TRINEFLEX Production Processes GLOSSARY

ENERGY AUDIT STANDARDS

Term	Definition
Energy audit	The Energy audit is a systematic procedure with the purpose of obtaining adequate knowledge of the energy consumption profile of a building or group of buildings, an industrial or commercial operation or installation or a private or public service, identifying and quantifying cost-effective energy saving opportunities, and reporting the findings. [Directive 2012/27/EU]
Energy Efficiency Obligation Scheme	Energy Efficiency Obligation schemes are a type of policy tool to help Governments deliver energy efficiency, energy productivity and/or carbon emission reduction goals
Energy Benchmarking	Benchmarking is the practice of comparing the measured performance of a device, process, facility, or organization to itself, its peers, or established norms, with the goal of informing and motivating performance improvement.

GLASS PROCESS GLOSSARY

Term	Definition
Annealing	The slow and controlled cooling of containers so that thermal stresses and strains within the container are gradually relieved. The amount of residual stress, known as temper, is assessed by optical comparison with a number of standard strain discs.
Automatic weigher	A device for weighing each container automatically.
Batch	The mixed raw materials used in manufacturing glass that have been blended and proportionally mixed for delivery to the glass furnace.
Blank mould	The metal mould which first shapes the glass in the manufacture of hollow ware.
Blank	Usually refers to a glass parison that is formed during the first step of glass molding. The piece is then transferred to a lamp worker or glass blower for final shape configuration.
Blisters	Larger bubbles which are not removed by fining are known as “blisters”, smaller ones as “seeds” and longitudinally stretched bubbles as “air-lines”. Bubbles in glass are generally considered as defects but may also be intentionally created and used as a form of decoration (see “air twist”)
Blow mould	The mould in which a glass article is blown to its final shape.

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Blow-and-blow process	A production process used for glass container manufacturing with forming machines. The elongated gob of molten glass formed by the gob feeder falls into the inverted parison (blank) mould. It is blown down into the mould (settle blow) before being blown from below. (counter blow) back up into the now closed mould. The inverted parison is transferred to an upright position in the blow mould where it is reheated before compressed air is introduced into the parison bubble. During blowing, a vacuum is applied through the mould to suck any trapped air or other gases from the bottom of the mould. A takeout mechanism then lifts the container from the mould.
Bottle inspection	Quality control to ensure bottles are free from defects.
Bubbles	Gaseous inclusions in the glass melt which are removed by refining (see "fining"). Fining agents are introduced to encourage the formation of larger bubbles which rise more rapidly to the surface of the melt, attracting smaller bubbles on their way.
Burners	Used to heat glass in furnaces of all sizes, burners mix air (or oxygen) and gas (natural gas or liquid petroleum gases) for efficient combustion.
Calibration	The process of adjusting and setting the optical pyrometer's parameters to match the actual temperature of the object being measured.
Centering	The group is made up of a clamp system with a centering limit switch. That's his job to center the package on the center line of the roller conveyor, during the centering phase the sonar reader memorizes the height of the package thus allowing the machine to prepare the length of film necessary for capping of the package.
Coating	A thin layer which covers the surface of an object. Coatings may be applied to glass in order to alter the appearance or performance of the product in question e.g. anti-reflective coatings applied to auto mirrors to aid vision, coatings with photocatalytic and hydrophilic properties to make self-cleaning windows.
Cold-end	The containers are checked, and the defective ones are discarded
Cold-end coating	A treatment applied to the external surface of containers at the lehr end by spraying them with a dilute solution or vapour of a water-soluble organic substance. This treatment gives lubricity to the surface, thus reducing damage by friction and also maintains the effectiveness of the hot-end coating.
Composition zone (raw materials)	The raw materials and scrap are received, stored, mixed and sent to the furnace
Conditioning	The adjustment of the temperature and viscosity characteristics of the molten glass to those required for forming.
Containers forming	The process of turning a gob of molten glass into a hollow container was first mechanized towards the end of the 19th Century. Fully automatic machines were developed during the first quarter of the 20th Century, principally in the USA, using the blow-and-blow process for narrow-neck ware and the press-and-blow process for wide-neck ware. The landmarks in the development of automatic forming of containers were the gob feeder in 1923, which automated delivery of consistently sized gobs of glass, and the individual section bottle making machine in 1925. The equipment in use today is descended from these innovations.

