

Definitions, 1-10
 Defrosting, 662
 Degree-day, 3
 for cities, 463, 472
 formula for, method, 462
 industrial, 472, 473
 operating unit, 471
 unit fuel consumption, 467
 Degree of saturation, 8, 25, 31
 Dehumidification, 3, 737, 857
 935
 air conditioning units, 655
 air washers, 857
 coil selection, 879, 889
 comparison of methods, 935
 control, 949
 definitions and methods, 935
 equipment, 857, 935, 938
 performance, 938
 estimating loads, 942
 liquid methods, 940, 941
 moisture load, 942
 ships, 1174
 solid methods, 937, 938
 vapor transfer, 943
 Dehumidifying agents, 935
 absorbents, 935
 adsorbents, 935
 Dehydration, 3
 Density of air, 1
 Design conditions
 summer, 288, 291
 winter, 263-270
 Dew point
 apparatus temperature, 288,
 332
 flue gas, 378, 1064
 temperature, 9, 26
 Dichlorodifluoromethane, 890-
 901, 929, 930
 Dielectric heating, 1027, 1041
 Diffusivity, thermal, 3
 Direct
 expansion coils, 882
 fired unit heater, 637
 indirect heating unit, 3
 radiator, 7
 return system, 3, 557
 Disc fan, 813
 Distribution of air (see *Air
 Distribution*), 475, 751, 1162,
 1170
 District heating, 717
 condensate return, 727
 meters, 732
 pipe insulation, 727
 piping, 725, 729
 conducts for, 722
 inside, 727
 sizes, 721
 tunnels, 725
 steam requirement, 717
 zoning, 729
 Diverging vanes, 766
 Domestic oil burners, 387
 Door, doors
 coefficients of transmission,
 213
 leakage, 241, 243
 natural ventilation, 252
 Down-feed
 one-pipe riser, 3, 6, 507
 steam heating, 4, 511
 system, 3, 505
 Draft, drafts, 3, 433
 available, 436, 441
 calculations, 433
 chimney, 433
 control, 452
 factors, 434
 forced, 433
 general equation, 433
 head, 3
 industrial chimneys, 435
 natural, 245, 433
 regulation, 351

Draft, drafts (continued)
 regulator, 389
 residential chimneys, 440
 requirements, 351, 434, 448
 appliances, 448
 theoretical, 433
 Drawing symbols, 17
 Drip, drips, 3, 512, 542
 Drum dryer, 1156
 Dry air, 1
 composition, 25, 368
 filters, 835
 properties of, 30
 velocity, head, 792
 Dry-bulb temperature, 9
 Dry cooling coils, 879, 891
 Dry return, 8, 505
 Dryer, dryers, 1154
 cabinet, 1150, 1156
 calculations, 1150
 compartment, 1156
 cylinder, 1156
 drum, 1156
 rotary, 1156
 spray, 1157
 tunnel, 1156
 Drying, 4, 1129, 1135
 application of hygrometry,
 1149
 calculations, 1150
 chart, 1141, 1149, 1151
 conduction, 1155
 constant rate period, 1139, 1141
 convection, 1155
 critical moisture, 1146
 effect of air velocity, 1140
 equations, 1144
 equilibrium moisture, 1147
 equipment, 1154
 example, 1158
 external conditions, 1137
 factors influencing, 1136
 falling rate period, 1143
 internal conditions, 1137
 mechanism of, 1136
 methods, 1154
 conduction, 1155
 convection, 1155
 radiant, 1154
 periods, 1138
 problem, 1154
 radiant, 1154
 surface temperature, 1140
 systems, 1135
 terminology, 1135
 Duct, ducts, 478, 781
 air velocities in, 476, 797, 1100,
 1108
 approaches to outlets, 773
 area change, 794
 attenuation, 1007
 circular equivalents, 787
 construction details, 805, 1109
 design, 478, 796, 1104
 design methods, 798
 equal friction, 798
 static regain, 801
 velocity reduction, 798
 dual duct, 745
 dynamic losses, 790
 elbow friction losses, 792
 exhaust design, 1104
 friction losses, 783
 heat loss coefficients, 809, 810
 lining, 1008
 measurement of velocities,
 1230
 perimeter, 479
 pressure changes, 781
 pressure loss, 781, 783
 recirculating, 467, 471, 726
 rectangular equivalents of
 round, 439, 787
 resistance, 781
 roughness correction, 786
 sizing, 781, 796
 sound absorbers, 1008-1013
 symbols for drawing, 17

