

## VI. Acronyms and Abbreviations

$\tau_{id}$	Ignition delay time	ATDC	After top dead center
$\eta$	Effectiveness	atm	Atmosphere
$^{\circ}\text{C}$	Degrees Celsius	Au	Gold
$\Delta P$	Pressure drop	B	Boron
$\Phi$	Fuel/air equivalence ratio	B100	100% biodiesel
$^{\circ}\text{F}$	Degrees Fahrenheit	B100	Mid-speed & 100% engine load point of ESC Test Procedure
0-D	Zero-dimensional	B25	Mid-speed & 25% engine load point of ESC Test Procedure
1-D	One-dimensional	B75	Mid-speed & 75% engine load point of ESC Test Procedure
3-D	Three-dimensional	Ba	Barium
4Q	Fourth quarter	BaAl <sub>2</sub> O <sub>4</sub>	Barium aluminate
A	Availability	Ba(NO <sub>3</sub> ) <sub>2</sub>	Barium nitrate
a.u.	Arbitrary units	BaO	Barium oxide
A/cm <sup>2</sup>	Amps per square centimeter	BC	Black carbon
A75	Near peak torque speed & 75% engine load point of ESC Test Procedure	BDC	Bottom dead center
AC	Air compressor	BES	Basic Energy Sciences
AC	Alternating current	BET	Named after Brunauer, Emmett and Teller, this method for determining 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.
A/C	After cooler	bhp-hr	Brake horsepower hour
ACE	Advanced Combustion in Engines	Bi <sub>2</sub> Te <sub>3</sub>	Bismuth Telluride
ACES	Advanced Collaborative Emissions Study	BMEP	Brake mean effective pressure
AEC	Advanced Emission Controls Working Group	bmep	Brake mean effective pressure
AEI	After end of injection	BOI	Beginning of injection
AETEG	Automobile exhaust thermoelectric generator	BP	formerly British Petroleum
Ag	Silver	BSDPM	Brake specific dry particulate matter
AHRR	Apparent heat release rate	Bsfc	Brake specific fuel consumption
AIChE	American Institute of Chemical Engineers	BSFC	Brake specific fuel consumption
A/F	Air to fuel ratio	bsNOx	Brake specific NOx emissions
AFR	Air/fuel ratio	btdc	Before top dead center
Al	Aluminum	BTE	Brake thermal efficiency
Al <sub>2</sub> O <sub>3</sub>	Aluminum oxide	C/N	Carbon to nitrogen ratio
AM	Air motor	C:N	Ratio of carbon to nitrogen
AMDC	Advanced mode diesel combustion	C <sub>1</sub>	Carbon content in the exhaust or reformer in terms of carbon atoms
ANN	Artificial neural network	C <sub>2</sub> H <sub>6</sub>	Ethane
ANL	Argonne National Laboratory		
ANSI	American National Standards Institute		
APA	Air-power-assist		
APU	Auxiliary power unit		
ASI	Time after the start of injection		
ASME	American Society of Mechanical Engineers		
AT	Aftertreatment		
atdc	After top dead center		

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C <sub>3</sub> H <sub>6</sub>	Propylene	CPF	Catalyzed particulate filter
CA	Crank angle	CPU	Central processing unit
CA50	Crank angle at which 50% of the combustion heat release has occurred	Cr	Chromium
CAC	Charge air cooler	CR	Compression ratio
CAD	Computer-aided design	CRADA	Cooperative Research and Development Agreement
CAD	Crank angle degrees	CRC	Coordinating Research Council
CAFE	Corporate average fuel economy	CR-DPF	Continuously regenerating diesel particle filter
CAI	Controlled autoignition	CRF	Combustion Research Facility
CAP	Critical adjustable parameter	CRS	Common Rail System
CARB	California Air Resources Board	Cs,i	Solid species concentration
CBM	Carbon balance method	Cu	Copper
cc	Cubic centimeter	CVT	Continuously variable transmission
CDI	Compression direct injection	CWLR	Constant weight loss rate
CDPF	Catalytic diesel particulate filter	d	Nozzle diameter
CeO <sub>2</sub>	Cerium oxide	DAQ	Data acquisition
CFD	Computational fluid dynamics	DC	Direct current
