

Australian Standard[®]

Chain link fabric fencing

Part 1: Security fences and gates— General requirements



This Australian Standard® was prepared by Committee CE-008, Chain Link Fabric Security Fences and Gates. It was approved on behalf of the Council of Standards Australia on 4 June 2010.

This Standard was published on 21 September 2010.

The following are represented on Committee CE-008:

- Australasian Wire Industry Association
 - Australian Chain Link Fencing Association
 - Australian Chamber of Commerce and Industry
 - Australian Industry Group
 - Master Builders Association
 - Temporary Fencing Association of Australia
 - Water Services Association of Australia
-

This Standard was issued in draft form for comment as DR AS 1725.1.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

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Chain link fabric fencing

Part 1: Security fences and gates— General requirements

Originated as AS 1725—1975.
Second edition 2003.
Revised and redesignated as AS 1725.1—2010.

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Published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 978 0 7337 9644 9

PREFACE

This Standard was prepared by the Standards Australia Committee CE-008, Chain Link Fabric Security Fences and Gates to supersede AS 1725—2003, *Chain link fabric security fencing and gates*.

The objective of this Standard is to establish minimum requirements for fence materials and workmanship for security fences, in order to ensure satisfactory service by the fence for the purchaser, and assist manufacturers and installation contractors by eliminating unnecessary minor variations in purchasers' requirements. Where alternatives are provided in this Standard, purchasers should nominate their preference.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

Statements expressed in mandatory terms in notes and footnotes to tables and figures are deemed to be requirements of this Standard.

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STANDARDS AUSTRALIA

Australian Standard Chain link fabric fencing

Part 1: Security fences and gates—General requirements

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for chain link fabric security fencing and gates available in a range of alternatives and combinations, with options for fence height, fabric, wire coatings, wire service duty, pipe grades and tables, and types of security fencing design options, depending on agreement between purchaser and manufacture to suit the circumstances of site security. Purchasers need to carefully consider, select and nominate their preference for each component.

NOTES:

- 1 AS 1725 Parts 1 to 5 fencing solutions are not deemed to be structures as defined in AS 4100, therefore, are not intended to comply with AS 1170, AS 4100 and AS/NZS 4600. However, in applications of high wind loading, crowd control and safety barriers, which can be considered a risk to public safety or deemed to be a building structure, the specifier is required to comply with AS 1170, AS 4100 and AS/NZS 4600.
- 2 Appendix A provides purchasing guidelines which will assist the purchasers to establish the security fencing requirements suitable for their site application. Purchasers need to carefully consider, select and nominate their preference for each component.

1.2 APPLICATION

This Standard is applicable to the manufacture and installation of chain link fabric security fences and tubular gates, the normal uses for which include the following:

- (a) Security for industrial, commercial and public buildings that are in isolated locations or are surrounded by open space, examples being factories, offices and schools.
- (b) Security for, or restriction of access to, expansive open areas, such as residential developments, playing fields, open-air storage, defence bases, airports, water storages, freeways and hazardous areas such as quarries.
- (c) Security fences for government institutions and other open areas where restricted access is desirable.

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

- | | |
|-------|---|
| 1074 | Steel tubes and tubulars for ordinary services |
| 1170 | Structural design actions |
| 2423 | Coated steel wire fencing products for terrestrial, aquatic and general use |
| 2700S | Colour standards for general purposes |
| 3972 | Portland and blended cements |
| 4100 | Steel Structures |

4506 Metal finishing—Thermoset powder coatings

AS/NZS

1163 Cold-formed structural steel hollow sections

2312 Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings

4600 Cold-formed steel structures

4680 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles

4792 Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process

EN

10255 Non-alloy steel tubes suitable for welding and threading—Technical delivery conditions

1.4 DEFINITIONS

For the purposes of this Standard, the definitions given in AS 2423, AS 4506, AS/NZS 4792 and those below apply.

1.4.1 Backstay

A diagonal tubular steel member supporting a post laterally and set into the ground.

1.4.2 Barbed wire

Conventional twist or reverse twist wire complying with AS 2423.

1.4.3 Baseplates

Metal plates welded to base of post to provide fitting and securing to concrete pavement, timber floors, steel floors or similar surfaces.

1.4.4 Braced panel

Two adjacent posts with connecting bracing rail and bracing cable.

1.4.5 Bracing cable

Twin-twisted wires with turnbuckle used in strainer assemblies as a tension member.

1.4.6 Bracing rail

The horizontal tubular steel compression member used in a braced panel.

1.4.7 Bracing diagonal stay

A diagonal tubular steel member fixed to end, strainer, corner and gate posts in the line of the fence behind the chain link fabric and set into the ground or alternatively clamped to the base of the adjoining post.

1.4.8 Cable support wires

Longitudinal wires supporting the chain link fabric between fence posts.

1.4.9 Chain link fabric

Diamond-pattern-woven fencing fabric manufactured from wire with a select range of wire diameters and coating options together with alternative design formed selvedge, in accordance with AS 2423.

1.4.10 Chain link fabric (service duty)

A grading to determine the durability and strength options of the fabric.

NOTE: The options in this Standard are heavy duty or light duty (refer to AS 2423).

