

HANDBOOK OF

POWER, UTILITY

AND BOILER

Terms and Phrases

Sixth Edition

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F OREWORD

This is the sixth edition of a Lexicon containing words commonly used in connection with Boilers and Auxiliary Equipment. It has been divided into major sections, titled as major parts or functions, and arranged in sequence as the fuel or products of combustion pass through a steam generating unit. This has been done to limit, when desirable, the scope of a definition to the subject of the section.

The final section, "Legislative and Regulatory Terms", lists terms, acronyms, and phrases which are popularly used at the time of publishing. However, these could change over a period of time.

The difficulties of obtaining 100% accuracy and coverage in such a Lexicon are recognized by the Lexicon Task Force. This edition contains some revisions and needed additions to reflect current industry practice. Constructive criticisms and suggestions for revisions in, or additions to, future editions will be welcome. This Lexicon is not to be considered as a purchasing specification.

The Task Force gratefully acknowledges the help and suggestions in the preparation of this Lexicon received from individuals and organizations in and outside the boiler industry.

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The American Boiler Manufacturers Association wishes to express its appreciation for the Task Force work in updating this Lexicon. Their dedication, while representing the interests of the Utility Boiler, Industrial Systems, Commercial Systems and Burner product market groups, brought this publication to the present perceived level of the industry.



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FUELS

ACID SLUDGE - A waste product from the refining of petroleum which may be used as a fuel.

AGGLOMERATING - The characteristic of a coal which causes coking on the fuel bed during volatilization.

AGGLUTINATING - A characteristic of coal that causes it to form a button having measurable bonded strength when mixed with certain amounts of inert material and heated in the absence of oxygen or air.

AIR DRIED - Condition of coal after sample has been exposed to 85°F to 95°F air until weight is constant.

ANALYSIS, PROXIMATE - Analysis of solid fuel stating moisture content, volatile matter, fixed carbon, heating value and ash content expressed on a percent by weight basis.

ANALYSIS, ULTIMATE - Chemical analysis of a fuel stating carbon, hydrogen, sulfur, nitrogen, chlorine, oxygen, and ash content expressed on a percent by weight basis.

ANTHRACITE - A high ASTM ranked coal with dry fixed carbon 92% or more but less than 98%; and dry volatile matter 8% or less and more than 2% on a mineral-matter-free basis.

AS-FIRED FUEL - Fuel in the condition as fed to the fuel burning equipment.

ASH - The incombustible solid matter in fuel.

ASH-FREE BASIS - The method of reporting fuel analysis whereby ash is deducted and other constituents are recalculated to total 100%.

BAGASSE - Refuse from the processing of sugar cane.

BARK - The fibrous external covering of trees. Bark from wood pulp mills and spent tanbark are major sources of bark as fuel.

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BARLEY - Anthracite coal size - through 3/16" round mesh screen, over 3/32" round mesh screen; otherwise known as No. 3 Buckwheat.

BED MOISTURE - The moisture in coal when in the seam.

BEE HIVE COKE - Coke manufactured in bee hive, rectangular, or similar forms of ovens in a horizontal bed where heat for the coking process is secured by combustion within the oven chamber.

BIOMASS - Fuels which result from biological sources requiring a relatively short time for replenishment: Wood and bagasse are typical examples.

BITUMINOUS COAL - ASTM coal classification by rank on a mineral-matter-free basis with bed moisture only.

Low Volatile: Dry fixed carbon 78% or more but less than 86%; and dry volatile matter 22% or less but more than 14%.

Medium Volatile: Dry fixed carbon 69% or more but less than 78%; and dry volatile matter 22% or less but more than 31%.

High Volatile (A): Dry fixed carbon less than 69% and dry volatile matter more than 31% - Btu value equal to or greater than 14,000 moist, mineral-matter-free basis.

High Volatile (B): Btu value 13,000 or more but less than 14,000 moist, mineral-matter-free basis.

High Volatile (C): Btu value 11,000 or more but less than 13,000 moist, mineral-matter-free basis commonly agglomerating, or 8,300 to 11,500 Btu agglomerating.

BLACK LIQUOR - Liquid by-product fuel extracted from wood in an alkaline pulp manufacturing process and containing the chemical used to accomplish the extraction.

BLAST FURNACE GAS - Lean combustible by-product gas resulting from burning coke with a deficiency of air in a blast furnace.

BONE COAL - Coal from that part of a seam which has a very high ash content. In connection with anthracite, any material which has 40%, or more, but less than 75% fixed carbon.

