LICENCE

for

AS 1345-1995 Identification of the contents of pipes, conduits and ducts

Licensee: Mr Peter Doherty

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AS 1345—1995

Australian Standard®

Identification of the contents of pipes, conduits and ducts

This Australian Standard was prepared by Committee SF/16, Identification of Pipes. It was approved on behalf of the Council of Standards Australia on 24 November 1994 and published on 5 March 1995.

The following interests are represented on Committee SF/16:

Australian Chamber of Commerce and Industry

Australian Gas Association

Australian Institute of Petroleum

Institute of Hospital Engineering, Australia

Public Works Department, N.S.W.

Society of Fire Protection Engineers

Water Board Sydney—Illawarra—Blue Mountains

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Australian Standard®

Identification of the contents of pipes, conduits and ducts

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PREFACE

This Standard was prepared by the Standards Australia Committee on Identification of Pipes, to supersede AS 1345—1982.

The basic colour scheme for pipe identification remains virtually the same as it was in the 1982 edition, as does the design and use of pipe markers. The only significant difference is the inclusion of a dark-blue supplementary colour to be used as an additional colour band around pipes carrying materials for human consumption.

A number of other changes have been made to the Standard with a view to making it easier to understand and use by practitioners. For example, the tabulation of base colours and their uses now includes a series of illustrative examples of where each colour should, and should not be used.

As regards the specification of colour, the Standard now provides both for a target colour for matching colour-mixed surface finishes such as paints, and a colour tolerance where ready-made materials such as adhesive films or as-supplied pipe colour are to be considered.

In the Foreword to the 1982 edition it was noted that the colour system adopted in that Standard was based on the International Standard ISO/R 508*. The Committee observed at that time that this International Standard had been approved by many ISO member bodies and that it applied to shipping as well as land installations. Furthermore, the requirements of ISO/R 508 were considered to possess intrinsic merit in that the number of colours were reduced to a minimum and the colours given were sufficiently distinct from one another to be separately identifiable when seen in isolation. Although ISO/R 508 has since been withdrawn, action to issue a revision has started. It is likely, however, to be some considerable time before a revised ISO Standard is available. It was therefore considered inappropriate to delay the development of this edition of this Standard.

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

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* Identification colours for pipes conveying fluids in liquid or gaseous condition in land installations and on board ships.

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FOREWORD

This Standard relies fundamentally on a single colour identification system. It is not possible to provide for all situations in such a system. Furthermore, because colours may be seen in isolation from one another, the absolute number of colours available is limited and is considerably less than the ideal number of categories which might otherwise be provided for pipe contents. For this reason, in selecting an appropriate colour, worker safety is one of the most important concerns. For example, the colour for acids and alkalis would be applied only where a potential corrosive hazard existed, and not to highly diluted acids or alkalis such as might be found in waste water or liquid foodstuff.

More detailed information on the contents of a pipe is provided, firstly, by the use of two special supplementary colours, yellow to indicate especially hazardous material and dark blue for materials for human consumption. The second means is by use of pipe markers which include words to describe the contents. Symbols for radioactive and biological hazards are also used.

The Standard sets out principles which should be considered in the planning of a scheme for identification of piping. Individual undertakings may find it necessary to depart from these principles in the application of markings in particular localities. However, this should only be done in extreme circumstances where adherence to the general principles cannot possibly be maintained and special care is taken to ensure that no colour is used for a purpose which conflicts with this Standard to the degree that either safety or operational efficiency is compromised.

The principles of this Standard should be applied to the identification of buried and other normally inaccessible services. However, it is recognized that such application may present difficulties and for this reason no normative requirements have been specified.

STANDARDS AUSTRALIA

Australian Standard

Identification of the contents of pipes, conduits and ducts

1 SCOPE This Standard specifies means of identifying the contents of pipes, conduits, ducts and sheathing used to contain fluids, or for the distribution of electrical or communications services in land installations and on board ships, by the use of colours, words and symbols. It is not intended to apply to buried or normally inaccessible services. However, the general principles may be applied when considering those services.

NOTE: It is recognized that application of this Standard to buried services may present difficulties and for this reason only general guidance is offered.

2 APPLICATION It is recognized that in certain industries and applications there are consistent and widely recognized colour coding systems in use other than that specified in this Standard. Use of alternative systems is acceptable under this Standard in the following circumstances:

(a) In installations normally inaccessible other than to operators and emergency response personnel trained in the coding system in use; where different services would otherwise have predominantly the same identification colour, and supplementary or alternative identification is desirable for operational reasons but does not compromise safety.

(b) In areas in public view where use of the basic identification colour would not be aesthetically acceptable. In such cases all required colours and markers shall be placed on the pipe as soon as it has disappeared from public view, e.g. through a wall or bulkhead. If word descriptions are required on the service they may be placed in a contrasting colour on the decorative colour in public view.

Appendix A lists known examples of alternative systems and the Standards in which they are specified or described.