1.4.11 Concrete footings

Given mass of concrete as per post as shown in Tables B2, B2, C2, C3, D2 and D3 to support fence members in ground.

1.4.12 Fence posts and assemblies

1.4.12.1 *Fence post*

An upright tubular steel member for supporting fencing material.

1.4.12.2 *Corner post*

A fence post positioned at a corner or change of direction of the alignment of a fence.

1.4.12.3 *End post*

Fence post at the end of a line of fencing.

1.4.12.4 *Gate post*

Two fence posts forming a gateway.

1.4.12.5 *Intermediate post*

Fence posts positioned at regular, equally spaced intervals between corner and/or end posts to provide support for the fencing material.

1.4.12.6 *Strainer posts*

Fence posts at significant variations in levels and at intervals when specified with either bracing stays or bracing cables to enable required tension of support cables and chain link fabric to be obtained.

1.4.12.7 *Post extension*

An extension of the fence post above the normal height of chain link fabric, which may be angled or vertical and to which barbed wire may be attached.

1.4.12.8 *Strainer assembly*

- (a) A strainer post with bracing cables or bracing stays.
- (b) Alternatively, a braced panel with crossed diagonal bracing cables.

1.4.13 Fittings

Clamps, caps, hinges and components used in the assembly of a fence.

1.4.14 Gate

A tubular steel rectangular-shaped frame covered with chain link fabric, hinged on a gate post and used to close a gateway.

1.4.15 Lacing and tie wire

The wire that is used to lace and/or tie chain link fabric to support cables, fence posts, pipe rails and gate frame.

1.4.16 Metallic wire coating

Zinc or zinc/aluminium-alloy coating complying with AS 2423.

1.4.17 Organic paint coatings

A thin coating finish over a base metallic-coated wire, complying with AS 2423.

1.4.18 Plastic or polymer wire coatings

A coating such as extruded PVC or fuse-bonded polymer over a base metallic-coated wire, complying with AS 2423.

1.4.19 Pipe rail

Horizontal tubular steel member clamped to fence posts to support chain link fabric located at selected selvedge edges of chain link fabric.

1.4.20 Powder coating paint finish

A coating of pigments and reinforcing fillers over galvanized tubular steel fence members and associated galvanized fence fittings (refer to AS 4506).

1.4.21 Selvedge

Top and bottom formed edges of the chain link fabric (refer to AS 2423).

1.5 PIPE SPECIFICATIONS AND TABLES

Alternative pipe specifications and tables form part of the requirements of this Standard, to assist purchasers in evaluating the performance criteria for strength of the nominated pipe Standards AS 1074, AS/NZS 1163 and EN 10255. The pipe specifications given in Table B1 of Appendix B for Class 1 (medium quality) pipe or Table C1 of Appendix C for Class 2 medium/light quality pipe or Table D1 of Appendix D for Class 3 (medium/extra light quality) pipe shall be used when considering the durability required for the proposed application.

NOTES:

- 1 Medium quality pipe remains consistent throughout Appendices B, C, and D for all gate posts and all terminal posts.
- 2 The pipe grades and Tables options form part of this Standard; however, it is not intended to limit the pipe sizes for other arrangements, which may provide the purchaser with improved performance.

1.6 SERVICE LIFE

1.6.1 General

The durability of the various components in a fence is dependent on both the climatic conditions and the local environmental, or microclimatic, conditions of the site in which the fence is to be placed.

NOTE: For guidance on the durability of metal and paint coatings applied to steel, refer to AS/NZS 2312.

1.6.2 Estimation of durability of wire products

An accurate estimation of the durability is usually not possible without in-depth knowledge of all the conditions pertaining to a particular site, although local experience may prove to be of assistance.

NOTE: For guidance, AS 2423 gives indications, or estimations, of the durability of metallic (i.e. non-plastic coated) zinc coatings covered by this Standard.

1.7 TYPES OF SECURITY FENCING DESIGN OPTIONS

1.7.1 Type 1—Rail-less security fencing

Rail-less security fencing shall be constructed with three (3) longitudinal cable wires to support the chain link fabric, with all cables are attached and secured to posts and strained taut between all braced panel terminal strainer posts, as follows:

- (a) *Type 1-R-L/P-T* Rail-less plain top security fencing, in accordance with Figure H1, Appendix H.
- (b) *Type 1-R-L/B-T* Rail-less 3 barbed top security fencing (vertical or cranked top), in accordance with Figure I1, Appendix I.

1.7.2 Type 2—Pipe rail security fencing

Pipe rail security fencing shall be constructed with pipe rails clamped between every post to nominated selvedge edge to support the chain link fabric and improve the service life of the security fence.

Where no pipe rail is provided, then a cable wire shall be required to support the chain link fabric to either selvedge edge. For bottom rail only, security fencing, braced panels shall be required to all terminal strainer posts as per rail-less fence design (to maintain tension for top cable wires).

The following applies:

- (a) *Type 2-T-B/P-T* Top and bottom rail, plain top security fencing in accordance with Figure J1, Appendix J.
- (b) *Type 2-T-R/P-T* Top rail only, plain top security fencing.
- (c) *Type 2-B-R/P-T* Bottom rail only, plain top security fencing.
- (d) *Type 2-T-B/B-T* Top and bottom rail, 3 barbed top security fencing (vertical or cranked top), in accordance with Figure K1, Appendix K.
- (e) *Type 2-T-R/B-T* Top rail only, 3 barbed top security fencing (vertical or cranked top).
- (f) *Type 2-B-R/B-T* Bottom rail only, 3 barbed top security fencing (vertical or cranked top).