BRITISH THERMAL UNIT (BTU) - The mean British Thermal Unit is 1/180 of the heat required to raise the temperature of 1 pound of water from 32°F to 212°F at a constant atmospheric pressure. It is about equal to the quantity of heat required to raise 1 pound of water 1 degree F. (251.9957 calories or 1054.35 joule).

BROKEN COAL - Anthracite coal size - through 4 3/8", over 3 1/4" round mesh screen.

BROWN COAL - A former coal classification according to rank now included in lignite B.

BUCKWHEAT - Anthracite coal size:

- No. 1 (Buckwheat) - through 9/16", over 5/16" round mesh screen.
- No. 2 (Rice) - through 5/15", over 3/16" round mesh screen.
- No. 3 (Barley) - through 3/16", over 3/32" round mesh screen.
- No. 4 - through 3/32", over 3/64" round mesh screen.
- No. 5 - through 3/64", round mesh screen.

BUG DUST - Bituminous coal dust screenings of a fineness below commercial size.

BUNKER C OIL - Residual fuel oil (No. 6 fuel oil) of high viscosity commonly used in marine and stationary steam power plants.

BY-PRODUCT COKE - Coke manufactured with attendant recovery of by-product in ovens that are heated externally.



CAKING - Property of certain coals to become plastic when heated and form large masses of coke.

CALORIE - The mean calorie is 1/100 of the heat required to raise the temperature of 1 gram of water from 0°C to 100°C at a constant atmospheric pressure. It is about equal to the quantity of heat required to raise one gram of water 1°C (4.184 joule).

CALORIFIC VALUE - The number of heat units liberated per unit of quantity of a fuel burned in a calorimeter under prescribed conditions.

CALORIMETER - Apparatus for determining the calorific value of a fuel.

CARBON (ELEMENT) - The principal combustible constituent of most fuels.

CARBONIZATION - The process of converting coal to carbon by removing other ingredients.

CARBONRESIDUE - The quantity of the carbonaceous material remaining after the volatile compounds are vaporized.

CLASS - Rank of coal.

CLASSIFICATION - Method of separating coals with reference to their properties. See Grade and Rank.

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COAL - Solid hydrocarbon resulting from the decomposition of vegetal material under the influence of time, temperature, pressure and micro-organisms.

COAL GAS - Gas formed by the destructive distillation of coal.

COAL-OIL MIXTURES (COM) - A mixture of coal and oil, usually with stabilizing agents added typically containing 50% or more by weight of ground or finely powdered coal. Heat content and viscosity of mixture vary with concentration of coal.

COAL TAR - Black viscous liquid, one of the by-products formed by distillation of coal.

COKE - Fuel consisting largely of the fixed carbon and ash in coal obtained by the destructive distillation of bituminous coal.

COKE BREEZE - Fine coke screenings usually passing a 1/2" or 3/4" screen opening.

COKE OVEN GAS - Gas produced by destructive distillation of bituminous coal in closed chambers. Heating value 500/550 Btu/cu. ft.

COKE OVEN TAR - See Coal Tar.

COKING - The conversion by heating in the absence or near absence of air of carbonaceous fuel, particularly certain bituminous coals, to a coherent, firm, cellular carbon product known as coke. (See also Petroleum Coke.)

COLLOIDAL FUEL - Mixture of fuel oil and powdered solid fuel.

COMBUSTIBLE - The heat producing constituents of a fuel.

CRACKED RESIDUE - The residue obtained by cracking crude oils.

CRUDE OIL - Unrefined petroleum.

CULM - The fine refuse from anthracite production.

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DISTILLATE OIL - Light fraction of oil which has been separated from crude oil by fractional distillation.

DISTRICT - Coal producing region as defined by the Federal Bituminous Coal Act of 1937.

DRY, ASH FREE BASIS - The method of reporting fuel analysis with ash and moisture eliminated and remaining constituents recalculated to total 100%.

DRY, FUEL BASIS - The method of reporting fuel analysis with moisture eliminated and other constituents recalculated to total 100%.

DRY, MINERAL-MATTER-FREE BASIS - The method of reporting fuel analysis with moisture and ash, with other mineral matter eliminated and remaining constituents recalculated to total 100%.

DULONG'S FORMULA - A formula for calculating the approximate heating value of solid fuels from the ultimate analysis.

FIELD - Fuel producing region such as coal fields and oil fields.

FINES - Commonly the percentage of coal which passes through a 1/4" screen.

FIXED CARBON - The carbonaceous residue less the ash remaining in the test container after the volatile matter has been driven off in making the proximate analysis of a solid fuel.

FLASH POINT - The flash point of a liquid is an indication of the maximum temperature at which it can be stored and handled without serious fire hazard.

