

Synthetic EXothermics

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Reducing Metal Loss Through Fluxing

In the following brief, a few "givens" are observed. The first of which is that the typical amount of untreated dross of any amount of melted ingot, with or without in-plant returns, is approximately 3%. The second given is that untreated dross is usually composed of 80% aluminum and 20% aluminum oxide.

Using these givens, we will examine what happens in a foundry or die casting plant when they flux metal. We examine melting 1,000,000 lbs. of primary aluminum ingot and 400,000 lbs. of in-plant returns. The goal is to reduce melt loss and to recover as much metal as possible from the dross. If these 1,400,000 lbs. of metal are melted in an efficiently operating gas reverberatory furnace, then the amount of untreated dross, equaling 3% of the total metal, will be equal to 42,000 lbs.

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| 1,000,000 pounds of primary aluminum ingot |
| + 400,000 pounds of in-plant returns |
| 1,400,000 total pounds melted |
| \times 3% dross multiplier |
| 42,000 pounds of raw, untreated dross |

All aluminum alloys are easily oxidized with normal melting and holding methods. This oxidation process forms Al_2O_3 as part of the metal is changed during normal melting operations. This oxide gathers and traps metallic droplets of aluminum and forms what is commonly know as dross. Smaller amounts of other nonmetallics are also present in the dross. Typical untreated dross contains 80% aluminum and 20% aluminum oxide. A great deal of metal is lost in the dross skimming process. Recovery of this metal is necessary for maintaining high profitability. By treating dross with a good, quality exothermic flux in an aluminum furnace, aluminum will be released from the dross. By fluxing metal correctly, metal content of the dross can be lowered to 35%.

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|-------------------------|--------------------|---------------------------------------|-------------|
| <i>Untreated dross:</i> | 33,600 lbs. | (80% Al) | Aluminum |
| | <u>+8,400 lbs.</u> | (20% Al ₂ O ₂) | Oxides |
| | 42,000 lbs. | | Total Dross |

| | | | |
|------------------------------|--------------------|---------------------------------------|----------------------------------|
| <i>After Flux treatment:</i> | 4,523 lbs. | (35% Al) | Aluminum |
| | <u>+8,400 lbs.</u> | (65% Al ₂ O ₃) | Oxides (stays the same as above) |
| | 12,923 lbs. | | Treated dross |

Recovered Aluminum 29,077 lbs.

Dross treated with flux alone; $33,600 - 4,523 = 29,077$ pounds of aluminum can be saved. Costing \$0.78 per pound aluminum value, a **\$21,816.00** savings per 1,000,000 pounds of ingot charged can be realized. With these kind of savings, obviously fluxing metal is imperative.

The actual price you pay for metal can modify these figures. The method of calculation remains the same. Any incurred additional cost, such as the price of the flux or additional labor must be subtracted from the above savings.

The type of flux needed depends on what must be done with the metal. Many organizations are compelled by local or state regulations to maintain a very low smoke level during foundry operations. Because of this, it is necessary to use a flux that has a good exothermic action while emitting a low level of smoke and fumes. **Synex, Inc.**, America's premier high tech premium flux manufacturer, has several types of low smoke and no smoke fluxes for different metals. **Synex, Inc.**'s product line spans many types of metals and their alloys, with the latest chemical formulas designed to give the best results in the industry with minimal disturbance to the environment.

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