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Containers inspection	Inspection of glass containers includes the following: gauging or measuring; inspection for specific faults; proof testing. Gauging or measuring checks: height, diameter and verticality; choke (inner and outer dimension of the neck); dips and saddles in the finish area (mouth/seal of the container); wall thickness. Inspection for specific faults: cracks (also known as checks); stones; foreign material (tramps); spikes; birdswings; thin spots. Proof testing: simulated impact; vertical load.
Cullet	Manufactured glassware that is unusable as a results of chips, cracks and problems can be bought by studio artists to be melted in their furnace as the primary source of clear (or color) instead of using batch
Cutting and welding	The group consists of a hot bar welding device and a cutting system it uses a blade mounted on a pneumatic linear actuator. Its task is to produce from the tubular caps of adequate length.
Density	Mass per unit volume measured in grams per cubic centimetres.
Devitrification	(1) The process whereby glass becomes partly crystallized as it cools (usually too slowly) from the molten state; (2) the crystals formed by this process. Devitrification can also occur on the surface as a result of unsuccessful annealing or accidental heating to a high temperature. It is not caused by chemical reaction between glass and its environment, which is known as weathering
Drop guide	A small metal arm, situated just below the shears, which steadies the gob — sometimes slightly deflected by the lower shear blade — so that it falls directly into the drop-guide tube or into the scoop.
Electric heating	The use of electric heating cells in forehearths, which can vary in configuration.
Electrode	A metal conductor through which electricity enters or leaves an electrolyte, gas, vacuum, etc.).
Emissivity	The measure of an object's ability to emit radiation, which affects the accuracy of temperature measurements with an optical pyrometer.
Equivalent viscosity	A value determined by the Fulcher equation to calculate viscosity based on temperature, used in the context of glass processing.
Expansion joint	A structural element designed to absorb expansion or contraction due to temperature changes, often used in superstructures.
Feeder channel	A refractory trough which delivers molten glass to the feeder mechanism.
Feeder connection	The blocks surrounding the opening in the front wall which receive the channel leading to the feeder mechanism. The opening in a furnace wall through which glass flows into the forehearth.
Feeder mechanism	A mechanism mounted on the casing of the forehearth which delivers the glass in gobs. The rate of flow of the molten glass is regulated by the use of different sized orifices in the feeder spout and by a plunger which pushes the glass through the orifice. Shears for the cutting of the glass flow into gobs are operated through the same cam system as that of the plunger to ensure constant gob size.
Flint	A glass color or lack of color. Flint is perfectly clear transparent glass, like window glass, used for all types of containers.

