.0	20.0	20.5	20.5	19.5	19.5
1987	20.5	20.5	21.0	21.0	19.5	19.5
1988	20.5	20.5	21.0	21.0	19.5	19.5
1989	20.5	20.5	21.5	21.5	19.0	19.0
1990	20.0	20.0	20.5	20.5	19.0	19.0
1991	20.2	20.2	20.7	20.7	19.1	19.1

Table III

Model Year	Combined	
	Compact	Other
1992	20.2	20.2
1993	20.4	20.4
1994	20.5	20.5
1995	20.6	20.6

Table IV

Model year	and

2001	20.7
2002	20.7
2003	20.7
2004	20.7
2005	21.0
2006	21.6
2007	22.2
2008	22.5
2009	23.1
2010	23.5

FIGURE 1

$$Required\_Fuel\_Economy\_Level = \frac{N}{\sum_i \frac{N_i}{T_i}}$$

Where:

N is the total number (sum) of light trucks produced by a manufacturer, N_i is the number (sum) of the i^{th} light truck model type produced by the manufacturer, and

T_i is fuel economy target of the i^{th} light truck model type, which is determined according to the following formula, rounded to the nearest hundredth:

$$T = \frac{1}{\frac{1}{a} + \left(\frac{1}{b} - \frac{1}{a}\right)\frac{e^{(x-c)/d}}{1+e^{(x-c)/d}}}$$

Where:

Parameters a, b, c, and d are defined in §533.3 Table V;

e = 2.718; and

x = footprint (in square feet, rounded to the nearest tenth) of the model type

TABLE V—PARAMETERS FOR THE LIGHT TRUCK FUEL ECONOMY TARGETS

	Parameters

Where:

$CAFE_{required}$ is the required level for a given fleet,

Subscript i is a designation of multiple groups of light trucks, where each group's designation, *i.e.,* i = 1, 2, 3, etc., represents light trucks that share a unique model type and footprint within the applicable fleet.

$Production_i$ is the number of units of light trucks produced for sale in the United States within each ith designation, *i.e.,* which share the same model type and footprint.

$TARGET_i$ is the fuel economy target in miles per gallon (mpg) applicable to the footprint of light trucks within each ith designation, *i.e.,* which shares the same model type and footprint, calculated according to Figure 3 and rounded to the nearest hundredth of a mpg, *i.e.,* 35.455 = 35.46 mpg, and the summations in the numerator and denominator are both performed over all models in the fleet in question.

Where:

TARGET is the fuel economy target (in mpg) applicable to vehicles of a given footprint (*FOOTPRINT,* in square feet),

Parameters *a, b, c,* and *d* are defined in Table VI, and

The *MIN* and *MAX* functions take the minimum and maximum, respectively of the included values.

Table VI—Parameters for the Light Truck Fuel Economy Targets

Mode ye	e e			
	a	*b*	*c*	*d*
2012	29.82	22.27	0.0004546	0.014900
2013	30.67	22.74	0.0004546	0.013968
2014	31.38	23.13	0.0004546	0.013225
2015	32.72	23.85	0.0004546	0.011920
2016	34.42	24.74	0.0004546	0.010413

(b)(1) For model year 1979, each manufacturer may:

(i) Combine its 2- and 4-wheel drive light trucks and comply with the average fuel economy standard in paragraph (a) of this section for 2-wheel drive light trucks; or

(ii) Comply separately with the two standards specified in paragraph (a) of this section.

(2) For model year 1979, the standard specified in paragraph (a) of this section for 4-wheel drive light trucks applies only to 4-wheel drive general utility vehicles. All other 4-wheel drive light trucks in that model year shall be included in the 2-wheel drive category for compliance purposes.

(c) For model years 1980 and 1981, manufacturers of limited product line light trucks may:

(1) Comply with the separate standard for limited product line light trucks, or

(2) Comply with the other standards specified in §533.5(a), as applicable.

(d) For model years 1982–91, each manufacture may:

(1) Combine its 2- and 4-wheel drive light trucks (segregating captive import and other light trucks) and comply with the combined average fuel economy standard specified in paragraph (a) of this section; or

(2) Comply separately with the 2-wheel drive standards and the 4-wheel drive standards (segregating captive import and other light trucks) specified in paragraph (a) of this section.

(e) For model year 1992, each manufacturer shall comply with the average fuel economy standard specified in paragraph (a) of this section (segregating captive import and other light trucks).

(f) For model year 1996 and thereafter, each manufacturer shall combine its captive imports with its other light trucks and comply with the average fuel economy standard in paragraph (a) of this section.

(g) For model years 2008–2010, at a manufacturer's option, a manufacturer's light truck fleet may comply with the fuel economy level calculated according to Figure I and the appropriate values in Table V, with said option being irrevocably chosen for that model year and reported as specified in §537.8.

(h) For model year 2011, a manufacturer's light truck fleet shall comply with the fuel economy level calculated for that model year according to Figure 1 and the appropriate values in Table V.

(i) For model years 2012–2016, a manufacturer's light truck fleet shall comply with the fuel economy level calculated for that model year according to Figures 2 and 3 and the appropriate values in Table VI.

