

2.2 Moist Air as Real Fluids

2.2.1 Temperature Scale

International practical temperature scale 1968 (IPTS-1968)

2.2.2 The Names of Substance, Library File and Single Shot Program

Name of Substance:	Moist Air
Library File for UNIX:	libjmarf.a
Library File for DOS,Windows95/NT:	JMARF.LIB
Single Shot Program for UNIX:	marf-ss
Single Shot Program for DOS,Windows95/NT:	MARF-SS.EXE

2.2.3 Reference State and Formula

The specific enthalpy and entropy of dry air are both assigned the value zero at 101325 Pa (1 atm) and 273.15 K (0°C). The specific enthalpy and entropy of saturated liquid water are both assigned the value zero at the triple point (273.16 K, 0.01°C).

All equations for the thermodynamic properties of dry air, saturated moist air, and the saturated phases of water have been cited from references [1] and [2].

References

- [1] R.W.Hyland and A.Wexler, ASHRAE Transactions 89(2A), (1983), pp.520-535
- [2] R.W.Hyland and A.Wexler, ASHRAE Transactions 89(2A), (1983), pp.500-519

Table III-2.2-1 Moist Air as Real Fluid Function

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
1	DPA(P,T,WB)	DPA: Dew Point Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] −100≤WB≤T≤200 [°C]
2	DPC(P,T,RH)	DPC: Dew Point Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [−]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [−] PST/0.99≤P≤50 [bar] −100≤T≤200 [°C] 0≤RH≤1.0 [−]
3	DPD(P,T,X)	DPD: Dew Point Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤X _s [kg/kg _{DA}] PST/0.99≤P≤50 [bar] −100≤T≤200 [°C] 0≤X≤X _s [kg/kg _{DA}]
4	DPE(P,T,H)	DPE: Dew Point Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] H _a ≤H≤H _s [J/kg _{DA}] PST/0.99≤P≤50 [bar] −100≤T≤200 [°C] H _a ≤H≤H _s [J/kg _{DA}]
5	DPF(P,X,H)	DPF: Dew Point Temperature [K] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤X _s [kg/kg _{DA}] H _a ≤H≤H _s [J/kg _{DA}]
6	DSA(P,T,WB)	DSA: Degree of Saturation [−] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] −100≤WB≤T≤200 [°C]
7	DSB(P,T,DP)	DSB: Degree of Saturation [−] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] −100≤DP≤T≤200 [°C]
8	DSC(P,T,RH)	DSC: Degree of Saturation [−] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [−]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [−] PST/0.99≤P≤50 [bar] −100≤T≤200 [°C] 0≤RH≤1.0 [−]
9	DSD(P,T,X)	DSD: Degree of Saturation [−] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤X _s [kg/kg _{DA}] PST/0.99≤P≤50 [bar] −100≤T≤200 [°C] 0≤X≤X _s [kg/kg _{DA}]

