

DRIVE CLEAN GUIDE

Emission standards, emission test methods, and technical information relating to Ontario Regulation 361/98, as amended.

Drive Clean Office
Ontario Ministry of the Environment and Climate Change

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INTRODUCTION:

Drive Clean was introduced in 1999 to reduce smog-causing emissions from cars, trucks and buses.

Drive Clean requirements are set out in Ontario Regulation 361/98 (Motor Vehicles), as amended, made under the authority of the *Environmental Protection Act*. In this document, O. Reg. 361/98, as amended, is referred to as the "**Regulation**."

The Drive Clean Guide is incorporated by reference into Ontario Regulation 361/98 and sets out specific methods for measuring vehicle emissions, as well as the standards vehicles must meet to pass a Drive Clean test.

This Guide is organized pursuant to the Regulation section numbers which refer to the "Drive Clean Guide".

The Ministry of the Environment and Climate Change's on-road enforcement component, known as the Vehicle Emissions and Enforcement Program (VEEP), makes use of this Guide for the procedures and standards applicable to its enforcement program.

Regulations under the *Highway Traffic Act* specify which vehicles must pass an emissions test for registration renewal, for transferring ownership of a used vehicle, or for other transactions requiring a Safety Standards Certificate. These provisions are found in Ontario Regulation 628, R.R.O. 1990, as amended, and they address such items as model years affected and test frequency. In Regulation 628, Registered Gross Weight determines the test notification and frequency. In this document, Regulation 628 is referred to as the "**HTA Regulation**".

The four Drive Clean logos for Light Vehicles and Heavy Vehicles (in English and in French) and the four phrases "Drive Clean", "Operation Air Pur", "for the air we breathe" and "respirons en toute tranquillité" are official marks of the Province of Ontario pursuant to the Trade-marks Act (Canada). The official marks cannot be used for any purpose, whether commercial or non-commercial, without the prior written consent of the Province.

DEFINITIONS:

The Regulation contains definitions of relevant terms. The following are definitions of terms used in this Guide:

Term	Definition
CO	Carbon Monoxide
DLC	Data Link Connector – socket located on a vehicle that allows external diagnostic tools to communicate with a vehicle’s OBD system. This is an integral part of an OBD vehicle’s emissions control system.
DTC	Diagnostic Trouble Code - codes stored by a vehicle’s OBD computer that identify emissions control system problems.
Director	Person designated under the <i>Environmental Protection Act</i> by the Minister of the Environment and Climate Change to make decisions and perform other functions with respect to the Regulation
GVWR	Gross Vehicle Weight Rating - the value specified by the vehicle manufacturer as the loaded weight of a single vehicle
HC	Hydrocarbons
Heavy Vehicle	A motor vehicle with a GVWR of more than 4,500 kilograms (9,921 lbs)
HTA Regulation	Ontario Regulation 628, R.R.O. 1990, as amended made under the authority of the <i>Highway Traffic Act</i>
Inspector (Light or Heavy –duty)	A person is a Drive Clean inspector if he or she has successfully completed, within the previous 24 months, a course satisfactory to the Director with respect to the testing of air emissions and on-board diagnostic systems.
Light Vehicle	A motor vehicle with a GVWR of 4,500 kilograms (9,921 lbs) or less
MIL	Malfunction Indicator Light - a visual light on a vehicle’s dashboard that indicates when there is a problem with a vehicle’s emissions control system; sometimes referred to as the “Check Engine” light
On-Board Diagnostic System (OBD)	The OBD system is a built-in sensor and computer system that constantly checks the proper function of emissions control systems on modern vehicles.
Regulation	Ontario Regulation 361/98 (Motor Vehicles), as amended, made under the authority of the <i>Environmental Protection Act</i>
SOP	Standard Operating Procedure - pertaining to the “Light Duty Vehicle Standard Operating Procedures for Ontario’s Drive Clean Facilities” or the “Heavy Duty Vehicle Standard Operating Procedures for Ontario’s Drive Clean Facilities”
US EPA	United States Environmental Protection Agency

