

October 16, 1996

SPEC VERIFICATION TEAM

Issue: **Verification or Re-definition of Heater Bias/ Cigarette Circumference specification Ranges**

I. Objective: Determine lower and upper targets for heater biases coupled with corresponding established upper and lower target cigarette rod circumferences that will ensure satisfactory product performance.

II. Measures to Characterize Initial Systems

- Heater Lotis bias
- Heater blade resistance
- Fixture RTD w/o cigarette
- Calibrated heater energy on boards

III. Measures of Satisfactory Product Performance:

- Insertion Force into heater and at tipping (assumes cap ID is at specified 0.310")
- System RTD with and without Cigarette -- to verify tipping seal with cig. diameter
- Subjective smoking response
- Subjective insertion/removal ease -- independent of ejector
- Machine TPM delivery
- WS

IV. Test Plan:

- Matrix of possible combinations:

	Cig. Rod Circ.		
Heater X2 Bias	24.35 +/- 0.05 mm	24.5 +/- 0.05 mm	24.65 +/- 0.05 mm
0.118-0.122 " radius	A	B	C
0.138-0.142 " radius	A'	B'	C'

- Proposed combinations for specific tests:

Test	Heater / Cigarette Circ. Combination	Replicates
Insertion force	A, B, C, A', B', C'	4 heaters each size x 5 cigs each circ
System RTD w/ Cigarette	A, B, C, A', B', C'	4 heaters each size x 5 cigs each circ.
Machine TPM delivery	A, C, A', C'	4 heaters each size x 5 cigs per pad per combination
Subjective Response	A' and C	4 heaters each size x 1 cig per heater: 8 total smokings
WS	A' and C	2 heaters each size x 3 cig per heater

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Major Activity	Subsidiary Activities	Resources
A. Heaters		
<ul style="list-style-type: none"> * Heaters with biases at 0.118-0.122 avg. X2 radius and 0.138-0.142 avg. X2 radius, alloy TBD, and in IB Fixtures. SD < 0.004 " * Four heaters of each size needed + 1 spare each = 10 heaters for first test replicate. Order 20 heaters total for first and second replicate if needed. * <u>Issue</u>: Laser Cut vs. Stamped. -- Assuming laser cut at this point. 	<ul style="list-style-type: none"> * Request for 20 heaters, 10 of each size (5 of each size to start test, 5 each again for replication if needed) * Incoming Lotis * Resistance * Arrange with LET/ET for flex circuits and board calibration 	<ul style="list-style-type: none"> J. Adams/ARD M. Reagan/Lotis CW Robb and G. Yoss/ RTC
B. Cigarettes		
<ul style="list-style-type: none"> * Select cigarettes with circumferences in range of 24.35+/- 0.05, 24.5+/- 0.05, and 24.65+/- 0.05. * Establish with Cig Team and PSPT what specific cigs should be used for subj., TPM, and/or WS (recommend using IB cigs WS and TPM comparison to present work). 	<ul style="list-style-type: none"> * Check with Cig Team on available cigs for testing (mechanical testing not necessarily with same cigs as for subj. and WS) * Use "filter standards" to cross check insertion force and to get base line for filter standard effectiveness (a nice-to-have, not critical to test) 	<ul style="list-style-type: none"> * Cig Team * W. Houck * PSPT
C. Mechanical Testing		
<ul style="list-style-type: none"> * Insertion Force 	<ul style="list-style-type: none"> * Cigarettes at standard conditions * Chatillon, 5 in/min * Insertion force for rod and tipping 	<ul style="list-style-type: none"> MEC and help
D. Delivery Assessment		
<ul style="list-style-type: none"> * After Lotis and calibration, heaters machine smoked for standard TPM and pad analysis. Five cigs per pad and three replicates per heater. * Four Heaters of each bias 	<ul style="list-style-type: none"> * Calibrate heaters to Analytical smoker. * Standard test procedure and submission to R&D for analysis 	<ul style="list-style-type: none"> * Patty, Patsy, Sue, MEC * R&D * G. Shelton/ Ltr. Group * Flex circuits and boards

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Major Activity	Subsidiary Activities	Resources
<p>* Subjective Assessment</p> <p>Part I. Smoking experience: MDF and IPDP panels. Protocol TBD with PSPT and Cig team. Forced choice or degree of difference?</p> <p>Part II. Insertion ease:</p>	<p>* Need guidance on best way to assess potential taste/volume/harshness etc. differences between the extremes.</p> <p>* Initial test calls for four replicates of A' and C pairs.</p> <p>* <u>Decision point I</u>: If subjective responses are different, what magnitude of difference will be acceptable?</p> <p>* Need additional guidance on descriptors for insertion ease. How tight is too tight -- short of crushing cigarette?</p> <p>* <u>Decision point II</u>: If low heater bias/ 24.7mm cigarette combination is deemed too tight, what needs to change? I.e., is the cigarette range lowered or the heater bias range upped. Both have baggage.</p>	<p>* Sue, Wynn, Patsy, Patty, IPDP, MDF panel</p> <p>* Cig Team</p> <p><i>Note</i>: will require interfacing with present subjective test schedules.</p>
<p>* WS</p> <p>* WS at 23J with A' and C</p>	<p>* Four replicates of each combination planned. Degree of reproducibility may allow reduction to two replicates.</p>	<p>* Greg S. and ltr. group for calibrations</p> <p>* R&D</p>
<p>* Report Results to affected Teams and determine if additional testing warranted</p>		MDF

V. Listed below are concerns today not specifically addressed in above test plan.
We are prepared to address the following issues as information is available.

ISSUE	PROBLEM	NOT ANSWERED	NEEDS
Energy	max/min = total range	Impact unknown	max/min energy via lighter
Cigarette circumference capability	manufacturing CpK unknown	Impact on heaters long term	max/min cig. circ. % cigs histogram for circ. range
Alloy batch iterations	unknown performance	Impact on longevity	test time, alloy characteristics
Heater manufacturing method	description, impact on performance and robustness	base line information and test data	heater samples, Reliability quotient
Others unknown			

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