Guidelines for Aluminum Scrap Receiving and Inspection Based on Safety and Health Considerations

Fourth Edition

The Aluminum Association



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GUIDELINES FOR ALUMINUM SCRAP RECEIVING AND INSPECTION BASED ON SAFETY AND HEALTH CONSIDERATIONS
Fourth Edition

The original *Guidelines* were developed by the Aluminum Association's Task Force on Scrap Charging with review and comment by the Institute of Scrap Recycling Industries (ISRI), now known as the Recycled Materials Association (ReMA).

The *Guidelines* are based on information believed to be reliable and are offered in good faith but without any guarantee. The conditions which exist in individual plants vary widely, and thus no uniformly applicable standards exist for handling scrap aluminum. Accordingly, the Aluminum Association and its member companies assume no responsibility or liability for the general applicability of the guidelines and recommendations herein, which though based on state-of-the-art knowledge may not be appropriate in all situations. Users of these *Guidelines* 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 practices.

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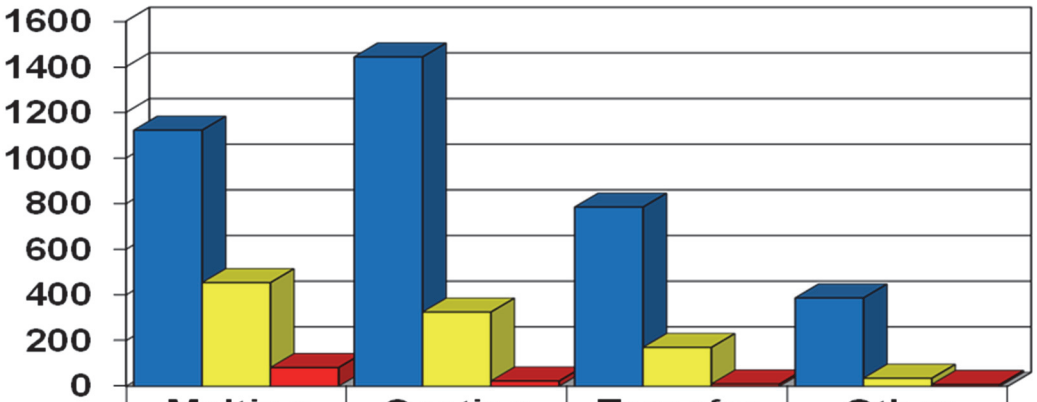
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I. INTRODUCTION

A. Purpose

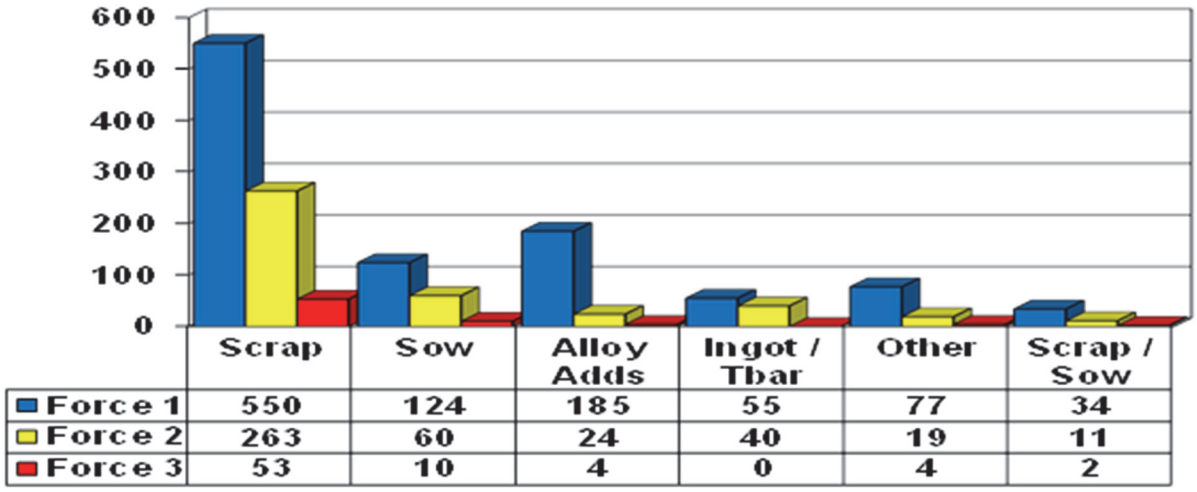
These Guidelines have been created to assist aluminum scrap remelting facilities in reducing accidents and injuries related to moisture and contamination in scrap. The document also aims to encourage cooperation among scrap suppliers, transporters, and processors to help prevent these incidents.

