

Spectrometer Reproducibility tests (half intensity positions)

The following spectrometer reproducibility tests were performed by alternating between two element positions where the spectrometer positions were adjusted to the side of each peak to yield an intensity half that of the actual on-peak position.

This provides a “worst case scenario” test in that the intensity reproducibility is much more difficult when the spectrometer position is located on the slope of the peak as opposed to the normal on-peak position.

First 10 measurements:

On-Peak (off-peak corrected) or MAN On-Peak X-ray Counts (and Faraday Current):											
ELEM:	mg ka	si ka	si ka	mg ka	ca ka	si ka	ca ka	si ka	ca ka	si ka	BEAM
BGD:	MAN	MAN	MAN	MAN	MAN	MAN	MAN	MAN	MAN	MAN	
SPEC:	1	1	4	4	2	2	5	5	3	3	
CRYST:	TAP	TAP	TAP	TAP	LPET	LPET	PET	PET	LPET	LPET	
ORDER:	1	2	1	2	1	2	1	2	1	2	
10G	6051.1	21789.1	21058.6	8097.6	16438.7	17213.0	8042.7	3093.4	19124.3	7284.7	20.017
11G	5994.8	21910.3	21104.4	8089.0	16332.7	17346.3	8019.3	3094.3	19272.8	7265.5	20.017
12G	6049.7	21829.5	20993.4	8074.7	16079.0	17203.4	8028.8	3070.3	19237.5	7242.2	20.017
13G	6111.9	21839.0	21104.1	8057.1	16255.4	17453.2	8027.6	3098.8	19320.7	7252.1	20.019
14G	6035.4	21804.2	21039.3	8099.2	16227.7	17429.4	8024.3	3088.5	19322.2	7308.2	20.017
15G	6059.8	21957.2	21189.5	8136.2	16512.4	17355.3	7965.2	3040.1	19334.3	7259.9	20.017
16G	6031.8	21968.6	21065.9	8081.5	16615.1	17342.2	7966.4	3089.1	19068.2	7249.4	20.019
17G	6135.9	21890.4	21233.7	8075.6	16332.4	17339.4	7997.9	3106.8	19148.0	7246.7	20.019
18G	5970.1	22007.4	21038.6	8088.2	16280.8	17478.2	8043.1	3093.5	19122.1	7252.5	20.019
19G	6107.7	22184.4	21083.5	8087.6	16392.4	17379.6	8182.4	3087.8	19440.8	7247.6	20.020
20G	5918.0	22017.2	21099.6	8157.6	16363.2	17419.4	8028.5	3083.4	19124.4	7261.3	20.020
AVER:	6042.4	21927.0	21091.9	8094.9	16348.2	17359.9	8029.7	3086.0	19228.7	7260.9	20.018
SDEV:	64.3	116.8	68.7	28.6	144.6	88.6	57.4	17.8	118.7	19.6	.001
1SIG:	50.1	95.5	93.7	58.0	82.5	85.0	57.8	35.8	89.4	55.0	
SIGR:	1.28	1.22	.73	.49	1.75	1.04	.99	.50	1.33	.36	
SERR:	19.4	35.2	20.7	8.6	43.6	26.7	17.3	5.4	35.8	5.9	
%RSD:	1.1	.5	.3	.4	.9	.5	.7	.6	.6	.3	

Second 10 measurements:

On-Peak (off-peak corrected) or MAN On-Peak X-ray Counts (and Faraday Current):											
ELEM:	mg ka	si ka	si ka	mg ka	ca ka	si ka	ca ka	si ka	ca ka	si ka	BEAM
BGD:	MAN	MAN	MAN	MAN	MAN	MAN	MAN	MAN	MAN	MAN	
SPEC:	1	1	4	4	2	2	5	5	3	3	
CRYST:	TAP	TAP	TAP	TAP	LPET	LPET	PET	PET	LPET	LPET	
ORDER:	1	2	1	2	1	2	1	2	1	2	
21G	6073.3	22219.8	21168.0	8130.5	16475.2	17193.5	8028.9	3090.3	19398.5	7293.9	20.022
22G	6103.7	22102.0	21099.8	8154.0	16495.7	17374.5	8079.6	3071.9	19781.9	7274.6	20.020
23G	6003.8	22318.4	21129.2	8158.4	16838.8	17361.1	8121.2	3109.0	19532.6	7241.8	20.022
24G	5981.4	22316.7	21225.4	8152.0	17012.1	17318.4	8171.1	3130.1	19483.0	7308.5	20.022
25G	6010.1	22636.7	21113.3	8115.7	17188.2	17338.2	8116.9	3107.3	19622.3	7211.3	20.022
26G	6108.8	22129.0	21220.8	8151.7	15982.7	17153.0	8208.4	3106.0	19659.4	7296.6	20.023
27G	6104.4	22141.2	21130.1	8172.0	17066.1	17153.6	8141.1	3097.4	19374.4	7237.2	20.023
28G	6053.8	22144.5	21226.7	8195.9	17176.8	17153.9	8335.5	3084.2	19251.8	7236.6	20.022
29G	6021.5	22270.5	21241.1	8141.6	16555.9	17091.7	8165.7	3098.9	19444.4	7265.8	20.023
30G	6141.3	22687.3	21309.6	8189.0	16949.0	16925.8	8108.3	3122.9	19403.5	7279.7	20.023
AVER:	6060.2	22296.6	21186.4	8156.1	16774.0	17206.4	8147.7	3101.8	19495.2	7264.6	20.022
SDEV:	54.1	207.9	68.4	24.6	387.5	142.4	82.9	17.3	156.7	31.7	.001
1SIG:	50.2	96.3	93.9	58.2	83.5	84.6	58.2	35.9	90.0	55.0	
SIGR:	1.08	2.16	.73	.42	4.64	1.68	1.42	.48	1.74	.58	
SERR:	17.1	65.7	21.6	7.8	122.5	45.0	26.2	5.5	49.6	10.0	
%RSD:	.9	.9	.3	.3	2.3	.8	1.0	.6	.8	.4	

After 5 years the Cameca Sx100 spectrometer reproducibility is within specification (1.2%) for all spectrometers on the first set, within specification except for Ca on spectrometer 2 on the 2nd set of measurements.