


# Acacia Estate Stage 8

## GITA Inspection Verification Report

<b>Prepared For:</b>	Streetworks Pty Ltd
<b>Report Number</b>	10542A V2
<b>Version Release Date</b>	9 May 2019
<b>Report Released By</b>	Chris Caulfield
<b>Title</b>	Project Manager
<b>Signature</b>	



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## 1 Introduction

*Terra Firma Laboratories* was engaged by *Streetworks Pty Ltd* as the Geotechnical Inspection and Testing Authority (GITA) to provide Level 1 supervision and testing works on the earthworks component for Acacia Estate Stage 8. This work was conducted over the period of 24/09/2018 to 29/10/2018.

This report presents that the allotment earthworks was carried out in accordance with AS3798-2007 *Guidelines for Earthworks for Commercial and Residential Development* and in compliance with the compaction control specifications established by the contractor.

## 2 Scope of Work

### 2.1 Area of Work

The areas of work included lots 812 to 816, 823 to 833 and 841 to 846. The site will be a residential estate.

The area on which fill was placed is shown on site plan (Appendix 1: *Test Location Plan*) based on drawings prepared by GPR Consulting, Drawing Reference 0055-08-R02/R03) and provided by *Streetworks Pty Ltd*.

The supervision work by the GITA involved both inspection of sub grade preparation work and full time inspection and testing of fill placement.

### 2.2 Specification

The technical specification for compaction control requirements was provided by *Streetworks Pty Ltd* and established that:

Test Rolling is required for all layers of structural fill and materials within 150mm of permanent subgrade level so as to withstand test rolling without visible deformation or springing. Corrective action is required where unstable areas exceed 20% of the area being considered by test rolling.

Section 5.2 of AS3798-2007 (Section 5.2) establishes a specification requirement for a minimum density ratio of not less than 95% noting that soils containing more than 20% of particles coarser than 37.5mm cannot be tested for relative compaction using the procedures of AS1289 5.1.1 and AS1289 5.2.1.

In accordance with Table 8.1 (AS3798), for large scale operations, (greater than 1500m<sup>2</sup>), the minimum testing frequency is 1 test per layer per material type per 2500m<sup>2</sup> or 1 test per 500m<sup>3</sup> distributed reasonable evenly throughout full depth and area or 3 tests per lot. AS3798 defines a lot as “an area of work that is essentially homogenous in relation to material type and moisture condition, rolling response and compaction technique, and which has been used for the assessment of the relative compaction of an area of work”. All three of these test frequencies must be achieved and this is typically confirmed to have been achieved when 3 tests per visit (day) have been completed.

### 2.3 Limitations

Terra Firma Laboratories cannot verify any works completed by others outside of the time period specified in the introduction. Uncontrolled works may include, but are not limited to trenching for services, cut and fill works for slab preparation or subsequent removal of vegetation and back fill of holes unless specified in section 2.1 of this report.

Terra Firma Laboratories cannot verify that the material used as a filling medium is free from chemical or other contamination.

Verification of finished surface level to design levels is outside of the scope of the GITA report.

## 3 Construction Method

### 3.1 Subgrade Preparation

At the time of subgrade inspection the following was observed:

- Subgrade preparation involved stripping the site of topsoil, vegetation and organic matter to a depth of approximately 200mm below existing levels.
- The site was cleared of all trees and stumps to the extent necessary for the fill placement to proceed
- The roots of all trees and any debris was removed from site prior to any fill placement

The sub-grade area was then proof-rolled to confirm it was capable of withstanding test rolling without visible deformation or springing and any areas observed to be soft or otherwise unsuitable were rectified. The sub-grade was watered and scarified prior to fill placement to aid layer bonding.

### 3.2 Fill Placement

The contractor was observed to have suitable construction equipment and plant available on-site during the construction period for use in the fill placement.

All fill was placed in layers of thicknesses not exceeding 300mm. At the completion of a placed layer, compaction testing was performed to confirm appropriate compaction had been achieved and supported the observations made. It should be noted that the compaction tests are representative samples of the fill placed and support the visual assessment of the works completed. Each house lot does not necessarily require a compaction test to have been conducted within the house allotment but may have been verified by testing conducted within up to a 2500m<sup>2</sup> area of the house lot.

Final fill placement levels were verified against design level by others. For the purposes of this report, it was observed that finished levels were in accordance with levels marked on site by survey markers.