NOTE: Additional Standards may be included in future editions of this Standard. Enquiries in this regard may be made to Standards Australia Head Office quoting Committee Number SF/16.

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

AS

1169 Minimizing of combustion hazards arising from the medical use of flammable anaesthetic agents

1596 LP gas—Storage and handling

1744 Forms of letters and numerals for road signs

2700 Colour standards for general purposes

2896 Medical gas systems—Installation and testing of non-flammable medical gas pipeline systems

3000 Electrical installations—Buildings, structures and premises (know as the SAA Wiring Rules)

3500 National Plumbing and Drainage Code

Federal Office of Road Safety
Australian Code for the Transport of Dangerous Goods by Road and Rail

Australian Institute of Petroleum
CP5 Code of Practice for Pipeline Identification

4 DEFINITIONS For the purposes of this Standard, the definitions below apply.

4.1 Normally inaccessible—intimately contained within a mass of material or in an inaccessible duct or enclosure to which access cannot normally be gained. The term includes services within a securely isolated enclosure to which entry is denied to all but authorized personnel who have detailed knowledge of the contents of pipes within the enclosure.

4.2 Normative requirement—a requirement which it is necessary to meet if the Standard is to be implemented.

4.3 Pipe—a transport medium through which fluids flow or which contains electrical or communication circuits. The term includes conduits, ducts and sheathing when used for this purpose.

4.4 Shall—indicates that a statement is mandatory.

4.5 Should—indicates a recommendation.

4.6 May—indicates the existence of an option.

5 IDENTIFICATION SYSTEM The system for pipe identification comprises the following elements:

(a) *The base identification colour*—which is a single colour, selected in accordance with Clause 6, and which may cover all or part of the pipe as set out in Clause 9. It is required in all cases. The natural or as-manufactured colour of the pipe need not necessarily comply with this Standard, except where a potentially hazardous conflict might arise, e.g. the use of a green pipe to carry a corrosive substance.

(b) *Pipe marker*—which comprises one or more words on a label identifying either the contents or the hazardous nature of the contents, or both, in accordance with Clause 7. The words are placed on a background of the base identification colour with an outer contrasting border. The pipe marker is a normative requirement only in certain conditions (see Clause 7).

(c) *Supplementary colours*—which comprise a band or panel of a different colour used to indicate an additional attribute of the contents of the pipe, i.e. contents for human consumption or contents of a hazardous nature. Symbols for radiation and biological hazard, where relevant, are placed within the band or panel. Where required in accordance with Clause 8, the use of supplementary colours is a normative requirement.

6 BASE IDENTIFICATION COLOUR

6.1 General The objective of the base identification colour is to provide immediate information as to the contents of the pipe in broad terms. The relative hazard of a potential contents leak or spill to operations and maintenance workers, and more particularly, crews responding to emergency calls, will usually be the critical factor in determining which colour is appropriate in a particular case.

NOTE: Further discussion on the objective of the base identification colour is given in the Foreword.

Other colour codings which are provided largely for the convenience of operations and maintenance workers are as follows (see also Table 1):

(a) *Water*—the distinction is made between pipes primarily carrying water, e.g. potable, mildly contaminated waste, cooling/heating, which will be green, and solutions of other materials in water such as foodstuffs and organic waste, which in most cases will be black.

(b) *Air and other gases*—the distinction is made between pipes carrying only air, e.g. compressed, vacuum, ventilation, which will be light blue, and all other gases, including pneumatic transport of particulate solids, which may be yellow-ochre or violet.

(c) *Fire services*—these are coloured red even though they carry a material which could be classified elsewhere.

6.2 Application of colours The colours which shall be used as base identification colours for pipes (see Clause 5(a)) together with guidance on where each should be used, are shown in Table 1 and specified in Clause 6.3.

6.3 Colour specification The colours to be used for the purposes listed in Table 1 shall be as specified in Table 2. Two forms of specification are given in the Table, as follows:

(a) *Target colour* This colour is shown in heavy type by name and reference number in accordance with AS 2700, in the second and third column. It shall be used for colour matching wherever a paint or other colour mixed surface finish is to be used.

(b) *Colour with tolerance* Where an in-built pipe colour or the colour of a manufactured film is to be considered as the pipe colour for the purposes of this Standard, it shall be acceptable if it lies within the colour space and the luminance factor limits specified in accordance with the CIE Chromaticity Coordinate system in columns four to six of Table 2. These colour spaces are illustrated on the CIE Chromaticity Chart at Appendix B, which also gives an abbreviated explanation of the CIE Chromaticity Coordinate System. The non-preferred colours in the second column of Table 2, in lighter type, fall within the corresponding colour space, and may be used in lieu of the preferred colour when materials of those colours are supplied.

7 PIPE MARKERS

7.1 General description Pipe markers comprise either a printed label which can be affixed to a pipe or the equivalent colours and information signwritten directly onto the pipe or incorporated into the pipe at manufacture. Markers shall show the following information:

(a) A word or words indicating the contents of the pipe and, if desired, some especially hazardous aspect of the pipe, e.g. high pressure, high voltage, toxic waste; or both. The words shall be in either white or black letters as shown in Figure 1.

