TS 01621:3.0

Technical Information

TfNSW Proprietary Components and Systems Register (CSR) for Bridgeworks

Issue date: 13 December 2024

Effective date: 13 December 2024

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Document information

Owner: Director Engineering Bridges and Structures
Technical, Design and Engineering
Infrastructure Projects and Engineering

Mode: Road

Discipline: Civil

Document history

Revision	Effective date	Summary of changes
1.0	14 December 2022	Renumbered as TS 01621:1.0. Version number recommenced in line with new designation.
2.0	30 March 2023	Second issue.
3.0	13 December 2024	Third issue. Appendix A to J issued.

Preface

This document provides lists of registered proprietary bridge components and systems which can be used in TfNSW projects. The listed components and systems have been assessed against the model TfNSW QA specifications that were current at the time of evaluation. These registered components and systems are available to be specified in drawings and utilised during construction, contingent upon a project-specific fit-for-purpose assessment and considerations for appropriate design, installation, and future maintenance. Project-specific product approvals are required for all products being proposed on a TfNSW bridge project.

If a supplier seeks to have a product included on the list without corresponding TfNSW QA specifications or type approval conformity requirements or both, the proposal is typically rejected.

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1 Scope

This document details the proprietary bridge components and systems that are registered for use in TfNSW bridges and structures infrastructure projects, when and if deemed fit-for-purpose for the specific project.

It summarises the outcome of the assessment process of these products against the relevant model TfNSW QA specifications, and if successful, results in a registration letter to the relevant supplier and inclusion on the appended list. The latest appended list of TfNSW proprietary components and systems (CSR) for bridgeworks is publicly available via the TfNSW Standards portal.

Project specific fit-for-purpose assessment is out of the scope of this document.

2 Application

This document is intended to be used by designers, proof engineers, independent verifiers, technical managers, project managers, project engineers, and asset custodians implementing the requirements for selecting a registered product as part of a quality assurance plan during design, construction, operation, and maintenance asset life cycle stages.

Appendix A Proprietary bridge expansion joints

The registered proprietary bridge expansion joints are listed in Table 1.

Table 1 – registered proprietary bridge expansion joints

Joint type	Product name	Company
Fingerplate (See Notes i, ii, iii)	CIPEC WP Series steel fingerplate joints: WP250, WP300, WP350, WP400, WP450, WP500, WP550, WP600	Freyssinet Australia
	GRANOR/ETIC SFEJ series steel fingerplate joints: SFEJ 150, SFEJ 200, SFEJ 250, SFEJ 300, SFEJ 350, SFEJ 400, SFEJ 450, SFEJ 500, SFEJ 550, SFEJ 600	Granor Rubber & Engineering
	TENSA Finger RSFD-B140-AU (parallel-sided fingers)	mageba (Australia) Pty Ltd
	TENSA Finger RSFD-B300 (triangular fingers)	mageba (Australia) Pty Ltd
Sawtooth (See Notes i, ii & iii)	CIPEC Wd110, Wd160, Wd230C	Freyssinet Australia
	ETIC: EJ-110, EJ-160, EJ200 and EJ250R ('R' indicates reduced maximum opening.)	Granor Rubber & Engineering
Strip seal (See Note i)	CIPEC WOSd 75 AUS-R CIPEC WOSd 100 AUS-R	Freyssinet Australia
	Granor Ausflex: Type AC-AR with Chloroprene seal sizes75D, 100D, 125D and 100F	Granor Rubber & Engineering
	Britflex BEJ (Rehabilitation of expansion joints only)	Evolution Civil Maintenance
	TENSA Single Gap RS-B80	mageba (Australia) Pty Ltd
	Watson Bowman Acme: Strip Seal	Granor Rubber & Engineering
Compression seal	Watson Bowman Acme: Series WA and WG	Granor Rubber & Engineering
Small movement joints with elastomeric concrete nosing	XJS System (Rehabilitation of small movement joints)	Granor Rubber & Engineering
Prefabricated seals with elastomeric nosing	SIKA EMSEAL BEJS Expansion Joint with SIKA EMSEAL Emcrete Elastomeric Nosing (for rehabilitation work only)	BENZBERG Pty Ltd

Joint type	Product name	Company
Cold applied sealant joints	Emer-Seal: Fosroc Nitoseal SC820 (Type 1 sealant) Fosroc Nitoseal SC800 (Type 2 sealant) (Refer to TfNSW TS 01762 for sealant type definition)	Parchem

Notes:

i. Recess for anchors in top surface should be filled with approved sealant such as Parchem PU40 after tightening.

ii. Provide stainless steel drainage troughs for new bridges.

iii. These joints may have large gaps, and may not suit the use of cyclists or pedestrians. Designers should check the suitability of these joints for the bridge use and conditions.

