

**WAC 204-21-180 Deceleration alert lamp system.** (1) Deceleration warning lights must:

(a) Be installed as follows:

(i) Only one such system may be mounted on a motor vehicle, trailer, semitrailer, truck tractor, or pole trailer.

(ii) Provision must be made for rigid or shock-absorbing mounting.

(iii) The axis of the light beam must be parallel to the roadway and the longitudinal axis of the vehicle.

(iv) The lamp must be mounted on the centerline of the rear exterior of the vehicle or with the optical center of the lamp not more than fifteen inches from the centerline.

(v) The deceleration warning light system must be mounted as nearly as practicable at the same height as the existing stop lamps on the vehicle.

(vi) Visibility of the deceleration lamps to the rear must not be obstructed by any part of the vehicle or load thereon.

(b) Meet Type I or Type II requirements and test methods for a deceleration alert system.

(i) Type I - the system must:

(A) Be mounted on the rear of the vehicle as close as possible to the vertical centerline of the vehicle.

(B) Be mounted at a height of not more than seventy-two inches nor less than fifteen inches.

(C) Have a center-to-center (optical axis) distance between two adjacent compartments not exceeding six inches.

(D) Have three compartments. The center compartment emits a green light and is energized when the vehicle operator has the accelerator depressed. The two outer compartments emit an amber light and are energized when the operator releases the accelerator and prior to applying pressure to the foot brake pedal. When the amber lights are energized, the green light is deenergized. When pressure is applied to the foot brake pedal, the amber lights are deenergized and the vehicle's stop lamps operate in the normal manner. SAE Standard J578d is adopted for color chromaticity boundaries.

(E) Meet the requirements under the following sections of SAE J575g: Section B, samples for test; Section C, lamp bulbs; Section D, laboratory facilities; Section E, vibration test; Section F, moisture test; Section G, dust test; Section H, corrosion test; and Section J, photometry. If plastic material is used in optical parts it must comply with the requirements set forth in SAE J576c.

(F) Measure the beam candle power with the H-V axis taken as paralleled to the longitudinal axis of the vehicle. The candle power measurements for the center green compartment must be made with the incandescent filament of the lamp at least ten feet from the photometric screen.

Beam candle power measurements of the two amber compartments must be made by either of the following methods:

(I) The two compartments may be photometered together provided that a line from the optical axis (filament centers) of each compartment to the center of the photometer sensing device does not make an angle of more than  $0.6^\circ$  with the photometer (H-V) axis.

(II) Each compartment may be photometered separately by aligning its axis with the photometer and adding the value at each test point.

Table 1 lists the design candle power requirements for the two outer amber lights, and Table 2 lists the design candle power requirements for the center green light.

Table 1 Minimum Design Candle power Requirements for Amber Light			Table 2 Minimum Design Candle power Requirements for Green Light		
Test	Points	Candle power	Test	Points	Candle power
10 up and 10 down	10L V 10R	25 65 25	10 up and 10 down	10L V 10R	1 1.5 1
	20L	25		20L	1
	10L	65		10L	2
5 up and 5 down	5L V 5R	85 125 85	5 up and 5 down	5L V 5R	4 4 4
	10R	65		10R	2
	20R	25		20R	1
	20L	25		20L	2
	10L	75		10L	3
	5L	125		5L	5
	H-V	175		H-V	5
	5R	125		5R	5
	10R	75		10R	3
	20R	25		20R	2
	Maximum	450		Maximum	45

(ii) Type II - The system must:

(A) Operate so as to indicate a component of deceleration of the vehicle on which it is installed by varying the flashing rate of a yellow lamp when the service brakes are applied.

(B) Incorporate an automatic means for reducing the intensity of the lamp during darkness. The system must cause the voltage to the deceleration lamps to decrease to  $5.0 \text{ V} \pm 10\%$  at  $0 \text{ g}$  deceleration during darkness. The specified voltage must be reached when the illumination on the sensor is not more than  $5 \text{ lm/sq. ft.}$ , nor less than  $0.5 \text{ lm/sq. ft.}$

(C) Have an output voltage, duty cycle, and flash rate of the control unit as a temperature of  $24^\circ \pm 5.5^\circ\text{C}$  ( $75^\circ \pm 10^\circ\text{F}$ ), when  $12.8 \text{ V}$  dc is applied to the input terminal, as shown in Table I when the control sensor is placed on a tilt table and slightly vibrated as the table is slowly rotated through the angles representing the specified vehicle deceleration rates.

