

Release notes for version 4.3 of SGSOL

Summary :
78 elements
343 binary systems
88 ternary systems
5 quaternary systems

System Components:

Ag	Al	Am
As	Au	B
Ba	Be	Bi
C	Ca	Cd
Ce	Co	Cr
Cs	Cu	Dy
Er	Eu	Fe
Ga	Gd	Ge
Hf	Hg	Ho
In	Ir	K
La	Li	Lu
Mg	Mn	Mo
N	Na	Nb
Nd	Ni	Np
O	Os	P
Pa	Pb	Pd
Pr	Pt	Pu
Rb	Re	Rh
Ru	S	Sb
Sc	Se	Si
Sm	Sn	Sr
Ta	Tb	Tc
Te	Th	Ti
Tl	Tm	U
V	W	Y
Yb	Zn	Zr

List of Phases:

a) Solution Phases

GAS	LIQUID	FCC_A1
FCC_L12	FCC_AUCU	BCC_A2
BCC_B2	B2_BCC	HCP_A3
HCP_ZN	DHCP	DIAMOND_A4
BCT_A5	TETRAGONAL_A6	TET_ALPHA1
TETRAGONAL_U	RHOMBOHEDRAL_A7	HEXAGONAL_A8

RHOMBO_A10	BETA_RHOMB_BCSI	CHI_A12
CBCC_A12	CUB_A13	CUB_A15
ORTHORHOMBIC_A20	SIGMA	HIGH_SIGMA
MU_PHASE	P_PHASE	R_PHASE
ZINCBLLENDE_B3	GRAPHITE	RED_P
LAVES_PHASE	LAVES_C14	LAVES_C15
LAVES_C36	CEMENTITE	KSI_CARBIDE
M23C6	M7C3	M6C
M3C2	V3C2	M5C2
MC_SHP	MC_ETA	AL4C3
FE4N	FECN_CHI	PI_PHASE
TI2N	MN4N	B4C
BM	B2M	M2B_TETR
B4M3	SIB3	SIB6
B_NSI	WB_ALPHA	WB_BETA
W2B5	ASP	CU3P
M2P	M3P	NI5P2_L
AGCD_ETA	AGSB_ORTHO	AGZN_GAMMA
AGZN_ZETA	ALM_D019	AL3M_D022
ALCE_AMORPHOUS	AL_CEND	AL_CEND3_L
AL3_CEND	AL11_CEND3_H	AL11_CEND3_L
ALCU_GAMMA_D83	ALCU_ETA	ALCU_EPSILON
ALCU_THETA	ALCU_DELTA	ALCU_ZETA
ALCUZN_GAMMA_H	ALCUZN_T	AL2FE
AL5FE2	AL5FE4	AL13FE4
ALFESI_ALPHA	ALLI	ALMG_BETA
ALMG_GAMMA	ALMG_EPSILON	AL12MG17
ALMGZN_PHI	ALMGZN_TAU	AL4MN
AL6MN	AL8MN5_D810	AL11MN4
AL12MN	ALMNSI_ALPHA	ALMNSI_BETA
ALNB2	ALNB3	AL3NB
AL3NI2	ALTA_SIGMA	ALTI
AU5HF	AU2HF	AUHF_ALPHA
AUHF_BETA	AUIN_ALPHA1	BIIN_EPSILON
BITL_EPSILON	CDSB_OMEGA	CONB_MU
CONB_LAMBDA	COZN	CO4ZN
CO3W	CRSI2	CR3SI_A15
CUSB_FCC_BETA	CUSN_GAMMA_DO3	CUTI
CU4TI	CU6Y	CUZN_GAMMA
FE2R	FE3R	FE17R2
FE23R6	FESB	FESI
M3SI	FE5SI3	FEU6
FE2U	FEZN_GAMMA_D82	FEZN4
FEZN_DELTA	FEZN_ZETA	FEUZR_DELTA
FEZR2	FEZR3	NIHF2
INSN_BETA	INSN_GAMMA	MG2Y

MG24Y5	MGZN	MG2ZN3
MG2ZN11	MN2ZR	MONI_DELTA
NBNI_MU	NI3NB	NB3SN_C15
NB6SN5	NI2SI_TETA	NI3MOTA
NITA	NITA2	NITI2
NI3TI	NI10ZR7	NI3ZR
NI5ZR	NI7ZR2	NIZR2
PD3PB	PD5PB3_BETA	PD5PB3_GAMMA
PDSN	PDSN2	PDSN3
PDSN4	PD2SN_GAMMA	PD3SN
PD20SN13	PTTA_SIGMA	SBSN
SI3TI5	SIV3	SNTI3

Stoichiometric Condensed Phases:

BETA_RHOMBO_B	WHITE_P	MONOCLINIC
ORTHORHOMBIC_S	ORTHORHOMBIC_GA	ORTHORHOMBIC_AC
TETRAG_AD	BCT_AA	ALPHA_PU
BETA_PU	GAMMA_PU	RHOMBOHEDRAL_C19
OMEGA_ZR	M12C	AL8SIC7
AL4SIC4	CR2VC2	FE8SI2C
SIC	ALN	BN_HP4
MN6N4	MN6N5	EPSILON_TAN
TI3N2	TI4N3	WN_DELTA
ALB2	ALB12_ALPHA	ALB12_BETA
CR2B_ORTH	CR3B4	CR5B3
CRB	CRB2	CRB4
FE2B	FEB	FENDB_T1
FENDB_T2	FENDB_T3	MOB
MOB4	MO2B2	MO2B5
NDB4	NDB6	NDB66
ND2B5	NIB	NI3B
NI4B3	VB	VB2
V2B3	V3B2	V3B4
WB3	W2B	FEP
MNP	MNP3	MN3P
MN2P	MOP	NI5P2_H
NI6P5	NI12P5	PSI
AGBA	AG2BA	AG2BA3
AG5BA	AG3BE8	AGCA
AGCA3	AG2CA	AG3CA5
AG7CA2	AG9CA2	AGCD
AG2CD3	AGCE	AG2CE
AG4CE	AG51CE14	AGIN2
AG2IN	AGMG3	AG3MG
ALAU	ALAU2	ALAU4

AL2AU	AL2AU5	AL2CA
AL4CA	AL2CASI2	AL_CEND3_H
AL2_CEND	ALCR2	AL4CR
AL8CR5_H	AL8CR5_L	AL9CR4_L
AL9CR4_H	AL11CR2	AL13CR2
ALCU_PRIME	ALCULI_R	ALCULI_T1
ALCULI_T2	ALCULI_TB	ALCUMG_QPHASE
ALCUMG_SPHASE	ALCUMG_VPHASE	ALFESI_BETA
ALFESI_GAMMA	ALFESI_DELTA	ALFESI_TAU1
ALFESI_TAU3	ALLA	ALLA3
AL2LA	AL3LA	AL11LA3D
AL11LA3F	AL53LA22	AL2LI3
AL4LI9	ALMG_DZETA	ALMGMN_T
ALMNSI_DELTA	AL4MO	AL5MO
AL8MO3	AL12MO	AL63MO37
ALND2	AL3NI	AL3NI5
ALRU	AL13RU4	AL2RU
AL3RU2	AL6RU	ALTA
AL3TA	AL3TA2	AL7TA5
AL69TA39	AL2TI	AL11TI5
AL7V	AL8V5	AL10V
AL23V4	AL2W	AL4W
AL5W	AL7W3	AL12W
AL77W23	ALY	ALY2
AL2Y	AL2Y3	AL3Y
AL3Y5	ALZR	ALZR2
ALZR3	AL2ZR	AL2ZR3
AL3ZR	AL3ZR2	AL3ZR5
AL4ZR5	AU2BI	AU4HF
AU3HF	AU10HF7	AUHF2
AUIN	AUIN2	AU3IN
AU4IN	AU7IN3	AU62IN38
AUPB2	AUPB3	AU2PB
AUSB2	AUSN	AUSN2
AUSN4	AU5SN	AU10SN
AUTE2	AU10ZR7	AUZR
AUZR2	AUZR3	AU2ZR
AU2ZR3	AU3ZR	AU4ZR
B2MG	B4MG	B7MG
BACU	BACU13	BIIN
BIIN2	BI3IN5	BIK3A
BIK3B	BI2K	BI2K3
BI4K5	CACU	CACU5
CA2CU	CAMG2	CASI
CASI2	CA2SI	CD3IN
CEMG	CEMG2	CEMG3

CEMG12	CE2MG17	CE5MG41
CO2CE	CO3CE	CO5CE
CO7CE2	CO11CE24	CO17CE2
CO19CE5	COGE	CO3GE
COGE2	CO5GE2	CO5GE3
CO5GE7	CO3NB	CO7NB2
CO16NB9	COSM3	CO2SM
CO3SM	CO4SM9	CO5SM
CO7SM2	CO17SM2	CO19SM5
COTA2	CO7TA2	CO2ZN15
COZN7	COZN14	CR3MN5
CR2RU	CR3RU	CRSI
CR5SI3	CRZN13	CRZN17
CSNA_S	CUCE	CU2CE
CU4CE	CU5CE	CU6CE
CU3GE	CUIN_BETA	CUIN_ETA
CUIN_DELTA	CUIN_THETA	CUMG2
CUND	CU2ND	CU4ND
CU5ND	CU6ND	CUPR
CU2PR	CU4PR	CU5PR
CU6PR	CU2SB	CU9SB2
CU11SB2	CU73SB20	CU15SI4_EPSILON
CU19SI6_ETA	CU33SI7_GAMMA	CU9SI2_DELTA
CUSM	CU2SM	CU4SM
CU5SM	CU6SM	CU3SN
CU6SN5	CU6SN5_L	CU10SN3
CU41SN11	CUTI2	CU2TI
CU3TI2	CU4TI3	CUY
CU2YR	CU7Y2	CU4Y
CU2YH	CUZR	CUZR2
CU5ZR	CU8ZR3	CU10ZR7
CU51ZR14	FE2GD	FE3GD
FE17GD2	FE23GD6	FE17ND2
FE17ND5	FESB2	FESI2_H
FESI2_L	FE2SI	FESN
FESN2	FE3SN2	FE5SN3
FETI	FEUZR_EPSILON	FEUZR_LAMBDA
FEUZR_KAPPA	FE23ZR6	GDMG
GDMG2	GDMG3	GDMG5
HFNIA	HFNI3A	HFNIB
HFNI3B	HFNI5	HF2NI7
HF3NI7	HF7NI10	HF9NI11
HF8NI21	LANI	LANI3
LANI5	LA2NI3	LA2NI7_ALPHA
LA2NI7_BETA	LA3NI	LA7NI3
LA7NI16	LI7SI3	LI12SI7

LI13SI4	LI22SI5	MG2NI
MGSC	MG2SI	MG2SN
MG7ZN3	MNNI	MN2NI
MN3NI	MNNI2	MNNI3
MN6SI	MN9SI2	MN11SI19
MN3TI	MN4TI	TIMN_ALPHA
TIMN_BETA	MONI4_BETA	MONI3_GAMMA
MOSI2_TET	MOSI2_HEX	MO3SI
MO5SI3	NBSN2	NDSB
NDSB2	ND2SB	ND4SB3
ND5SB3	NISI2_C1	NI3SI_MONOCL
NI3SI_ORTHO	NI2SI	NI3SI2
NI31SI12	NISI_B31	NI2TA
NI8TA	NI2V	NI3V
NI2V7	NIW	NIW2
NI4W	NI11ZR9	NI21ZR8
NIZR	PDPB	PDPB2
PD5PB3_ALPHA	PD13PB9	PD2SN
PD3SN2_ALPHA	PD3SN2_BETA	PD3SN2_GAMMA
PRSB	PRSB2	PR2SB
PR4SB3	PR5SB3	RUSI
RU2SI	RU2SI3	RU4SI3
RU5SI3	RUZR	RU2ZR
SB2SN3	SB3ZN4_GAMMA	SB3ZN4_BETA
SB2ZN3_TETHA	SB2ZN3_DZETA	SITA2
SITA3	SI2TA	SI3TA5
SITI	SITI3	SI2TI
SI4TI5	SI2V	SI3V5
SI5V6	SI2W	SI3W5
SIY	SI2Y_H	SI2Y_R
SI3Y5	SI4Y5	SI5Y3_R
SI5Y3_H	SIZR	SIZR2
SIZR3	SI2ZR	SI2ZR3
SI3ZR5	SI4ZR5	SMSB
SMSB2	SM2SB	SM4SB3
SM5SB3	SNTI2	SN3TI5
SN5TI6	SNZR4	SN2ZR
SN3ZR5	SRCU	SRCU5
V2ZR	ZRPB2	ZR4PB
ZR5PB3		

Sources of binary, ternary and quaternary assessments

a) Binary Systems

Ag-Al

S S Lim, P L Rossiter and J W Tibballs; CALPHAD, 1995, 19(2), 131-142. "Assessment of the Al-Ag binary phase diagram". The assessment requires a new dataset for CUB_A13 Ag.

Ag-Au

The data are taken from the assessment of Hassam et al (S Hassam, M Gambino, M Gaune-Escard, J P Bros, J Agren; Metall. Trans. 1988, 19A, 409-416 "Experimental and calculated Ag+Au+Ge phase diagram").

Ag-B

Data for the Ag-B system are from an unpublished assessment of Korb (2004) supplied by GTT to SGTE in 2005.

Ag-Ba

Data for the Ag-Ba system are from an unpublished assessment by P Y Chevalier and E Fischer (1995) supplied to SGTE, January 2005.

Ag-Be

Data for the Ag-Be system are from an unpublished assessment of Korb (2004) supplied by GTT to SGTE in 2005.

Ag-Bi

The data are from the assessment of Leo Lukas based on Zimmermann's original work (H L Lukas, B Zimmermann; Unpublished Work, 1998; B Zimmerman, Thesis, University of Stuttgart 1976 "Optimisation by experimental and calculation of the binary and ternary systems of Ag, Bi, Pb and Tl").

Ag-C

Data for the Ag-C system are from an unpublished assessment of Korb (2004) supplied by GTT to SGTE in 2005.

Ag-Ca

Data for the Ag-Ca system are from an unpublished assessment by P Y Chevalier and E Fischer (1996) supplied to SGTE, January 2005.

Ag-Cd

Data for the Ag-Cd system are from an unpublished assessment by P Y Chevalier (2004) supplied to SGTE, January 2005

Ag-Ce

Data for the Ag-Ce system are from the assessment of Yin et al. (F Yin, M Huang, X Su, P Zhang, Z Li, Y Shi; J. Alloy Comp., 2002, 334, 154-158. "Thermodynamic assessment of the Ag-Ce (silver-cerium) system").

Ag-Cr

Data for the Ag-Cr system are from an unpublished assessment of T Jantzen (2004) supplied by GTT to SGTE in 2005.

Ag-Cu

The data for the Ag-Cu system are from an update of Lukas (H L Lukas, Unpublished work, 1998) of his earlier assessment (F. H. Hayes, H. L. Lukas, G. Effenberg, and G. Petzow, Z. Metallkde. 77 (1986) 749-754) "A thermodynamic optimisation of the Cu-Ag-Pb system".

Ag-Fe

Data for the Ag-Fe system are from an unpublished assessment of Korb (2004) supplied by GTT to SGTE in 2005.

Ag-Ge

P Y Chevalier; Thermochemica Acta 1988, 130, 25-32 "Critical assessment of thermodynamic data for the Silver-Germanium system"

Ag-In

P Y Chevalier and E Fischer (Private Communication, 1998). The data for the fcc phase were modified by A T Dinsdale February 1999 to be compatible with latest data for fcc In.

Ag-Mg

SGTE Noble metals database compiled by Philip Spencer

Ag-Mo

Unpublished assessment of J Korb (2004) supplied by GTT to SGTE in 2005

Ag-Pb

The data for this system were critically assessed by Leo Lukas (Unpublished work, 2000) based on original work of Zimmermann (B Zimmerman, Thesis, University of Stuttgart 1976 "Optimisation by experimental and calculation of the binary and ternary systems of Ag, Bi, Pb and Tl").