Appendix B Proprietary bridge bearings

The registered proprietary bridge bearings are listed in Table 2.

Table 2 – registered proprietary bridge bearings

Bearing type	Company	Product name
Pot (See Note i)	Freyssinet Australia	Tetron CD FX/GL/GG
	Granor Rubber & Engineering	GPFF, GPFX and GPGS
	mageba (Australia) Pty Ltd	RESTON
Spherical (See Note i)	Freyssinet Australia	TETRON SB ISOGLIDE
	mageba (Australia) Pty Ltd	RESTON
Laminated elastomeric	Freyssinet Australia	Freyssinet
	Granor Rubber & Engineering	Series A to K, Series N to Y
	mageba (Australia) Pty Ltd	LASTO BLOCK (Type B)
Unreinforced elastomeric pads and strips	Granor Rubber & Engineering	Granor® Elastomeric Bearings
	mageba (Australia) Pty Ltd	LASTO Pads and Strips

Note:

i. Preapproval of pot and spherical bearings was based on sample designs provided by the suppliers. Prior to supply to projects, bearings should be designed and independently verified to ensure conformance with TfNSW relevant specifications and AS 5100.4 by the project team.

Appendix C Proprietary bridge deck waterproofing membranes

The registered proprietary bridge deck waterproofing membranes to TfNSW specification TS 00082 are listed in Table 3.

Table 3 – registered proprietary bridge deck waterproofing membranes

Company	Product name	Waterproofing system
GCP Applied Technologies (contingent upon successful renewal audit)	Eliminator System	Liquid applied membrane
Hychem International Pty Ltd	RPM Belgium Matacryl® WPM	Liquid applied membrane

Appendix D Proprietary post-tensioning systems

(Refer to TfNSW QA Specification TS 01736.1).

General Note:
Bursting reinforcement in post-tensiosning local anchorages is in accordance with AS5100.5 except stated otherwise for the post-tensioning system.

Preapproval of post-tensioning systems is subject to their compliant installation under supervision and certification of an approved supervisor. According to TfNSW TS 01736, this supervisor is a nominated employee of the supplier, who is audited and listed for each supplier by the Senior Bridge Engineer (ATS | Engineering Bridges & Structures | Policy & Specifcation).

The registered proprietary post-tensioning systems and their components are listed In Sections D.1 to D.7.

D.1 Dywidag Systems International Construction Pty Ltd

D.1.1 Dywidag Threadbar system

The post-tensioning systems and their components are:

a. stressing and non stressing anchorage: square plate and domed anchor nut without grout slot

b. coupling: cylindrical movable coupling system types D and G and fixed coupling system

c. hot-rolled ribbed bar sizes of 26, 32, 36, 40, 47, and 57 mm diameters to AS/NZS 4672 with minimum tensile strength of 1050 MPa.

D.1.2 Dywidag factory grouted double corrosion protection Threadbar system

The post-tensioning systems and their components are:

a. stressing and non stressing anchorage: square plate and domed anchor nut without grout slot

b. coupling: cylindrical coupling system type D

c. hot-rolled ribbed bar sizes of 26, 32, 36, 40, 47, and 57 mm diameters to AS/NZS 4672 with minimum tensile strength of 1050 MPa.

Note: Use limited to unbonded post-tensioning system.

D.1.3 Dywidag MA multistrand post-tensioning system

The post-tensioning systems and their components are:

a. stressing anchorage: anchor heads and multi plane MA bearing plate up to 55 strands using 30/60 degrees teeth 3-piece wedges of type 36H for diameter 15.2 mm strand and type 37H for diameter 15.7 mm strand

b. non-stressing anchorage: anchor heads and multi plane MA bearing plate up to 55 strands using 30/60 degrees teeth 3-piece wedges of type 36H for diameter 15.2 mm strand and type 37H for diameter 15.7 mm strand, or type H bond anchorage up to 22 strands

c. ducts: circular spiral steel sheet ducts zinc coated to EN 523

d. tendon sizes of 5, 7, 9, 12, 15, 19, 22, 27, 31, 37, 43, 49, and 55 strands of the following types and grades:

   1. AS/NZS 4672.1-7 wire ordinary-15.2-1750-Relax 2
   2. AS/NZS 4672.1-7 wire ordinary-15.2-1830-Relax 2
   3. EN 10138-3-Y 1867S7-15.7 Low Relaxation

e. bursting reinforcement: TfNSW approved details including helix reinforcement in accordance with Dywidag Prestressing System - European Technical Assessment ETA-13/0815 available at the Dywidag website.