Duct, ducts (continued)
 system design, 475, 781, 796,
 1104
 warm air perimeter, 479
 weight, 808, 809
 Dust, dusts, 781, 796, 1104
 equal friction method, 798
 general rules, 796
 static regain method, 801
 velocity method, 798
 Dust, 4, 113, 151
 combustible, 163
 concentrations, 161, 162
 control, 134
 counter, 153
 determination, 151
 filters, 831, 842, 846
 industrial, 152
 particle size chart, 153
 precipitators, 835, 848
 removal, 831
 size, 153
 Dust collectors, 831, 842
 application, 831, 840, 844
 centrifugal, 845
 cyclone, 846
 cloth, 846
 degree of dust removal, 843
 electrostatic, 848
 fabric, 845, 848
 factors affecting selection, 843
 inertial separators, 845
 settling chambers, 846
 scrubbers, 845, 847
 testing methods, 835
 types, 844
 wet, 845
 centrifugal, 847
 packed tower, 847
 spray towers, 847
 washers, 847
 wet filters, 847
 Dynamic head, 5, 790
 losses, 790
 E

EDR (Equivalent direct radia-
 tion), 7, 517, 522, 524
 defined, 7, 410, 592
 Effective temperature, 9, 122
 chart, 122, 126
 index, 122
 Efficiency
 boiler, 414
 conversion burner furnace, 426
 seasonal, 458
 Ejector nozzles, 769
 Elbow
 attenuation, 1008
 copper equivalents, 556
 friction losses, 556, 792, 793
 iron equivalents, 556, 553, 1184
 sheet metal, equivalent, 790
 Electric, electrical
 baseboard, 1030, 1031
 convector, 1029, 1031
 demand control, 1042
 dielectric heating, 1041
 heat applications, 1028
 heating, 1027
 calculating capacities, 1036
 central, 1034, 1035
 control, 1042
 domestic water, 1038
 equipment, 1029
 heat pump, 1035
 induction, 1041
 power problems, 1041
 resistors, 8, 1027
 systems, 1030
 units, 1028, 1029
 hot water heating, 1034
 induction heating, 1041
 installation methods, 1029
 motor design limits, 974

Electric, electrical (continued)
 panel heating, 600, 1032-1034
 precipitators, 835, 848
 radiant convector, 1031
 radiant heating, 600, 1031
 resistors, 1027, 1032
 steam radiator, 1032
 systems, 973, 1029
 voltage ratings, 974
 Electricity, static, 139, 1132
 Emissivity, 95
 Enclosed radiator, 695
 Energy, Conservation Law, 23
 Enthalpy, 4, 24, 30, 31, 51
 free, 4
 specific, 4, 30
 Entropy, 4, 30, 51
 mixing, 51
 specific, 4
 Equivalent evaporation, 4
 Estimating fuel consumption,
 457
 Eupatheoscope, 1236
 Evaporative
 condensers, 923
 cooled, unit conditioners, 651
 cooling, 747
 Evaporators, 925
 Excess air, 350, 366, 370, 399
 Exhaust opening, 776, 1098, 1108
 measurement of velocities,
 1108, 1230
 Exhaust systems, 1097
 air flow equipment, 1110
 axial velocity formula, 1098
 capture velocity, 1098
 construction, 1109
 conveying velocity, 1100-1103,
 1108
 corrosion, 1112, 1114
 duct construction, 1109
 duct design, 1104, 1109
 duct resistance, 1107
 duct system design, 1104
 duct velocity, 1100-1103
 ducts for, 1104
 air velocities in, 1100-1103
 construction, 1109
 design, 1109
 resistance, 1104, 1107
 dust filters, 1111
 elements, 1097
 equipment, 1097, 1111
 exhaust requirements, 1104
 general requirements, 1097
 hoods, 1097
 air flow, 1099
 air velocity, 1098
 axial velocity formula for,
 1098
 canopy, 1100-1103
 capture velocities, 1098
 chemical laboratories, 1101
 design principles, 1097
 kitchen, 1101
 special exhaust require-
 ments, 1099
 spray booth, 1103
 suction, 1111
 velocity contours, 1099
 ventilation rates, 1100-1105
 make-up air, 1111
 maintenance, 1111
 materials, 1109, 1112, 1114
 performance, 1111
 pressure loss, 1107
 specifications, 1109
 suction requirements, 1111
 types of fans, 1110
 velocity contours, 1099
 velocity requirements, 1100-
 1107
 ventilation rates, 1100-1105
 Expansion
 factor, gases, 81, 82
 of pipe, 544, 688
 tank installation, 568

