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Fire and electrical protection standard on employeesNFPA 70E (Standard for Electrical Safety in the Workplace) is a standard of the National Fire Protection Association (NFPA). The document covers electrical safety requirements for employees. The NFPA is best known for publishing the National Electrical Code (NFPA 70).NFPA 70E addresses employee workplace electrical safety requirements. The standard focuses on practical safeguards that also allow workers to be productive within their job functions. Specifically, the standard covers the safety requirements for the following:Electrical conductors and equipment installed within or on buildings or other structures, including mobile homes, recreational vehicles, and other premises (yards, carnivals, parking lots, and industrial substations)Conductors that connect installations to a supply of electricityNot covered are - electrical installations in marine, aircraft, auto vehicles, communications and electrical utilities.Key principles covered are JSA/JHA/AHA procedures to ascertain shock protection boundaries, arc flash incident energy expressed in calories/cm2, lockout-tagout, and personal protective equipment. While the various OSHA, ASTM, IEEE and NEC standard provide guidelines for performance, NFPA 70E addresses practices and is widely considered as the de facto standard for Electrical Safety in the Workplace.Practices include:Staging a "safe work zone" with boundaries, barricades, signs and attendants.Proper body positioning to reduce ergonomic risk, use of rescue hooks in Medium Voltage switching.Human factor analysis, written procedures to reduce incidents not otherwise imminent from above.[1]Electrical engineeringHigh-voltage hazardsArc FlashNFPA 70 National Electrical Code (NEC)NFPA 70B Recommended Practice for Electrical Equipment MaintenanceNFPA 72 National Fire Alarm CodeNFPA 704 Standard System for the Identification of the Hazards of Materials for Emergency ResponseNFPA 853 Standard for the installation of stationary fuel cell power systemsNFPA 921 Guide for Fire and Explosion InvestigationsNFPA 101 Life Safety CodeNFPA 1123 Code for Outdoor Firework DisplaysNFPA 1901 Standard for Automotive Fire Apparatus^ Sam Pherwani, P.Eng CESCP NFPA 70E instructor NASA, Berkeley Lab, Shermco - via J. R. White ASTM/IEEE/NFPA committeeNFPA 70E: Standard for Electrical Safety in the WorkplaceRetrieved from " ratings0% found this document useful (0 votes)129 viewsSaveSave 2021 NFPA 70E Changes For Later0%0% found this document useful, undefined Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. You have no items in your shopping cart. By Steve Edwards & Jay Smith, ContributorsThe National Fire Protection Associations 2021 (NFPA) 70E Standard for Electrical Safety in the Workplace has been updated and is now in effect. NFPA 70E is one of the most widely used consensus standards in U.S. workplaces. The standard has a comprehensive scope (the 2021 standard is 100+ pages), addressing electrical safety-related work practices, safety-related maintenance requirements, and administrative controls to protect employees from electrical shock and arc flash. The standard covers every part of electrical work from voltage measuring and troubleshooting on both ac and dc systems, de-energizing equipment, and verifying the absence of voltage before any work is done.NFPA70E standard is revised every three years. The 2021 edition of NFPA 70E was issued on June 1, 2020 and became effective June 21, 2020. The changes are important for every electrical worker to understand so they can keep in compliance and stay safe on their jobs.A Look at the Revisions:Some of the 2021 revisions have been reorganizing. For instance, Article 110 of the standard General Requirements for Electrical Safety-Related Work Practices has been revised to consolidate general requirements for electrical safety-related work programs, practices and procedures from other articles. The first priority in implementing these work practices is hazard elimination. Energized electrical conductors and circuit parts operating at voltages equal to or greater than 50 volts are to be put into an electrically safe condition before an employee performs work if the individual is within the limited approach boundary and/or the individual interacts with equipment where conductors or circuit parts are not exposed but an increased likelihood of injury from an exposure to an arc flash hazard exists.Electrical safety training for employees exposed to specific hazards associated with electrical energy is to be classroom-based, on-the-job, or a combination of the two. New to the 2021 edition: classroom training can include interactive electronic or interactive web-based training components.The 2021 70E edition places a new emphasis on keeping on file, documenting, and following the recommendations of electrical equipment and PPE manufacturers instructions. Manufacturers instructions sometimes have been skipped because the information might be hard to access, forcing workers to dig through equipment packaging, or small print instructions have made readability difficult. Manufacturers must now make instructions and recommendations more readable and more accessible.Personal protective equipment (PPE) constitutes part of NFPA 70E. PPE includes nonconductive head protection, eye protection, hearing protection, and arc-rated clothing whenever there is possible exposure to an electric arc flash, insulating blankets, and