CFR	Waukesha Cooperative Fuel Research Engine	DCSF	Diesel combustion simulation facility
CFR	Coordinating Fuel Research	DDC	Detroit Diesel Corporation
CFR	Critical functional response	DECSE	Diesel Emission Control Sulfur Effects
Cg,i	Gas species concentration	DEER	Diesel Engine Emissions Reduction
CGIC	Clean gas induction cooler	deg	Degrees
CHEMKIN	Sandia chemical kinetics code	DELTA	Diesel Engine for Light Truck Application
CI	Compression ignition	DEM	Delayed extended main
CIDI	Compression ignition direct injection	DeNO <sub>x</sub>	Oxides of nitrogen reduction
CIMAC	International Council on Combustion Engines	DGE	Diethylene glycol diethyl ether (CAS 112-36-7)
CINL	Cycle integrated natural luminosity	DI	Direct injection, direct injected
CLD	Chemi-luminescence detector	DIB	Di-isobutylene
CLEAN	Trademark for Detroit Diesel low-temperature combustion strategy	DIL	Dual in-line
CLEERS	Cross-Cut Lean Exhaust Emissions Reduction Simulations	dm	Decimeter
CLOSE	Collaborative Lubricating Oil Study on Emissions	DME	Dimethyl ether
cm	Centimeter	DNS	Direct numerical simulation
cm <sup>3</sup>	Cubic centimeters	DNPH	2,4-dinitrophenylhydrazine
CNC	Computer numerically controlled	DOC	Diesel oxidation catalyst
CNG	Compressed natural gas	DoE	Design of experiment
CO	Carbon monoxide	DOE	U.S. Department of Energy
CO <sub>2</sub>	Carbon dioxide	DOHC	Double overhead camshaft
COV	Coefficient of variation	DOM	Discrete ordinates method
CO <sub>x</sub>	Oxides of carbon	DP	Pressure differential
CP	Chevron Phillips	DPF	Diesel particulate filter
CPER	Counterflow preheating with near-equilibrium reaction	DPNR	Diesel Particulate NO <sub>x</sub> Reduction
cpi	Cells per inch	DPV	Differential pulse voltammetry
		DRIFTS	Diffuse reflectance infrared Fourier-transform spectroscopy

DTTEG	Diesel truck thermoelectric generator	FTP-75	Federal Test Procedure for light-duty vehicles
e <sup>-</sup>	Electron		
E10	10% ethanol, 90% gasoline fuel blend	FVVA	Full variable valve actuation
E85	85% ethanol, 15% gasoline fuel blend	FWHM	The full width at half the maximum activity as a function of temperature
ECM	Engine control module		
ECU	Engine control unit	FY	Fiscal year
EEERE	Energy Efficiency and Renewable Energy	G	Gram
EDS	Energy dispersive spectroscopy	g	Gram
EDX	Energy dispersive X-ray	g/hphr	Grams per horsepower-hour
EGR	Exhaust gas recirculation	g/bhp-hr	Grams per brake horsepower-hour
EINO <sub>x</sub>	Emissions index of NO <sub>x</sub>	gIMEP	Gross indicated mean effective pressure
ELPI	Electrical low pressure impactor	g/kWh	Grams/kilowatt-hour
ELS	Elastic light scattering	g/mi	Grams per mile
ELSLII	Elastic laser scattering with laser-induced incandescence	GA	Genetic algorithm
		GATE	Graduate Automotive Technology Education
EMD	Electro-Motive Division of General Motors Corporation		
		GC	Gas Chromatography
EO	Engine-out	GC-MS	Gas chromatography – mass spectrometry
EOI	End of injection		
EPA	U.S. Environmental Protection Agency	GDC	Gadolinium-doped cerium oxide
EPVA	Electro-pneumatic valve actuator	GDI	Gasoline direct injection
ER	Expansion ratio	GE	General Electric
ERC	Engine Research Center	Ge	Germanium
ESC	European Steady State Cycle	GHSV	Gas hourly space velocity
η	Effectiveness	GM	General Motors
ETC	Electric turbocompound	GRC	GE Global Research Center
EVC	Exhaust valve closing	GT-Power	Gamma Technologies engine modeling software
EVO	Exhaust valve opening		