Section 2(8): On-Board Diagnostics System Advisory Test

Table 2(8): On-Board Diagnostics System Advisory Test

Model Year and GVWR	Test
2007 & newer model year heavy vehicles, over 4,500 kg GVWR	OBD test standards - Advisory Only

Section 8: Two Speed Idle Test Gasoline Fuelled Light Vehicles (and other fuels except diesel)

The Two Speed Idle Test is to be used for vehicles not manufactured to be compatible with the OBD test procedure prescribed in Section 9.0.1 of the Regulation. Appendix D of the Drive Clean SOP will list the majority of vehicles the ministry has identified as requiring modified OBD tests or alternative tests.

The procedure to be used is the preconditioned Two Speed Idle Test set out in the USEPA publication EPA-AA-TSS-I/M-90-3 January 1991 – Recommended I/M Short Test Procedures for the 1990's: Six Alternatives or a test that the Director considers equivalent.

Table 8: Maximum Emission Standards - Two Speed Idle Test Gasoline Fuelled Light Vehicles (and other fuels except diesel)*

Model Year and GVWR	HC (ppm) by volume	CO (%) by volume	Visible emissions (seconds in any one-minute period)
For vehicles up to 3,856 kg GVWR:			
1998 & newer model years	150	0.7	5
1988-1997	200	1.0	5
1981-1987	300	1.5	5
1980 and older model years	600	5.0	5
For vehicles over 3,856 kg GVWR but not over 4,500 kg GVWR:			
1998 & newer model years	200	1.0	5
1988-1997	220	1.2	5
1980-1987	300	3.0	5
1975-1979	400	4.0	5
1970-1974	800	6.5	5
1969 and older model years	1000	8.0	5

* Emission standards for both idle test and 2500 RPM test

Section 9.0.1: On-Board Diagnostics System Test

A light vehicle manufactured to be OBD compliant is required to be tested for compliance with the OBD test standards using at a minimum, the OBD test elements described below in Table 9.0.1A.

Table 9.0.1A: OBD Test

Vehicle Model Year and Type	OBD Test Elements
<ul style="list-style-type: none"> 1998 & newer model year light vehicles up to 3,856 kg GVWR 2007 & newer model year light vehicles 3,857 – 4,500 kg GVWR 	Connect test unit to vehicle DLC.
	Download the vehicle data and Readiness Status to test unit.
	Download the vehicle MIL Command Status to test unit.
	Download the vehicle DTC list to test unit.
	Disconnect test unit from vehicle DLC.
	Test unit will determine compliance with OBD test standards prescribed in Table 9.0.1B.

Notes:

1. A missing, damaged, inoperable or inaccessible DLC, or presence of an OBD pass-through device will result in the vehicle being rejected from the OBD test.
2. Vehicles manufactured to be OBD compliant will be rejected from testing if they cannot communicate valid OBD emissions data.
3. Appendix D of the Drive Clean SOP will list the majority of vehicles the ministry has identified as requiring modified OBD tests or alternative tests.

A vehicle is deemed to be compliant with the OBD Test Standards if it meets the criteria detailed below in Table 9.0.1B.

Table 9.0.1B: OBD Test Standards

Vehicle Model Year and Type	Pass Criteria	Fail Criteria
1998 – 2000 light vehicles	No Fail criteria detected.	<ul style="list-style-type: none"> Vehicle OBD computer is unable to communicate with OBD emissions test unit, or 3 or more supported non-continuous monitors <u>not set</u> to “Ready”, or MIL is commanded “ON” with DTC(s).
2001 & newer model year light vehicles	No Fail criteria detected.	<ul style="list-style-type: none"> Vehicle OBD computer is unable to communicate with OBD emissions test unit, or 2 or more supported non-continuous monitors <u>not set</u> to “Ready”, or MIL is commanded “ON” with DTC(s).

Section 10: Two Speed Idle Test Gasoline Fuelled Heavy Vehicles (and other fuels except diesel)

This section applies only to heavy vehicles (GVWR greater than 4,500 kg).