[43 FR 12014, Mar. 23, 1978]

§ 33 6 Me e en nd c c on p oced e

(a) Any reference to a class of light trucks manufactured by a manufacturer shall be deemed—

(1) To include all light trucks in that class manufactured by persons who control, are controlled by, or are under common control with, such manufacturer; and

(2) To exclude all light trucks in that class manufactured (within the meaning of paragraph (a)(1) of this section) during a model year by such manufacturer which are exported prior to the expiration of 30 days following the end of such model year.

(b) The average fuel economy of all nonpassenger automobiles that are manufactured by a manufacturer and are subject to §533.5(b) or to §533.5(c) shall be determined in accordance with procedures established by the Administrator of the Environmental Protection Agency under section 503(a)(2) of the Act.

[42 FR 13807, Mar. 14, 1977, as amended at 43 FR 12013, Mar. 23, 1978]

Append A o [illegible] pe of C c n Co p nce nde § [illegible] p

Assume a hypothetical manufacturer (Manufacturer X) produces a fleet of light trucks in MY 2012 as follows:

Appendix A, Table 1

Mode ype				De c p on	Ac e ed f e econo y p	e
o p	C ne n e	B c en ne L	n on c			
1	Pickup A 2WD	4	A5	Reg cab, MB	27.1	800
2	Pickup B 2WD	4	M5	Reg cab, MB	27.6	200
3	Pickup C 2WD	4.5	A5	Reg cab, LB	23.9	300
4	Pickup C 2WD	4	M5	Ext cab, MB	23.7	400
5	Pickup C 4WD	4.5	A5	Crew cab, SB	23.5	400
6	Pickup D 2WD	4.5	A6	Crew cab, SB	23.6	400
7	Pickup E 2WD	5	A6	Ext cab, LB	22.7	500
8	Pickup E 2WD	5	A6	Crew cab, MB	22.5	500
9	Pickup F 2WD	4.5	A5	Reg cab, LB	22.5	1,600
10	Pickup F 4WD	4.5	A5	Ext cab, MB	22.3	800
11	Pickup F 4WD	4.5	A5	Crew cab, SB	22.2	800
Total						6,700

Note to Appendix A, Table 1. Manufacturer X's required corporate average fuel economy level under §533.5(i) would first be calculated by determining the fuel economy targets applicable to each unique model type and footprint combination for model type groups (1–11) illustrated in Appendix A, Table 2:

Appendix A, Table 2

Manufacturer X calculates a fuel economy target standard value for each unique model type and footprint combination.

Mode ype				De c p on	B e e ze	ee e nc e	d & f ve e nc e	oo p n f	e	e econo y e nd d p
o p	C ne n e	B c en ne L	n on c							
1	Pickup A 2WD	4	A5	Reg cab, MB	235/75R15	100.0	68.8	47.8	800	27.30
2a	Pickup B 2WD	4	M5	Reg cab, MB	235/75R15	100.0	68.2	47.4	100	27.44
2b	Pickup B 2WD	4	M5	Reg cab, MB	235/70R16	100.0	68.4	47.5	100	27.40
3	Pickup C 2WD	4.5	A5	Reg cab, LB	255/70R17	125.0	68.8	59.7	300	23.79
4	Pickup C 2WD	4	M5	Ext cab, MB	255/70R17	125.0	68.8	59.7	400	23.79
5	Pickup C 4WD	4.5	A5	Crew cab, SB	275/70R17	150.0	69.0	71.9	400	22.27
6a	Pickup D 2WD	4.5	A6	Crew cab, SB	255/70R17	125.0	68.8	59.7	200	23.79
6b	Pickup D 2WD	4.5	A6	Crew cab, SB	285/70R17	125.0	69.2	60.1	200	23.68
7	Pickup E 2WD	5	A6	Ext cab, LB	255/70R17	125.0	68.8	59.7	500	23.79
8	Pickup E 2WD	5	A6	Crew cab, MB	285/70R17	125.0	69.2	60.1	500	23.68
9	Pickup F 2WD	4.5	A5	Reg cab, LB	255/70R17	125.0	68.9	59.8	1,600	23.76
10	Pickup F 4WD	4.5	A5	Ext cab, MB	275/70R17	150.0	69.0	71.9	800	22.27
11	Pickup F 4WD	4.5	A5	Crew cab, SB	285/70R17	150.0	69.2	72.1	800	22.27

Total	6,700

Note to Appendix A, Table 2. With the appropriate fuel economy targets determined for each unique model type and footprint combination, Manufacturer X's required fuel economy target standard would be calculated as illustrated in Appendix A, Figure 1.

Appendix A, Figure 1

Calculation of Manufacturer X's target fuel economy standard value.

