Application Note EDXRF1904

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EDXRF1904 - Chromium on HDG Steel

Scope

This application note demonstrates the measurement of chromium (Cr) conversion coating on hot-dip galvanized steel using NEX QC+.

Background

Aluminum and steel are often coated with a protective conversion coating, also called passivate or passivation coating, to prevent oxidation and corrosion of the base metal. Conversion coatings include chromium (Cr), titanium (Ti), vanadium (V), manganese (Mn), nickel (Ni), phosphorus (P), or zirconium (Zr). A phosphate coating may also be applied to minimize wear on cutting tools and stamping machines.

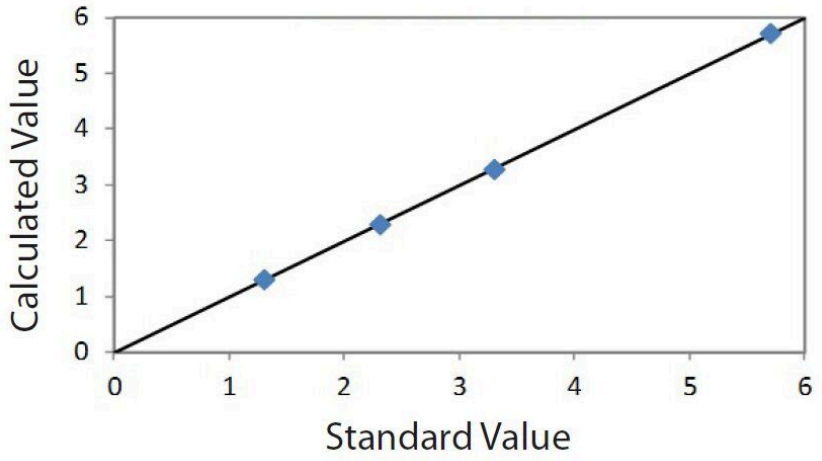
Aluminum is often coated for use in aircraft parts, aluminum window frames, and other similar industries where the aluminum is exposed to weathering. Steel for the automotive industry is typically first galvanized with a zinc coating before the conversion coating is applied. Protected steel is also used for outdoor sheds and other similar uses where steel is exposed to weathering. Conversion coating also helps in the retention of paint for the final finished product.

Calibration

An empirical calibration was built using a set of standards assayed by careful weigh-strip-weigh. The thickness of the galvanized layer may not be constant, so an automatic correction can be enabled that compensates for the Zn X-rays effect on the Cr X-ray signal if the Zn coating varies.

Element: Cr **Units: mg/ft²**

Sample I.D.	Standard value	Calculated value
STD 1	1.3	1.32
STD 2	2.3	2.30
STD 3	3.3	3.27
STD 4	5.7	5.72



Correlation plot Cr on HDG steel

Recovery and repeatability

To demonstrate repeatability (precision), the low and high calibration standards were chosen. Each sample was measured in a static position for ten repeat analyses with typical results shown below.

Element: Ti **Units: mg/ft²**				
Sample I.D.	**Standard value**	**Average value**	**Std. dev**	**% Relative**
STD 1	1.3	1.30	0.013	1.0
STD 4	5.7	5.69	0.022	0.4

Conclusion

The performance shown here demonstrates NEX QC+ provides excellent sensitivity and performance for the measurement of chromium conversion coatings on HDG steel.

Related products

NEX QC Series

Combines quality, affordability, and performance for a wide range of applications