Ag-Sb

The data for the Ag-Sb system are from the assessment of Oh et al (C-S Oh, J-H Shim, B-J Lee, D N Lee; J. Alloys Compounds, 1996, 238, 155-66 "A thermodynamic study on the Ag-Sb-Sn system"). The solubility of Ag in solid Sb has been ignored.

Ag-Si

The data for the Ag-Si system are taken from the assessment of Chevalier (P Y Chevalier; Thermochemica Acta 1988, 113, 33-41 "Thermodynamic evaluation of the Silver-Silicon system")

Ag-Sn

The data for the Ag-Sn system are from the assessment of Oh et al (C-S Oh, J-H Shim, B-J Lee, D N Lee; J. Alloys Compounds, 1996, 238, 155-66 "A thermodynamic study on the Ag-Sb-Sn system"). Data for the fcc phase were modified by A T Dinsdale to accommodate changes to the data for fcc Sn.

Ag-V

Data for the Ag-V system are from an unpublished assessment of Korb (2004) supplied by GTT to SGTE in 2005.

Ag-W

Data for the Ag-W system are taken from an unpublished assessment of K Hack (2005) based on an assessment of Vijayakumar et al (M Vijayakumar, A M Sriramamurthy, S V Nagender Naidu, CALPHAD 1988, 12(2), 177). The data were supplied by GTT to SGTE in 2005.

Ag-Zn

The data for the Ag-Zn system are from the unpublished assessment by Suzana Fries and Victor Vitusiewicz, Jan 2002. This is a revision of the assessment by T Gomez-Acebo CALPHAD 1998, 22(2), 203-220 "Thermodynamic assessment of the Ag-Zn system". The latest assessment: V T Vitusiewicz, S G Fries, U Hecht, A Drevermann, S Rex; Int. J. Mat. Res.; 2006, 97(5), 556-568 "Enthalpies of formation measurements and thermodynamic description of the Ag-Cu-Zn system" has not been used because some of the data and models are incompatible with other data in the database.

Al-As

The data for the Al-As system from the assessment of Ansara and Dutarte (I Ansara, D Dutarte, CALPHAD, 1984, 8(4), 323-342 "Thermodynamic study of the Al-Ga-As-Ge system"

Al-Au

Data for the Al-Au system were taken from the assessment of Murray et al (J L Murray, H Okamoto and T B Massalski; Bulletin of Alloy Phase Diagrams 1987, 8(1), 20 "The Al-Au (Aluminium-Gold) system") modified by A T Dinsdale to be consistent with the SGTE unary data and to prevent high temperature stability of fcc phase. Small change was made to data for ALAU by T Jantzen (2006) to prevent formation of FCC_A1 in centre of phase diagram. It is recommended that further work should be done on the data for the intermetallic compound phases.

Al-B

The data for the Al-B system were from the assessment of Mirkovic et al (D Mirkovic, J Groebner, R Schmid-Fetzer, O Fabrichnaya, H L Lukas, J. Alloys Compounds, 2004, 384, 168-174 "Experimental study and thermodynamic reassessment of the Al-B system")

Al-Bi

The data for the Al-Bi systems are from the assessment of McAlister (A J McAlister, Bulletin of Alloy Phase Diagrams, 1984, 5, 247-250 "The Al-Bi (Aluminium-Bismuth) System")

Al-C

The data for the Al-C system are from the assessment of Gröbner et al (J. Gröbner, H. L. Lukas, and F. Aldinger; Calphad 1996, 20, 247-254. "Thermodynamic Calculation of the Al-Si-C System")

Al-Ca

Data for the Al-Ca system are from the assessment of Anglezio et al. (J C Anglezio, C Servant, I Ansara; CALPHAD, 1994, 18(3), 273-309. "Contribution to the experimental and thermodynamic assessment of the Al-Ca-Fe-Si, Al-Ca-Si, Al-Fe-Si and Ca-Fe-Si systems")

Al-Ce

Data for the Al-Ce system are from an unpublished assessment of Cacciamani et al representing a revision of the assessment published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Cr

Data for the Al-Cr system are taken from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499). This assessment was itself based on the publication of Saunders and Rivlin (N Saunders, V G Rivlin, Z. Metallkde. 1987, 78(11), 795-801 "Thermodynamic characterization of Al-Cr, Al-Zr and Al-Cr-Zr alloy systems).

Al-Cu

Data for the Al-Cu system are taken from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Fe

Data for the Al-Fe system were taken from an unpublished assessment of M Seiersten published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Ga

Data for the Al-Ga system are from the critical assessment of Watson (A Watson CALPHAD 1992, 16(2), 207-217 "Re-assessment of phase diagram and thermodynamic properties of the Al-Ga system")

Al-Ge

Data for the Al-Ge system are from the critical assessment of Ansara et al (I Ansara; J P Bros; M Gambino; CALPHAD 1979, 3(3), 225 "Thermodynamic analysis of the germanium-based ternary systems")

Al-Hg

The data for the Al-Hg system are based on the assessment of McAlister (A J McAlister; Bull. Alloy Phase Diagrams, 1985, 6, (3), 219-221 "The Al-Hg (Aluminum Mercury) System").

Al-In

The data for the Al-In system were assessed by Coughanowr, (Thesis, University of Florida) but reported in the paper by Ansara et al (I Ansara; C Chatillon; H L Lukas; T Nishizawa; H Ohtani; K Ishida; M Hillert; B Sundman; B B Argent; A Watson; T G Chart; T Anderson; CALPHAD 1994, 18(4), 177-222 "A binary database for III-V compound semiconductor systems").

Al-La

The data for the Al-La system are from the assessment of Wang Jixin (Wang Jixin; CALPHAD, 1994, 18(3). 269-272 "Thermodynamic optimisation for the Al-La system").

Al-Li

Data for the Al-Li system are taken from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Mg

Data for the Al-Mg system are from the assessment of Liang et al. (P Liang, H-L Su, P Donnadieu, M G Harmelin, A Quivy, P Ochin, G Effenberg, H J Seifert, H L Lukas and F Aldinger; Z. Metallkde 1998, 89, 536-540)

“Experimental investigation and thermodynamic calculation of the central part of the Mg-Al phase diagram”).

Al-Mn

The data for Al-Mn system are from the assessment of Jansson (A Jansson, Report TRITA-MAC-0462, May 1991, Materials Research Centre, Royal Institute of Technology, Stockholm).

Al-Mo

Data for the Al-Mo system are taken from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499). Data for the bcc_b2 phase (ALMO) were derived by B Sundman, 2001.

Al-N

Data for the Al-N system are taken from an unpublished assessment of H L Lukas published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Note: The bcc_a2 phase appears to be stable at high temperatures

Al-Nb

Data for the Al-Nb system are from the assessment of Servant and Ansara (C Servant and I Ansara; J. Chim. Phys. 1997, 94, 869-888 “Thermodynamic assessment of the Al-Nb system”).

Al-Nd

Data for the Al-Nd system are from an unpublished assessment of Cacciamani et al representing a revision of the assessment published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Ni

Data for the Al-Ni system are from the assessment of Ansara et al (I Ansara, N Dupin, H L Lukas and B Sundman; J. Alloys Compounds 1997, 247, 20-30 “Thermodynamic assessment of the Al-Ni system”).

Al-P

The data for the Al-P systems were from an unpublished assessment of H L Lukas reported in the paper by Ansara et al (I Ansara; C Chatillon; H L Lukas; T Nishizawa; H Ohtani; K Ishida; M Hillert; B Sundman; B B Argent; A Watson; T G Chart; T Anderson; CALPHAD 1994, 18(4), 177-222 "A binary database for III-V compound semiconductor systems"). The data were revised by J Korb, H Hack (unpublished work 1998). The original assessment gave negative heat capacities for AlP and a very strong deviation of the standard entropy with respect to the SGTE Pure Substance database. The data for AlP in the ZINCBLENDE_B3 structure were revised (Delta_H298, S298 and Cp) as well as the excess parameter in the LIQUID phase.

Al-Pb

Data for the Al-Pb system are from the assessment of Yu et al (S-K Yu, F Sommer and B Predel; Zeit. Metallkde., 1996, 87(7), 574-580 "Isopiestic measurements and assessment of the Al-Pb system"

Al-Ru

Data for the Al-Ru system are taken from an unpublished assessment by P Y Chevalier and E Fischer (1996) supplied to SGTE in January 2005.

Al-Sb

The data for the Al-Sb system are from the assessment of Coughanowr et al (C A Coughanowr; U R Kattner; T J Anderson; CALPHAD, 1990, 14, (2), 193-202 "Assessment of the Al-Sb System").

Al-Si

Data for the Al-Si system are from an unpublished assessment of Lukas et al published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Sn

The Al-Sn data were taken from the assessment of Fries et al (S. G.-Fries, H. L. Lukas, S. Kuang and G. Effenberg, Proc. "User Aspects of Phase Diagrams", F. Hayes ed., The Institute of Metals, London, 280-286 (1991). "Calculation of the Al-Zn-Sn Ternary System").

Al-Ta

The data for the Al-Ta system are from the assessment of Du and Schmid-Fetzer (Y Du R J Schmid-Fetzer R; J. Phase Equil. 1996, 17(4), 311-324. "Thermodynamic modelling of the Al-Ta system").

Note: Some interaction parameters for the sigma phase were missing in the original paper.

Al-Ti

Data for the Al-Ti system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-V

Data for the Al-V system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-W

Data for the Al-W system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Y

Data for the Al-Y system are taken from an unpublished assessment of Gröbner et al published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499). This assessment is based on earlier work by the same authors (J Gröbner; H L Lukas; F Aldinger; J. Alloys and Compd., 1995, 220(1-2), 8-14 "Thermodynamic Calculations In The Y-Al-C System").

Al-Zn

Data for the Al-Zn system are taken from the assessment of an Mey (S an Mey, Z. Metallkde.; 1993, 84(7), 451-455 "Re-evaluation of the Al-Zn system").

Al-Zr

Data for the Al-Zr system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

As-Au

Data for the As-Au system are from the SGTE Noble metals database compiled by Philip Spencer

As-Ga

The data for the As-Ga system are from the assessment of Chatillon et al (C Chatillon, I Ansara, A Watson and B B Argent, CALPHAD, 1990, 14(2), 203-14 "Re-assessment of the thermodynamic properties and phase diagrams of the Ga-As and In-As systems").

As-Ge

The data for the As-Ge system are from the assessment of Ansara and Dutartre (I Ansara, D Dutartre, Calphad 1984, 8(4), 323-342).

As-In

The data for the As-In system are from the assessment of Chatillon et al (C Chatillon, I Ansara, A Watson and B B Argent, CALPHAD, 1990, 14(2), 203-14 "Re-assessment of the thermodynamic properties and phase diagrams of the Ga-As and In-As systems").

As-P

The data for the As-P system are from the paper by Ansara et al (I Ansara; C Chatillon; H L Lukas; T Nishizawa; H Ohtani; K Ishida; M Hillert; B Sundman; B B Argent; A Watson; T G Chart; T Anderson; CALPHAD 1994, 18(4), 177-222 "A binary database for III-V compound semiconductor systems").

As-Pb

The source of data for the As-Pb system is uncertain. The data have been assessed by Rannikko et al. (Rannikko H.; Sundström S.; Taskinen P.; Thermochimica Acta, 216, 1-14 (1993) "An Optimised Equilibrium Phase Diagram and Solution Thermodynamics of Arsenic-Lead Alloys").

As-Sb

The data for the As-Sb system are from the paper by Ansara et al (I Ansara; C Chatillon; H L Lukas; T Nishizawa; H Ohtani; K Ishida; M Hillert; B Sundman; B B Argent; A Watson; T G Chart; T Anderson; CALPHAD 1994, 18(4), 177-222 "A binary database for III-V compound semiconductor systems").

Au-B

Data for the Au-B system are from an unpublished assessment by P Y Chevalier (1998) supplied to SGTE, January 2005.

Au-Bi

The data for the Au-Bi system are from the assessment of Chevalier (P-Y Chevalier; Thermochemica Acta 1988, 130, 15-24 "Thermodynamic evaluation of the Gold-Bismuth system").

Au-C

Data for the Au-C system are from the SGTE Noble metals database compiled by Philip Spencer.

Au-Co

Data for the Au-Co system are from an unpublished assessment of Korb (2004) supplied by GTT to SGTE in 2005.

Au-Cu

The data for the Au-Cu system is from the assessment of Sundman et al (Sundman B.; Fries S G; Oates W A; CALPHAD, 22, (3), 335-354 (1998) "A Thermodynamic Assessment of the Au-Cu System - An example illustrating the need for more physics in CALPHAD Solution Models"). Two different datasets are given in the paper. The adopted assessment was derived by considering the chemical ordering.

Au-Ge

The data for the Au-Ge system are from the assessment of Chevalier (P Y Chevalier; Thermochemica Acta 1989, 141, 217-226 "A Thermodynamic Evaluation of the Au-Ge and Au-Si systems").

Au-Hf

Data for the Au-Hf system are taken from the assessment of Du and Yang (Z Du, L Yang, J. Alloys Comp., 2003, 353, 213-216 "Thermodynamic assessment of the Au-Hf system").

Au-In

The data for Au-In system were taken from the assessment of Ansara and Nabot (I Ansara, J P Nabot; Thermochemica Acta 1988, 129, 89-97 "A thermodynamic assessment of the Au-In system"). The interaction data for the fcc phase were modified by A T Dinsdale (1999) to compensate for use of revised data for fcc In.

Au-Pb

The data for the Au-Pb system were taken from the assessment of Nabot (J P Nabot, Thesis, LTPCM, Grenoble). The hcp_a3 data were added by A T Dinsdale (October 2006).

Au-Sb

The data for the Au-Sb system are taken from the assessment of Chevalier (P Y Chevalier; Thermochemica Acta 1989, 155, 211-225 "A Thermodynamic Evaluation of the Au-Sb and Au-Tl systems").

Au-Si

The data for the Au-Si system is from an unpublished update by P Y Chevalier to his earlier assessment (Chevalier P Y; Thermochemica Acta, 1989, 141, 217-226 "A Thermodynamic Evaluation of the Au-Ge and Au-Si systems").

Au-Sn

The data for the Au-Sn system were based on the assessment of Chevalier (P Y Chevalier Thermochemica Acta 1988, 130, 1-13 "A thermodynamic evaluation of the Au-Sn system"). Changes were made by A T Dinsdale (1998) to the data for the fcc and hcp phases to correspond to the data for Sn adopted by SGTE.

Au-Te

The adopted data for the Au-Te system are based on those assessed by Feutelais et al (Y Feutelais, D Mounai, J R Didry, B Legendre. J Phase Equilib., 1994, 15(4), 380-385 "The Gold-Tellurium system"). It was necessary to change

the AuTe₂ data considerably from that published in order to reproduce any of their diagrams.

Au-Tl

The data for the Au-Tl system were taken from the assessment of Chevalier (P-Y Chevalier; *Thermochimica Acta*, 1989, 155, 211-225 "A Thermodynamic Evaluation of the Au-Sb and Au-Tl systems". Interaction data for the hcp phase were included to prevent the phase from becoming incorrectly stable.

Au-Zr

The data for the Au-Zr system are from the assessment of Su et al (X Su, F Yin, Z Li and Y Shi, *Z. Metallkd.*, 2000, 91, 744-747 "Thermodynamic Assessment of the Zr-Au System").

B-C

Data for the B-C system were taken from the assessment of H. Bittermann published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

B-Cr

The data for the B-Cr system is from an unpublished assessment by Li-Mei Pan, (1991). Data for the bcc_a2 phase were modified by O Fabrichnaya, 2001 to allow interstitial solution of B in bcc Cr.