EWHR	Exhaust waste heat recovery	GUI	Graphical user interface
f	Fuel/Air Equivalence Ratio	GVWR	Gross vehicle weight rating
FBMAFS	Forward-backward mass air flow sensor	h	Convective heat transfer coefficient
FCVT	FreedomCAR and Vehicle Technologies	H	Enthalpy
FEA	Finite-element analysis	H <sub>2</sub>	Diatomic (molecular) hydrogen
Fe	Iron	H <sub>2</sub> CO	Formaldehyde
f <sub>FO</sub>	Fuel oxygen equivalence ratio	H <sub>2</sub> O	Water
FHWA	Federal Highway Administration	H <sub>2</sub> O <sub>2</sub>	Hydrogen peroxide
FLC	Federal Laboratory Consortium	H2-ICE	Hydrogen-fueled internal combustion engine
FIE	Fuel Injection Equipment		
FLRS	Full load rated speed engine condition	H2-SpaciMS	Hydrogen-calibrated spatially resolved capillary inlet mass spectrometry
FMEA	Failure mode and effects analysis		
f <sub>mep</sub>	Friction mean effective pressure	HC	Hydrocarbons
FSN	Filter smoke number	HCCI	Homogeneous charge compression ignition
FSNR	Fuel specific NO <sub>x</sub> reduction		
FTIR	Fourier transform infrared	HCN	Hydro-cyanic acid
ft-lb	Foot-pound	HC-SCR	Hydrocarbon selective catalytic reduction
FTP	Federal Test Procedure	HCT	Hydrodynamics, Chemistry, Thermodynamics code

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HD	Heavy-duty	ITEC	International Truck and Engine Corporation
HDCC	Heavy-duty corporate composite	ITH	Intake throttle valve
He	Helium	IVA	Intake valve actuation
HECC	High-efficiency clean combustion	IVC	Intake valve closing
HEI	Health Effects Institute	IVO	Intake valve opening
HELD	High-energy laser diagnostics	J	Joule
HEV	Hybrid electric vehicle	JPL	Jet Propulsion Laboratory
HFPE	Hydrogen free piston engine	JW	Jacket water
HHV	Higher heating value	JWHR	Jacket water heat rejection
HIL	Hardware-in-loop	k	thousand
HMO	Hydrous metal oxide	k	Mass transfer coefficient
hp	Horsepower	K	Kelvin
HP	High pressure	K	Potassium
HPCR	High-pressure common rail	kg	Kilogram
HPL	High pressure loop	kHz	Kilohertz
HR	Heat release	KIVA	Combustion analysis software developed by Los Alamos National Laboratory
hr	Hour	KIVA-CTC	KIVA characteristic time combustion
HRR	Heat release rate	KIVA-RIF	KIVA representative interactive flamelet
HSDI	High-speed direct-injection	kJ	Kilojoules
HTCD	Heavy truck clean diesel	kJ/L	Kilojoules per liter
HTML	High Temperature Materials Laboratory	$\text{kJ/m}^3$	Kilojoules per cubic meter
HVA	Hydraulic valve actuator	KL	Soot optical thickness
HWFET	Highway Fuel Economy Test	kPa	Kilopascal
HXN	Heat exchanger	KS	Converging hydroground nozzle
Hz	Hertz	kW	Kilowatt
IC	Internal combustion	L	Liter
I/C	Intercooler	L/D	Length-to-diameter ratio
ICCD	Intensified charged-coupled device	La	Lanthanum
ICDEM	Individual cylinder delayed extended main	Lambda	Ratio of the actual air/fuel ratio to the stoichiometric air/fuel ratio
ICE	Internal combustion engine	LANL	Los Alamos National Laboratory
ID	Injection delay	LAST	Lead, antimony, silver, and tellurium, an n-type TE material
ID	Injection duration	LAST/T	LAST/Tin, a p-type TE material
ID	Internal diameter	LB	Lattice-Boltzmann
IDD	Interstage duct difuser	lb ft	Pound foot
IEA	International Energy Agency	lb/min	Pounds per minute
IEEE	Institute of Electrical and Electronics Engineering	lbs	Pounds
IMEP	Indicated mean effective pressure	lbs/sec	Pounds per second
I/O	Input-output	LD	Light-duty
IR	Infrared	LDA	Laser doppler anemometry
IS	Integrated system	LDT	Light-duty truck
ISFC	Indicated specific fuel consumption	LEM	Linear eddy model
ISU	Iowa State University		
