Subject: NVLAP Calibration Scope & NVLAP Code Modifications

Over the next year, NVLAP will be making some adjustments to its scopes of accreditation for the calibration labs. Some changes are refinements to the new format introduced last year. Some additions, modifications, and deletions of the internal NVLAP codes (20/XXX) are also being done as noted below. These codes were originally based on NIST services offered 20 years ago and require updating. The code changes will also assist NVLAP in formation and tracking of proficiency tests. Information is provided on changes made over the past two years. A chart showing the changes is provided on the last page of the document. Highlights of the changes are:

Format-related changes

- Minor format adjustment to NVLAP Code Headers. The header information will display horizontally as a row instead of appearing in the left column. The term "NVLAP Code:" will be removed and the code will now appear in parentheses at the end of the row header.
- All data left justified, except for some indentation in the left column to create sub-parameters and instruments under main code headings.
- Addition of a fixed comment related to the use of L in length uncertainty expressions. This states the value of L is the measured value in the same units shown in the range.
- Some notes that were moved into the body of the scope may be footnoted and placed at the end as they were in the past.

Code-related changes

- Codes 20/R05, 06, and 07 for high frequency capacitors, inductors, and resistors will be merged into their associated DC/LF codes 20/E10, 11, and 02, respectively. Due to changes in technology, there is no continued need to segregate these between high and low frequencies. Most organizations, including NIST, perform these functions in the same general lab areas.
- Code 20/R11 will be merged into 20/E01. Both of these codes are related to converting AC to DC and the only distinguishing difference is frequency. We have changed the upper limit from 1 MHz to 100 MHz. The major change will be that calibration of thermal voltage convertors will be listed under 20/E01. The ability to generate a flat response was usually placed in 20/R11. This will be moved to 20/R17 (see next bullet).
- Existing code 20/R17 will be renamed RF/Microwave Power. This code will encompass all power measuring and generation devices as well as providing calibration factors for power sensors. This code will also include relative power measurements that cannot made with a network analyzer, such as flatness.
- A new code, 20/R18, named Scattering Parameters, is now in use. This code includes all general measurements performed by a network analyzer. It covers items currently in codes 20/R01, 02, 03, 13, 14, and 16. The general idea is that a relative measurement is being made in phase and/or magnitude, either reflected or transmitted (amplified or attenuated). This code also

includes methods that achieve the same result as a network analyzer, such as using a measuring receiver to measure attenuation.

- It is noted that arguments can be made that some instrumentation or calibrations could go into either R17 or R18. We are currently working with NIST technical experts on a very exacting list of the correlation of instruments to NVLAP codes. This list will be published on the calibration webpage when completed.
- A new mechanical code, 20/M16, Calibration of Weighing Instruments, has been created to distinguish balances and scales as a category separate from code 20/M08 for mass. M08 will now be called Mass Determination.
- Some scopes had lab thermometer calibration capabilities erroneously coded with 20/T07, Resistance Thermometry, which should have been listed as 20/T03, Laboratory Thermometers, Digital and Analog. The confusing point here is that T07 covers the calibration of resistive thermometer devices versus their use as a standard for calibration of other devices. This change has been in process as affected scopes were reissued at renewals.
- We have been separating torque into a new code 20/M15 away from force, M06.
- Labs that calibrate low frequency power measuring equipment such as AC power monitors, power analyzers, and watt transducers should have these capabilities listed on their scopes under code 20/E12, LF Power/Energy. While the individual measurements, such as current, voltage, and phase, required in the calibration of these low frequency power measuring instruments may be listed on a laboratory's scope, it may not be obvious that the lab can perform calibrations of these instruments. Also, what power range is covered is not evident. Example: A lab may be able to calibrate 1 kA and 50 kV, but this doesn't necessarily mean it can calibrate 50 MW of power. Notify your NVLAP Program Manager if your lab would like to perform such measurements on an accredited basis and this code is not on your scope.

Questions related to these changes may be directed to any of the calibration laboratory program managers.

Current and Past NVLAP Code Changes (Last 2 years)

(Note: Codes abbreviated without the preceding "20/")

Affected Codes	Action	Discontinue Use?
R01 - Coaxial Air Line Standards	move items to new R18	Yes
R02 - Coaxial/Waveguide Terminations	move to new R18	Yes
R03 - Dielectric Materials	move to new R18	Yes
R05 - HF Capacitance	start using LF Capacitance E10	Yes
R06 - HF Inductance	start using LF Inductance E11	Yes
R07 - High Frequency Resistors	start using AC resistance E02	Yes
R11 - RF-DC Voltage/Current Converter	Move any entries ≤ 100 MHz to E01, all others to R17	Yes
R12 - RF/Microwave Bolometer Units	use R17	Yes
R13 - RF/Microwave Attenuators	move to R18	Yes
R14 - RF/Microwave Phase Shifters	move to R18	Yes
R15 - VHF Omnidirectional Range	move to R08	Yes
R16 - Group Delay	move to R18	Yes
R17 - RF/Microwave Power Meters	Change name to RF/Microwave Power	No
R18 - Scattering Parameters (NEW CODE)	This code includes all general measurements performed by a network analyzer	N/A
T07 - Resistance Thermometry	Parameters that use resistive temperature devices as standards moved to T03	No
E12 - LF Power/Energy	This code shall be utilized if the lab generates or measures low frequency power	No
M08 - Mass Determination	Weighing instruments under this code have been moved to new code M16. Name of M08 changed to Mass Determination	No
M16 - Calibration of Weighing Instruments (NEW CODE)	Used for weighing instruments	N/A
M06 - Force	Torque items under this code moved to new code M15. Force items remain.	No
M15 - Torque (New Code)	New code for torque related items	N/A
T08 - Temperature Indicators	This code is intended for electrical simulation for temperature readout devices only. Moved any thermocouple calibration to new code T11	No
T11 - Thermocouples (New)	New code specifically for calibration of thermocouple probes and wire	N/A