FREE MOISTURE - Same as Surface Moisture.

FRIABILITY - The tendency of a coal to crumble or break into small pieces.

FUEL - A substance containing combustible used for generating heat.

FUEL-AIR MIXTURE - Mixture of fuel and air.

FUEL BED - Layer of burning fuel on a furnace grade.

FUEL OIL - Any hydrocarbon oil as defined by ASTM D396 including the following grades:

- **GRADE No. 1:** A light distillate intended for use in burners of the vaporizing type in which the oil is converted to a vapor by contact with a heated surface or by radiation. High volatility is necessary to ensure that evaporation proceeds with a minimum of residue.
- **GRADE No. 2:** A heavier distillate than grade No. 1. It is intended for use in atomizing type burners which spray the oil into a combustion chamber where the

tiny droplets burn while in suspension. This grade of oil is used in most domestic burners and in many medium capacity commercial-industrial burners where its ease of handling and ready availability sometimes justify its higher cost over the residual fuels.

- **GRADE No. 4 (Light):** Usually a light residual, but at times can be a heavy distillate. It is intended for use in pressure-atomizing commercial industrial burners not requiring higher cost distillates and in burners equipped to atomize oils of higher viscosity. Its permissible viscosity range allows it to be pumped and atomized at relatively low storage temperatures.
- **GRADE No. 4:** Usually a light residual, but at times can be a heavy distillate. It is intended for use in burners equipped with devices that atomize oils of higher viscosity rather than the oil used in domestic burners. Its permissible viscosity range allows it to be pumped and atomized at relatively low storage temperatures. Thus, in all but extremely cold weather it requires no preheating for handling.
- **GRADE No. 5 (Light):** A residual fuel of intermediate viscosity for burners capable of handling fuel more viscous than grade No. 4 with preheating. Preheating may be necessary in some types of equipment for burning and in colder climates for handling.
- **GRADE No. 5 (Heavy):** A residual fuel more viscous than grade No. 5 (light) and is intended for use in similar service. Preheating may be necessary in some types of equipment for burning and in colder climates for handling.
- **GRADE No. 6:** Sometimes referred to as "Bunker C" is a high-viscosity oil used mostly in commercial and industrial heating. It requires preheating in the storage tank to permit pumping, and additional preheating at the burner to permit atomizing. The extra equipment and maintenance required to handle this fuel usually preclude its use in small installations.

GRADE - Coal and oil classification according to quality.

GRAVITY - Weight index of fuels: Liquid petroleum products expressed either as specific or A.P.I. (American Petroleum Institute) gravity; weight index of gaseous fuels as specific gravity related to air under specific conditions; or weight index of solid fuels as specific gravity related to water under specific conditions.

GRINDABILITY - A characteristic of a coal relating to the ease of its pulverization. The grindability index of a standard selected coal was given the factor 100. Coals harder to grind have a lower index number. This index is a factor in pulverizer selection.

GROUP - A sub-classification of coal by rank.

HIGHER HEATING VALUE - The total heat obtained from the combustion of a specified amount of fuel which is at 600F when combustion starts, and the combustion products of which are cooled to 600F before the quantity of heat released is measured. (See also Calorific Value and Lower Heating Value)

HOGGED FUEL - Wood refuse after being chipped or shredded by a machine known as a hog.

HYDROCARBON - A chemical compound of hydrogen and carbon.

IGNITION TEMPERATURE - Lowest temperature of a fuel at which combustion becomes self-sustaining.

ILLUMINANTS - Light oil or coal compounds that readily burn with a luminous flame such as ethylene, propylene and benzene.

INERT GASEOUS CONSTITUENTS - Incombustible gases such as nitrogen which may be present in a fuel.

JOULE - A unit of energy equal to a newton-meter. In heating it is the amount of heat produced by one watt in one second (0.2390 calorie or .00094845 Btu).

KILN-DRIED WOOD - Wood dried in a kiln to speed up the usual air drying or seasoning process.

LIGNITE A - A coal of low ASTM ranking with calorific value limits on a moist, mineral-matter-free basis between 6,300 and 8,300 Btu per pound.

LIGNITE B - A coal of lowest ASTM ranking with calorific value limits on a moist, mineral-matter-free basis less than 6,300 Btu per pound.

LIQUEFIED PETROLEUM GAS - Fuel gases, including commercial propane, predominantly propane or propylene, or commercial butane which is predominantly butane, isobutane, and/or butylene.

LOWER HEATING VALUE - The higher heating value of a fuel minus the latent heat of vaporization of the water in the fuel and water formed by combustion of the hydrogen in the fuel.