ISX	Cummins Inc. 15-liter displacement, inline, 6-cylinder heavy-duty diesel engine		

LEP	Low Emissions Technologies Research and Development Partnership (often abbreviated to Low Emissions Partnership); a consortium between Ford, General Motors and DaimlerChrysler	MET	More Electric Truck
LES	Large eddy simulation	mg/cm <sup>2</sup>	Milligrams per square centimeter
LEVII	Low Emission Vehicle II	mg/min	Milligram per mile
LHV	Lower heating value	mg/mm <sup>2</sup>	Micrograms per square millimeter
LIBS	Laser-induced breakdown spectroscopy	mg/scf	Milligrams per standard cubic foot
LIDAR	Light detection and ranging	mi	Mile
LIDELS	Laser-induced desorption with elastic light scattering	min	Minute
LIF	Laser-induced fluorescence	MIT	Massachusetts Institute of Technology
LII	Laser-induced incandescence of soot	MK	Modulated Kinetics
LLNL	Lawrence Livermore National Laboratory	ML	Monolayer
LNT	Lean NOx trap	MLQWF	Multi-layer quantum well films
LO	Light-off temperature – the minimum temperature at which half the maximum catalyst activity is identified	MLR	Multivariable local regression
LP	Low pressure	μm	Micrometer
LPEGR	Low pressure exhaust gas recirculation	mm	Millimeter
LPL	Low pressure loop	mmols	Micro-moles
LQHCCI	Lean quasi-homogeneous charge compression ignition	Mn	Manganese
LRRI	Lovelace Respiratory Research Institute	Mo	Molybdenum
LSA	Low solidity airfoil	mol	Mole
LSC	Lanthanum strontium chromite	mol/s	Moles per second
LTC	Low-temperature combustion	MOU	Memorandum of Understanding
LTC-D	Low-temperature combustion-diesel	MPa	Megapascals
M/G	Motor/generator	mph	Miles per hour
m <sup>2</sup>	Square meters	ms	Millisecond
m <sup>2</sup> /gm	Square meters per gram	MSATs	Mobile source air toxics
m <sup>3</sup>	Square meters	MSU	Michigan State University
mA	Milliamps	MTU	Michigan Technological University
MAS	Magic-angle spinning	MVCO	Micro-variable circular orifice
MB	Mercedes-Benz	MY	Model year
mbar	Millibar	N <sub>2</sub>	Diatom nitrogen
MBE	Molecular beam epitaxy	N <sub>2</sub> O	Nitrous oxide
MBT	Minimum for best torque	N <sub>2</sub> O <sub>3</sub>	Nitrogen trioxide
MCE	Multi-cylinder engine	Na	Sodium
MCH	Methylcyclohexane	NACS	North American Catalysis Society
MCRS	Modular Common Rail System	NAHRR	Normalized apparent heat release rate
MD	Medium-duty	NAM	North American Meeting
MDO	Mechanism design option	NCO	Isocyanate
MECA	Manufacturers of Emission Controls Association	NEA	Nitrogen-enriched air
MeOH	Methanol	NEDC	New European Drive Cycle
		NETL	National Energy Technology Laboratory
		NH <sub>3</sub>	Ammonia
		NLCAT	National Laboratory Catalysis Conference
		nm	Nanometer
		Nm	Newton meter
		NMEP	Net mean effective pressure
		NMHC	Non-methane hydrocarbon

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NMOG	Non-methane organic gases	PDF	Probability density function
NMR	Nuclear magnetic resonance	PE	Power electronics
NO	Nitric oxide	PEMS	Portable emissions measurement system
NO <sub>2</sub>	Nitrogen dioxide	PFI	Port fuel injection, port fuel injected
NO <sub>x</sub>	Oxides of nitrogen (NO and NO <sub>2</sub> )	PFI-DI	Port fuel injection/direct injection
NRE	NO <sub>x</sub> reduction efficiency	PhosphorT	Phosphor thermography instrument
NRT	NO <sub>x</sub> reduction technology	PHX	Primary heat exchanger
ns	Nanosecond	PID	Proportional, integral, and derivative
NLS	National Synchrotron Light Source	PIV	Particle image velocimetry
NSR	Normalized stoichiometric ratio	PLII	Planar laser-induced incandescence