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Forehearth	A refractory tank whose function is to receive glass from the furnace, reduce its temperature to the desired level and discharge it to the feeder mechanism at a uniform temperature. The forehearth usually consists of two sections: a cooling section with burners and cooling ducts which allow the cooling process to be regulated, and a conditioning (equalising) section generally equipped only with burners which ensure uniform temperature distribution through the glass flow as it enters the feeder.
Forehearth casing	A structure for holding the forehearth blocks together.
Forming molds	The forming mold sometimes referred to as the bottle mold is the mold in which the bottle is blow into its final shape after being preformed in a blank mold.
Furnace	An enclosed structure for the production and application of heat. In glassmaking, furnaces are used for melting the batch, maintaining pots of glass in a molted state, and reheating partly formed objects at the glory hole.
Gas heating	The use of burners and natural gas to provide heating in the forehearth.
Glass	A homogeneous material with a random, liquidlike (non-crystalline) molecular structure. The manufacturing process requires that the raw materials be heated to a temperature sufficient to produce a completely used melt, which, when cooled rapidly, becomes rigid without crystallizing.
Glass distribution	The wall thickness or the evenness of the glass distribution throughout the container.
Glass level measurement	Techniques used to determine the level of molten glass in a forehearth or furnace.
Glass recycling	The process of recovering and melting glass to produce new bottles.
Gob	A drop of still molten glass formed by the cutting of the stream of glass as it flows from the forehearth through a feeder into a spout/orifice of variable diameter; the greater the diameter, the larger the gob. The gobs are fed into the forming machine to be moulded into bottles and other glass objects.
Head loss	The pressure drop or reduction in the fluid's energy due to flow resistance or other factors within the equipment.
Heat balance	A comparison between the input heat and the losses, which helps ensure that the forehearth conditions are suitable for glass production.
Hot end	A manufacturing term for the area of a glass manufacturing plant where molten glass is processed.
Hot-end coating	A treatment applied to the external surface of containers at the hot end of the lehr, i.e. as they leave the machine conveyor. The containers are passed through a cloud of vapour or spray concentrated in a coating hood. This treatment improves the mechanical properties of the outer surface.
I.S. Machine	I.S. (independent/individual section) container forming machines are made up of individual but identical sections placed side by side in line. Each section comprises an arrangement of mechanisms with gears enabling the sections to be started or stopped independently of the others, making the I.S. machine more flexible than continuous- or intermittent-motion rotary machines.
Inclusions	A collective term for bubbles, metal and glass particles, and other foreign materials that have been added to the glass for decorative effects.

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Insulation	Material used to reduce heat transfer, typically placed around areas where temperature control is essential.
Internal cooling	The cooling of the internal surface of a container by air introduced at the final-blow stage of forming.
Job change	The changing of the moulds on a forming machine to make a different type of container.
Lehr	A special type of oven or kiln used specifically for annealing glass (see “annealing”). In industrial production, it usually has a moving belt to carry the glass through at controlled speeds and is divided into different areas each with its own heat source, making it possible to carefully regulate the temperature gradient to which the glass is submitted.
Losses through infrastructure refractories	Heat losses through the refractory materials that make up the infrastructure of the forehearth.
Machine down-time	The time during which a forming machine is not producing containers because of a fault in the machine or because of a job change.
Machine speed	The number of shear cuts per minute. Colloquially, the number of gobs delivered per minute, which may be a multiple of the number of shear cuts per minute.
Melt	The fluid glass produced by melting a batch of raw materials.
Melting	The melting of the mixture takes place at the »hot end of glass production. Inside the furnace, the mixture of used glass and primary raw materials is heated.
Mould	A form, normally made of wood or metal, used for shaping and/or decorating molten glass. Some moulds (e.g., dip moulds impart a pattern to the parison, which is then withdrawn, and blown and tooled to the desired shape and size; other moulds are used to give the object its final form, with or without decoration.
Multi-gob production	A specific kind of production that allows for greater flexibility, even with small batch sizes. On a multi-gob glass-blowing machine, two, or in some cases even more, glass containers can be made at the same time that differ in their shape and weight. A special sorting machine then automatically forwards the different glass products for their product-specific quality testing and packing.
Narrow-neck-press-and-blow process	While the molten glass is still in the blank mould, a plunger is pressed into it to ensure that the walls of the glass container are not only as uniform as possible but also thinner. The technological shift from the traditional process to the narrow-neck-press-and-blow process has enabled the production of thin-walled glass containers – e.g. lightweight glass. Another advantage of this process is that the parison cools down faster during pressing, resulting in higher production rates.
Optical pyrometer	An instrument that measures temperature by detecting the infrared radiation emitted by an object. It often requires calibration and adjustment for accuracy.
Orifice ring	In a feeder mechanism, the term refers to the opening formed by an orifice ring or bush in the bottom of the spout.
Packaging zone	The containers are arranged on pallets and heat-shrinked with stretch film
Parison	The preliminary shaped red-hot glass that hangs from the neck rings as the blank molds open. The parison is also called "pattern" or "blank".