non-melting footwear. The 2021 edition addresses the common practice of wearing high-visibility vests over arc rated clothing. In the past qualified workers that were required to wear high-visibility vests had to remove the vests if the vest did not meet the level of arc flash protection required. Now qualified workers can wear a category 1 arc rated high-visibility vests (4 cal/cm2) during the workday and not have to remove it to perform electrical troubleshooting or voltage measurementsAcceptable electrical safety footwear has been expanded in the 2021 edition to go beyond traditional leather footwear to include other types footwear other than leather or dielectric as long as it has been tested to demonstrate no ignition, melting, or dripping at the estimated incident energy exposure or the minimum arc rating for the respective arc flash PPE category.In addition, the definition of balaclava has been changed. The word hood and sock were removed. The new definition: an arc-rated head-protective fabric that protects the neck and head except for a small portion of the facial area.Circuit Breaker Safety and Battery SafetyCircuit breaker safety and battery safety have new requirements in the 2021 edition. When circuit breakers are initially switched on after installation or after maintenance has been completed, operators are now required to wear appropriate arc-rated PPE. This change affects potentially every maintenance employee in a workplace.Also, circuit breakers that interrupt faults approaching their interrupting ratings are to be inspected and tested according to the manufacturers instructions.The ever-increasing power of batteries (in particular lithium batteries) is addressed in the 2021 edition. Energy exposure levels are not to exceed 50 volts AC and 5 milliamperes and 100 volts DC unless proper controls are implemented. Multiple hazards may be encountered when working on batteries, such as shock, arc flash, chemical, and thermal. PPE selection should consider all the hazards, depending on the task.Typically, in the past, lithium batteries came in cells of 1.5 volts for uses such as powering cordless drills or cordless lawn mowers. More recently, lithium batteries come in packs of cells where voltage can exceed 100 volts. Some systems use lithium batteries with up to 1,000 volts. This is the type of power needed for electric automobiles, buses, and trucks. This level of energy can create serious electrical shock and arc flash hazards for employees. Heat released during cell failure can damage nearby cells, releasing more heat in a chain reaction known as a thermal runaway. The high-energy density in lithium batteries makes them more susceptible to these reactions.The NFPA 70E 2021 requires an arc flash risk assessment be conducted prior to any work on a battery system over 100 volts to identify chemical, electrical shock, arc flash hazards, and requires an assessment of the risks associated with the type of task being performed. Lower voltage can result in a bodily shock caused by a spark. Newer, higher industrial voltages can cause an arc flash explosion, necessitating the risk assessment.A new article (Article 360) was added that covers safety related work requirements when working with capacitors. The article covers specific personal safety measures that must be completed by workers when working with or de-energizing capacitors.The next edition of NFPA 70E is set for the year 2024. The first draft public input deadline will be June 1, 2021, with the first draft being posted March 22, 2022. The second draft will be posted February 28, 2023.Steve Edwards is the Executive Vice President of Electrical Safety & Condition Monitoring. As such, hehas responsibility for Arc Flash, Lockout-Tag-out, Infrared, and Vibration/Ultrasound solutions to ensure a safe and reliable processfor clients and their physicalinfrastructure with the multi-national field force.With over 18years of global experience in various levels of business strategy, Edwards sets up teams and programs to supply a best in-class customer experience. He has held leadership positions with Exponent (engineering consulting business) and Stericycle (medical waste and product recall services). He has worked with partners both internally and externally to design customized solutions from small start-ups to large fortune 500 organizations. Edwards is a native of Indiana and received his bachelors degree from of Purdue University with a degree in Organizational Leadership. sedwards@seamgroup.comJaySmith is the Director Electrical Safety Services. As such, heis the (SME)for the Electrical SafetyServices Division with a focus onassistingclients and internal safety teams for arc flash assessments and lockout/tagout services.For the past 19 years atSEAM Group, he worked with thousands of clients to improve workplace safety and performance by implementing industry standards for electrical safety.Smithis known nationally for his expertise with arc flash and NFPA 70E and is annually invited to speak at numerous national conferences and corporate safety summits.Smith isfeatured in several publications, webinars, and articles. jsmithjr@seamgroup.com1. NFPA-70EElectrical Safety in the Workplace Are Your Workers Qualified? 2. Are Your Workers Qualified Take a moment and think about the electrical related tasks your workers perform in your facility: 1)-replace light bulbs 2)-replace light ballasts 3)-troubleshoot 4)-replaces components 5)-preventive maintenance 6)-manage electrical contractor 3. 