(Manufacturer's Light Truck Production for Applicable Model Year) / ((Group 1 Volume / Group 1 Target) + ((Group 2a Volume / Group 2a Target) + … + (Group 11 Volume / Group 11 Target)) =

6700/ (800/27.30 + 100/27.44 + 100/27.40 + 300/23.79 + 400/23.79 + 400/22.27 + 200/23.79 + 200/23.68 + 500/23.79 + 500/23.68 + 1600/23.76 + 800/22.27 + 800/22.27) = 23.7

$$\frac{\text{Manufacturer's Light Truck Production for Applicable Model Year}}{\left[\frac{\text{Group1 Volume}}{\text{Group1 Target}} + \frac{\text{Group2a Volume}}{\text{Group2a Target}} + \frac{\text{Group2b Volume}}{\text{Group2b Target}} + \frac{\text{Group3 Volume}}{\text{Group3 Target}} + \cdots + \frac{\text{Group9 Volume}}{\text{Group9 Target}} + \frac{\text{Group10 Volume}}{\text{Group10 Target}} + \frac{\text{Group11 Volume}}{\text{Group11 Target}}\right]} = \frac{6{,}700}{\left[\frac{800}{26.99} + \frac{100}{27.13} + \frac{100}{27.08} + \frac{300}{23.54} + \frac{400}{23.54} + \frac{400}{22.06} + \frac{200}{23.54} + \frac{200}{23.45} + \frac{500}{23.54} + \frac{500}{23.45} + \frac{1600}{23.52} + \frac{800}{22.06} + \frac{800}{22.06}\right]}$$

Fleet's target fuel economy standard = 23.7 mpg

Appendix A, Figure 2

Calculation of Manufacturer X's actual fuel economy value.

(Manufacturer's Light Truck Production for Applicable Model Year) / ((Group 1 Volume / Group 1 Fuel Economy) + ((Group 2 Volume / Group 2 Fuel Economy) + … + (Group 11 Volume / Group 11 Fuel Economy)) =

6700 / (800/27.1 + 200/27.6 + 300/23.9 + 400/23.7 + 400/23.5 + 400/23.6 + 500/22.7 + 500/22.5 + 1600/22.5 + 800/22.3 + 800/22.2) = 23.3

$$\frac{\text{Manufacturer's Light Truck Production for Applicable Model Year}}{\left[\frac{\text{Group1 Volume}}{\text{Group1 FuelEcon}} + \frac{\text{Group2 Volume}}{\text{Group2 FuelEcon}} + \frac{\text{Group3 Volume}}{\text{Group3 FuelEcon}} + \frac{\text{Group4 Volume}}{\text{Group4 FuelEcon}} + \frac{\text{Group5 Volume}}{\text{Group5 FuelEcon}} + \frac{\text{Group6 Volume}}{\text{Group6 FuelEcon}} + \frac{\text{Group7 Volume}}{\text{Group7 FuelEcon}} + \frac{\text{Group8 Volume}}{\text{Group8 FuelEcon}} + \frac{\text{Group9 Volume}}{\text{Group9 FuelEcon}} + \frac{\text{Group10 Volume}}{\text{Group10 FuelEcon}} + \frac{\text{Group11 Volume}}{\text{Group11 FuelEcon}}\right]} = \frac{6{,}700}{\left[\frac{800}{27.1} + \frac{200}{27.6} + \frac{300}{23.9} + \frac{400}{23.7} + \frac{400}{23.5} + \frac{400}{23.6} + \frac{500}{22.7} + \frac{500}{22.5} + \frac{1600}{22.5} + \frac{800}{22.3} + \frac{800}{22.2}\right]}$$

Fleet's actual fuel economy value = 23.3 mpg

Note to Appendix A, Figure 2. Since the actual average fuel economy of Manufacturer X's fleet is 23.3 mpg, as compared to its required fuel economy level of 23.5 mpg, Manufacturer X did not comply with the CAFE standard for MY 2012 as set forth in section 533.5(i).

Appendix A Figure 3

$$\text{Manufacturer's Light Truck Production for Applicable Model Year} = \frac{9{,}500}{\frac{1{,}000}{27.0} + \frac{1{,}500}{25.6} + \frac{1{,}000}{25.4} + \frac{2{,}000}{22.1} + \frac{3{,}000}{22.4} + \frac{1{,}000}{20.2}}$$

$$\left(\frac{\text{Model A Volume}}{\text{Model A Fuel Econ.}} + \frac{\text{Model B Volume}}{\text{Model B Fuel Econ.}} + \frac{\text{Model C Volume}}{\text{Model C Fuel Econ.}} + \frac{\text{Model D Volume}}{\text{Model D Fuel Econ.}} + \frac{\text{Model E Volume}}{\text{Model E Fuel Econ.}} + \frac{\text{Model F Volume}}{\text{Model F Fuel Econ.}}\right)$$

$$= 23.2 \text{ mpg}$$

Note to Appendix A Figure 3. Since the actual average fuel economy of Manufacturer X's fleet is 23.2 mpg, as compared to its required fuel economy level of 23.1 mpg, Manufacturer X complies with the Reformed CAFE standard for MY 2008 as set forth in §533.7(g).

[71 FR 17677, Apr. 6, 2006; 71 FR 19451, Apr. 14, 2006, as amended at 75 FR 25724, May 7, 2010]