The procedure to be used is the preconditioned Two Speed Idle Test procedure set out in the USEPA publication EPA-AA-TSS-I/M-90-3 January 1991 – Recommended I/M Short Test Procedures for the 1990's: Six Alternatives or a test that the Director considers equivalent.

Table 10: Maximum Emission Standards - Two Speed Idle Test Gasoline Fuelled Heavy Vehicles (and other fuels except diesel)

Model Year	HC (ppm) by volume	CO (%) by volume	Visible emissions (seconds in any one-minute period)
1998 & newer model years	200	1.0	5
1988-1997	220	1.2	5
1980-1987	300	3.0	5
1975-1979	400	4.0	5
1970-1974	800	6.5	5
1969 and older model years	1000	8.0	5

Section 11: Opacity Test for Diesel Fuelled Light Vehicles

The opacity test procedure for diesel fuelled light vehicles is to be used for diesel vehicles not manufactured to be compatible with the OBD test procedure prescribed in Section 9.0.1 of the Regulation.

Opacity Test Procedure:

- 1. For Light Duty Diesel Vehicles, located in the Greater Toronto Area, urban and commuter areas, and expanded program area, that require the Drive Clean emissions test for registration:**

Light duty diesel visual inspection or a test the Director considers equivalent - after ensuring the vehicle is operating at a normal temperature, the Inspector must observe the vehicle's tailpipe for a period of 5 minutes while the vehicle is at curb idle (min 450; max 1,250 RPM) in neutral gear or in park.

- 2. For Light Duty Diesel Vehicles, located outside of the Greater Toronto Area, urban and commuter areas, and expanded program area, that require the Drive Clean emissions test for registration:**

The opacity test according to SAE J1667 Snap Acceleration Smoke Test Procedure for Heavy Diesel Powered Vehicles, issued by the Society of Automotive Engineers, Inc. 1996-02 or a test the Director considers equivalent.

Table 11: Maximum Emission Standards - Opacity Test Light Duty Diesel Fuelled Vehicles

Vehicle Model Year and Type	Greater Toronto Area, urban and commuter areas, and expanded program area	Outside of the Greater Toronto Area, urban and commuter areas, and expanded program area
1988-1997 model year light vehicles, up to 3,856 kg GVWR	No more than 5 consecutive seconds of visible smoke in any 1 minute period during a 5 minute observation period	Maximum Emission Standards – Diesel Fuelled Heavy Vehicles set out in Table 12
1988- 2006 model year light vehicles 3,857 – 4,500 kg GVWR	No more than 5 consecutive seconds of visible smoke in any 1 minute period during a 5 minute observation period	Maximum Emission Standards – Diesel Fuelled Heavy Vehicles set out in Table 12

Note: Appendix D of the Drive Clean SOP will list the majority of vehicles the ministry has identified as requiring modified OBD tests or alternative tests.

Section 12: Opacity Test for Diesel Fuelled Heavy Vehicles

The opacity test procedure for diesel fuelled heavy vehicles is the SAE J1667 Snap Acceleration Smoke Test Procedure for Heavy Diesel Powered Vehicles, issued by the Society of Automotive Engineers, Inc. 1996-02; or a test that the Director considers equivalent; or the Roadside Opacity Test, described below, provided that:

- i. the Roadside Opacity Test may be used only by a Provincial Officer designated under the *Environmental Protection Act*, and
- ii. the Roadside Opacity Test is not acceptable for the purpose of s. 8.2 of the HTA Regulation.

Definition – “School bus”

For purposes of this section, “school bus” has the same meaning as in section 175(1) of the *Highway Traffic Act*.

"school bus" means a bus that,

- a. is painted chrome yellow, and
- b. displays on the front and rear thereof the words "school bus" and on the rear thereof the words "do not pass when signals flashing". ("autobus scolaire").