The final 300mm of fill placed across the site was placed as a topsoil layer or growing medium and should be considered as non-structural, as it was placed in an uncontrolled manner, as allowed by specifications and placement of the final 300mm of fill was not observed by the GITA.

#### 4 Construction Verification

Compaction Verification testing is summarized in a detailed test register with test certificates attached provided in Appendix 2: *Compaction Test Register and Test Certificates*. A test location plan (10542D1, Appendix 1) providing a schematic of test locations across the extent of scope of works for every placed layer of fill is also documented.

A total of 20 density tests (Hilf method in accordance with 1289 5.7.1) were undertaken. The results summarised in the compaction test register (Appendix 2) confirm that for every layer of fill placed in a specific work area, satisfactory testing was completed.

#### 5 Statement of Compliance

The intention of this report is to provide a description of the earthworks construction for Stage 8 at Acacia Estate. For completed fill areas of greater than 300mm, and for works completed between 24/09/2018 and 29/10/2018, earthworks construction activities were conducted under the full time supervision of the Geotechnical Inspection and Testing Authority. Inspections and testing of the fill areas at this site indicate that both sub grade preparation and fill placement have been conducted in accordance with the specification. The earthworks construction for Stage 8 of Acacia Estate was observed to be constructed in compliance with the requirements of the Technical Specification.

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## Compaction Test Register

**Client:** Streetworks Pty Ltd                      **Project No:** 10542  
**Project:** Acacia Estate Stage 8                      **Specification:** 95%

Date:	Test No:	Layer:	Retest of:	Density:	Pass/Fail:	Lot No:	Report No:
24/09/2018	1	Layer 1		95.5	Pass	813	10542-1
26/09/2018	2	Layer 1		95	Pass	842	10542-2
26/09/2018	3	Layer 1		95	Pass	843	10542-2
27/09/2018	4	Layer 1		100.5	Pass	830	10542-3
27/09/2018	5	Layer 2		101	Pass	831	10542-3
27/09/2018	6	Layer 2		100	Pass	832	10542-3
1/10/2018	7	Layer 1		97.5	Pass	823	10542-4
1/10/2018	8	Layer 1		100	Pass	827	10542-4
1/10/2018	9	Layer 2		99	Pass	824	10542-4
1/10/2018	10	Layer 1		102	Pass	844	10542-4
1/10/2018	11	Layer 1		105	Pass	845	10542-4
29/10/2018	12	FSL		103	Pass	825	10542-5
29/10/2018	13	FSL		103.5	Pass	841	10542-5
29/10/2018	14	FSL		104.5	Pass	833	10542-5
29/03/2019	15	FSL		98	Pass	814	10542-6
29/03/2019	16	FSL		100	Pass	815	10542-6
29/03/2019	17	FSL		104.5	Pass	816	10542-6
29/03/2019	18	FSL		104	Pass	826	10542-6
29/03/2019	19	FSL		105.5	Pass	828	10542-6
29/03/2019	20	FSL		104.5	Pass	829	10542-6
30/03/2019	21	FSL		97.5	Pass	812	10542-7

# Material Test Report


**Report Number:** 10542-1  
**Issue Number:** 2 - This version supersedes all previous issues  
**Date Issued:** 30/10/2018  
**Client:** Streetworks Pty Ltd  
 45 Commercial Drive, Pakenham Vic 3810  
**Project Number:** 10542  
**Project Name:** Acacia Stage 8  
**Project Location:** Cranbourne  
**Client Reference:** 5855  
**Work Request:** 202  
**Date Sampled:** 24/09/2018 15:00  
**Sampling Method:** AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted  
**Specification:** 95%  
**Material:** Mudstone



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 Approved Signatory: Chris Caulfield  
 Project Manager  
 NATA Accredited Laboratory Number: 15357

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1	
Sample Number	P18-202A
Test Number	1
Date Tested	24/09/2018
Time Tested	15:00
Test Request #/Location	Lot 813
Chainage (m)	**
Location Offset (m)	**
Layer / Reduced Level	Layer 1
Thickness of Layer (mm)	300
Soil Description	Mudstone
Test Depth (mm)	275
Sieve used to determine oversize (mm)	19.0
Percentage of Wet Oversize (%)	0.0
Field Wet Density (FWD) t/m <sup>3</sup>	1.92
Field Moisture Content %	21.4
Field Dry Density (FDD) t/m <sup>3</sup>	1.58
Peak Converted Wet Density t/m <sup>3</sup>	2.01
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**
Moisture Ratio % (AS 1289.5.4.1)	104.0
Adjusted Moisture Ratio % (AS 1289.5.4.1)	**
Moisture Variation (Wv) %	-1.0
Adjusted Moisture Variation %	**
Hilf Density Ratio (%)	95.5
Compaction Method	Standard