Explosions—up to Force 3—have resulted from contamination like fertilizer and water entering furnaces, causing injuries, fatalities, and plant damage. The following charts, figures 1 and 2, show Aluminum Association data (1980–2024) on explosion incidents during melting, highlighting that most severe explosions occur while charging scrap. The explosion severity rating is shown in Figure 3.



	Melting	Casting	Transfer	Other
Force 1	1122	1443	785	387
Force 2	454	325	170	35
Force 3	82	23	10	8

Figure 1. Number and force level of molten metal explosions by operation (1980-2024)



	Scrap	Sow	Alloy Adds	Ingot / Tbar	Other	Scrap / Sow
Force 1	550	124	185	55	77	34
Force 2	263	60	24	40	19	11
Force 3	53	10	4	0	4	2

Figure 2. Number and force level of molten metal explosions by charge material (1980-2024)



Guidelines	Force 1	Force 2	Force 3
Property Damage	None	Minor	Considerable
Light	Minimal	Flash	Intense
Sound	Short cracking	Loud Report	Painful
Vibration	Short and sharp	Brief rolling	Massive structural
Metal Dispersion	<15 feet	>15 to 50 feet	>50 feet

Figure 3: Explosion Characterization and force Rating Criteria

The Aluminum Association recognizes that different scrap processors may have different facilities, equipment, and procedures and may, therefore, adopt a variety of safety practices appropriate to their individual circumstances.

In presenting these *Guidelines*, the Aluminum Association does not suggest or intend that all aluminum scrap melting facilities adopt and follow them completely and without deviation. Some plants may find some of these *Guidelines* inapplicable to their operations; others may adopt alternative or different safety practices not mentioned here in response to

their individual circumstances. These *Guidelines* are entirely safety-related and are not intended to provide commercial advice or guidance of any kind.

The *Guidelines*, then, offer information and suggestions derived from general industry experience for the consideration of individual plants in designing and operating their own scrap-remelting safety programs.

All melting facilities and other scrap-handling personnel are expected to follow the safety- and health-related procedures established by their own plant management. These *Guidelines* are not intended to pre-empt or replace those procedures.

B. Scope

Solid bulk aluminum is a safe, noncombustible metal, but molten aluminum and aluminum powder can be highly reactive, capable of releasing large amounts of energy in chemical reactions.

Some of the most common and severe hazards associated with scrap are water, nitrates (ammonium nitrate for example), and other oxidizers. If these hazards are charged into a furnace that already holds molten aluminum, they can cause catastrophic explosions.

Other hazards of concern include:

- **Heavily oxidized metals**, which can trigger a dangerous thermite reaction when in contact with molten aluminum
- **Flammable materials**, which may ignite
- **Radioactive substances, PCBs, hypodermic needles, and other toxic materials**, which pose serious health risks to both scrapyard and remelting plant workers
- **Aluminum fines**, which can explode when dispersed in air and exposed to an ignition source
- **Live ammunition, which** has been found in aluminum scrap, can explode

General safety practices are discussed in the Aluminum Association's *Guidelines for Handling Molten Aluminum, Fourth Edition*, but hazards of the sort described above must be addressed before aluminum scrap reaches the remelting furnace.

Consequently, the following guidelines deal with practices intended to keep water and other contaminants out of aluminum scrap destined for remelting; to discover water and contaminants in incoming aluminum scrap; to safely address water and contaminants from incoming scrap when possible; and to reject unacceptably contaminated scrap.

C. Overview

Sections II through VII cover the full chain of major processes related to the safe processing