Cfl lamp working principle pdf printable free pdf file

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Light source â "tubelightâ" redirect here. For other uses, you know tubelight (disambiguation). For size and designations of lamps, see fluorescent lamp formats. Linear fluorescent times that illuminate a pedestrian Top Top: Two non -integrated compact fluorescent lamps. Below: two tubular fluorescent times. Both types require a ballast in the
luminaire. A fose, on the left, is shown for the scale. Integrated compact fluorescent times in different ways with E27 cap and an electronic ballast at the base. Tympic lamp of two F71T12 pins of 100 W used in tanning beds. The symbol (HG) indicates that this line contains mercury. In the United States, this symbol is now required in all fluorescent
lamps containing mercury. [1] A style lampa support â "Tombstoneâ" for fluorescent lamps of two t12 and t8 pins within the end of a lamp of two preheated pins. In this line, the filament is surrounded by a metallic cisterus shield oblong, which helps reduce the darkening of the end of the line. [2] A fluorescent, or fluorescent tube, is a low -pressure
mercury steam discharge line that uses fluorescence to produce visible light. An eligric current in the gas excites mercury steam, which produces ultraviolet short wave light that then causes a fósforo layer inside the line to shine. A fluorescent lamp converts the eloquent energy into a lot of more efficiently that an incandescent time. The light efficacy
of the fluorescent fluorescent lighting systems is 50 100 lasses per watt, several times the effectiveness of incandescent bulbs with a comparable light outlet. By way of comparison, the luminous efficacy of an incandescent bulb can be only 16 látos per watt. Fluorescent regular ones are more expensive than the incandescent because, between things,
require a ballast to regulate the current through the lamp, but the initial cost is offset by a much lower operating cost. Compact fluorescent lamps are available in the same popular sizes as incandescent lamps and are used as an energy-saving alternative in homes. Because they they they ³Ãbircsed neiuq ,rekc¼ÃlP suiluJ euf relssieG obut nu noc
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important observation that the glow in the tube changed position when it was near an electromagnetic field. Edmond Becquerel observed in 1859 that certain substances emit light when placed in a Geissler tube. He then applied thin layers of luminescent materials to the surfaces of these tubes. There was fluorescence, but the tubes were very
inefficient and had a short service life.[5] Research that began with the Geissler tube continued as even better vacuum cleaners were produced. The most famous was the evacuated tube used for scientific research by William Crookes. That tube was evacuated by the highly effective mercury vacuum pump created by Hermann Sprengel. The research
carried out by Crookes and others led to the discovery of electrons in 1897 by J. J. Thomson and X-rays in 1895 by Wilhelm RÃ¶ntgen. But the Crookes tube, as it came to be known, produced little light because the vacuum in it was too good and therefore lacked the trace amounts of gas needed for electrically stimulated luminescence. Early
Discharge Lamps One of the first mercury vapor lamps invented by Peter Cooper Hewitt, 1903. It was similar to a fluorescent lamp without the fluorescent coating on the tube and produced greenish light. The round device under the lamp is the ballast. Thomas Edison briefly looked for fluorescent lighting for its commercial potential. He invented a
fluorescent lamp in 1896 that used a calcium tungstate coating as a fluorescent substance, excited by X-rays, but although it received a patent in 1907,[6] it was not put into production. As in other attempts to use Geissler tubes for illumination, it had a short service life, and given the success of incandescent light, Edison had little reason to look for
an alternative means of electric illumination. Nikola Tesla did similar experiments in the 1890s, designing high-frequency fluorescent light bulbs that gave a bright greenish light, but as with the devices of nu nu ³Ãrgol euq sag ed agracsed ed arapmiÃl anu ³Ãerc nosidE ed sodaelpme sougitna sol ed onU .laicremoc otix©Ã nºÃngin ³Ãrgol es on
commercial success. ³ In 1895, Daniel McFarlan Moore demonstrated 2- to 3-meter (6.6- to 9.8-foot) long lamps that used carbon dioxide or nitrÃ³gene to emit white or pink light, respectively. They were considerably more complicated than an incandescent bulb, which required a high³voltage power supply and a pressure regulator system ³ fill gas. [7]
Peter Cooper Hewitt Moore invented an electromagnet-controlled valve that maintains a constant gas pressure inside the tube, ³ extend working life. [8] Although Moore's lamp was complicated, expensive, and required very high voltages, it was considerably more efficient than incandescent lamps, and produced an approximation ³ closer to natural
light than contemporary incandescent lamps. From 1904 onwards, Moore's lighting system was installed ³ several shops and offices. [9] Its success contributes to the motivation of General Electric ³ improve the incandescent lamp, especially its filament. GE's efforts came to fruition with the invention ³ a tungsten-based filament. The extended lifespan
and improved efficiency of incandescent bulbs denied one of the key advantages of Moore's lamp, but GE purchased the relevant patents in 1912. These patents and the inventive efforts that supported them were of considerable value when the company took ³ fluorescent lighting more than two days later. Around the same time Moore was developing
his lighting system³ Peter Cooper Hewitt invented the Mercury Vapor Lamp, patented in 1901 (US 682692). Hewitt's lamp shines when a current is passed through mercury vapor to low pressure³n. Unlike Moore's lamps, the Hewitts were manufactured in standardized sizes and operated at low voltages. The mercury vapor lamp was superior to the
incandescent lamps of time in of energy efficiency, but the green blue light that produced limited its applications. However, it was used for photography and some industrial processes. Mercury steam lamps continued They developed at a slow pace, especially in Europe, and at the beginning of the day of 1930, they received limited use for large -scale
lighting. Some of them used fluorescent coatings, but were mainly used for color correction and not to improve light exit. The mercury steam las. Cooper-Hewitt had not been the first to use mercury vapor for lighting, since previous efforts had been mounted by Way, Rapieff, Arons, and Bastian and Salisbury. In particular, it was the mercury steam
lamp invented by Kãƒ â¼ CH and retschinsky in Germany. The lamp used a lower -diameter bulb and a higher current that worked at more high pressures. As a consequence of the current, the bulb worked at a higher temperature, which required the use of a quartz bulb. Although its exit of light regarding the electric consumption was better than
that of other light sources, the light that produced was similar to that of the Cooper-Hewitt as soon as it lacked the red portion of the spectrum, which the made inadequate for ordinary lighting. Due to the difficulties in sealing the electrodes to quartz, it was very short of it had a very short life. [10] Main article of neonic artages: Neón lighting The
next step in gas -based lighting took advantage of the luminescent qualities of the neon, an inert gas that had been discovered in 1898 by isolation of the atmosphere. The neó shine a bright red when used in Geissler tubes. [11] In 1910, Georges Claude, a frank that had developed a technology and a successful business for liquefaccion of the air, was
obtaining sufficient nest as a byproduct to support a neon lighting industry. [12] [13] While the neon light was used around In France for general lighting, it was not more efficient energy that incandescent conventional lighting. Neón tube lighting, which also includes the use of mercury argical and vapor as alternative gases, became mainly used for