(b) A background colour generally in the form of a rectangular colour identification block large enough to accommodate the words, such colour being the basic identification colour from Table 1. See also the alternative form specified in Clause 7.2.3 for small services.

(c) A contrasting border around the colour identification block as shown in Figure 1. The border colour should normally be white but may be yellow if a hazard identification patch or band is to be used with the marker.

(d) A chevron within the border, if required, to indicate the direction of flow in a pipe carrying a liquid or gas.

A typical pipe marker is illustrated in Figure 1.

TABLE 1

PIPE IDENTIFICATION COLOURS AND THEIR USES

Colour name and basic identification	Colour	Applications (see Note 1)	Exclusions (see Note 1)
Green —water		Drinking water (see Note 2) Waste water Cooling water, including seawater Heating water Storm water Hydraulic power supply Recycled water	Sewage, and other dangerously polluted waste water
Silver-grey —steam		Live steam Process steam Exhaust steam Space heating steam	
Brown —oils, flammable and combustible liquids		Fuel and lubricating oils Animal and vegetable oils for food processing (see Note 2) Petrol, diesel and other light fraction fuels Other flammable or combustible liquid substances	Liquefied gases under pressure
Yellow-ochre —gases		Fuel gases Process gases Liquefied gases under pressure Pneumatic transport of particulate solids Exhaust gases and fumes Medical gases (see Note 2)	Air Highly acid or alkaline gases
Violet —acids and alkalis		All corrosive liquids and gases	
Light blue —air		Compressed air Instrument air Vacuum Ventilation Pneumatic conveyor	
Black —other liquids		Chemical mixtures in water or organic solvent Liquid foodstuffs (see Note 2) Sewage, organic waste Chemical and process wastes	Corrosive materials Flammable or combustible material
Red —fire services		Dedicated water, foam, other fire extinguishing supply lines	Electrical supply Communication circuits
Orange —electric power		Electricity supply circuits	Extra-low voltage circuits
White —communications		Telephone and other communication circuits Extra-low voltage supply	

NOTES:

1 The list of applications in the third column and exclusions in the fourth column may not be exhaustive.

2 Services containing materials for human consumption have a supplementary colour (see Clause 8.1).

TABLE 2
SPECIFICATION OF COLOURS FOR PIPE MARKINGS AND MARKERS

Colour name	Conforming AS 2700 colours*	AS 2700 ref. numbers	CIE chromaticity coordinates (x,y) of the corners of the colour spaces (see also Figure 1)					Luminance factor	
								Min.	Max.
			(Measurement method as described in AS 2700)						
Green	Emerald **Jade** Shamrock	G13 **G21** G23	x y	.231 .752	.320 .425	.275 .395	.009 .698	.10	.20
Silver-grey	—	—							
Brown	Tan **Golden tan** Brown Nut brown	X51 **X53** X54 X55	x y	.452 .412	.482 .385	.415 .360	.403 .380	.10	.20
Yellow-ochre	Straw **Sand** Sandstone Raffia Biscuit	Y24 **Y44** Y53 X31 X42	x y	.385 .408	.400 .390	.360 .360	.350 .370	.40	.65
Violet	**Lilac**	**P23**	x y	.309 .297	.294 .165	.262 .200	.303 .306	.30	.50
Light blue	**Aqua** Bluebell	**B25** B41	x y	.255 .312	.278 .290	.232 .255	.203 .300	.30	.50
Red	Scarlet **Signal red** Waratah	R12 **R13** R14	x y	.627 .372	.670 .330	.524 .330	.502 .353	.10	.20
Orange	Marigold **Orange**	X13 **X15**	x y	.563 .435	.608 .392	.505 .370	.480 .398	.25	.40
Yellow**	Wattle Vivid yellow **Golden yellow** Sunflower	Y12 Y13 **Y14** Y15	x y	.510 .488	.547 .452	.485 .421	.460 .448	.40	.60
Dark blue**	Mid blue Ultramarine Bright blue **Harbour blue**	B15 B21 B23 **B24**	x y	.052 .262	.195 .300	.235 .246	.105 .098	.10	.20

* The preferred colour in each group is shown in heavy type (see Clause 6.3(a)).
** The colours yellow and dark blue are supplementary colours (see Clause 8).

Basic identification colour	Legend colour	Chevron colour
Green, brown, red, violet, light blue, orange, black	White	Same as basic identification colour
Silver-grey, white, yellow-ochre	Black	Black

NOTE: One arrow should be removed if flow is in one direction only.

FIGURE 1 TYPICAL PIPE MARKER

7.2 Size

7.2.1 *Letters* Lettering on markers should be large enough to be readily read by persons with normal eyesight at the maximum distance at which the marker needs to be read. Letters shall be as specified in AS 1744. Series C or D capitals are recommended. As a guide, under good visibility conditions, a letter height of at least 1 mm for each 0.4 m of required reading distance should be provided. This may not be achievable on small services. In such cases the maximum practicable letter size shall be used. Except for small services (see Clause 7.2.3) the minimum letter height shall be as shown in Table 3.