**Moisture Variation Note:**

Positive values = test is dry of OMC  
 Negative values = test is wet of OMC

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# Material Test Report


**Report Number:** 10542-2  
**Issue Number:** 1  
**Date Issued:** 08/10/2018  
**Client:** Streetworks Pty Ltd  
 45 Commercial Drive, Pakenham Vic 3810  
**Project Number:** 10542  
**Project Name:** Acacia Stage 8  
**Project Location:** Cranbourne  
**Client Reference:** 05269  
**Work Request:** 222  
**Date Sampled:** 26/09/2018 15:10  
**Sampling Method:** AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted  
**Specification:** 95%  
**Material:** Silty Clay



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## Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

	P18-222A	P18-222B
Sample Number	P18-222A	P18-222B
Test Number	2	3
Date Tested	26/09/2018	26/09/2018
Time Tested	15:10	15:10
Test Request #/Location	Lot No 842	Lot No 843
Chainage (m)	**	**
Location Offset (m)	**	**
Layer / Reduced Level	Layer 1	Layer 1
Thickness of Layer (mm)	300	300
Soil Description	Silty Clay	Silty Clay
Test Depth (mm)	275	275
Sieve used to determine oversize (mm)	19.0	19.0
Percentage of Wet Oversize (%)	0.0	0.0
Field Wet Density (FWD) t/m <sup>3</sup>	1.91	1.88
Field Moisture Content %	18.1	22.7
Field Dry Density (FDD) t/m <sup>3</sup>	1.62	1.54
Peak Converted Wet Density t/m <sup>3</sup>	2.02	1.98
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	**
Moisture Variation (Wv) %	-0.5	-0.5
Adjusted Moisture Variation %	**	**
Hilf Density Ratio (%)	<b>95.0</b>	<b>95.0</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>

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# Material Test Report

**Report Number:** 10542-3  
**Issue Number:** 1  
**Date Issued:** 08/10/2018  
**Client:** Streetworks Pty Ltd  
 45 Commercial Drive, Pakenham Vic 3810  
**Project Number:** 10542  
**Project Name:** Acacia Stage 8  
**Project Location:** Cranbourne  
**Client Reference:** 05270  
**Work Request:** 233  
**Date Sampled:** 27/09/2018 15:00  
**Sampling Method:** AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted  
**Specification:** 95%  
**Material:** Silty Clay



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Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1			
Sample Number	P18-233A	P18-233B	P18-233C
Test Number	4	5	6
Date Tested	27/09/2018	27/09/2018	27/09/2018
Time Tested	15:00	15:00	15:00
Test Request #/Location	Lot 830	Lot 831	Lot 832
Chainage (m)	**	**	**
Location Offset (m)	**	**	**
Layer / Reduced Level	Layer 1	Layer 2	Layer 2
Thickness of Layer (mm)	300	300	300
Soil Description	Silty Clay	Silty Clay	Silty Clay
Test Depth (mm)	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0.0	0.0	0.0
Field Wet Density (FWD) t/m <sup>3</sup>	1.92	2.05	2.04
Field Moisture Content %	30.6	21.4	22.1
Field Dry Density (FDD) t/m <sup>3</sup>	1.47	1.69	1.67
Peak Converted Wet Density t/m <sup>3</sup>	1.91	2.03	2.04
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	**	**
Moisture Ratio % (AS 1289.5.4.1)	103.5	104.5	106.5
Adjusted Moisture Ratio % (AS 1289.5.4.1)	**	**	**
Moisture Variation (Wv) %	-1.0	-1.0	-1.0
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	100.5	101.0	100.0
Compaction Method	Standard	Standard	Standard

**Moisture Variation Note:**

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# Material Test Report

**Report Number:** 10542-4  
**Issue Number:** 1  
**Date Issued:** 08/10/2018  
**Client:** Streetworks Pty Ltd  
 45 Commercial Drive, Pakenham Vic 3810  
**Project Number:** 10542  
**Project Name:** Acacia Stage 8  
**Project Location:** Cranbourne  
**Client Reference:** 2789 and 2791  
**Work Request:** 247  
**Date Sampled:** 01/10/2018  
**Sampling Method:** AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted  
**Specification:** 95%  
**Material:** Mudstone