striking signs and and However, neon lighting was relevant to the development of fluorescent lighting, since Claude's improved electrode (patented in 1915) supervised the "spraying", an important source of electrode degradation. The spray occurred when ionized particles hit an electrode and started metal bits. Although Claude's invention required
electrodes with a lot of surface, it showed that a great impediment to gas -based lighting could be overcome. The development of the light of neon was also significant for the last key element of the fluorescent lamp, its fluorescent coating. [14] In 1926, Jacques Risler received a French patent for the application of fluorescent coatings to neon light
tubes. [15] The main use of these regrets, which can be considered the first commercially successful fluorescent, was for advertising, not the general lighting. This, however, was not the first use of fluorescent coatings; Becquerel had previously used the idea and Edison Usó tungstate of calcium for his failed line. [16] [17] [18] Other efforts were
mounted, but all were plagued with low efficiency and various technical problems. Of particular importance was the invention in 1927 of a low voltage vapor of Friedrich Meyer, Hans-Joachim Spanner and Edmund Germer, who were employees of a German company in Berlon. A German patent was awarded, but it never entered the commercial
production. Commercialization of fluorescent features All the main characteristics of fluorescent lighting were in place in the late 1920 Glass manufactured economically, inert gases to fill the tubes, eligric ballasts, long -lasting electrodes, mercury vapor as a source of luminescence, effective in producing reliable electric discharge and fluorescent
coatings that could be energized by ultraviolet light. At this point, intensive development was more important than basic research. In 1934, Arthur Compton, Compton, arartne arapmiÃl al euq ed s©Ãupsed sesem socop ,etnecseroulf arapmiÃl al erbos selagel sohcered ramalcer arap esab anu EG a oid lluH ed etnetap al neib iS .setnecseroulf secul
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³Ãretne es amrif al ,n³Ãiccudorp He indicated that the lamp had been created as an upper means of producing ultraviolet light, but the application also contained some statements that referred to fluorescent lighting. The efforts to obtain an US patent had suffered numerous delays, but if granted, the patent could have caused serious difficulties to
GE. At first, Ge tried to block the emission of a patent claiming that the priority should go to one of his employees, Leroy J. Buttolph, who according to his affirmation had invented a fluorescent flaw in 1919 and whose request Patent was pending. He had also submitted a patent application in 1936 in the name of Inman to cover the ã ¢ â
improvements of ã ¢ â made by his group. In 1939, Geyer's claim, Spanner and Germer had a great time, and that in any case a long interference procedure was not more convenient for them. Therefore, they withdrew the Buttolph claim and paid 180,000 dollars to acquire the request Meyer, et al., Which at that time was owned by a company known
as Electrons, Inc. The patent was duly granted in December 1939. [21] This patent, together with Hull's patent, put Ge in what seemed to be a firm legal land, although he faced the legal challenges of Sylvania Electric Products, Inc., who alleged infraction in patents that he had. Although the patent problem was not completely resolved for many
years, the strength of General Electric in the manufacture and marketing gave it a preeminent position in the emerging market of fluorescent light. Sales of "Fluorescent Ligs of Luminoso" began in 1938 when four tubes of different sizes were marketed. They were used in accessories manufactured by three Lédere corporations, Lightolier, Artcraft
Fluorescent Lighting Corporation and Globe Lighting. The fabric introduction of ballast Slimline in 1946 was performed by Westinghouse and General Electric and the showcase/showcase accessories were introduced by ARTIRAFT Fluorescent Lighting Corporation in 1946. [22] [23] During the GE and Westinghouse advertised the new lights through
exhibitions at the New York World's Fair and the Golden Gate International Expo³n San Francisco. Fluorescent lighting systems ³ spread rapidly during World War II as the manufacture of the war intensified ³ demand for ³ lighting. By 1951, more light was produced in the United States by fluorescent lamps than by incandescent lamps. [24] In the
first years, zinc orthosilicate with variable beryllium content was used as a greenish phosphorus³p. The small additions of magnesium tungstate improved the blue part of the spectrum that produces acceptable white. After beryllium was discovered to be ³, phosphorus³based phosphorus took over. [25] Principles of operation³ The fundamental
mechanism for the conversion of energy ³ ³ light is the emission of a photo³n when an electro³n in a mercury atom falls from an excited state to a lower energy level. The electrons flowing in the arc collide with the mercury atoms. If the ³ electron incident has enough energy, it transfers power to the outside electro³n of the atom, which causes that
electro³n to temporarily jump to a higher energy level that is not stable. He took to emit an ultraviolet photo³ as the volume's ³ returned to a lower, more stable energy level. ³ Most photons released from mercury atoms have wavelengths in the ultraviolet (UV) region of the spectrum, predominantly at wavelengths of 253.7 and 185 nanÃ³meters (NM).
These are not visible to the human eye, so the ultraviolet energy is converted into visible light by the fluorescence of the inner phosphorus³coating. The energy difference between the absorbed ultraviolet fotÃ³n and the emitted visible light fotÃ³n is intended to heat the phpÃ³phosphorus coating. The current flows through tube in a low pressure arc
discharge. Electrons collide and ionize noble gas in the bulb that surrounds the filament to form a plasma by the impact ionization process. As a result of the avalanche avalanche the conductivity of ionized gas rises rapidly, allowing higher currents to flow through the lamp. Filling gas helps to determine the characteristics and dimensions of the lamp
but does not emit light in Ã. Filling gas effectively increases the distance electrons travel through the tube, allowing an electron³n a greater chance of interacting with a mercury atom. Additionally, argÃ³n volumes, excited to a metastable state by the impact of an electroÃ³n, can impart energy to a atom of mercury and ionize it, described as the
Penning effect. This reduces the view and operating voltage of the lamp, compared ³ other possible filling gases such as krypt³n.[26] Construction³ ³Close-up of the all of a germicidal lamp (an essentially similar design that does not use fluorescent phosphorus, which allows the electrodes to be seen) A fluorescent lamp tube is filled with a mixture of
argÃ³n, xenÃ³n, neÃ³ ³n kryptÃ, and mercury vapor. The ³n pressure within the buffer is about 0.3% of the atmospheric pressure.[27] Only the partial pressure of mercury vapor is about 0.8 Pa (8 thousand³ ³th of atmospheric pressure³n), in a 40-watt T12 buffer.[28] The inner surface of the buffer is coated with a fluorescent coating made up of various
mixtures of ³ salts Rare earth and metalic phosphorus. The bulb electrodes are typically made of spiral tungsten and are coated with a mixture of barium, strontium and calcium ³ to improve the emission³n termiÃ³nica. A germicidal lamp uses a low-pressure mercury vapor discharge that is identical ³ a fluorescent lamp, but the uncoated molten quartz
envelope allows for the transmission ³ ultraviolet radiation³n. Fluorescent tubes in lamps are usually straight, and their length ranges from 100,000 meters (3.9 inches) for lamps ,atcapmoc ,atcapmoc siÃm anoz anu ne zul ed daditnac amsim al ranoicroporp arap nazilitu es U ed amrof ne sednarg siÃm sarapmiÃL .atcapmoc siÃm zul ed etneuf anu
