



Database name: ThermoTech Al-based Alloys Database
Database acronym: TTAL6 **Database version:** 6.1
Database owner: ThermoTech
Database segment: Aluminum Based Alloys

Brief description

TTAL6 is a comprehensive database for Al-alloys that can be used for all major types of commercial Al-alloys ranging from pure Al to complex commercial alloys.

Applications

Al-based alloy design and engineering.

Included Elements

Al B C Ca Co Cr Cu Fe H La Mg Mn Ni Pb Sc Si Sn
 Sr Ti V Zn Zr

Included Phases

AL11RE3_ALPHA	AL3MG2	AL7CU2FE	BORON	MG2SI
AL13CO4	AL3NI	AL7CU4NI	CBCC_A12	MG2X_C1
AL13CR4SI4	AL3NI2	AL8FEMG3SI6	E_ALCRMGMN	MGZN2
AL20CU2MN3	AL3RE_DO19	AL8SIC7	FCC_A1	S_AL2CUMG
AL2CU	AL4C3	AL9M2	GAS	SIC
AL2SI2M	AL4M_D13	ALFESI_ALPHA	GRAPHITE	SILICON
AL3FE	AL4SIC4	ALFESI_BETA	HCP_A3	T_ALCUMGZN
AL3M_DO22	AL5CU2MG8SI6	ALPHA	LIQUID	
AL3M_DO23	AL6MN	BCC_A2	MB2_C32	
AL3M_L12	AL7CR	BCT_A5	MC	

Assessed Systems

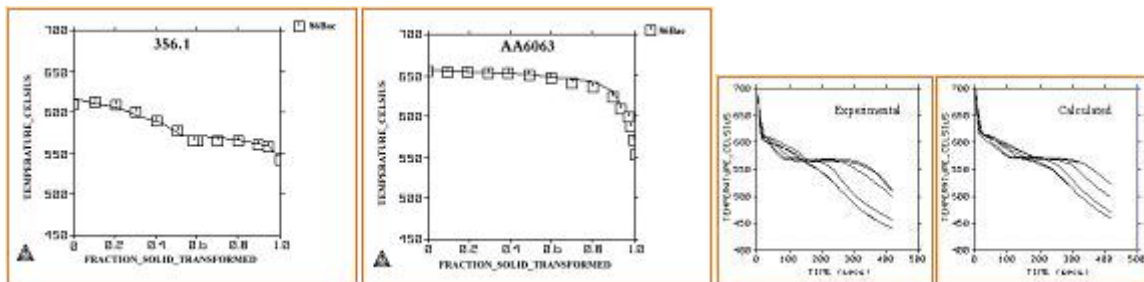
All phases have been critically assessed and treated by some appropriate thermodynamic models (e.g. the Sublattice Model for solid solutions and liquid mixture phases, the Ideal Gas Model for gas mixture phase, etc), which are applicable over a wide temperature-pressure-composition range.

Validation

The TTAL6 database successfully predicts precipitation hardening reactions and provides excellent results for solution phase treatment temperatures and the formation of the "insoluble" compounds formed as part of the solidification process.

One of the striking successes of the database concerns prediction of the non-equilibrium solidification behaviour of Al-alloys. Excellent agreements between the calculated results (fs vs T) and experimental data from for instance Backerud et al. (1986) can be obtained using the SCHEIL module in the TCC and TCW software. The simulation also allows properties like heat evolution and the segregation patterns to be successfully predicted.

The phases predicted to form during the solidification process are well matched (as illustrated below). It is clear that the database provides very accurate predictions for the solidification behaviour of Al-alloys in conditions that are well away from those associated with equilibrium. This provides a stringent test of the capabilities of the TTAL6 database that it passes remarkably well.

**Scientific Models & References**

See the Thermo-Calc Software reference list available at:

http://www.thermocalc.com/DOWNLOAD_AREA/References.html