VIII Acronyms and Abbreviations

°C	Degrees Celsius
°F	Degrees Fahrenheit
0-D	Zero-dimensional
1-D	One-dimensional
3-D	Three-dimensional
4Q	Fourth quarter
a.u.	Arbitrary units
A/cm^2	Amps per square centimeter
A/T	Aftertreatment
A75	Near peak torque speed & 75% engine load point of ESC Test Procedure
AC	Alternating current
AEC	Advanced Emission Controls Working Group
AETEG	Automobile exhaust thermoelectric generator
Ag	Silver
AHRR	Apparent heat release rate
Al	Aluminum
Al_2O_3	Aluminum oxide
ANL	Argonne National Laboratory
ANSI	American National Standards Institute
ASI	Time after the start of injection
ASME	American Society of Mechanical Engineers
AT	Aftertreatment
ATDC	After top dead center
atm	Atmosphere
Au	Gold
AU	Arbitrary units
B	Boron
B100	Mid-speed & 100% engine load point of ESC Test Procedure
B25	Mid-speed & 25% engine load point of ESC Test Procedure
B75	Mid-speed & 75% engine load point of ESC Test Procedure
Ba	Barium
BaO	Barium oxide
BDC	Bottom dead center
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.
bhp-hr	Brake horsepower hour
Bi_2Te_3	Bismuth Telluride
BMEP	Brake mean effective pressure
bmep	Brake mean effective pressure
BOI	Beginning of injection
BP	British Petroleum
BPF	Bandpass Filter
Bsfc	Brake specific fuel consumption
BSFC	Brake specific fuel consumption
btdc	Before top dead center
BTE	Brake thermal efficiency
C:N	Ratio of carbon to nitrogen
C_1	Carbon content in the exhaust or reformer in terms of carbon atoms
C_2H_6	Ethane
C_3H_6	Propylene
CA	Crank angle
CA50	Crank angle at which 50% of the combustion heat release has occurred
CAD	Computer-aided design
CAD	Crank angle degrees
CAI	Controlled autoignition
CAP	Critical adjustable parameter
cc	Cubic centimeter
CCD	Charge coupled device
CDI	Compression direct injection
CDPF	Catalytic diesel particulate filter
CeO_2	Cerium oxide
CFD	Computational fluid dynamics
CFR	Coordinating Fuel Research
CFR	Critical functional response
CHEMKIN	Name of chemical-kinetic code
CI	Compression ignition
CIDI	Compression ignition direct injection

CIMAC	International Council on Combustion Engines
CLEAN	Trademark for Detroit Diesel low-temperature combustion strategy
CLEERS	Cross-Cut Lean Exhaust Emissions Reduction Simulations
cm	Centimeter
cm^3	Cubic centimeters
CO	Carbon monoxide
CO_2	Carbon dioxide
COV	Coefficient of variation
CO_x	Oxides of carbon
CP	Chevron Phillips
cpi	Cells per inch
Cr	Chromium
CRADA	Cooperative Research and Development Agreement
CR-DPF	Continuously regenerating diesel particle filter
CRF	Combustion Research Facility
CRS	Common Rail System
Cu	Copper
CWLR	Constant weight loss rate
DC	Direct current
DCSF	Diesel combustion simulation facility
DDC	Detroit Diesel Corporation
DECSE	Diesel Emission Control Sulfur Effects
DEER	Diesel Engine Emissions Reduction
deg	Degrees
DELTA	Diesel Engine for Light Truck Application
DEM	Delayed and extended main
$DeNO_x$	Oxides of nitrogen reduction
DI	Direct injection
dm	Decimeter
DME	Dimethyl ether
DNS	Direct Numerical Simulation
DOC	Diesel oxidation catalyst
DoE	Design of experiment
DOE	U.S. Department of Energy
DOHC	Double overhead camshaft
DPF	Diesel particulate filter
DPNR	Diesel Particulate NO_x Reduction
DPV	Differential pulse voltammetry
DRIFT	Diffuse reflectance infrared Fourier transform
DRIFTS	Diffuse reflectance infrared Fourier-transform spectroscopy
DTTEG	Diesel truck thermoelectric generator
e^-	Electron
ECM	Electronic control module
EDS	Energy dispersive spectroscopy
EGR	Exhaust gas recirculation
$EINO_x$	Emissions index of NO_x
ELPI	Electrical low pressure impactor
ELS	Elastic light scattering
ELSLII	Elastic laser scattering with laser-induced incandescence
EMD	Electro-Motive Division of General Motors Corporation
EPA	U.S. Environmental Protection Agency
ESC	Steady-State Emission Test Procedure
ETC	Electric turbocompound
ϕ	Fuel/Air Equivalence Ratio
Fe	Iron
fFO	Fuel oxygen equivalence ratio
FLC	Federal Laboratory Consortium
FLRS	Full load rated speed engine condition
FMEA	Failure mode and effects analysis
fmep	Friction mean effective pressure
FSN	Filter smoke Number (AVL)
FTIR	Fourier transform infrared
ft-lb	Foot-pound
FTP	Federal Test Procedure
FTP	Federal Transient Protocol
FTP-75	Federal Test Procedure for LD vehicles
FWHM	The full width at half the maximum activity as a function of temperature
FY	Fiscal year
g	Gram
g/hp-hr	Grams per horsepower-hour
g/kWh	Grams/kilowatt-hour
g/mi	Grams per mile
GC-MS	Gas chromatography – mass spectrometry
GDI	Gasoline direct injection
GE	General Electric
Ge	Germanium
GHSV	Gas Hourly Space Velocity; a measure of gas flow rate through a reactor in units of liters of gas per liter of catalyst per hour, or L L-1 h-1, or h-1.
GRC	GE Global Research Center