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NATA Accredited Laboratory Number: 15357

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1					
Sample Number	P18-247A	P18-247B	P18-247C	P18-247D	P18-247E
Test Number	7	8	9	10	11
Date Tested	01/10/2018	01/10/2018	01/10/2018	01/10/2018	01/10/2018
Time Tested	16:00	16:00	16:00	16:00	16:00
Test Request #/Location	Lot 823	Lot 827	Lot 824	Lot 844	Lot 875
Chainage (m)	**	**	**	**	**
Location Offset (m)	**	**	**	**	**
Layer / Reduced Level	Layer 1	Layer 1	Layer 2	Layer 1	Layer 1
Thickness of Layer (mm)	300	300	300	300	300
Soil Description	Mudstone	Mudstone	Mudstone	Mudstone	Mudstone
Test Depth (mm)	275	**	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0.0	0.0	0.0	**	0.0
Field Wet Density (FWD) t/m <sup>3</sup>	2.02	2.02	1.96	2.03	2.02
Field Moisture Content %	17.5	21.8	15.3	21.9	22.3
Field Dry Density (FDD) t/m <sup>3</sup>	1.72	1.66	1.70	1.67	1.65
Peak Converted Wet Density t/m <sup>3</sup>	2.07	2.02	1.98	2.00	1.93
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	**	**	**	**
Moisture Ratio % (AS 1289.5.4.1)	114.5	109.5	88.5	92.0	93.5
Adjusted Moisture Ratio % (AS 1289.5.4.1)	**	**	**	**	**
Moisture Variation (Wv) %	-2.0	-2.0	2.0	2.0	1.5
Adjusted Moisture Variation %	**	**	**	**	**
Hilf Density Ratio (%)	<b>97.5</b>	<b>100.0</b>	<b>99.0</b>	<b>102.0</b>	<b>105.0</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>

**Moisture Variation Note:**

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# Material Test Report

**Report Number:** 10542-5  
**Issue Number:** 1  
**Date Issued:** 01/11/2018  
**Client:** Streetworks Pty Ltd  
 45 Commercial Drive, Pakenham Vic 3810  
**Project Number:** 10542  
**Project Name:** Acacia Stage 8  
**Project Location:** Cranbourne  
**Client Reference:** 5876  
**Work Request:** 480  
**Date Sampled:** 29/10/2018 15:15  
**Sampling Method:** AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted  
**Specification:** 95%  
**Material:** Mudstone  
**Material Source:** Onsite



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## Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1

Sample Number	P18-480A	P18-480B	P18-480C
Test Number	12	13	14
Date Tested	29/10/2018	29/10/2018	29/10/2018
Time Tested	16:00	16:00	16:00
Test Request #/Location	Lot 825	Lot 841	Lot 833
Chainage (m)	**	**	**
Location Offset (m)	**	**	**
Layer / Reduced Level	FSL	FSL	FSL
Thickness of Layer (mm)	300	300	300
Soil Description	Mudstone	Mudstone	Mudstone
Test Depth (mm)	275	275	275
Sieve used to determine oversize (mm)	19.0	19.0	19.0
Percentage of Wet Oversize (%)	0.0	0.0	0.0
Field Wet Density (FWD) t/m <sup>3</sup>	1.94	1.94	2.05
Field Moisture Content %	20.3	17.0	10.5
Field Dry Density (FDD) t/m <sup>3</sup>	1.62	1.66	1.86
Peak Converted Wet Density t/m <sup>3</sup>	1.89	1.88	1.97
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**	**	**
Moisture Ratio % (AS 1289.5.4.1)	84.5	86.0	71.0
Adjusted Moisture Ratio % (AS 1289.5.4.1)	**	**	**
Moisture Variation (Wv) %	3.5	3.0	4.5
Adjusted Moisture Variation %	**	**	**
Hilf Density Ratio (%)	<b>103.0</b>	<b>103.5</b>	<b>104.5</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>

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# Material Test Report

**Report Number:** 10542-6  
**Issue Number:** 1  
**Date Issued:** 02/04/2019  
**Client:** Streetworks Pty Ltd  
 45 Commercial Drive, Pakenham Vic 3810  
**Project Number:** 10542  
**Project Name:** Acacia Stage 8  
**Project Location:** Cranbourne  
**Work Request:** 1550  
**Date Sampled:** 29/03/2019  
**Sampling Method:** AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted  
**Specification:** 95%  
**Material:** Mudstone  
**Material Source:** Onsite