B-Fe

The data for the B-Fe system are taken from the assessment of Hallemans et al (B Hallemans, P Wollants, J R Roos; *J. Phase Equil.* 1995, 16(2), 137-149. "Thermodynamic assessment of the Fe-Nb-B phase diagram", B Hallemans, P Wollants, J R Roos; *Z. Metallkde*, 1994, 85, 676-682 "Thermodynamic re-assessment and calculation of the Fe-B phase diagram")

B-Hf

The data for the Hf-B system were taken from the assessment of Bittermann and Rogl (H Bittermann, P Rogl, *J. Phase Equilib.*; 1997, 18(1), 24-47. "Critical assessment and thermodynamic calculation of the ternary system Boron-Hafnium-Titanium (B-Hf-Ti)")

B-Mg

Data for the B-Mg system are from the assessment of Liu et al. (Z-K Liu, Y Zhong, D G Schlom, Calphad, 2001, 25(2), 299-303 "Computational thermodynamic modeling of the Mg-B system").

B-Mo

The data for the B-Mo system is from an unpublished assessment by Li-Mei Pan, (1991).

B-N

Data for the B-N system were taken from the assessment of H. Wen and H L Lukas published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

B-Nd

The data for the B-Nd system are from the assessment of Hallemans et al (B Hallemans, P Wollants and J R Roos; J. Phase Equilib. 1995, 16(2), 137-149 "Thermodynamic assessment of the Fe-Nb-B phase diagram").

B-Ni

The data for the B-Ni system is from an unpublished assessment by Li-Mei Pan, (1991).

B-Si

Data for the B-Si system were taken from the assessment of S G Fries and H L Lukas published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

B-Ti

Data for the B-Ti system were taken from the assessment of C Bätzner published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

B-V

The data for the B-V system is from an unpublished assessment by Li-Mei Pan, (1991).

B-W

The data for the B-W system are from the assessment of Duschanek and Rogl (H Duschanek, P Rogl; *J. Phase Equil.*; 1995, 16(2), 150-161 "Critical Assessment and Thermodynamic Calculation of the Binary System Boron-Tungsten (B-W)").

Ba-Cu

The data for the Ba-Cu system were taken from the assessment of Konetzki et al (Konetzki R, Schmid-Fetzer R; Watson A; Argent B; Fries S G, Lukas H L; *Z. Metallkde.*; 1993, 84(8), 569-573. "The Ba-Cu binary system").

Ba-Ru

The data for the Ba-Ru system is taken from an unpublished assessment of P Y Chevalier and E Fischer (1995) supplied to SGTE in January 2005.

Bi-Cu

Data for the Bi-Cu system are taken from the assessment by Teppo et al. (Teppo, Niemela, Taskinen, Report TKK-V-B50, 1989, HUT). The same authors also reassessed the data (Teppo O; Niemela J; Taskinen P; *Thermochim.Acta*, 1990, 173, 137-150 "An Assessment of the Thermodynamic Properties and Phase Diagram of the system Bismuth-Copper").

Bi-Ga

Data for the Bi-Ga system are from the assessment of Girard (C. Girard, Thesis, Marseille 1985)

Bi-Ge

The data for the Bi-Ge system are from the assessment of Chevalier (P Y Chevalier; *Thermochimica Acta*, 1988, 132, 111-116 "Thermodynamic Evaluation of the Bismuth-Germanium system")

Bi-Hg

Data for the Bi-Hg system are from an unpublished assessment of S A Mucklejohn.

Bi-In

The data for the Bi-In system are based on the assessment of Chevalier (P Y Chevalier, *CALPHAD* 1989, 12(4), 383-392 "A thermodynamic evaluation of

the Bi-In system”) and has also been quoted by Boa and Ansara; (D Boa, I Ansara, Thermochemica Acta 1998, 314, 79-86 “Thermodynamic Assessment of the Ternary System Bi-In-Pb”). Some of the parameters in the database are slightly different from those published. The data were modified by A T Dinsdale (2000) to correct for an error in the data for BiIn₂. Data for the hcp_a3 and tet_alpha1 phases were added by A T Dinsdale (October 2006).

Bi-K

Data for the Bi-K system were taken from an assessment of Chevalier (Thermodata report 54.90/PYC/mm, March 1990).

Bi-Pb

The data for the Bi-Pb system were from an unpublished assessment by H L Lukas reported by Boa and Ansara, (D Boa, I Ansara, Thermochemica Acta 1998, 314, 79-86 “Thermodynamic Assessment of the Ternary System Bi-In-Pb”). Data for the tet_alpha1 phase and tetragonal_a6 phases were added by A T Dinsdale (October 2006).

Bi-Sb

Data for the Bi-Sb system are from the assessment of Ohtani and Ishida (H Ohtani, K Ishida; J. Electronic Materials, 1994, 23(8), 747-755 “A Thermodynamic Study of the Phase Equilibria in the Bi-Sn-Sb System”)

Bi-Si

The data for the Bi-Si system are taken from the assessment of Olesinski and Abbaschian (R W Olesinski, G J Abbaschian, Bulletin of Alloy Phase Diagrams 1985, 6(4), 359-361 “The Bi-Si (Bismuth-Silicon) System)

Bi-Sn

Data for the Bi-Sn system are from the assessment of Ohtani and Ishida (H Ohtani, K Ishida; J. Electronic Materials, 1994, 23(8), 747-755 “A Thermodynamic Study of the Phase Equilibria in the Bi-Sn-Sb System”)

Bi-Tl

Data for the Bi-Tl system were from an unpublished assessment of Lukas based on an earlier assessment of Zimmermann et al. (Zimmermann B; Henig E T; Lukas H L; Z. Metallkde., 1976, 67(12), 815-820 “The system Ag-Bi-Tl, calculation of part of the system, binary optimisations (Ag-Bi, Ag-Tl, Bi-Tl, Ag-Bi-Tl)”)

Bi-Zn

Data for the Bi-Zn system were taken from the assessment of Malakhov (D Malakhov, CALPHAD 2000, 24(1), 1-14 "Thermodynamic Assessment of the Bi-Zn System")

C-Co

Data for the C-Co system were assessed by A Fernandez Guillermet, Z. Metallkde., 1987, 78, 700-9 "Thermodynamic analysis of the Co-C system". This assessment was referred to by Weidling Jansson (A Weidling and B Jansson, CALPHAD 1997, 21(3), 321-333 "A Thermodynamic Evaluation of the Co-Cr and the C-Co-Cr systems").

C-Cr

Data for the C-Cr system are from the assessment of Lee (B J Lee CALPHAD 1992, 16(2), 121-149 "On the Stability of Cr carbides"). This assessment was referred to by Weidling and Jansson (A Weidling and B Jansson, CALPHAD 1997, 21(3), 321-333 "A Thermodynamic Evaluation of the Co-Cr and the C-Co-Cr systems"). Data for the CBCC_A12 and CUB_A13 phases are from the assessment of Lee (B J Lee, Metall. Trans. A; 1993, 24A, 1017-1025. "A Thermodynamic Evaluation of the Fe-Cr-Mn-C system").

C-Cu

The data for the C-Cu system are from the unpublished assessment of Chandrakasekan et. al (1987).

C-Fe

Data for the C-Fe system are taken from the assessment of Gustafson (P Gustafson, Report TRITA-MAC-0237, October 1984, Scand. J. Metall.; 1985, 14, 259-267 "A Thermodynamic Evaluation of the Iron-Carbon system"). Data for other phases not stable in the binary system are taken from assessments by Huang (W. Huang, Report TRITA-MAC 411 (Rev 1989); Metall. Trans. A; 1990, 21A, 2115-2123 "A Thermodynamic Assessment of the Fe-Mn-C system"), Huang (W. Huang, TRITA-MAC 441 (1990), Metall. Trans. A, 1991, 22A(9), 1911-1920 "Thermodynamic Properties of the Fe-Mn-V-C System"), Lee (B-J Lee, unpublished revision of data for the C-Cr-Fe-Ni system (1991)), and Du and Hillert (H. Du, M. Hillert, Z. Metallkde., 1991, 82(4), 310-316 "An Assessment of the Fe-C-N System", H. Du, J. Phase Equilibria, 1993, 14(6), 682-693 "A Reevaluation of the Fe-N and Fe-C-N systems". The data for the V3C2 phase were modified to be 10 J/mol more positive than those for the M3C2 phase. The data for the liquid data were modified by Tatjana Buhler to prevent bcc phase from becoming stable at high temperatures.

C-Hf

The data for the C-Hf system were taken from the assessment of Bitterman and Rogl (H Bitterman, P Rogl, J Phase Equil. 1997, 18(4), 344-356 "Critical assessment and thermodynamic calculation of the binary system Hafnium-Carbon (Hf-C)").

C-Ir

Data for the C-Ir system are from an unpublished assessment of Korb (2004) supplied by GTT to SGTE in 2005.

C-Mn

The data for the C-Mn system were taken from the assessment of Huang (W. Huang, Report TRITA-MAC 411 (Rev 1989); Metall. Trans. A; 1990, 21A, 2115-2123 "A Thermodynamic Assessment of the Fe-Mn-C system" and W. Huang, TRITA-MAC 441 (1990), Metall. Trans. A, 1991, 22A(9), 1911-1920 "Thermodynamic Properties of the Fe-Mn-V-C System").

C-Mo

The data for the C-Mo system were from the assessment of Andersson (J-O Andersson, Report TRITA-MAC 0317, CALPHAD 1988, 12, 1-8. (1986) "Thermodynamic properties of Mo-C". Enhancements were made by Andersson (J-O Andersson, Report TRITA-MAC 0321 (1986), CALPHAD 1988, 12(1), 9-23 "A Thermodynamic Evaluation of the Fe-Mo-C system" and Caian Qui (Caian Qui, Report TRITA-MAC 482 (1992), (Hillert M, Qiu C.; J. Phase Equil., 1992, 13(5), 512-521 "A Reassessment of the Fe-Cr-Mo-C system")

C-N

The data for this system are assumed to be ideal.

C-Nb

Data for the C-Nb system are taken from the assessments of Huang (W. Huang, Mater. Sci. and Techn. 1990, 6(8), 687-694 "Thermodynamic Evaluation of Niobium-Carbon system", W. Huang, Report TRITA-MAC 390 (1989); Z. Metallkde. 1990, 81(6), 397-404 "A thermodynamic evaluation of the Fe-Nb-C system"). Note - the bcc phase becomes stable incorrectly at high temperatures.

C-Ni

Data for the C-Ni system are from the assessment of Lee (B J Lee, CALPHAD, 1992, 16(2), 121-149 "On the stability of Cr carbides").

C-Os

Data for the C-Os system are from an unpublished assessment of Korb (2004) supplied by GTT to SGTE in 2005.

C-P

Data for the C-P system are from the assessment of Gustafson (P Gustafson, Inst. Met. Res. (Report IM-2549, 1990)).

C-Pb

Data for the C-Pb system are from an unpublished assessment of Chart (T G Chart, NPL 1987).

C-Pd

Data for the C-Pd system are from an unpublished assessment of Korb (2004), updated by Jantzen (2005), supplied by GTT to SGTE in 2005.

C-Pt

Data for the C-Pt system are from an unpublished assessment of Korb (2004), updated by Jantzen (2005), supplied by GTT to SGTE in 2005.

C-Rh

Data for the C-Rh system are from an unpublished assessment of Korb and Jantzen (2004), supplied by GTT to SGTE in 2005.

C-Ru

Data for the C-Ru system are from an unpublished assessment of Korb and Jantzen (2004), supplied by GTT to SGTE in 2005.

C-Si

The data for the C-Si system are from the assessment of Lacaze and Sundman (J Lacaze, B Sundman, Metall. Trans. A, 1991, 22A, 2211 "An assessment of the Fe-C-Si system"). Note: The data were derived specifically for use with steel systems and should be used with care for other types of materials. Data for the hcp_a3 phase were added by A T Dinsdale (October 2006).

C-Ti

The data for the C-Ti system are from an unpublished assessment of Balasubramanian, (1989).

C-V

The data for the C-V system are taken from the assessment of Weiming Huang (Huang W, Z. Metallkde, 1991, 82, (3), 174-181 "An Assessment of the V-C System"). Additional data are from further work by W. Huang (W. Huang, Report TRITA-MAC 441 (1990)) and Lee (B-J Lee, Report TRITA-MAC 475 (1991)).

C-W

The data for the C-W system are taken from the assessment of Gustafson (P Gustafson, Report TRITA 0212 (1985), Mat. Sci and Tech. 1986, 2(7), 653-658 "Thermodynamic Evaluation of Carbon-Tungsten system". Data for other phases were assessed by Gustafson as part of the assessment of high order systems (P Gustafson, Report TRITA-MAC 331 (1987), Z. Metallkde. 1988, 79(7), 421-425 "A Thermodynamic Evaluation of the C-Fe-Mo-W system"; P Gustafson, Report TRITA-MAC 348 (1987), Metall. Trans. A 1988, 19(10), 2547-2554 "A Thermodynamic Evaluation of the C-Cr-Fe-W system"; P Gustafson, Report TRITA-MAC 330 (1987), Z. Metallkde, 1988, 79(6), 397-402 "A Thermodynamic Evaluation of the C-Mo-W system")

Ca-Cu

The data for the Ca-Cu system is from an assessment by Risold et al (Risold D; Hallstedt B; Gauckler L J; Lukas H L; Fries S G; CALPHAD 1996, 20(2), 151-160 "Thermodynamic Optimization of the Ca-Cu and Sr-Cu systems")

Ca-Mg

The data for the Ca-Mg system are taken from the assessment of Agarwal et al (Agarwal R, Lee J J, Lukas H L, Sommer F, Z. Metallkde 1995, 86, 103-108 "Calorimetric Measurements and Thermodynamic Optimization of the Ca-Mg system")

Ca-Ru

The data for the Ca-Ru system is taken from an unpublished assessment of P Y Chevalier and E Fischer (1996) supplied to SGTE in January 2005.

Ca-Si

Data for the Ca-Si system are taken from the assessment of Anglezio et al (Anglezio J C, Servant C, Ansara I; CALPHAD, 1994, 18(3), 273-309 "Contribution to the experimental and thermodynamic assessment of the Al-Ca-Fe-Si, Al-Ca-Si, Al-Fe-Si and Ca-Fe-Si systems")

Cd-Ga

Data for the Cd-Ga system are from the assessment of Zakulski et al (Zakulski W, Moser Z, Rzyman K, Lukas H L, Fries S G, Sikiennik M, Kaczmarczyk R, Castanet R; J. Phase Equil. 1993,14(2),184-196 "Thermodynamic studies and phase diagrams of the Cd-Ga-In system")

Cd-Hg

Data for the Cd-Hg system are the assessment of Jang et al (Jang J, Silk N J, Watson A, Bryant A W, Chart T G, Argent B B, CALPHAD, 1995, 19(3), 415-430. "The thermodynamics and phase diagrams of the Cd-Hg and Cd-Hg-Te systems")

Cd-In

Data for the Cd-In system are from the assessment of Zakulski et al (Zakulski W, Moser Z, Rzyman K, Lukas H L, Fries S G, Sikiennik M, Kaczmarczyk R, Castanet R; J. Phase Equil. 1993,14(2),184-196 "Thermodynamic studies and phase diagrams of the Cd-Ga-In system")

Cd-Pb

Data for the Cd-Pb system are from the assessment of Zakulski and Moser (W Zakulski, Z Moser, J. Phase Equilib, 1995, 16(3), 239-242; W Zakulski, Z Moser, J. Phase Equilib, 1995, 16(6), 484 "A calculation of the Cd-Pb (Cadmium-Lead) system").

Cd-Sb

The data for the Cd-Sb system are taken from the assessment of Zabdyr (L A Zabdyr, CALPHAD 1997, 21(3), 349 "Phase equilibria in ternary Cd-Sb-Zn system").