Table III-2.2-1 Moist Air as Real Fluid Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
10	DSE(P,T,H)	DSE: Degree of Saturation [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99 ≤ P ≤ 5.0 × 10 ⁶ [Pa] 173.15 ≤ T ≤ 473.15 [K] Ha ≤ H ≤ Hs [J/kg _{DA}] PST/0.99 ≤ P ≤ 50 [bar] -100 ≤ T ≤ 200 [°C] Ha ≤ H ≤ Hs [J/kg _{DA}]
11	DSF(P,X,H)	DSF: Degree of Saturation [-] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99 ≤ P ≤ 5.0 × 10 ⁶ [Pa] PST/0.99 ≤ P ≤ 50 [bar] 0 ≤ X ≤ Xs [kg/kg _{DA}] Ha ≤ H ≤ Hs [J/kg _{DA}]
50	ENHFAC(P,T)	ENHFAC: Enhancement Factor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C]	PST/0.99 ≤ P ≤ 5.0 × 10 ⁶ [Pa] 173.15 ≤ T ≤ 473.15 [K] PST/0.99 ≤ P ≤ 50 [bar] -100 ≤ T ≤ 200 [°C]
89	FC('A')	FC: Fundamental Constants MA: 'A'='MA':28.9645 Relative Molecular Weight of Dry Air MW: 'A'='MW':18.01528 Relative Molecular Mass of Water RA: 'A'='RA':461.520 Gas Constant of Dry Air RW: 'A'='RW':287.055 Gas Constant of Water Vapor	one of 'MA', 'MW', 'RA' and 'RW'
12	HA(P,T,WB)	HA: Specific Enthalpy [J/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99 ≤ P ≤ 5.0 × 10 ⁶ [Pa] 173.15 ≤ WB ≤ T ≤ 473.15 [K] PST/0.99 ≤ P ≤ 50 [bar] -100 ≤ WB ≤ T ≤ 200 [°C]
13	HB(P,T,DP)	HB: Specific Enthalpy [J/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99 ≤ P ≤ 5.0 × 10 ⁶ [Pa] 173.15 ≤ DP ≤ T ≤ 473.15 [K] PST/0.99 ≤ P ≤ 50 [bar] -100 ≤ DP ≤ T ≤ 200 [°C]
14	HC(P,T,RH)	HC: Specific Enthalpy [J/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [-]	PST/0.99 ≤ P ≤ 5.0 × 10 ⁶ [Pa] 173.15 ≤ T ≤ 473.15 [K] 0 ≤ RH ≤ 1.0 [-] PST/0.99 ≤ P ≤ 50 [bar] -100 ≤ T ≤ 200 [°C] 0 ≤ RH ≤ 1.0 [-]
15	HD(P,T,X)	HD: Specific Enthalpy [J/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99 ≤ P ≤ 5.0 × 10 ⁶ [Pa] 173.15 ≤ T ≤ 473.15 [K] 0 ≤ X ≤ Xs [kg/kg _{DA}] PST/0.99 ≤ P ≤ 50 [bar] -100 ≤ T ≤ 200 [°C] 0 ≤ X ≤ Xs [kg/kg _{DA}]
84	IDENTF('A')	IDENTF: CHARACTER TYPE FUNCTION for Package Identification (Length 20) C: 'A'='C': 'MIXTURE OF DRY AIR AND WATER VAPOR' S: 'A'='S': 'MOIST AIR' Name of Substance V: 'A'='V': '10.1' Version Number	one of 'C', 'S' and 'V'
49	PST(T)	PST: Saturation Pressure of Pure Water [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C]	173.15 ≤ T ≤ 473.15 [K] -100 ≤ T ≤ 200 [°C]

Table III-2.2-1 Moist Air as Real Fluid Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
22	RHA(P,T,WB)	RHA: Relative Humidity [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]
23	RHB(P,T,DP)	RHB: Relative Humidity [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤DP≤T≤200 [°C]
24	RHD(P,T,X)	RHD: Relative Humidity [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤X _s [kg/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤X≤X _s [kg/kg _{DA}]
25	RHE(P,T,H)	RHE: Relative Humidity [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] H _a ≤H≤H _s [J/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] H _a ≤H≤H _s [J/kg _{DA}]
26	RHF(P,X,H)	RHF: Relative Humidity [-] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤X _s [kg/kg _{DA}] H _a ≤H≤H _s [J/kg _{DA}]
16	RWA(P,T,WB)	RWA: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]
17	RWB(P,T,DP)	RWB: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤DP≤T≤200 [°C]
18	RWC(P,T,RH)	RWC: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [-]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [-] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤RH≤1.0 [-]
19	RWD(P,T,X)	RWD: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤X _s [kg/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤X≤X _s [kg/kg _{DA}]

Table III-2.2-1 Moist Air as Real Fluid Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
20	RWE(P,T,H)	RWE: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] Ha≤H≤Hs [J/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] Ha≤H≤Hs [J/kg _{DA}]
21	RWF(P,X,H)	RWF: Mole Fraction of Water Vapor [-] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤Xs [kg/kg _{DA}] Ha≤H≤Hs [J/kg _{DA}]
27	SA(P,T,WB)	SA: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]
28	SB(P,T,DP)	SB: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤DP≤T≤200 [°C]
29	SC(P,T,RH)	SC: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [-]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [-] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤RH≤1.0 [-]
30	SD(P,T,X)	SD: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] X: Humidity Ratio [kg/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤X≤Xs [kg/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤X≤Xs [kg/kg _{DA}]
31	SE(P,T,H)	SE: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] Ha≤H≤Hs [J/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] Ha≤H≤Hs [J/kg _{DA}]
32	SF(P,X,H)	SF: Specific Entropy [J/(kg _{DA} ·K)] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤Xs [kg/kg _{DA}] Ha≤H≤Hs [J/kg _{DA}]
33	TF(P,X,H)	TF: Dry-Bulb Temperature [K], [°C] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤Xs [kg/kg _{DA}] Ha≤H≤Hs [J/kg _{DA}]
34	VA(P,T,WB)	VA: Specific Volume [m ³ /kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]