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## Compaction Control AS 1289 5.1.1 & 5.4.1 & 5.8.1 & 2.1.1

Sample Number	P19-1550A	P19-1550B	P19-1550C	P19-1550D	P19-1550E	P19-1550F
Test Number	15	16	17	18	19	20
Date Tested	29/03/2019	29/03/2019	29/03/2019	29/03/2019	29/03/2019	29/03/2019
Time Tested	16:00	16:00	16:00	16:00	16:00	16:00
Test Request #/Location	Lot 814	Lot 815	Lot 816	Lot 826	Lot 828	Lot 829
Chainage (m)	**	**	**	**	**	**
Location Offset (m)	**	**	**	**	**	**
Layer / Reduced Level	FSL	FSL	FSL	FSL	FSL	FSL
Thickness of Layer (mm)	300	300	300	300	300	300
Soil Description	Mudstone	Mudstone	Mudstone	Mudstone	Mudstone	Mudstone
Test Depth (mm)	275	275	275	275	275	275
Fraction Tested (mm)	19.0	19.0	19.0	19.0	19.0	19.0
Oversize (wet basis) %	0	0	0	0	0	0
Oversize (dry basis) %	0	0	0	0	0	0
Field Wet Density t/m <sup>3</sup>	1.83	1.88	1.85	1.82	1.88	1.84
Field Moisture Content %	12.6	11.4	11.2	9.4	11.5	10.6
Field Dry Density t/m <sup>3</sup>	1.63	1.69	1.75	1.76	1.77	1.76
Maximum Dry Density t/m <sup>3</sup>	1.66	1.68	1.67	1.69	1.68	1.68
Adjusted Maximum Dry Density t/m <sup>3</sup>	**	**	**	**	**	**
Optimum Moisture Content (OMC) %	19.0	19.0	19.0	17.0	18.5	19.5
Adjusted Optimum Moisture Content (OMC) %	**	**	**	**	**	**
Moisture Variation %	6.5	7.5	7.5	7.5	7.0	9.0
Moisture Ratio %	66.5	59.5	59.5	55.0	62.0	54.0
Density Ratio %	<b>98.0</b>	<b>100.0</b>	<b>104.5</b>	<b>104.5</b>	<b>105.5</b>	<b>104.5</b>
Compaction Method	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>	<b>Standard</b>

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# Material Test Report

**Report Number:** 10542-7  
**Issue Number:** 2 - This version supersedes all previous issues  
**Date Issued:** 09/05/2019  
**Client:** Streetworks Pty Ltd  
 45 Commercial Drive, Pakenham Vic 3810  
**Project Number:** 10542  
**Project Name:** Acacia Stage 8  
**Project Location:** Cranbourne  
**Work Request:** 1763  
**Date Sampled:** 25/09/2018  
**Sampling Method:** AS1289 1.2.1 6.4 (b) - Sampling from layers in earthworks or pavement - compacted  
**Specification:** 95%  
**Material:** silty Clay  
**Material Source:** Onsite



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Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Chris Caulfield  
 Project Manager

NATA Accredited Laboratory Number: 15357

Compaction Control AS 1289 5.7.1 & 5.8.1 & 2.1.1	
Sample Number	P19-1763A
Test Number	21
Date Tested	25/09/2018
Time Tested	15:30
Test Request #/Location	Lot 812
Chainage (m)	**
Location Offset (m)	**
Layer / Reduced Level	Layer 1
Thickness of Layer (mm)	300
Soil Description	silty Clay
Test Depth (mm)	275
Sieve used to determine oversize (mm)	19.0
Percentage of Wet Oversize (%)	0.0
Field Wet Density (FWD) t/m <sup>3</sup>	1.94
Field Moisture Content %	16.9
Field Dry Density (FDD) t/m <sup>3</sup>	1.66
Peak Converted Wet Density t/m <sup>3</sup>	1.99
Adjusted Peak Converted Wet Density t/m <sup>3</sup>	**
Moisture Ratio % (AS 1289.5.4.1)	100.5
Adjusted Moisture Ratio % (AS 1289.5.4.1)	**
Moisture Variation (Wv) %	0.0
Adjusted Moisture Variation %	**
Hilf Density Ratio (%)	97.5
Compaction Method	Standard

**Moisture Variation Note:**

Positive values = test is dry of OMC  
 Negative values = test is wet of OMC

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