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MANUFACTURED GAS - Fuel gas manufactured from coal, oil, or other such fuels. This is different from natural gas (SNG).

META-ANTHRACITE - Highest coal classification according to rank. Dry fixed carbon 98% or more and dry volatile matter 2% or less, on a mineral-matter-free basis.

MINERAL-MATTER-FREE BASIS - The method of reporting coal analysis whereby the ash plus other minerals which are in the original coal are eliminated and the other constituents recalculated to total 100%.

MOISTURE AND ASH-FREE BASIS - Method of reporting coal analysis -Dry, Ash-Free Basis.

MUNICIPAL WASTE - Untreated solid waste material as collected from household and commercial establishments. It is highly variable in appearance, density and BTU content.

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NATURAL GAS - Gaseous fuel occurring in nature.

NUT - Anthracite coal designation through 1 5/8" collected on 13/16" screen. Bituminous coal designation through 2" collected on 1 1/4" screen.

NUT AND SLACK - A mixture of commercially available coal sizes containing a percentage of each of the grades.

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OIL GAS - Gas produced from petroleum.

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PEA - Anthracite or bituminous coal size. In anthracite through 13/16" over 9/16" round hold screen, in bituminous 3/4" x 3/8".

PEAT - An accumulation of compacted and partially devolatilized vegetable matter with high moisture content. This is an early stage of coal formation.

PETROLEUM - Naturally occurring mineral oil consisting predominantly of hydrocarbons.

PETROLEUM COKE - Solid carbonaceous residue remaining in oil refining stills after distillation process.

POUR POINT - The pour point is an indication of the lowest temperature at which liquid fuels can be stored and still be capable of flowing under very low forces.

PRODUCER GAS - Gaseous fuel obtained by burning solid fuel in a chamber where a mixture of air and steam is passed through the incandescent fuel bed. This process results in a gas, almost oxygen free, containing a percentage of the original heating value of the solid fuel in the form of CO and H₂.

PROVINCE - The largest division in classifying a coal producing area. The six provinces in the United States being: Eastern, Interior, Gulf, Northern Great Plains, Rocky Mountains, and Pacific Coast.

PROXIMATE ANALYSIS - See Analysis Proximate.

PULVERIZED FUEL - Solid fuel reduced to a fine size, such as 70% through a 200 mesh screen.

PYRITES - A compound of iron and sulfur naturally occurring in coal.

RANK - Method of coal classification based on the degree of progressive alteration in the natural series from lignite B to meta-anthracite. The limits under classifications according to rank are on a mineral-matter-free basis.

RDF - See Refuse Derived Fuel (RDF).

RED LIQUOR - An acid water mixture of organic material - wood residue - and spent inorganic pulping chemicals, generally associated with a sulfite pulping process.

REFINERY GAS - The commercially non-condensable gas resulting from fractional distillation of crude oil, or the cracking of crude oil or petroleum distillates.

REFUSE - See Municipal Waste.

REFUSE DERIVED FUEL (RDF) - A solid fuel prepared from municipal solid waste. The waste material is usually refined by shredding, air classification, magnetic separation, or other means. The fuel may be packed, chopped, pelletized, pulverized, or be subject to other mechanical treatment. Further refinement to either a gas or liquid yields a fuel of the synthetic type.

RESIDUAL FUELS - Products remaining from crude petroleum after removal of some of the water and an appreciable percentage of more volatile hydrocarbons. (See Residual Oils.)

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RESIDUAL OILS - Oils which are too heavy to be evaporated in any normal evaporation or distillation process and are so left over from that process. Such oils are frequently cracked (high temperature fractionation) or catalytically cracked (fractionation in presence of aluminasilica catalyst).

RICE - Anthracite coal size, otherwise known as No. 2 Buckwheat - through 5/16" over 3/16" round mesh screen.

RUN OF MINE - Unscreened coal as it comes from the mine.

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SAWDUST - Fine particles of wood refuse from sawmills.

SCREENING - The undersized coal from a screen process (often minus 3/4" or smaller, bituminous).

SEAM - A continuous tabular deposit of vegetal or sedimentary origin bedded between parallel strata of sandstone, shale or clay.

SEDIMENT - A noncombustible solid matter which settles out at the bottom of a liquid; a small percentage is present in residual fuel oil.

SEMI-ANTHRACITE - A coal classification according to rank. Dry fixed carbon 85% or more and less than 92% and dry volatile matter 14% or less and more than 8%, on a mineral-matter-free basis.

SEMI-BITUMINOUS - A former coal classification according to rank - including Low Volatile Bituminous.

SIFTINGS - Fine particles of solid fuel which sift through a grate.

