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Document Title:

RTP1 Test Specification

Summary / Scope:

This document lists the production tests required for the RTP1. The document aims to suggest the performance and properties that should be measured from the probe and sub-assemblies.

This document is believed to be the correct specification of production test requirements on release, however, is expected to change in further issues as the project progresses.

Reason for Issue / Nature of Change:

[1] — Draft for G1

[2] – First full release for G3

Distribution:

Project File, Assembly Cell

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Doc No: T-6656-9100-02

Title: RTP1 Probe Test Specification

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REVISION SHEET

1. This document exists at this stage to aid NPI in forming Work Instructions and SOPs to measure or ensure the properties in this document. All numerical values in this document are estimates and should be confirmed during prototype builds.
2. This version pertinent to RTP1 part number A-6656-0200-01 with limits applicable.

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1. Introduction

This document describes the specification of the production tests for the RTP1 A-6656-0200-01 RTP1 Probe Assembly. The aim of the specification tests is to confirm that the product is correctly assembled and meets the product spec.

2. Sub assembly tests

2.1 Sensor assembly tests

The functionality of the temperature sensor and the Z transducer should be checked at an ambient temperature at a range of tip compressions.

The following is an example table of expected ranges:

State	Tip Compressed (aligned with front of housing)		Tip Uncompressed		Reported Temp	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
Ambient	2.7 V	3.3 V	1.5 V	1.8 V	18°C	28°C

Table 1: Limits for the Z transducer and thermistor test at ambient temperature

2.2 The carbon tube tolerance from lower housing to tube locator

Should be checked against the drawing of A-6656-0210.

3. Functional Assembly checks on probe assembly

Checks to be completed on fully assembled probe.

3.1 Z deflection and spring rate

When loaded, the correlation between mass and deflection should be:

Mass	Voltage output (V)
None	1.5-1.8V
90 g +/-3g	2.7-3.3V
None	1.5-1.8V

Table 2: Limits for the Z transducer tests on full assembly

3.2 Probe Function

Digital and electrical connectivity testing should be completed to ensure the probe is compatible with a Revo2. This includes:

- Probe type (0x79)– write to EEPROM
- Serial Number – write to EEPROM
- Probe type (0x79)– read from EEPROM
- Serial Number – read from EEPROM and compared to probe body and 2D barcode
- Probe Present / Probe OK

Checks as per the table below should be performed:

	Lower Limit	Upper Limit
Total current drawn by the probe (VHEAD = 5V)	100 mA	120 mA
Temperature reported	18°C	28°C

Table 3: Current draw and reported temperature on Probe function tests

3.3 Breakout & pull off forces

The kinematic pull-off forces are to be determined by conducting breakout force tests with a calibrated Lloyd force testing stand and calibrated test artefact (T-98721), as described in document [PD-3061-9209](#) (REVO Test Stand Breakout Artefacts).

The expected results are as follows:

Lloyd Reading			Adjusted Reading			
0°	120°	240°	0°	120°	240°	Average
3.644 N	3.447 N	3.457 N	20.1 N	18.9 N	19.7 N	19.6 N

Table 4: Expected breakout and pull off forces using T-98721 [To be reviewed on Beta build]

The following is the maximum expected range of:

Angle	Breakout Range (N)
0°	16.00 – 26.10
120°	14.20 – 23.40
240°	13.80 – 22.80

[Current expected values, all values to be confirmed based on calibration of T-98721]

3.4 Ball Heights

The height of the housing kinematic balls and the top plate gold balls should be checked to drawing A-6656-0200 once the top plate has been torqued to the housing.

4. CMM Performance Tests

4.1 Z sensor Calibration

Test that the product can successfully complete a Z sensor calibration routine. Gain value limits TBC following design tests. The maximum acceptable error in Z sensor accuracy at 4mm deflection is 0.5mm.

The RMS, Maximum error and null offset should be within the following parameters:

	Upper limit	Lower limit
RMS	TBC	TBC
Error	TBC [>0.5mm]	TBC [<0.5mm]
Null offset	TBC [>500 Counts]	TBC [<500 Counts]

4.2 Functional testing

4.2.1 Ambient Temperature test

The ambient temperature measurement should be within 0.5°C of a stand-alone calibrated Workpiece Temperature Sensor WPS1 temperature sensor.

4.2.2 Hot Plate test

This test will verify that the rise time of RTP1 reported temperature is ≤ 10 seconds to within 0.5°C of the stable temperature. The RTP1 tip should start on a surface at ambient temperature then move to be in contact with a 50°C hot plate. The RTP1 reported temperature is determined to be stable when its rate of change has reduced to less than 0.001°C/s. When the RTP1 reported temperature is stable, a check should be made that the reported temperature is within 1°C of an independent class AA PT100 sensor also attached to the hot plate.

5. Appearance / Packing Checks

Check that the completed probe is packaged to drawing A-6656-0200.