GT-Power	Gamma Technologies engine modeling software
H_2	Diatomic (molecular) hydrogen
HC	Hydrocarbons
HCCI	Homogeneous charge compression ignition
HCN	Hydro-cyanic acid
HD	Heavy-duty
He	Helium
HECC	High-efficiency clean combustion
HELD	High-energy laser diagnostics
HEV	Hybrid electric vehicle
H_2ICE	Hydrogen-fueled internal combustion engine
HMO	Hydrous metal oxide
H_2O	Water
H_2O_2	Hydrogen peroxide
hp	Horsepower
HPCR	High-pressure common rail
HR	Heat release
hr	Hour
HRR	Heat release rate
H_2-SpaciMS	Hydrogen-calibrated spatially resolved capillary inlet mass spectrometry
HTCD	Heavy truck clean diesel
HTML	High Temperature Materials Laboratory
Hz	Hertz
IC	Internal combustion
ICCD	Intensified Charge Coupled Device (camera)
ICE	Internal combustion engine
ID	Injection duration
ID	Internal diameter
IEA	International Energy Agency
IEEE	Institute of Electrical and Electronics Engineering
IMEP	Indicated mean effective pressure
imep	Indicated mean effective pressure
IR	Infrared
IVC	Intake valve camshaft
J	Joule
K	Kelvin
K	Potassium
K_2CO_3	Potassium Carbonate
K_2O	Potassium oxide
KeV	Kilo electron volts, a unit of energy
kg	Kilogram
kHz	Kilohertz
KIVA	a transient, three-dimensional, multiphase, multicomponent code for the analysis of chemically reacting flows with sprays developed at the Los Alamos National Laboratory
kJ	Kilojoule
kJ/L	Kilojoules per liter
kJ/m^3	Kilojoules per cubic meter
KL	Soot optical thickness
kPa	Kilopascal
kW	Kilowatt
L	Liter
L/D	Length-to-diameter ratio
La	Lanthanum
LANL	Los Alamos National Laboratory
lb ft	Pound foot
lb/mi	Pounds per minute
lbs	Pounds
lbs/sec	Pounds per second
LD	Light-duty
LDT	Light-duty truck
LEP	Low Emissions Technologies Research and Development Partnership (often abbreviated to Low Emissions Partnership); a consortium between Ford, General Motors and DaimlerChrysler
LES	Large eddy simulation
LHV	Lower heating value
LIBS	Laser-induced breakdown spectroscopy
LIDELS	Laser-induced desorption with elastic light scattering
LIF	Laser-induced fluorescence
LII	Laser-induced incandescence of soot
LLNL	Lawrence Livermore National Laboratory
LNT	Lean NO_x trap
LO	Light-off temperature – the minimum temperature at which half the maximum catalyst activity is identified
LQHCCI	Lean quasi-homogeneous charge compression ignition
LSC	Lanthanum strontium chromite
LTC	Low-temperature combustion
M/G	Motor/generator
m^2	Square meters

