VIII Acronyms and Abbreviations

°C °F 0-D 1-D 3-D 4Q a.u. A/cm² A/T A75	Degrees Celsius Degrees Fahrenheit Zero-dimensional One-dimensional Three-dimensional Fourth quarter Arbitrary units Amps per square centimeter Aftertreatment Near peak torque speed & 75% engine load point of ESC Test Procedure		the surface area of a solid involves monitoring the adsorption of nitrogen gas onto the solid at low temperature and, from the isotherm generated, deriving the volume of gas required to form one monolayer adsorbed on the surface. This volume, which corresponds to a known number of moles of gas, is converted into a surface area though knowledge of area occupied by each molecule of adsorbate.
AC	Alternating current	bhp-hr	Brake horsepower hour
AEC	Advanced Emission Controls	Bi ₂ Te ₃	Bismuth Telluride
	Working Group	BMEP	Brake mean effective pressure
AETEG	Automobile exhaust thermoelectric	bmep	Brake mean effective pressure
	generator	BOI	Beginning of injection
Ag	Silver	BP	British Petroleum
AHRR	Apparent heat release rate	BPF	Bandpass Filter
Al	Aluminum	Bsfc	Brake specific fuel consumption
Al_2O_3	Aluminum oxide	BSFC	Brake specific fuel consumption
ANL	Argonne National Laboratory	btdc	Before top dead center
ANSI	American National Standards	BTE	Brake thermal efficiency
ANDI	Institute	C:N	Ratio of carbon to nitrogen
ASI	Time after the start of injection		Carbon content in the exhaust or
ASME	American Society of Mechanical	C_1	reformer in terms of carbon atoms
ASME	· · · · · · · · · · · · · · · · · · ·	СП	Ethane
ΑT	Engineers Aftertreatment	C_2H_6	
ATDC		C_3H_6	Propylene
ATDC	After top dead center	CA	Crank angle
atm	Atmosphere	CA50	Crank angle at which 50% of the
Au	Gold	CAD	combustion heat release has occurred
AU	Arbitrary units	CAD	Computer-aided design
B	Boron	CAD	Crank angle degrees
B100	Mid-speed & 100% engine load point	CAI	Controlled autoignition
D. 6. 6	of ESC Test Procedure	CAP	Critical adjustable parameter
B25	Mid-speed & 25% engine load point	cc	Cubic centimeter
D##	of ESC Test Procedure	CCD	Charge coupled device
B75	Mid-speed & 75% engine load point	CDI	Compression direct injection
_	of ESC Test Procedure	CDPF	Catalytic diesel particulate filter
Ba	Barium	CeO_2	Cerium oxide
BaO	Barium oxide	CFD	Computational fluid dynamics
BDC	Bottom dead center	CFR	Coordinating Fuel Research
		CFR	Critical functional response
		CHEMKIN	Name of chemical-kinetic code
BET	Named after Brunauer, Emmett and	CI	Compression ignition
	Teller, this method for determining	CIDI	Compression ignition direct injection

CIMAC	International Council on Combustion	e ⁻	Electron
CLEAN	Engines	ECM	Electronic control module
CLEAN	Trademark for Detroit Diesel low-	EDS	Energy dispersive spectroscopy
CLEEDG	temperature combustion strategy	EGR	Exhaust gas recirculation
CLEERS	Cross-Cut Lean Exhaust Emissions	EINO _x	Emissions index of NO _x
	Reduction Simulations	ELPI	Electrical low pressure impactor
cm ₃	Centimeter	ELS	Elastic light scattering
cm ³	Cubic centimeters	ELSLII	Elastic laser scattering with laser-
CO	Carbon monoxide	EMD	induced incandescence
CO ₂	Carbon dioxide	EMD	Electro-Motive Division of General
COV	Coefficient of variation	EDA	Motors Corporation
CO_{X}	Oxides of carbon	EPA	U.S. Environmental Protection
CP _.	Chevron Phillips	EGG	Agency
cpi	Cells per inch	ESC	Steady-State Emission Test
Cr	Chromium	ETC	Procedure
CRADA	Cooperative Research and	ETC	Electric turbocompound
CD DDE	Development Agreement	ф	Fuel/Air Equivalence Ratio
CR-DPF	Continuously regenerating diesel	Fe	Iron
CDE	particle filter	fFO	Fuel oxygen equivalence ratio
CRF	Combustion Research Facility	FLC	Federal Laboratory Consortium
CRS	Common Rail System	FLRS	Full load rated speed engine
Cu	Copper		condition
CWLR	Constant weight loss rate	FMEA	Failure mode and effects analysis
DC	Direct current	fmep	Friction mean effective pressure
DCSF	Diesel combustion simulation facility	FSN	Filter smoke Number (AVL)
DDC	Detroit Diesel Corporation	FTIR	Fourier transform infrared
DECSE	Diesel Emission Control Sulfur	ft-lb	Foot-pound
BEEB	Effects	FTP	Federal Test Procedure
DEER	Diesel Engine Emissions Reduction	FTP	Federal Transient Protocol
deg	Degrees	FTP-75	Federal Test Procedure for LD
DELTA	Diesel Engine for Light Truck		vehicles
DEL (Application	FWHM	The full width at half the maximum
DEM	Delayed and extended main		activity as a function of temperature
DeNO _x	Oxides of nitrogen reduction	FY	Fiscal year
DI	Direct injection	g	Gram
dm	Decimeter	g/hp-hr	Grams per horsepower-hour
DME	Dimethyl ether	g/kWh	Grams/kilowatt-hour
DNS	Direct Numerical Simulation	g/mi	Grams per mile
DOC	Diesel oxidation catalyst	GC-MS	Gas chromatography – mass
DoE	Design of experiment	CD.	spectrometry
DOE	U.S. Department of Energy	GDI	Gasoline direct injection
DOHC	Double overhead camshaft	GE	General Electric
DPF	Diesel particulate filter	Ge	Germanium
DPNR	Diesel Particulate NO _x Reduction	GHSV	Gas Hourly Space Velocity; a
DPV	Differential pulse voltammetry		measure of gas flow rate through a
DRIFT	Diffuse reflectance infrared Fourier		reactor in units of liters of gas per
DD1	transform		liter of catalyst per hour, or L L-1 h-
DRIFTS	Diffuse reflectance infrared Fourier-	a= a	1, or h-1.
DEEE C	transform spectroscopy	GRC	GE Global Research Center
DTTEG	Diesel truck thermoelectric generator		

