

Australian Standard™

Coal preparation

Part 4: Flowsheets and symbols

This Australian Standard was prepared by Committee MN/1, Coal and Coke. It was approved on behalf of the Council of Standards Australia on 4 September 1998 and published on 5 January 1999.

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Australasian Institute of Mining and Metallurgy
Australian Coal Association
Australian Coal Preparation Society
Australian Institute of Energy
Bureau of Steel Manufacturers of Australia
Coalfield Geology Council of New South Wales
CSIRO, Division of Energy Technology
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This Standard was issued in draft form for comment as DR 97400.

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 4156.4—1999

Coal preparation

Part 4: Flowsheets and symbols

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NOTES

AS 4156.4—1999

Australian Standard™

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Originated as AS 1414—1973.
Previous edition AS 1414—1990.
Revised and redesignated as AS 4156.4—1999.

Published by Standards Australia
(Standards Association of Australia)
1 The Crescent, Homebush, NSW 2140

ISBN 0 7037 2227 X
 **Documents**
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PREFACE

This Standard was prepared by the Standards Australia Committee MN/1, Coal and Coke to supersede AS 1414—1990, *Flowsheets and symbols relating to coal preparation plant*. Its purpose is to provide principles relating to the preparation of flowsheets for coal preparation plant. In the preparation of this Standard cognizance was taken of ISO 924:1989, *Coal preparation plant—Principles and conventions for flowsheets* and ISO 561:1989, *Coal preparation plant—Graphical symbols*. Minor modifications have been made to ISO conventions to conform with established Australian practice.

The objective of this revision is to delete unused symbols, revise some symbols and provide symbols for equipment that has come into use since the previous edition.

The term ‘informative’ has been used in this Standard to define the application of the Appendices to which it applies. An informative appendix is for guidance and information only.

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STANDARDS AUSTRALIA

Australian Standard

Coal preparation

Part 4: Flowsheets and symbols

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard sets out recommended principles and drawing conventions for flowsheets and symbols relating to coal preparation plant.

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

AS

2418 Coal and coke—Glossary of terms

ISO

561 Coal preparation plant—Graphical symbols

1.3 DEFINITIONS For the purpose of the Standard, the definitions in AS 2418 and those below apply.

1.3.1 Coal preparation—collectively, physical and mechanical processes applied to coal to make it suitable for a given application.

1.3.2 Capacities

1.3.2.1 Design capacity—the rate of feed, defined by limits expressing the extent and duration of load variations, at which specific items of plant subject to a performance guarantee have to operate continuously and give the guaranteed results on a particular quality of feed.

1.3.2.2 Mechanical maximum capacity—the highest rate of feed at which specific items of equipment, not subject to performance guarantees, will function on the type and quality of feed for which they are supplied.

1.3.2.3 Nominal capacity—a notional figure, expressed in mass per hour, used in the title of a flowsheet and in general descriptions of a plant, applying to the plant as a whole and to the specific project under consideration.

1.3.2.4 Operational capacities—figures given on a flowsheet to indicate quantities per unit time passing various points in the plant, taking account of fluctuations in the rate of supply and composition (as to size and impurity content) and the balance of the circuits.

1.3.2.5 Peak design capacity—a rate of feed, in excess of the design capacity, which specific items of plant will accept for short periods without necessarily fulfilling the performance guarantees given for them.

NOTE: Further information on the capacity definitions is given in Appendix A.

1.3.3 Flowsheets

1.3.3.1 Balanced flowsheet—a specialized process flowsheet indicating the operational capacities at various points in the plant.

1.3.3.2 Basic flowsheet—a diagram of the various stages in the treatment of the coal in a preparation plant, usually either a block flowsheet or a process flowsheet.

1.3.3.3 Block flowsheet—a basic flowsheet indicating, in words, the main operational steps within the plant, the movement of the various materials between the steps and the final products obtained; it can also show the average mass flow at various points in the plant.

1.3.3.4 Equipment flowsheet—a specialized process flowsheet indicating the number of units, and their sizes and design capacities.

1.3.3.5 Process flowsheet—a diagram indicating, in symbols, the units of plant used in the various operational steps carried out within a coal preparation plant.