TABLE I

Test Requirements for Deceleration Lamps				
Deceleration (g)	Output (V)	Peak Relative Brightness	Flash Rate (Hz)	On Time (%)
0.0	7.0	1.0	1.0	50
0.1	—	1.0	1.5	48
0.2	—	1.0	2.3	46
0.3	—	1.2	3.4	44
0.4	—	1.4	5.0	42
0.5	—	1.7	7.6	40

(D) Have a deceleration at which the unit switches from a lower to a higher flash rate that is within  $\pm 0.05 \text{ g}$  of the rate specified in Table I. If the unit operates at more steps than the required minimum, the additional values for each column must lie on the smooth curve connecting the indicated values within the specified tolerances. The values specified in Table II apply to ramp-type inertial sensors for which the downward angles correspond to the deceleration and a tolerance of  $3.0^\circ$  applies to the tilt angle.

TABLE II

Test Requirements for Deceleration Sensors			
Deceleration (g)	DEGREES		
	Forward Tilt Angle	Dip Correction	Corrected Tilt Angle
0.0	0.0	0.0	0.0
0.1	5.7	0.8	6.5
0.2	11.3	1.6	12.9
0.3	16.7	2.4	19.1
0.4	21.8	3.2	25.0
0.5	26.6	4.0	30.6

(E) Have the rms of the output voltage during the on portion of the flash cycle at the 1 Hz flash rate within  $\pm 5\%$  of the specified value, measured at the lamp bulbs with daytime illumination on the automatic darkness sensor.

(F) Have a relative brightness of the lamp or bulbs at the decelerations within  $\pm 25\%$  of the specified values after the fifth flash with the brightness of the lamp or its bulbs taken as 1.0 when measured with the rms output voltage specified for 0 g deceleration.

(G) Have a flash rate within  $\pm 15\%$  of the specified value. The percent on time must be within  $\pm 10\%$  of the specified value.

(H) Have linear dip corrections varying from  $4^\circ$  at 0.5 g or more deceleration to  $0^\circ$  at 0 g on passenger vehicles and pickup trucks that have substantial front end dip upon braking.

(I) Comply with the following mechanical tests in SAE Standard J575g (tests for motor vehicle lighting devices and components): Corrosion, dust, moisture, vibration, and warpage (at a flashing rate of 1 Hz when a plastic lens or housing is used).

(J) Meet the following control system requirements at both 11 V and 15 V:

(I) Low temperature test. The control system must be placed in its normal operating position in a circulating air cabinet at  $-32^\circ \pm 3^\circ\text{C}$  ( $-25^\circ \pm 5^\circ\text{F}$ ) for 2 hours. At the end of that period and while still at that temperature, the unit must meet the requirements in Table I at 0 g and 0.3 g.

(II) High temperature test. The control system must be placed in its normal operating position in a circulating air cabinet at  $74^\circ \pm 0^\circ$ ,  $-2.8^\circ\text{C}$  ( $165^\circ \pm 0^\circ$ ,  $-5^\circ\text{F}$ ) for 2 hours. At the end of that period and while at that temperature, the unit must meet the requirements in Table I at 0 g and 0.3 g.

(K) Operate the control system continuously at a supply voltage of 12.8 V dc for 200 hours with no failure (except bulb replacement), after which it must meet the requirements in Table I at 0 g and 0.3 g.

(L) Meet the photometric requirements in Table III after the sample has been mechanically tested in the order shown in (b)(ii)(J) of this subsection for the luminous intensity of a deceleration lamp with the bulbs operated at mean spherical candela.

TABLE III

Photometric Requirements for Deceleration Signal Lamps					
Test Point Coordinates		Max		Min	
Vertical	Horizontal	Amber	Red	Amber	Red
	10L	70	35	25	12.5
10U	V	200	100	60	30
	10R	70	35	25	12.5
	20L	40	20	15	7.5

Photometric Requirements for Deceleration Signal Lamps

Test Point Coordinates		Max		Cd		Min	
Vertical	Horizontal	Amber	Red	Amber	Red	Amber	Red
5U	10L	200	100	60	30		
	5L	600	300	200	100		
	V	800	400	350	175		
	5R	600	300	200	100		
	10R	200	100	60	30		
	20R	40	20	15	7.5		
H	20L	40	20	15	7.5		
	10L	200	100	60	30		
	5L	800	400	350	175		
	V	1,300	650	600	300		
	5R	800	400	350	175		
	10R	200	100	60	30		
5D	20R	40	20	15	7.5		
	20L	40	20	15	7.5		
	10L	200	200	60	30		
	5L	600	300	200	100		
	V	800	400	350	175		
	5R	600	300	200	100		
10D	10R	200	100	60	30		
	10L	70	35	25	12.5		
	10R	70	35	25	12.5		

[Statutory Authority: RCW 46.37.005 and 46.37.320. WSR 15-16-124, § 204-21-180, filed 8/5/15, effective 9/5/15; WSR 08-19-104, § 204-21-180, filed 9/17/08, effective 10/18/08.]