CT Dawe	Commo Tochnologica engino	1.11	V:lahaut-
GT-Power	Gamma Technologies engine	kHz KIVA	Kilohertz
II	modeling software	KI VA	a transient, three-dimensional,
H ₂	Diatomic (molecular) hydrogen		multiphase, multicomponent code for
HC	Hydrocarbons		the analysis of chemically reacting
HCCI	Homogeneous charge compression		flows with sprays developed at the
нол	ignition	1.7	Los Alamos National Laboratory
HCN	Hydro-cyanic acid	kJ	Kilojoule
HD	Heavy-duty	kJ/L	Kilojoules per liter
Не	Helium	kJ/m ³	Kilojoules per cubic meter
HECC	High-efficiency clean combustion	KL	Soot optical thickness
HELD	High-energy laser diagnostics	kPa	Kilopascal
HEV	Hybrid electric vehicle	kW	Kilowatt
H ₂ ICE	Hydrogen-fueled internal combustion	L	Liter
	engine	L/D	Length-to-diameter ratio
HMO	Hydrous metal oxide	La	Lanthanum
H_2O	Water	LANL	Los Alamos National Laboratory
H_2O_2	Hydrogen peroxide	lb ft	Pound foot
hp	Horsepower	lb/mi	Pounds per minute
HPCR	High-pressure common rail	lbs	Pounds
HR	Heat release	lbs/sec	Pounds per second
hr	Hour	LD	Light-duty
HRR	Heat release rate	LDT	Light-duty truck
H ₂ -SpaciMS	Hydrogen-calibrated spatially	LEP	Low Emissions Technologies
2 1	resolved capillary inlet mass		Research and Development
	spectrometry		Partnership (often abbreviated to
HTCD	Heavy truck clean diesel		Low Emissions Partnership); a
HTML	High Temperature Materials		consortium between Ford, General
	Laboratory		Motors and DaimlerChrysler
Hz	Hertz	LES	Large eddy simulation
IC	Internal combustion	LHV	Lower heating value
ICCD	Intensified Charge Coupled Device	LIBS	Laser-induced breakdown
ICCD	(camera)	LIDS	spectroscopy
ICE	Internal combustion engine	LIDELS	Laser-induced desorption with elastic
ID	Injection duration	LIDEES	light scattering
ID	Internal diameter	LIF	Laser-induced fluorescence
IEA	International Energy Agency	LII	Laser-induced incandescence of soot
IEEE	Institute of Electrical and Electronics	LLNL	Lawrence Livermore National
ILLE	Engineering	LLINL	Laboratory
IMEP	Indicated mean effective pressure	LNT	Laboratory Lean NO _x trap
	*	LO	A .
imep IR	Indicated mean effective pressure Infrared	LO	Light-off temperature – the minimum
			temperature at which half the
IVC	Intake valve camshaft		maximum catalyst activity is
J	Joule W. Jania	LOHOOL	identified
K	Kelvin	LQHCCI	Lean quasi-homogeneous charge
K	Potassium	1.00	compression ignition
K_2CO_3	Potassium Carbonate	LSC	Lanthanum strontium chromite
K ₂ O	Potassium oxide	LTC	Low-temperature combustion
KeV	Kilo electron volts, a unit of energy	M/G	Motor/generator
kg	Kilogram	m^2	Square meters

