

AEFAC – TN04

GUIDELINE FOR THE SPECIFICATION OF FASTENINGS TO CONCRETE – ENGINEERING GENERAL NOTES

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1. Scope

This Technical note provides recommendations for the information to be included on engineering drawings for the specification of safety-critical fastenings for use in concrete.

The advice provided in this document is of a general nature and should not be considered a substitute for manufacturer's installation instructions or technical advice from the manufacturer/supplier.

2. General

A complete and accurate specification of a fastener fixed into concrete requires the following to be addressed:

1. Sufficient information included to ensure that the product designed is the product that is installed (refer to Section 4).
2. Installation of the fastener(s) is performed by a suitably experienced and qualified installer under appropriate supervision (refer to Section 5).
3. A suitable change management procedure is followed if the installation cannot proceed as intended (refer to Section 6).

Fasteners are to be treated as a system including fastener products, hole preparation and installation techniques.

The following points should be considered:

- Incorrect installation such as poor hole cleaning, may reduce fastener performance and prevent the fastener from functioning as intended.
- A complete and accurate specification is necessary to ensure that the correct product is procured and installed correctly.

3. Prequalification

Fastenings for use in concrete in safety-critical applications should have a prequalification that is compatible with the design provisions stipulated in AS 5216 and that is appropriate for the given application.

4. Product Information

The information listed in the specification should be sufficiently detailed to clearly define the product and its installation as assumed in the design. It may be possible to install a similar product only if it has been approved by the responsible engineer.

A recommendation for the minimum information to be included in the specification for different types of fasteners is included in the Appendix A of this Technical Note.

However, the manufacturer's installation instructions should always be consulted for a complete list of items to be included in the specification.

5. Installation

The installer should be suitably competent for the fastener installation. Competence may be demonstrated by being a current AEFAC certified installer, or an installer with the appropriate training from the manufacturer/supplier for the installed product.

The installation should follow the manufacturer's installation instructions and any additional information specified by the design engineer.

The installation depth of the fastener should be shown on the drawing.

Recommended text for specification

- All fasteners must be installed in accordance with the manufacturer's installation instructions that may be supplemented by information specified by the design engineer.
- Installation should be performed by an AEFAC certified installer or by a person trained by the manufacturer/supplier of the specified product.

6. Change Management

Many variables related to the substrate, fastener, fixture, environment and loading influence the suitability of a fastener for a given application. In the event that the specified product cannot be procured or installed as specified, the design engineer should provide written consent for an alternate solution (e.g. different fastener, different hole location, etc.) before work proceeds.

It may be possible to install an alternate product only if it has been approved by the responsible engineer. This may be necessary if the specified product is unavailable, drilling has met refusal due to the presence of rebar, etc. Selection includes the consideration of design criteria, product performance data and characteristics of the substrate.

Recommended text for specification

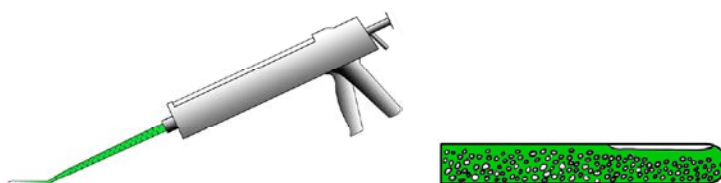
- The responsible engineer must be consulted for the approval of an alternate product or for the approval of a revised specification in the event that the fastener cannot be procured or installed as per the original specification.

APPENDIX A

ADDITIONAL FASTENER-SPECIFIC MATERIAL

A.1 Post-installed fasteners

A.1.1 Chemical fasteners



- Chemical fasteners are sensitive to poor installation methods.

Minimum information to be specified

Always refer to manufacturer’s installation instructions for a complete list of items to be included in the specification.

Chemical	Manufacturer’s name	
	Product name	
Anchor rod	Type	(E.g. Threaded rod)
	Diameter	(E.g. M12)
	Length (mm)	(E.g. 200mm)
	Finish/Coating	(E.g. Galvanised)
	Strength Grade	(E.g. Class 8.8)
	Depth of embedment (mm)	(E.g. 110mm)
Drill hole	Diameter (mm)	(E.g. 14mm)
	Depth (mm)	(E.g. 110mm)
	Drill type	(E.g. Carbide-tipped)
Max tightening torque (Nm)	If applicable	(E.g. 100 Nm)

Note: The setting tool and cleaning accessories (blow-out pump, cleaning brushes, etc.) suitable for the specified product shall be used as recommended by the manufacturer. The chemical needs to be cured for the time recommended by the manufacturer before application of any load. Curing time varies with the temperature at installation.