Cd-Zn

The data for the Cd-Zn system are taken from the assessment of Zabdyr (L A Zabdyr, CALPHAD 1997, 21(3), 349-358 "Phase equilibria in ternary Cd-Sb-Zn system"). This represents a revision of his earlier assessment: L Zabdyr, W

Zakulski, Arch. Metall.; 1993, 38(1), 3-18 "Thermodynamics and phase diagram of the Cd-Zn system. Critical re-evaluation by Lukas method".

Ce-Co

The data for the Ce-Co system are taken from the assessment of Xuping Su et al. (Xuping Su, Weijing Zhnag and Zhenmin Du, J. Alloys Compounds 1998, 267, 121-127 "A thermodynamic modelling of the Co-Ce system").

Ce-Cu

The data for Cu-Ce systems are taken from the assessment of Zhuang et al (Zhuang W, Qiao Z Y, Wei S, Shen J; J. Phase Equilib, 1996, 17(6), 508-521 "Thermodynamic Evaluation of the Cu-R (R: Ce, Pr, Nd, Sm) binary systems"). Note: the bcc and fcc phases have missing interactions. The phases may be classified as ideal without problem in calculation of the binary systems but may not extrapolate well into multicomponent systems.

Ce-Mg

Data for the Ce-Mg system are from an unpublished assessment of G Cacciamani, A Saccone and R Ferro published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499). The interaction value for the hcp_a3 phase was modified by Alan Dinsdale (2001) to be consistent with the new data for hcp_a3 Ce.

Co-Cr

The data from Co-Cr system are taken from the assessment of Weidling and Jansson (A Weidling, B Jansson, CALPHAD 1997, 21(3), 321-333 "A thermodynamic evaluation of the Co-Cr and C-Co-Cr systems").

Co-Cu

Data for the Co-Cu system are taken from the assessment by Nishizawa and Ishida (T Nishizawa, K Ishida; Bull. Alloy Phase Diagrams, 1984, 5(2), 161-5 "The Co-Cu(Cobalt-Copper) system". The data were modified to be consistent with SGTE unary data.

Co-Fe

Data for the Co-Fe system were taken from the assessment of Fernandez Guillermet (A. Fernandez Guillermet, Report TRITA-MAC 324 (1986), High Temp. High Press. 1988, 19, 477-499 "Critical evaluation of the

Thermodynamic Properties of the Iron-Cobalt system"). Data for Fe₄N phase were introduced by A T Dinsdale (17/5/1999).

Co-Ge

Data for the Co-Ge system are from an unpublished assessment of Korb (2004), supplied by GTT to SGTE in 2005.

Co-Mn

Data for the Co-Mn system were taken from the assessment of Huang (W. Huang, Report TRITA-MAC 386, CALPHAD 1989, 13, 231-242 "An Assessment of the Co-Mn System").

Co-N

Data for the Co-N system are taken from the assessment of Fernandez Guillermet and Jonsson (A Fernandez Guillermet, S Jonsson, Z. Metallkde., 1992, 83, 21-31 "Predictive Approach to Thermodynamic Properties of Co Nitrides and phase stability in the Co-N system"). Interaction data for the Fe₄N phase were introduced by A T Dinsdale (17/5/99) for compatibility with the Fe-N data.

Co-Nb

Data for the Co-Nb system are from the assessment of Hari Kumar et al. (Kumar K C H; Ansara I, Wollants P, Delaey L; J. Alloys Compd., 1998, 267(1-2), 105-112 "Thermodynamic Optimisation of the Co-Nb system").

Co-Ni

Data for the Co-Ni system are from the assessment of Fernandez Guillermet (A Fernandez Guillermet, Report TRITA-MAC 324B (1986), Z Metallkde, 1987, 78, 639-647 "Assessment of the thermodynamic properties of the Ni-Co system").

Co-Sm

Data for the Co-Sm system are from the assessment of Xuping Su et al (Xuping Su, Weinjing Zhang, Guoquan Liu, Zhenmin Du; J. Alloys Compounds 1998, 267, 149-153 "A Thermodynamic Assessment of the Co-Sm system")

Co-Ta

Data for the Co-Ta system are taken from the assessment of Liu and Chang (Z-Kui Liu, Y A Chang; CALPHAD 1999, 23(3-4), 339-356 "Thermodynamic Assessment of the Co-Ta system").

Co-W

Data for the Co-W system are taken from the assessment of Fernandez Guillermet (A. Fernandez Guillermet, Report TRITA-MAC 371 (1988), Metall. Trans. 1989, 20A, 935-956 "Thermodynamic properties of the Co-W-C system"). Data for other phases were provided by Gustafson (P. Gustafson, Report TRITA-MAC 330 (1987), Z. Metallkde, 1988, 79(6), 397-402 "A thermodynamic evaluation of the C-Mo-W System") and Jansson (B. Jansson, IM report (1987)).

Co-Zn

Data for the Co-Zn system are taken from the assessment of Vassilev and Jiang (G.P. Vassilev, M. Jiang, J. Phase Equil. and Diffusion 2004, 25, 259-268. "Thermodynamic optimization of the Co-Zn system").

Cr-Cu

Data for the Cr-Cu system are from the assessment of Zeng and Hamalainen (Zeng K, Hamalainen M; CALPHAD, 1995, 19(1), 93-104 "Thermodynamic analysis of stable and metastable equilibria in the Cu-Cr system").

Cr-Fe

The data for the Cr-Fe system are from the assessment of Andersson and Sundman (J-O Andersson, B. Sundman, Report TRITA 0270 (1986), CALPHAD 1987, 11, 83-92 "Thermodynamic properties of the Cr-Fe system"). The data were revised slightly by Lee (B J Lee CALPHAD 1993, 17, 251 "Revision of thermodynamic descriptions of the Fe-Cr And Fe-Ni liquid phases"). Data for the High Sigma phase are also from Lee (B J Lee, Metall. Trans. A 1993, 24A, 1919-1933 "A thermodynamic evaluation of the Cr-Mn and Fe-Cr-Mn systems").

Cr-Mg

Data for the Cr-Mg system are from an unpublished assessment of I Ansara published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Cr-Mn

Data for the Cr-Mn system are from the assessment by Lee (B J Lee, Metall. Trans. A 1993, 24A, 1919-1933 "A thermodynamic evaluation of the Cr-Mn and Fe-Cr-Mn systems").

Cr-Mo

The data for the Cr-Mo system are from an assessment by Frisk (K. Frisk, Report D 60, KTH, (1984))

Cr-N

Data for Cr-N system are from an assessment by Frisk (Frisk K; Report TRITA-MAC 393 (1989), CALPHAD, 1991, 15(1), 79-106 "A thermodynamic evaluation of the Cr-N, Fe-N, Mo-N and Cr-Mo-N systems").

Cr-Nb

Data for the Cr-Nb system were taken from an assessment of Costa Neto et al (Costa Neto J G, Fries S G, Lukas H L, Gama S, Effenberg G; CALPHAD 1993, 17(3), 219-228 "Thermodynamic optimisation of the Nb-Cr system").

Cr-Ni

Data for the Cr-Ni system were from an unpublished assessment by T G Chart, D D Gohil and A T Dinsdale. Data for the HCP phase were derived by Ansara et al (Ansara I, Dupin N, Joubert J M, Latroche M, Percheron-Guegan A; J. Phase Equilib., 1998, 19(1), 6-10. "Thermodynamic study of the Cr-Ni-Zr system").

Cr-P

Data for the Cr-P system are from the assessment by Miettinen (J Miettinen, CALPHAD 1999, 23(1), 141-154 "Thermodynamic description of Cr-P and Fe-Cr-P systems at low phosphorus contents"). The data for the M3P phase were modified by A T Dinsdale (25/2/99).

Cr-Ru

Data for the Cr-Ru system are from an unpublished assessment of P Y Chevalier and E Fischer (1998) supplied to SGTE in January 2005

Cr-Si

The data for the Cr-Si system were from the assessment of Coughanowr et al (Coughanowr C A, Ansara I, Lukas H L; CALPHAD, 1994,18(2), 125-140 "Assessment of the Cr-Si system").

Cr-Ta

Data for the Cr-Ta system are from the assessment of Dupin and Ansara (N Dupin, I Ansara, Z. Metallkde 1996, 87(7), 555-561 "Thermodynamic Assessment of the Cr-Ni-Ta System").

Cr-Ti

Data for the Cr-Ti system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Cr-V

Data for the Cr-V system are from the assessment of Lee (B J Lee, Z. Metallkde.; 1992, 83(5), 292-299 "A thermodynamic evaluation of the Fe-Cr-V system").

Cr-W

Data for the Cr-W system are from the assessment of Gustafson (P. Gustafson, Report TRITA-MAC 320 (1986), CALPHAD 1988, 12(3), 277-292 "A Thermodynamic evaluation of the Cr-Ni-W system").

Cr-Zn

Data for the Cr-Zn system are from an unpublished assessment of I Ansara published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Cr-Zr

Data for the Cr-Zr system are the assessment of Zeng et al (Zeng K, Hamalainen M, Luoma R, Z. Metallkde., 1993, 84(1), 23-28 "A thermodynamic assessment of the Cr-Zr system"). The data for the fcc phase were from Ansara et al (Ansara I, Dupin N, Joubert J M, Latroche M, Percheron-Guegan A; J. Phase Equilib., 1998, 19(1), 6-10. "Thermodynamic study of the Cr-Ni-Zr system")

Cs-K

Data for the Cs-K system are from an unpublished assessment of M H Rand (AERE Harwell, report)

Cs-Na

Data for the Cs-Na system are from an unpublished assessment of M H Rand (AERE Harwell, report)

Cs-Rb

Data for the Cs-Rb system are from an unpublished assessment of M H Rand (AERE Harwell, report)

Cu-Fe

Data for the Cu-Fe system are from the assessment of Ansara and Jansson published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499). The data were also reported in the report TRITA-MAC-533, 1993 by A Jansson.

Cu-Ge

Data for the Cu-Ge system are from an unpublished assessment by M H Rand

Cu-In

Data for the Cu-In system are from an assessment of Kao et al (C R Kao, A Bolcavage, S-L Chen, S W Chen, Y A Chang, A D Romig Jr.; J. Phase Equil. 1993, 14(1), 22-30 "Phase equilibria of the Cu-In system. II- Thermodynamic assessment and calculation of phase diagram").

Cu-Ir

Data for the Cu-Ir system are from an unpublished assessment of Korb (2004), supplied by GTT to SGTE in 2005.

Cu-Li

Data for the Cu-Li system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Cu-Mg

The data for the Cu-Mg system are from the assessment of Liang et al (Liang P, Seifert H J, Lukas H L, Ghosh G, Effenberg G, Aldinger F, CALPHAD, 1998, 22(4), 527-543 "Thermodynamic modeling of the Cu-Mg-Zn ternary system").

Cu-Mn

The data for the Cu-Mn system are based on the assessment of Vrestal et al (J Vrestal, J Stepankova, P Broz, Scand. J. Metall. 1996, 25, 224-231 "Thermodynamics of the copper-manganese system"). The data were modified by A T Dinsdale (7/3/2000) to avoid bcc phase being stable in regions where it should not be stable.

Cu-Nb

The data for the Cu-Nb system are from the assessment of Hamalainen et al (Hamalainen M, Jaaskelainen K, Luoma R, Nuotio M, Taskinen P, Teppo O, CALPHAD, 1990, 14(2), 125-137 "A Thermodynamic analysis of the binary alloy systems Cu-Cr, Cu-Nb and Cu-V").

Cu-Nd

The data for Cu-Nd system are taken from the assessment of Zhuang et al (Zhuang W, Qiao Z Y, Wei S, Shen J, J. Phase Equil, 1996, 17(6), 508-521 "Thermodynamic evaluation of the Cu-R (R: Ce, Pr, Nd, Sm) binary systems"). Note: Both fcc and bcc phases have missing interactions but may be treated as ideal for calculations in the binary system. Care should be taken when extrapolating to multicomponent systems.

Cu-Ni

The data for the Cu-Ni system are taken from assessment by an Mey (an Mey S, CALPHAD, 1992, 16(3), 255-260 "Thermodynamic Re-evaluation of the Cu-Ni system").

Cu-P

Data for the Cu-P system are from an unpublished assessment by Chandrasekan et. al, (1987).

Cu-Pb

Data for the Cu-Pb system are from an assessment by Hayes et al (F. H. Hayes, H. L. Lukas, G. Effenberg, and G. Petzow, Z. Metallkde. 1986, 77, 749-

754). The interactions in the bcc and hcp phases were assumed to be the same as fcc phase.

Cu-Pr

Data for Cu-Pr system were taken from the assessment of Zhuang et al (Zhuang W, Qiao Z Y, Wei S, Shen J, J. Phase Equil., 1996, 17(6), 508-521 "Thermodynamic evaluation of the Cu-R (R: Ce, Pr, Nd, Sm) binary systems"). Note: Both fcc and bcc phases have missing interactions but may be treated as ideal for calculations in the binary system. Care should be taken when extrapolating to multicomponent systems.

Cu-Sb

Data for the Cu-Sb system were taken from an assessment of Nitsche et al. (R Nitsche, S an Mey, K Hack, P J Spencer, Z. Metallkde 1991, 82, 67-72 "A thermodynamic evaluation of the copper-antimony system"). Note the original assessment was not carried out with SGTE unary data, however the difference from using these unary data is small. The assessment is OK for the moment with Cu₉Sb₂ commented out. The Cu₇Sb₂ data were modified by K Hack to prevent the phase from becoming stable again at high temperatures.

Cu-Si

Data for the Cu-Si system are from an unpublished assessment of S Fries, T Jansson, I Hurtado and L Lukas. This represents a revision of the dataset published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Cu-Sm

Data for Cu-Sm system were taken from the assessment of Zhuang et al (Zhuang W, Qiao Z Y, Wei S, Shen J, J. Phase Equil., 1996, 17(6), 508-521 "Thermodynamic evaluation of the Cu-R (R: Ce, Pr, Nd, Sm) binary systems"). Note: The bcc phase has missing interactions but may be treated as ideal for calculations in the binary system. Care should be taken when extrapolating to multicomponent systems.

Cu-Sn

Data for the Cu-Sn system are from the assessment by Shim et al (J-H Shim, C-S Oh, B J Lee and D N Lee, Z. Metallkde, 1996, 87(3), 205-212 "Thermodynamic assessment of the Cu-Sn system"). The data for the fcc_a1 were revised by B J Lee to be compatible with the SGTE data for fcc Sn (1999). The hcp_a3 and hcp_zn data were taken as the similar to tha data for fcc_a1.

Cu-Sr

The data for the Cu-Sr system are from the assessment of Risold et al (Risold D; Hallstedt B; Gauckler L J; Lukas H L; Fries S G; CALPHAD 1996, 20(2), 151-160 "Thermodynamic Optimization of the Ca-Cu and Sr-Cu systems").

Cu-Ti

The data for Cu-Ti system are taken from the assessment of Hari Kumar et al (Hari Kumar H C, Ansara I, Wollants P, Delaey L, Z. Metallkde, 1996, 87(8) 666-672 "Thermodynamic optimisation of the Cu-Ti system").

Cu-Tl

Data for the Cu-Tl system are from the assessment of Chevalier (P-Y Chevalier, Thermochimica Acta, 1989, 156, 383-392 "A Thermodynamic evaluation of the Copper-Thallium system").

Cu-V

The data for the Cu-V system are from the assessment of Hamalainen et al (Hamalainen M, Jaaskelainen K, Luoma R, Nuotio M, Taskinen P, Teppo O, CALPHAD, 1990, 14(2), 125-137 "A Thermodynamic analysis of the binary alloy systems Cu-Cr, Cu-Nb and Cu-V").

