

SPECIFICATION TABLE NO. 33 HEMISPHERICAL TOTAL EMITTANCE OF CHROMIUM

Curve No.	Ref. No.	Year	Temperature Range, K	Reported Error, %	Composition (weight percent), Specifications and Remarks
1	9	1960	77.4		Plated on monel; measured in vacuum (10^{-5} mm Hg).

DATA TABLE NO. 33 HEMISPHERICAL TOTAL EMITTANCE OF CHROMIUM

[Temperature, T, K; Emittance, ϵ]T ϵ CURVE 1*

77.4 0.084

* Not shown on plot

SPECIFICATION TABLE NO. 34 NORMAL TOTAL EMITTANCE OF CHROMIUM

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Curve No.	Ref. No.	Year	Temperature Range, K	Geometry θ'	Reported Error, %	Composition (weight percent), Specifications and Remarks
1	16	1937	367	$\sim 0^\circ$	± 1.1	Plated on iron; polished.
2	15	1947	373	$\sim 0^\circ$		Polished.
3	34	1957	516-1005	$\sim 0^\circ$	± 10	Pure; strip (0.005 in. thick); same results obtained for 4 different surface treatments (a. as received, b. cleaned with liquid detergent, c. polished, d. oxidized in air at red heat for 30 min.); measured in air (5×10^{-4} mm Hg); increasing temp, Cycle 1.
4	34	1957	680-1216	$\sim 0^\circ$	± 10	Above specimen and conditions, Cycle 2.
5	34	1957	722-1205	$\sim 0^\circ$	± 10	Above specimen and conditions, Cycle 3.

DATA TABLE NO. 34 NORMAL TOTAL EMITTANCE OF CHROMIUM

[Temperature, T, K; Emittance, ε]

T	ε
<u>CURVE 1</u>	
367	0.08
<u>CURVE 2</u>	
373	0.075
<u>CURVE 3</u>	
516	0.055
903	0.141
1005	0.230
<u>CURVE 4</u>	
680	0.110
855	0.171
966	0.240
1072	0.405
1166	0.382
1216	0.420
<u>CURVE 5</u>	
722	0.290
905	0.355
1072	0.435
1205	0.480

SPECIFICATION TABLE NO. 35 NORMAL SPECTRAL EMITTANCE OF CHROMIUM

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Curve No.	Ref. No.	Year	Wavelength μ	Temperature Range, K	Geometry θ°	Reported Error, %	Composition (weight percent), Specifications and Remarks
1	19	1914	0.65	1703	$\sim 0^\circ$	1	Film; tungsten substrate; melted in hydrogen then oxidized in air by heating; measured in air; Pt reference ($\epsilon = 0.33$ for $\lambda = 0.650 \mu$ at all temp).
2	39	1948	0.669	1550	$\sim 0^\circ$		Heated in hydrogen for one week at 1493° K; measured in hydrogen; ϵ independent of temp up to 1550° K.

DATA TABLE NO. 35 NORMAL SPECTRAL EMITTANCE OF CHROMIUM

[Temperature, T, K; Emittance, ϵ ; Wavelength, λ , μ]

T	ϵ
<u>CURVE 1*</u>	
$\lambda = 0.65$	
1703	0.60
<u>CURVE 2*</u>	
$\lambda = 0.669$	
1550	0.334

* Not shown on plot

SPECIFICATION TABLE NO. 36 NORMAL SPECTRAL EMITTANCE OF CHROMIUM

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Curve No.	Ref. No.	Year	Temperature K	Wavelength Range, μ	Geometry θ°	Reported Error, %	Composition (weight percent), Specifications and Remarks
1	19	1914	1733	0.55-0.65	$\sim 0^\circ$		Film; tungsten substrate; measured in hydrogen; Pt reference ($\epsilon = 0.33$ for $\lambda = 0.650 \mu$ and $\epsilon = 0.38$ for $\lambda = 0.547 \mu$ at all temp).

