System XR

Calibration Standards Guide

System XR

The following tables list currently available standard sets used for calibration of common System XR film measurement applications. Indicated are the standard set part number (use when ordering), typical applications that can be calibrated with the standard set, the base material included, the optimum measurement range for the application calibrated, as well as any pertinent notes. In most cases, the full measurement range exceeds the optimum range. Base materials are interchangeable; additional base materials may be ordered for any foil-based standard set.

System XR X-ray fluorescence metrology tools are capable of measuring many other applications. If your application is not listed, or requires a greater measurement range than noted, please contact Veeco Applications Engineering. Many other non-stock standards are available, including custom standards. All standard sets are fabricated by Veeco Instruments and are NIST-traceable.

Single Layer Foil Standards

Standard	Part No.	Typical Applications	Base	Range	Notes
Au	12511-1	Au on Ni, Cu, MoMn, brasses*, P-BRZ, CA725, all Fe, W, Al,	Ni**	1 - 320µi (0.03 - 8.9µm)	Special thin Au can be ordered for 0-5µi (0 - 0.13µm)
		Al_2O_3, Si, Ge, GaAs, SiO_2, BeO, Ag, Mo			
Ag	12511-4	Ag on Cu, brasses, BeCu, P-BRZ, CA725, all Fe, Kovar	Cu	20 - 2000µi (0.5 - 50µm)	
		Alloy 4L, Mo, SiO_3, Ti, Si, Ni plastics, $BaTiO_3$, W, Al, $Al2O_3$			
Al	12511-10	Al on Ni, Fe, stainless steel	Fe	100 - 4500µi (2.5 - 112.5µm)	Ranges for Al on Fe and Ni bearing alloys. Thin Al foils available for Al/Si
Cd	12511-9	Cd on Fe, stainless steel	Fe	20 - 2000µi (0.5 - 50µm)	
Cr	12511-7	Cr on Fe, most stainless steel, Cu, Ni, brass, bronzes	Fe	20 - 800µi (0.5 - 20µm)	Special thin Cr can be ordered for 0 - 10µi (0 - 0.25µm)
Co	12511-12	Co on Fe,	Fe	20 - 1200µi (0.5 - 30µm)	Special thin Co can be ordered for 0-10µi (0 - 0.25µm)
Cu	12511-3	Cu on epoxy, Fe, Fe alloys, plastics, brass	Fe**	20 - 1200µi (0.5 - 30µm)	Use Ni filter for Cu/brass
Mo	12511-11	Mo on Fe	Fe	20 - 2200µi (0.5 - 55µm)	Special thin Mo available for Mo/Si
Ni-P	12511-6	Ni-P on Cu, Kovar, Fe, Al, P-BRZ, brass	Fe	20 - 800µi (0.5 - 20µm)	Standards normally 7-10% P
Ni	12511-2	Ni on Cu, BeCu, CA725, P-BRZ, brasses, Al, Al_2O_3,	Cu**	20 - 1000µi (0.5 - 25µm)	Use Co filter for all Cu alloy bases, W bases
		W, Si, all steels, Kovar, Invar, Alloy 42, Alloy 52, Mo			
Pd	12511-14	Pd on Ni, Cu, P-BRZ, CA725, brasses, Kovar	Ni**	5 - 250µi (0.13 - 6.25µm)	Special thin Pd available for 0 - 10µi (0 - 0.25µm)
Rh	12511-15	Rh on Ni, Cu, brasses, P-BRZ Kovar	Ni**	20 - 350µi (0.5 - 8.89µm)	Special thin Rh available for 0 - 10µi (0 - 0.25µm)
Sn	12511-5	Sn on Cu, BeCu, CA725, brasses, P-BRZ, all steel alloys,	Cu**	40 - 2500µi (1 - 62.5µm)	Special thin Sn available for immersion Sn (0-40µi / 0 - 1µm)
		Ni, Alloy 42, Kovar, Al, Si, Pb			
Ti	12511-13	Ti on Fe, Si	Fe	20 - 1300µi (0.5 - 32.5µm)	
Zn	12511-8	Zn on Fe, stainless steel	Fe	20 - 1300µi (0.5 - 32.5µm)	