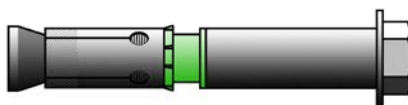
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Example text for specification

- The chemical product shall be a (*manufacturer name, product name*). The anchor rod shall be a *M12 x 200 threaded rod, galvanised, steel grade 8.8*, installed in a *14mm diameter hole with a 110 mm depth and tightened to a maximum 100 Nm torque* using a calibrated torque wrench.
- Cleaning accessories prescribed by the manufacturer's installation instructions shall be used

A.1.2 Torque-controlled expansion fastener – thick-walled type



- Mechanical fasteners are particularly sensitive to deviation of the hole diameter and may not function if installed in a hole with an incorrect diameter. Refer to Manufacturer's Installation Instructions for drill tolerances.

Minimum information to be specified

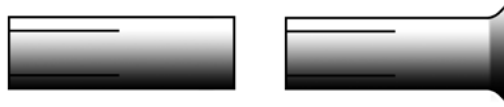
Manufacturer's name	
Product name	
Fastener size	(E.g. M12)
Finish / Coating	(E.g. galvanised)
Drill hole diameter (mm)	(E.g. 18mm)
Drill hole depth (mm)	(E.g. 110mm)
Tightening torque (Nm)	(E.g. 70Nm)

Note: *The setting tools, torque wrench and cleaning accessories (blow-out pump and cleaning brushes etc.) suitable for the specific product shall be used as per the manufacturer's installation instructions.*

Example text for specification

- The fastener shall be a (*manufacturer name, product name*), *M12 x 125 with galvanised coating*, installed in an *18 mm diameter hole drilled to a depth of 110 mm and tightened to a torque of 70 Nm* using a calibrated torque wrench.
- Setting tools and cleaning accessories prescribed by the manufacturer's installation instructions shall be used.

A.1.3 Deformation-controlled expansion fasteners



- Mechanical fasteners are particularly sensitive to deviation of the hole diameter and may not function if installed in a hole with an incorrect diameter. Refer to Manufacturer's Installation Instructions for drill tolerances.
- Mechanical fasteners should not be over-tightened during installation since this may damage the fastener and/or substrate, compromising the safety of the connection.

Minimum information to be specified

Fastener	Manufacturer's name	
	Product name	
	Diameter and length (mm)	(E.g. M12 x 50mm)
	Finish/coating	(E.g. Zinc plated)
Fastener bolt/threaded rod	Diameter and length (mm)	(E.g. M12x80)
	Finish/coating	(E.g. Zinc plated)
	Strength grade	(E.g. Steel grade 8.8)
Drill hole	Diameter (mm)	(E.g. 15mm)
	Depth (mm)	(E.g. 55mm)
Setting tool	Name	
	Size	(E.g. 1/2" x 50mm)
Max tightening torque (Nm)	If applicable	(E.g. 20 Nm)

Notes: *The setting tools (including setting punch, sockets etc.), cleaning accessories (Blow-out pump and cleaning brushes etc.) suitable for the specified product and a torque wrench (if applicable) shall be used as per the manufacturer's installation instructions.*

Example text for specification

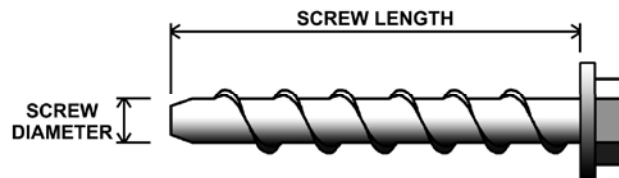
- The fastener shall be a *(manufacturer name, product name)* with dimensions *M12 x 50 and zinc coating*. The hole shall be drilled to a *15 mm diameter and 55 mm depth*. A *(manufacturer name) 1/2" x 50 mm setting tool of (product number)* shall be used during installation. An *M12x80, zinc plated, steel grade 8.8 bolt* shall be installed to a *maximum torque of 20 Nm* using a calibrated torque wrench.
- Cleaning accessories prescribed by the manufacturer's installation instructions shall be used.

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- A setting tool shall be used in accordance with the manufacturer's installation instructions.
- The minimum thread embedment depth required by the manufacturer's installation instructions shall be observed.