SILT - Finely divided anthracite obtained as a residue from cleaning process.

SLACK - Screening or small size coal which is not above 3/4".

SLACKING - Breaking down of friable coals due to changes in moisture contents.

SLATE - A rock formation sometimes overlaying or mixed with a coal seam. In connection with anthracite coal, any material which has less than 40% fixed carbon.

SNG - Sometimes used as an abbreviation for either Synthetic Natural Gas or Substitute Natural Gas.

SOLVENT REFINED COAL (SRC) - Coal that has been cleaned, via a solvent, to remove a substantial amount of impurities, especially ash and sulfur compounds.

SUB-BITUMINOUS COAL - An intermediate rank coal between lignite and bituminous with more carbon and less moisture than lignite.

- a. Btu 10,500 or more and less than 11,500
- b. Btu 9,500 or more and less than 10,500
- c. Btu 8,300 or more and less than 9,500

SUBSTITUTE NATURAL GAS - A gaseous fuel produced by blending gaseous substances with properties different from natural gas to yield a fuel with properties similar to natural gas.

SURFACE MOISTURE - That portion of the moisture in the coal which comes from external sources as water seepage, rain, snow, and condensation.

SYNFUEL - Liquid or gaseous fuels having variable heating values resulting from manufacturing process.

SYNTHETIC NATURAL GAS - A gaseous fuel produced from substances with properties different from natural gas to yield a fuel with properties similar to natural gas.

TANBARK - Fibrous portion of ground oak or hemlock bark used in tanning. Spent tanbark is used as fuel.

THERM - A unit of heat applied especially to gas. One therm = 100,000 Btu.

TOTAL MOISTURE - The sum of inherent moisture and surface moisture in coal.

ULTIMATE ANALYSIS - See Analysis, Ultimate.

VEIN - A non-sedimentary deposit disseminated through a rocky mass filling crevices in the earth.

VISCOSITY - The measure of the internal friction of a fluid or of its resistance to flow. In fuel oil it is highly significant since it indicates both the relative ease with which the oil will flow or may be pumped, and the ease of atomization.

VOLATILE MATTER - Those products given off by a material as gas or vapor, determined by definite prescribed methods.

WASHED SIZES - Sizes of coal which have been washed.

WASTE FUEL - Any by-product fuel that is waste from a manufacturing process.

WATER AND SEDIMENT - Moisture and foreign matter in liquid fuel (appreciable amounts of water and sediment tend to cause fouling of handling equipment).

WATER GAS - Gaseous fuel consisting primarily of carbon monoxide and hydrogen made by the interaction of steam and incandescent carbon.

WEATHERING - An index or measure of the disintegrating characteristic of a coal when exposed to a standard condition of humidity, temperature and immersion.

FUEL-PREPARATION EQUIPMENT

AERATION - The process of mixing air with pulverized fuel in a transport pipe or storage bin.

AIR CLASSIFICATION - A method using air to separate material by size or weight.

AIR SEAL - A closure obtained by using air as the securing medium, as air under pressure to prevent the entrance of pulverized material between the shaft and yoke of pulverizers.

AIR-SWEPT PULVERIZERS - A pulverizer in which the fuel is removed by a stream of air.

AIR-TRANSPORT SYSTEM - A fuel transport system utilizing air as the conveying medium.

BIN SYSTEM - A system in which fuel is pulverized, stored in bins, and subsequently withdrawn through feeders to the burners in amounts sufficient to satisfy load demands.

BLOWER - The fan used to force air through a pulverizer or to force primary air through an oil or gas burner register.

CLASSIFIER - That part of a pulverizer system which rejects coarse particles from the air conveying pulverized fuel.

CRICKET - A wedge-shaped member of refractory or other construction used to subdivide a channel into hopper-shaped pockets.

CRUSHER - A machine to reduce lumps of solid fuel to a desired maximum size.

CYCLONE - A stationary centrifugal type separator used to separate pulverized fuel from pulverizer air in storage system.

DIRECT-FIRED CIRCULATING SYSTEM - A system in which fuel is pulverized in proportion to the load demand and conveyed directly from the pulverizers to the burners.

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DRIER - An apparatus for the removal of part or all of the water or moisture from the fuel.

EVAPORATOR - A vessel from which part or all of the water in the contained liquid mixture is removed by evaporation, the usual source of heat being immersed elements containing a heated fluid.

EXHAUSTER - A fan connected to the outlet of a pulverizer and used to draw pulverizer air through a pulverizer and in some cases to augment the pulverizer air by the addition of primary air.

FILTER - Porous material through which fluids or fluid-and-solid mixtures are passed to separate matter held in suspension.