Calibration Standards

Alloy and Multilayer Standards

Standard	Part No.	Typical Applications	Base	Range	Notes
Au/Ni/xx	12510-2	Au and Ni on Cu, Be-Cu, brasses, white metal, P-BRZ,	Cu**	**Au:** 1 - 120µi (0.03 - 3µm) **Ni:** 10 - 400µi (0.25 - 10µm)	
		Al, Si, Kovar, Fe, Cu/Al_2O_3			
Au/NiP/xx	12510-10	Au and Ni-P on Cu, Be-Cu, brasses, white metal, P-BRZ,	Cu**	**Au:** 1 - 100µi (0.03 - 2.5µm) **Ni:** 10 - 400µi (0.25 -10µm)	Typically 7 - 10% P for NiP
		Al, Si, Kovar, Fe, Cu/Al_2O_3			
Au/Ni/xx *(immersion)*	12510-13	Electroless Au on Ni on Cu, brasses, P-BRZ, white metal	Cu**	**Au:** 1 - 15µi (0 - 0.38µm) **Ni:** 10 - 400µi (0.25 - 10µm)	
		Al, Si, Kovar, Fe, Cu/Al_2O_3			
Au/Ni-P/xx *(immersion)*	12510-14	Electroless Au on Ni-P on Cu, brasses, P-BRZ, white metal	Cu**	**Au:** 0 - 15µi (0 - 0.38µm) **Ni:** 10 - 400µi (0.25 - 10µm)	
		Al_2O_3, Si, Ge, GaAs, SiO_2, BeO, Ag, Mo			
Au/Ag/xx	12510-7	Au and Ag on Cu, brasses, P-BRZ, BeCu	Cu**	**Au:** 1 - 200µi (0.03 - 5µm) **Ag:** 20 - 200µi (0.5 - 5µm)	
Au/Pd/xx	12510-8	Au & Pd on Cu, brasses, Ni/Cu alloys, CA725, P-BRZ, Kovar	Ni**	**Au:** 0 - 60µi (0 - 1.5µm) **Pd:** 2 - 300µi (0.05 - 7.5µm)	
Ag/Ni/xx	12510-3	Ag & Ni on Cu, Be-Cu, brasses P-BRZ, white metal, Al, Si,	Cu**	**Ag:** 10 - 300µi (0.25 - 7.5µm) **Ni:** 10 - 500µi (0.25 - 12.5µm)	
		Kovar, Fe, Cu/Al_2O_3			
Cr/Ni/xx	12510-9	Cr & Ni on Fe, brasses, Cu	Fe	**Cr:** 1 - 200µi (0.03 - 5µm) **Ni:** 20 - 500µi (0.5 - 12.5µm)	
Cu-Zn/xx *(brass)*	12509-3	Cu-Zn on Fe (typ. 70% Cu, 30% Zn), white metal, Al,	Fe	0-100% Cu 10 - 500µi (0.25 - 12.5µm)	For measurement of thickness & composition
		Si, Kovar, Fe, Cu/Al_2O_3			of Cu-Zn alloy
Ni/Cu/xx	12510-5	Ni & Cu on Fe, Zn	Fe	**Ni:** 20 - 650µi (0.5 - 16.3µm) **Cu:** 20 - 700µi (0.5 - 17.5µm)	Must use Ni & Co filters if measuring on Zn or brass
Pd-Ni/xx	12509-4	Pd-Ni on Cu, P-BRZ, Kovar, ceramic	Cu	0-100% Pd 20 - 300µi (0.5 - 7.6µm)	For measurement of thickness & composition
Pd/Ni/xx	12510-11	Pd & Ni on Cu, P-BRZ, Kovar,	Cu	**Pd:** 10 - 120µi (0.25 - 3µm) **Ni:** 10 - 500µi (0.25 - 12.5µm)	
SnPb/xx	12510-1	SnPb on CU, P-BRZ, Kovar, ceramic	Cu**	**Sn Thickness** (100% Sn): 40 - 3500µi (1 - 87.5µm)	Numerical filtering required for PCB and
				Sn-Pb Thickness (60-40): 40 - 1500µi (1 - 37.5µm)	SnPb/Ni/Ag/Ceramic applications
				Sn-Pb Thickness (90-10): 40 - 2000µi (1 - 50µm)	
Sn/Ni/xx	12510-4	Sn & Ni on C, BeCu, brasses, Fe, Alloy 42, Kovar	Cu**	**Sn:** 10 - 350µi (0.25 - 8.8µm) **Ni:** 10 - 500µi (0.25 - 12.5µm)	
Sn/Cu/xx	12510-12	Sn & Cu on brass, Fe	Fe**	**Sn:** 10 - 350µi (0.25 - 8.8µm) **Cu:** 10 - 500µi (0.25 - 12.5µm)	Requires Ni filter when brass substrate is used
Sn-Ni/xx	12509-6	Sn-Ni on Fe, Cu, brass Alloy 42, Kovar	Cu	0-100% Sn 50 - 1000µi (1.3 - 25µm)	
Zn-Ni/Fe	12509-5	Zn-Ni on Fe	Fe	0-100% Zn 10 - 500µi (0.25 - 12.5µm)	