7.2.2 *Colour identification block* Except for small services (see Clause 7.2.3), the height of the background patch shall be at least one and a half times the letter height required in Clause 7.2.1, or that given in Table 3, whichever is the greater.

TABLE 3

MINIMUM HEIGHT OF PIPE MARKER COLOUR PATCHES AND LETTERS

millimetres

Size of service (outside diameter or depth of side)	Minimum height of background patch	Minimum letter height
<40	See Clause 7.2.3	
40 to 75	25	12
>75	50	24

The length of the patch shall be either the length of the word or words plus 25 mm at each end of the legend, or 375 mm, whichever is the greater.

7.2.3 Small services The basic identification colour for use on pipes of less than 40 mm outside diameter shall be a continuous band around the circumference of the pipe with the word or words, where required, in not less than 4 mm upper-case letters placed longitudinally along the pipe and repeated several times around the circumference so that they are visible from all viewing directions.

7.3 Application

7.3.1 *Normative requirements* Pipe markers shall be used in the following circumstances:

(a) Wherever hazard identification (see Clause 8.2) is required.

(b) Wherever there are several pipes side by side with the same base identification colour but different contents, and confusing one with another could have serious consequences.

(c) Where a pipe needs to be quickly identified in detail in an emergency.

(d) Wherever required by another Australian Standard or a legal requirement.

7.3.2 *Requirements which are not normative* In addition to the normative requirements, pipe markers may be used to identify in detail the contents of any pipe.

Wherever pipe markers are used on a pipe, all nearby pipes, in particular those with the same base identification colour, should also have pipe markers.

7.4 Informative labelling When supplied, pipe markers shall be accompanied by the following information, either stamped on or included in packaging, or printed on each item:

(a) The pipe size range for which the markers are suitable.

(b) The way the marker is intended to be placed on the pipe.

(c) Recommended locations along the pipe.

(d) Use of the chevron to indicate flow direction.

8 SUPPLEMENTARY COLOURS AND HAZARD IDENTIFICATION

8.1 Materials for human consumption Wherever it is considered that a hazard involving the contamination of materials for human consumption could arise, e.g. by reason of insufficiently well-identified pipes being adjacent to other pipes which might carry contaminants, the pipes carrying materials for human consumption shall in addition to the base colour be identified by a band of dark-blue colour at least 75 mm wide (small services excepted, see Clause 9.3), displayed in conjunction with the base colour band or pipe marker.

Services to which this requirement might apply would include—

(a) potable water;

(b) foodstuffs;

(c) other liquids for human consumption; and

(d) medical gases.

8.2 Hazard identification Wherever a special hazard to operators or maintenance personnel is present within a service, a yellow band or patch at least 75 mm wide (25 mm for small services, see Clause 9.3) shall be displayed in conjunction with each pipe marker. The yellow band shall carry the additional markings illustrated in Figure 3, as follows:

(a) If contaminated with ionizing radiation, the radiation symbol shown in Figure 2(a).

(b) If contaminated with biologically hazardous material, the biological hazard symbol shown in Figure 2(b).

(c) In all other cases, alternate diagonal black and yellow stripes of equal width as shown in Figure 3.

NOTE: As a guide, an indication of the type and extent of hazards which could require hazard identification is given in Appendix C.

9 LOCATION AND FORM OF IDENTIFICATION MARKINGS

9.1 General requirements Identification markings comprising either bands of base identification colour or pipe markers as required (see Clause 7.3) shall be located adjacent to all junctions, valves, service appliances, bulkheads, wall penetrations and the like, and at spacings not greater than 8 m along the service. An exception will be for uninterrupted lengths of external services, visible along their length, where the spacing of the identification shall not exceed 50 m. Typical examples are shown in Figure 4.

Where pipe markers are a normative requirement under Clause 7.3.1 all identification markings required under this Clause shall be pipe markers.

9.2 Form of marking Identification marking for other than small services (see Clause 9.3), shall be provided as specified elsewhere in this Standard, in one of the following forms:

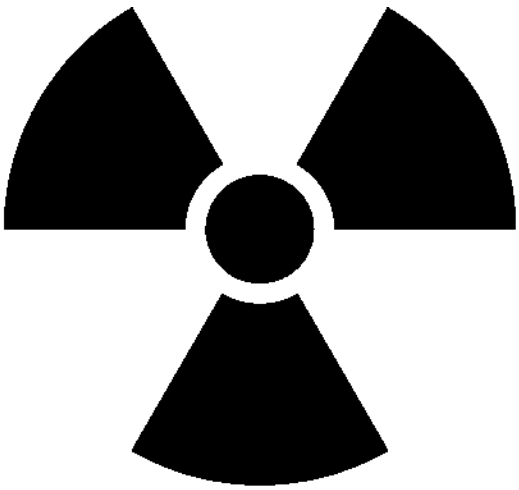
(a) The base identification colour applied to the full length of the service.