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diameter tube attached in one h to provide a large amount of low volume light output. Light³emitting phosphors are applied as a paint-like coating on the inside of the tube. The organic solvents are allowed to evaporate, then the tube is heated to almost the melting point ³ the glass to eject the remaining organic compounds and fuse the coating to the
lamp tube. Careful control of the grain size of the suspended phosphors is necessary; large grains lead to ³ coatings, and small parts lead to poor maintenance and efficiency of light. Most of the ³phosphors work best with a particle size of about 10 micrÃ³meters. The coating should be thick enough to capture all the ultraviolet light produced by the
mercury arc, but not so thick that the phosphorus coating absorbs too much visible light³ The first phosphorus ³ synthetic versions of natural fluorescent minerals, with small amounts of added metals as activators. Later other compounds were discovered, which allowed to make different colors of lamps. [29] Ballasts Main article: ballasts different
ballasts for fluorescent and discharge lamps Fluorescent lamps are negative differential resistance devices, so as more current flows through them, the resistance of the fluorescent lamp droplets, allowing more current to flow through them. Connected directly to a constant³voltage power supply, a fluorescent lamp quickly self-destructs due to
uncontrolled current flow. To avoid this, fluorescent lamps should use a to regulate the current flow through the lamp. The terminal voltage through an operating lamp varies according to the current of the arc, the diameter of the pipe, the temperature and the filling gas. A 48-inch (1.219 mm) general illumination service T12 [30] lamp operates at
430 mA, with a drop of 100 volts. High output lamps operate at 800 mA, and some types otnup le ne asnednoc es oirucrem le euq odaD]23[.arapmiÃl al ed ortned oirucrem ed ropav ed laicrap n³Ãiserp al ne otcefe us y allibmob al ed derap al ed arutarepmet al rop acitÃrc arenam ed odatcefa ev es setnecseroulf sarapmiÃl sal ed otneimidner lE
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ed aÃrav aicnetop ed levin lE .A 5,1 atsah Fresco of the Lémpara, a careful design is required to keep that point to the umbimal temperature, about 40 ° C. The use of an amalgam with some other metal reduces the vapor pressure and extends the top temperature range up; However, the "cold point" temperature of the bulb wall must still be
controlled to avoid High -performance fluorescent lamps have characteristics, such as a deformed tube or internal technical fissures to control the temperature of the cold point and mercury distribution. The very loaded small ones, such as compact fluorescent lamps, also include heat leaks in the tube to maintain the mercury vapor pressure to the
last value. [33] a Sankey diagram of Pédidas de Energía in a fluorescent lamp. In modern designs, the greatest pédida is the custaining efficiency of converting high -energy UV photons into less energy visible photons. Only a fraction of the entry of the eloquent energy into a lamp becomes a ã ºtil. The ballast dissipates some heat; Electronic ballasts
can be around 90% efficient. There is a fixed voltage fall in the electrodes, which also produces heat. Part of the energy in the Mercury vapor column also dissipates, but approximately 85% becomes visible and ultraviolet light. Not all the UV radiation that hits the fesphor coating becomes visible light; Some energy is lost. The greatest time in the
modern times is due to the slightest energy of each visible photo, compared to the energy of the UV photons that generated them (a phenomenon called Stokes Shift). Incident photons have an energy of 5.5 volts of electron, but produce visible photons with energy around 2.5 volts of electron, so only 45% of the UV energy is used; The rest dissipates
as heat. [34] Fluorescent lamps of frog "ccfl" redirect here. For other uses, see CCFL (disambiguation). ADDITIONAL INFORMATION: Inverter ccfl more information: Cótodo cold a fluorescent lamp of the cold sign of an emergency sign. Running at a very high voltage than other fluorescent, the lamp produces a low -American brightness discharge
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that emit electrons only due to the large tension between the electrodes. The cages will be heated by the current that flows through them, but they are not hot enough for a significant end emission. Because the feats of cold cages do not have the end -to -wear emission covering, they can have much long lives that the hot cages. This makes them
desirable for long -lasting applications (such as backlinally on hairline screens). Electrode sputtering can still occur, but electrodes can be molded (for example, in an internal cylinder) to capture most of the Sputtered as it does not miss the electrode material. Frão -all of the feats are generally less efficient than the term of termic emission because
the cadish cadish tension is much more high. The dissipated power due to the voltage of the Cãtodo does not contribute to the exit of light. However, this is less significant with long tubes. The increase in power dissipation at the ends of the tubes is also generally meaning that the cold -timed tubes have to function at a lower load that their
equivalents of termic emission. Given the high tube voltage required anyway, these tubes can be made easily long, and even function as standard chains. They are more suitable for folding in special forms for letters and seasons, and they can also be activated or disabled instantly. Home Main article: The gas used in the fluorescent tube must be
ionized before the arch can "hit." For small regrets, much tension is not needed to hit the arch and the start of the line does not present any problem, but the largest tubes require a substantial tension (in the range of a thousand volts) . Many starter circuits have been used The choice of circuit is based on cost, AC voltage, pipe length, instant vs. non-
instantaneous start-up, temperature ranges and part availability. Preheating A preheating fluorescent lamp circuit using an automatic start switch. A: Fluorescent tube, B: Power supply (+220 volts), C: Starter motor, D: Switch (bi-metallic) (bi-metallic) ed sametsis sonuglA .sallaf ed olcic le ne allaf euq obut nu ,setnallirb serotpurretni ed serodaicini
noc sacin³Ãrtcele setnecseroulf sarapmiÃl ed serodacnarra soL]53[.euqnarra le ne ollirb ed agracsed anu azneimoc arap etneicifusni se odidnecne obut le euq ed s©Ãvart a ejatlov le euqrop etnemaveun arreic es on euqnarra ed rotpurretni lE .senortcele ed aunitnoc n³Ãisime al etimrep euq ol ,setneilac sodotiÃc sol enietnam aslupmi euq lapicnirp
agracsed al ,erruco obut le euq zev anU .adidnecne iÃtse arapmiÃl al euq atsah etiper es osecorp lE ;ocra le raeplog arap oslup ed ejatlov nu iÃraicini e sotnemalif sol etnemacilcÃc iÃratnelac ollirb ed rotpurretni lE .)n³Ãgra o n³Ãen(etreni sag eneitnoc euq adalles sag ed agracsed ed arapmiÃl al a±Ãeuqep anu ne otreiba etnemlamron ocili¡Ãtemib
rotpurretni nu ne etsisnoC .arapmiÃl al ed sodotiÃc sol etnemaciti¡Ãmotua etneilacer ollirb ed rotpurretni ed rodacnarra nU]airasecen atiC[.selaunam serotpurretni e NIP ocimr©Ãt euqnarra norazilitu eS -ortauc ,atneses so±Ãa sol ed setna)ociti¡Ãmotua oicini ed rotpurretni("rodaicini" otneimatnelacerp ed arapmiÃl anU]airasecen atiC[.)soitav 03
etnemadamixorpa atsah V 021 ed y 001 ed sarapmiÃl arap y(V 042 ed sesÃap 002 ne radnÃtse sopiuqe nu sametsis sotsE]53[.laicini ocra le raicini arap omoc otla etnemetneicifus ol obut le erbos ejatlov nu ricudni ertsal le euq ecah otse ,der al ed ortsinimus la etnemativalet etnematcerroc artemonorc es iS .euqnarra ed rotpurretni le erba es
,otneimatnelacerp ed opmeit le nu ed s©Ãupsed ;solratnelacerp arap atolab al noc eires ne radnÃtse sotnemalif sol etcetnoc euq etnemlautca)ahcered al a otiucric ed amargaid rev( )ociliÃtem-ib(ociti¡Ãmotua o ocini¡Ãcem rotpurretni nu noc otnuj arapmiÃl al ed omertxe adac ne odotiÃc :n³Ãicanibmoc ed otnemalif nu azilitu ,tratShctiwS odamall n©Ãibmat