Expansion (continued)
 tank piping, 568
 tank size, 570
 tanks, 568
 valves, 926
 Explosion hazard, 138
 Extended plenum systems, 485,
 486
 F
 Fan, fans, 813
 applications, 827
 arrangement of drives, 822
 attic, 829
 location, 829
 axial flow, 813
 central system, 2, 827
 centrifugal, 813, 817
 characteristic curves, 818-821
 control, 824
 designations, 814
 drive position, 824
 efficiency, 817
 exhaust, 828
 furnace system, 4, 475
 hot gas, 829
 installation, 827
 kitchen, 829
 laws, 815
 marine, 828
 mine, 828
 motive power, 825
 noise generated, 1002
 oil burner, 388
 performance, 813, 817, 818, 1002
 propeller, 813
 radial flow, 813, 817
 rotation, 823
 selection of, 825
 air conditioning systems, 825
 industrial exhaust systems,
 1110
 special application, 829
 speed, 826
 system characteristics, 821
 types, 813
 unitary systems, 828
 velocity, operating, 826
 volume control, 824
 Fanning formula, 69, 581
 Fever therapy, 142
 equipment for production of,
 143
 Film conductance, 92, 169, 172,
 176
 Filter, filters, 831
 air conditioning units, 655
 atmosphere, 813
 charged media, 826
 dry air, 835, 846, 1166
 dust, 835
 furnace, 422
 installation, 840
 ionizing, 835
 maintenance, 839
 moving curtain, 834
 performance, 837
 selection, 839, 843
 testing, 837
 vapor adsorption, 849
 viscous impingement type, 833
 Fitting, fittings
 allowance
 pipe, 521, 556, 1184
 sheet metal, 494, 495, 790
 Flash leg, 543
 Flexible mountings, 1121
 Float trap, 538
 Floor
 cooling unit, 654
 heat transfer coefficients, 193,
 194, 195, 205
 panel design, 617-621
 unit heater, 638
 Floor slab heat loss, 210, 276
 Flow
 coefficient, orifices, 77
 compressible fluids, 73

Flow (continued)
 critical, 76
 fluids, 67, 73
 through nozzle or orifice, 75
 measurement
 head meters, 78, 82
 liquids, 78
 orifices, 78
 Pitot tube, 84, 1226
 variable area meters, 85
 Flow meters, 78, 732, 1183, 1184
 Flue gas analysis, 372
 Flue gas dew-point, 376
 Flue gas loss, 373
 Fluids, flow, 67, 73
 theory, 67
 Fluid meters, 78, 1183
 Fog, 4, 152, 155
 Force, 4
 Forced
 air heating system, 475
 ceiling panel systems, 497
 design, 479
 large systems, 493
 perimeter systems, 479-492
 summer operation, 503
 circulation pipe sizes, 551
 convection, 91-93
 Fourier's Equation, 221
 Free
 convection, 92, 93
 enthalpy, 4
 Freezing in pipes, 712
 Frick's Law, 220
 Friction loss
 air ducts, 502, 781
 circular pipes, 69
 effect of area change, 794
 elbows, 482, 494, 495, 521, 556,
 792, 1184
 gas piping, 401
 high temperature, 582
 non-circular pipes, 72
 refrigerant piping, 929, 930
 water heating, 552, 554, 555, 581
 water piping, 552, 554-556, 581,
 1180-1182
 Fuel, fuels, 343
 analysis, 343, 353, 360
 burning equipment, 379
 burning rates, 405
 calorific value, 367
 classification, 344, 346, 352, 361
 consumption, 457
 calculated heat-loss method,
 459
 degree-day method, 461
 load factor, 473
 maximum demands, 473
 seasonal efficiency, 458
 unit, 467-471
 firing methods, 347, 348, 349
 gas, 359
 heat of combustion, 367
 heating value, 367
 liquid, 352
 solid, 343
 unit consumption, 468, 469
 utilization, 422
 Fuel oil, 352
 analysis, 353
 blended, 353
 calorific value, 357
 carbon residue, 354
 catalytically cracked, 353
 classification of, 352, 355
 combustion of, 366
 estimating consumption, 404,
 467, 469
 flashpoint, 354
 grade of, 355
 maximum carbon dioxide
 values, 371
 piping, 395
 storage, 395
 straight-run, 353
 theoretical air requirements,
 369
 thermally cracked, 353