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Plunger	The vertical, reciprocating refractory part of a feeder mechanism which alternately forces the glass through the orifice and pulls it up after shearing.
Plunger mechanism	Mechanism comprising the plunger carrier, plunger linkage, plunger cam, plunger height adjustment and plunger assist mechanism.
Press and blow process	A plunger is inserted first, air then follows to form the gob into a parison. At one point this process was typically used for wide mouth containers, but with the addition of a Vacuum Assist Process, it can now be utilized for narrow mouth applications as well. Strength and distribution is at its best in this method of glass formation and has allowed manufacturers to "lightweight" common items such as beer bottles to conserve energy.
Pyrometer	An instrument used to measure the temperature inside the furnace or forehearth.
Quality inspections	Hot End Quality Inspection includes measuring bottle weight and checking bottle dimensions with go no-go gauges. After leaving the cold end of the lehr, bottles then pass through electronic inspection machines that automatically detect faults. These include, but are not limited to: wall thickness inspection, damage detection, dimensional analysis, sealing surface inspection, side wall scanning and base scanning.
Radiative heat losses	Loss of heat through radiation, which may necessitate the creation of openings in the superstructure for cooling.
Recycling	The word "recycling", borrowed from English, is derived from the Greek kýklos (cycle) and the Latin prefix re- (back, again). In recycling (reuse, reprocessing), waste products are reused, or their basic materials are processed into secondary raw materials. The goal of a future-proof materials cycle is for all the raw materials to be brought back into the production process after the individual product has reached the end of its life cycle. Glass goes round in a materials cycle that is 100% closed. It can be endlessly reshaped into new bottles and jars, with no loss of quality. To produce flint and brown glass, up to 60% recycled glass can be used, and for new green glass, theoretically, as much as 100%. The quality of the material that is collected and how it is processed are vital.
Redox	The abbreviated form of "reduction-oxidation". The term "redox equilibria" is used to refer to the balance between reduction and oxidation in the glass furnace.
Refractories	Material capable of withstanding extremely high temperatures and thus used in furnaces for industries such as glass and steel where raw materials have to be heated to a molten form.
Regenerative heating	As in recuperative heating (see "recuperative heating"), waste heat from the furnace is used to pre-heat combustion air. Regenerative heating is a cyclic process whereby exhaust gases pass over and thus heat up refractory blocks in one of two pre-heating chambers. Once the first chamber has been heated up, exhaust gases are diverted to heat the second chamber, while cold combustion gas is introduced into the first chamber to be pre-heated by the hot refractory blocks. Continuous reversal of this process provides a permanent flow of pre-heated gas for combustion.

