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| AUSTROADS TECHNICAL SPECIFICATION ATS 5306Supply and Installation of Void Formers | P5C2T1#yIS1 |
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| 0BContents[1. Scope 1](#_Toc106373629)[2. Referenced Documents 1](#_Toc106373630)[3. Definitions 2](#_Toc106373631)[4. Quality System Requirements 2](#_Toc106373632)[5. Materials 2](#_Toc106373633)[6. Fabrication 3](#_Toc106373634)[General 3](#_Toc106373635)[Prefabricated Void Formers and End Caps 3](#_Toc106373636)[Drains 4](#_Toc106373637)[Solid Void Formers 4](#_Toc106373638)[7. Installation 4](#_Toc106373639)[General 4](#_Toc106373640)[Joints in Void Formers 5](#_Toc106373641)[Installation of Prefabricated Void Formers 5](#_Toc106373642)[Installation of Solid Void Formers 5](#_Toc106373643)[Tolerances 6](#_Toc106373644)[Annexure A: Summary of Hold Points, Witness Points and Records 7](#_Toc106373645) |

# Scope

Austroads Technical Specification ATS 5306 sets out the requirements for the supply and installation of the following void formers for the purpose of forming voids in cast in place voided slab bridges:

1. prefabricated void formers, including associated end caps and anchorages, for circular voids; and
2. solid void formers made of a lightweight material, including associated anchorages, for voids with irregular shapes.

# Referenced Documents

The following documents are referenced in this Specification:

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| **Australian / New Zealand Standards**AS 1366.3 Rigid cellular plastics sheets for thermal insulation, Part 3: Rigid cellular polystyrene – Moulded (RC/PS-M) |
| **Austroads**ATS 5305 Formwork for ConcreteATS 5316 Cementitious Mortar and Grout |

# Definitions

The following definition applies to this Specification.

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| **Professional Engineer:**  | A person who:1. is registered on any scheme of registration of engineers prescribed by legislation in the applicable jurisdiction;
2. is appropriately registered or prequalified if the Principal has implemented an applicable registration or prequalification scheme; and
3. satisfies at least one of the following requirements:
4. is a Chartered Professional Engineer; or
5. holds a 4 year civil engineering degree from a university that is accredited under the Washington Accord and is registered in a relevant area of practice on the National Engineering Register (in Australia) or the Register of Chartered Professional Engineers (in New Zealand).
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# Quality System Requirements

The Contractor must prepare and implement a Quality Plan that includes the documentation in Table 4.1.

Table 4.1: Quality Plan

| Clause | Description of Document |
| --- | --- |
| 6.1 | Details of the proposed void former |
| 6.3 | Manufacturer’s certification |
| 7.4 | Certification from a Professional Engineer |

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| **HOLD POINT 1.** |
| Process Held | Placing of Concrete. |
| Submission Details | The Quality Plan must be provided to the Principal at least 10 working days prior to the commencement of work on site. |

Refer to ATS 5305 for the requirements for certification of the design of the void formers and anchors or supports holding the void formers in place during the concrete pour.

# Materials

Void formers (including any end caps) must be manufactured from material that is:

1. non-absorbent and impermeable and not softened or otherwise altered physically or chemically by contact with fresh, plastic or hardened concrete;
2. dimensionally stable and retains its physical properties at the maximum temperature generated during the curing of the concrete;
3. of sufficient strength and toughness to withstand damage from transport, storage, installation and placement of concrete (including bruising from concrete vibrators);
4. suitably formulated so as not to cause staining or discolouration from moisture discharged from the formers; and
5. resistant to fire.

At all times, void formers (including any end caps) must be free of damage. Damage includes any holes, sprung seams, dents or depressions that may cause concrete leakage or cause the concrete surface to be non-conforming.

The minimum requirements for solid void formers must be manufactured from rigid cellular polystyrene complying to Class S of AS 1366.3 and coated with a minimum 2 mm thick rapid curing, solventless, aromatic urethane coating or approved equivalent. The Contractor may submit a proposal to the Principal to relax the requirement for a coating, provided that the polystyrene class is upgraded to a higher class than S and the cover to steel reinforcement is increased by 5 mm.

# Fabrication

## General

The Quality Plan must include complete details of the following:

1. a full technical description of the proposed void former, including documented evidence of previous use and performance;
2. the material type;
3. the method of construction and installation;
4. the type and spacing of anchors and supports to hold down the void former;
5. the maximum pressure head and maximum height differential between the two sides of the void former which shall be consistent with the most adverse conditions that may exist during the concreting operations.

Void formers must be fabricated so that after concreting the specified dimensions, levels and alignment of the completed Works are achieved within the specified tolerances, making due allowances for any deflections of the void formers which may occur before and during the placement of concrete.

The Contractor must submit a certificate from the manufacturer verifying that that the void former is capable of withstanding the pressures and conditions of the concrete pour in accordance with this Specification.

## Prefabricated Void Formers and End Caps

Prefabricated void formers must be fabricated to within the following tolerances:

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| --- | --- |
| 1. outside diameter or exterior transverse dimension:
 | + 2 mm to - 3 mm |
| 1. overall length, with end caps in place:
 | + 0 to - 20 mm. |

The outside diameter to the outer surface of the prefabricated void former must be measured away from any seams or stiffening ribs.

The outer surface of the prefabricated void former must be free of any projections or ridges.

Any stiffening ribs must be formed in such a way as to project inwards, with the outer surface of the void former between the ribs forming a smooth cylinder. The depth of such stiffening ribs must not exceed 20 mm.

Seams in prefabricated void formers must be:

1. watertight;
2. recessed to present a smooth outer surface; and
3. mechanically overlocked when fabricated from spirally-wound strip material.

