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Property Libraries

for Working Fluids for Calculating Heat Cycles, Turbines, Heat Pumps, and Refrigeration Processes

Steam, Water, and Ice

Library LibIF97

- Industrial Formulation IAPWS-IF97 (Revision 2007)
- Supplementary Standards
  IAPWS-IF97-S01
  IAPWS-IF97-S03ref
  IAPWS-IF97-S04
  IAPWS-IF97-S05
- IAPWS Revised Advisory Note No. 3 on Thermodynamic Derivatives (2008)

Library LibICE

- Ice from IAPWS-06
- Melting line and sublimation line from IAPWS-08
- Water from IAPWS-IF97
- Steam from IAPWS-95 and IAPWS-IF97

Humid Combustion Gas Mixtures

Library LibHuGas

Model: Ideal mixture of the real fluids:
CO_2 - Span and Wagner (1994)
O_2 - Schmidt and Wagner (1995)
H_2O - IAPWS-95
Ar - Tegeler et al. (1999)
N_2 - Span (2000)

and of the ideal Gases:
SO_2, CO, Ne (Bücker et al., 2003)

Consideration of:
- Condensation of steam
- Dissociation and poynting effect

Library LibIDGAS

Model: Ideal gas mixture from VDI-Guideline 4670

Humid Air

Library LibHuAir

Model: Ideal mixture of the real fluids:
- Dry air from Lemmon et al. (2000)
- Steam, water, and ice from IAPWS-IF97 and IAPWS-06

Consideration of:
- Condensation and freezing of steam
- Dissociation from VDI-Guideline 4670 (2003)
- Poynting effect from ASHRAE RP-1485 (2009)

Ideal Gas Mixtures

Library LibIdGasMix

Model: Ideal mixture of the ideal gases:

Ar	SO_2	Methane
Ne	H_2	Ethane
N_2	H_2S	Ethylene
O_2	OH	Propylene
CO	He	Propane
CO_2	F_2	n-Butane
Air	NH_3	Isobutane
NO		Benzene
H_2O		Methanol

Consideration of:
Dissociation from VDI-Guideline 4670 (2003)

Carbon Dioxide including Dry Ice

Library LibCO2

Formulation of
Span and Wagner (1994)

Seawater

Library LibSeaWa

IAPWS-Formulation of Feistel (2008) and IAPWS-IF97

Ammonia/Water - Mixtures

Library LibAmWa

IAPWS Guideline 2001 of
Tillner-Roth and Friend (1998)

Ammonia

Library LibNH3

Formulation of
Tillner-Roth (1995)

Water/Lithium Bromide - Mixtures

Library LibWaLi

Formulation of Kim
and Infante Ferreira (2004)

Hydrogen

Library LibH2

Formulation of
Leachman et al. (2007)

Dry Air including Liquid Air

Library LibRealAir

Formulation of
Lemmon et al. (2000)

Nitrogen

Library LibN2

Formulation of
Span et al. (2000)

Siloxanes as ORC Working Fluids

$C_8H_{24}O_4Si_4$
Octamethylcyclotetrasiloxane
Library LibD4

$C_{10}H_{30}O_5Si_5$
Decamethylcyclopentasiloxane
Library LibD5

$C_{14}H_{42}O_5Si_6$
Tetradecamethylhexasiloxane
Library LibMD4M

$C_6H_{18}OSi_2$
Hexamethyldisiloxane
Library LibMM

Formulation of Colonna et al. (2006)

$C_{12}H_{36}O_6Si_6$
Dodecamethylcyclohexasiloxane
Library LibD6

$C_{10}H_{30}O_3Si_4$
Decamethyltetrasiloxane
Library LibMD2M

$C_{12}H_{36}O_4Si_5$
Dodecamethylpentasiloxane
Library LibMD3M

$C_8H_{24}O_2Si_3$
Octamethyltrisiloxane
Library LibMDM

Formulation of Colonna et al. (2008)

R134a

Library LibR134a

Formulation of
Tillner-Roth and Baehr (1994)

Iso-Butane

Library LibButane_Iso

Formulation of Bücker et al. (2003)

Liquid Coolants

Library LibSecRef

Liquid solutions of water with:

$C_2H_6O_2$	Ethylene glycol
$C_3H_8O_2$	Propylene glycol
C_2H_5OH	Ethyl alcohol
CH_3OH	Methyl alcohol
$C_3H_8O_3$	Glycerol
K_2CO_3	Potassium carbonate
$CaCl_2$	Calcium chloride
$MgCl_2$	Magnesium chloride
NaCl	Sodium chloride
$C_2H_3KO_2$	Potassium acetate

Formulation of the International Institute of Refrigeration (1997)

Propane

Library LibPropane

Formulation of
Lemmon et al. (2007)

n-Butane

Library LibButane_n

Formulation of Bücker et al. (2003)

Ethanol

Library LibC2H5OH

Formulation of Schroeder et al. (2012)

Methanol

Library LibCH3OH

Formulation of
de Reuck and Craven (1993)

Helium

Library LibHe

Formulation of Arp et al. (1998)

Hydrocarbons

$C_{10}H_{22}$ Dekane
Library LibC10H22

C_5H_{12} Isopentane
Library LibC5H12_ISO

C_5H_{12} Neopentane
Library LibC5H12_NEO

C_5H_{14} Isohexane
Library LibC5H14

C_7H_8 Toluene
Library LibC7H8

Formulation: Lemmon and Span (2006)

Other Fluids

CO Carbon monoxide
Library LibCO

COS Carbonyl sulfide
Library LibCOS

H_2S Hydrogen sulfide
Library LibH2S

N_2O Dinitrogen monoxide
Library LibN2O

SO_2 Sulfur dioxide
Library LibSO2

C_3H_6O Acetone
Library LibC3H6O

Formulation: Lemmon and Span (2006)

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