D.2 Fortec Australia Pty Ltd.

D.2.1 MK4 multistrand post-tensioning system

The post-tensioning systems and their components are:

a. MeKano4 PT system M/TK – approved to European Technical Approval ETA-12/0310 & ETA 19/0065:

   - Active anchor head type MSA with 4 to 37 x 15.2 or 15.7mm diameter strands using 3-piece ring wedges

   - Passive anchor head type MSA with 4 to 37 x 15.2 or 15.7mm diameter strands using 3-piece ring wedges

b. tendon sizes of 4, 5, 7, 9, 12, 15, 19, 24, 27, 31 and 37 strands of:

   1. AS/NZS 4672.1 7-wire ordinary-15.2-1750-Relax 2
   2. AS/NZS 4672.1 7-wire ordinary-15.2-1830-Relax 2
   3. AS/NZS 4672.1 7-wire ordinary-15.7-1860-Relax 2

c. coupling: not included in this register

d. sheaths/Ducts: Corrugated galvanised steel sheet ducts zinc coated to AS1397, or GTI corrugated polypropylene (PP) plastic ducts with an additional transition sleeve in use between casting and duct for strands 24 and above

e. bursting reinforcement in accordance with MeKano4 PT system TK/M-European Technical Approval ETA 19/0065 and ETA/12-0310 available at Fortec Australia website.

D.3 Freyssinet Australia Pty Ltd

D.3.1 Freyssinet C range multistrand prestressing system

The post-tensioning systems and their components are:

a. stressing (active) and non-stressing (fixed) anchorages: type AnC15 using 3-piece wedges

b. non-stressing dead end anchorages (embedded in concrete):

1. type DE comprising power seated 2-piece wedge and barrel assemblies on steel plate for 15.2 strands (tendon sizes of 3, 4, 7, 13, 19, 25, 31, and 37 strands)
2. type DE comprising power seated 3-piece wedge and barrel assemblies on steel plate for 15.7 strands (tendon sizes of 3, 4, 7, 13, 19, 25, 31, and 37 strands)
3. type DE comprising extruded type 15D anchor swages on steel plate for 15.2 and 15.7 strands (tendon sizes of 3, 4, 7, 13, 19, 25, 31, and 37 strands)
4. type NB internal passive anchorage with extruded type 15DC anchor swages for 15.2 and 15.7 strands

c. coupling:

1. couplers type CI, comprising of staggered monostrand connectors of individual strands, for up to 37 strands
2. couplers type CU, multistrand fixed couplers for tendon sizes of 3, 4, 7, 13, 19, 25, 31, and 37 strands

d. ducts: circular steel ducts zinc coated to AS 1397 and HDPE Plyduct corrugated ducts

e. tendon sizes of 3, 4, 7, 13, 19, 25, 31, 37, and 55 strands of the following types and grades:

1. AS/NZS 4672.1-7 wire ordinary-15.2-1750-Relax 2
2. AS/NZS 4672.1-7 wire ordinary-15.2-1830-Relax 2
3. EN 10138-3-Y1867S7-15.7 Low Relaxation

f. bursting reinforcement in accordance with Freyssinet Prestressing System - European Technical Approval ETA-06/0226 with some changes to suit reinforcement sizes in Australia. Refer to Freyssinet catalogue available at the Freyssinet website.

D.3.2 Freyssinet Australia slab system

The post-tensioning systems and their components are:

a. stressing (active) anchorages: stressing blocks with 2-piece wedges, except for anchorages of size 5S15 that comprise barrels and 2-piece wedges

b. non stressing anchorages: cast-in onion dead end with steel plates

c. coupling: coupler blocks

d. ducts: round and oval galvanised ducts

e. tendon sizes of 2, 3, 4, and 5 strands of the following types and grades:

   1. AS/NZS 4672.1-7 wire ordinary-12.7-1870-Relax 2

   2. AS/NZS 4672.1-7 wire ordinary-15.2-1750-Relax 2.

D.3.3 Freyssibar system

The post-tensioning systems and their components are:

a. stressing and non-stressing anchorages: flat anchorage with standard plates, flat washers and nuts. The standard plates can be found in four different designs:

   1. FP: bearing plate

   2. FPGH: bearing plate with injection slot

   3. FPGHT: bearing plate with injection slot and welded tube

   4. FPGHTV: bearing plate with injection slot and welded tube fitted with injection inlet

b. coupling: moveable or fixed cylindrical couplers

c. Freyssibar nominal sizes of 26.5, 29, 32, 36, 40, and 50 mm diameters made of steel grade 1030 conforming to prEN 10138:2003 Parts 1 & 4

d. ducts: galvanised steel circular corrugated ducts

e. bursting reinforcement in accordance with Freyssinet Prestressing System - European Technical Approval ETA-09/0169 with some changes to suit reinforcement sizes in Australia. Refer to Freyssinet catalogue available at the Freyssinet website.

D.3.4 Freyssibar+ system

a. Freyssibar+ nominal sizes of 57 and 75mm diameters made of steel grade 1080 MPa

b. stressing and non-stressing anchorages: Flat anchorage with standard plates, flat washers and nuts. The standard plate can be found in four different designs:

   1. F+P: bearing plate

2. F+PGH: bearing plate with injection slot
3. F+PGHT: bearing plate with injection slot and welded tube
4. F+GHTV: bearing plate with injection slot and welded tube fitted with injection inlet.

c. coupling: Moveable or fixed couplers

d. ducts: Circular plastic compliant with FIB Bulletin 75 or galvanized ducts

e. grouting System: Freyssinet PT grouting system.

D.4 SRG Limited

D.4.1 SRG Limited slab post-tensioning system

The post-tensioning systems and their components are:

a. stressing anchorages: anchor blocks on cast-in anchorage using 2-piece wedges

b. non stressing anchorages: cast-in swaged type dead end on steel plate or bulb dead end

c. coupling: coupling anchorages, using 2-piece wedges for strands to be coupled and swaged ends for coupling strands

d. ducts: circular and flat steel sheet ducts zinc coated to AS 1397

e. tendon sizes of 1 to 5 strands of the following types and grades:

1. AS/NZS 4672.1-7 wire ordinary-12.7-1870-Relax 2
2. AS/NZS 4672.1-7 wire ordinary-15.2-1750-Relax 2
3. AS/NZS 4672.1-7 wire ordinary-15.2-1830-Relax 2.

D.4.2 Macalloy bar prestressing system

The post-tensioning systems and their components are:

a. stressing and non stressing anchorages: flat stressing nut and washer on square steel anchor plate with an unthreaded hole

b. coupling: Macalloy Couplers

c. ribbed bar of 25, 26.5, 32, 36, 40, and 50 mm diameters as approved in ETA-07/0046

d. ducts: circular spiral steel sheet ducts zinc coated to AS 1397

e. bursting reinforcement in accordance with Annex C of ETA-21/0054.

D.4.3 BBR VT CONA CMI BT prestressing system

The post-tensioning systems and their components are:

a. active (stressed) or passive (fixed) plain anchor head type A2 (2 to 31 strands) using 3-piece wedges

b. active or passive plain anchor head type A6 (2 to 61 strands) using 3-piece wedges

c. active or passive threaded anchor head type H2 (2 to 31 strands) using 3-piece wedges

d. active or passive single plane multistrand coupler type K (2 to 31 strands)

e. active or passive multistrand sleeve coupler type H (2 to 31 strands)

f. bearing trumplates type A spheroidal cast iron (2 to 61 strands)

g. HDPE anchorage trumpets type A (2 to 61 strands)

h. HDPE coupler trumpets type K (2 to 31 strands)

i. circular zinc-coated steel ducts to AS 1397

j. circular BBR VT corrugated polypropylene ducts and couplings

k. CONA 3-piece wedge type H with steel spring ring

l. tendon sizes of 2 up to 61 strands of the following types and grades:

   - AS/NZS 4672.1-7 wire ordinary-15.2-1860-Relax 2 (ACRS Certified) or;
     EN I0138-3-Y1860S7-15.3-140-1860-260-Low relax (CARES Certified or equivalent)
   - AS/NZS 4672.1-7 wire ordinary-15.7-1860-Relax 2 (ACRS Certified) or;
     EN I0138-3-Y1860S7-15.7-150-1860-279-Low relax (CARES Certified or equivalent)

m. bursting reinforcement in accordance with Freyssinet Prestressing System - European Technical Approval ETA-09/0169 with some changes to suit reinforcement sizes in Australia. Refer to the catalogue available at the BBR website.