m^2/gm	Square meters per gram
m^3	Square meters
mA	Milliamps
mbar	Millibar
MBE	Molecular beam epitaxy
MCRS	Modular Common Rail System
MECA	Manufacturers of Emission Controls Association
MeOH	Methanol
mg/cm^2	Milligrams per square centimeter
mg/mi	Milligram per mile
mg/mm^2	Micrograms per square millimeter
mg/scf	Milligrams per standard cubic foot
min	Minute
MIT	Massachusetts Institute of Technology
MLQWF	Multi-layer quantum well films
MLR	Multivariable local regression
μm	Micrometer
mm	Millimeter
mmols	Micro-moles
Mn	Manganese
Mo	Molybdenum
mol	Mole
mol/s	Moles per second
MOPO	Master optical parametric oscillator
MOU	Memorandum of Understanding
MPa	Megapascals
mph	Miles per hour
ms	Millisecond
MTU	Michigan Technological University
MY	Model year
N_2	Diatomic nitrogen
Na	Sodium
Nd-YAG	Neodymium-doped yttrium aluminum garnet
NEA	Nitrogen-enriched air
NH_3	Ammonia
NLCAT	National Laboratory Catalysis Conference
nm	Nanometer
Nm	Newton meter
NMHC	Non-methane hydrocarbon
NMOG	Non-methane organic gases
NMR	Nuclear magnetic resonance
NO	Nitric oxide
NO_2	Nitrogen dioxide
N_2O	Nitrous oxide
N_2O_3	Nitrogen trioxide
NO_x	Oxides of nitrogen (NO and NO_2)
ns	Nanosecond
NSR	Normalized stoichiometric ratio
NTE	Not-to-exceed
NTP	Non-thermal plasma
NTRC	National Transportation Research Center
O_2	Diatomic (molecular) oxygen
OEM	Original Equipment Manufacturer
OFCVT	Office of FreedomCAR and Vehicle Technologies
OH	Hydroxyl radical
OH*	Hydroxyl radical that emits ultraviolet photons
OH PLIF	Planar laser-induced fluorescence of OH
OMS	Octahedral molecular sieve
ORC	Organic Rankine Cycle
ORNL	Oak Ridge National Laboratory
P	Pressure
P2P	Ratio of the peak activity of a new material to the peak activity of a reference material
PAC	Plasma-assisted catalyst
PC	Personal computer
PCCI	Premixed charge compression ignition
PD	Photodiode
PDF	Probability density function
PEMS	Portable emissions measurement system
PFI	Port fuel injection
PFI-DI	Port fuel injection/direct injection
PhosphorT	Phosphor thermography instrument
PLIF	Planar laser-induced fluorescence
PLII	Planar laser-induced incandescence
PM	Particulate matter
PM	Permanent magnet
PMT	Photomultiplier tube
PNGV	Partnership for a New Generation of Vehicles
PNNL	Pacific Northwest National Laboratory
Post80	Late cycle injection after the main fuel pulse at 80° after top dead center
PO_x	Partial oxidation
ppb	Parts per billion
ppi	Pores per square inch
ppm	Parts per million

PRF	Primary Reference Fuels (iso-octane and n-heptane),
PRF80	PRF mixture with an octane number of 80 (i.e., 80% iso-octane and 20% n-heptane)
psi	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, Quantum System L Series 9 Liter
QSK19	Quantum System K Series 19 Liter
QSX15	Quantum System X Series 15 Liter
QW	Quantum well
R&D	Research and development
RANS	Reynolds averaged navier stokes
RASP	Rotating arc spark plug
RCF	Rapid Compression Facility
RDG-PFA	Rayleigh-Debye-Gans polydisperse fractal aggregate
Rh	Rhodium
RIF	Representative interactive flamelet
ROI	Rate of injection
rpm	Revolutions per minute
RSM	Response surface method
s	Conductivity $(Wcm)^{-1}$
S	Seebeck coefficient
S	Sulfur
S/N	Signal-to-noise ratio
SAE	Society of Automotive Engineers
SBCE	Set-based concurrent engineering
sccm	Standard cubic centimeters
SCE	Single-cylinder engine
SCF/min	Standard cubic feet per minute
SCR	Selective catalytic reduction
SCTE	Single-cylinder test engine
sec	Second
SEM	Scanning electron microscopy
SGS	Subgrid-scale
Si	Silicon
SI	Spark ignition
SiC	Silicon carbide
SICM	System Integration Configuration Matrix
SIDI	Spark ignition direct injection
SINL	Spatially Integrated Natural Luminosity
SLPM	Standard liters per minute
SMPS	Scanning mobility particle scanner
SMR	Steam reformation
SNL	Sandia National Laboratories
SO_2	Sulfur dioxide
SOI	Start of injection
SO_x	Oxides of sulfur
SpaciMS	Spatially resolved capillary inlet mass spectrometer
Sr	Strontium
SR	Switched reluctance
sS^2T	Power factor (mV/ºC)
SU	Stanford University
SUV	Sports utility vehicle
SV	Space velocity
T	Temperature
T70	A fuel blend containing the oxygenate tetraethoxy-propane
TACOM	Tank Automotive Armaments Command
TCI	Turbulence/chemistry interactions
TDC	Top dead center
TDI	Turbocharged direct injection
TE	Thermoelectric
TEG	Thermoelectric generator
TEM	Transmission electron spectroscopy
TEOM	Tapered element oscillating microbalance
TGA	Thermal gravimetric analysis
THC	Total hydrocarbons
Ti:Si	Ratio of titanium to silicon
TPD	Temperature-programmed desorption
TPGME	Tri-propylene glycol monomethyl ether
TPM	Total particulate matter
TPR	Temperature-programmed reduction
TPRX	Temperature-programmed reaction
TRLC	Top-ring-land crevice
TWC	
UCB	University of California Berkeley
UEGO	Universal exhaust gas oxygen
UHC	Unburned hydrocarbons
UIS	Unit injector system
ULSD	Ultra-low sulfur diesel
UM	University of Michigan
UPS	Unit pump system
USCAR	U.S. Cooperative Automotive Research
V	Volt
VCO	Valve-covering orifice
VCR	Variable compression ratio
VDC	Voltage – direct current
VGC	Variable geometry compressor
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)