2,		110	
m_3^2/gm	Square meters per gram	NO_x	Oxides of nitrogen (NO and NO ₂)
m^3	Square meters	ns	Nanosecond
mA	Milliamps	NSR	Normalized stoichiometric ratio
mbar	Millibar	NTE	Not-to-exceed
MBE	Molecular beam epitaxy	NTP	Non-thermal plasma
MCRS	Modular Common Rail System	NTRC	National Transportation Research
MECA	Manufacturers of Emission Controls		Center
	Association	O_2	Diatomic (molecular) oxygen
MeOH	Methanol	OEM	Original Equipment Manufacturer
mg/cm ²	Milligrams per square centimeter	OFCVT	Office of FreedomCAR and Vehicle
mg/mi	Milligram per mile		Technologies
mg/mm ²	Micrograms per square millimeter	OH	Hydroxyl radical
mg/scf	Milligrams per standard cubic foot	OH*	Hydroxyl radical that emits
min	Minute		ultraviolet photons
MIT	Massachusetts Institute of	OH PLIF	Planar laser-induced fluorescence of
	Technology		OH
MLQWF	Multi-layer quantum well films	OMS	Octahedral molecular sieve
MLR	Multivariable local regression	ORC	Organic Rankine Cycle
μm	Micrometer	ORNL	Oak Ridge National Laboratory
mm	Millimeter	P	Pressure
mmols	Micro-moles	P2P	Ratio of the peak activity of a new
Mn	Manganese		material to the peak activity of a
Mo	Molybdenum		reference material
mol	Mole	PAC	Plasma-assisted catalyst
mol/s	Moles per second	PC	Personal computer
MOPO	Master optical parametric oscillator	PCCI	Premixed charge compression
MOU	Memorandum of Understanding		ignition
MPa	Megapascals	PD	Photodiode
mph	Miles per hour	PDF	Probability density function
ms	Millisecond	PEMS	Portable emissions measurement
MTU	Michigan Technological University		system
MY	Model year	PFI	Port fuel injection
N_2	Diatomic nitrogen	PFI-DI	Port fuel injection/direct injection
Na	Sodium	PhosphorT	Phosphor thermography instrument
Nd-YAG	Neodymium-doped yttrium	PLIF	Planar laser-induced fluorescence
1,4 1110	aluminum garnet	PLII	Planar laser-induced incandescence
NEA	Nitrogen-enriched air	PM	Particulate matter
NH ₃	Ammonia	PM	Permanent magnet
NLCAT	National Laboratory Catalysis	PMT	Photomultiplier tube
1 (EC/II	Conference	PNGV	Partnership for a New Generation of
nm	Nanometer	11101	Vehicles
Nm	Newton meter	PNNL	Pacific Northwest National
NMHC	Non-methane hydrocarbon	TIVIL	Laboratory
NMOG	Non-methane organic gases	Post80	Late cycle injection after the main
NMR	Nuclear magnetic resonance	1 03100	fuel pulse at 80° after top dead center
NO	Nitric oxide	PO_x	Partial oxidation
NO_2	Nitrogen dioxide		Parts per billion
_	Nitrous oxide	ppb	<u>-</u>
N ₂ O		ppi	Pores per square inch Parts per million
N_2O_3	Nitrogen trioxide	ppm	i aris per illillion

PRF 80 Primary Reference Fuels (iso-octane and n-heptane), of 80 (i.e., 80% iso-octane and 20% n-heptane)	DDE		CNII	
PRF80 PRF mixture with an octane number of 80 (i.e., 80% iso-octane and 20% octane and 20% o	PRF	` `		
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n-heptane) psi Pounds per square inch psig Pounds per square inch psig Pounds per square inch gauge Pt Platinum QSB5.9 Quantum System B Series 5.9Liter (Midrange Industrial Product) QSC8.3/QSL9 Quantum System C Series 8.3 Liter, QSC8.3/QSL9 Quantum System K Series 9 Liter QSR19 Quantum System K Series 9 Liter QSX15 Quantum System X Series 19 Liter QSX19 Quantum System X Series 19 Liter QSX10 Quantum System X Series 19 Liter QSX10 Quantum System X Series 19 Liter QSX110 QW	PRF80			•
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SMPS Scanning mobility particle scanner VGC Variable geometry compressor				-
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SMR Steam reformation VGS Variable geometry spray				
	SMR	Steam reformation	VGS	Variable geometry spray

VNT Variable nozzle turbine VVA Variable valve actuation

W Watt

W/cmK Watts per centimeter-Kelvin

wt% Weight percent

XPS X-ray photoelectron spectroscopy

XRD X-ray diffraction

Y Yttrium yr Year Zn Zinc

ZT Dimensionless thermoelectric figure

of merit; equal to: (electrical

conductivity)(Seebeck

coefficient)^2(temperature)/(thermal

conductivity)