A.1.4 Concrete screw



- Mechanical fasteners are particularly sensitive to deviation of the hole diameter and may not function if installed in a hole with an incorrect diameter. Refer to Manufacturer's Installation Instructions for drill tolerances.

Minimum information to be specified

Screw	Manufacturer's name	
	Product name	
	Screw diameter (mm)	(E.g. 10mm)
	Screw length (mm)	(E.g. 75mm)
	Finish / coating	(E.g. Stainless steel)
Drill hole	Diameter (mm)	(E.g. 10mm)
	Depth (mm)	(E.g. 70mm)
	Minimum embedment depth (mm)	(E.g. 70mm)
Max tightening torque (Nm)	If applicable	(E.g. 40Nm)

Notes: *Cleaning accessories (blow-out pump and cleaning brushes etc.) suitable for the specified product and torque wrench (if applicable) shall be used as per the manufacturer's installation instructions.*

Example text for specification

- The fastener shall be a (*manufacturer name, product name*), 10 x 75 with zinc-plated coating, installed in a 10 mm diameter hole drilled to a depth of 70 mm and to a torque that does not exceed 40 Nm using a calibrated torque wrench.
- Cleaning accessories prescribed by the manufacturer's installation instructions shall be used.

A.1.5 Torque-controlled expansion fastener – stud type



- Mechanical fasteners are particularly sensitive to deviation of the hole diameter and may not function if installed in a hole with an incorrect diameter. Refer to Manufacturer's Installation Instructions for drill tolerances.

Minimum information to be specified

Manufacturer's name	
Product name	
Fastener size and length	(E.g. M12 x 100mm)
Finish / Coating	(E.g. galvanised)
Drill hole diameter (mm)	(E.g. 14mm)
Drill hole depth (mm)	(E.g. 70mm)
Tightening torque (Nm)	(E.g. 40Nm)

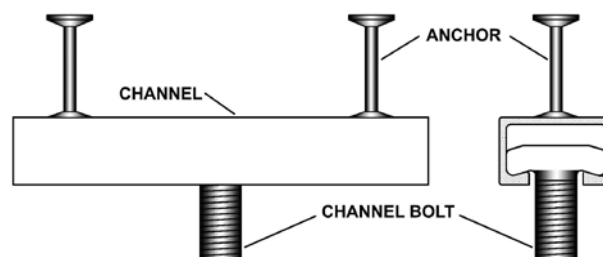
Notes: The setting tools (including sockets etc.), cleaning accessories (blow-out pump and cleaning brushes etc.) suitable for the specified product shall be used as per the manufacturer's installation instructions.

Example text for specification

- The fastener shall be a (*manufacturer name, product name*), M12 x 100 with zinc-plated coating, installed in a 12 mm diameter hole drilled to a depth of 70 mm and tightened to a torque of 40 Nm using a calibrated torque wrench.
- Cleaning accessories prescribed by the manufacturer's installation instructions shall be used.

A.2 Cast-in fasteners

A.2.1 Anchor channel



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- Anchor channel should not be puddled into the concrete.
- Adequate support should be provided to the anchor channel to ensure the correct position is maintained during the concrete pour.
- Adequate compaction of concrete is required around the head of the anchors for proper engagement.

Minimum information to be specified

Channel	Manufacturer's name	
	Channel name	
	Channel length, l_{ch} (mm)	(E.g. 450 mm)
	Channel width, b_{ch} (mm)	(E.g. 50 mm)
	Channel height, h_{ch} (mm)	(E.g. 30 mm)
	Finish / Coating	(E.g. Zinc plated)
Channel bolt	Manufacturer's name	
	Diameter and length (mm)	(E.g. M16x60)
	Finish/Coating	(E.g. Zinc plated)
	Strength grade	(E.g. Steel grade 8.8)
	Max tightening torque, T_{inst} (mm)	(E.g. 60 Nm)

Example text for specification

- The anchor channel shall be a (*manufacturer name, product name*), zinc-plated with the following parameters: $l_{ch} = 450$ mm, $b_{ch} = 50$ mm, $h_{ch} = 30$ mm. The channel bolt shall be a (*manufacturer name, product name*), M16 x 60, steel grade 8.8, zinc-plated, and tightened to a maximum torque equal to 60 Nm using a calibrated torque wrench.
- Anchor channel should be securely positioned prior to pouring concrete.
- Concrete should be properly compacted around the head of the anchors.



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