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Re-heating	Radiation of heat to the outer surface of the article while it is still in the mould, which occurs after the outer surface has initially been "chilled" by the mould surface.
Shears	A pair of blades at the outlet of the feeder mechanism which cut the hot glass to produce the gob of required size.
Shoulder	The portion of a glass container in which the maximum cross section or body area decreases to joint the neck of the container.
Shrink hooding	Shrink hooding consists of covering the loads with a hood and then heat shrinking it. This technology allows the film on your products to be stiffened and provide optimal support.
Softening point	Temperature at which a thread or rod of glass rapidly deforms under its own weight.
Spool valve	A valve consisting of a reciprocating core to direct compressed air to where it is needed.
Spout	A specially shaped refractory piece containing the orifice forming the delivery end of the feeder mechanism.
Spout cover	A slip-cast refractory piece, the core of which is filled with insulating powder, covering the spout.
Strain point	The temperature at which thermal residual stresses become permanent upon cooling. Temperatures above the strain point will introduce permanent stresses that can cause or contribute to fracture. At temperatures below the strain point, the glass can be temporarily heated and cooled without introducing permanent stress. The strain point can be considered the maximum service temperature.
Superstructure and infrastructure ventilation	Ventilation systems designed to cool the glass surface and the superstructure refractories.
Surface treatment	External treatment is applied to prevent abrading, which makes the glass more prone to breakage. The coating (usually a polyethylene or tin oxide-based mixture) is sprayed on and reacts on the surface of the glass to form a tin oxide coating. This coating prevents the bottles from sticking to one another to reduce breakage. Tin oxide coating is applied as a hot end treatment. For cold end treatment, the temperature of the containers is reduced to 100 °C before application. This coating can be washed off. Hot End treatment is applied before the annealing process. Treatment applied in this fashion actually reacts to the glass and cannot be washed off.
Thermal calculation	Calculations related to the heat balance of forehearths, considering various factors such as heat extraction, heat losses, and input from heating systems.
Thermal conductivity	The passage of heat through a material. Insulation materials are defined as having ‘low’ thermal conductivity whereas metallic materials generally have ‘high’ thermal conductivity.
Thermal control	Monitoring and adjusting temperatures to ensure bottle quality
Thermocouple	A pair of different metals in contact at a point, generating a thermo-electric voltage which can serve as a measure of temperature. The wires are encased in a protective sheath that can be introduced as a probe into the glass furnace or forehearth.
Threshold relay	A device that activates or deactivates a circuit when a certain current or voltage threshold is reached.

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Trough	That section of the gob delivery system which carries the gob from the scoop to the gob deflector.
Tube holder	A metallic, annular device for supporting the tube in the spout.
Ventilation flow rate	The rate at which air is circulated or moved through a system, often measured by differential pressure through an orifice.
Venturi tubes	Short pieces of narrow tube between wider sections of tube, used for exerting suction or measuring flow rates.

COPPER PROCESS GLOSSARY

Term	Definition
Extrusion process	The extrusion process is a manufacturing technique used to create tubes of a fixed cross-sectional profile by pushing or drawing material through a die. The process begins with the delivery of copper billets, which serve as raw materials. These billets are heated to a suitable temperature for extrusion.
Drawing Process	The drawing process is a metalworking technique used to reduce the cross-sectional area of a workpiece, shape its profile, and increase its length. In cold drawing, straight copper tubes derived from a press are fed into the machine.
Die-plug mechanism	This process utilizes a die-plug mechanism where the die reduces the cross-sectional area of the copper tube, shapes its profile, and increases its length.
Extrusion process	The extrusion process is a manufacturing technique used to create tubes of a fixed cross-sectional profile by pushing or drawing material through a die. The process begins with the delivery of copper billets, which serve as raw materials. These billets are heated to a suitable temperature for extrusion.

ALUMINUM PROCESS GLOSSARY

Term	Definition
Aluminum scrap	Aluminum pieces discarded from post-production (manufacturing) or post-consumption (discarded by users) processes
Aluminum melting rotary furnace	A device where aluminum scrap is melted
Aluminum salt slag	Waste material generated during the secondary aluminum melting process, and which can be later on recycled for the recovery of salt and aluminum concentrates

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Casting	Pouring of a molten metal into a mould
Holding furnace	A furnace that is dedicated for holding molten metal
Pyrogasification	Process of heating waste to a high temperature in a low oxygen environment to produce biogas
Refining	A process when from a basic material (in this case, aluminum scrap) a desired product is achieved by adding necessary elements
Retrofit	Add sensors or equipment to existing hardware to make use of different new technologies
WDF	Waste derived fuels – waste of various types (e.g. municipal solid waste, industrial, commercial) that cannot be recycled, but after certain pretreatment steps could be used as fuel