The types of security fencing design options as detailed form part of this Standard; however, it is not intended to limit other designs or arrangements which may provide purchaser that improved performance for security.

Refer to Appendices B to K for requirements on specific design options as follows:

- (i) Appendix B for class 1 medium quality pipe.
- (ii) Appendix C for class 2 medium/light quality pipe.
- (ii) Appendix D for class 3 medium/extra light quality pipe.
- (iii) Appendix E for gate frames.
- (iv) Appendix F for galvanized baseplates.
- (v) Appendix G for optional diagonal brace stays.
- (vi) Appendix H for fence and gate Type 1-R-L/P-T (rail-less plain top).
- (vii) Appendix I for fence and gate Type 1-R-L/B-T (rail-less 3 barbed top).
- (viii) Appendix J for fence and gate Type 2-T-B/P-T (top and bottom rail plain top).
- (ix) Appendix K for fence and gate Type 2-T-B/B-T (top and bottom rail 3 barbed top).

1.8 PURCHASING GUIDELINES

NOTE: Refer to Appendix A for information on purchasing guidelines.

SECTION 2 MATERIALS

2.1 GENERAL

Materials used in the construction of components for chain link fences and gates covered by this Standard shall meet the requirements of Clauses 2.2 to 2.6.

NOTE: It is essential that the zinc or, where applicable, zinc/aluminium-alloy coating mass, or coating thickness, on all fencing materials, whether posts or chain link fabric or tie wire or hinges, that are not otherwise protected by an overlaid organic coating such as plastic, paint or powder coating, meet minimum specified requirements, if the fence is to attain service design life with minimal appearance of detractive red rust.

2.2 WIRE FENCING MATERIALS

Chain link fencing fabric, barbed wire, single-stranded fencing wire and tie wire shall comply, in all respects, with AS 2423.

Metallic-coated wires shall have a coating class appropriate for the service environment and for the nominated service design life.

Where the chain link fabric is composed of galvanized wire, all of the other wires used in the fence shall be of the same coating designation, that is, if the fabric is W10Z, then all other galvanized wires shall be W10Z.

NOTE: The same principle applies to zinc/aluminium-alloy coated wires, e.g., the designation will be W05Z5A.

All metallic-coated wires used in the fence shall be either all galvanized or all zinc/aluminium-alloy coated, to ensure that all endure for similar periods of time before the onset of red rusting.

2.3 STEEL TUBES

Medium quality pipe specified in Tables B2 and B3 of Appendix B for posts, stays, rails and bracing rails shall comply with either AS/NZS 1163 strength grade 250 MPa and/or AS 1074, EN 10255 strength grade 195 MPa.

Light quality pipe specified in Tables C2 and C3 of Appendix C for posts, stays, rail and bracing rails shall comply with either AS/NZS 1163 strength grade 350 MPa and/or AS 1074, EN 10255 strength grade 195 MPa.

Extra light quality pipe specified in Tables D2 and D3 of Appendix D for posts, stays, rail and bracing rails shall comply with either AS/NZS 1163 strength grade 350 MPa and/or AS 1074, EN 10255 strength grade 195 MPa.

The galvanized (zinc) coating on the steel tubes shall comply with AS/NZS 4792 with a coating class of HDG 300 or equivalent service life.

2.4 FITTINGS/BASEPLATES

All clamps, pipe fittings, hinges, fasteners, catches and baseplates and any other parts shall be manufactured from plain carbon steel, suitable for hot-dip galvanizing complying with AS/NZS 4680.

2.5 CONCRETE POST FOOTINGS

Concrete for post footings shall comply with Tables B2 and B3 of Appendix B or Tables C2 and C3 of Appendix C or Tables D2 and D3 of Appendix D and shall be at least 20 MPa in compressive strength.

Post footings shall have been prepared using cement complying with AS 3972.

2.6 POWDER COATING

Powder coating shall comply with the requirements of AS 4506.

SECTION 3 COMPONENTS

3.1 GATE POSTS

Gate posts shall be medium quality as specified in Tables B2, C2 and D2 of Appendices B, C and D, respectively.

3.2 FENCE POSTS

Fence posts shall be in accordance with Clause 1.5 and one of the following pipe qualities, as nominated by the purchaser:

- (a) Class 1, (medium quality), see Appendix B, Table B3.
- (b) Class 2, (medium/light quality), see Appendix C, Table C3.
- (c) Class 3, (medium/extra light quality), see Appendix D, Table D3.

Posts may be spliced by butt welding, provided that the splice is located in the concrete and is not less than 150 mm below ground level. Welds shall be cleaned and treated with zinc rich paint. The tops of all posts shall be provided with tightly fitted steel galvanized caps.

Post extensions, where required by the purchaser for the attachment of barbed wire, shall be provided with holes not greater than 6 mm diameter or, optionally, shall be indented nominally 2 mm deep at 150 mm centres above the top of the selvedge of the chain link fabric for the attachment of the barbed wire.