NSR	NO <sub>x</sub> storage and reduction	PLIF	Planar laser induced fluorescence
NTE	Negative temperature effect	PLRS	Planar laser Rayleigh scattering
NTE	Not-to-exceed	PM	Particulate matter
NTP	Non-thermal plasma	PM	Permanent magnet
NTP	National Toxicology Program	PMT	Photomultiplier tube
NTRC	National Transportation Research Center	PNGV	Partnership for a New Generation of Vehicles
NVO	Negative valve overlap	PNNL	Pacific Northwest National Laboratory
NZ-50	Near-Zero Emissions at 50% Thermal Efficiency	Post80	Late cycle injection after the main fuel pulse at 80° after top dead center
O <sub>2</sub>	Diatomic (molecular) oxygen	PO <sub>x</sub>	Partial oxidation
O <sub>3</sub>	Ozone	ppb	Parts per billion
OEM	Original Equipment Manufacturer	PPCI	Partially premixed compression ignition
OFCVT	Office of FreedomCAR and Vehicle Technologies	ppi	Pores per square inch
OH	Hydroxyl	ppm	Parts per million
OH*	Hydroxyl radical that emits ultraviolet photons	PRF	Primary Reference Fuels (iso-octane and n-heptane),
OH PLIF	Planar laser-induced fluorescence of OH	PRF80	PRF mixture with an octane number of 80 (i.e., 80% iso-octane and 20% n-heptane)
OMS	Octahedral molecular sieve	PRR	Pressure rise rate
ORC	Organic Rankine Cycle	psi	Pounds per square inch
ORNL	Oak Ridge National Laboratory	psig	Pounds per square inch gauge
OS	Office of Science	Pt	Platinum
OSC	Oxygen storage capacity	PWM	Pulse width modulated
OTR	Over-the-road	Q	Heat
P	Pressure	Q1, Q2, Q3, Q4	First, second, third and fourth quarters
P-V	Pressure-volume	QSB5.9	Quantum System B Series 5.9 Liter (Midrange Industrial Product)
P2P	Ratio of the peak activity of a new material to the peak activity of a reference material	QSC8.3/QSL9	Quantum System C Series 8.3 Liter, Quantum System L Series 9 Liter
PAC	Plasma-assisted catalyst	QSK19	Quantum System K Series 19 Liter
PC	Personal computer	QSX15	Quantum System X Series 15 Liter
PCI	Partially premixed compression ignition	OTR	Over-the-road
PCM	Power control module, powertrain control module	QW	Quantum well
PCP	Peak cylinder pressure	R&D	Research and development
PCCI	Premixed charge compression ignition	RANS	Reynolds Averaged Navier Stokes
PCS	Power control subsystem	RASP	Rotating arc spark plug
PD	Photodiode		

RCF	Rapid compression facility	SMR	Steam methane reformation
RDG-PFA	Rayleigh-Debye-Gans polydisperse fractal aggregate	SMSI	Strong metal support interaction
RGF	Residual gas fraction	SNL	Sandia National Laboratories
RGR	Residual gas recirculation	SNR	Signal-to-noise ratio
Rh	Rhodium	SO <sub>2</sub>	Sulfur dioxide
RIF	Representative interactive flamelet	SOC	State of charge
RMS	Root mean square	SOC	Start of combustion
ROHR	Rate of heat release	SOF	Soluble organic fraction
ROI	Rate of injection	SOI	Start of injection
rpm	Revolutions per minute	SO <sub>x</sub>	Oxides of sulfur
RSM	Response surface method	S <sub>p</sub>	Mean piston speed
RT	Room temperature	SpaciMS	Spatially resolved capillary inlet mass spectrometer
RUS	Resonant ultrasound spectrography	SPS	Spark plasma sintering
s	Conductivity (Wcm) <sup>-1</sup>	Sr	Strontium
S	Entropy	SR	Steam reforming
S	Seebeck coefficient	sS <sup>2</sup> T	Power factor (mV/°C)
S	Sulfur	SU	Stanford University
S/N	Signal-to-noise ratio	SUV	Sports utility vehicle
SAE	Society of Automotive Engineers	SV	Space velocity
SBCE	Set-based concurrent engineering	SVOC	Semivoltaic organic compound