D.5 VSL Australia Pty Ltd

D.5.1 VSL Type SC multistrand prestressing system

The post-tensioning systems and their components are:

a. stressing anchorage: machined anchor heads with 90° spigot on cast-in square-faced castings using 2-piece wedges

b. non-stressing anchorage: cast-in Type P swaged ends on steel plate or Type H onion dead ends

c. coupling: type KAS Multistrand coupler heads with 90° spigot (see Note i)

d. ducts: circular corrugated galvanised ducts and corrugated plastic ducts VSL PT PLUS system

e. tendon sizes of 7, 12, 19, 22, 27, 31, 37, 42, 48, and 55 strands of the following types and grades:

1. AS/NZS 4672.1-7 wire ordinary-12.7-1870-Relax 2
2. AS/NZS 4672.1-7 wire ordinary-15.2-1750-Relax 2
3. AS/NZS 4672.1-7 wire ordinary-15.2-1830-Relax 2.

Note:

i. Maximum coupled tendon size made up of 12.7 mm strands is 55x12.7 mm and maximum coupled tendon size made up of 15.2 mm strands is 31x15.2 mm.

D.5.2 VSL Type GC prestressing system

The post-tensioning systems and their components are:

a. active or passive end QT material anchor heads type E for 1 to 55 strands

b. non-stressing anchorage bonded anchorages type H for 1 to 37 strands

c. fixed coupler type K for 3 to 37 strands

d. spheroidal graphite cast iron Gc castings for 3 to 55 strands

e. ducts: internal tendons: corrugated galvanised steel ducts (PL1) and corrugated plastic ducts VSL PT PLUS to fib75 (PL1, PL2 and PL3)

external tendons: HDPE pipe and accessories in accordance with AS/NZS 4131 (PL2 and PL3)

f. sheet metal rolled K - trumpet for K couplers for 3 to 37 strands

g. polypropylene trumpet with Gc castings for 19 to 55 strands

h. 2-piece wedge type W6N (for 15.2 mm diameter strand) or W6S (for 15.7 mm diameter strand) with or without clip

i. 7-wire strands:

- 15.2mm: AS/NZS 4672.1-7 wire-15.2-1770-Relax 2
- 15.2mm: AS/NZS 4672.1-7 wire-15.2-1860-Relax 2
- 15.7mm: AS/NZS 4672.1-7 wire-15.7-1860-Relax 2

j. bursting reinforcement system design parameters, anchorage spacing, and concrete strength in accordance with ETA-06/0006.

D.5.3 VSL slab system

The post-tensioning systems and their components are:

a. stressing anchorages: anchor blocks on cast-in anchorage using 2-piece wedges

b. non stressing anchorages: cast-in Type P swaged ends on steel plate or Type H onion dead ends

c. coupling: slab coupling anchorages type S - using 2-piece wedges for strands to be coupled and swaged ends for coupling strands

d. ducts: oval galvanised ducts and corrugated plastic ducts VSL PT PLUS system

e. tendon sizes of 1 to 5 strands of the following types and grades:

   1. AS/NZS 4672.1-7 wire ordinary-12.7-1870-Relax 2
   2. AS/NZS 4672.1-7 wire ordinary-15.2-1750-Relax 2
   3. AS/NZS 4672.1-7 wire ordinary-15.2-1830-Relax 2.

D.5.4 VSL CT stressbar system

The post-tensioning systems and their components are:

a. stressing anchorages: flat stressing nut and washer or spherical nut and washer on steel bearing plates

b. non stressing anchorages: cast-in steel plate with threaded hole or a stressing anchorage

c. coupling: machined cylindrical CT couplers

d. ducts: circular corrugated galvanised ducts and corrugated plastic duct VSL PT PLUS system

e. bar size of 26, 29, 32, 36, 40, 48, 56, and 75 mm diameter coarse threaded bar made of steel grade AS 1444-V with nominal minimum tensile strength of 1030 MPa fabricated to AS/NZS 4672.1-[26,29,32,36,40,48,56,75]-1030-P.

Refer to the publications available at the VSL Australia website.