,otneimatnelacerp lE .arapmiÃl al raicini atnetni euq zev adac ajnaran aedapraP ocitiÃmotua euqnarra ed rotpurretni lE .otneimatnelacerp ed arapmiÃl anu azneimoc euq tsallaB :G ,sotnemaliF :F ,rodasnednoC :E used a thermal overmining trip to detect repeated initial attempts and disable the circuit until it was manually restarted. A power factor
correction capacitor (PFC) draws the main current of the electrical network to compensate for the delay current drawn by the lamp circuit. [35] Electric starters use a different method to preheat the cathodes. [36] They can be plugged in with bright entrances. They use a semiconductor switch and "soft start" the lamp by preheating the cathodes
before applying a start pulse that hits the lamp for the first time without blinking; This discourages a minimum amount of material from the cathodes during initiation, giving a longer useful life of the lamp. [35] It is claimed that this prolongs the useful life of the lamp by a factor of typically 3 to 4 times for a lamp that is often turned on as household
use, [37] and reduce the blackening of the ends of the lamp typical of fluorescent tubes. The circuit is typically complex, but the complexity is built into the IC. Electric starters can be optimized for fast start-up (typical start-up time of 0.3 seconds), [37] [38] or for more reliable start-up even at low temperatures and with low supply voltages, with a
start-up time of 2 â¬, 4 seconds. [39] Faster start-up units may produce audible noise during start-up. [40] Electric starters only attempt to start a lamp for a short time when the power is initially applied, and do not repeatedly attempt to restrict a lamp that is dead and unable to hold an arc; Some stop trying to automatically start a failed lamp. [36]
This eliminates the recoil of a lamp and the continuous flashing of a failed lamp with a brightness initiator. Electric starters are not subject to wear and do not need to be replaced periodically, although they may fail like any other electrical circuit. Manufacturers usually cite lives of 20 years, or while adjusting the light [38] [39] Instant Home T12
Fluorescent Tubes. The first two are a quick start (for "Tombstone" and plug brackets respectively), while the third is an instant start lamp. The instant start has a characteristic pin, rounded, for ollirb ollirb nu euq atsah aslupmi es etneirroc al ,ocra le "aeplog" ejatlov otla ed apsihc al euq zev anU .ocra led n³Ãiccudnoc al raicini ,otnat ol rop ,y sag ed
anmuloc al renopmocsed arap omoc otla etnemetneicifus ol ejatlov nu asu etnemelpmis oeniÃtnatsni oicini lE .4491 ne noratnevni es oeniÃtnatsni oicini ed setnecseroulf sobut soL .etroser led sodagrac efuhcne ed setropos sol a forms. As the bulb heats up and the pressure³n increases, the current continues to rise and both the resistance and the
voltage³ ³n go down, until the voltage of the net or the line takes over and the discharge becomes an arc. These tubes have no filaments and can be identified by a single pin at each end of the tube (for ordinary lamps; compact all-purpose lamps may also have a single pin, but they work from a transformer rather than a ballast). The bulb gates have a
plug "disconnected" at the low voltage end that disconnects the ballast when the tube is removed, ³ avoid discharges. Instant start lamps are slightly more energy efficient than fast start lamps, because they do not constantly send a heating current to all during operation, but the start of all start lamps increases the sputter, and take much longer to
move from a glow discharge to an arc during heating, so the useful life is normally about half of those seen in comparable fast start lamps.[41] ³ of an arc requires the emission ³n termi³nica of large amounts of electrons from the whole, the fast-onset ballast designs provide winds within the ballast that continuously heat the filaments of the whole. ³
Normally it works with an arc voltage lower than the instant start design; no inductive voltage spike occurs for the start, so the lamps must be mounted near a grounded reflector to allow the glow discharge to propagate through the tube and initiate arc discharge through capacitive coupling. In some lamps, a grounded "starter aid" strip is attached
to the outside of the lamp glass. This type of ballast is incompatible with Fluorescent t8 times of European energy savings because these regrets require an starting tension superior to that of the open circuit tension of the ravenst boot ballasts. A "iron" ballast (magnical) of raverous start continuously heats the cages at the ends of the masters. This
ballast works with two F40T12 features in series. Started the ravenst initial ballasts use a small self -transformator for for gnitrats gnirud decuder si egamad edohtac dna decalper eb ot sehctiws retrats on era ereht ,revewoH .stnenopmoc tiucric fo tsoc laitini rehgih eht fo esuaceb snoitallatsni laicremmoc ni esu ot detcirtser ylniam era stiucric trats
tnanoser-imeS .gnitmil tnerruc sedivorp tiucric eht ,spord egatlov ebut dna sesaercni tnerruc eht sA .ssenthgirb lluf sehcaer ,sdnoces evif ot eerht revo ,ylwols pmal eht ,taeh sedortcele eht sA .sekirts cra eht dna ,egatlov gnignir eht fo taht woleb sllaf egatlov gnikirts ebut eht ,erutarepmet noissime cinoimreht ot pu taeh sedortcele eht sa tub
,sedortcele dloc htiw cra eht ekirts ot wol oot si egatlov ebut sihT]24[.tnerruc gnitaeh edortcele llams a dna ,ebut eht ssorca egatlov ylppus eht ecitw tuoba etareneg dna yceneuqerf enil ta etanoser roticapac dna remrofsnart eht ,tnerruc cra on htiW .roticapac a dna remrofsnart dnuow elbuod a esu sdohtem sihT .sebut tnecseroulf 21T htiw esu rof
gnithgiL nrohT yb detnevni saw tiucric trats tnanoser-imes eht margaid tiucric trats tnanoser-imes A tiucric trats tnanoser-imes a no gnitrats pmal tnecseroulf ttaw-56 A trats tnanoser-imeS .sebut 21T tneiciffe ssel ,redlo eht htiw esu rof dengised era dna stiucric V 042 no ylno desu era stsallab trats-kciuQ .)no denrut si hctiws a nehw(deilppa si
rewop retfa yletaidemmi ylraen no snrut thgil tsallab trats-kciuQ a taht erutaef elbarised eht fo esuaceb snoitallatsni)laitnediser(citsemod ni desu osla era stsallab trats-kciuQ ;sselehtenoN .seruliaf pmal fo ecruos nommoc a ,hctiws retrats a rof deen eht setanimile stsallab trats-kciuq A .stsoc ecnanetniam rewol fo esuaceb snoitallatsni laicremmoc ni
nommoc erom era stsallab trats-kciuQ .ekirts ot meht rof redro ni rotcelfer latem dehtrae na raen detnuom eb ot deen sebuT .tinu etarapes a eb yam ro tsallab eht htiw denibmoc rehtie si remrofsnart-otua ehT .dnoces a flah nihtiw trats lliw ebut eht dna ,decuder si rewop gnitaeh tnemalif eht ,sekirts cra na nehW .deilppa tsrif si rewop nehw stnemalif
eht lamps lamps last longer, reducing maintenance costs. Because of the high open circuit tube voltage, this starting method is particularly good for starting tubes in cold locations. Additionally, the circuit power factor is almost 1.0, and no additional power factor correction is needed in the lighting installation. As the design requires that twice the
supply voltage must be lower than the cold-cathode striking voltage (or the tubes would erroneously instant-start), this design cannot be used with 240 volt AC power unless the tubes are at least 1.2 m (3 ft 11 in) length. Semi-resonant start fixtures are generally incompatible with energy saving T8 retrofit tubes, because such tubes have a higher
starting voltage than T12 lamps and may not start reliably, especially in low temperatures. Recent proposals in some countries to phase out T12 tubes will reduce the application of this starting method. Electronic ballasts Fluorescent lamp with an electronic ballast. Electronic ballast for fluorescent lamp, 2ÃÃ58 W Electronic ballast basic schematic
Electronic ballasts and different compact fluorescent lampsElectronic ballasts employ transistors to change the supply frequency into high-frequency AC while regulating the current flow in the lamp. These ballasts take advantage of the higher efficacy of lamps, which rises by almost 10% at 10 kHz, compared to efficacy at normal power frequency.
