

APPENDIX D

PARTICLE SIZE–U.S. SIEVE SIZE AND TYLER SCREEN MESH EQUIVALENTS

In the multiphase combustion area, we often encounter unburned and partially burned particles of different sizes. In the United States, these sizes are often expressed in a standard measured quantity in terms of either U.S. Sieve Size or Tyler Screen Mesh. Sieving or screening is a method of separating a mixture of particles (or grains) into two or more size fractions (see Tables E.1 and E.2). The over size particles are trapped above the screen while undersize particles can pass through the screen. Sieves can be used in stacks, to divide samples up into various size fractions and hence determine particle size distributions. Sieves and screen usually are used for larger particle sizes, $d_p \geq 37 \mu\text{m}$ (0.037mm).

TABLE D.1. Standard U.S. Sieve Sizes and Tyler Mesh Sizes

U.S. Sieve Size	Tyler Mesh Size	Opening (mm)	Opening (in)
—	2½ mesh	8.00	0.312
—	3 mesh	6.73	0.265
No. 3½	3½ mesh	5.66	0.233
No. 4	4 mesh	4.76	0.187
No. 5	5 mesh	4.00	0.157
No. 6	6 mesh	3.36	0.132
No. 7	7 mesh	2.83	0.111
No. 8	8 mesh	2.38	0.0937
No. 10	9 mesh	2.00	0.0787
No. 12	10 mesh	1.68	0.0661
No. 14	12 mesh	1.41	0.0555
No. 16	14 mesh	1.19	0.0469
No. 18	16 mesh	1.00	0.0394
No. 20	20 mesh	0.841	0.0331
No. 25	24 mesh	0.707	0.0278
No. 30	28 mesh	0.595	0.0234
No. 35	32 mesh	0.500	0.0197
No. 40	35 mesh	0.420	0.0165
No. 45	42 mesh	0.354	0.0139
No. 50	48 mesh	0.297	0.0117
No. 60	60 mesh	0.250	0.0098
No. 70	65 mesh	0.210	0.0083
No. 80	80 mesh	0.177	0.0070
No. 100	100 mesh	0.149	0.0059
No. 120	115 mesh	0.125	0.0049
No. 140	150 mesh	0.105	0.0041
No. 170	170 mesh	0.088	0.0035
No. 200	200 mesh	0.074	0.0029
No. 230	250 mesh	0.063	0.0025
No. 270	270 mesh	0.053	0.0021
No. 325	325 mesh	0.044	0.0017
No. 400	400 mesh	0.037	0.0015

TABLE D.2. Particle Characteristics for Different Sizes

	0.0001	0.001	0.01	0.1	1	10	100	1,000	10,000	100,000	1,000,000	10,000,000	100,000,000	1,000,000,000
	Particle Diameter, microns (μ)													
	Particle Diameter, microns (μ)													
Equivalent Sizes	Theoretical Mesh (Used very infrequently)													
	U.S. Screen Mesh													
Electromagnetic Waves	Visible													
	Solar Radiation													
Typical Particles and Gas Dispersoids	Near Infrared													
	Far Infrared													
	Microwaves (Radar, etc.)													
	X-Rays													
	Ultraviolet													
	Solar Radiation													
	Rosa's Smoke													
	Oil Smokes													
	Tobacco Smoke													
	Meningeal Dusts and Cells													
Ammonium Chloride														
Fume														
Sulfuric Concentrator Mist														
Carbon Black														
Sulfuric Mist														
Fly Ash														
Coal Dust														
Cement Dust														
Fertilizer, Ground Limestone														
Beach Sand														
PolvORIZED Coal														
Flotation Ores														
Zinc Oxide Fume														
Ground Talc														
Plant Spores														
Spray Dried Milk														
Alkali Fume														
Milled Flour														
Nebulizer Droplets														
Lipid Emulsions														
Nasal Mucus														
Red Blood Cell Diameter (Average): 7.5 μ ± 0.5 μ														
Bacteria														
Human Hair														
Hydraulic Nozzle Droplets														
Impingers														
Electroformed														
Sieves														
Microscope														
Elutriation														
Sedimentation														
Turbidimetry ⁺														
Permeability ⁺														
Adsorption ⁺														
Light Scattering ⁺⁺														
Nuclei Counter														
Electrical Conductivity														
Machine Tools (Micrometers, Calipers, etc.)														
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