SERIES NG 300
FENCING

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FENCING

NG 302 Requirements for Temporary and Permanent Fences

1 Clause 302 sets out the action to be taken by the Contractor, drawing particular attention to the requirements for temporary fencing in all situations where he does not provide permanent fencing immediately.

2 There may be specific temporary fencing requirements for a particular location during the construction period, eg. to isolate a semi-permanent diversion of a public right of way or a Statutory Undertaker's works or apparatus. Such fencing should be shown on the Drawings. The Contractor is obliged to provide all temporary fences required for safety and security as a result of his particular method of working, and maintain such temporary fencing during the period of the Works.

NG 303 Temporary Fencing

1 A range of temporary fencing has been included which will cover the majority of situations arising where permanent fencing is not immediately erected.

2 The types of fencing have been selected from the range in BS 1722 and are of a quality which will provide a fence strong enough to protect property and be economical in repetitive use when the need arises. The high standard should encourage the immediate provision of permanent fencing, although this is not always practical because of the possibility of damage to the permanent fencing during the progress of the Works.

3 The height of the fence in the range selected may have to be increased or, it may be considered excessive for the purpose it has to perform. Any further requirements or relaxation should be described on the Drawings.

NG 304 Timber Quality

1 (11/02) Stress grading rules are based on rectangular sections but it is permissible to process trapezoidal sections for fencing, without re-grading, from rectangular sections, as long as the processing does not remove more than 10% of the cross-sectional area. Alternatively the trapezoidal section may be machine graded using machine settings applicable to the thickness and largest width dimension of the trapezoid. However, it is not considered practical to stress grade small fencing components such as fence rails and posts.

2 (05/04) Sub-Clause 304.5 sets out a requirement for timber used in fences and environmental barriers to be supplied from sustainable sources. Clause 126 further clarifies the sustainability requirements and certification required to prove provenance for all timber and wood used in the works, whether permanent or temporary.

3 (11/02) Advise on the identification of suitable species for preservation treatment of posts and rails can be found in BS 5589.

NG 306 Permanent Fencing

1 Only one type of wooden fence, and one type of dropper fence have been chosen within the British Standard range and these are shown in the HCD. This national standardisation avoids the need to keep a multitude of stocks and enables suppliers and fencing sub-contractors to hold stocks of material to the correct dimensions for new and replacement purposes.

2 The types of fence in the HCD should be sufficient to meet all environmental and amenity factors and the chosen design which should be decided after consultation with the Overseeing Organisation should fit visually into each distinctive stretch of country, each situation having its appropriate type of fence. Wherever a change of fence type is made, the transition point should be carefully selected to coincide with a convenient feature which will give a logical reason for the change in fence design.

3 (05/01) Where a motorway is bordered by farm land, the Secretary of State (the Overseeing Organisation in Northern Ireland) undertakes in the fencing covenant to provide and maintain a sufficient fence or wall to prevent cattle and sheep (including lambs) and, at the request of the vendor, horses and pigs, from straying on the motorway. Although motorway fences are sited on highway land it is not always possible to carry out the erection within the boundary. Consideration should be given to obtaining an easement so that the erector can encroach on the adjoining land both for initial erection and any subsequent maintenance, including the maintenance of mesh provided for the security of animals such as badgers.

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4 (05/01) Where additional stockproofing is required; the following options should be considered:

(i) Timber Fence

Fencing wire stapled to the field side of the fence as follows:

(a) one barbed wire above the top rail;

(b) two lower wires, barbed or plain as described, one below the bottom rail and the other between that rail and the next above; alternatively, a fifth timber rail may be provided as shown in the HCD.

(ii) Dropper Pattern Fence

(a) one barbed wire fixed, with tie wires every 450 mm, to the top wire of the 1.35 m fence;

(b) one barbed wire fixed as in (a) to the third from top wire of the 1.35 m fence;

(c) provision of a 1.80 m fence when there is a possibility of there being deer on adjacent land but;

(d) provision of a 2.10 m fence when deer are on adjacent land in large numbers.

However, the views of the landowner should be sought before deciding on the position of barbed wire because practice varies over the country.

If horses are being contained it may not be satisfactory to fix barbed wire at a low level.

