Guidelines for Metrication in the Field of Electrodeposition and Related Processes[1]

1. Scope

1.1 These guidelines are intended as an aid in the use of the metric system as it applies to the field of electrodeposited metallic coatings and related finishes.

1.2 These guidelines serve to abstract from the comprehensive treatment of the subject (ASTM Standard E 380 for Metric Practice) those terms which are of particular interest in electrodeposition.

1.3 The recommendations given here are based on the following premises:

1.3.1 The International System of Units (SI) and other units approved by the General Conference on Weights and Measures will come into common use throughout the United States and the world, in the field of electrodeposition as in others.

1.3.2 Conversion to SI and other approved units should be achieved as rapidly as practical.

1.4 Conversion practices for quantities used primarily by other scientific and engineering disciplines are not considered within the scope of these guidelines. These include heat capacity, thermal conductivity, electrical conductivity, tensile strength, heating rates, and ventilation rates.[1]

[1] Developed by Committee B-8 on Metallic and Inorganic Coatings. Published as information only July 1976.

2. Approved Units and Symbols

2.1 A comprehensive treatment of metric units is given in ASTM Standard E 380.

2.2 Units of special significance to electrodeposition and related processes are given in Table 1.

3. Recommended Conversion Practices

3.1 SI-based units should be used in scientific papers and publications. The alternative metric units given in Table 1 may be used for other communications.

3.2 In Table 1, the "alternative metric units" are units that may be commonly used in the plating shop and control laboratory because of common usage in the literature and in the laboratory, or because they are made up of units of convenient size in which the measurements are actually made. For formal scientific communications, the use of these units is discouraged.

3.3 During the conversion period, when the reader may not readily understand the new metric units, the equivalent quantity in familiar units should be used in parentheses following the metric quantity.

3.4 SI and other approved units with inch-pound equivalents in parentheses) are always acceptable for electrodeposition communications.

TABLE 1 Units of Special Significance to Electrodeposition and Related Processes

Quantity	SI Units[A,B]	Symbol	Alternative Metric Units[A,B]	Symbol
Coating thickness	micrometre	µm		
Coating mass (weight)	gram per square metre	g/m^2	milligram per square centimetre	mg/cm^2
Current density	ampere per square metre	A/m^2	ampere per square decimetre	A/dm^2
			milliampere per square centimetre	mA/cm^2
Quantity of electricity	coulomb (ampere-second)	C	ampere-hour	A·h
			ampere-minute	A·min
Volume	cubic metre	m^3	litre	L
	cubic centimetre	cm^3	millilitre	mL
Mass concentration	kilogram per cubic metre	kg/m^3	gram per litre	g/L
Volume concentration	cubic centimetre per cubic metre	cm^3/m^3	cubic centimetre per litre	cm^3/L
			millilitre per litre	mL/L
Stress (internal) pressure	megapascal	MPa		
Temperature	kelvin	K	degree Celsius (formerly degree centigrade)	°C

[A] The prefixes shown are believed to be appropriate for most circumstances. Other prefixes should be used if needed to avoid very large or very small numbers.
[B] The spellings *metre* and *litre* as used in this publication are preferred by ASTM. However, *meter* and *liter* are also widely used.

APPENDIX

(Nonmandatory Information)

X1. CONVERSION FACTORS

X1.1 Table X1.1 contains some useful conversion factors for units and quantities commonly used in the field of electrodeposition and related finishes.

TABLE X1.1 Conversion Factor

To convert from (To convert to)	to (from)	multiply by (divide by)
mil	µm	25.4
microinch	µm	0.0254
mg/in.^{2}	g/m^2	1.55
mg/in.^{2}	mg/cm^2	0.155
mg/ft^2	mg/m^2	10.8
mg/ft^2	µg/cm^2	1.08
oz (avoirdupois)/in.^{2}	kg/m^2	43.9
oz (avoirdupois)/in.^{2}	g/cm^2	4.39
oz (avoirdupois)/ft^2	kg/m^2	0.305
oz (avoirdupois)/ft^2	mg/cm^2	30.5
A/ft^2	A/m^2	10.8
A/ft^2	mA/cm^2	1.08
A/in.^{2}	mA/cm^2	1.55
A/in.^{2}	mA/cm^2	155
A·h	C	3600
A·min	C	60
A·s	C	1
1000 gal (U.S. liquid)	m^3	3.79
gallon (U.S. liquid)	L	3.79
oz (U.S. fluid)	mL	29.6
oz (avoirdupois)/gal (U.S. liquid)	kg/m^3	7.49
oz (avoirdupois)/gal (U.S. liquid)	g/L	7.49
oz (troy)/gal (U.S. liquid)	g/L	8.22
oz (U.S. fluid)/gal (U.S. liquid)	cm^3/m^3	7810
oz (U.S. fluid)/gal (U.S. liquid)	mL/L	7.81
oz (U.S. fluid)/gal (U.S. liquid)	cm^3/L	7.81
psi	kPa	6.89
kgf/mm^2	MPa	9810
1000 psi	MPa	6.89
A·h/ft^2 for 1 mil	C/m^2 for 1µm	1530
A·h/ft^2 for 1 mil	mA·h/cm^2 for 1 µm	0.0424
°F (interval)	°C (interval)	5/9
°F	°C	$t_c = (t_F - 32)\ 5/9$