Heavy Duty Diesel Fuelled Vehicles - 20 Percent Opacity Or Less

Any diesel fuelled heavy vehicle that achieves 20% opacity or less when tested in accordance with this section, may be exempt from emissions testing requirements in eligible years as defined by the HTA Regulation. This program is designed by the Ministry of the Environment and Climate Change as an incentive for heavy duty diesel fuelled vehicles to achieve emission results that exceed the minimum requirement.

Table 12: Maximum Emission Standards Diesel Fuelled Heavy Vehicles

Model year	Vehicle Type	Standards
1990 and older model year	School bus	30% Opacity
	Other	40% Opacity
1991 and newer model year	School bus	30% Opacity
	Other	30% Opacity

Roadside Opacity Test Procedures for Diesel Fuelled Heavy Vehicles

1.0	Purpose
	This document provides a procedure to conduct roadside testing of Diesel Fuelled Heavy Vehicles [GVWR greater than 4,500 kg (9,921 lbs)] to assess compliance with section 12 of the Regulation.
2.0	Limitations
2.1	This procedure shall only be used by Provincial Officers designated under the Environmental Protection Act.
2.2	This procedure requires the use of a sampling type smokemeter, also called a partial flow smokemeter, which appears in the following list:
	<ul style="list-style-type: none"> • Wager Portable Smoke Meter Model 6500; • Wager Portable Smoke Meter Model 6700; • Wager Portable Smoke Meter Model 7500; • Red Mountain Engineering Smoke Check 1667; • Bosch RTT 100 Diesel Smoke Opacimeter.
2.3	Ambient Air Test Conditions:
2.3.1	No testing shall occur when visible humidity (for example fog, rain and snow) is present where exhaust samples are drawn or the smoke plume is measured.
2.3.2	No testing shall occur when the ambient air temperature at the test location is below 2° C (36° F) or above 30° C (86° F) unless correction factors to compensate for relative humidity, barometric pressure, or ambient temperature are applied.
3.0	Smokemeter Calibration Verification
3.1	The smokemeter calibration shall be verified at the beginning of each testing day unless the unit is self-calibrating, in which case the following steps in this section are not necessary.
3.2	Prior to any zero or full scale checks, the meter shall be warmed up and stabilized according to the manufacturer's recommendations.
3.3	Prompt smokemeter to carry out calibration verification.
3.4	With the smokemeter in opacity readout mode and with no blockage of the smokemeter light beam, check the readout to display 0.0% ± 1.0% opacity.
3.5	The calibration of the smokemeter shall be verified by using the smokemeter manufacturer's supplied neutral density filter(s). When prompted by the smokemeter,

	insert the filter into the sensor head ensuring it is placed between the sensor light source and detector. The opacity reading of the smokemeter should be the filter opacity percentage $\pm 1\%$. If the smokemeter does not read within $\pm 1\%$ of the filter, do not carry out any testing. Clean and re-install the neutral density filter and recheck the calibration or refer to the User Manual to troubleshoot the source of the problem.
3.6	Record the result.
4.0	Pre-test Safety Check and Vehicle Preparation
4.1	Ensure that the vehicle operator keeps the engine running. If the engine is inadvertently shut off, the engine should be immediately restarted and the operator should be instructed to move the vehicle as quickly as possible in the vehicle's lowest gear for at least 25 feet, in order to activate the engine air/fuel ratio controls on some engines.
4.2	Confirm that the vehicle is diesel fuelled and has a GVWR greater than 4,500 kg (9,921 lbs).
4.3	Chock the vehicle wheels.
4.4	Visually inspect the vehicle exhaust system for any leaks; if a severe leak prevents the exhaust from exiting at the end of the stack, test at the point of leakage (unless this point is immediately downstream of a bend in the pipe). If testing is impractical, have the vehicle repaired and retested.
4.5	Confirm the engine is warmed up by observing the vehicle water and/or oil gauges or by confirming that the vehicle has been operated under load for at least 15 minutes.
4.6	Verify that the operator has set the engine idle speed to low idle.
4.7	Verify the speed-limiting capability of the engine governor using the following procedure:
4.7.1	If the vehicle is equipped with a manual transmission, the transmission must be placed in neutral and the clutch must be disengaged. If the vehicle is equipped with an automatic transmission, the transmission must be placed in the park position, if available. Otherwise, it should be placed in the neutral position.
4.7.2	Check with the vehicle operator to determine that the vehicle's governor is operating correctly. If the governor is not working correctly the vehicle should be repaired and retested.
4.7.3	With the engine at low idle, instruct the driver to slowly depress the engine accelerator and allow the engine speed to gradually increase toward its maximum governed high idle speed. As the engine speed increases, carefully note any visual or audible indications that the engine or vehicle may be of questionable soundness. If there are no indications of problems, allow the engine speed to increase to the point that it is possible to verify that the speed-limiting capability of the governor is functioning. Should there be an indication that the speed-limiting capability of the governor is not