3.3 BRACING RAILS, BRACING STAYS AND BACKSTAYS

Bracing rails, bracing stays and backstays shall be provided without joints and shall be DN 32 (diameter nominal) and 42.4 mm OD (outside diameter) in accordance with Clause 3.2.

3.4 PIPE RAIL FENCING

Pipe rail, where nominated by the purchaser to support the chain link fabric, shall be DN 32 and 42.4 mm OD without joints. Joints are only permitted for continuous top rail fencing at not less than 6000 mm intervals (top rail only).

Joints shall be tightfitting with either internal swagged or external or internal sleeve joints or screwed and socket joints or butted together centrally over post within fitting as per selected pipe qualities in accordance with Clause 3.2.

NOTE: Joints in bottom rails are not permitted.

3.5 CHAIN LINK FABRIC

3.5.1 General

This Clause (3.5) specifies three optional heights of chain link fabric for security fencing, namely 1800 mm, 2100 mm and 2400 mm, all manufactured with a nominal 50 mm pitch mesh and optionally two wire diameters, either 3.15 mm 'heavy duty' or 2.5 mm 'light duty'.

3.5.2 Height options

The preferred heights of chain link fabric for security fencing shall be:

- (a) 1800 mm.
- (b) 2100 mm.
- (c) 2400 mm.

3.5.3 Service duty

A grading to determine the durability and strength options between the two preferred wire diameters for chain link fabric nominated in this Standard with a 50 mm nominal pitch mesh shall be as follows:

- (a) *Heavy duty*—as defined in AS 2423, chain link fabric manufactured with 3.15 mm wire, which represents the most rigid and durable fabric for higher security applications.
- (b) *Light duty*—as defined in AS 2423, chain link fabric manufactured with 2.50 mm wire, light duty may be selected for light industrial applications where security and durability are of a lower priority.

NOTES:

- 1 Light duty 2.50 mm wire fabric provides for only approximately 60% of the load bearing capacity of heavy duty 3.15 mm wire fabric.
- 2 Fuse-bonded polymer coatings provide positive adhesion to the base wire to withstand higher impact damage therefore requires less polymer coating thickness.
- 3 Fuse-bonded polymer-coated wire will provide for improved service life in higher impact situations and coastal areas.

For preferred chain link options, refer to Figure 3.1.

3.5.4 Selvedge

The preferred combination of selvedges for security fencing shall be ‘knuckled-barbed’ (KB), i.e. knuckled bottom and barbed top (see Figure 3.1).

NOTE: Other combinations may be used only if selected by purchaser to suit their site requirements, as follows:

- (a) ‘Knuckled-knuckled’ (KK)—Knuckled both top and bottom.
- (b) ‘Barbed-barbed’ (BB)—Barbed both top and bottom.

3.5.5 Coatings

Chain link fabric is available in a range of coating options, as specified in AS 2423.

Chain link fabric that is manufactured with a metallic finish wire coating shall comply with the following:

- (a) *Galvanized coating* Designation shall be W10Z minimum and identifying code HG.
- (b) *Zinc/aluminium-alloy coating* Designation shall be W05Z5A minimum and identifying code ZA.

NOTES:

- 1 AS 2423 provides advice on durability of both zinc-coated and zinc/aluminium-alloy coated wires under a variety of environmental conditions.
- 2 Thin organic coatings (paint compounds) may be used over metallic-coated wires (refer to AS 2423).
- (c) *Extruded plastic coated wire, PVC (polyvinyl chloride)* Shall comply with AS 2423 with a base metallic coating not less than W02Z.

NOTE: All extruded plastic coated wire diameters are measured and specified by the core base metallic-coated wire diameter, for example:

- (a) Extruded PVC—3.15 mm core base metallic-coated wire with extruded plastic coating provides a typical 3.95 mm minimum outside diameter.
- (b) Extruded PVC—2.50 mm core base metallic coated wire with extruded plastic coating provides a typical 3.2 mm minimum outside diameter.

- (d) *Fuse-bonded polymer (FBP)* Coated wire shall comply with AS 2423 with a base metallic coating not less than W02Z.

NOTE: All fuse-bonded polymer-coated wire diameters are measured and specified by the core base metallic-coated wire diameter, for example:

- (a) Fuse-bonded polymer—3.15 mm core base metallic-coated wire with fuse-bonded polymer-coated wire provides a typical 3.55 mm minimum outside diameter.
- (b) Fuse-bonded polymer—2.50 mm core base metallic-coated wire with fuse-bonded polymer-coated wire provides a typical 2.85 mm minimum outside diameter.

Colours for plastic/polymer-coated wire shall be either black or dark green. The black shall approximate Black N61 and the dark green shall be Bottle Green G11 of AS 2700S. The plastic shall be UV-stable.

NOTE: Other colours may be negotiated between interested parties, but it should be noted that the resulting plastics/polymer may have a lower resistance to UV radiation.

3.5.6 Preferred range

The preferred range of chain link fabric for security fences is given in Table 3.1.

NOTE: Purchasers may select and specify other combinations of chain link fabric complying with AS 2423 if heavier grades of fabric or wire coating durability are required for their site application.