Cu-Y

Data for the Cu-Y system are from the assessment of Fries et al (Fries S G, Lukas H L, Konetzki R, Schmid-Fetzer R, J. Phase Equil., 1994, 15(6), 606-614 "Experimental investigation and thermodynamic optimization of the Y-Cu binary system"). The data for the CuY phase have been modified slightly to correct the calculated invariant temperatures.

Cu-Zn

Data for the Cu-Zn system are taken from the assessment of Kowalski and Spencer (Kowalski M, Spencer P J, J. Phase Equil., 1993, 14(4), 432-438 "Thermodynamic reevaluation of the Cu-Zn system").

Cu-Zr

Data for the Cu-Zr system are taken from the assessment of Zeng et al (Zeng K J, Hamalainen M, Lukas H L, J. Phase Equil., 1994, 15(6), 577-586 "A new thermodynamic description of the Cu-Zr system").

Dy-Fe

The data for Fe-Dy system have been taken from the assessment of Landin and Agren (S Landin, J Agren, J. Alloys and Compounds 1994, 207/208, 449-453 "Thermodynamic assessment of Fe-Tb and Fe-Dy phase diagrams and prediction of Fe-Tb-Dy phase diagram").

Dy-Tb

The data for Dy-Tb system have been taken from the assessment of Landin and Agren (S Landin, J Agren, J. Alloys and Compounds 1994, 207/208, 449-453 "Thermodynamic assessment of Fe-Tb and Fe-Dy phase diagrams and prediction of Fe-Tb-Dy phase diagram").

Fe-Gd

The data for the Fe-Gd system were taken from an assessment by Zhang et al. (Zhang W, Li C, Su X, Han K; J. Phase Equil., 1998, 19(1), 56-63. "An updated evaluation of the Fe-Gd (Iron-Gadolinium) system").

Fe-Mg

Data for the Fe-Mg system are from an unpublished assessment of J Tibbals published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499). Note. The compounds Cu₈₇Si₁₃-kappa and Cu₈₅Si₁₅-beta were replaced respectively by hcp-A3 and bcc_A2. (July 1997)

Fe-Mn

The data for the Fe-Mn system were taken from the assessment of Huang (W. Huang, Report TRITA-MAC 388 (rev 1989), CALPHAD 1989, 13, 243-252 "An assessment of the Fe-Mn system").

Fe-Mo

The data for the Fe-Mo system are taken from an assessment by Fernandez Guillermet (A Fernandez Guillermet, CALPHAD 1982, 6, 127-140 "An assessment of the Fe-Mo system"). The data for the sigma phase were revised (1986) (Report TRITA-MAC 200 (1982)). Data for other phases were derived by Andersson et al. (J-O Andersson, Lange N, Report TRITA 0322 (1986), Met Trans A, 1988, 19(6), 1385-1394 "An experimental study and a thermodynamic evaluation of the Fe-Cr-Mo system", J-O Andersson, Report TRITA 0321 (1986), CALPHAD 1988, 12(1), 9-23 "A thermodynamic evaluation of the Fe-Mo-C system") and Frisk (Frisk K, Report TRITA-MAC 428 (1990), Met.

Trans. A, 1992, 23(2), 639-649 "An experimental and Theoretical study of the phase equilibria in the Fe- Mo- Ni system").

Fe-N

The data for the Fe-N systems are from the assessment of Frisk (Frisk K CALPHAD, 1991, 15(1), 79-106 A thermodynamic evaluation of the Cr-N, Fe-N, Mo-N and Cr-Mo-N systems"). Data for bcc_a12 and cub_a13 are taken from the assessment of Caian Qiu (Caian Qiu, Report TRITA-MAC-0493, Metall. Trans. A, 1993, 24(3), 629-645 "A thermodynamic evaluation of the Fe-Mn-N system").

Fe-Nb

Data for the Fe-Nb system are from the assessment of Huang (W. Huang, Report TRITA-MAC 390 (1989), Z. Metallkde. 1990, 81, 397-404 "An assessment of the C-Fe-Nb system").

Fe-Nd

Data for the Fe-Nd system are from the assessment of Hallemans et al (B Hallemans, P Wollants and J R Roos; J. Phase Equilib. 1995, 16(2), 137-149 "Thermodynamic assessment of the Fe-Nb-B phase diagram"). Note the invariant reaction for the fcc phase are calculated to be different from those published.

Fe-Ni

Data for the Fe-Ni system were taken from an unpublished assessment by T G Chart , D D Gohil and A T Dinsdale (1986). The data for the liquid phase were modified by Lee (B J Lee; CALPHAD, 1993, 17(3), 251 "Revision of thermodynamic descriptions of the Fe-Cr and Fe-Ni liquid phases").

Fe-P

Data for the Fe-P system are from an unpublished assessment by P Gustafson (1990).

Fe-Pb

Data for the Fe-Pb system are from an unpublished assessment of Dinsdale and Gohil (1987).

Fe-Ru

Data for the Fe-Ru system are taken from an unpublished assessment of P Y Chevalier and E Fischer (2004) supplied to SGTE in January 2005.

Fe-Sb

Data for the Fe-Sb system are from and assessment of Benyan Pei et al, (Benyan Pei, Bjorkman B, Sundman B, Jansson B, CALPHAD, 1995, 19(1), 1-15 "A thermodynamic assessment of the Iron-Antimony system").

Fe-Si

Data for the Fe-Si system are based on the assessment of Lacaze and Sundman (J Lacaze, B Sundman, Metall. Trans. A, 1991, 22A, 2211 "An assessment of the Fe-C-Si system") but modified by Miettinen (J Miettinen CALPHAD 1998, 22(2), 231-256 "Reassessed thermodynamic solution phase data for ternary Fe-Si-C system").

Fe-Sn

Data for the Fe-Sn system are from the assessment of Hari Kumar et al (K C Hari Kumar, P Wollants, L Delaey, CALPHAD, 1996, 20(2), 139-149 "Thermodynamic evaluation of Fe-Sn phase diagram")

Fe-Tb

Data for Fe-Tb system were taken from the assessment of Landin and Agren (S Landin, J Agren J. Alloys and Compounds 1994, 207/208, 449-453 "Thermodynamic assessment of Fe-Tb And Fe-Dy phase diagrams and prediction of Fe-Tb-Dy phase diagram").

Fe-Ti

Data for the Fe-Ti system are from an unpublished assessment of M H Rand published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Fe-U

Data for the Fe-U system are from the assessment of Kurata et al (Kurata M, Ogata T, Nakamura K, Ogawa T, J. Alloys Compd., 1998, 271-273, 636-640 "Thermodynamic assessment of the Fe-U, U-Zr and Fe-U-Zr systems").

Fe-V

Data for the Fe-V system are from the assessments of Huang (W. Huang, TRITA-MAC 432 (Rev 1989,1990), Z. Metallkde, 1991, 82(5), 391-401 "A thermodynamic evaluation of the Fe-V-C system", W. Huang Met. Trans. A,

1991, 22(9), 1911-1920 "Thermodynamic properties of the Fe-Mn-V-C system").

Fe-W

The data for the Fe-W system are from the assessment of Andersson and Gustafson CALPHAD, 1983, 7(4), 317-326 "A thermodynamic evaluation of the Iron-Tungsten system". Further data for the system relate to ternary assessments of Gustafson (P. Gustafson, Met. Trans. A 1987, 18, 175-188, P. Gustafson, Z. Metallkunde, 1988, 79(6), 388-396 "An experimental study and A thermodynamic evaluation of the Fe-Mo-W system") and Fernandez Guillermet (A. Fernandez Guillermet, L. Ostlund, Report TRITA-MAC 258 (1985), Met. Trans. A 1986, 17, 1809-23).

Fe-Zn

The data for the Fe-Zn system are from the assessment of Reumont et al. (G Reumont, P Perrot, J M Fiorani, J Hertz; J. Phase Equilibria 2000, 21, 371-378 "Thermodynamic assessment of the Fe-Zn system").

Fe-Zr

Data for the Fe-Zr system are from the assessment of Servant et al (C. Servant, C. Gueneau, I. Ansara, J. Alloys Comp. 220 (1995) 19-26. "Experimental and Thermodynamic assessment of the Fe-Zr system"). Data for the DELTA, ORTHO_A20 and TETRAGONAL_U are taken from the work of Kurata et al (Kurata M, Ogata T, Nakamura K, Ogawa T, J. Alloys Compd., 1998, 271-273, 636-640 "Thermodynamic assessment of the Fe-U, U-Zr and Fe-U-Zr systems").

Ga-Ge

Data for the Ga-Ge system are taken from the assessment of Ansara et al (I. Ansara, J.P. Bros, M. Gambino, CALPHAD 1979, 3, 225-233 "Thermodynamic analysis of the germanium-based ternary systems (Al-Ga-Ge, Al-Ge-Sn, Ga-Ge-Sn").

Ga-Hg

Data for the Ga-Hg system are from an unpublished assessment of I Ansara, (1991).

Ga-In

The data for the Ga-In system are from the assessment of Rugg and Chart (B C Rugg, T G Chart CALPHAD, 1990, 14(2), 115-123 "A critical assessment of thermodynamic and phase diagram data for the Gallium-Indium system").

Ga-P

The data for the Ga-P system were assessed by I Ansara and C Chatillon, (Unpublished) but reported in the paper by Ansara et al (I Ansara; C Chatillon; H L Lukas; T Nishizawa; H Ohtani; K Ishida; M Hillert; B Sundman; B B Argent; A Watson; T G Chart; T Anderson; CALPHAD 1994, 18(4), 177-222 "A binary database for III-V compound semiconductor systems").

Ga-Pb

Data for the Ga-Pb system were from an assessment by Ansara et al (I. Ansara, F. Ajersch, J Phase Equil 1991, 12(1), 73-77 "The Ga-Pb (Gallium-Lead) system").

Ga-Sb

The data for the Ga-Sb system were assessed by T Andersson, (Unpublished) but reported in the paper by Ansara et al (I Ansara; C Chatillon; H L Lukas; T Nishizawa; H Ohtani; K Ishida; M Hillert; B Sundman; B B Argent; A Watson; T G Chart; T Anderson; CALPHAD 1994, 18(4), 177-222 "A binary database for III-V compound semiconductor systems").

Ga-Sn

Data for the Ga-Sn system are from an assessment of Anderson and Ansara (T J Anderson, I Ansara, J Phase Equilibria 1992, 13(2), 181-189 "The Ga-Sn (Gallium-Tin) system").

Ga-Zn

Data for the Ga-Zn system are taken from an assessment of Dutkiewicz et al (Dutkiewicz J; Moser Z; Zabdyr L; Gohil D D; Chart T G; Ansara I; Girard C; Bull. Alloy Phase Diagrams, 1990, 11(1), 77-82 "The Ga-Zn (Gallium-Zinc) system").

Gd-Mg

Data for the Gd-Mg system are taken from the assessment of Cacciamani et al (Cacciamani G, Saccone A, Borzone G, Delfino S, Ferro R, Thermochemica

Acta, 1992, 199, 17-24 "Computer coupling of thermodynamics and phase diagrams: the Gadolinium-Magnesium system as an example"). The data for the bcc phase and the intermetallic compounds GdMg and GdMg₂ were modified by A T Dinsdale (September 2006) to compensate for a change in the data for pure Gd.

Ge-In

The data for the Ge-In systems are from the assessment by Chevalier (P Y Chevalier, 1989, 155, 227-240 "A thermodynamic evaluation of the Germanium-Indium, Germanium-Lead, Germanium-Antimony, Germanium-Thallium and Germanium Zinc systems").

Ge-Pb

The data for the Ge-Pb systems are from the assessment by Chevalier (P Y Chevalier, 1989, 155, 227-240 "A thermodynamic evaluation of the Germanium-Indium, Germanium-Lead, Germanium-Antimony, Germanium-Thallium and Germanium Zinc systems")

Ge-Sb

The data for the Ge-Sb systems are from the assessment by Chevalier (P Y Chevalier, 1989, 155, 227-240 "A thermodynamic evaluation of the Germanium-Indium, Germanium-Lead, Germanium-Antimony, Germanium-Thallium and Germanium Zinc systems")

Ge-Si

Data for the Ge-Si system are from the assessment of Olesinski and Abbaschian (R W Olesinski, G J Abbaschian, Bull. Alloy. Phase Diag.; 1984, 5(2), 180-183 "The Ge-Si(Germanium-Silicon) system").

Ge-Sn

Data for the Ge-Sn system are from the assessment of Feutelais et al (Y Feutelais, B Legendre, S G Fries, CALPHAD, 1996, 20(1), 109-123 "Thermodynamic evaluation of the system Germanium-Tin").

Ge-Tl

The data for the Ge-Tl systems are from the assessment by Chevalier (P Y Chevalier, 1989, 155, 227-240 "A thermodynamic evaluation of the Germanium-Indium, Germanium-Lead, Germanium-Antimony, Germanium-Thallium and Germanium Zinc systems")

Ge-Zn

The data for the Ge-Zn systems are from the assessment by Chevalier (P Y Chevalier, 1989, 155, 227-240 "A thermodynamic evaluation of the Germanium-Indium, Germanium-Lead, Germanium-Antimony, Germanium-Thallium and Germanium Zinc systems")

Hf-Mo

Data for the Hf-Mo system are from the assessment of Shao (G Shao, Intermetallics, 2002, 10, 429-434. "Thermodynamic assessment of the Hf-Mo and Hf-W systems").

Hf-Ni

Data for the Hf-Ni system are from the assessment of Wang et al (T Wang, Z Jin, Ji-C Zhao, Z. Metallkd. 2001, 92, 441-446. "Experimental study and reassessment of the Ni-Hf binary system").

Hf-Ta

Data for the Hf-Ta system are from the assessment of Fernandez Guillermet (A Fernandez Guillermet, Z. Metallkde 1996, 86(6), 382-387 "Gibbs energy modelling of the phase diagram and thermochemical properties in the Hf-Ta system").

Hf-Ti

Data for the Hf-Ti system are from the assessment of Bitterman and Rogl (H Bitterman, P Rogl, J. Phase Equil., 1997, 18(1), 24-47 "Critical assessment and thermodynamic calculation of the ternary system Boron-Hafnium-Titanium [B-Hf-Ti]").

In-P

The data for the In-P system were assessed by I Ansara and C Chatillon, (Unpublished) but reported in the paper by Ansara et al (I Ansara; C Chatillon; H L Lukas; T Nishizawa; H Ohtani; K Ishida; M Hillert; B Sundman; B B Argent; A Watson; T G Chart; T Anderson; CALPHAD 1994, 18(4), 177-222 "A binary database for III-V compound semiconductor systems").

In-Pb

Data for the In-Pb system have been assessed by A Bolcavage (reported by Boa and Ansara (D Boa, I Ansara Thermochemica Acta, 1998, 314, 79-86

“Thermodynamic assessment of the ternary system Bi-In-Pb”). Data for the rhombohedral_a7 phase were added by A T Dinsdale (October 2006).

In-Sb

The data for the In-Sb system were assessed by T J Anderson, (Unpublished) but reported in the paper by Ansara et al (I Ansara; C Chatillon; H L Lukas; T Nishizawa; H Ohtani; K Ishida; M Hillert; B Sundman; B B Argent; A Watson; T G Chart; T Anderson; CALPHAD 1994, 18(4), 177-222 “A binary database for III-V compound semiconductor systems”).

In-Si

Data for the In-Si system are from the assessment of Olesinski et al (R W Olesinski, N Kanani, G J Abbaschian, Bulletin of Alloy Phase Diagrams 1985, 6(2), 128 “The In-Si system”).

In-Sn

Data for the In-Sn system are from an unpublished assessment by I Ansara. Data for bcc_a2, fcc_a1, hcp_a3 and hcp_zn assessed by A T Dinsdale for work on solder systems.

In-Zn

Data for the In-Zn system are B J Lee, CALPHAD 1996, 20(4), 471-480 “Thermodynamic assessment of the Sn-Zn and In-Zn binary systems”.