	<p>functioning (engine speed continues to increase), or that potential engine damage or unsafe conditions for personnel or equipment may occur, the accelerator should immediately be released, and the test aborted.</p> <p>If the engine speed continues to increase uncontrollably, immediately shut off the engine fuel supply.</p> <p>In the case of governor failure or malfunction, the vehicle should be repaired and retested.</p>
4.8	All accessories including the vehicle air conditioning must be turned off.
4.9	If the engine is equipped with an engine brake, it must be deactivated.
4.10	The parking brake and trailer brakes must be turned off and the brakes must not be applied.
4.11	All devices installed on the engine or vehicle that alter the normal acceleration characteristics of the engine and have the effect of temporarily lowering snap-acceleration results or preventing the test from being successfully completed shall be deactivated prior to testing.
5.0	Test Procedure
	With the vehicle conditioned as in 4.0:
5.1	Prior to conducting the opacity test on a vehicle equipped with multiple exhaust outlets, determine which exhaust outlet exhibits the highest smoke level by visually comparing the exhaust smoke from each outlet during one or more repetitions of the snap-acceleration test cycle. If there is no discernible difference in the exhaust smoke exiting each outlet, conduct the testing using the most convenient outlet. If there is a difference in the exhaust smoke from the multiple outlets, conduct the test using the exhaust outlet that visually appears to have the highest smoke level.
5.2	Determine either of the following:
5.2.1	Measure the outside diameter of the portion of the vehicle exhaust pipe which visually appears to have the smallest outside diameter (No engine compartment inspection is required). The outside diameter of the exhaust pipe must be rounded down to the nearest whole inch or metric equivalent. If the exhaust pipe's outside diameter is determined to be greater than 127 mm (5 inches) the exhaust pipe outside diameter shall be determined to be 127 mm (5 inches),
Or	
5.2.2	The rated horsepower of the engine from the tune-up label affixed to the engine.
5.3	Initiate the smokemeter test sequence.
5.4	Enter required information into smokemeter as prompted. Instruct smokemeter that clean out snaps will be performed.

5.5	Prior to attaching or inserting the sensor head into the exhaust stack, have the smokemeter perform zero and full scale checks when prompted.
5.6	Place sensor into the exhaust stack.
5.7	Per smokemeter prompts, have vehicle operator conduct at least 3 preliminary snap-acceleration test cycles using the sequence described in 6.0.
5.8	Within 2 minutes of the execution of the 3 preliminary snap-acceleration cycles per smokemeter prompts, conduct the 3 official snap-acceleration test cycles using the sequence described in 6.0.
6.0	Vehicle Operator Instruction - Snap-Acceleration Test Cycle
6.1	The vehicle operator shall move the accelerator to fully open as rapidly as possible.
6.2	The operator shall hold the accelerator in the fully open position for 1 to 4 seconds after the engine has achieved its maximum governed speed.
6.3	Upon completion of the 1 to 4 seconds at maximum governed speed, the operator shall release the accelerator and allow the engine to return to low idle speed.
6.4	Once the engine has reached its low idle speed, the operator shall allow the engine to remain idle for a minimum of 5 seconds, but no longer than 45 seconds, before initiating the next snap-acceleration test cycle.
7.0	Test Validation
7.1	Upon completion of the 3 official snap-acceleration test cycles, remove the sensor head from the stack and, if prompted by the smokemeter, conduct the post-test zero procedure.
7.2	Ensure that the difference between the highest and lowest of the 3 official snap-acceleration test results is 5 opacity percentage points or less.
7.2.1	If the test was valid, print out a copy of the test results and save the data.
7.2.2	If the test was invalid, repeat the test procedure. (If improper or inconsistent application of the accelerator is suspected, re-instruct the vehicle operator as to the proper execution of the snap-acceleration test cycle or refer to the smokemeters User Manual for troubleshooting invalid tests.)
7.3	The test result for comparison with the maximum emissions standards in section 12 of the Drive Clean Guide is the average opacity of the 3 official snap-acceleration tests.