NOTE: The figures given on flowlines are derived from design capacity figures and include combinations of design capacity figures at product junction points.

SECTION 2 PRINCIPLES AND CONVENTIONS FOR FLOWSHEETS

2.1 TYPES OF FLOWSHEETS Four flowsheets are normally used to depict a coal preparation plant. These are—

- (a) block flowsheet;
- (b) process flowsheet;
- (c) balanced flowsheet; and
- (d) equipment flowsheet.

NOTE: More detailed flowsheets, such as a process and instrumentation diagram, may be necessary. Such flowsheets are not discussed in this Standard but, in the interests of uniformity, they should follow the recommendations of this Standard or of other relevant Standards.

Examples of block and process flowsheets are shown in Figures 1 and 2 respectively. In the interests of standardization, it is recommended that the format be maintained.

Examples of balanced and equipment flowsheets are given in Figures 3 and 4 respectively.

2.2 GROUPING OF OPERATIONS AND PRODUCTS To prepare a flowsheet it is necessary for the preparation process to be broken into a number of headings, so that stages coming within the scope of a particular heading are grouped together. The stages from the point where the raw coal enters the plant to the disposition of the products can normally be summarized under the following headings:

- (a) Supply and pretreatment of feed coal.
- (b) Cleaning.
- (c) Subsequent treatment of products (including separation of solids from water).
- (d) Product storage and loading.
- (e) Characteristics of products.

In certain cases, it may be desirable to use an additional heading for the separation of solids from water instead of including it under Item (c). In the process flowsheet (Figure 2), it is not recommended that characteristics of products (Item (e)) be shown.

2.3 CONVENTIONS FOR FLOWSHEETS

2.3.1 General A flowsheet should follow the following conventions:

- (a) Raw coal entering the plant is shown in the top left-hand corner of the flowsheet.
- (b) As far as possible, the flowsheet is arranged so that the product decreases in size from the top to the bottom of the flowsheet. Where size ranges are to be shown, the larger size is given first. Wherever possible, a vertically descending order is used for clean coal, middlings and discard.
- (c) For block flowsheets, processes are indicated by rectangles, approximately equal in size, elongated either vertically or horizontally. Storage is indicated by squares.

The process is indicated by writing in the rectangle or square as appropriate, e.g.

THICKENING

SCREENING

- (d) Lines indicating flow of materials are either horizontal or vertical. They generally enter rectangles, squares or symbols from the top or left side and leave from the bottom or right side, thereby giving a top-left to bottom-right flow.
- (e) Full lines are used to indicate the main flow of materials. Alternative routes are indicated by broken lines.
- (f) Lines forming the rectangles on block flowsheets and the symbols on process and equipment flowsheets are shown by thick lines and the product flow by slightly thinner lines. The flowlines for minor circuits such as fluid only are distinguished by relatively thinner lines.
- (g) Junctions of flowlines are clearly indicated by dots. Where there is no junction of materials, the lines simply cross. All flowlines are clearly arrowed at their delivery ends and at all junctions.
- (h) If the design of the plant is to include provision for an extension or the addition of a separate operational stage (e.g. froth flotation), these provisions are indicated on the flowsheet by the use of short dashes (e.g. — — —).
- (i) If divisions between categories of process steps are indicated by vertical lines, care should be taken to distinguish them from the flowlines, e.g. by the use of a long chain (— — . — — . — —).
- (j) Methods of expressing capacity are those described in this Standard.
- (k) Code numbers referring to particular items of plant are used only on equipment flowsheets.
- (l) Materials sizes may be shown in the data blocks of balanced flowsheets or the data columns of equipment flowsheets.
- (m) For block flowsheets, 'tonnes per hour' data are shown without units, but other values (e.g. bin capacities) include appropriate units.
- (n) For process flowsheets, units of equipment are indicated by the symbols described in Section 3.

2.3.2 Data blocks Where solids, liquid or pulp flows, or solids concentrations are to be shown on the balanced flowsheet, they should be in accordance with the conventions recommended. All figures should relate to operational capacity and the respective figures for input and output for each process should balance (see Figure 5). Additional parameters may be shown by the inclusion of extra boxes and should be defined on the flowsheet.