FINENESS - The percentage by weight of a standard sample of a pulverized material which passes through standard screen of specified mesh when subjected to a prescribed sampling and screening procedure (ASTM D197).

FLUIDIZING - Causing a mass of solid particles to assume some of the properties of a fluid as aeration.

HEATER, STORAGE TANK - See Oil Heater, Storage Tank.

HOG - A machine for reducing wood refuse to chips or shreds of approximately uniform size.

IMPACT PLATE - A plate against which a stream of coal is impinged for the purpose of pulverization.

MILL - See Pulverizer.

MILL DRYING - The evaporation of moisture from the fuel within the pulverizer.

MUNICIPAL WASTE TREATING TERMS:

- **TIPPING** - The act of transferring municipal solid waste from the transport vehicle to the waste receiving area.
- **SHREDDING** - The process of reducing the particle size of municipal solid waste. The process may contain more than one step such as a primary or coarse shredder and a secondary or fine shredder.

OIL HEATER - A heat exchanger utilizing steam, hot water or electricity to heat oil to the desired viscosity.

OIL HEATER, STORAGE TANK - A heater directly in the tank to maintain oil in a pumpable condition.

OIL HEATING AND PUMPING SET - See Pump and Heater Set.

PELLETIZING - The process of forming uniform size solid pellets of fuel from fine shredded organic refuse.

PNEUMATIC CONVEYING - The transportation of fuel through a conduit by air.

PRESSURE SYSTEM PULVERIZER - A pulverizer located on the discharge side of primary air blower.

PULVERIZED-FUEL FEEDER - An apparatus for the controlled delivery of pulverized fuel from a storage bin.

PULVERIZER - A machine which reduces a solid fuel to a fineness suitable for burning in suspension.

- **High Speed (over 800 rpm)**

- (a) **IMPACT PULVERIZER** - A machine wherein the major portion of the reduction in particle size of the fuel to be pulverized is effected by fracture of larger sizes by sudden shock, impingement, or collision of the fuel with rotating members and casing.

- (b) **ATTRITION PULVERIZER** - A machine wherein the major portion of the reduction on particle size is by abrasion, either by pulverizer parts on coal, or by coal on coal.

- **Medium Speed (between 70 and 300 rpm)**

- (a) **ROLLER PULVERIZER** - A machine having grinding elements consisting of conical or cylindrical rolls and a bowl, bull-ring mating rings, or table, any of which may be the rotating member, the fuel to be pulverized being reduced in size by crushing or attrition between the rolls and the rings.

- (b) **BALL PULVERIZER** - A machine in which the grinding elements consist of one or more circular rows of metal balls arranged in suitable raceways, wherein the fuel to be pulverized is reduced in size by crushing and attrition between the balls and raceways.

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- **Low Speed (under 70 rpm)**

(a) **BALL OR TUBE PULVERIZER** - A machine having a rotating cylindrical or conical casing charged with metal ball or slugs and the fuel to be pulverized, reduction in particle size being effected by crushing and attrition due to continuous relative movement of the charge on rotation of the casing.

PUMP AND HEATER SET - Assembled unit consisting of oil heater, fuel pump, strainer, valve, piping and temperature controls.

PUMP AND HEATER SET, DUPLEX - Pump and Heater Set with dual pumps, heaters, and strainers.

PUMP AND HEATER SET, SIMPLEX - See Pump and Heater Set.

PUMP, AUTOMATIC OIL - A pump, not an integral part of a burner, which automatically pumps oil from the supply tank and delivers the oil under a constant head to an oil-burning appliance.

PUMP, OIL-TRANSFER - An oil pump automatically or manually operated, which transfers through continuous piping from a supply tank to an oil-burning appliance or to an auxiliary tank.

PYROLYSIS - A process in which organic material is heated to break it down into a gas and/or oil product.

RAW-FUEL FEEDER - A machine for the controlled delivery of raw fuel.

RIFFLE OR RIFFLE DISTRIBUTOR - A device for diverting material into two or more equal parts, comprising a number of narrow sloping chutes of equal width, having a common inlet and having adjacent chutes diverging to separate outlets; a laboratory device. Also used on some exhaust outlets to divide mixtures of pulverized coal and air.

SCREEN - A perforated plate, cylinder or mesh fabric, usually mounted on a frame for separating coarser from finer parts.

SCRUBBER - An apparatus for the removal of solids and objectionable materials from gases.

SEPARATION - The act of segregating particular types of materials from the aggregate municipal solid waste. Separation techniques include magnetic, gravity, and hand separation. For example, steel cans may be magnetically separated from the rest of the waste.