(b) The base identification colour in bands not less than 375 mm in length, located in accordance with Clause 9.1.

(c) A pipe marker in accordance with Clause 7, located in accordance with Clause 9.1.

(d) A pipe marker with band of supplementary colour or hazard identification in accordance with Clause 8.

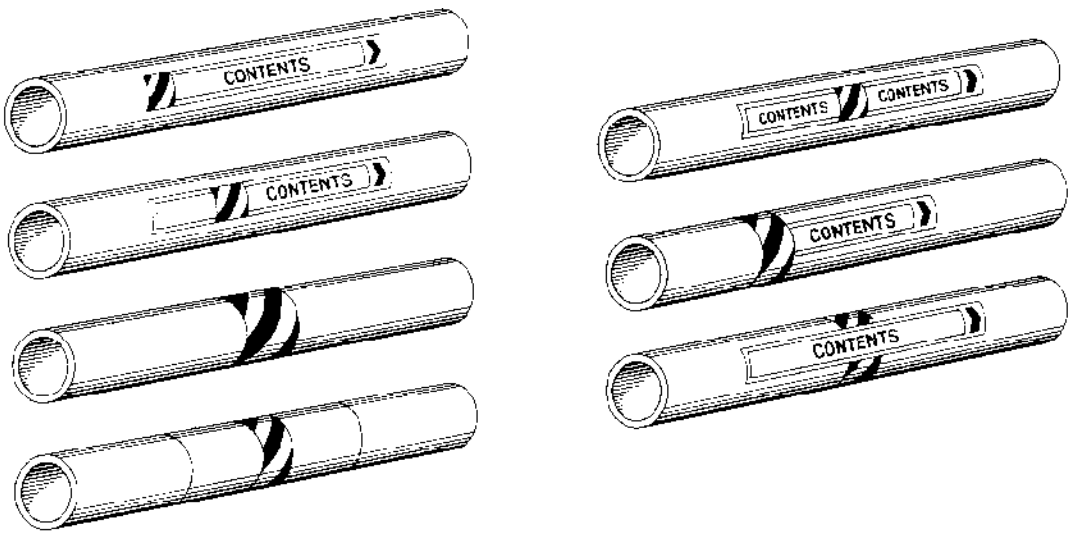
(e) A combination of either Item (c) or Item (d) with Item (a).



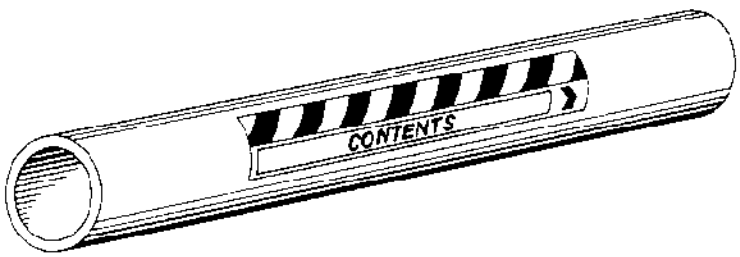
(a) Ionizing radiation

(b) Biological hazard

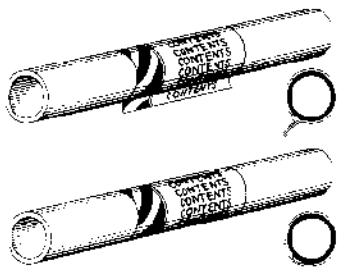
FIGURE 2 SYMBOLS FOR IONIZING RADIATION AND RADIATION AND BIOLOGICAL HAZARD



(a) Normal application



(b) Application to very large pipes



(c) Application to small pipes

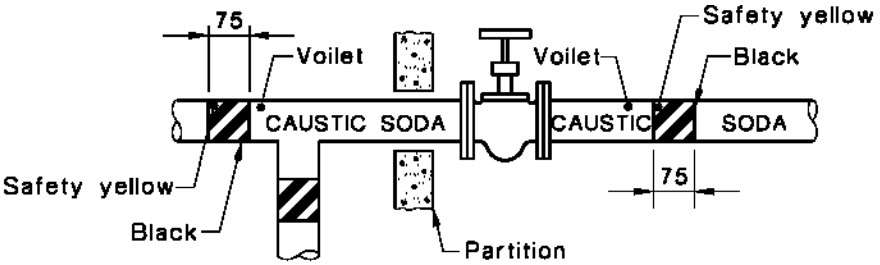
FIGURE 3 EXAMPLES OF IDENTIFICATION MARKINGS ON HAZARDOUS SERVICES

9.3 Small services Services less than 40 mm in outside diameter shall have identification markers which may be reduced in size to not less than the following:

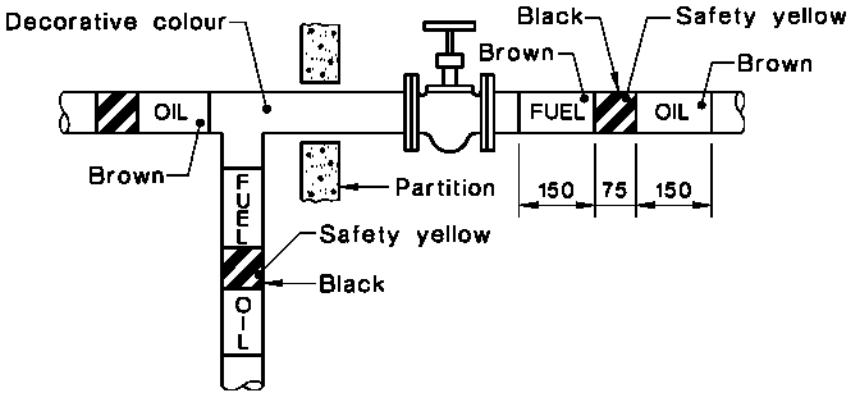
(a) Length of base colour band or pipe marker . . . 70 mm.

(b) Length of supplementary colour or hazard identification band or patch . . . 25 mm.

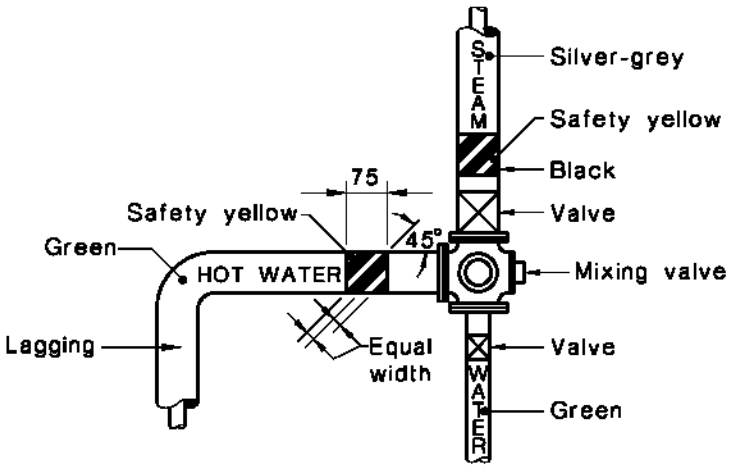
9.4 Multiple pipe installations Where several pipes are to be identified at the one location, care should be taken to ensure that all pipe markers are visible to an observer from one position, e.g. as illustrated in Figure 5.



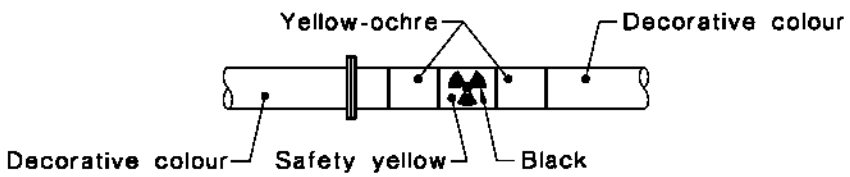
(a) Pipeline for caustic soda



(b) Pipeline for fuel oil



(c) Pipeline for water and steam



(d) Gas pipeline with ionizing radiation present

DIMENSIONS IN MILLIMETRES

FIGURE 4 EXAMPLES OF THE APPLICATION OF MARKINGS NEAR VALVES, PIPE JUNCTIONS AND BULKHEADS

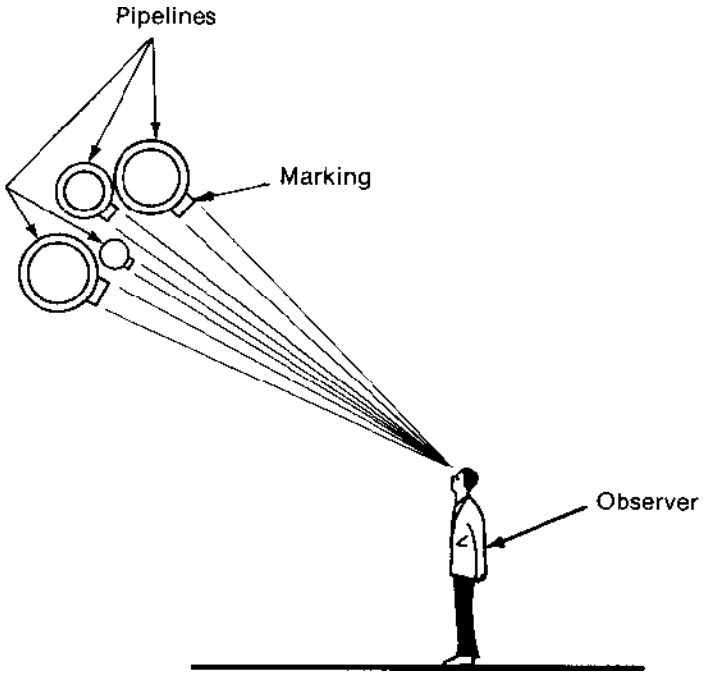


FIGURE 5 LOCATION OF PIPE MARKERS TO ENSURE VISIBILITY OF SEVERAL MARKERS AT A SINGLE OBSERVER LOCATION

10 JACKETED PIPES Where a pipe carries two separate liquids or gases in coaxial pipes, the base colour shall be that of the more hazardous of the two contents, and two pipe markers placed side by side, with the words INNER and OUTER added to the respective contents descriptions, shall be used. The pipe marker for the less hazardous material shall be coloured according to the code for that material.