D.6 Rizzani de Eccher Australia Pty Ltd

D.6.1 Tensacciai MTAI and MTAIM prestressing system (contingent upon successful renewal audit)

The post-tensioning systems and their components are:

a. active anchorage types MTAI15 (15.2 strand) and MTAI15S (15.7 strand) for 4 to 37 strands

b. passive anchorage types MTAIM15 (15.2 strand) and MTAIM15S (15.7 strand) for 4 to 37 strands

c. spheroidal graphite cast iron block – Grade EN-GJS-500-7 for 4 to 37 strands

d. corrugated steel sheet duct to EN 523

e. corrugated HDPE trumpet

f. 3-piece wedge with steel spring ring – Grade 16NiCr4 to EN 10084 or Grade C15 to EN 10277-2

g. 1770 MPa or 1860 MPa 7-wire strand with diameters 15.2 mm or 15.7mm to EN 10138 or approved equivalent

h. bursting and additional local anchorage reinforcement, system design parameters and anchorage spacing and concrete strength in accordance with ETA approval ETA-08/0012 version 3 of 23/01/2017, available at the Tensa International website.

D.7 Tecpresa

D.7.1 Tecpresa multistrand post-tensioning system (contingent upon successful renewal audit)

The post-tensioning systems and their components are:

a. stressing anchorage: anchor block and bearing plate welded to trumpet, using 3-piece wedges

b. non-stressing anchorage: anchor block, bearing plate, and plate welded to trumpet, using 3-piece wedges

c. coupling: threaded couplers

d. ducts: circular spiral steel sheet ducts zinc coated to AS 1397 or EN 523, or plastic PT ducts

e. tendon: Sizes of 4, 7, 9, 12, 15, 19, 25, 31, and 37 strands of the following types and grades:

   1. AS/NZS 4672.1-7 wire ordinary-15.2-1750-Relax 2
   2. AS/NZS 4672.1-7 wire ordinary-15.2-1830-Relax 2
   3. EN 10138-3-Y 1860S7-15.7 Low Relaxation

f. bursting reinforcement: TfNSW approved details are shown in Tecpresa Technical Data Sheet available at the Ferrovial website.

Appendix E Proprietary grouting systems

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The preapproved proprietary grouting systems are listed in Table 4. Refer to TfNSW TS 01736 for more information.

Table 4 – registered proprietary grouting systems

Company	Grouting system material component
Freyssinet Australia Pty Ltd	BluCem HS 200A
VSL Australia Pty Ltd	Crosbe InfraGrout® 110
VSL Australia Pty Ltd	Crosbe InfraGrout® 110 Low Carbon

Appendix F Proprietary ground anchor systems

(Refer to TfNSW QA Specification TS 02163).

General Note:

Preapproval of ground anchor systems is subject to their compliant installation under supervision and certification of an approved supervisor. According to TfNSW TS 02163, this supervisor is a nominated employee of the supplier, who is audited and listed for each supplier by the Senior Bridge Engineer (ATS | Engineering Bridges & Structures | Policy & Specification).

F.1 Dywidag Systems International Construction Pty Ltd

F.1.1 Dywidag single Threadbar system

a. stressing anchorage: Square plate and domed anchor nut without grout slot

b. coupling: cylindrical movable coupling system types D and G and fixed coupling system

c. hot-rolled ribbed bar sizes of 26, 32, 36, 40, 47, and 57 mm diameters to AS/NZS 4672 with minimum tensile strength of 1050 MPa.

F.1.2 Dywidag factory grouted double corrosion protection Threadbar system

a. stressing anchorage: square plate and domed anchor nut without grout slot

b. coupling: cylindrical coupling system type D

c. hot-rolled ribbed bar sizes of 26, 32, 36, 40, 47, and 57 mm diameters to AS/NZS 4672 with minimum tensile strength of 1050 MPa.

F.1.3 Dywidag multistrand ground anchor (up to 22 strands) system comprising

a. ETA-13/0815 approved machined anchor heads with 90 degrees spigot on square steel plates using 30/60 degrees teeth 3-piece wedges of Type 36H for diameter 15.2 mm strand and Type 37H for diameter 15.7 mm strand

b. tendon sizes of 3, 5, 7, 9, 12, 15, 19, 22 strands of the following types and grades:

1. AS/NZS4672.1-7 wire ordinary-15.2-1750-Relax 2
2. AS/NZS 4672.1-7 wire ordinary-15.2-1830-Relax 2
3. AS/NZS 4672.1-7 wire ordinary-15.2-1860-Relax 2
4. AS/NZS 4672.1-7 wire ordinary-15.7-1860-Relax 2.