Full document details: AS 4156.4-1999 (2013)

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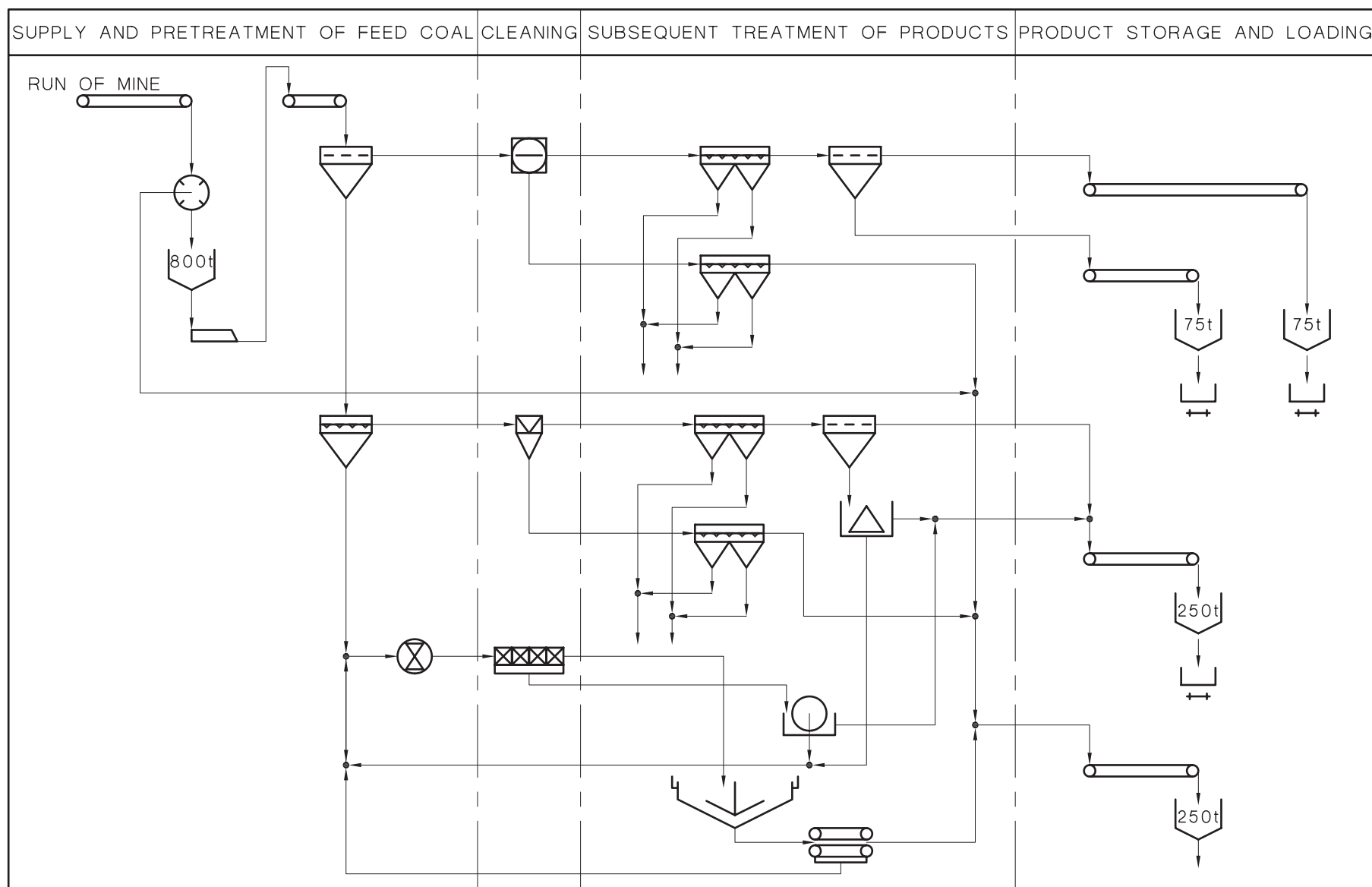