11 ADDITIONAL WARNING NOTICES Where there is likely to be a safety hazard for workers working on or dismantling a pipe, caused by factors other than the nature of the contents, e.g. cutting into pipe containing asbestos, or welding or flame cutting of plastic pipe or rubber-lined pipe, a warning notice comprising a yellow background with black letters of size and type as required by Clause 7.2.1, shall be provided.

APPENDIX A

METHODS OF IDENTIFICATION SPECIFIED IN OTHER STANDARDS

(Informative)

A1 SCOPE This Appendix is a list of known standards where reference is made to alternative methods of pipe identification.

A2 AUSTRALIAN STANDARDS

AS 1596—LP Gas—Storage and Handling—calls up AS 1345 for identification of liquid and vapour lines in LPG installations. In addition, an appendix illustrates contents markers which are recommended as supplementary identification for propane and butane pipelines.

AS 3000—SAA Wiring Rules—sets out the requirements for the colour marking of insulated and covered conductors under certain circumstances, including earthing conductors. The statutory or supply authority may also require that cable of different colours be used for identification purposes.

AS 1169—Minimizing of combustion hazards arising from the medical use of flammable anaesthetic agents—deals with the reduction of the risk of fire and explosion from the use of flammable medical agents, and the installation of medical gas supply systems. Identification of the pipes used in such systems is also covered.

AS 2896—Medical gas systems—Installation and testing of non-flammable medical gas pipeline systems—provides for alternative means of identifying pipes for the reticulation of medical gases in hospitals.

AS 3500—National Plumbing and Drainage Code—excludes single unit and certain small multiple-unit residential properties from the requirements of AS 1345.

A3 INDUSTRY STANDARDS

AIP CP5—Code of Practice for Pipeline Identification—published by the Australian Institute of Petroleum. This Standard is widely used in the petroleum industry in petroleum terminals and bulk plants.

Copies of CP5 are available from—

Australian Institute of Petroleum
257 Collins Street
MELBOURNE VIC. 3000

APPENDIX B

CHROMATICITY DIAGRAM FOR IDENTIFICATION COLOURS USED ON PIPES

(Informative)

Figure 1 shows the colour spaces set out in Table 2 for each of the standard pipe identification colours, plotted on the CIE Chromaticity Diagram.

