

Buildings and structures for agriculture —

Part 40: Code of practice for design and construction of cattle buildings

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Farm and Horticultural Buildings Standards Policy Committee (FHB/-) to Technical Committee FHB/1, upon which the following bodies were represented:

- AFRC Institute of Engineering Research
- Aggregate Concrete Block Association
- Brick Development Association
- British Cement Association
- British Commercial Glasshouse Manufacturers' Association
- British Constructional Steelwork Association Ltd.
- British Poultry Federation Limited
- British Precast Concrete Federation Ltd.
- British Veterinary Association
- British Wood Preserving Association
- British Woodworking Federation
- Cold Rolled Sections Association
- Department of Agriculture and Fisheries for Scotland
- Department of Agriculture Northern Ireland
- Electricity Supply Industry in England and Wales
- Farm and Rural Buildings Centre
- Farm Buildings Association
- Fibre Cement Manufacturers' Association Limited
- Health and Safety Executive
- Institution of Civil Engineers
- Local Authority Organizations
- Ministry of Agriculture, Fisheries and Food
- National Farmers' Union
- Royal Institute of British Architects
- Royal Institution of Chartered Surveyors
- Steel Construction Institute
- Timber Research and Development Association

This British Standard, having been prepared under the direction of the Farm and Horticultural Buildings Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 December 1990

© BSI 04-1999
First published, as BS 5502-2.2 and BS 5502-2.5, 1981
Second edition, as BS 5502-40, December 1990

The following BSI references relate to the work on this standard:
Committee reference FHB 1
Draft for comment 88 14765 DC

ISBN 0 580 18942 2

Amendments issued since publication

Amd. No.	Date	Comments
7665	June 1993	Indicated by a sideline in the margin

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
1 Scope	1
2 Definitions	1
3 Animal welfare considerations	1
4 Design and construction	1
5 Environment	2
6 Dimensions and space	3
7 Feeding and drinking arrangements	6
8 Services	8
9 Ancillary accommodation	8
10 Fire precautions	10
11 Safety signs and notices	10
Appendix A Bibliography	11
Index	12
Figure 1 — Cowshed dimensions	7
Table 1 — Optimum environmental conditions for cattle	2
Table 2 — Maximum gas concentrations	2
Table 3 — Levels of lighting for cattle buildings	2
Table 4 — Area allowance for dairy cattle on solid or slatted floors	3
Table 5 — Area allowance for beef cattle on solid floors	3
Table 6 — Bedded area allowance for loose housed calves	4
Table 7 — Minimum air space for housed calves	4
Table 8 — Area allowance for beef cattle on fully slatted, perforated or mesh floors	4
Table 9 — Individual pen sizes for calves	4
Table 10 — Dimensions of cow cubicles	5
Table 11 — Dimensions of cubicles for young stock (including beef)	5
Table 12 — Dimensions of cowsheds	5
Table 13 — Bedded area allowance for single suckler cow and calf (excluding creep area)	6
Table 14 — Slatted, perforated or mesh floor area allowance for single suckler cow and calf (excluding creep area)	6
Table 15 — Dimensions of cubicles for suckler cows	6
Table 16 — Bedded area allowance for calves in calf creep	6
Table 17 — Width of feeding face required for cattle eating simultaneously	6
Table 18 — Production of waste by cattle	8
Publications referred to	Inside back cover

Foreword

This Part of BS 5502 has been prepared under the direction of the Farm and Horticultural Buildings Standards Policy Committee. This Part together with Parts 41, 42, 43 and 49 is a revision of BS 5502-2.2 and BS 5502-2.5 which are withdrawn.

