

Guidelines for Handling Aluminum Fines Generated During Various Aluminum Fabricating Operations

The Aluminum Association
Incorporated



F-1

**Guidelines for Handling Aluminum Fines Generated
During Various Aluminum Fabricating Operations**



Documents
Document Sharing Hub

The opinions and recommendations in this publication are based on information believed to be reliable and are offered in good faith but without guarantee. The precise causes of dust explosions, and the conditions under which the problems may arise, are not fully known. The operational conditions which exist in individual plants and facilities vary widely, and thus no definitive standards exist for dust collection and disposal. Accordingly, The Aluminum Association and its member companies assume no responsibility or liability for the completeness of the data or the general applicability of the opinions and recommendations herein, which are based on state-of-art knowledge but may not be appropriate in all situations. Users of this publication should adapt the recommendations herein, as appropriate, to the precise conditions of the individual facility and should always exercise independent discretion in establishing plant or facility operating procedures. No warranty, express or implied, is made of this information by The Aluminum Association or by any of its member companies.

SCOPE

This brochure discusses the potential problems involved in various aspects of aluminum fabricating which generate fine aluminum particles. It also discusses methods of particle collection and handling designed to reduce the risk of fire or explosion. The information is similar, in general, to that presented in NFPA 65, "Standard for Processing and Finishing of Aluminum." However, it is not written to displace any aspect of the Standard, but rather to support and perhaps supplement it. In addition, it is not meant to cover aluminum powder and paste products. These are discussed in The Aluminum Association brochure No. TR-2, "Recommendations for Storage and Handling of Aluminum Powders and Paste."

INTRODUCTION

The fines and how they are generated

During fabricating operations aluminum fines may be generated by such activities as grinding, sawing, cutting, sanding or scratch brushing and at least some of them will be fine enough to be potentially explosible. The term "dust" or "powder" is frequently used to describe such particles. It is difficult to be specific about dimensions, but if all the particles are *larger* than 500 microns, an explosion will probably not be sustained. It is more likely, however, that a mixture of coarser and finer material will be generated, and if at least 15% to 20% of the mixture is finer than 44 microns (325 mesh), then it has the potential for explosion.

Finer particles burn readily when their ignition point is reached, and tend to ignite the coarser particles as well. In the case of aluminum, an explosion can result if ignition occurs while the particles are suspended in air as a dust cloud, since the burning extends from one particle to another with extreme speed.

Examples of potential sources of ignition are open flames, welding equipment and cutting torches, matches and cigarettes, faulty electrical equipment and static electrical discharges. Such conditions must be avoided in areas where dust producing operations are carried out.

Measuring the hazard and how it may change

The degree of hazard involved in any given operation can be determined by laboratory explosibility testing conducted by qualified personnel. The U.S. Bureau of Mines in Pittsburgh can advise the location of proper testing facilities. Later, if any changes are made in the process which generates the fines, fresh samples should always be submitted for re-determination of the minimum explosive concentration and ignition energy. Changes in speed, alloy, lubricant or abrasive used may cause finer particles to develop and thus increase the potential hazard.

General criteria for an aluminum dust explosion

Several conditions must be met before a dust explosion can take place:

1. The dust has to be combustible.
2. It must be suspended in air.
3. It must be fine enough to propagate flame.