Ir-Ni

Data for the Ir-Ni system are from an unpublished assessment of Korb (2004), supplied by GTT to SGTE in 2005.

Ir-Pt

Data for the Ir-Pt system are from an unpublished assessment of Korb and Jantzen (2004), supplied by GTT to SGTE in 2005.

Ir-Rh

Data for the Ir-Rh system are from an unpublished assessment of Korb and Jantzen (2004), supplied by GTT to SGTE in 2005.

Ir-Ru

Data for the Ir-Ru system are from an unpublished assessment of Korb (2004), supplied by GTT to SGTE in 2005.

K-Rb

Data for the K-Rb system are from an unpublished assessment of M H Rand (AERE Harwell, report)

La-Ni

Data for the La-Ni system are from an assessment by Du et al. (Z Du, D Wang, W Zhang; J. Alloys Compds. 1998, 264, 209-213 "Thermodynamic assessment of the La-Ni system").

Li-Mg

Data for the Li-Mg system are from an assessment by Saunders (Saunders N CALPHAD, 1990, 14(1), 61-70 "A review and thermodynamic assessment of the Al-Mg and Mg-Li systems").

Li-Si

Data for the Li-Si system have been assessed by Braga et al (Braga M H, Malheiros L F, Ansara I, J. Phase Equil. 1995, 16(4), 324-330 "Thermodynamic assessment of the Li-Si system"). The second dataset was used.

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Li-Zr

Data for the Li-Zr system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Mg-Mn

Data for the Mg-Mn system are from an unpublished assessment of J Tibballs published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Mg-Ni

The data for the Mg-Ni system are taken from an assessment of Jacobs and Spencer (Jacobs M H G, Spencer P J, CALPHAD, 1998, 22(4), 513-526 "A critical thermodynamic evaluation of the system Mg-Ni").

Mg-Ru

Data for the Mg-Ru system are from an unpublished assessment by P Y Chevalier and E Fischer (2004) supplied to SGTE, January 2005.

Mg-Sc

Data for the Mg-Sc system are taken from the assessment of Pisch et al (A Pisch, R Schmid-Fetzer, G Cacciamani, P Riani, A Saccone, R Ferro, Z Metallkde.; 1998, 89(7), 474-477 "Mg-rich phase equilibria and thermodynamic assessment of the Mg-Sc system"). Further data were assessed in a subsequent publication (J Groebner, R Schmid Fetzer, A Pisch, G Cacciamani, P Riani, N Parodi, G Borzone, A Saccone, R Ferro; Z Metallkde., 1999, 90(11), 872-880 "Experimental investigations and thermodynamic calculation in the Al-Mg-Sc system").

Mg-Si

The data for the Mg-Si system are taken from the assessment of Heufel et al (Heufel H, Godecke T, Lukas H L, Sommer F, J. Alloys Compds., 1997, 247(1-2), 31-42 "Investigation of the Al-Mg-Si system by experiments and thermodynamic calculations").

Mg-Sn

The data for the Mg-Sn system are from an unpublished assessment of Fries and Lukas (Private communication 5/3/99) and are based on an earlier assessment (Fries S G, Lukas H L, J. Chim. Phys., 1993, 90(2), 181-187 "Optimisation of the Mg-Sn system"). The data for the hcp phase were modified by A T Dinsdale to take account of new data for hcp Sn.

Mg-Y

Data for the Mg-Y system are from a assessment of Fabrichnaya et al (O B Fabrichnaya, H L Lukas, G Effenberg, F Aldinger, Intermetallics, 2003, 11, 1183-1188 "Thermodynamic optimization in the Mg-Y system")

Mg-Zn

The data for the Mg-Zn system are from the assessment by Liang et al (P Liang, T Trafa, J A Robinson, S Wagner, P Ochin, M G Harmelin, H J Seifert, H L Lukas, F Aldinger; Thermochemica Acta 1998, 314, 87-110 "Experimental investigation and thermodynamic calculation of the Al-Mg-Zn system", P Liang, H J Seifert, H L Lukas, G Ghosh, G Effenberg, F Aldinger, CALPHAD,

1998, 22(4), 527-543 "Thermodynamic modeling of the Cu-Mg-Zn ternary system").

Mg-Zr

Data for the Mg-Zr system are from an unpublished assessment of M Hamalainen published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Mn-N

Data for the Mn-N system are taken from the assessment of Caian Qui and Fernandez Guillermet (Caian Qui, A Fernandez Guillermet, Report TRITA-MAC 472, Z. Metallkunde 1993, 84(1), 11-22 "Predictive approach to the entropy of Manganese Nitrides and calculation of the Mn-N phase diagram"). Data for the interaction in the Fe₄N phase were introduced by A T Dinsdale (17/5/99) for consistency with Fe-N data.

Mn-Ni

Data for the Mn-Ni system were assessed by A T Dinsdale (unpublished, 1989).

Mn-P

The source of the assessed data for the Mn-P system is not known.

Mn-Pb

Data for the Mn-Pb system are from an unpublished assessment by A T Dinsdale (2003).

Mn-Si

Data for the Mn-Si system are from an unpublished assessment of J E Tibballs published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Mn-Ti

Data for the Mn-Ti system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Mn-V

Data for the Mn-V system are from an assessment by Huang (W. Huang, TRITA-MAC 441 (1990), CALPHAD, 1991, 15(2), 195-208 "A thermodynamic analysis of the Mn-V and Fe-Mn-V systems").

Mn-Zr

Data for the Mn-Zr system are from an unpublished assessment of K Hack published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Mo-N

Data for the Mo-N system are from an assessment of Frisk (K. Frisk, Report TRITA-MAC 393 (1989), CALPHAD, 1991, 15(1), 79-106 "A thermodynamic evaluation of the Cr-N, Fe-N, Mo-N and Cr-Mo-N systems").

Mo-Nb

Data for the Mo-Nb system are from an unpublished assessment by P Y Chevalier.

Mo-Ni

Data for the Mo-Ni system are from an assessment by Frisk (K Frisk, CALPHAD, 1990, 14(3), 311-320 "A thermodynamic evaluation of the Mo-Ni system"). Additional data were also provided in the reports TRITA-MAC 428 (1990) and TRITA-MAC 429 (1990) by K Frisk. The data were modified by A T Dinsdale to allow Mo to occupy the first sublattice of the Mu₂ phase. This was necessary for compatibility with the Co-Mo system

Mo-P

The data for the Mo-P system are from an unpublished assessment by P Gustafson (1990).

Mo-Si

The data for the Mo-Si system are from an unpublished assessment by J A Gisby.

Mo-Ti

Data for the Mo-Ti system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database

for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Mo-V

The data for the Mo-V system are from an assessment by Luoma (R Luoma, Report TKK-V-B76. Helsinki Univ. of Technology, Espoo, Finland "Thermodynamic analysis of the binary systems Mo-V, Ni-V, Si-V and Ti-V").

Mo-W

Data for the Mo-W system are from an assessment of Gustafson (P Gustafson, Z. Metallkde, 1988, 79(6), 388-396 "An experimental study and a thermodynamic evaluation of the Fe-Mo-W system"). Further data were provided by Gustafson (P Gustafson, Z. Metallkde., 1988, 79(6), 397-402 "A thermodynamic evaluation of the C-Mo-W system") and Andersson (J-O Andersson, CALPHAD 1988, 12(1), 9-23 "A thermodynamic evaluation of the Fe-Mo-C system").

N-Nb

The data for the N-Nb system are from an assessment by Huang (Weiming Huang, Metall. Trans. A, 1996, 27, 3591-3600 "Thermodynamic assessment of the Nb-N system").

N-Ni

The data for the N-Ni system are from an assessment by Fernandez Guillermet and Frisk (Fernandez Guillermet A, Frisk K Int. J. Thermophys., 1991, 12(2), 417-431 "Thermodynamic properties of nickel nitrides and phase stability in the Nickel-Nitrogen system").

N-Si

The data for the N-Si system are from an assessment by Gustafson (P Gustafson, Inst. Met. Res. (Sweden) (1990)). Note – it is not clear whether these data are appropriate for steel systems only.

N-Ta

The data for the N-Ta system are from an assessment by Frisk (K Frisk; J Alloys and Compounds; 1998, 278, 216-226 "Analysis of the phase diagram and thermochemistry in the Ta-N and the Ta-C-N systems").

N-Ti

The data for the N-Ti system are from the assessment of Zeng and Schmid-Fetzer (Zeng K, Schmid-Fetzer R, *Z Metallkde* 1996, 87, 540-554 "Critical assessment and thermodynamic modeling of the Ti-N system").

N-V

The data for the N-V system are from an assessment of Du et al (Yong Du, R Schmid-Fetzer, H Ohtani; *Z. Metallkde* 1997, 88(7), 545-556 "Thermodynamic assessment of the V-N system").

N-W

The data for the N-W system are from an assessment by Fernandez Guillermet and Jonsson (A Fernandez Guillermet, S Jonsson, *Z. Metallkde*. 1993, 84(2), 106-117 "Thermodynamic analysis of stable and metastable W nitrides and calculation of the W-N phase diagram").

Na-Rb

Data for the Na-Rb system are from an unpublished assessment of M H Rand (AERE Harwell, report)

Nb-Ni

The data for the Nb-Ni system are from the assessment of from Bolcavage and Kattner (Bolcavage A, Kattner U R, *J Phase Equil.*; 1996, 17(2), 92-100 "A reassessment of the calculated Ni-Nb phase diagram").

Nb-Sn

The data for the Nb-Sn system are from an assessment by Toffolon et al (C Toffolon, C Servant, B Sundman; *J. Phase Equil.*; 1998, 19(5), 479-485 "Thermodynamic assessment of the Nb-Sn system").

Nb-Ti

Data for the Nb-Ti system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Nb-V

The data for the Nb-V system are from the assessment of Hari Kumar et al (K C Hari Kumar, P Wollants, L Delaey, CALPHAD, 1994, 18(1), 71-80 "Thermodynamic calculation of Nb-Ti-V phase diagram").

Nb-Zr

The data for the Nb-Zr system are from an assessment by Fernandez Guillermet (A. Fernandez Guillermet, Z. Metallkde. 1991, 82(6), 478-487 "Thermodynamic analysis of the stable phases in the Zr-Nb system and calculation of the phase diagram").

Nd-Pr

Data for the Nd-Pr system are from an assessment by Cacciamani et al (G Cacciamani, R Ferro, H L Lukas, Z. Metallkde. 1992, 83, 669-672 "Assessment of the Nd-Sb and Pr-Sb binary systems and calculation of the Nd-Pr-Sb ternary system").

Nd-Sb

Data for the Nd-Sb system are from an assessment by Cacciamani et al (G Cacciamani, R Ferro, H L Lukas, Z. Metallkde. 1992, 83, 669-672 "Assessment of the Nd-Sb and Pr-Sb binary systems and calculation of the Nd-Pr-Sb ternary system").

Ni-P

The source of data for the Ni-P system is unknown.

Ni-Pb

Data for the Ni-Pb system are from the assessment of Cui Ping Wang et al (Cui Ping Wang, Xing Jun Liu, I Ohnuma, R Kainuma, K Ishida, CALPHAD 2000, 24(2), 149-167 "Thermodynamic assessment of the Cu-Ni-Pb system").

Ni-Ru

Data for the Ni-Ru system are from an unpublished assessment of P Y Chevalier and E Fischer (2001) supplied to SGTE in January 2005.

Ni-Si

The data for the Ni-Si system are taken from the an assessment of Lindholm and Sundman (M Lindholm, B Sundman; Metall Trans A 1996, 26A, 2897-2903 "A thermodynamic evaluation of the Nickel-Silicon system").

Ni-Ta

The data for the Ni-Ta system are taken from an assessment by Cui and Jin (Y Cui, Z Jin; *Z Metallkde* 1999, 90(3), 233-241 "Experimental study and reassessment of the Ni-Ta system").

Ni-Ti

The data for Ni-Ti systems are from an assessment of Bellen et al. (P Bellen, K C Hari Kumar, P Wollants, *Z. Metallkde*, 1996, 87(12), 972-978 "Thermodynamic assessment of the Ni-Ti phase diagram").

Ni-V

The data for the Ni-V system are from an unpublished assessment of J Korb and K Hack published in the COST507 final report COST507 Thermochemical database for light metal alloys, Volume 2, eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499

Ni-W

The data for the Ni-W system are from the assessment of Gustafson et al (P Gustafson, A Gabriel, I Ansara, Report TRITA 0263(1985), *Z Metallkde*, 1986, 78, 151-156). Additional data were provided by Fernandez Guillermet (A Fernandez Guillermet, TRITA-MAC 373(1988), "Thermodynamics of the Co-Ni-W: A preliminary Calphad analysis").

Ni-Zr

Data for the Ni-Zr system are taken from the assessment of Ghosh (Ghosh G; *J. Mater. Res.*, 1994, 9(3), 598-616 "Thermodynamics and kinetics of stable and metastable phases in the Ni-Zr system"). Data for the Laves_c14 and Laves_c15 were provided by Ansara et al. (I Ansara, N Dupin, J M Joubert, M Latroche, A Percheron-Guegan; *J. Phase Equilibria*, 1998, 19(1), 6-10 "Thermodynamic study of the Cr-Ni-Zr system").

P-Sb

The data for the P-Sb system were assessed by Ansara and Chatillon, (Unpublished) but reported in the paper by Ansara et al (I Ansara; C Chatillon; H L Lukas; T Nishizawa; H Ohtani; K Ishida; M Hillert; B Sundman; B B Argent; A Watson; T G Chart; T Anderson; *CALPHAD* 1994, 18(4), 177-222 "A binary database for III-V compound semiconductor systems").

P-Si

The data for the P-Si system are from an unpublished NPL assessment.

Pb-Pd

The data for the Pd-Pb system are from an assessment by Ghosh (G Ghosh; J. Phase Equil, 1999, 20(3), 309-315 "Thermodynamic modeling of the Palladium-Lead system"). Note that these data are slightly different from those in published by Ghosh in Metall. Mater. Trans. A 1999, 30A, 5-18 "Thermodynamic modeling of the Palladium-Lead-Tin system".

Pb-Sb

The data for the Pb-Sb system are from the assessment of Ohtani et al. (Ohtani H, Okuda K, Ishida K, J. Phase Equil., 1995, 16(5), 416-429 "Thermodynamic study of phase equilibria in the Pb-Sn-Sb system").

Pb-Si

The data for the Pb-Si system are from the assessment of Olesinski and Abbaschian (R W Olesinski, G J Abbaschian, Bull. Alloy Phase Diagrams, 1984, 5(3), 271-3 "The Lead-Silicon system").

Pb-Sn

The data for the Pb-Sn system are from the assessment of Ohtani et al. (Ohtani H, Okuda K, Ishida K, J. Phase Equil., 1995, 16(5), 416-429 "Thermodynamic study of phase equilibria in the Pb-Sn-Sb system"). Data for the fcc and liquid phase revised by A T Dinsdale to take account of revised unary data for fcc Sn.

Pb-Tl

The data for the Pb-Tl system is from an unpublished assessment by I. Ansara, H.L. Lukas and S. G. Fries.

Pb-Zn

The data for the Pb-Zn system are from an assessment by Srivastava and Sharma (Srivastava M, Sharma R C, J. Phase Equil. 1993, 14(6), 700-709 "Thermodynamic analysis and phase equilibria calculations of Pb-Zn, Sn-Zn, and Pb-Sn-Zn systems").

Pb-Zr

Data for the Pb-Zr system are from the assessment by Dixon, Argent and Chart (Dixon P R, Argent B B, Chart T G CALPHAD, 1998, 22(3), 397-416 "The alloy systems Zirconium-Cerium and Zirconium-Lead").

Pd-Rh

Data for the Pd-Rh system are from an unpublished assessment of Korb (2004), supplied by GTT to SGTE in 2005.