DATA TABLE NO. 36 NORMAL SPECTRAL EMITTANCE OF CHROMIUM

[Wavelength, λ , μ ; Emittance, ϵ ; Temperature, T, K]

λ	ϵ
<u>CURVE 1*</u>	
<u>T = 1733</u>	
0.55	0.53
0.65	0.39

* Not shown on plot

SPECIFICATION TABLE NO. 37 NORMAL SPECTRAL REFLECTANCE OF CHROMIUM

Curve No.	Ref. No.	Year	Temperature K	Wavelength Range, μ	Geometry θ θ' ω'	Reported Error, %	Composition (weight percent), Specifications and Remarks
1	124	1941	298	0.1347-0.2026	$\sim 0^\circ \sim 0^\circ$		Polished; measured in vacuum ($\sim 10^{-3}$ mm Hg).
2	146	1958	298	0.3-2.7	9° 2π		Electroplated; measured in vacuum; data extracted from smooth curve; MgCO_3 reference.
3	223	1962	298	2.00-25.99	$\sim 0^\circ$ 2π		Polished; converted from $R(2\pi, 0^\circ)$.
4	223	1962	298	2.00-26.00	$\sim 0^\circ$ 2π		Above specimen and conditions except after particle impact.
5	223	1962	77	2.00-26.00	$\sim 0^\circ$ 2π		Above specimen and conditions.
6	235	1967	298	2.5-30.0	$\sim 0^\circ \sim 0^\circ$		5N pure chromium; mechanically polished with 0.25 μ diamond grit; electro-polished; annealed in a high vacuum.

DATA TABLE NO. 37 NORMAL SPECTRAL REFLECTANCE OF CHROMIUM

[Wavelength, λ, μ ; Reflectance, ρ ; Temperature, T, K]

λ	ρ	λ	ρ	λ	ρ
<u>CURVE 1</u>		<u>CURVE 3</u>		<u>CURVE 6*</u>	
T = 298		T = 298		T = 298	
0.1347	0.14	2.00	0.780	2.5	0.709
0.1438	0.16	2.73	0.844	3.0	0.778
0.1570	0.19	4.07	0.902	4.0	0.848
0.1640	0.22	6.41	0.943	5.0	0.879
0.1757	0.27	8.50	0.942	6.0	0.890
0.1901	0.32	10.87	0.950	6.4	0.900
0.2026	0.37	12.51	0.949	7.0	0.915
		14.18	0.946	8.0	0.927
		17.60	0.946	9.0	0.938
		21.94	0.948	10.0	0.946
		25.99	0.953	11.0	0.955
				12.0	0.960
				13.0	0.964
				14.0	0.969
				15.0	0.972
				20.0	0.975
				25.0	0.976
				30.0	0.977
<u>CURVE 2</u>		<u>CURVE 4</u>			
T = 298		T = 298			
0.3	0.485	2.00	0.728		
0.4	0.570	2.61	0.788		
0.5	0.589	3.89	0.849		
0.6	0.570	5.31	0.881		
0.7	0.565	7.49	0.900		
0.8	0.577	9.31	0.904		
0.9	0.587	11.33	0.906		
1.0	0.572	13.49	0.915		
1.1	0.580	15.57	0.921		
1.2	0.600	18.79	0.923		
1.3	0.633	21.53	0.930		
1.4	0.672	23.57	0.925		
1.5	0.681	26.00	0.909		
1.6	0.681				
1.7	0.673				
1.8	0.674				
1.9	0.700				
2.0	0.730				
2.1	0.764				
2.2	0.790				
2.3	0.826				
2.4	0.845				
2.5	0.890				
2.6	0.927				
2.7	0.905				
		<u>CURVE 5</u>			
		T = 77			
		2.00	0.727*		
		3.89	0.864		
		5.98	0.906		
		7.99	0.913		
		9.94	0.903		
		11.99	0.901		
		13.98	0.922		
		16.02	0.922		
		18.02	0.925		
		20.05	0.924		
		21.90	0.930		
		23.98	0.913		
		26.00	0.909*		

* Not shown on plot

SPECIFICATION TABLE NO. 38 ANGULAR SPECTRAL REFLECTANCE OF CHROMIUM

Curve No.	Ref. No.	Year	Temperature K	Wavelength Range, μ	Geometry θ θ' ω'	Reported Error, %	Composition (weight percent), Specifications and Remarks
1	132	1911	298	0.55-9.40	15° 15°	≤ 3	Polished; silvered glass mirror reference.