When the AC period is shorter than the relaxation time to de-ionize mercury atoms in the discharge column, the discharge stays closer to optimum operating condition.[43] Electronic ballasts convert supply frequency AC power to variable frequency AC. The conversion can reduce lamp brightness modulation at twice the power supply frequency. Low
cost ballasts contain only a simple oscillator and series resonant LC circuit. This principle is called the current resonant inverter circuit. After a short time the voltage across the lamp reaches about 1 kV and the lamp instant-starts in cold cathode mode. The cathode filaments are still used for the protection of the ballast from overheating if the lamp
does not turn on. Some manufacturers use positive temperature coefficient (PTC) thermistors to disable instant onset and allow time to preheat the filaments. The most complex electronic ballasts use programmed boot. The output frequency starts above the resonance frequency of the balloon output circuit; And after the filaments heat up, the
frequency decreases rapidly. If the frequency approaches the resonant frequency of the ballast, the output voltage will increase so much that the lamp will turn on. If the lamp does not turn on, an electrical circuit stops the ballast from functioning. Many electronic ballasts are controlled by a microcontroller, and these are sometimes called digital
ballasts. Digital ballasts can apply a fairly complex logic to the start and operation of the lamp. This allows functions such as testing for broken electrodes and missing tubes before trying to start, tube replacement detection, and tube type detection, so that a single ballast can be used with several different tubes. Features such as attenuation can be
included in the built-in microcontroller software, and can be found in various manufacturers' products. Since their introduction in the 1990s, high-frequency ballasts have been used in general lighting fixtures with quick start or preheating lamps. These ballasts convert the input power into an output frequency exceeding 20 kHz. This increases the
efficiency of the lamp. [44] These ballasts operate at voltages that can be up to 600 volts, which require some consideration in the design of the housing, and may cause a lesser limitation on the length of the cable cables from the ballast to the ends of the lamp. The end Life The life expectancy of a fluorescent lamp is mainly limited by the life of
cathode electrodes. To maintain an adequate current level, the electrodes are coated with a metal oxide emission mixture. Every time you start the lamp, lamp, anu euq atsah ,opmeit le noc nadarged es n©Ãibmat arapmiÃl al nerbuc euq sorofs³Ãf soL]64[.soda±Ãesid lam serosrevni sonugla noc amelborp nu res edeup otsE .etnemacitsiÃrd
esratroca edeup arapmiÃl al ed litºÃ adiv al y ,sodortcele sol ed onu ed sedadimixorp sal ne esab sag led adasor aicnecsinimul anu omoc atseifinam es oirucrem ed ropav ed n³Ãiserp al ,ocirt©Ãmisa n³Ãicubirtsid anu asuac y ,CD ogses nu ajab etnemavitcefe arepo ol ,ocirt©Ãmisa
etneirroc ed ojulf le a obut le retemoS]54[.airamirp agracsed omoc orelev le amot n³Ãgra le sag le odnauc eunet asor nu ellirb arapmiÃl al euq ecah etnemlanif y ,atelpmoc zul ed adilas al atsah odagnolorp etneimatnelacerp ed opmeit nu etnemlaicini asuac oicini ed oirucrem ed adidr©Ãp aL .odanell es sag le euq ne esraropave arap elbinopsid iÃtse on ay y ,sonretni
setnenopmoc sol y orofs³Ãf le ,oirdiv ed obut le rop odibrosba se oirucrem le odnauc rallaf nedeup oirucrem ed odinetnoc ojab noc sarapmiÃl ed so±Ãesid soL .amsim al ed ollaf nu acovorp euq ol ,arapmiÃl al edneicne es euq zev adac ecrapse es otneimirbucer le .etneilac odotiÃc omoc aºÃtca euq anibob al ed lartnec etrap al ne sacnalb sacin³Ãmret
senoisime ed alczem al ed sotneimirbucer us artseum euq n³Ãiserp ajab ed oirucrem ed sag ed agracsed ed arapmiÃl anu ne otnemalif led erreiC .ogren avleuv es y aczeruosc es euq odnacovorp ,sodortcele sol aedor euq latsirc la ereihda es odaziropav lairetam lE .sodotiÃc sol edsed odaetorropsihc areibuh etneicifus sacin³Ãmret senoisime ed alczem
anu euq ed s©Ãupsed racnarra aÃdop on ay ,etnemlarulag ³Ãgapa y ³Ãidnecne es euq ,obut etsE .arapmiÃl al odnatilibahni ,esrepmor edeup n©Ãibmat otnemalif lE .acid³Ãtac n³Ãicazirevlup al a natcefa aicneucerf al y oicini ed odot©Ãm lE .olodn©Ãicerucso ,obut led sederap sal ne alumuca es odazirevlup lairetam lE .obut led ortned sodasep senoi e
senortcele ed otcapmi le rop sodortcele sol ed animile es odotiÃc led otneimirbucer led daditnac a±Ãeuqep anu ,otneimanoicnuf le etnarud no longer produces an acceptable fraction of its initial light output. The failure of the integral electric ballast of a compact fluorescent bulb will also end its useful life. Compact fluorescent lamp that has reached
the end of its useful life due to mercury adsorption. Light is produced only by the base Fill. Phosphors and the Spectrum of Emitted Light Light from a fluorescent lamp reflected on a CD shows the individual bands of color. The spectrum of light emitted by a fluorescent lamp is the combination of light emitted directly by the mercury vapor and light
emitted by the phosphorescent coating. The spectral lines of mercury emission and the effect of phosphorescence give a combined spectral distribution of light different from that produced by incandescent sources. The relative intensity of the light emitted in each narrow band of wavelengths over the visible spectrum is in different proportions to that
of an incandescent source. Colored objects are perceived differently under light sources with different spectral distributions. For example, some people find that the color representation produced by some fluorescent lamps is hard and unpleasant. A healthy person may sometimes appear to have an unhealthy skin tone under fluorescent lighting. The
degree to which this phenomenon occurs is related to the spectral composition of light, and can be measured by its chromatic reproduction index (CRI). Colour temperature Main article: Colour temperature The colour temperature of different electric lamps The correlated colour temperature (CCT) is a measure of the "shadow" of the whiteness of a