End caps must overlap the void former by minimum 20 mm. The joint must be sealed and watertight.

Prefabricated void formers and end caps, which are dented, otherwise damaged or exhibiting signs of corrosion must not be used in the Works.

## Drains

Each prefabricated void former must be provided with a UPVC drainpipe at each end. Where a void former is curved vertically, additional drains must be provided at all other low points of the void former soffit. An additional drain must be provided on each side of a joint in a prefabricated void former.

Unless shown otherwise on the Drawings, the drain must be a minimum of 50 mm inside diameter and must be perpendicular to the bridge soffit and extend 10 mm below the soffit of the member.

Drains must be extended through the void former soffit and finish flush with the internal surface of the void former.

## Solid Void Formers

Solid void formers must be fabricated to the following tolerances:

1. outside dimensions: + 2 mm to - 3 mm
2. diagonal dimensions: + 3 mm to - 3 mm
3. overall length: + 0 to – 20 mm
4. horizontal bow: The greater of 0.06% of length or ± 8mm.

The outer surface of the solid void former must be free of any projections or ridges.

Solid void formers, which are cracked, spalled and porous must not be used in the Works.

# Installation

## General

Void formers must be secured in position so that:

1. uplift caused by buoyancy is resisted without distortion of the void former;
2. joints between void former segments are watertight;
3. deflection under buoyancy effects does not exceed 3 mm; and
4. there must be no significant local deformation and movement of the void former during and after concreting operations.

Each anchor or support must be capable of resisting 1.5 times the full buoyancy force calculated on the assumption that the void former is fully immersed in plastic concrete producing full hydrostatic pressure and is simply supported between anchors or supports.

 Vertical deflection of the anchor or support under the buoyancy force must not exceed 2 mm. In addition, the lateral movement of the void former must not exceed 2 mm under 1.5 times the full lateral force of plastic concrete acting on one side of the void.

Unless provided pursuant to ATS 5305, the Contractor must provide to the Principal certification from a Professional Engineer stating that for the requirements for certification of the design of the void formers and anchors holding the void formers in place comply with this Specification.

Any removable void formers must be removed carefully in a manner that does not damage or crack the concrete. Methods such as the use of air pressure to release void formers or cold water or other fluid to cool the void former are not permitted

## Joints in Void Formers

The number of joints in void formers must be minimised.

If the length of void required is too large to be satisfied by a single void former, joints will be permitted if constructed as follows:

1. joints are formed by butting two lengths of void former;
2. anchors or supports are provided on each side of the joint at a distance from the joint not greater than 100 mm;
3. for prefabricated void formers, a stiff sleeve around the joint to prevent relative lateral displacement of the void formers is provided; fabricate such sleeve from a material similar to, and with a wall thickness not less than, that of the void formers, and must have an internal corrugation on its circumference complying with Clause 6.7 to maintain the sleeve central to the joint;
4. for solid void formers, the joining ends are butted so that the gap does not exceed 1mm and a stiff sleeve around the joint is provided to limit the relative lateral displacements of the void former ends to 1 mm, with the sleeve being recessed into the void formers so that the external surface of the joint is flush with the void former; and
5. the joint must be watertight.

## Installation of Prefabricated Void Formers

Prefabricated void formers must be held down by anchors.

Each anchor must consist of a hot dip galvanized steel rod or strip, shaped to closely fit the curve of the void former, firmly held down on each side of the void former. The two legs of the anchor may be normal to the soffit or splayed apart.

Anchors must be connected directly to the supporting framework of the soffit formwork.

For pretensioned voided planks, anchors must be connected directly to the top of the supporting formwork.

Unless stated specifically otherwise on the Drawings, the anchor must be clear of any reinforcement by a minimum of 30 mm.

Where bars are used for support, the distance measured along the bar, from the point of contact with the void former to the point of contact with the deck reinforcement, must not be less than 150 mm.

All support bars must be galvanised.

Effective measures must be taken to prevent staining or spalling of the soffit concrete at the anchor positions.

## Installation of Solid Void Formers

Solid void formers must be restrained from lateral movement and uplift by supports at the top and/or sides of the void.

The supports to the solid void formers must prevent uplift from buoyancy loads and both lateral and longitudinal movements associated with the concreting operation. The supports must be attached directly to a supporting frame above the void former and must not be attached to the reinforcement.

Unless stated specifically otherwise on the Drawings, the supports must be clear of any reinforcement to give a minimum cover of 30 mm.

Effective measures must be taken to ensure that the cover of the reinforcement to the void is maintained at all times during the concreting operation.

Cores on the top surface slab which result from the removal of the supporting members must be filled with concrete of the same grade as that used in the concrete member or a shrinkage compensating polymer modified cementitious repair material in accordance with the requirements of ATS 5316.

## Tolerances

Unless other positional tolerances are specified on the Drawings, voids must be located within:

1. ± 10 mm vertically measured from the soffit; and
2. ± 5 mm transversely measured from the longitudinal centreline of the member.

Notwithstanding compliance with the tolerances in Clause 7.21, the cover from the void to the nearest reinforcement must not be less than the specified concrete cover.

Annexure A: Summary of Hold Points, Witness Points and Records

The following is a summary of the Witness Points / Hold Points that apply to this Specification and the Records that the Contractor must submit to the Principal to demonstrate compliance with this Specification.

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| **Clause** | **Hold point** | **Witness point** | **Record** |
| 4.1 | 1. Placement of Concrete
 |  | Quality Plan |

Amendment Record

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| Amendment no. | Clauses amended | Action | Date |
| - | New specification | New | October 2023 |
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| **Key** |  |
| Format | Change in format |
| Substitution | Old clause removed and replaced with new clause |
| New | Insertion of new clause |
| Removed | Old clauses removed |