Pd-Sn

Data for the Pd-Sn system are from the assessment of Ghosh (G Ghosh; Metall. Mater. Trans. A 1999, 30A, 5-18) "Thermodynamic modeling of the palladium-lead-tin system").

Pr-Sb

Data for the Pr-Sb system are from an assessment by Cacciamani et al (G Cacciamani, R Ferro, H L Lukas, Z. Metallkde. 1992, 83, 669-672 "Assessment of the Nd-Sb and Pr-Sb binary systems and calculation of the Nd-Pr-Sb ternary system").

Ru-Si

Data for the Ru-Si system are from an unpublished assessment P Y Chevalier and E Fischer (1995) supplied to SGTE in January 2005.

Ru-Zr

Data for the Ru-Zr system is from an unpublished assessment by P Y Chevalier and E Fischer (1995) supplied to SGTE in January 2005.

Sb-Si

Data for the Sb-Si system are from an assessment by Olesinski and Abbaschian (R W Olesinski, G J Abbaschian Bull. Alloy Phase Diagrams 1985, 6(5), 445-8 "The Sb-Si system").

Sb-Sm

The data for the Sb-Sm system are from an assessment by Cacciamani et al (G Cacciamani, G Borzone, N Parodi, R Ferro, Z. Metallkde. 1996, 87(7), 562-567 "Constitutional properties of rare earth antimonides: Trends and optimization Sm-Sb and Er-Sb alloys").

Sb-Sn

Data for the Sb-Sn system are from an unpublished assessment of J Vizdal and A Kroupa (2005). This makes use of new unpublished DSC data of Vassilev in 2004. Earlier assessments of Jonsson and Agren (Jonsson B, Agren J, Mater. Sci. Technol, 1986, 2, 913 "A thermodynamic assessment of the Sb-Sn system") and Ohtani and Ishida (H Ohtani, K Ishida; J Electronic Materials, 1994, 23(8), 747-755 "A thermodynamic study of the phase equilibria in the Bi-Sn-Sb system") used different unary data for the Sb in the metastable BCT_A5 structure from those adopted by SGTE.

Sb-Zn

The data for the Sb-Zn system are from the assessment of Zabdyr (L A Zabdyr, CALPHAD 1997, 21(3), 349-358 "Phase equilibria in ternary Cd-Sb-Zn system").

Se-Te

Data for the Se-Te system are from an assessment by Ghosh et al (G Ghosh, R C Sharma, D T Li, Y A Chang, J. Phase Equil., 1994, 15(2), 213-224 "The Se-Te (Selenium-Tellurium) system").

Si-Sn

The data for the Si-Sn system was from an assessment by Jacobs and Spencer (Jacobs M H G, Spencer P J, CALPHAD 1996, 20(1), 89-91 "A thermodynamic evaluation of the system Si-Sn").

Si-Ta

Data for the Ta-Si system are from an assessment by Vahlas et al (C. Vahlas, P-Y Chevalier and E. Blanquet, CALPHAD 1989, 13, 273-292 "A thermodynamic evaluation of four Si-M (M = Mo, Ta, Ti, W) binary systems").
Note: there is a spurious miscibility gap in the liquid at high temperatures.

Si-Ti

Data for the Si-Ti system are from an assessment by Seifert et al (H J Seifert, H L Lukas, G Petzow, Z. Metallkde 1996, 87(1), 2-13 "Thermodynamic optimization of the Ti-Si system").

Si-V

Data for the Si-V system are from an unpublished assessment of M H Rand and N Saunders published in the COST507 final report (COST507

Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Si-W

Data for the Si-W system are from an assessment by Vahlas et al (C. Vahlas, P-Y Chevalier and E. Blanquet, CALPHAD 1989, 13, 273-292 "A thermodynamic evaluation of four Si-M (M = Mo, Ta, Ti, W) binary systems").

Si-Y

Data for the Si-Y system are from an assessment by Ran et al (Ran Q, Lukas H L, Effenberg G, Petzow, Z. Metallkde, 1989, 80(6), 402-405 "A thermodynamic assessment of the Si-Y system").

Si-Zn

Data for the Si-Zn system are an assessment by Jacobs and Spencer (Jacobs M H G, Spencer P J, CALPHAD, 1996, 20(3), 307-320 "A critical thermodynamic evaluation of the systems Si-Zn and Al-Si-Zn").

Si-Zr

Data for the Si-Zr system are from the assessment of Gueneau et al (Gueneau C, Servant C, Ansara I, Dupin N, CALPHAD, 1994,18(3), 319-327 "Thermodynamic assessment of the Si-Zr system").

Sn-Ti

Data for the Sn-Ti system are from an unpublished assessment of F H Hayes published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499). The data for the hcp phase were modified to be consistent with a change in Sn hcp data.

Sn-Zn

Data for the Sn-Zn system are from an unpublished assessment of S G Fries and H L Lukas published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Sn-Zr

Data for the Sn-Zr system are from an unpublished assessment of J Korb and K Hack published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H

Rand, July 1998, EUR18499). The data for the hcp phase were modified to take account of new unary for hcp Sn.

Ta-Ti

Data for the Ta-Ti system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Ti-V

Data for the Ti-V system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Ti-W

Data for the Ti-W system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

U-Zr

Data for the U-Zr system are from the assessment of Kurata et al (Kurata M, Ogata T, Nakamura K, Ogawa T, J. Alloys Compd., 1998, 271-273, 636-640 "Thermodynamic assessment of the Fe-U, U-Zr and Fe-U-Zr systems").

V-Zr

Data for the V-Zr system are from an unpublished assessment of J Korb and K Hack published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

b) Ternary systems

Ag-Cu-Pb

The data for the Ag-Cu-Pb system are from an update of Lukas (H L Lukas, Unpublished work, 1998) of his earlier assessment (F. H. Hayes, H. L. Lukas, G. Effenberg, and G. Petzow, Z. Metallkde. 77 (1986) 749-754) "A thermodynamic optimisation of the Cu-Ag-Pb system".

Al-C-Si

The data for the Al-C-Si system are from the assessment of Groebner et al (J Groebner, H L Lukas, F Aldinger CALPHAD 1996, 20, 247-254 "Thermodynamic Calculation of the Al-Si-C System". Note: the dataset may not give best agreement with experiment since the C-Si data in the database are different from those used in this assessment.

Al-Ca-Si

The data for the Al-Ca-Si system are from the assessment of Anglezio et al (Anglezio J C, Servant C, Ansara I; CALPHAD, 1994, 18(3), 273-309 "Contribution to the experimental and thermodynamic assessment of the Al-Ca-Fe-Si, Al-Ca-Si, Al-Fe-Si and Ca-Fe-Si systems").

Al-Cu-Li

Data for the Al-Cu-Li system are from an unpublished assessment of N Saunders published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Cu-Mg

Data for the Al-Cu-Mg system are from an assessment of T Bühler et al (Buhler T, Fries S G, Spencer P J, Lukas H L, J. Phase Equil., 1998, 19(4), 317-333 "A thermodynamic assessment of the Al-Cu-Mg ternary system").

Al-Cu-Si

Data for the Al-Cu-Si system are from an unpublished assessment of T Bühler published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Fe-Mn

Data for the Al-Fe-Mn system are from an unpublished assessment of A Jansson and T G Chart published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Fe-Si

Data for the Al-Fe-Si system are from an unpublished assessment of P Kolby published in the COST507 final report (COST507 Thermochemical database

for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Ga-In

The data for the Al-Ga-In system are from an assessment by Ansara et al (Ansara I, Bros J P, Girard C, CALPHAD, 1978, 2(3), 187-196 "Thermodynamic analysis of the Ga-In, Al-Ga, Al-In and the Al-Ga-In systems").

Al-Ga-Sn

The data for the Al-Ga-Sn system are from an assessment based on the work of Gaune et al (Gaune J L, Gambino M, Bros J P, Martin-Garin R, Ansara I, Thermochem.Acta, 1977, 18(2), 217-228 "Contribution to the thermodynamic study of the ternary Aluminum-Gallium-Tin system").

Al-Mg-Mn

Data for the Al-Mg-Mn system are from an unpublished assessment of I Ansara published in the COST507 final report (COST507 Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Mg-Si

The data for the Al-Mg-Si system are taken from the assessment of Heufel et al (Heufel H, Godecke T, Lukas H L, Sommer F, J. Alloys Compds., 1997, 247(1-2), 31-42 "Investigation of the Al-Mg-Si system by experiments and thermodynamic calculations").

Al-Mg-Zn

The data for the Al-Mg-Zn system are from the assessment by Liang et al (P Liang, T Trafa, J A Robinson, S Wagner, P Ochin, M G Harmelin, H J Seifert, H L Lukas, F Aldinger; Thermochemica Acta 1998, 314, 87-110 "Experimental investigation and thermodynamic calculation of the Al-Mg-Zn system", P Liang, H J Seifert, H L Lukas, G Ghosh, G Effenberg, F Aldinger, CALPHAD, 1998, 22(4), 527-543 "Thermodynamic modeling of the Cu-Mg-Zn ternary system"). The data were refined further by Liang et al. Werksoffer 98 Vol6 "Metalle/simulation" ed R Kopp et al. pp463-8, 1999, New York, Wiley VCH

Al-Mn-Si

Data for the Al-Mn-Si system are from an unpublished assessment of P Kolby, M H Rand and T G Chart published in the COST507 final report (COST507

Thermochemical database for light metal alloys, Volume 2 eds I Ansara, A T Dinsdale and M H Rand, July 1998, EUR18499).

Al-Sn-Zn

The data for the Al-Sn-Zn system are from an assessment of Fries et al (S G Fries; H L Lukas, S Kuang; G Effenberg, Proc. Conf. User Aspects of Phase Diagrams 1992, pp280-286).

Au-In-Pb

The data for the Au-In-Pb system are from an unpublished assessment by I Ansara (1986).

B-Fe-Nd

The data for the Fe-Nd-B system are from the assessment of Halleman et al (B Halleman, P Wollants and J R Roos; J. Phase Equilib. 1995, 16(2), 137-149 "Thermodynamic assessment of the Fe-Nb-B phase diagram"). Note: the calculated phase diagram for 298 K does not agree with published version.

Bi-Ga-Zn

The data for the Bi-Ga-Zn system are from C. Girard, Thesis (Marseille 1985).

Bi-In-Pb

The data for the Bi-In-Pb system are from the assessment of Boa and Ansara, (D Boa, I Ansara, Thermochemica Acta 1998, 314, 79-86 "Thermodynamic Assessment of the Ternary System Bi-In-Pb").

C-Co-Cr

The data for the C-Co-Cr system are from an assessment by Weidling and Jansson (A Weidling and B Jansson, CALPHAD 1997, 21(3), 321-333 "A Thermodynamic Evaluation of the Co-Cr and the C-Co-Cr systems")

C-Co-Fe

The data for the C-Co-Fe system are from an assessment by Fernandez Guillermet (A Fernandez Guillermet, Report TRITA-MAC 361 (1987), Z. Metallkde. 1988, 79(5), 317-329 "Thermodynamic properties of the Fe-Co-C system"). Additional data are further work by Fernandez Guillermet (A. Fernandez Guillermet, Report TRITA-MAC 362 (1988), Z. Metallkde. 1988, 79, 524-536 "Thermodynamic properties of the Fe-Co-Ni-C system") and Jansson (B. Jansson, IM report (1987)).

C-Co-Ni

The data for the C-Co-Ni system are from the assessment of Fernandez Guillermet (A. Fernandez Guillermet, Report TRITA-MAC 362 (1988), *Z. Metallkde.* 1988, 79, 524-536 "Thermodynamic properties of the Fe-Co-Ni-C system") supplemented by work by Jansson (B. Jansson, IM report (1987)).

C-Co-W

Data for the C-Co-W system are from an assessment of Fernandez Guillermet (A Fernandez Guillermet, Report TRITA-MAC 371 (1988), *Metall. Trans. A* 1989, 20(5), 935-956 "Thermodynamic properties of the Co-W-C system") supplemented by work by Jansson (B. Jansson, IM report (1987)).

C-Cr-Fe

Data for the C-Cr-Fe system are from an assessment by Andersson (J-O Andersson, Report TRITA 0207 (1986), *Metall. Trans A*, 1988, 19(3), 627-636 "A Thermodynamic evaluation of the Fe-Cr-C system"). Modified data for the Liquid phase were taken from the work of B J Lee (B J Lee CALPHAD 1993, 17, 251 "Revision of thermodynamic descriptions of the Fe-Cr And Fe-Ni liquid phases").

C-Cr-Mn

Data for the C-Cr-Mn system are the assessment of Lee et al (B-J Lee, Rizzo H F, Massalski T B, Nastasi M, *Metall. Trans. A*, 1993, 24, 1017-1025 "A thermodynamic Evaluation of the Fe-Cr-Mn-C system").

C-Cr-Mo

Data for the C-Cr-Mo system are from the assessments of Caian Qui, (Caian Qui, Report TRITA-MAC 482 (1992), Hillert M, Qiu C, *J. Phase Equil.*, 1992, 13(5), 512-521 "A reassessment of the Fe-Cr-Mo-C system", Qiu C, *J. Alloys and Compounds*, 1993, 199(1-2), 53-59 "Thermodynamic analysis and calculation of the Cr-Mo-C system").

C-Cr-N

Data for the C-Cr-N system are from unpublished work by Gustafson (P Gustafson, *Inst. Met. Res. (Sweden)* (1990)).

C-Cr-Ni

Data for the C-Cr-Ni system are from the assessments of Hillert and Caian Qiu (Hillert M, Qiu C, *Metall. Trans. A*, 1991, 22(10), 2187-2198 "A thermodynamic assessment of the Fe-Cr-Ni-C system"), *Metall. Trans. A*,

1992, 23A, 1593-1595. Additional data are from the assessments of Kajihara and Hillert, (M Kajihara, M Hillert, Metall. Trans. A, 1990, 21, 2777-2787 "Thermodynamic evaluation of the Cr-Ni-C system"), and Lee (Lee B-J, CALPHAD, 1992, 16(2), 121-149 "On the stability of Cr carbides").

C-Cr-V

Data for the C-Cr-V system are from the assessment of Lee and Lee (Lee B-J, Lee D N, Report TRITA-MAC 474 (1991), Report TRITA-MAC 475 (1991), J. Phase Equil., 1992, 13(4), 349-364 "A thermodynamic evaluation of the Fe-Cr-V-C system").

C-Cr-W

Data for the C-Cr-W system are from the assessment of Gustafson (P. Gustafson, Report TRITA-MAC 348, (1987), Metall. Trans. A, 1988, 19(10), 2547-2554 "A thermodynamic evaluation of the C-Cr-Fe-W system")

C-Cu-Fe

Data for the C-Cu-Fe system are from an unpublished assessment of Gustafson (P Gustafson, Inst. Met. Res. (IM-2549, 1990))

C-Fe-Mn

Data for the C-Fe-Mn system are from the assessment of Huang (W. Huang, Report TRITA-MAC 411 (Rev 1989), Metall. Trans. 1990, 21(8), 2115-2123 "A thermodynamic assessment of the Fe-Mn-C system").

C-Fe-Mo

Data for the C-Fe-Mo system are from an assessment by Andersson (J-O Andersson, Report TRITA 0321 (1986), CALPHAD 1988, 12(1), 9-23 "A thermodynamic evaluation of the Fe-Mo-C system"). Further data are taken from the assessment of Caian Qui (Hillert M, Qiu C, Report TRITA-MAC 482 (1992) Revision, J. Phase Equil., 1992, 13(5), 512-521 "A reassessment of the Fe-Cr-Mo-C system")

C-Fe-N

Data for the C-Fe-N system are from an assessment of Du and Hillert (H Du, M. Hillert, Report TRITA-MAC 435(1990), Z. Metallkde, 1991, 82(4), 310-316 "An assessment of the Fe-C-N system").