light source as compared to a black body. Typical incandescent illuminance is 2700 K, which is yellowish white.[47] Halogen illuminance is 3000 K.[48] Fluorescent lamps are made for a chosen CCT by altering the mix of phosphors inside the tube. Warm white fluorescents have a CCT of 2700 K and are popular for residential lighting. Neutral white
fluorescents have a CCT of 3000 K or 3500 K. Cold white fluorescents have a CCT of 4100 K and are popular for illuminating omoc omoc sajab siÃm roloc ed sarutarepmet ebicrep onamuh ojo le ,eunet siÃm n³Ãicanimuli ed selevin A .sotla siÃm zul ed selevin ereiuqer etnemlareneg TCC atla ed n³Ãicanimuli aL .odaluza ocnalb roloc ed se euq ,K 0056 a
K 0005 ed TCC nu neneit sonruid setnecseroulf soL nice, as related through the bend of Kruithof. Therefore, a faint 2700 K incandescent lamp looks comfortable and a bright 5000 K lamp also looks natural, but a faint 5000 K fluorescent lamp looks too pale. Daytime fluorescents look natural only if they are very bright. Color Reproduction Index A cold
white helical fluorescent lamp reflected on a diffraction grid reveals the various spectral lines that make up the light. Fluorescent spectra in comparison with other forms of illumination. Clockwise from the top left: Fluorescent lamp, incandescent bulb, candle flame and LED lighting. Main article: Color rendering Index Color rendering Index Color
rendering Index (CRI) is a measure of how well colors can be perceived using light from a source, in relation to light from a reference source such as natural light or a black body of the same color temperature. By definition, an incandescent lamp has an IRC of 100. Real-life fluorescent tubes achieve CRIs of between 50 and 98. Fluorescent lamps with
low CRI have phosphors that emit very little red light. The skin looks less pink, and therefore "unhealthy" compared to incandescent lighting. Colored objects appear muted. For example, a low CRI 6800 K halophosphate tube (an extreme example) will make reds look dull red or even brown. Since the eye is relatively less efficient at detecting red
light, an improvement in the chromatic reproduction index, with an increase in energy in the red part of the spectrum, may reduce overall luminous efficacy.[31]: 8 Lighting arrangements use fluorescent tubes in a variety of shades of white. Mixing types of tubes inside the accessories can improve the color reproduction of smaller tubes Composition
of the phosphorus Part of the less pleasant light comes from tubes containing the oldest halophosphate-type phosphors (chemical formula Ca5 (PO4) 3 (F, Cl):Sb3+, Mn2+). This phosphorus emits mainly yellow and blue light, and relatively little green and red. In the absence of a reference, this mixture looks white to the eyes, but the light has a
spectrum. The color rendering index (CRI) of such lamps is around 60. Since the 1990s, higher-quality fluorescent lamps use triphosphor mixture, based on europium and terbium ions, which have emission bands more evenly distributed over the spectrum of visible light. Triphosphor tubes gives a more natural color reproduction to the human eye.
The CRI of such lamps is typically 85. Fluorescent-lamp spectra Typical fluorescent lamp with rare-earth phosphor A typical "cool white" fluorescent lamp utilizing two rare-earth-doped phosphors, Tb3+, Ce3+:LaPO4 for green and blue emission and Eu:Y2O3 for red. For an explanation of the origin of the individual peaks click on the image. Several of
the spectral peaks are directly generated from the mercury arc. This is likely the most common type of fluorescent lamp in use today. An older-style halophosphate-phosphor fluorescent lamp Halophosphate phosphors in these lamps usually consist of trivalent antimony- and divalent manganese-doped calcium halophosphate (Ca5(PO4)3(Cl, F):Sb3+,
Mn2+). The color of the light output can be adjusted by altering the ratio of the blue-emitting antimony dopant and orange-emitting manganese dopant. The color rendering ability of these older-style lamps is quite poor. Halophosphate phosphors were invented by A. H. McKeag et al. in 1942. "Natural sunshine" fluorescent light Peaks with stars are
mercury lines. Yellow fluorescent lights The spectrum is nearly identical to a normal fluorescent lamp except for a near total lack of light shorter than 500 nanometers. This effect can be achieved through either specialized phosphor use or more commonly by the use of a simple yellow light filter. These lamps are commonly used as lighting for
photolithography work in cleanrooms and as "bug repellent" outdoor lighting (the efficacy of which is questionable). Spectrum of a "blacklight" lamp There is typically only one phosphor present in a blacklight lamp, usually consisting of europium-doped strontium siÃm etreivnoc asonimul aicacife ed setnecseroulf sarapmiÃl sal ed setnecsednacni
sarapmiÃl sal noc n³Ãicarapmoc aL .aÃd led zul al ed roloc le ed sarutarepmet sal ramixorpa arap oediv ed roloc ed n³Ãicidner ed ecidnÃ ed sarapmiÃl y oediv ed soedaprap rative arap aicneucerf atla ed sotsalab nazilitu y ,selanoicidart saneg³Ãlah zul ed setneuf sal euq socserf siÃm noS .soediv y salucÃlep ed n³Ãiccudorp al arap oiranecse led
n³Ãicanimuli al ne nasu es odunem a selaicepse setnecseroulf secul sal ,lareneg n³Ãicanimuli al ed siÃmedA .acit©Ãgrene aicneicife ed sarapmiÃl ed sopit sorto y DEL o setnecseroulf setnecseroulf sarapmiÃl noc setnecsednacni sarapmiÃl ed n³Ãicutitsus al y setnecsednacni sallibmob ed n³Ãicanimile al odnatnela niÃtse sesÃap sohcuM .ragul reiuqlauc ne soicifide
ne setnecsednacni sallibmob rev orar yum se ocitiÃsa etsedus le y etse le nE .zul ed adilas al ed dadilibatpeca al y lacol n³Ãicalbop al ed selatneibma y sareicnanif ,sacit©Ãgrene senoicapucoerp sal ed oicerp le nºÃges aÃrav etnecseroulf n³Ãicanimuli al ed laicnedisser osu le ,sesÃap sorto nE]airasecen atiC[.setnecseroulf sol a odnazalpmeer iÃtse
,oirucrem eneitnoc on y etnemacit©Ãgrene etneicife siÃm se euq ,DEL omoc n³Ãicanimuli odneyunimsid iÃtse etnecseroulf osu lE .ainrofilaC omoc seragul ne osu royam nu odatluser omoc n³Ãiccurtsnoc ed sogid³Ãc sol y selacsif sovitnecni sol ,dadicirtcele ed sotsoc soL .setnecsednacni secul sanu zev arar y savitacifingis nos setnecseroulf