Calibration Standards

Plated Standards

Standard	Part No.	Typical Applications	Base	Range	Notes
Ag/Cu	12454-1	Ag on Ni, Cu, Fe, Fe alloys* Cu alloys*, W	Cu	20 - 2000µi 0.5 - 50µm	
Au/KVR	12454-12	Au on Kovar, Invar alloy 42, 52, Fe	Kovar	1 - 300µi 0.03 - 7.5µm	
Au/Ni	12454-4	Au on Ni, Cu, Cu alloys*	Ni	1 - 300µi 0.03 - 7.5µm	Special linear range standards available for 0 - 10µi (0 - 0.25µm)
Cu/Fe	12454-7	Cu on Carbon Steel	Fe	20 - 1200µi 0.5 - 30µm	
Cr/Fe	12454-16	Cr on Carbon steel	Fe	20 - 800µi 0.5 - 20µm	
Ni-P/Al	12454-20	Ni-P on Al or Al_2O_3, Si	Al	20 - 800µi 0.5 - 20µm	Standards normally 7-10% P
Ni-P/Cu	12454-18	Ni-P on Cu, P-BRZ, CA725*, brass, W*	Cu	20 - 800µi 0.5 - 20µm	Standards normally 7-10% P
Ni-P/Fe	12454-17	Ni-P on carbon, Fe	Fe	20 - 800µi 0.5 - 20µm	Standards normally 7-10% P
Ni-P/KVR	12454-19	Ni-P on Kovar, Alloy 42	Kovar	20 - 800µi 0.5 - 20µm	Standards normally 7-10% P
Ni/Cu	12454-2	Ni on Cu, brasses*, bronzes*, W*, Be-Cu, CA725*	Cu	20 - 1000µi 0.5 - 25µm	Use Co filter
Ni/Fe	12454-6	Ni on Fe, stainless Fe	Fe	20 - 1200µi 0.5 - 30µm	Numerical Filtering
Ni/KVR	12454-5	Ni on Kovar, Alloy 42*	Kovar	20 - 1000µi 0.5 - 25µm	Numerical Filtering
Pd/Ni	12454-14	Pd on Ni, Cu, P-BRZ*, CA725*,brasses*, Kovar	Ni	5 - 250µi 0.13 - 6.3µm	
Rh/Ni	12454-13	Rh on Ni, Cu, brasses*, P-BRZ*,Kovar	Ni	4 -200µi 0.1 - 5µm	
Sn/Cu	12454-3	Sn on Cu, Ni, brasses*, P-BRZ*, CA725*, Kovar, steels	Cu	40 - 2500µi 1 - 63.5µm	Special linear range standards available for 0 - 50µi (0 - 1.25µm)
Zn/Fe	12454-9	Zn on steels	Fe	20 - 1300µi 0.5 - 32.5µm	
Cd/Fe	12454-8	Cd on Fe, stainless steel	Fe	20 - 2000µi 0.5 - 50µm	
TSPS	8542	**Thickness Standards Preparation Service** (Custom standards prepared from samples provided by customer)			

Notes:

The preceding tables list stock standard configurations. Special non-stock standards are listed at right. A six to eight week lead time should be allowed when ordering non-stock special standards. Veeco Instruments can provide many other standards not listed on special order.

(*) Indicates Base Correction is required when measuring on this base material.

(**) Other Bases Available: Cu, Al-1100, Al-2024, Al-3003, Al_2O_3, Alloy 42, Alloy 52, Brass CDA 260, Cd, CA725, FR4-Epoxy, 1010 Fe, SS 304, Invar, Kovar, Ni, P-BRN_2, CDA 510 P-BR_2, CDA 521 P-BR_2, Pb, Sn, Zn, Mo, Cu-clad Epoxy, Inconel 600, Monel.

Special Order Standards:

Foils:
Pt, Pb, W, Nb, Sb, Bi, Zr, Ru, Ta.

Dual Layer Foils:
Rh/Ni/xx, Au/Pd-Ni/xx, Zn/NiP/Al, Rh/Ag/xx, Au/Rh/xx.

Alloys:
Ni-Fe/xx, Pd-Co/xx, Au-Ag/xx, Mo-Mn/xx, Pd-Ag/xx, Ti-W/xx, Cu-Ni/xx, Ga-As/xx, Sn-Bi/xx, Sn-Ag/xx.

Plated Standards:
TiN/Fe, TiC/Fe, ZrN/Fe, TaN/Si, Fe_2O_3/Al, Albaloy/Cu.