5 The requirement for spacing straining posts at intervals not exceeding 300 m and intermediate posts at 7.5 m centres for dropper pattern fences should be waived in the following circumstances:

(i) Undulating ground. When the fence line is straight but varies in level, straining posts should be provided at the summits and valleys of the slopes and the requirement for these additional straining posts should be stated in Appendix 3/1 or on the Drawings.

When the ground is uneven under the line of the fence it is suggested that the ground be trimmed, particularly if the fence is desired to be stockproof, and that this requirement be included in Appendix 3/1.

(ii) Horizontal alignment. When the alignment of the carriageway is on a horizontal curve, the curve cannot be followed with dropper pattern fencing. In such cases the distance between the straining posts should be divided into a series of straights, depending on the sharpness of curvature, and turning posts should be erected at each change of direction. For instance with the desired minimum radius of 1020 m it is suggested that 3 turning posts be included between straining posts at 75 m centres. The angle of change of direction at a turning post should not be more than 135°.

The land take should reflect the need to erect this type of fence in a series of straights.

(iii) Sharp change of direction. It is recommended that two straining posts be provided instead of using one.

6 Wire dropper fencing will often have been chosen because of its capacity to blend into the landscape, and so plastic coated wire and posts have been chosen as the standard. The fittings should also be unobtrusive; preferred fittings are included in the HCD.

In choosing the fittings required the following points should be noted and where appropriate included in Appendix 3/1:

(i) The fittings on intermediate posts should allow the strained wires to be free running.

(ii) The size of the holes drilled in the posts should be to the appropriate dimensions for the fittings chosen and surplus holes should be filled with grommets.

(iii) Plastic coated wire which has exposed galvanizing should be painted with plastic paint.

(iv) External ratchets, droppers and other fittings should be coated with plastic paint.

(v) Breaks in straining wires can be repaired by untensioning, fixing a wire vice fitting, as shown on the HCD, and retensioning.

7 The Drawings should show where fencing is required, and the position, length and height for each type of fence. Appendix 3/1 should include any further details required.

8 Foundations to posts for wooden post and rail fences can be either rammed backfill or concrete mix ST 2, unless otherwise specified in Appendix 1/15 or Appendix 3/1 (see HCD Drawings H3 and H15).

9 (05/01) Where fencing for the protection of planted areas is required, the type of fence may be selected from the options shown on HDC Drawing Numbers H3, H39, H40, H43 and H44. Where animal security fencing is required, an appropriate mesh can be selected from HCD Drawing Numbers H46, H47 and H48. The choice of mesh shall have regard to the need to minimise the number of fences and the number of mesh attachments.

10 (05/01) If the fence is to be secured against rabbits and/or badgers, the method should be described in Appendix 3/1, together with the method of securing the turned-out portion of the fence. The location of the fence should be given careful consideration such that access for installation and future maintenance is available. Option (iv) is the least effective barrier to rabbits but it may be necessary to specify this, for example, where it has not been possible to obtain the relevant easement to the side of the fence facing the rabbit harbourage.

NG 307 Permanent Fencing for Accommodation Works

1 Landowners select the type of fencing for boundaries except those on motorway schemes. Nevertheless they should be encouraged to choose a type from the HCD or BS 1722, which, if it has to contain stock must be adequate for the purpose. Agreed requirements should be described in Appendix 1/15, or shown on the Drawings.

NG 308 (05/01) Gates and Stiles

1 The location and details of construction of gates and stiles should be shown on the Drawings. Reference should be made to the HCD wherever possible. Where access gates are to be provided in a length of fencing that incorporates wildlife mesh, the underside of the gate shall include security measures such as a concrete plinth.

NG 311 (05/01) Preservation of Timber

1 (05/08) Where natural durability is to be used to ensure the required service life without treatment, reference should be made to BS EN 350-2 which classifies different timber species according to their natural durability. European standards also provide methods for the specification of preservative-treated timber. These are presented in terms of the results of the treatment rather than the process used to treat the timber. The preservatives to be used are described in terms of their performance in test rather than the composition of the formulation. BS EN 335-1 defines service environments for timber in use in terms of biological use classes and these are used to describe preservative types. A use class 4 preservative is used to protect timber in ground contact and therefore satisfies all the mandatory test requirements specified for such a preservative in BS EN 599-1. However, there are additional optional tests to give greater assurance of performance. Clause 311 includes a ground contact field test as an additional requirement. The results of the treatment are specified according to the requirements of BS EN 351-1 by defining the penetration and retention of the preservative in the treated wood and the sampling system that must be used to demonstrate compliance.