While BS 5502 is being revised and added to, the opportunity is being taken to restructure the standard into the following broad subject areas:

- *Part 0: Introduction and consolidated index;*
- *Part 10 to 19: Reference information and legislation;*
- *Part 20 to 39: General design;*
- *Part 40 to 59: Livestock buildings;*
- *Part 60 to 79: Crop buildings;*
- *Part 80 to 99: Ancillary buildings.*

More specifically, the livestock building series will comprise:

- *Part 40: Code of practice for design and construction of cattle buildings;*
- *Part 41: Code of practice for design and construction of sheep buildings and pens;*
- *Part 42: Code of practice for design and construction of pig buildings;*
- *Part 43: Code of practice for design and construction of poultry buildings;*
- *Part 49: Code of practice for design and construction of milking premises;*
- *Part 50: Code of practice for design, construction and use of storage tanks and reception pits for livestock slurry;*
- *Part 51: Code of practice for design and construction of slatted, perforated and mesh floors for livestock;*
- *Part 52: Code of practice for design and construction of emergency ventilation systems for livestock buildings.*

A more detailed description of the new structure of BS 5502 is given in Part 0.

The object of introducing the new structure is to allow subject areas to be broadly characterized, and related subject matter, whether in the form of recommendations, guidance or supporting data, to be rationalized and brought together. It will also allow sufficient flexibility to enable BS 5502 to be expanded and developed in a logical way in the future.

It has been assumed in the drafting of this Part of BS 5502 that the execution of its provisions is entrusted to appropriately qualified and experienced people, for whose guidance it has been prepared.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 5502 gives recommendations for buildings used for the housing of cattle, and more specifically for the housing of cows, beef cattle, bulls, young stock and calves. The recommendations are not applicable to milking parlours.

NOTE 1 The titles of the publications referred to in this standard are listed on the inside back cover.

NOTE 2 The numbers in square brackets in the text of this standard refer to the numbered references in Appendix A.

2 Definitions

For the purposes of this standard, the definitions given in BS 6100 apply.

NOTE Work has commenced on a further Part of BS 5502 (Part 10) which will be a glossary of terms for building and structures for agriculture.

3 Animal welfare considerations

3.1 Attention is drawn to the provisions of the current Codes of recommendations for the welfare of livestock [1].

3.2 All buildings should be designed, constructed and maintained so as to avoid discomfort, distress or injury to cattle. All fittings and surfaces accessible to livestock should not have sharp edges or projections and fittings should be arranged so as to avoid injury.

3.3 Cows should not be kept on a fully slatted, perforated or mesh floor. A solid floor area incorporating straw or a suitable bed should be provided to ensure comfort and to reduce the risk of injury to the udder to which dairy cows are particularly vulnerable.

NOTE The Farm Animal Welfare Council has clarified that this clause applies to dairy cows only and not to beef cows.

3.4 In accommodation for cows, it is essential to provide separate solid floored bedded pens for use at calving time, and a solid floored creep area with bedding should be available for the calves where cows with calves at foot are grouped together. Calves less than four weeks old should not be housed on totally slatted, perforated or mesh floors.

3.5 Cattle over 130 kg housed on slats with rubberized surfaces should have access to adequate areas of hard surfacing to provide foot abrasion.

4 Design and construction

4.1 Design

4.1.1 The building or structure should be designed and constructed in accordance with the general principles and recommendations given in BS 5502-20, BS 5502-21, BS 5502-22, BS 5502-23 and BS 5502-25¹⁾.

¹⁾ In preparation.

4.1.2 Pens, isolation boxes and other accommodation for the housing of fractious animals should be robust in construction, have suitable safeguards for the protection of stockpersons and a means for their escape, i.e. in case any potentially hazardous situation should arise (see also [2]).

4.2 Occupancy

The types and ages of the cattle to be housed, and periods during which the various parts of the building or buildings are subject to human occupation should be taken into account in the design (see BS 5502-22).

4.3 General construction of buildings

All surfaces and fittings that may come into contact with cattle should be free from projections, edges or perforations that could cause damage to cattle.

4.4 Floors

Floors to which stock has access should have a slip resistant surface. However, this should not be abrasive nor allow moisture to accumulate so creating a risk of ice patches. Solid floors not walked on, e.g. floors under slatted areas, should have a smooth surface to aid drainage and cleaning.

