

Product Description:

The addition of compressed powder additive to aluminium for alloying purpose is well established. Rapid and consistent alloying is the critical parameter to maximize the efficiency of aluminium cast house operations. Therefore, the use of compacted powder has been favorably adopted by aluminium cast house, due to its speed of dissolution and reproducible recovery for both bulk and trim alloying addition. Each tablet contain a precise weight of high purity alloying element, Iron and balance being sodium free non-hygroscopic fluxes to accelerate dissolution and recovery.

Chemical composition:

Tab. Grade	Chemical Composition (%)	
	Fe	Flux
Fe 80%	79 - 81	Balance

Shape and Size:

Forms	Std. Size (mm)	Std. Weight (Kg)
Cylindrical Tablet	Dia: 90, Height – 40 ± 5	1- 1.33

Physical properties & Dissolution characteristics:

Alloy Grade	Density (gm/cc)	Complete break time (in minutes) inside melt at 720 – 750°C	Complete dissolution time (in min.)	Recovery (% in ≥ 30 minute with stirring)
Fe 80%	4.0 – 5.0	4 – 5 minutes	~ 20	> 90%

Mechanism of Dissolution:

When Iron tablet is added into the Al melt at 720 - 750°C, the tablet takes around 15 second to be fully wetted. Once wetting has occurred, tablet quickly breaks apart, as a thick layers of irregular shaped intermetallic form around the iron particles with eutectic beyond.

After five minutes, a second angular metallic is found, in addition to the irregular shape, as shown in figure 1 this appears to be quit thin, with increasing time volume of intermetallic increases, causes pressure increase and which forces some of the intermetallic out into the melt, thus slowly Fe get dissolved into the melt.

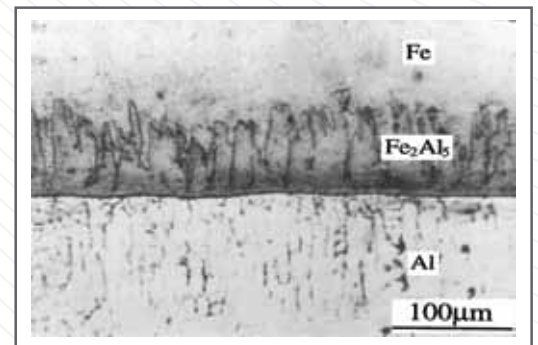


Fig. 1

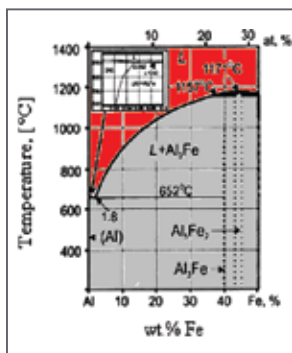


Fig. 2 Al-rich end of the equilibrium Al-Fe Phase diagram

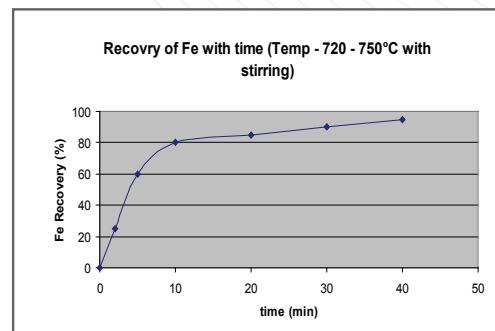


Fig. 3 showing the recovery % of Fe vs. Time in 1TN Al furnace with target Fe - 0.8%.

Recovery of Iron Tablet

The recovery of iron tablet in molten aluminum bath depends on various factors as on - Iron Tablet itself (nature of binder, Fe % in tablets and Fe oxidation level), Furnace temp, required Fe alloying level, type of stir, time of stir, removal of surface dross before addition, even tablet distribution in furnace. The fig.3 showing the Minex Fe Tablet recovery in 1TON molten Aluminum bath at temp 750°C with a stirring bath condition. The recovery of the iron is found above 90% in 30 minutes. The flux containing iron tablet will dissolve quicker than flux-free tablets. The presence of flux enhances the Fe recovery just after the addition may be due the following reason.

1. The low melting point flux 560°C brings about a rapid dispersion of the metal particles. This good dispersion then allows rapid dissolution due to the large surface exposed.
2. The sodium-free, non-hygroscopic flux removes any surface oxide films from the metal particles to allow fast dissolution.

Addition technique:

The following guide to the efficient use of Iron Tablet for alloy additions in Aluminum casthouses.

Wait until the Aluminum bath has reached a holding temp of approx. 720° to 750°C. Dissolution will be slower at lower temp. For better performance addition of Iron Tablets can be made as follows:

1. Move any dross which has build up on the surface of the melt to the sides of the furnace. This will allow the tablets to sink quickly under aluminum melt.
2. Add the tablets at different points around the furnace to ensure an even distribution. Hold the bath for at least half an hour to ensure complete dissolution and recovery of iron tablet.
3. Once the Iron Tablet has dissolved, stir the furnace thoroughly, preferably from bottom of the bath to the top. This will ensure maximum recovery and homogenous composition.
4. Both temp and composition can be checked before casting begins

Application:

Iron tablet is added to improve the high temperature strength of Aluminum alloys. The solid solubility of Iron in Aluminum is very low (~ 0.4%). Therefore most of iron present in Aluminum appears as an intermetallic second phase Al in combination with Aluminum (as given in fig.2 Al-Fe phase diagram) and often other elements. Because of its limited solubility it is used in electrical conductors in which it provides a slight increase in strength and better creep characteristics at moderate application temperatures.

Iron reduces the grain size in wrought products alloy of Iron & Manganese near the ternary eutectic content can have a useful combination of strength and ductility at room temp. and retain strength at elevated temperatures. The properties are due to the fine grain size i.e. stabilized by the finely dispersed Iron rich second phase. Iron is added to Al-Cu-Ni group of alloys to increase the strength at elevated temperature.

Packing:

Tablet wrapped with Al foil or plastic shrink and packed in corrugated box. Each box contains 25Kg material. Packing can also be changed as per customer requirement.

Storage:

Use dry place to store the material preferably inside the cover.

Safety:

Material Safety Data Sheet can be supplied on demand. Material is not hazardous but normal safety precautions to be followed.