F.2 VSL Australia Pty Ltd

F.2.1 VSL type SC multistrand system

a. anchor head: machined anchor heads with 90° spigot on cast-in square-faced castings using 2-piece wedges

b. ducts: HDPE PE 100 corrugated ducts

c. tendon sizes of 7, 12, 19, 22, 27, 31, 37, 42, 48, and 55 strands of the following types and grades:

   1. AS/NZS 4672.1-7 wire ordinary-12.7-1870-Relax 2
   2. AS/NZS 4672.1-7 wire ordinary-15.2-1750-Relax 2
   3. AS/NZS 4672.1-7 wire ordinary-15.2-1830-Relax 2.

F.2.2 VSL CT stressbar system

a. anchor head: flat stressing nut and washer or spherical nut and washer on steel bearing plates

b. coupling: machined cylindrical CT couplers

c. ducts: HDPE PE 100 corrugated ducts

d. bar size of 26, 29, 32, 36, 40, 48, 56, and 75 mm diameter coarse threaded bar made of steel grade AS 1444-V with nominal minimum tensile strength of 1030 MPa fabricated to AS/NZS 4672.1-[26,29,32,36,40,48,56,75]-1030-P.

Appendix G Proprietary mechanical grade D500N reinforcing bar splices

Proprietary mechanical grade D500N reinforcing bar splices are listed in Sections G.1 to G.8.

G.1 Ancon Building Products trading as Leviat

Table 5 – Ancon Building Products reinforcing bar splices

Product name	Size	Comments
Ancon BT 12 to BT 40	12 mm to 40 mm	A threaded type coupler that requires threading of the ends of reinforcement bars to be spliced.
Ancon MBT ET12 to MBT ET36	12 mm to 36 mm	This coupler should be used only where the threaded type couplers cannot be used. The coupler relies on a row of screws tightened to hold the ends of reinforcement bars to be spliced and does not require bar end preparation.

G.2 InfraBuild Construction Solutions

Table 6 – InfraBuild Construction Solutions reinforcing bar splices (Contingent upon successful renewal audit)

Product name	Size	Comments
Dextra Griptec Standard Couplers	12 mm to 40 mm	A threaded type coupler extruded over the ends of the reinforcement bars to be spliced.
Dextra Unitec Bolted Couplers	20 mm to 36 mm	This coupler should be used only where the threaded type couplers cannot be used. The coupler relies on a row of screws tightened to hold the ends of reinforcement bars to be spliced and does not require bar end preparation.

G.3 ITW Australia Pty Ltd

Table 7 – ITW Australia Pty Ltd reinforcing bar splices

Product name	Size	Comments
ReidBar TX reinforcing bar splices	12 mm to 32 mm	ReidBar RB12TX, RBA16TX, RBA20TX, RBA25TX and RB32TX. A threaded type coupler that requires threading of the ends of reinforcement bars to be spliced.

G.4 nVent – Erico Products Australia Pty Ltd

Table 8 – nVent – Erico Products Australia Pty Ltd reinforcing bar splices

Product name	Size	Comments
Lenton Plus Standard Coupler EL12A12N to EL40A12N	12 mm to 40 mm	A threaded type coupler that requires threading of the ends of reinforcement bars to be spliced.
Lenton Plus Position Coupler EL12P13LN to EL40P13LN	12 mm to 40 mm	A threaded type coupler, with an extension nut to avoid the need to rotate the splicing bar during installation.
Lenton Plus Position Coupler EL12P14LN to EL40P14LN	12 mm to 40 mm	A threaded type coupler, with an extension nut to avoid the need to rotate the splicing bar during installation.

G.5 Onefab Engineering Pty Ltd

Table 9 – Onefab Engineering Pty Ltd reinforcing bar splices

Product name	Size	Comments
Onefab OneTouch reinforcing bar splices	16 mm and 32 mm	OneTouch HD16 and HD32. A threaded type coupler that does not require threading of the ends of reinforcement bars to be spliced.

G.6 Silva Global Pty Ltd

Table 10 – Silva Global Pty Ltd reinforcing bar splices

Product name	Size	Comments
Silva Global Griptec reinforcing bar splices	12 mm, 20 mm to 40 mm	Silva Global Griptec AG12, AG25, AG28, AG32, AG36 and AG40. A threaded type coupler extruded over the ends of the reinforcement bars to be spliced.