Section 13: Submission of Vehicle for Testing

This form has been approved by the Minister of the Environment for the purposes of section 13 of the Regulation.



Ontario

Ministry of
the
Environment

Ministère de
l'Environnement

Form The Environmental Protection Act
Formule Loi sur la protection de l'environnement

Notice to Submit Motor Vehicle / Avis de presentation d'un vehicule automobile

Information contained on this form is collected under the authority of the Environmental Protection Act, Sections 21, 22 and 23 and Ontario Regulation 361/98. It is used for enforcement purposes regarding motor vehicle drivers and owners. Questions should be directed to Supervisor, Vehicle Emissions Enforcement Unit, Ministry of the Environment, 305 Milner Ave, 10th floor, Toronto, Ontario, M1B 3V4. Tel (416) 314-4278 or General Information 1-888-758-2999.

Ces renseignements, recueillis en vertu de la Loi sur la protection de l'environnement, art. 21, 22 et 23 et reg. 361/98 de l'Ontario, servent à appliquer les dispositions relatives aux conducteurs et propriétaires de véhicules. Veuillez adresser toute question à l'Unité de contrôle des émissions de véhicules, Ministère de l'Environnement, 305 Milner Ave, Suite 1000, Toronto (Ontario) M1B 3V4. No de tel. : (416) 314-4278 ou renseignements généraux au 1-888-758-2999.

Take notice that under The Environmental Protection Act and Regulation thereunder,
Vous êtes avisé qu'aux termes de la Loi sur protection de l'environnement et du règlement afferent,

Name of person served / Nom de la personne avisée

- Owner / Propriétaire
 Driver / Conducteur
 Operator / Opérateur*

of (address) / Adresse de la personne avisée:

Drivers License No. / Numero du permis de conduire	Province / State Province / Etat	
is required to submit the motor vehicle bearing (Ontario) Registration Plate number est tenu presenter le vehicule automobile immatricule	Prov. / State. Prov. / Etat	Make / Marque
Vehicle identification number / Numero d'identification du vehicule	Vehicle Year / Année du vehicule	

to the inspection site at / au lieu d'inspection a:

on or before / au plus tard le

_____ (Day) _____ (Month) _____ at _____

for testing and inspection / pour une analyse et une inspection

Notice served and dated at / Avis remis a

this _____ day of _____ 20 _____ at _____ AM/PM at _____

le _____ jour de _____ 20 _____ a _____ h a _____

SIGNATURE OF PROVINCIAL OFFICER / POLICE OFFICER
SIGNATURE DE L'AGENT PROVINCIAL / DE POLICE

Officer Number / Numero de l'agent

Detachment or District Address / Adresse du district ou du detachement

***Operator** means the person directly or indirectly responsible for the operation of a motor vehicle including the conduct of the driver, and the carriage of goods or passengers, if any, in the vehicle or combination of vehicles;

***Opérateur** signifie la personne directement ou indirectement responsable du fonctionnement d'un véhicule, y compris le comportement du conducteur et le transport des biens ou des passagers, s'il y a lieu, sans le véhicule.