

Commonwealth of Virginia
 Department of General Services
 Division of Consolidated Laboratory Services
 Richmond, Virginia

Tuning Fork Laboratory Inspection Checklist

Refer to DCLS Doc #2364: Protocol for the Certification of Laboratories Performing Tuning Fork Certification Testing					
Facility Name: _____ Lab ID: _____					
Assessor: _____ Analyst: _____ Inspection Date: _____					
ATTACHMENTS REQUIRED FOR COMPLETE ASSESSMENT PACKET:					
<input type="checkbox"/> Laboratory Equipment List, #6959 or equivalent <input type="checkbox"/> Laboratory Personnel List, #6960 or equivalent <input type="checkbox"/> Laboratory Quality Manual Checklist, #6957					
Item	Reference	Requirement	Yes	No	Comments
EQUIPMENT					
1	Protocol §V.B.5	Does the equipment list provided by the laboratory correspond to the equipment observed to be in use on site? <i>Note: Ka-band radar devices approved for use in VA may operate at 33.8 GHz, 34.7 GHz, or 35.5 GHz. TF certification laboratories should ensure either that all appropriate Ka-band reference TFs are available prior to performing certification testing, or define in the Quality Manual the scope of testing available to VA customers.</i>			
2	Protocol §V.B.8	Is documentation of equipment calibration and maintenance available?			
3	Protocol §V.B.8	Is equipment calibration and maintenance performed on schedules specified in the quality manual?			
4	Protocol §V.B.8	Does documentation include the dates and types of service performed on each piece of equipment during the past three years?			
RECORDKEEPING (GENERAL)					
5	Protocol §V.B.14.a.i,ii,iii	Were tuning fork certification records retained for at least three years? <ul style="list-style-type: none"> • Maintenance logs • Calibration records • Sample observation records 			
NOTES:					

Item	Reference	Requirement	Yes	No	Comments
6	Protocol §V.B.14.a.iv	Were analyst training records maintained for a minimum of three years?			
7	Protocol §V.B.13	<p>Were training records, including an initial demonstration of capability, available for each analyst performing tuning fork certification testing?</p> <ul style="list-style-type: none"> • Minimum of 20 consecutive frequency observations for each reference tuning fork • Calc'd mean and std dev • Frequency of oscillation within $\pm 0.5\%$ of certified value <p>Note: <i>Not Applicable for technicians employed more than 3 y. Labs only required to keep records 3 y.</i></p>			
8	Protocol §V.B.4	Did the laboratory have a log of the printed names, initials and signatures of all analysts performing tuning fork certification testing, data review, and/or certificate notarization?			

CERTIFICATION RECORDS		
Records Reviewed	Date	Analyst(s)
_____	_____	_____
_____	_____	_____
_____	_____	_____

RECORD REVIEW					
9	Protocol §V.B.11.e.i	Were the reference tuning forks tested prior to beginning testing and at the conclusion of each day?			
10	Protocol §V.B.11.e.ii	Were the data for the reference tuning forks evaluated to verify that the frequency of oscillation was within $\pm 0.5\%$ of that specified by the manufacturer or the most recent independent certification?			
11	Protocol §V.B.11.e.iii	Was the temperature of the test environment recorded at beginning and end of each certification test batch?			
12	Protocol §V.B.11.e.iv	Was the temperature of the test environment maintained within the range of 20°C – 30°C? <i>(NOTE: A lab should consider monitoring relative humidity at the testing site if the possibility of exceeding 10%-85% is suspected.)</i>			

NOTES:

Item	Reference	Requirement	Yes	No	Comments
13	Protocol §V.B.15.a	Was each tuning fork identified by a serial number or other unique identifier?			
14	Protocol §V.B.11.e.v	Was each tuning fork subjected to a minimum of 2 observations that were averaged to calculate the mph equivalent?			
15	Protocol §V.B.11.e.vi	<p>Were calculations performed accurately?</p> <p>Were calculations reproducible using the laboratory's raw data and quality manual?</p> <p><i>Note: Complete documentation includes sufficient recordkeeping to reconstruct any/all calculations used by the laboratory staff.</i></p>			
16	Protocol §V.B.14.b.i	Were all raw data recorded in ink or entered directly into a computer program?			
17	Protocol §V.B.11.e.vii	Had the analysts initialed and dated each page of their work?			
18	Protocol §V.B.14.b.ii, iii	Were corrections to records documented with a single line through the original entry, and dated and initialed by the person who made the correction?			
19	Protocol §V.B.11.a	Were sample receiving and tracking procedures described in the laboratory's quality manual consistently followed?			
20	Protocol §V.B.11.b,c	Were analysts interviewed knowledgeable of the laboratory's procedures for labeling and management of tuning forks, should they be rejected <u>before</u> testing per the laboratory's sample rejection policy?			
21	Protocol §V.B.11.g	Were analysts interviewed knowledgeable of the laboratory's procedures for customer notification, labeling, and disposition of tuning forks that fail the certification testing?			

NOTES:

Item	Reference	Requirement	Yes	No	Comments
22	Protocol §V.B.11.f.i	Were completed certificates reviewed for calculation and transcription errors?			
23	Protocol §V.B.11.f.i	Was each review documented with the date and signature or initials of the reviewer?			
24	Protocol §V.B.15	Did each certificate include the following? <input type="checkbox"/> The serial number of each tuning fork <input type="checkbox"/> The date testing was performed <input type="checkbox"/> The frequency at which the tuning fork was found to oscillate <input type="checkbox"/> The corresponding calculated MPH <input type="checkbox"/> The radar frequency band within which the tuning fork was to be used <input type="checkbox"/> The name and signature of the analyst who performed the testing <input type="checkbox"/> The date, seal and signature of notarization			
OBSERVATION OF TUNING FORK CERTIFICATION TESTING PROCEDURE ON SITE					
25	Protocol §V.B.11.e.i §V.B.11.e.ii	Were reference standards observed before and after the sample observation batch? Were the reference standards observed to oscillate within $\pm 0.5\%$ of their specified values?			
26	§V.B.11.e.iii	Was temperature recorded at the beginning and end of the sample observation batch?			
27	§V.B.11.e.iv	Was the test environment maintained between 20° C and 30° C throughout the period of the tests? <i>Note: See question #11 regarding relative humidity.</i>			
28	§V.B.11.d	Did the tuning fork calibration demonstration include striking the tuning fork on a nonmetallic object and waiting for a stable output?			
29	§V.B.14.b.i	Was raw data recorded in ink (or directly entered into a computer program)?			
30	§V.B.11.e.v	Data reported as the average of a minimum of 2 observations of each tuning fork?			
31	§V.B.11.e.vi	Were the correct calculations applied to the averages of the observed frequency counts?			
32	§V.B.11	Was the calibration procedure performed as written?			
NOTES:					

Calculations K band: Speed, mph = Average observed frequency (Hz) / 72.0301
Or = Average observed frequency x 0.013883
Ka band: Speed, mph = Average observed frequency / (2.983135 x nominal microwave frequency, GHz)

Operating Frequencies and Calculations

K band: 24,050 MHz

K band speed, mph = Average observed frequency / 72.0301

Ka band: 33,400 MHz to 36,000 MHz

Ka band speed, mph = Average observed frequency (Hz) / (2.983135 x nominal microwave frequency)

Nominal Ka Microwave frequencies by manufacturer

- i. Decatur / KSI: 35.5 GHz
- ii. MPH: 33.8 GHz
- iii. Stalker: 34.7 GHz

NOTES:

CHECKLISTS ARE AN INTERVIEW/REVIEW TOOL USED BY ASSESSORS AND ARE NOT TO BE CONSIDERED AS A SUBSTITUTE FOR REQUIREMENTS OF THE PUBLISHED REFERENCE. CHECKLISTS ARE SUBJECT TO CHANGE.