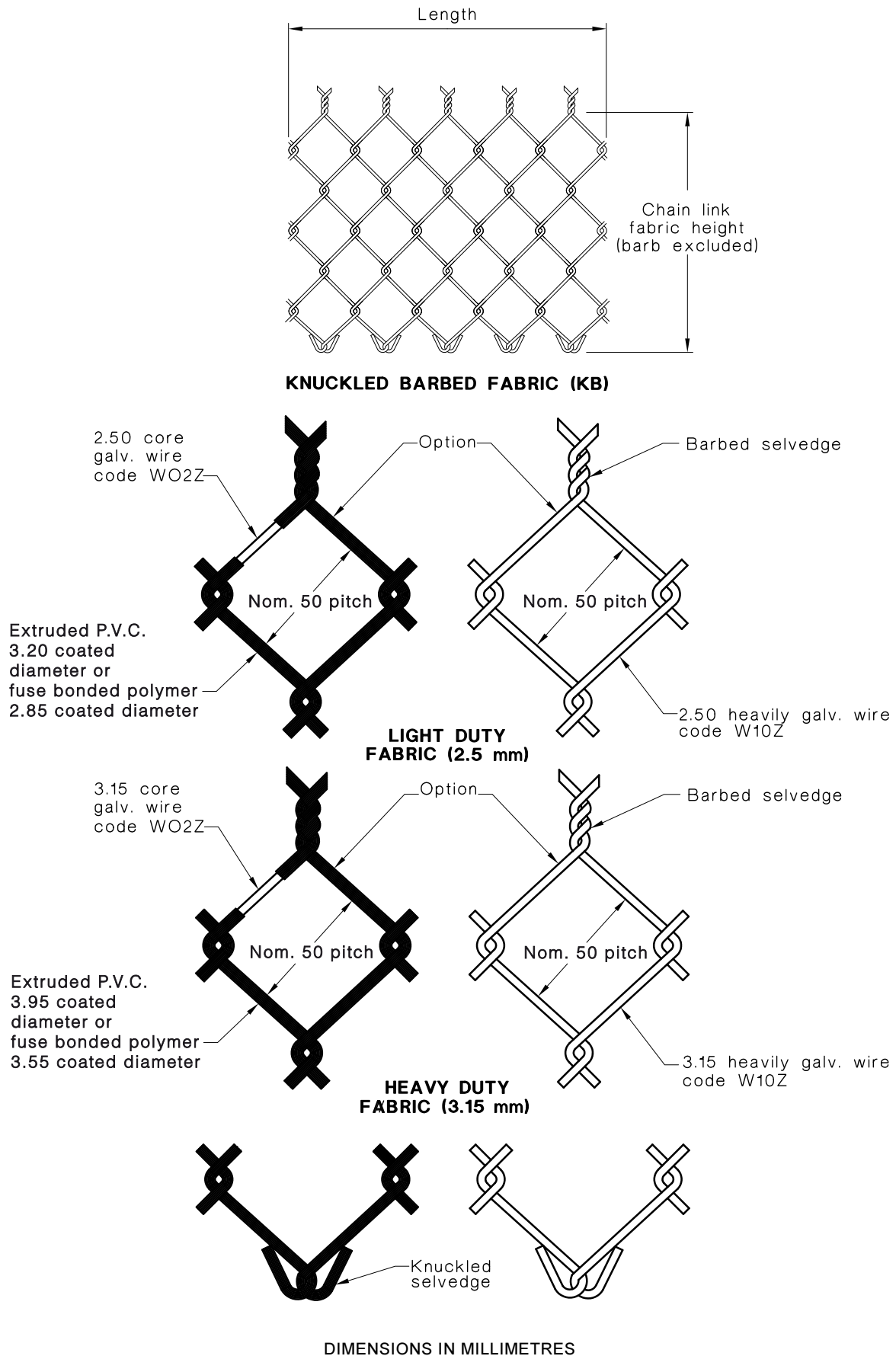


FIGURE 3.1 PREFERRED CHAIN LINK FABRIC OPTIONS

TABLE 3.1
PREFERRED RANGE OF CHAIN LINK FABRIC SECURITY FENCING

Fabric height mm	Pitch or mesh size mm	Wire diameter mm	Wire coating designation and identifying code	Selvedge—Top and bottom edge of fabric	Fabric service duty
(Fabric height) × 50 × 3.15/W10Z/HG/KB heavy duty (chain link fabric)					
1800	50	3.15	W10Z/HG	KB (Knuckled-barbed)	Heavy duty
2100	50	3.15	W10Z/HG	KB (Knuckled-barbed)	Heavy duty
2400	50	3.15	W10Z/HG	KB (Knuckled-barbed)	Heavy duty
(Fabric Height) × 50 × 3.15/W02Z/SG-PVC/KB heavy duty (chain link fabric)					
1800	50	3.15	W02Z/SG-PVC	KB (Knuckled-barbed)	Heavy duty
2100	50	3.15	W02Z/SG-PVC	KB (Knuckled-barbed)	Heavy duty
2400	50	3.15	W02Z/SG-PVC	KB (Knuckled-barbed)	Heavy duty
(Fabric Height) × 50 × 3.15/W02Z/SG-FBP/KB heavy duty (chain link fabric)					
1800	50	3.15	W02Z/SG-FBP	KB (Knuckled-barbed)	Heavy duty
2100	50	3.15	W02Z/SG-FBP	KB (Knuckled-barbed)	Heavy duty
2400	50	3.15	W02Z/SG-FBP	KB (Knuckled-barbed)	Heavy duty
(Fabric Height) × 50 × 2.50/W10Z/HG/KB light duty (chain link fabric)					
1800	50	2.50	W10Z/HG	KB (Knuckled-barbed)	Light duty
2100	50	2.50	W10Z/HG	KB (Knuckled-barbed)	Light duty
2400	50	2.50	W10Z/HG	KB (Knuckled-barbed)	Light duty
(Fabric Height) × 50 × 2.50/W02/SG-PVC/KB light duty (chain link fabric)					
1800	50	2.50	W02Z/SG-PVC	KB (Knuckled-barbed)	Light duty
2100	50	2.50	W02Z/SG-PVC	KB (Knuckled-barbed)	Light duty
2400	50	2.50	W02Z/SG-PVC	KB (Knuckled-barbed)	Light duty
(Fabric Height) × 50 × 2.50/W02/SG-FBP/KB light duty (chain link fabric)					
1800	50	2.50	W02Z/SG-FBP	KB (Knuckled-barbed)	Light duty
2100	50	2.50	W02Z/SG-FBP	KB (Knuckled-barbed)	Light duty
2400	50	2.50	W02Z/SG-FBP	KB (Knuckled-barbed)	Light duty

NOTES:

- KB selvedge mesh shall be the standard fabric available for security fencing.
- Either BB fabric, i.e. barbed selvedge both top and bottom, or KK fabric, i.e. knuckled selvedge both top and bottom, shall only be available on request, if specified by purchaser.

3.6 BARBED WIRE

Barbed wire, if required by the purchaser, shall be manufactured to AS 2423.

3.7 BRACING CABLE (FOR BRACED PANEL)

Each bracing cable shall be of the same coating quality as selected for the chain link fabric and comprise of two strands of 3.15 mm core wire twisted together or tensioned in conjunction with a galvanized 12 mm turnbuckle.

3.8 SUPPORT CABLES

Each support cable shall be of the same coating quality as selected for the chain link fabric and comprise of any one of the following:

- (a) *Metallic-coated* Helicoil cable wire (single-strand 4 mm diameter wire helix spiralled).
- (b) *Extruded plastic coated* Helicoil cable wire (single-strand 4 mm diameter core metallic-coated base wire plus plastic coating to provide 5.20 mm coated outside diameter wire helix spiraled).
- (c) *Fuse-bonded polymer-coated* Helicoil cable wire (single-strand 4 mm diameter core metallic-coated base wire plus polymer coating to provide 4.35 mm coated outside diameter wire helix spiraled).
