for Equipment Technology and Operations for Wastes and Recyclable Materials — Baling Equipment — Safety Requirements
American National Standard
for Equipment Technology and Operations
for Wastes and Recyclable Materials —

Baling Equipment —
Safety Requirements

Secretariat
Environmental Industry Associations

Approved February 27, 2008
American National Standards Institute, Inc.
American National Standard

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute, 25 W. 42nd Street, New York, New York, 10036, Phone: 212-642-4900, Fax: 212-398-0023.

Published by

Waste Equipment Technology Association
(Part of Environmental Industry Associations)
4301 Connecticut Ave., N. W., Washington, D.C. 20008

Copyright © 2008 by the Environmental Industry Associations
All rights reserved

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior permission of the publisher.

Printed in the United States of America
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword (informative)</td>
<td>iv</td>
</tr>
<tr>
<td>0 Introduction (informative)</td>
<td>1</td>
</tr>
<tr>
<td>1 Scope</td>
<td>2</td>
</tr>
<tr>
<td>2 Normative references</td>
<td>2</td>
</tr>
<tr>
<td>3 Definitions</td>
<td>2</td>
</tr>
<tr>
<td>4 Construction</td>
<td></td>
</tr>
<tr>
<td>4.1 General</td>
<td>15</td>
</tr>
<tr>
<td>4.2 Component requirements</td>
<td>15</td>
</tr>
<tr>
<td>4.3 Construction requirements, tests and evaluation criteria</td>
<td>16</td>
</tr>
<tr>
<td>5 Safeguards and features</td>
<td></td>
</tr>
<tr>
<td>5.1 Access covers</td>
<td>18</td>
</tr>
<tr>
<td>5.2 Service openings</td>
<td>18</td>
</tr>
<tr>
<td>5.3 Controls</td>
<td>18</td>
</tr>
<tr>
<td>5.4 Operating switches and sensors</td>
<td>18</td>
</tr>
<tr>
<td>5.5 Security switch</td>
<td>18</td>
</tr>
<tr>
<td>5.6 Emergency controls</td>
<td>19</td>
</tr>
<tr>
<td>5.7 Interlocks</td>
<td>19</td>
</tr>
<tr>
<td>5.8 Guarding</td>
<td>19</td>
</tr>
<tr>
<td>5.9 Container/cart lifting systems</td>
<td>20</td>
</tr>
<tr>
<td>5.10 Start-up alarms</td>
<td>21</td>
</tr>
<tr>
<td>5.11 Vertical downstroke balers – additional safety features</td>
<td>23</td>
</tr>
<tr>
<td>5.12 Vertical upstroke balers – additional safety features</td>
<td>23</td>
</tr>
<tr>
<td>5.13 Horizontal balers – additional safety features</td>
<td>24</td>
</tr>
<tr>
<td>6 Markings</td>
<td></td>
</tr>
<tr>
<td>6.1 General</td>
<td>24</td>
</tr>
<tr>
<td>6.2 Marking of permanently connected equipment</td>
<td>25</td>
</tr>
<tr>
<td>6.3 Marking of cord connected equipment</td>
<td>26</td>
</tr>
<tr>
<td>6.4 Marking of components</td>
<td>26</td>
</tr>
<tr>
<td>6.5 Caution, warning and danger markings</td>
<td>27</td>
</tr>
<tr>
<td>6.6 Permanence of markings</td>
<td>28</td>
</tr>
<tr>
<td>7 Instructions</td>
<td></td>
</tr>
<tr>
<td>7.1 General</td>
<td>29</td>
</tr>
<tr>
<td>7.2 Installation and operating instructions</td>
<td>29</td>
</tr>
<tr>
<td>Annexes</td>
<td></td>
</tr>
<tr>
<td>A Bibliography (informative)</td>
<td>31</td>
</tr>
<tr>
<td>A.1 American National Standards</td>
<td>31</td>
</tr>
<tr>
<td>A.2 U.S. Government Health &amp; Safety Regulations</td>
<td>31</td>
</tr>
<tr>
<td>A.3 Standards for components</td>
<td>31</td>
</tr>
</tbody>
</table>
Figures