2 (05/08) Inspection of the timber before preservative treatment is of the utmost importance and arrangements should be made for this to be carried out for each scheme. The extent of permitted defects generally is defined in the relevant British and European Standards indicated in Clause 304. Rejection of timber due to defects affected by moisture content, ie. 'checks' and 'splits' can only be enforced when the timber is within the specified moisture content range. This is only certain before preservation treatment and before the timber is subjected to the uncontrolled conditions on site. It is not satisfactory to inspect the material for quality control on delivery to site except in respect of physical defects which are unaffected by moisture content.

3 (05/08) Since the level of protection afforded by preservative treatment is now defined by required levels of retention and penetration in the treated timber, it is no longer necessary to include methods of treatment in the specification. However, it is anticipated that vacuum/high pressure methods of treatment will be required to achieve the retentions and penetration specified. Equally, the moisture content of the timber can be critical when attempting to treat timber in this way to the specified requirements. It is, therefore, advisable to ensure that the timber is at a moisture content of 28% or less before preservative treatment is carried out. To achieve this moisture content, fresh-sawn timber should be cut to the required sizes and open-stacked, preferably under cover, for a period that will depend on climate, weather and timber species. Alternatively, the timber can be kiln dried.

4 (05/08) If timber moisture content is to be assessed, the moisture meter offers a quick practical and convenient method (see BS EN 13183-2). Electrical resistance-type moisture meters should always be used in accordance with the manufacturer's instructions. Meters should be suitably calibrated before each use against a calibrated meter or oven-dried sample. A check box for this is available from TRADA Technology Ltd.

5 (05/08) The moisture meter test results can be confirmed by oven-drying tests (see BS EN 13183-1). This is particularly desirable in any case where there is the possibility of dispute. However, the non-destructive method of sampling (moisture meter method) should normally be used.

6 (05/08) Quality control at all stages of the process is essential. Clause 7 of BS EN 351-1 contains

recommendations on suitable factory production control procedures. Normally, direct testing shall be used to check compliance with penetration and retention specifications. BS EN 351-1 includes definitions of permeable and resistant timbers, enabling the AQL to be established. BS EN 351-2 includes guidance on the sampling scheme and the penetration pass/fail criteria for different AQLs. To demonstrate that the specified sapwood retention has been achieved, the analytical zones (i.e. complete sapwood portion) of all the borings taken to determine penetration should be combined and converted to an appropriate homogeneous form for chemical analysis. For all penetration and retention determinations suitable methods of analysis are required.

7 (05/08) If creosote has been applied, its dark colour provides the necessary indicator of its presence and penetration. A method of analysis to determine retention is described in EN 12490. For other preservatives, suitable methods of analysis should be obtained from the preservative manufacturer.

8 (05/08) If the manufacturer has demonstrated to the satisfaction of the Overseeing Organisation that a safe relationship exists between the achievement of the required penetration and retention and measurable features of the treatment process, the manufacturer can use these measurable features to demonstrate compliance. In BS EN 351-1 this is referred to as the indirect method. However, if this approach is established, the manufacturer should demonstrate the correctness of the relationship to the Overseeing Organisation during random, unannounced checks initiated by the Overseeing Organisation.

9 (05/08) If the indirect testing approach is established and the treatment process parameters are used to demonstrate compliance, the only way to ensure that each treatment process has been carried out as required is to witness the treatment. If exceptionally this is not done, it is necessary to accept the assurance of the treater, embodied in a certificate of treatment that should be provided with each batch. It may be that a batch of inspected timber, because of variations in the Contractor's programme, is sent to another scheme. In such cases, suitable arrangements should be made regarding inspection of the subsequent batch destined for the initial scheme.