WASTEWATER TREATMENT PROCESS GLOSSARY

Term	Definition
Wastewater Treatment Plant	A Wastewater Treatment Plant is a facility designed to receive, treat, and process wastewater from various sources, such as residential, industrial, or commercial sources. The primary goal of a wastewater treatment plant is to remove pollutants and contaminants from the wastewater to ensure its safe discharge into the environment or its reuse. The treatment process involves various stages aimed at reducing the environmental impact of the wastewater and producing treated water that meets regulatory standards.
Septic sewage / Municipal wastewater	Septic sewage refers to wastewater that originates from residential, commercial, or industrial sources and contains a mixture of human waste, household water, and other organic and inorganic materials. Unlike municipal wastewater transported through a centralized sewer system, septic sewage is typically collected in on-site septic tanks or similar decentralized systems.
Pollution load	The pollution load, also known as the pollutant load or contaminant load, refers to the amount or concentration of pollutants, contaminants, or substances released into the environment and contribute to environmental pollution. This term is commonly used in the context of wastewater or effluent discharged from industrial processes, sewage treatment plants, or other sources.
Pre-treatment	In the context of a WWTP, pre-treatment (such as, Screening, Grit removal, chemical addition) refers to the initial phase of processing raw influent (wastewater entering the treatment facility) before it undergoes more advanced treatment steps. The goal of pre-treatment is to remove or reduce certain contaminants and materials that could interfere with the

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	efficiency and effectiveness of subsequent treatment processes. This phase helps protect downstream equipment, prevent clogging, and improve the overall performance of the wastewater treatment.
Screening	The removal of large objects such as sticks, leaves, and debris to prevent damage to pumps and equipment.
Grit Removal	The separation of heavy particles like sand and gravel that could cause wear and abrasion in downstream processes.
Sedimentation	Sedimentation refers to a physical water treatment process where suspended particles, such as solids and floc, settle to the bottom of a treatment unit under the influence of gravity. This process occurs in a structure called a sedimentation tank or clarifier. Sedimentation is crucial for the removal of suspended solids from wastewater, contributing to the overall purification of water before it undergoes additional treatment stages. The clarified effluent from sedimentation is then directed to subsequent treatment units, such as biological reactors or filtration systems, for further processing. The design and efficiency of sedimentation tanks vary based on the specific requirements of the wastewater treatment process and the characteristics of the influent.
Aeration tank (secondary treatment)	The aeration tank is a key component in the secondary treatment process of a WWTP. Also known as the biological reactor or activated sludge tank, the aeration tank provides an environment where microorganisms break down organic pollutants in the wastewater. The primary goal of the aeration tank is the biological oxidation of organic pollutants. Microorganisms, primarily bacteria, utilize the dissolved organic matter in the wastewater as a food source, converting it into microbial biomass and harmless byproducts. The effectiveness of the aeration tank contributes to the overall efficiency of the wastewater treatment system in removing pollutants and producing treated effluent.
Disinfection	Disinfection is the process of eliminating or inactivating pathogenic microorganisms, such as bacteria, viruses, and parasites, from the treated wastewater. The primary objective of disinfection is to ensure that the effluent discharged from the WWTP is safe for the environment and poses minimal health risks to humans and aquatic life. The choice of disinfection method depends on various factors, including the specific requirements of the regulatory authorities, environmental considerations, and the characteristics of the treated wastewater.
Industrial water	It is the treated water used to cover the needs inside the facility. As is the flushing of the dewatering unit.
Biological sludge	Biological sludge is the solid residue that results from biological treatment processes. Biological sludge is a significant component in the overall wastewater treatment process, contributing to the removal of organic pollutants and improving the quality of the treated water. The management and disposal of biological sludge are essential considerations for wastewater treatment plants to ensure environmental compliance and sustainability.