sarapmiÃl sal ed sotsoc ed sorroha sol euq nartneucne es setnecseroulf saserpme sal y saleucse sal ,serop ,sejarag o sonat³Ãs ,sanicoc ne etnemlapicnirp nartneucne es setnecseroulf sarapmiÃl sal ,sesnedinuodatse saicnedisser sal nE .raluger sallibmob ed amot anu ne rajacne nedeup on etimrep sel euq ol ,arapmiÃl al ed esab al ne railixua acin³Ãrtcele al nargetni satcapmoc
setnecseroulf sarapmiÃl sahcuM .ralupop siÃm odneivlov iÃtse es)LFC(atcapmoc etnecseroulf arapmiÃl aL]94[.so±Ãamat y samrof sahcum ne neneiv setnecseroulf sarapmiÃl saL senoicacilpA .aredam ed oirdiv ed erbos nu ne odinetnoc iÃtse euq the visible light input power of incandescent lamps. A typical 100-watt tungsten filament incandescent
lamp can convert only 5% of its power input to visible white light (400 â700 nm wavelength), while typical fluorescent lamps become about 22% of the power input to visible white light. [31] : 20 The effectiveness of stgil gnhsalf ruff serutxiF .egatlov tsallab paliava htew trats tonnac pmal h .enog si liretam noisme ehh lla hw!sedohtc ehf fo ecafrus
gnittime-nortcele het sedore ylthgils elcyc trats hcaE [45] .spmal fo efil ehnetrohs lliw (sruoh 3 yreve naht erom) gnihctiqerF gnitiqerF segatnaw.segdniw.inoidnwichlw.sinueivycnwichlw ifo, rov gninoitidnoc, ria ot detoved noitpmusnoc ygrene, dna, tsuc, ezis, eht secuder yltaerg siht .spmal tnecsednacni tnelaviuqe fo teah htfif-ne tuba ffo evig
spmal tenecserolF teeh rewoL .secafrus detanimulli na pmal nwteb ecnatsid laciut eht derapmoc agal si peht; tnemalif tnecsednacni desuffidnu na morf nesaeer lehkar nsereoeortig rutiutnioNtivntibnivng, ngNtivngNtivng, ng i.ecroos working men ylacisyhp dna detasnepmoc ylausu si pmal tenecseroulf a, pmal teneczenacni na htiw derapmoC
ecnanimo rewoL [etadpu sdnen][35].efil sti revo noitpmusnoc ygrenewol yb ruf detasnepmoc ylausu si pmal tenecsednacni na htiw derapmoc pmal tnecseroulf a fo tsc leitrehgihT [25]. yad resruo 8srao 200000000000000000000000000000snoitidnoc set dradnats rednU.emit a ta sruoh serareves detarepo nehw pmal tenecsednacni tnelaviuqna sa gnol sa
samit 02 ot 01 reached llew pmal tenecseroulf a yllacepyT efiL.(FATA°59) CATA°U53 ta yllaidsi pml5T ehelihw (FATA°C77) CATA°52 ct8PimalTeerulfT efiL. tSI3sehtSpmal5T5nI.ebutHT3foRTNEC7NIc8T4nI .pmalAhFoAbTsedlocAhErutarepmetPmal noTnednepdSiCaciffe pmal tenecserolF.stsallabCinortceleHtiw %01 DNA,stsallabCitengamHTIWrewop
pmalFo %52 tubaNac ssolTsaltsallaB [15] Rao Ot Tsalab Ranidro Na Htuo Ebut Ttoo 4 A letter Teto Rep We will fund 61 Tuba morpho Segnar Sebut Sebut .esion dettime ecuder ot dnuopmoc gnittop ekil-rat a htiw dellif yllausu era stsallab citengam ,aciremA htroN nI .esion gnizzub ro gnimmuh elbidua na ecudorp nac stsallab citengamortcelE .spmal
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ro stnemgip fo noitadarged tnevrep ot thgil VU morf noitcetorp deen yam stcafitra muesuM]56[]46[]36[.slaudividni evitisnesotohp ni smotpmys etabrecaxe yam spmal tnecseroulf tcapmoc morf noitaidar teloivartlU]26[.erusopxe nus fo etunim eno ot tnelaviuqe si sruoh thgie rof sthgil tnecseroulf rednu gnittis morf erusopxe teloivartlu taht dnuof
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sniatniam taht tsallab a esu)gnisitrevda rof sa ti si removed in high-frequency ³ ballast lamps. The energy lost in magnetic ballasts is about 10% of the input power of the lamp according to the 1978 GE literature.[31] Electron ³ reduce this loss. Power quality and radio interference Single inductive fluorescent lamp ballasts have a power factor lower
than one. Inductive ballasts include power factor correction ³. Simple ³ ballasts can also have a low power factor due to their rectifier input stage. Fluorescent lamps are a non-linear charge and generate ³ currents in the power supply³c. The arc inside the lamp can generate radio frequency noise, which can be conducted through wiring the arc. Radio
interference can be suppressed. Very good suppression³n is possible, but á±ade at the cost of fluorescent accessories. Pre³maximum end-of-life fluorescent lamps may present a serious risk of radio frequency interference. The oscillations are generated from the negative differential resistance of the arc, and the current flow through the tube can form
a tuned circuit whose frequency depends on the length of the trajectory. [67] Operating temperature Fluorescent lamps work best around room temperature. At lower or higher temperatures, efficacy decreases. At temperatures below freezing³ the standard lamps cannot be switched on. Special lamps can be used for reliable outdoor service when it is
cold. Fluorescent tubes are long, low-luminance sources compared ³ high-pressure arc lamps³ incandescent lamps, and LEDs. However, the low light intensity of the emitting surface is useful because it reduces glare. Lamp design should control the light from a long tube instead of a compact balloon. The compact fluorescent lamp (CFL) replaces the
regular incandescent bulbs in many lighting fixtures where space permits. Fluorescent lamps with magnetic ballasts flicker at a normally imperceptible frequency of 100 or 120 Hz and this flicker may cause problems for some light-sensitive individuals;[68] light;[68] they are listed as problems for some people with autism, epilepsy, [69] lupus, [70]
cr³nica fatigue syndrome, Lyme disease, [71] and vÃ©rtigo. [72] The problem of the "heartbeat effect" created by taking photos under standard fluorescent lighting can ³ noticed a stroboscÃ³pico effect, where something spinning at the right speed can seem stationary if lit only by a single fluorescent lamp. This effect is removed by paired lamps that
operate on a lead delay ballast. Unlike a true strobe lamp³pica, the light level falls in an appreciable time and therefore the substantial "blur" of the most³vile part will be evident. Fluorescent lamps can cause flickering at the frequency of the power supply ³ (50 or 60 Hz), which is noticeable by more people. This happens if a failed or damaged event
results in slight rectification ³ uneven light output in positive and negative AC cycles. A power frequency flicker can be emitted from the ends of the tubes, if each tube electrode produces a slightly different light output pattern ³ each half cycle. The flicker to the power frequency is more noticeable in the peripheral vision ³ than when viewed directly.