10 (05/08) The conditions of approval for use of a wood preservative under the Control of Pesticide Regulations (CoPR) or Biocidal Products Regulations may state the minimum period of time from treatment to dispatch. Whether or not this is so in individual cases, timber should not be dispatched to site until it is at least surface dry. On receipt, it should be stacked on cross-bearers, with cross-bearers between bundles to allow drying to continue. Treatment with a water-borne preservative saturates and swells the timber. If subsequent drying is carried out too rapidly, extensive splitting can occur. To prevent this, slow drying, preferably under controlled conditions, is essential. The degree of necessary drying is largely dependent on the local prevailing weather conditions. (Note: For creosote treatment the surface of the timber may remain slightly tacky after treatment due to the nature of creosote.)

11 (05/08) If there is any doubt over the quality of preservation in the treated batch supported by indirect testing, the direct testing system can be applied.

NG 312 Painting of Timber Fences, Gates, Stiles and Posts

1 Appendix 1/15 should contain the details of accommodation works required in the Contract and should include the type and colour of paint required for fencing and gates. If preservation treatment is not required this should also be stated.

2 Requirements for the use of water borne acrylic paints or alkyd-acrylic paint instead of oil based paints should be given in Appendix 3/1.

3 Paint containing non-toxic constituents should be specified for use where the painted surfaces are accessible to animals.

NG SAMPLE APPENDIX 3/1: (05/01) FENCING, GATES AND STILES

[Note to compiler: Include here:]

1 Temporary Fencing

(i) Requirements for temporary fencing if different from requirements of sub-Clause 302.1 and 303.1.

(ii) Timing of removal of temporary fencing if different from sub-Clause 302.2.

(iii) Requirements for any preservation treatment to temporary fencing. *[303.3]*

2 Timber Quality

(i) (05/08) Requirements for timber if different from the requirements of sub-Clause 304.3.

3 Fittings

(i) Requirements for bolts, screws and nuts if different from the requirements of sub-Clause 305.1.

4 Permanent Fencing: Wooden Fencing, Gates and Stiles including Planting Works Fencing

(i) Flowing alignment and trimming ground to regular level on fence line.

[Location. Only included when necessary.]

(ii) Requirements for joining permanent fencing to existing hedges, fences and to other structures if different from the requirements of sub-Clause 306.1.

(iii) Details of additional stockproofing required. *[Location and details]*

(iv) Details of painting required.

[Only included when the compiler wishes to specify painting specifically.]

(v) Concrete surround to base of posts.

[Location. Included when the compiler wishes to specify concrete footings for post and rail fencing as shown on HCD drawing no. H3 and H15.]

(vi) Details of type of Planting Works Fencing. *[Location and details]*

(vii) Details of security treatment below access gates in fencing that incorporates wildlife mesh. *[Location and details]*

5 Permanent Fencing: Wire Dropper Fencing

(i) Flowing alignment and trimming ground to regular level on fence line.

[Location. Only included when necessary.]

(ii) Requirements for joining permanent fencing to existing hedges, fences and to other structures if different from the requirements of sub-Clause 306.1.

(iii) Details of additional stockproofing required. *[Location and details]*

(iv) Requirements for painting with plastic paint in accordance with sub-Clause 306.3.

(v) Zinc coated wire only.

[Only included when departing from standard zinc and plastic coating]

(vi) Details of fittings required. *[Preference is for hidden ratchet and wire vice and droppers and other fittings painted with plastic paint.]*

(vii) Spacing of posts and requirement for turning posts. *[Location.]*

6 Wire Mesh to Permanent or Existing Fencing

(i) Details of wire mesh attachments to fencing including the appropriate side of an existing fence to which the mesh is fixed. *[Location and details]*

(ii) Treatment of turned out portion of netting. *[Location and details]*

7 Badger Gates

(i) Details of requirements for badger gates including whether two-way gates are required. *[Location and details]*

8 Fenced Tree Guards

(i) Details of requirements for fenced tree guards. *[Location and details]*

9 Preservation of Timber

(i) Details of preservative to be used if different from sub-Clause 311.2(i). *[Location and details]*

10 Other

(i) Colour of plastic coating to high tensile wire. *[2605.3]*