All slatted, perforated and mesh floors should be designed in accordance with BS 5502-51¹⁾.

4.5 Walls and roof

4.5.1 Walls for certain types of cattle buildings (e.g. strawed yards) may not need a damp-proof membrane. Their design should be influenced by whether manure can accumulate against them (see BS 5502-22) and whether they will be subject to impact from stock or mechanical handling equipment.

4.5.2 Cladding above the draught-proof wall should be such as to exclude the worst effects of wind, rain and snow, whilst allowing for the optimum ventilation (see Table 1).

4.5.3 The internal wall surface should be capable of being cleaned and disinfected effectively. This is essential for calf and isolation accommodation.

4.5.4 Consideration should be given to the exterior roof colouring of all livestock buildings, bearing in mind that light colours have solar reflective advantages over dark colours.

4.6 Workmanship

Workmanship should be in accordance with BS 8000.

Table 1 — Optimum environmental conditions for cattle

Stock	Mass	Temperature range	Maximum air speed at stock level in winter	Ventilation rate per kilogram liveweight
	Kg	°C	m/s	m ³ /(h kg)
Calves	50 to 200	7 to 30	0.25	0.75 to 2.25
Young stock	200 to 400	3 to 25	0.25	0.25 to 1.5
Fattening beef	400 to 700	3 to 25	0.25	0.2 to 1.5
Adult dairy cows	400 to 800	3 to 25	0.25	0.2 to 1.5

5 Environment

5.1 General

Cattle, other than young calves, can adapt to a variety of environmental conditions. Housed stock, however, have less opportunity to choose a location suitable to their needs. The overwhelming need is for good ventilation rather than warm conditions. However, draughts and wet conditions should be avoided.

5.2 Environmental conditions

As the energy balance of the animal is affected by temperature, air speed, relative humidity, wetness of animal coat and of lying surfaces, feed intake, and the availability of dry bedding, it is not practical to recommend a precise value for any one factor. Recommended ranges of values for certain environmental factors which apply to cattle generally are therefore given in Table 1.

NOTE 1 These conditions provide an optimum environment. Reasonable variations outside these limits are not detrimental to the welfare of the stock.

NOTE 2 It is not practical to control relative humidity but it normally remains within acceptable limits if the recommended ventilation rates are maintained.

NOTE 3 The optimum temperature for cattle is strongly influenced by their feed intake. In special circumstances, therefore, it may be necessary to provide localized heating in calf units.

NOTE 4 It is important not to exceed the maximum air velocity for calves, but adult stock can tolerate draughts better.

The ventilation requirements set out in Table 1 can be met by the use of natural or powered ventilation systems. It is essential that such systems are designed for the likely maximum stocking levels [3].

5.3 Gas concentrations

Gas concentrations should normally not exceed those given in Table 2. Normal ventilation to satisfy other needs usually ensures this, but when for example manure is being moved below slatted, perforated or mesh floors, the risk of excessive gas concentration is greatly increased.

5.4 Lighting

Cattle should have natural lighting where possible, with supplementary artificial lighting where appropriate, to facilitate animal movement and management functions such as inspection. Recommended lighting levels are given in Table 3.

Table 2 — Maximum gas concentrations

Gas	Concentration for adult cattle ≥ 200 kg	Concentration for calves < 200 kg
	p.p.m. (V/V)	p.p.m. (V/V)
Carbon dioxide	5 000	3 000
Ammonia	25	20
Hydrogen sulphide	10	5
Carbon monoxide	50	10

Table 3 — Levels of lighting for cattle buildings

Task or location	Standard service illumination	Remarks
	lx	
Inspection	300	Local or portable lights
Sick animal pen	50	Veterinary attention required
Baby calf nursery	50	
All other buildings	50	
	20	Where adequate natural lighting is provided (5 % daylight factor minimum)