Near the end of life, fluorescent lamps may begin flashing at a frequency below the power frequency. This is due to the instability in the negative resistance of the arc discharge, [73] which can be from a bad or ballast lamp or a poor ³n connection. The new fluorescent lamps may show a twisted spiral pattern ³ light in one part of the lamp. This effect
is due to the loose material and usually disappears after a few hours of operation. [31]: 22 The problem of the "heartbeat effect" created by firing pellets under the electromagnetic ballasts of ³ fluorescent lighting can also cause For video recording, since there may be a call beat between the video box speed and fluctuations in the intensity of
fluorescent lamp. Fluorescent lamps with electronic ballasts do not blink, since above approximately 5 kHz, the half -life of the state of excited electrons is more long than that half cycle, [date required] and the production of light becomes continuous. The operating frequencies of the electric ballasts are selected to prevent interference with the
infrared remote controls. Defective or poor quality electronic ballasts can have a considerable light modulation of 100/120 Hz. Attenuation Fluorescent lamps cannot be connected to attenuation switches intended for incandescent lamps. Two effects are responsible for this: the waveform of the voltage emitted by a standard phase control regulator
interacts poorly with many ballasts, and it becomes difficult to hold an arc in the fluorescent tube at low power levels. The attenuation facilities require a compatible attenuation ballast. Some models of compact fluorescent lamps may be dimmed; in the United States, these lamps meet the UL 1993 standard.[74] Lamp sizes and designations Main
article: Formats of fluorescent lamps The systematic nomenclature identifies mass-market lamps in terms of their general shape, rated wattage, length, colour and other electric and illuminating characteristics. In the United States and Canada, lamps are typically identified by a code as FxxTy, where F is for fluorescent, the first number (xx) indicates
either the wattage in watts or the length in inches, the T indicates that the shape of the bulb is tubular, and the last number (y) is the diameter in eighths of an inch (sometimes in millimeters, rounded to the nearest millimeter). Typical diameters are T12 or T38 (1+1" Â 2 inches or 38 mm) for residential lamps, T8 or T26 (1 inch or 25 mm) for
commercial energy-saving lamps. Overconduction The overconduction of a fluorescent lamp is a method to get more light from each tube than is obtained under nominal conditions. ODNO (Overpowered Normal Output) fluorescent tubes are used When there is not enough space to place more bulbs to increase the light. Mã © everything is effective,
but generates some additional problems. This technique has been popularized among acuatic gardeners as a profitable form of an AÃ ± adir Eht spalm lacidem bvu]67[.cixot erew ertcafuname gnirud muillaht fo snoissime tub ,rotavitca na mulllaht desu spal ylrae .desu esla Etaroboroulf muihpsids ,etacibitd ,etacibitad a ,etacibitad a , Nommococ
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addition, UVC can cause ocular and cutaneous damage. Sometimes they are used by geoms to identify certain species of minerals by The color of its fluorescence when equipped with filters that pass the shortwave UV and block visible light produced by mercury discharge. They are also used in some EPROM drafts. Germicidal lamps have
designations that begin with G, for example G30T8 for a germicidal lamp of 30 watts, 1 inch (2.5 cm) diameter, 36 inches (91 cm) long (as opposed to a F30T8, which is the fluorescent lamp of the same size and classification³ ³). Electrodeless lamp Main article: Lamp without electrodes Induction lamps without ³ are fluorescent lamps without internal
electrodes. They have been available since 1990. A current is induced in the gas column by ³ electromagnetic induction. Because electrodes are often the life limiting element of fluorescent lamps, these types of electrode lamps can have a very long life span, although they also have a higher purchase price. ³ Fluorescent lamps were used as
backlighting for LCD screens on computer monitors and televisions before using LED-backlit LCD screens. They are also popular among computer case managers in recent years. Capacitive coupling with high-voltage lines can ³ a lamp continuously at low intensity. Fluorescent lamps may be illuminated by means other than a suitable ³nºC connection.
These other more, however, result in very dim or very short³lasting illumination, and are seen mostly in scientific demonstrations³ Standard electricity or a Van de Graaff generator will cause a lamp to flash momentarily when it discharges a high-voltage capacitance. A Tesla coil will pass high-frequency current through the tube, and since it also has a
high voltage, the gases inside the tube will ionize and emit light. it also works with plasma balloons. Capacitive coupling with high-voltage lines ³n can continuously ignite a lamp at low intensity, depending on the intensity of the field or the electric field. See also China Gas Filled Tube Tubes Ã¢ Â manufactured as a replacement for gas ot dengissa
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05, assigned to General Electric Company ^ Consultant on the occasion, Volume 50, page 4, 1946 ^ Westinghouse Engineer, Volume 12 '13, page 141, 1952 "Illumination ³ a revolution³ 20th century shop." Americanhistory.si.edu. ^ Van Broekhoven 2001, p. 97 "98. ^ William M. Yen, Shigeo Shionoya, Hajime Yamamoto, Phantom³Apps, CRC Press,
2006, ISBN 1-4200-4369-2, p. 84 "85 ^ Kulshreshha, Alok K. (2009). Basic engineering: principles and applications. India: Tata McGraw-Hill Education, p. 801. ISBN 978-0-07-014100-1. ^ Kane & Sell 2001, p. 185. ^ Van Broekhoven 2001, p. 93. ^ T12 Specifies the diameter of the light bulb in 1/8-inch units; A T12 bulb is 12Ã£â (1/8) inches or 1.5
inches (38 mm) in diameter. ^ A B C D E General Electric, BoletÃn tÃ©cnico TP 111R fluorescent lamps, December 1978 ^ Kane & Sell 2001, C.F. 182. ^ Kane & Sell 2001, p. 188. ^ Kane & Sell 2001, p. 196 "197. ^ A B C D "CapÃtulo 8. Illumination³" (PDF). Power semiconductor applications. Philips semiconductors. Original archive (PDF) on 2009-
11-22. Retrieved 2009-11-22. ^ A B "E³t³tE Boot Data Sheet (not fast boot), with a detailed explanation of the operation" (PDF). ^ A B "E³ ³tE Boot Data Sheet, with a detailed explanation of the operation³tE³tE Boot (PDF). ^ A B "E³tE Tube Starter 300C Fastlux for E-T Lights fluorescent ras." www.tabelek.co.uk. ^ A B "Start Start Electronic Starter
for UM2 Multi Pulse Fluorescent Tubes". www.tabelek.co.uk. ^ Quick start for fluorescent lights "the three 'fast' start marks (

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