G.7 SRG Global Products Pty Ltd

Table 11 – SRG Global Products Pty Ltd reinforcing bar splices

Product name	Size	Comments
Bartek BP Standard (BPS) reinforcing bar splices	12 mm to 40 mm	Bartek BPS12, BPS16, BPS20, BPS24, BPS28, BPS32, BPS36 and BPS40. A threaded type coupler that requires threading of the ends of reinforcement bars to be spliced.
Bartek BP Bridging (BPP) reinforcing bar splices	12 mm to 40 mm	Bartek BPB12, BPB16, BPB20, BPB24, BPB28, BPB32, BPB36 and BPB40. A threaded type coupler that requires threading of the ends of reinforcement bars to be spliced.

G.8 Stride Reinforcement Pty Ltd

Table 12 – Stride Reinforcement Pty Ltd reinforcing bar splices

Product name	Size	Comments
StrideTek reinforcing bar splices	12 mm to 40 mm	StrideTek reinforcing bar splices PT12CM, PT16CM, PT20CM, PT24CM, PT28CM, PT32CM, PT36CM, and PT40CM. A threaded type coupler that requires threading of the ends of reinforcement bars to be spliced.

Appendix H Dynamic testing of piles

Proprietary systems, organisations and equipment for dynamic testing of piles are listed in Section H.1 and Section H.2.

H.1 Systems and organisations

Registered systems and organisations for dynamic testing of piles are the following:

a. Pile Driving Analyzer and CAPWAP Analysis (GRL USA)

1. Independent Geoscience Pty Ltd
2. VicRoads (GeoPave)
3. PILETEST P/L (a division of Wagstaff Piling)
4. Golder Associates Pty Ltd
5. Frankipile Australia P/L (Sydney)
6. Pile Test International
7. Foundation Specialists Pty Ltd
8. Advanced Foundation Solutions (Aust) Pty Ltd
9. Dynamic Pile Testing Australia Pty Ltd
10. Piling Contractors Pty Ltd
11. Ngamo Dynamics Pty Ltd
12. Avopiling Australia Pty Ltd

b. TNO Foundation Pile Diagnostic System and TNOWAVE Analysis (TNO Laboratories, Netherlands)

1. Frankipile Australia P/L (Sydney)
2. Foundation Specialists Pty Ltd.

H.2 Equipment

Registered equipment for dynamic testing of piles are the following:

a. Driving and Monitoring Equipment

1. Pile Driving Analyzer manufactured by Pile Dynamics Inc
2. Foundation Pile Diagnostic System (Version 3) manufactured by TNO Laboratories

b. Wave Equation or Signal Matching Process Programs

1. CAPWAP supplied by Goble-Roche Laboratories (for Pile Driving Analyzer results)
2. TNOWAVE supplied by TNO Laboratories (for TNO Foundation Pile Diagnostic System results).

Appendix I Pile splices

This section covers registered pile slices. Preapproved pile slices are the following:

a. TfNSW (RTA) Epoxy Splicing System

b. Balken Twist Lock Joint (350 mm x 350mm) manufactured and supplied by Wagstaff Piling Pty Ltd

c. ABB Pile Joint (350 mm x 350mm with 4 clamping elements) supplied by Frankipile Australia Pty Ltd

d. Dynamic Precast Pile Joint (350 mm x 350mm and 400 mm x 400mm with 8 clamping elements) supplied by Wagstaff Piling Pty Ltd

e. BC Pile Joint (350 mm x 350mm and 400 mm x 400mm with 4 clamping elements) supplied by Frankipile Australia Pty Ltd

f. AFS Joint (400 mm x 400mm with 4 clamping elements) supplied by Advanced Foundation Solutions (Aust) Pty Limited.

Notes:

1. All pile splices listed above are mechanical splices except the splice in Item (a).
2. Mechanical pile splices have limited flexural and tensile strength, and might not be suitable for some applications. For information on short-term (during driving) and long-term design capacity of the above-mentioned pile splices, contact the Director Engineering Bridges and Structures.

Appendix J Proprietary slip resistant coatings

The registered proprietary slip resistant coatings are listed in Table 13.

Table 13 – Registered proprietary slip resistant coatings

Company	Product name	Skid resistant coating
Cormac Metal Spray (contingent upon successful renewal audit)	Cormac TH604	Aluminium + ceramic oxide metal spray (see Note i)

Note:

i. Cormac TH604: In high wear situations, surface skid resistance to be checked at regular intervals and coating to be reapplied as required.