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Anaerobic digestion	Anaerobic digestion is a biological process in which microorganisms break down organic matter in the absence of oxygen. This process occurs in an oxygen-free environment, such as an anaerobic digester. Anaerobic digestion is commonly applied to the sludge produced during wastewater treatment, specifically the biological sludge generated in the activated sludge process. One of the notable byproducts of anaerobic digestion is biogas, which primarily consists of methane and carbon dioxide. Biogas can be captured and utilized as an energy source for heating or power generation. Anaerobic digestion also stabilizes the sludge. Stabilization reduces the volume of sludge, eliminates pathogens, and transforms the organic content into a more environmentally benign form.
Dewatering	Dewatering is the process of removing water from sludge or biosolids, resulting in a reduction of the volume and weight of the sludge. The primary goal of dewatering is to produce a drier and more solid material that is easier and more cost-effective to handle, transport, and dispose of. Dewatering is a crucial step in the sludge management process within wastewater treatment.
Recirculation	Recirculation of sludge at WWTPs involves returning a portion of the treated sludge back into earlier stages of the treatment process. This strategy is employed to enhance the overall efficiency of the treatment plant and improve the performance of specific treatment units. Recirculation of sludge is a common practice in activated sludge systems, where biological treatment occurs.
Excess sludge	Excess sludge in WWTPs refers to the residual sludge that accumulates during the treatment process and is not actively participating in the biological treatment or other treatment units. It is the portion of sludge that exceeds the amount needed for maintaining the microbial population and treatment efficiency.
Deodirization	Deodorization refers to the process of reducing or eliminating unpleasant odors associated with the treatment of wastewater. Wastewater treatment processes can generate various odorous compounds, including hydrogen sulfide, ammonia, volatile organic compounds and other malodorous substances. Deodorization aims to control and mitigate these odors to minimize their impact on the surrounding environment and the community.
Mixed liquid Suspended Solids (MLSS)	The term Mixed Liquor Suspended Solids (MLSS) refers to the concentration of suspended solids (organic and inorganic particles) in the mixed liquor of an activated sludge process within a WWTP. MLSS is a key parameter used to assess and control the biological treatment of wastewater. Maintaining an appropriate MLSS concentration ensures that there is a sufficient population of microorganisms to efficiently treat the incoming wastewater. Too low or too high MLSS concentrations can impact the treatment efficiency and the settling characteristics of the activated sludge.
Flow meter	A flow meter is a device used to measure the flow rate or quantity of a fluid (liquid or gas) moving through a pipeline or an open channel. The

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	primary purpose of a flow meter is to provide accurate information about the rate of fluid flow, which is crucial in various industrial, commercial, and environmental applications.
Inverters	Inverters in the context of pumps refer to devices that are used to control the speed and operation of electric motors driving the pumps. An inverter, or variable frequency drive (VFD), is an electronic device that can adjust the frequency and voltage supplied to the motor, thereby controlling its speed. Inverters play a crucial role in enhancing the efficiency, control, and reliability of pump systems by providing variable speed control and optimizing energy usage.
Electrical energy consumption	Electrical Energy Consumption refers to the amount of electrical energy used by a device, system, or facility over a specific period. It is typically measured in kilowatt-hours (kWh) or megawatt-hours (MWh) and is a key metric in assessing the energy efficiency and operational costs of electrical equipment.
Renewable Energy System	A Renewable Energy System refers to a set of technologies, components, and infrastructure designed to harness energy from naturally occurring and replenishable sources. Unlike conventional energy sources such as fossil fuels, renewable energy systems utilize resources that are sustainable over the long term, promoting environmental sustainability and reducing dependence on finite resources. These systems aim to generate electricity or provide other forms of energy for various applications while minimizing environmental impact.
Emissions	Emissions refer to the release or discharge of substances, usually gases and particles, into the environment. These substances can be produced by natural processes, human activities, or a combination of both. Emissions are often associated with various environmental concerns, including air pollution, climate change, and water pollution. The term is commonly used in the context of pollutants released into the atmosphere.

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