SEPARATOR - A mechanical device for the removal of slate from coal, or an electromagnetic device for the removal of magnetic ores or tramp iron from coal.

SIEVE - A laboratory apparatus with screens through which the finer particles of a substance are passed to separate them from the coarser particles.

SNOWBALLING - The matting of pulverized-fuel particles into masses, usually occurring in pulverized-fuel storage bins.

SPLASH PLATE - An abrasion-resistant metal plate, forming the back of an elbow in a pulverized-fuel-and-air line, against which the fluidized material strikes and is dispersed for the purpose of obtaining uniform distribution in the succeeding line or burner.

SPRAY TOWER - A duct through which liquid particles flow counter-current to a column of gas; a fine spray is used when the object is to concentrate the liquid, a coarse spray when the object is to remove solids and objectionable materials from gases.

STORAGE SYSTEM - See Bin System.

STRAINER - A device, such as a filter, to retain solid particles while allowing a liquid to pass.

STRAINER, PRIMARY OIL - The strainer through which all oil first passes on the way to the burner or the pump, being upstream from any other strainer, sometimes called suction strainer.

STRAINER, SECONDARY OIL - A strainer downstream from the heater or pump, interposed in the fuel line between the primary strainer and the point at which fuel is delivered for combustion, sometimes called pressure strainer.

SUCTION SYSTEM PULVERIZER - A pulverizer in which the internal pressure is below atmospheric. It is generally located at the inlet of the primary air exhaust.

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TEMPERING MOISTURE - Water added to certain coals which, as received, have insufficient moisture content for proper combustion on stokers.

TRANSPORT SYSTEM - The pump and piping, blow tank and piping, or screw conveyor, used to transport the pulverized fuel from the cyclone to the pulverized-fuel bin in Storage Systems.

TRAP - A receptacle for the collection of undesirable material, as a pyrites trap in a pulverizer.

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VENTED AIR - The air or gas vented from a Storage System.

FUEL BURNING EQUIPMENT

Foreword

The terms included in this section are sometimes used in connection with one or more of the various fuel burning devices considered herein. Where slightly different meanings are attached to a specific term, they are separately defined in the index.

- Part 1 - Common Fuel Burning Terms
- Part 2 - Terminology for Burners
- Part 3 - Terminology for Fluidized Bed Combustion
- Part 4 - Terminology for Stokers



Part 1 - Common Fuel Burning Terms

AIR PORT - An opening through which air passes with or without significant direction change.

ARCH FIRING - Method of firing in which burners are placed in a furnace arch and directed downward.



BARRIER VALVE - A strong valve, not necessarily dust-tight, used as protection against furnace explosions traveling back into pulverizers or exhausters opened for inspection or maintenance.

BLOW TANK - A tank containing a batch of material into which compressed air is admitted to discharge the material into a transport system.

CORNER FIRING - A method of firing liquid, gaseous or pulverized fuel in which the burners are located in the corners of the furnace. (See Tangential Firing.)

CYCLONE AIR LOCK - A device at the bottom of a cyclone which permits the pulverized fuel to discharge but prevents the back flow of air.

DEFLECTOR - A device for changing direction of a stream of air or of a mixture of pulverized fuel and air.

DUMP PLATE - An ash supporting plate from which ashes may be discharged by rotation from one side of the plate.

DUST-TIGHT VALVE - A valve used to shut off burner lines or any line carrying fuel in suspension, with no leakage through the valve.

HORIZONTAL FIRING - A means of firing liquid, gaseous or pulverized fuel, in which the burners are so arranged in relation to furnace as to discharge the fuel and air into the furnace in approximately a horizontal direction.

INTERMITTENT FIRING - A method of firing by which fuel and air are introduced and burned in a furnace for a short period after which the flow is stopped, this succession occurring in a sequence of frequent cycles.

LIGHTING-OFF TORCH - A manual torch used for igniting fuel consisting of an oil-saturated absorbent material wrapped around an iron rod.

OVERFIRE AIR - Air admitted to the furnace above a matrix of burners for promoting staged combustion firing, thus reducing NO_x formation.

SCREW FEED - A means of introducing fuel by rotation of a screw.

TANGENTIAL FIRING - A method of firing by which a number of fuel nozzles are so located in the furnace walls that the center lines of the nozzles are tangential to a horizontal

circle. Corner firing is usually included in this type.

VERTICAL FIRING - An arrangement of a burner such that air and fuel are discharged into the furnace, in practically a vertical direction, either up or down.

WINDBOX - A chamber below the grate or surrounding a burner, through which air under pressure is supplied for combustion of the fuel.