- (d) *Metallic-coated* Twin-twisted cable wire (twin-strand 3.15 mm diameter wires, both wires twisted together between posts).
- (e) *Extruded plastic coated* Twin-twisted cable wire (twin-strand 3.15 mm diameter core metallic-coated base wires plus plastic coating to provide 3.95 mm coated outside diameter wire), both wires twisted together between posts).
- (f) *Fuse-bonded polymer-coated* Twin-twisted cable wire (twin-strand 3.15 mm diameter core metallic-coated base wires plus polymer coating to provide 3.55 mm coated outside diameter wire), both wires twisted together between posts).

3.9 LACING WIRE

Lacing wire shall be 2 mm diameter wire and shall be the same coating quality as selected for the chain link fabric and be one of the following:

- (a) *Metallic-coated* 2.0 mm wire.
- (b) *Extruded plastic coated* 2.0 mm diameter core metallic-coated base wire plus plastic coating to provide 2.80 mm coated outside diameter wire.
- (c) *Fuse-bonded polymer-coated* 2.0 mm diameter core metallic-coated base wire plus polymer coating to provide 2.35 mm coated outside diameter wire.

NOTE: For safety purposes, knotted joints in lacing wire are not permitted.

3.10 TIE WIRES AND CLIPS

Tie wire for posts shall be the same coating quality as selected for chain link fabric and comprise of either single-strand 2.0 mm diameter core wire or double-strand 1.57 mm diameter core wire, to secure chain link fabric or barbed wire to pipe posts and rails.

Tie wire to secure chain link fabric to cables shall be single-strand 1.57 mm diameter core wire or optionally 2.0 mm diameter core wire netting clips, and be one of the following:

- (a) *Metallic-coated* Of the same quality as chain link fabric.
- (b) *Extruded plastic coated* Of the same quality as chain link fabric.
- (c) *Fuse-bonded polymer-coated* Of the same quality as chain link fabric.

3.11 GATES

Gates shall be fabricated in accordance with the diagrams shown in Appendix E and the following requirements:

- (a) All joints shall be fully welded joints (staggered welding not permitted). Fillet welds shall be not less than 6 mm, exposed surface width and shall be cleaned by chipping and wire brushing.
- (b) Two coats of approved zinc-rich paint shall be applied in accordance with AS/NZS 4680 to any galvanized surface damaged by welding.
- (c) The height of the gate shall match the height of the fence (subject to allowance for sufficient minimum ground clearances).
- (d) The gates shall be covered with chain link fabric to match the fence. The covering shall be drawn taut and laced with 2 mm lacing wire to the outer frame and tied to each internal member.
- (e) When required by the purchaser, barbed wire shall be strained taut and tied to the gate extensions to match the lines of the barbed wire on the fence.
- (f) Alternative internal gate bracing designs shall be allowable provided they are engineered to deliver equal or improved performance to support gate frames.