SCAQMD	South Coast Air Quality Management District	SwRI	Southwest Research Institute
sccm	Standard cubic centimeters	T	Temperature
SCE	Single-cylinder engine	T70	A fuel blend containing the oxygenate tetraethoxy-propane
SCF/min	Standard cubic feet per minute	TACOM	Tank Automotive Armaments Command
SCI	Stoichiometric compression ignition	TAGS	Tellurium, antimony, germanium and silver
SCORE	Sandia Compression-ignition Optical Research Engine	TAP	Temporal Analysis of Products
SCORE	Single cylinder optical research engine	TC	Turbocompund
SCOT	Staged combustion with oxygen transfer	TCI	Turbulence/chemistry interactions
SCR	Selective catalytic reduction	TCR	Thermo-chemical recuperation
SCTE	Single-cylinder test engine	TDC	Top dead center
sec	Second	TDI	Turbocharged direct injection
SEM	Scanning electron microscopy	TDL	Tunable diode laser
SGS	Subgrid-scale	TE	Thermoelectric
Si	Silicon	TEG	Thermoelectric generator
SI	Spark ignition	TEM	Transmission electron spectroscopy
SiC	Silicon carbide	TEOM	Tapered element oscillating microbalance
SICM	System Integration Configuration Matrix	TGA	Thermal gravimetric analysis
SIDI	Spark ignition direct injection	TGM	Thermoelectric generator module
SINL	Spatially integrated natural luminosity	THC	Total hydrocarbon
SF	Scaling factor	Ti:Si	Ratio of titanium to silicon
SFC	Specific fuel consumption	TP	Tailpipe
SFTP	Supplemental Federal Test Procedure	TPD	Temperature-programmed desorption
SLPM	Standard liters per minute	TPGME	Tri-propylene glycol monomethyl ether
SMPS	Scanning mobility particle scanner	TPM	Total particulate matter

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TPR	Temperature-programmed reduction	VGC	Variable geometry compressor
TPRX	Temperature-programmed reaction	VGS	Variable geometry spray
TPS	Throttle position sensor	VMS	Vehicle mission simulation
TP-XRD	Temperature programmed X-ray diffraction	VNT	Variable nozzle turbine
TR-XRD	Time resolved X-ray diffraction	VOCs	Volatile organic compounds
TRLC	Top-ring-land crevice	VPTNA	Volvo Powertrain North America
TWC	Three-way catalyst	VTG	Variable turbine geometry
u	Gas velocity	VVA	Variable valve actuation
U	Internal energy	VVT	Variable valve timing
UCB	University of California Berkeley	W	Work
UEGO	Universal exhaust gas oxygen	WAVE	Ricardo engine and one-dimensional gas dynamics simulation software
UHC	Unburned hydrocarbons	W	Watt
UIS	Unit injector system	W/cmK	Watts per centimeter-Kelvin
ULSD	Ultra-low sulfur diesel	WGS	Water-gas-shift
UM	University of Michigan	WGSR	Water-gas-shift reaction
UNIBUS	Uniform bulky combustion system	WHR	Waste heat recovery
UPS	Unit pump system	WOT	Wide open throttle
USCAR	U.S. Cooperative Automotive Research	WREL	Watt Road Environmental Laboratory
US06	High-speed portion of the Supplemental Federal Test Procedure (SFTP)	wt%	Weight percent
UTM	Universal Transverse Mercator (mapping projection methodology)	XAFS	X-ray absorption fine structure
UTRC	United Technologies Research Center	XANES	X-ray absorption near-edge spectroscopy
UV	Ultraviolet	XPS	X-ray photoelectron spectroscopy
V	Volt	XRD	X-ray diffraction
VAC	Volts, alternating current	Y	Yttrium
VAT	Variable admission turbine	yr	Year
VCO	Valve-covering orifice	Zn	Zinc
VCR	Variable compression ratio	YSZ	Ytria-stabilized zirconia
VCT	Variable cam timing	ZT	Dimensionless thermoelectric figure of merit; equal to: (electrical conductivity)(Seebeck coefficient) <sup>2</sup> (temperature)/(thermal conductivity)
VDC	Volts, direct current		