1  Vertical downstroke baler ................................................................. 9
2  Vertical upstroke baler (chain driven) .................................................. 10
3  Horizontal extrusion baler ............................................................... 11
4  Horizontal closed-chamber baler ....................................................... 11
5  Two-stage vertical/horizontal (continuous) extrusion baler ................. 12
6  Two-stage horizontal baler (two compression strokes) ..................... 13
7  Two-ram horizontal baler with single-compression cylinder ............. 14
8  Guard or loading hopper – minimum loading height for baler ........... 20

C1  Articulate probe with web stop ....................................................... 39
C2  Probe for moving parts and uninsulated live parts .......................... 40
C3  Probe for film-coated wire .............................................................. 40
C4  Grounding symbol ........................................................................ 47

D1  Typical leakage-current measurement criteria ................................ 55
D2  Measurement instrument for reaction (leakage) current .................. 56

Tables

1  Mechanical construction requirements and performance evaluation criteria .................. 16
2  Electrical construction requirements and performance evaluation criteria ............... 17
3  Outlet-box marking .......................................................................... 26

C1  Minimum required distance from an opening to a part that involves a risk of electric shock .... 38
C2  Acceptable flexible cords ............................................................... 41
C3  Rating of heating element ............................................................. 47
C4  Maximum rating or setting of overload protective device .................. 49
C5  Spacings at other than field wiring terminals ................................ 50
C6  Spacings at wiring terminals ........................................................ 51

D1  Maximum temperature rises ......................................................... 58
D2  Maximum surface temperatures ................................................... 60

E1  Production line test conditions ...................................................... 63
FOREWORD (This foreword is not part of American National Standard Z245.51 -2008)

This American National Standard is applicable to the safety requirements for the design and construction of commercial baling equipment commonly used in recycling, solid waste disposal and raw materials handling. A companion standard, ANSI Z245.5 –2008 establishes safety requirements for the installation, maintenance and operation of commercial baling equipment. Both these standards taken together revise and replace ANSI Z245.5-1997.

The effective date of this standard shall be 12 months after the approval date of this standard by the American National Standards Institute, Inc. For all baling equipment manufactured prior to 12 months after the approval date of this standard, please refer to the previous editions of the ANSI Z245.5 standard.

Inquiries, requests for interpretation and suggestions for the improvement of this standard should be directed to the Secretary, Accredited Standards Committee Z245, c/o Environmental Industry Associations, 4301 Connecticut Ave., NW, Suite 300, Washington, D.C. 20008.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee Z245 on Equipment, Technology and Operations for Wastes and Recyclable Materials. Committee approval of this standard does not necessarily imply that all members of the committee voted for its approval. At the time it approved this standard, the Z245 Committee had the following members:

Gary Satterfield, Chairman

Lou Guilmette
Karon Simoni (Alternate)
Carl Hursh
Gary Satterfield
John Gilsstrap
Brent Dieleman
Paul Moore
Ralph A. Ford
Michael L. Knaub
Jerald G. Zanzig
Denny Gill
Thomas Stevens
Denny Pool
Steven M. Wienkes
David E. Malter
W.A. Martin
Susan Eppes
Gerald Van Beek
Jeffrey D. Kaplan
Mark Johnson (Alternate)
Garry Mosier, CSP
Mike Schwalbach
Dave Carlisle

City of Rochester
City of Rochester
Commonwealth of Pennsylvania (DEP)
Waste Equipment Technology Association
Institute of Scrap Recycling Industries, Inc.
Solid Waste Association of North America
NIOSH
Waste Industries
Schaefer Systems International, Inc.
Zantec, Inc.
Ameri-Kan
Wolverine Recycling Services, Inc.
SP Industries, Inc.
Environmental Equipment Solutions
Malter Associates, Inc.
Waste Management, Inc.
EST Solutions, Inc.
SACOM Safety Communications
City of Corpus Christi
Allied Waste Industries, Inc.
Allied Waste Industries, Inc.
Rehrig Pacific Company
City of Tacoma
Accredited Standards Committee Z245 Subcommittee 5 on Baler Safety, which provided the draft of this standard to the Z245 Committee, had the following members:

Kent Spiers, Chairman

Michelle Andersen  
Arthur Barham  
Don Barnes  
Steve Chytry  
Bruce Clark  
Ted Claunch  
Ed Correale  
Steve David  
Dan Dominguez  
Susan Eppes  
John Etherton  
Gary Fleming  
Ralph Ford  
Bill Geise  
Shannon Harrop  
Henry Jobe  
Mark Johnson  

Kim Kawasaki  
Gene Kesler  
Gus Koufonikos  
William T. Lowther  
W. A. Martin  
Will Moss  
Gerald Peters  
Harvey Podolsky  
Denny Pool  
Robert Riethmiller  
Jim Roseberry  
Gary Satterfield  
Michael Savage  
Joe Szany  
Jerry Van Beek  
Sidney Wildes
American National Standard for Equipment Technology and Operations for Wastes and Recyclable Materials —

Baling Equipment — Safety Requirements

0 Introduction

This standard was developed by American National Standards Institute Accredited Standards Committee Z245 Subcommittee 5 on Balers and approved by Accredited Standards Committee Z245. Certain portions of this material have been reproduced, with permission, from Underwriters Laboratories Inc. (UL) draft standard 1237, Commercial and Industrial Waste Compactors and Balers. The effort and support of UL and the 1237 Standards Technical Panel are gratefully acknowledged.

This standard revises the baler safety requirements found in ANSI Z245.5-1997. The complementary safety requirements for users/operators, installers and maintenance/repair individuals can be found in ANSI Z245.5-2008.

The requirements contained in this standard pertain to new balers as produced by the manufacturer. New requirements and revisions are not intended to be retroactive for balers manufactured to comply with earlier revisions of this standard. Refer to the approved edition of ANSI Z245.5 in effect at the time of manufacture for those requirements.

The requirements contained in this standard are not intended to apply to other components of end-use applications where a stationary baler is part of a designed compacting system.

A baler that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and involves a risk of fire, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements to determine that the level of safety as originally anticipated by the intent of this standard is maintained.

A baler whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard shall not be judged to comply with this standard. Where appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

Exceptions and notes contained in the standard apply to the clause or sub-clause in which they are contained or to which they reference. Exceptions pertain to normative requirements. Notes are informative and provide guidance for the evaluation of a normative requirement.

The units of distance measurement used in this standard are in the inch-pound system. When a value for measurement is followed by a value in other units in parentheses, the second value is only approximate. The first value is the requirement.
1 Scope

1.1 This standard establishes requirements to minimize the risk of fire, electrical shock and injury to persons during operation and maintenance of baling equipment for use with wastes and recyclable materials by commercial businesses, apartment buildings, industrial plants, waste processing facilities, waste disposal and transfer industries, and recycling facilities.

1.2 The requirements of this standard apply to balers rated at 600 volts or less, for outdoor or indoor use, and are employed in accordance with the manufacturer's installation, operation, and maintenance instructions and procedures.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

UL 20-1996, Safety Standard for General-Use Snap Switches
UL 50-1995, Cabinets and Boxes
UL 429-1999, Electrically Operated Valves
UL 746C-1995, Polymeric Materials - Use in Electrical Equipment Evaluations
UL 842-1999, Valves for Flammable Liquids
UL 969-1997, Marking and Labeling Systems
UL 1004-1994, Electric Motors
UL 1030-1994, Sheathed Heating Elements
UL 2111-1997, Safety Standard for Overheating Protection for Motors

3 Definitions

For the purposes of this American National Standard, the definitions below apply to terms used throughout this standard, unless the context clearly indicates otherwise.

3.1 access cover or door: A panel covering an opening that is designed to permit access to the interior of the baler.

3.2 access gate: A moveable barrier/guard that swings on hinges or moves in/on a track and is distinguished from a door by having openwork.

3.3 affected employee: An employee whose job functions place them in proximity to potential hazards related to work being performed by authorized employees.

3.4 authorized employee: A person who, on the basis of their specific experience and training, is permitted to perform certain designated duties.

3.5 automatic bale tying device: A device which installs wires or bands around a bale to maintain the bale's compressed state.

3.6 automatic start/cycling control: A control that uses an automatic actuator or sensor to initiate the operation of the baler on demand, when refuse is loaded into the loading chamber.