NOTE: Alternative designs are the subject of agreement between purchaser and manufacturer.

3.12 HINGES

Where clip-type hinges are used, a collar shall be welded to the gate frame to provide a bearing surface for either the top or bottom hinge. Alternatively, gudgeon pins may be used for bottom hinges only.

3.13 CATCHES

Unless otherwise specified by the purchaser, trip-type catches shall be fitted to gates for slam closing.

3.14 RESTRAINING AND LOCKING OF GATES

3.14.1 Drop-bolts

A drop-bolt made from 16 mm diameter round galvanized plain carbon steel shall be fitted to each double-leaf gate and keepers shall be provided at ground level to hold the gates in both open and closed positions.

3.14.2 Locking

Provision shall be made for the locking of the gate(s). The locking shall be by drop-bolts suitable for locking. A galvanized 8 mm chain welded to the hand hole maybe included if required by the purchaser. Handhole(s) shall be incorporated in the gate(s) so that a lock can be accessed from either side of the gate(s). Handholes may be omitted if locking from one side only is required.

3.14.3 Shoot-bolt

For single-leaf gates, a shoot-bolt made from 12 mm diameter round galvanized plain carbon steel set into a hand hole shall be provided for the attachment of a padlock. Hand holes may be omitted if locking from one side only is required.

3.15 BASEPLATES

Baseplates shall be in accordance with Figures F1 to F8, of Appendix F and the following:

- (a) Baseplates shall have fully welded joints (staggered welding not permitted). Fillet welds shall be not less than 6 mm exposed surface width and shall be cleaned by chipping and wire brushing.
- (b) Two coats of approved zinc-rich paint shall be applied in accordance with AS/NZS 4680 to any galvanized surface damaged by welding.

3.16 POWDER COATING THICKNESS

Powder coating application over galvanized steel tubes and fittings shall be a thermosetting polyester resin system, applied electrostatically and oven cured. Unless otherwise indicated, dry film thickness (DFT) shall be 60–100 µm.

3.17 OTHER PAINT COATING SYSTEMS

Other paint coating systems may be applied if agreed between the purchaser and installer provided they are applied strictly to manufacturer's recommendations and provide either equal or improved performance to powder coating over galvanized steel tubes and fittings.

SECTION 4 INSTALLATION

4.1 LINE AND LEVEL

All posts shall be vertical. Horizontal displacement shall be not greater than the height of the post divided by 240. The fence shall be so installed that on completion it is truly on the line of the boundaries, which shall have been previously set out by the purchaser. The top of the fence shall be even and follow approximately the profile of the ground or levels previously indicated by the purchaser. Unless otherwise agreed between the purchaser and supplier, the installation of the fence shall not include cutting or filling of the ground to vary the levels.

4.2 SPACING OF POSTS

4.2.1 For Type 1 Rail-less security fencing

Posts shall be spaced at 3300 mm maximum centres. Strainer assemblies shall be installed at significant changes of direction and where specified by the purchaser.

4.2.2 For Type 2 Pipe rail security fencing

Posts shall be spaced at 3300 mm maximum. Strainer assemblies shall be installed at significant changes of direction (only for fencing without top rail) and where specified by the purchaser.

4.3 FOOTINGS

4.3.1 Concrete post footings

Concrete post footings shall be not less than the minimum sizes specified in Tables B2 and B3 of Appendix B, or Tables C2 and C3 of Appendix C or Tables D2 and D3 of Appendix D, as appropriate.

The constituents for footings shall be thoroughly mixed and the concrete placed in position and thoroughly compacted as soon as possible after mixing. This shall be done with due regard being taken of prevailing weather conditions at the time of placing, but in no case shall the time exceed 1 h after mixing.

After installation of posts or stays, the complete excavation shall be filled with concrete, and well compacted as filling proceeds (allowing 24 h for curing period).

4.3.2 Baseplates

If agreed by purchaser and installer, where suitable concrete pavement or similar surfaces exist, baseplates as shown in Appendix F may be used in lieu of concrete footings as specified in Appendix B or C.

4.4 BRACING—FOR FENCING WITHOUT TOP RAIL

Braced panels or bracing stays shall be used on all ends, corners and gate posts and evenly spaced within 150 m on straight sections.

4.5 BRACED PANELS—FOR FENCING WITHOUT TOP RAIL

Where braced panels are used, the bracing rails shall be set 300 mm below the top selvedge of the chain link fabric. One strand of each section of the bracing cable shall be securely looped twice around the post and the two ends anchored to the turnbuckle. The cable shall be twisted taut and finely tensioned using the turnbuckle to ensure braced panel posts remain plumb under load after attachment of cable wire (as shown Figures H1 to H6, of Appendix H, and Figures I1 to I6, of Appendix I).