Part 2 - Terminology For Burners

AIR ATOMIZING OIL BURNER - A burner for firing oil in which the oil is atomized by compressed air which is forced into and through one or more streams of oil breaking the oil into a fine spray.

AIR NOZZLE - An air port having direction and appreciable length for directing an air stream.

ASPIRATING BURNER - A burner in which the fuel in a gaseous or finely divided form is burned in suspension, the air for combustion being supplied by bringing into contact with the fuel, air drawn through one or more openings by the lower static pressure created by the velocity of the fuel stream.

ATOMIZER - A device for reducing liquid to a very fine spray.

AUTOMATIC LIGHTER OR IGNITER - A means for starting ignition of fuel without manual intervention. Usually applied to liquid, gaseous or pulverized fuel. (See Igniter.)

BLUFF BODY - A type of diffuser normally resembling a disc or dish designed to induce downstream recirculation of air or fuel/air mixtures.

BURNER - A device for the introduction of fuel and air into a furnace at the desired velocities, turbulence and concentration to establish and maintain proper ignition and combustion of the fuel.

- **AUTOMATIC BURNER** - A burner that stops and starts automatically.
- **BURNER, AUTOMATICALLY IGNITED** - A burner having its main fuel automatically turned on and ignited. (See "Boiler and Fuel System Controls".)

- **BURNER, MANUALLY IGNITED** - A burner having its main fuel turned on only by hand and ignited under supervision. (See "Boiler and Fuel System Controls".)
- **BURNER, FORCED DRAFT** - A burner where air for combustion is supplied above atmospheric pressure.
- **BURNER, NATURAL DRAFT TYPE** - A burner which depends principally upon the natural draft to induce the air required for combustion.

BURNER WINDBOX - A plenum chamber around a burner in which air pressure is maintained to insure proper distribution and discharge of secondary air.

BURNER WINDBOX PRESSURE - The air pressure maintained in the windbox or plenum chamber.

CIRCULAR BURNER - A liquid, gaseous or pulverized fuel burner having a circular opening through the furnace wall.

COAL BURNER - A burner for use with pulverized coal.

COAL SPREADER - A device mounted at the discharge end of a coal nozzle which is used to spread and provide a turbulent mixing of pulverized coal with combustion air.

COMBINATION BURNER - See Multifuel Burner.

CONSTANT IGNITION - Usually a gas pilot that remains lighted at full volume whether the main burner is in operation or not.

CONTINUOUS IGNITER - Fuel igniter or igniter system designed for continuous operation to ignite and continue to support ignition of main fuel.

CROSS-TUBE BURNER - A form of burner so arranged with respect to furnace wall tubes that the length of the burner opening is at right angles to the line of the tubes.

DIFFUSER - A device used to distribute air flow within the burner to promote stable ignition and/or enhance fuel/air mixing. (See also Impeller.)

DUAL FLOW OIL BURNER - A burner having an atomizer, usually mechanical, having two sets of tangential slots, one set used for low capacities and the other set for high capacities.

EXTERNAL-MIX OIL BURNER - A burner having an atomizer in which the liquid fuel is impacted by a jet of high velocity steam or air after it has left an orifice.

FISHTAIL BURNER - A burner consisting of a diverging chamber having a rectangular outlet with a length dimension much greater than the width dimension.

FLAME DETECTOR - A device which indicates if the fuel is burning, or if ignition has been lost. The signal may be transmitted to an indicator or a control system.

FLAME FORMING - The technique of shaping the flame.

FLARE TYPE BURNER - A circular burner from which the fuel and air are discharged in the form of a cone.

FLAT FLAME BURNER - A burner terminating in a substantially rectangular nozzle, from which fuel and air are discharged in a flat stream.

GAS BURNER - A burner for use with gaseous fuel.

GAS RING - A circular device with multiple openings or orifices arranged to admit or distribute gaseous fuels into a burner throat.

HORIZONTAL ROTARY BURNER - See Rotary Oil Burner.

IGNITER - A burner smaller than the main burner, which is ignited by a spark or other independent and stable ignition source, and which provides proven ignition energy required to immediately light-off the main burner.

IGNITION TORCH - See Lighting-Off Torch.

IMPELLER - As applied to pulverized coal burners, a round metal device located at the discharge of the coal nozzle in circular type burners, to deflect the fuel and primary air into the secondary air stream. As applied to oil burners, same as diffuser.

INTEGRAL BLOWER BURNER - A burner having a blower as an integral part.

INTERMITTENT IGNITER - An igniter which is in service during light-off and while the main burner is firing, and which is shut off only when the main burner is shut off.