C-Fe-Nb

Data for the C-Fe-Nb system are from the assessment of Huang (W Huang, Report TRITA-MAC 390 (1989), *Z. Metallkde.* 1990, 81(6), 397-404 "A thermodynamic evaluation of the Fe-Nb-C system").

C-Fe-Ni

Data for the C-Fe-Ni system are from the assessment of Gabriel et al (A Gabriel, P Gustafson, I Ansara, Report TRITA-MAC 285 (1986), *CALPHAD* 1987, 11(3), 203-218 "A thermodynamic evaluation of the C-Fe-Ni system").

C-Fe-Si

Data for the C-Fe-Si system are based on the assessment of Lacaze and Sundman ((J Lacaze, B Sundman, *Metall. Trans. A*, 1991, 22A, 2211 "An assessment of the Fe-C-Si system") but modified by Miettinen (J Miettinen *CALPHAD* 1998, 22(2), 231-256 "Reassessed thermodynamic solution phase data for ternary Fe-Si-C system").

C-Fe-V

Data for the C-Fe-V system are taken the assessments of W Huang (W Huang Report TRITA-MAC 432 (1990), *Z. Metallkde.* 1991, 82(5), 391-401 "A thermodynamic evaluation of the Fe-V-C system") and Lee and Lee (Lee B-J, Lee D N, Report TRITA-MAC 474 (1991), *CALPHAD*, 1991, 15(3), 293-306 "A thermodynamic study on the Fe-V-C system").

C-Fe-W

Data for the C-Fe-W system are from the assessment of Gustafson (P Gustafson, Report TRITA 0257 (1985), *Metall. Trans A* 1987, 18, 175-188 "A thermodynamic evaluation of the C-Fe-W system", P Gustafson, Report TRITA-MAC 331 (1987), *Z. Metallkde.* 1988, 79(7), 421-425 "A thermodynamic evaluation of the C-Fe-Mo-W system").

C-Mn-Si

The data for the C-Mn-Si system are from an unpublished NPL assessment (1989). Data for the hcp_a3 phase were added by A T Dinsdale (October 2006).

C-Mn-V

Data for the C-Mn-V system are from the assessments of W Huang (W Huang Report TRITA-MAC 441 (1990), *Met. Trans. A*, 1991, 22(9), 1911-1920 "Thermodynamic properties of the Fe-Mn-V-C system", Fernandez Guillermet A, Huang W, *Int. J. Thermophys.*, 1991, 12(6), 1077-1102

“Thermodynamic analysis of stable and metastable carbides in the Manganese-Vanadium-Carbon System and Predicted Phase Diagram”).

C-Mo-V

Data for the C-Mo-V system are from an unpublished assessment of Gustafson (P Gustafson, Inst. Met. Res. (Sweden) (1990)).

C-Mo-W

Data for the C-Mo-W system are taken from the assessments of Gustafson (P. Gustafson, Report TRITA-MAC 330 (1987), Z. Metallkde. 1988, 79, (6), 397-402 “A thermodynamic evaluation of the C-Mo-W system”, P. Gustafson, TRITA-MAC 331 (1987), Z. Metallkde, 1988, 79(7), 421-425 “A thermodynamic evaluation of the C-Fe-Mo-W system”).

C-Ni-Ti

Data for the C-Ni-Ti system are taken from the assessment of Du and Schuster; (Du Yong, J C Schuster Z Metallkde. 1998, 89(6), 399-410 “Experimental investigation and thermodynamic modeling of the Ni-Ti-C system”).

C-Ni-W

Data for the C-Ni-W system are from the assessment of Gustafson et al (P Gustafson, A Gabriel, I Ansara, TRITA 0263(1985), Z Metallkde, 1986, 78, 151-156).

Cd-Ga-In

The data for the Cd-Ga-In system are from the assessment of Zakulski et al (Zakulski W, Moser Z, Rzyman K, Lukas H L, Fries S G, Sikiennik M, Kaczmarczyk R, Castanet R, J. Phase Equil. 1993,14(2),184-196 “Thermodynamic studies and phase diagrams of the Cd-Ga-In system”

Co-Cr-W

Data for the Co-Cr-W system are from an unpublished assessment of Jansson (B. Jansson, IM report (1987)).

Co-Fe-N

The data for the Co-Fe-N system are from the assessment of Fernandez Guillermet and Jonsson (A Fernandez Guillermet and S Jonsson, Z. Metallkde., 1992, 83(3) , 165-175 “Thermodynamic analysis of the Fe-Co-N

system and predictive approach to the phase diagram"). Note: the Fe-N dataset has been modified since this assessment.

Co-Fe-W

Data for the Co-Fe-W system are from the assessment of Fernandez Guillermet (A Fernandez Guillermet, Report TRITA-MAC 372 (1988), Z. Metallkde., 1988, 79(10), 633-642 "Thermodynamic calculation of the Fe-Co-W phase diagram").

Co-Ni-W

Data for the Co-Ni-W system are taken from the assessment of Fernandez Guillermet (A Fernandez Guillermet, Report TRITA-MAC 373(1988) "Thermodynamics of the Co-Ni-W: A preliminary Calphad analysis").

Cr-Fe-Mn

Data for the Cr-Fe-Mn system are from the assessment of Lee (B-J Lee, Metall. Trans. A 1993, 24(9), 1919-1933 "A thermodynamic evaluation of the Cr-Mn and Fe-Cr-Mn systems").

Cr-Fe-Mo

The data for the Cr-Fe-Mo system are from the assessment of Andersson and Lange (J-O Andersson, N Lange Report TRITA 0322 (1986), Metall Trans A, 1988, 19(6), 1385-1394 "An experimental study and a thermodynamic evaluation of the Fe-Cr-Mo system").

Cr-Fe-N

Data for the Cr-Fe-N system are from an assessment of Frisk (K Frisk, Report TRITA 0409 (1989), Report TRITA-MAC 422 (1990), Metall. Trans. A, 1990, 21(9), 2477-2488 "A thermodynamic evaluation of the Cr-Fe-N system").

Cr-Fe-Ni

Data for the Cr-Fe-Ni system are from an unpublished assessment of NPL and KTH. The liquid data have been modified by Lee (B-J Lee, CALPHAD 1993, 17(3), 251 "Revision of thermodynamic descriptions of the Fe-Cr And Fe-Ni liquid phases").

Cr-Fe-P

The data for the Cr-Fe-P system are taken from the assessment of Miettinen (J Miettinen, CALPHAD, 1999, , 23(1), 141-154 "Thermodynamic description of Cr-P and Fe-Cr-P systems at low phosphorus contents").

Cr-Fe-V

Data for the Cr-Fe-V system are from an assessment by Lee (B-J Lee, Report TRITA-MAC 474 (1991), Z. Metallkde., 1992, 83(5), 292-299 "A thermodynamic Evaluation of the Fe-Cr-V system").

Cr-Fe-W

Data for the Cr-Fe-W system are from an assessment by Gustafson (Gustafson P, Report TRITA-MAC 342, (1987), Metall. Trans. A, 1988, 19(10), 2531-2546 "An experimental study and a thermodynamic evaluation of the Cr-Fe-W system").

Cr-Mn-N

Data for the Cr-Mn-N system are from an assessment by Frisk (K Frisk, CALPHAD 1993, 17(3), 335-349 "A thermodynamic evaluation of the Cr-Mn-N system").

Cr-Mo-N

Data for the Cr-Mo-N system are taken from an assessment by Frisk (K Frisk, Report TRITA-MAC 393 (1989), CALPHAD, 1991, 15(1), 79-106; "A thermodynamic evaluation of the Cr-N, Fe-N, Mo-N and Cr-Mo-N systems").

Cr-Mo-Ni

Data for the Cr-Mo-Ni system have been taken from the assessment of Frisk (K Frisk, Report TRITA-MAC 429 (1990)).

Cr-Mo-W

Data for Cr-Mo-W system are taken from an assessment of Frisk and Gustafson (Frisk K, Gustafson P, Report TRITA-MAC 342, (1987), CALPHAD, 1988, 12(3), 247-254 "An assessment of the Cr-Mo-W system". Additional data were provided by Gustafson (P Gustafson, TRITA-MAC 354 (1987) "A thermodynamic investigation of the C-Cr-Fe-Mo-W system").

Cr-N-Ni

Data for the Cr-N-Ni system were assessed by Frisk (K Frisk, Report TRITA-MAC 422 (1990)).

Cr-N-Ti

Data for the Cr-N-Ti system were taken from an unpublished assessment by Gustafson (P Gustafson, Inst. Met. Res. (Sweden) (1990)).

Cr-N-V

Data for the Cr-N-V system were taken from an unpublished assessment by Gustafson (P Gustafson, Inst. Met. Res. (Sweden) (1990)).

Cr-N-W

Data for the Cr-N-W system were taken from an unpublished assessment by Gustafson (P Gustafson, Inst. Met. Res. (Sweden) (1990)).

Cr-Ni-Ta

Data for the Cr-Ni-Ta system have been assessed by Dupin and Ansara (N Dupin, I Ansara, Z Metallkunde 1996 87(7), 555-561 "Thermodynamic assessment of the Cr-Ni-Ta system").

Cr-Ni-W

Data for the Cr-Ni-W system were taken from the assessment of Gustafson (P Gustafson, Report TRITA-MAC 320 (1986), CALPHAD 1987, 12(3), 277-292 "A thermodynamic evaluation of the Cr-Ni-W system").

Cu-Fe-Ni

Data for the Cu-Fe-Ni system were taken from the assessment of Jansson (A Jansson, Report TRITA-MAC 340 (1987) "A thermodynamic evaluation of the Cu-Fe-Ni system").

Cu-Fe-P

Data for the Cu-Fe-P system are taken from the unpublished assessment of Gustafson (P Gustafson, Inst. Met. Res. (IM-2549, 1990)).

Dy-Fe-Tb

The data for Dy-Tb system are taken from the assessment of Landin and Agren (S Landin, J Agren, J. Alloys and Compounds 1994, 207/208, 449-453 "Thermodynamic assessment of Fe-Tb and Fe-Dy phase diagrams and prediction of Fe-Tb-Dy phase diagram").

Fe-Mn-N

The data for the Fe-Mn-N system are taken from the assessment of Caian Qiu (Caian Qiu, Report TRITA-MAC-0493, Metall. Trans A., 1993, 24(3), 629-645 "A thermodynamic evaluation of the Fe-Mn-N system").

Fe-Mn-Si

Data for the Fe-Mn-Si system are taken from the assessment of Forsberg and Agren (A Forsberg, J Agren, Report TRITA-MAC 483 (1992), J. Phase Equil., 1993, 14(3), 354-363 "Thermodynamic evaluation of the Fe-Mn-Si system and the Gamma/Epsilon martensitic transformation").

Fe-Mn-V

Data for the Fe-Mn-V system are taken from the assessment of Huang (W Huang, Report TRITA-MAC 441 (1990), CALPHAD, 1991, 15(2), 195-208 "A thermodynamic analysis of the Mn-V and Fe-Mn-V systems").

Fe-Mo-N

Data for the Fe-Mo-N system are taken from an assessment of Frisk (K Frisk, TRITA-MAC 433 (1990)).

Fe-Mo-Ni

Data for the Fe-Mo-Ni system are taken from an assessment of Frisk (K. Frisk, TRITA-MAC 428 (1990), Met. Trans. A, 1992, 23(2), 639-649 "An experimental and theoretical study of the phase equilibria in the Fe-Mo-Ni system").

Fe-Mo-P

Data for the Fe-Mo-P system are taken from the unpublished assessment of Gustafson (P Gustafson, Inst. Met. Res. (IM-2549, 1990)).

Fe-Mo-V

The source of the data for the Fe-Mo-V system is unknown.

Fe-Mo-W

Data for the Fe-Mo-W system are taken from an assessment of Gustafson (P Gustafson, TRITA-MAC 329 (1987), Z. Metallkde, 1988, 79(6), 388-396 "An experimental study and a thermodynamic evaluation of the Fe-Mo-W system").

Fe-N-Ni

Data for the Fe-N-Ni system are taken from an assessment of Frisk (K Frisk, Report TRITA-MAC 422 (1990), *Z. Metallkunde*, 1991, 82(1), 59-66 "A thermodynamic evaluation of the Fe-Ni-N system").

Fe-N-Ti

Data for the Fe-N-Ti system are taken from the assessment of Ohtani and Hillert (H Ohtani, M Hillert, *CALPHAD*, 1991, 15(1), 41-52 "A thermodynamic assessment of the Fe-N-Ti system").

Fe-N-V

Data for the Fe-N-V system are taken from the assessment of Ohtani and Hillert (H Ohtani, M Hillert, *CALPHAD*, 1991, 15(1), 25-39 "A thermodynamic assessment of the Fe-N-V system").

Fe-N-W

Data for the Fe-N-W system are taken from an unpublished assessment of Gustafson (P Gustafson, *Inst. Met. Res. (Sweden)* (1990)).

Fe-Ni-P

Data for the Fe-Ni-P system are taken from an unpublished assessment of Gustafson (P Gustafson, *Inst. Met. Res. (IM-2549)*, 1990).

Fe-Ni-W

Data for the Fe-Ni-W system are taken from an assessment of data by Fernandez Guillermet and Ostlund (A Fernandez Guillermet, L Ostlund, Report TRITA-MAC 258 (1985), *Met. Trans. A* 1986, 17(10), 1809-1823 "Experimental and theoretical study of the phase equilibria in the Fe-Ni-W system").

Fe-U-Zr

Data for the Fe-U-Zr system are from the assessment of Kurata et al (Kurata M, Ogata T, Nakamura K, Ogawa T, *J. Alloys Compd.*, 1998, 271-273, 636-640 "Thermodynamic assessment of the Fe-U, U-Zr and Fe-U-Zr systems").

Ga-In-Sb

The data for the Ga-In-Sb system are from the assessment of Janrong and Watson (Yang J, Watson A, *CALPHAD* 1994, 18(2), 165-175 "An assessment of

phase diagram and thermodynamic properties of the Gallium-Indium-Antimony system”).

Mo-Ni-W

No complete assessment carried out but data implied from unassessed parameter for the mu and sigma phases formed from linear combination of unary data.

Pb-Pd-Sn

The data for the Pb-Pd-Sn system are from the assessment of Ghosh (G Ghosh; Metall. Mater. Trans. A 1999, 30A, 5-18 “Thermodynamic modeling of the Palladium-Lead-Tin system”).

c) Quaternary Systems

C-Cr-Fe-Mn

The data for the C-Cr-Fe-Mn system are from the assessment of B-J Lee (B-J Lee, Rizzo H F, Massalski T B, Nastasi M, Metall. Trans. A; 1993, 24A, 1017-1025. “A Thermodynamic Evaluation of the Fe-Cr-Mn-C system”).

C-Cr-Fe-Mo

Data for the C-Cr-Fe-Mo system are from an assessment of Caian Qiu (Caian Qiu, Report TRITA-MAC-0482, Hillert M, Qiu C, J. Phase Equil., 1992, 13(5), 512-521 “A reassessment of the Fe-Cr-Mo-C system”).

C-Cr-Fe-V

Data for the C-Cr-Fe-V system are taken from the assessment of Lee and Lee (B-J Lee, D N Lee, J. Phase Equil. 1992, 13(4), 349-364. “A Thermodynamic evaluation of the Fe-Cr-V-C system”).

C-Fe-Mn-V

Data for the C-Fe-Mn-V system are from the assessment of Huang (W Huang Metall. Trans. A 1991, 22A, 1911-1920, “Thermodynamic properties of the Fe-Mn-V-C system”).

Cr-Fe-N-Ni

Data for the Cr-Fe-N-Ni system are taken from an assessment by Frisk (K Frisk, Thesis, Report TRITA-MAC-0422, Z. Metallkunde, 1991, 82(2), 108-117 "A thermodynamic evaluation of the Cr-Fe-Ni-N system").