Table III-2.2-1 Moist Air as Real Fluid Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
35	VB(P,T,DP)	VB: Specific Volume [$\text{m}^3/\text{kg}_{DA}$] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] DP*: Dew Point Temperature [K], [$^{\circ}\text{C}$]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq DP \leq T \leq 473.15$ [K] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq DP \leq T \leq 200$ [$^{\circ}\text{C}$]
36	VC(P,T,RH)	VC: Specific Volume [$\text{m}^3/\text{kg}_{DA}$] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] RH: Relative Humidity [-]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $0 \leq RH \leq 1.0$ [-] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $0 \leq RH \leq 1.0$ [-]
37	VD(P,T,X)	VD: Specific Volume [$\text{m}^3/\text{kg}_{DA}$] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] X: Humidity Ratio [kg/kg_{DA}]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $0 \leq X \leq X_s$ [kg/kg_{DA}] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $0 \leq X \leq X_s$ [kg/kg_{DA}]
38	VE(P,T,H)	VE: Specific Volume [$\text{m}^3/\text{kg}_{DA}$] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] H: Specific Enthalpy [J/kg_{DA}]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $H_a \leq H \leq H_s$ [J/kg_{DA}] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $H_a \leq H \leq H_s$ [J/kg_{DA}]
39	VF(P,X,H)	VF: Specific Volume [$\text{m}^3/\text{kg}_{DA}$] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg_{DA}] H: Specific Enthalpy [J/kg_{DA}]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] PST/ $0.99 \leq P \leq 50$ [bar] $0 \leq X \leq X_s$ [kg/kg_{DA}] $H_a \leq H \leq H_s$ [J/kg_{DA}]
40	WBB(P,T,DP)	WBB: Wet-Bulb Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] DP*: Dew Point Temperature [K], [$^{\circ}\text{C}$]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq DP \leq T \leq 473.15$ [K] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq DP \leq T \leq 200$ [$^{\circ}\text{C}$]
41	WBC(P,T,RH)	WBC: Wet-Bulb Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] RH: Relative Humidity [-]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $0 \leq RH \leq 1.0$ [-] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $0 \leq RH \leq 1.0$ [-]
42	WBD(P,T,X)	WBD: Wet-Bulb Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] X: Humidity Ratio [kg/kg_{DA}]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $0 \leq X \leq X_s$ [kg/kg_{DA}] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $0 \leq X \leq X_s$ [kg/kg_{DA}]
43	WBE(P,T,H)	WBE: Wet-Bulb Temperature [K] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [$^{\circ}\text{C}$] H: Specific Enthalpy [J/kg_{DA}]	PST/ $0.99 \leq P \leq 5.0 \times 10^6$ [Pa] $173.15 \leq T \leq 473.15$ [K] $H_a \leq H \leq H_s$ [J/kg_{DA}] PST/ $0.99 \leq P \leq 50$ [bar] $-100 \leq T \leq 200$ [$^{\circ}\text{C}$] $H_a \leq H \leq H_s$ [J/kg_{DA}]

Table III-2.2-1 Moist Air as Real Fluid Function (cont'd)

No.	Name of Function	Function and Argument(s)	Range of Argument(s)
44	WBF(P,X,H)	WBF: Wet-Bulb Temperature [K] P*: Total Pressure [Pa], [bar] X: Humidity Ratio [kg/kg _{DA}] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] PST/0.99≤P≤50 [bar] 0≤X≤X _s [kg/kg _{DA}] H _a ≤H≤H _s [J/kg _{DA}]
45	XA(P,T,WB)	XA: Humidity Ratio [kg/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] WB*: Wet-Bulb Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤WB≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤WB≤T≤200 [°C]
46	XB(P,T,DP)	XB: Humidity Ratio [kg/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] DP*: Dew Point Temperature [K], [°C]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤DP≤T≤473.15 [K] PST/0.99≤P≤50 [bar] -100≤DP≤T≤200 [°C]
47	XC(P,T,RH)	XC: Humidity Ratio [kg/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] RH: Relative Humidity [-]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] 0≤RH≤1.0 [-] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] 0≤RH≤1.0 [-]
48	XE(P,T,H)	XE: Humidity Ratio [kg/kg _{DA}] P*: Total Pressure [Pa], [bar] T*: Dry-Bulb Temperature [K], [°C] H: Specific Enthalpy [J/kg _{DA}]	PST/0.99≤P≤5.0×10 ⁶ [Pa] 173.15≤T≤473.15 [K] H _a ≤H≤H _s [J/kg _{DA}] PST/0.99≤P≤50 [bar] -100≤T≤200 [°C] H _a ≤H≤H _s [J/kg _{DA}]