DATA TABLE NO. 38 ANGULAR SPECTRAL REFLECTANCE OF CHROMIUM

[Wavelength, λ , μ ; Reflectance, τ ; Temperature, T, K]

λ	ρ
<u>CURVE 1*</u>	
<u>T = 298</u>	
0.55	0.550
1.17	0.575
1.55	0.605
2.05	0.623
2.45	0.650
3.05	0.700
4.05	0.765
4.80	0.795
5.45	0.825
6.10	0.855
6.60	0.860
7.10	0.870
7.50	0.875
8.10	0.885
8.45	0.900
8.80	0.903
9.40	0.920

* Not shown on plot

SPECIFICATION TABLE NO. 39 NORMAL SPECTRAL ABSORPTANCE OF CHROMIUM

Curve No.	Ref. No.	Year	Temperature K	Wavelength Range, μ	Geometry °	Reported Error, %	Composition (weight percent), Specifications and Remarks
1	307	1954	~298	0.400-2.600	~0°		Polished; data extracted from smooth curve.

DATA TABLE NO. 39 NORMAL SPECTRAL ABSORPTANCE OF CHROMIUM

[Wavelength, λ, μ ; Absorptance, α ; Temperature, T, K]

λ	α
<div>CURVE 1</div> <div>T = ~298</div>	
0.400	0.351
0.451	0.343
0.708	0.379
0.801	0.368
1.057	0.352
1.193	0.313
1.481	0.317
1.596	0.298
1.684	0.298
1.800	0.265
2.000	0.238
2.200	0.200
2.400	0.163
2.600	0.169

SPECIFICATION TABLE NO. 40 NORMAL SOLAR ABSORPTANCE OF CHROMIUM

Curve No.	Ref. No.	Year	Temperature Range, K	Geometry θ	Reported Error, %	Composition (weight percent), Specifications and Remarks
1	146	1958	298	9°		Electroplated; computed from spectral reflectivity for sea level conditions.
2	146	1958	298	9°		Electroplated; computed from spectral reflectivity for above atmosphere conditions.

DATA TABLE NO. 40 NORMAL SOLAR ABSORPTANCE OF CHROMIUM

[Temperature, T, K; Absorptance, α]

T	α
<u>CURVE 1*</u>	
298	0.415
<u>CURVE 2*</u>	
298	0.397

* Not shown on plot

SPECIFICATION TABLE NO. 41 NORMAL SPECTRAL TRANSMITTANCE OF CHROMIUM

Curve No.	Ref. No.	Year	Temperature K	Wavelength Range, μ	Geometry θ θ' ω'	Reported Error, %	Composition (weight percent), Specifications and Remarks
1	311	1966	298	0.546	0° 0°	± 1	Evaporated film (optical thickness 334 Å); evaporated onto glass microscope slide (at 298 K) in vacuum (2×10^{-5} mm Hg); aged in desiccator at 298 K for 10 days.
2	311	1966	298	0.546	0° 0°	± 1	Different sample, same as above specimen and conditions except optical thickness 457 Å.
3	311	1966	298	0.546	0° 0°	± 1	Different sample, same as above specimen and conditions except optical thickness 573 Å.
4	311	1966	298	0.546	0° 0°	± 1	Different sample, same as above specimen and conditions except optical thickness 695 Å.
5	311	1966	298	0.546	0° 0°	± 1	Different sample, same as above specimen and conditions except optical thickness 829 Å.
6	311	1966	298	0.546	0° 0°	± 1	Different sample, same as above specimen and conditions except optical thickness 935 Å.
7	311	1966	298	0.546	0° 0°	± 1	Different sample, same as above specimen and conditions except optical thickness 983 Å.
8	311	1966	298	0.546	0° 0°	± 1	Different sample, same as above specimen and conditions except optical thickness 1072 Å.
9	311	1966	298	0.546	0° 0°	± 1	Different sample, same as above specimen and conditions except optical thickness 1134 Å.

DATA TABLE NO. 41 NORMAL SPECTRAL TRANSMITTANCE OF CHROMIUM

[Wavelength, λ , μ ; Transmittance, τ ; Temperature, T, K]

λ	τ
<u>CURVE 1</u> T = 298	
0.546	0.438
<u>CURVE 2</u> T = 298	
0.546	0.309
<u>CURVE 3</u> T = 298	
0.546	0.240
<u>CURVE 4</u> T = 298	
0.546	0.206
<u>CURVE 5</u> T = 298	
0.546	0.134
<u>CURVE 6</u> T = 298	
0.546	0.092
<u>CURVE 7</u> T = 298	
0.546	0.082
<u>CURVE 8</u> T = 298	
0.546	0.057
<u>CURVE 9</u> T = 298	
0.546	0.048