4.6 BRACING DIAGONAL STAYS—FOR FENCING WITHOUT TOP RAIL

Bracing diagonal stays, where used, shall be attached to posts at a height not less than 300 mm below the top selvedge of the chain link fabric and enter the ground at a distance not less than equal to the height of the chain link fabric or clamped to base of adjoining post (as shown in Figure G1 and Figure G2 of Appendix G).

4.7 BACKSTAYS

Backstays shall be used where specified by the purchaser and shall be attached at a height not less than 1250 mm above ground level. The footings shall be set inside the fence line not less than 600 mm from the fence and shall extend not less than 600 mm vertically below ground level.

4.8 ATTACHMENT OF BRACING

Pipe bracing rails, bracing stays and backstays shall be connected to posts with galvanized bolted split clamp-on fittings (as shown in Figures H1 to H6, of Appendix H, and Figures I1 to I6, of Appendix I).

4.9 ATTACHMENT OF PIPE RAILS

All rails shall be securely connected to posts with galvanized bolted split clamp-on type fittings, (as shown in Figure E2 of Appendix E) in accordance with manufacturer's recommendations.

4.10 SUPPORT CABLES

Ends of cable wires shall be firmly secured to all terminal posts. Each cable wire shall be wrapped around the terminal post twice with the end neatly tied over a minimum of four tight compact twists around cable wire and the end neatly cut off flush with cable wire. There shall be three evenly spaced rows of support cables positioned at the top, centre and bottom of the fence fabric and on the outside face of the posts. The top support cable shall be positioned one half-diamond below the top selvedge of the chain link fabric. The bottom support cable shall be positioned not more than one diamond above the bottom selvedge of the chain link fabric (as shown in Figures H1 to H6, of Appendix H, and Figures I1 to I6, of Appendix I.)

Knotted joins in cable wire are not permitted.

4.11 ATTACHMENT OF SUPPORT—SINGLE STRAND 4 mm HELICOIL CABLE WIRE

Each helicoil cable wire shall be wrapped around and tied to the starting strainer post carried across the outside face of all line posts and adequately tensioned and strained taut between 1.0 to 1.2 kN and secured between terminal posts. Helicoil cable wire shall be securely tied to each intermediate post with a double cross tie with 2 mm tie wire. The tie shall be twisted twice and the ends neatly cut off and bent over to avoid injury.

4.12 ATTACHMENT OF SUPPORT—TWIN 3.15 mm TWISTED CABLES

The two component wires of each support cable shall be twisted together at intervals between posts to form a tight spiral pitch and so provide 1.0 to 1.2 kN tension on the cables to support the chain link fabric. The tensioning of the support cables shall not be commenced until the concrete footings have cured.

4.13 CHAIN LINK FABRIC

Unless otherwise specified, chain link fabric shall be placed on the outside of posts and strained taut between 1.0 to 1.2 kN and secured to each support cable, and all posts and bracing rails with tie wires, except at the end posts and gate posts.

At the end posts and gate posts the chain link fabric shall be fully laced to end posts, internal corner posts and gate posts. The space between the bottom selvedge of the chain link fabric and the ground shall be sufficiently small to clear the surface and maintain security.

As specified by the purchaser for pipe rail fencing the chain link fabric shall be fully laced through each diamond with 2.00 mm wire, to each rail at selvedge edge, or alternatively tied at each fourth diamond with double strand 1.57 mm wire (only if agreed with purchaser). Each tie wire shall be twisted twice and the ends neatly cut off and bent over to avoid injury.

4.14 TIE WIRES AND CLIPS

4.14.1 Tie wire to intermediate posts

There shall be a minimum of 2 ties per post to secure chain link fabric to posts, with each tie located centrally between cables. Ties to secure chain link fabric to bracing rails shall be at 480 mm max. spacing (each sixth diamond). Each tie wire shall be twisted twice and the ends neatly cut off and bent over to avoid injury.

4.14.2 Tie wire to cable wire

Tie wire to cable wire shall be 1.57 mm wire twisted twice and neatly cut off and secured at 480 mm max. spacing (each sixth diamond on chain link fabric).

4.14.3 Netting clips to cable wire

Netting clips to cable wire shall be 2.0 mm wire, sized correctly for the application and firmly clamped together and fully closed and overlapped with suitable pliers, secured at 320 mm maximum spacing (each fourth diamond on the chain link fabric).

4.15 BARBED WIRE

Barbed wire, where required by the purchaser, shall be strained taut between 1.0 to 1.2 kN between posts and secured with tie wires to post indentations, and preset at 150 mm equal spacing above chain link fabric.

4.16 BOLTS

All threaded bolts used for attachment of fittings on fences and gates shall be sized correctly for clamp-on fittings and securely tightened with nuts fitted inside the fence.

4.17 GATES—HINGED

Gates, where fitted, shall operate freely and keepers shall be set firmly into either concrete pavement or concrete footings of not less than 150 mm diameter and not less than 350 mm deep. The clearance under the gates, when in the closed position, shall be sufficiently small to clear the surface and maintain security.

4.18 SITE CLEARANCE

Unless otherwise specified by the purchaser, excavations of soil from postholes shall be spread neatly inside the fence line. Any rock excavated and surplus debris from post holes shall be removed from site.