FIGURE 2 EXAMPLE OF A PROCESS FLOWSHEET

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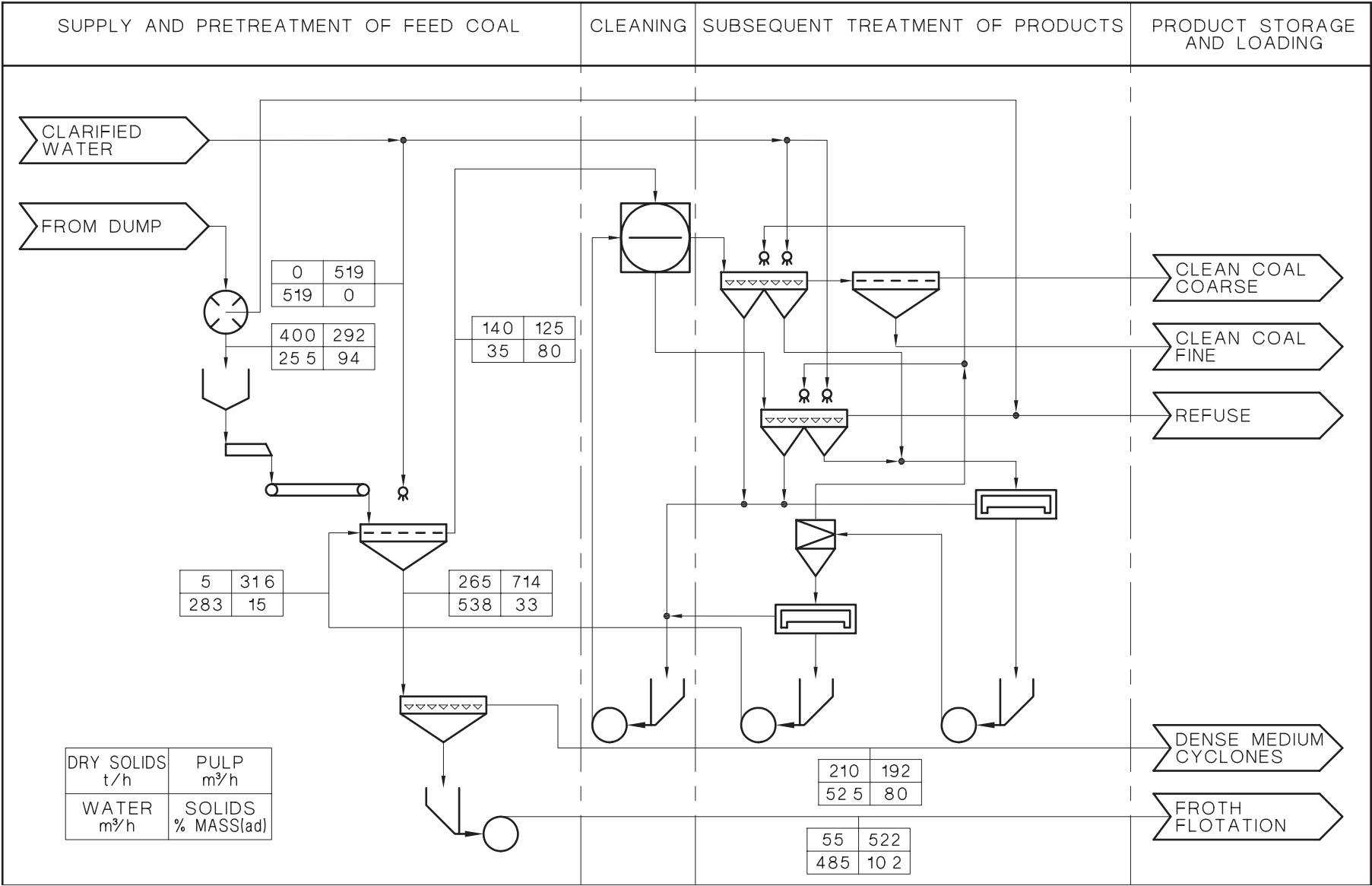


FIGURE 3 EXAMPLE OF A BALANCED FLOWSHEET

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