AS 3774—1990

Australian Standard®

Loads on bulk solids containers

STANDARDS AUSTRALIA

This Australian Standard was prepared by Committee BD/65, Loads on Bulk Solids Containers. It was approved on behalf of the Council of Standards Australia on 9 February 1990 and published on 13 August 1990.

The following interests are represented on Committee BD/65:

Association of Consulting Engineers, Australia
Bureau of Steel Manufacturers of Australia
CSIRO, Division of Building, Construction and Engineering
Institution of Engineers Australia
Railways of Australia Committee
State Electricty Commission of Victoria
University of Melbourne
University of Sydney
University of Wollongong

This Standard was issued in draft form for comment as DR 89138.

AS 3774—1990

Australian Standard®

Loads on bulk solids containers

First published as AS 3774—1990.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY NSW
ISBN 0 7262 6159 9

PREFACE

This Standard was prepared by the Standards Australia committee on Loads on Bulk Solids Containers.

This Standard is based on *Guidelines for the assessment of loads on bulk solids containers*, (first edition, 1986) prepared by a working party on bins and silos of National Committee of Structural Engineering, The Institution of Engineers Australia.

AS 3774—1990

Australian Standard®

Loads on bulk solids containers

First published as AS 3774—1990.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY NSW
ISBN 0 7262 6159 9

PREFACE

This Standard was prepared by the Standards Australia committee on Loads on Bulk Solids Containers.

This Standard is based on *Guidelines for the assessment of loads on bulk solids containers*, (first edition, 1986) prepared by a working party on bins and silos of National Committee of Structural Engineering, The Institution of Engineers Australia.

CONTENTS

Page

STANDARDS AUSTRALIA

Australian Standard
Loads on bulk solids containers

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE. This Standard specifies requirements for the determination of loads for the design of containment structures, including bins, silos, bunkers, and dump hoppers, for the mass storage of granular bulk solids.

This Standard does not apply to containers for the storage of silage.

NOTE: A typical bulk solids container specification data sheet is shown in Appendix A.

1.2 REFERENCED DOCUMENTS. The following documents are referred to in this Standard:

AS
1170 SAA Loading Code
1170.1 Part 1: Dead and live loads and load combinations
1170.2 Part 2: Wind loads
1657 SAA Code for Fixed Platforms, Walkways, Stairways, and Ladders
2121 SAA Earthquake Code

1.3 DEFINITIONS. For the purpose of this Standard, the definitions below apply.

1.3.1 Angle of repose—the angle between the surface of a piled-up bulk solid and the horizontal plane.

1.3.2 Axisymmetric flow—a flow pattern formed during the discharge from a container of a bulk solid and characterized by particle trajectories that are symmetrical about the vertical axis of the container.

1.3.3 Bulk solids container—a generic name for all types of structures for containment of granular bulk solids, generally equipped with discharge outlets and capable of being emptied by gravity or by mechanical or pneumatic means.

1.3.4 Upper characteristic value—a value chosen to correspond to a 95% probability of not being exceeded during the intended life of the structure or the permanency of the design.

1.3.5 Lower characteristic value—a value chosen to correspond to a 5% probability of not being exceeded during the intended life of the structure or the permanency of the design.

1.3.6 Coefficient of wall friction—the ratio of the frictional traction to lateral wall pressure at any point on the container wall.

1.3.7 Coefficient of variation—the standard deviation expressed as a percentage of the mean value.

1.3.8 Cone—a conical hopper.

1.3.9 Cylinder—the vertical part of a circular container.

1.3.10 Dead zone—a zone of material that cannot be discharged by gravity.

1.3.11 Eccentric flow—a flow pattern in which the vertical centreline of the flow channel does not coincide with the vertical centreline of the container.

1.3.12 Effective angle of internal friction—angle between the abscissa and the tangent of the curve representing the relationship of shearing resistance to normal stress acting within a soil.

1.3.13 Effective transition—a point of intersection between the primary flow zone and the wall of a funnel flow container.

1.3.14 Expanded flow—a flow pattern combining mass flow within the hopper with funnel flow in the portion of the container above the hopper.

1.3.15 Flow factor—a parameter which depends on the ratio of the strength to the consolidation pressure in a bulk solid.

1.3.16 Flow load—the load induced by the flow of a bulk solid during discharge.

1.3.17 Funnel flow—a flow pattern in which the primary flow zone meets the container wall below the free surface (see Figure 2.2).

1.3.18 Hopper—the converging part of the container, ending in a discharge outlet. A hopper may be conical, pyramidal, wedge, chisel, or transitional in shape.