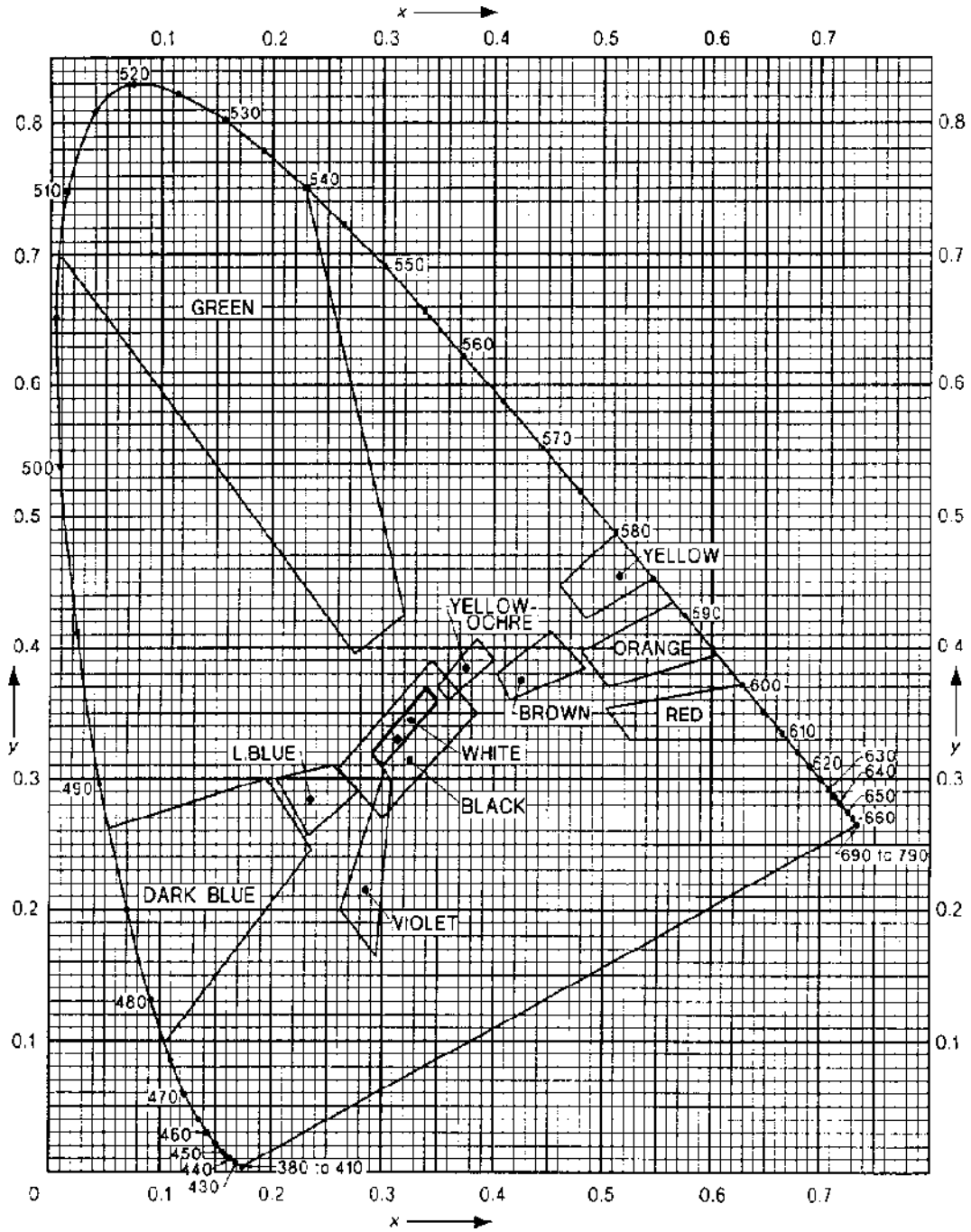


FIGURE B1 CIE CHROMATICITY LIMITS (COLOUR SPACES) FOR IDENTIFICATION COLOURS USED ON PIPES

In simple terms, the CIE* colour chart has, around the periphery of the horseshoe, the pure colours of the spectrum stretching from wavelength 300 (violet) to 790 (red) nanometres. Colours on the line would be dense, fully saturated colours—actually rather difficult to achieve in practice, especially colours viewed by reflected light. (Colours do not exist outside the horseshoe.)

More practical colours exist as progressively desaturated or washed-out colours as they move toward the centre of the diagram. The lightness or darkness of colours can change in two ways, first by the increase or decrease of luminance factor (pure white is 1.0, pure black zero), and secondly by greater or lesser degree of saturation. Most lightening or darkening is a combination of the two.

Changes in saturation will sometimes also result in changes in perceived colour, for example brown is a desaturated form of yellow-orange (at low luminance factor levels), but in most cases will result in a pastel shade of the original, e.g. red to pink. It will be noted that most of the AS 2700 colours are fairly well desaturated.

At the centre of the diagram is the absence of colour, i.e. white at high luminance factor, down through greys to black at zero luminance factor.

The system provides for an organized means of specifying colour tolerance. The colour spaces are adjusted to ensure that any colour lying in the space is generally perceived as having the named colour, whilst at the same time ensuring that there are large enough gaps between the spaces to avoid confusing one colour with the next.

Automatic hand-held colorimeters which will give direct readings of colour coordinates and luminance factor are available.

* Commission Internationale de l'Eclairage.

APPENDIX C
GUIDE TO SERVICES REQUIRING HAZARD IDENTIFICATION

(Informative)

C1 SCOPE This Appendix gives guidelines as to when a pipe service should be considered hazardous enough to require hazard identification.

C2 HAZARD TYPES AND DEGREES OF HAZARDS The following lists various types of hazard associated with pipes, and suggests the degree of hazard at which hazard identification should be considered (the class numbers in brackets refer to the relevant classes of materials listed in the Australian Dangerous Goods Code which would fall into the following categories):

(a) **Corrosive hazard**—materials that are likely to cause immediate burning of the skin on the hands and arms of an operator, if splashed or immersed (Class 8).

(b) **Chemical poison**—gaseous materials that are likely to cause immediate personal hazard if inhaled, or liquids which are poisonous if ingested in the small quantities likely to occur accidentally during maintenance or emergency operations. This category includes substances which can poison in the short term by absorption through the skin (Classes 2.3, 6.2).

(c) **Biological hazard**—this category would be generally confined to materials containing virulent disease-causing organisms. Sewer pipes other than those associated with hospitals and medical centres would not normally require hazard identification unless there was a danger of polluting another service (Class 6.2).

(d) **Radioactive hazard**—materials emitting ionizing radiation in excess of 74 becquerels per gram (Class 7).

(e) **Temperature**—unprotected pipes carrying material at temperatures above 60°C or below −10°C.

(f) **Pressure**—services carrying materials at elevated pressures, typically 0.5 Mpa for gases and 1.2 Mpa for liquids.

(g) **Flammability**—services carrying liquids, gases, or particulate solids which are flammable (Classes 2.1, 3, 4).

(h) **Voltage**—circuits carrying voltages in excess of 110 V (RMS).