19 year old apprentice in VirginiaInstalling light in attic on a new houseNo PPE or LOTOTouched live wire, fell down attic steps, broke neck and diedLack of safety cost this man his life. Are Your Workers Qualified? 4. Are Your Contractors Qualified? 46-year old electrical contractor, project supervisor electrocuted.New air compressor start upNFPA-70E and VPP require contractor management.Proper PPE and training could have prevented this fatality.Lack of safety cost this man his life. 5. Why Comply? The things we expect to happen dont cause injuries. Its always the things we dont expect or anticipate happening that injure people and cause fatalities. Given a second chance, what do you think these people would have done differently? 6. NFPA-70E Defines Qualified One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received the safety training to recognize and avoid the hazards involved? 7. Being Qualified Means: Reading and understanding arc flash labels. Using tables in NFPA-70E when arc flash labels are not posted on equipment.Knowing how to use and inspect electrical test equipment and electrical PPETraining on electrical equipment hazards (ex.-circuit breakers, variable speed drives, ground fault protective devices)Understanding the 6-step procedure for establishing an electrically safe work condition and the associated hazards 8. What is Arc Flash and Arc Blast? A phase to phase or phase to ground electrical fault Copper vaporizes expanding 67,000 timesTemperatures can reach as high as 36,000 degrees, thats 4 X hotter than the sun A flash burns eyes like a welding arcA blast can breaks bones, rupture ear drumsA flash and blast can start fires, cause explosions, and cause injuries or fatalities 9. Arc Flash What is a Calorie? A calorie is the amount of heat needed to raise thetemperature of one gram of water by 1C. Thermal energy is measured in calories/cm.1.2 calories/cm = Holding your finger in the bluepart of the flame for one second. 10. Reading An ARC Flash Label 33 Arc Flash Boundary when inside this boundary you must have arc flash clothing rated for a category 1 plus cotton under garments. Protect non-qualified personnel, barricade work area. 11. Reading An ARC Flash LabelNFPA-70E 130 D (2) 42 Limited Approach Boundary is shock hazard boundary. Un-qualified person are NOT allowed beyond this point unless escorted by a qualified person. 12. Reading An ARC Flash Label 12 Restricted Approach : must have arc flash PPE, electrically rated PPE, and insulated tools. Electrical hazard of 480 volts use 00-gloves rated for 500 volts.Shock hazard is from arc flash. 13. Reading An ARC Flash Label 1Prohibited Approach: must have arc flash PPE, electrically rated PPE, and insulated tools. Same as touching.Shock hazard is from energized exposed live part. 14. No Arc Flash Label What Do You Do? Use the tables in NFPA-70E to get information on what type of PPE is required to perform specific tasks on specific types of electrical equipment. An arc flash survey of your site may reveal instances where PPE hazard levels are lower than those in the NFPA-70E tables. 15. Arc Flash and Shock - PPE Electrical PPE (shock) is required even when using insulated tools and test equipment. Always inspect PPE before using it, your life is on the line! PPE is required until the power is verified OFF. 16. Arc Flash and Shock - PPE Air test rubber gloves by inflating them to 1-1/2 times their original size each day of use. Visually inspect every time you put them on. Do not use petroleum based hand cleaners as the residue will degrade the rubber. Store apart from leathers in a cool dry place out of direct sunlight flat. 17. Electrical Safety Gloves If you were handling sulfuric acid would you wear PPE to protect yourself? So why not protect yourself from something that can kill you even quicker than acid?Whenever you enter the restricted approach boundary for voltage levels >49 volts, electrical PPE is requiredMeters and insulated tools are extensions of you, electrical gloves are required when using them (NFPA-70E) 18. WARNING GRAPHIC SLIDE NEXT 19. Electrical & Arc Flash PPE So you cant work in electrical gloves? Yes arc flash clothing is hot but. 20. Turning It OFF Is SaferAnd Cost Effective A planned outage is always less expensive than an unplanned outage. Get involved in the safety planning. 21. Qualified to LOTO?? OSHA1910.147(d)(6)Prior to starting work, the employee must verify isolation and de-energization of equipment. The disconnecting means should be tried out as well as the operating system. 22. OSHA and Test Equipment OSHA-1910.334(c)(3) Test instruments and equipment and their accessories shall be rated for the circuits and equipment to which they will be connected and shall be designed for the environment in which they will be used. 23. Selecting the Proper Meter 4- Safety Categories 24. Selecting The Proper Meter Ensure the meter has the proper voltage rating for the circuit being tested.Ensure the meter is set on the correct settings. Ensure the meter has the proper category rating for the circuit being tested. 25. Using The Proper Meter Properly Ensure meter is approved by a recognized testing lab.Change meter fuses only with exact replacements.Avoid holding the meter while testing, it could become a hand grenade!Wear proper PPE when using a meter, it is an extension of you.Discard old test leads 26. Selecting The Proper Meter Not effective if:The insulated test point touches grounded metal.The cable being tested is partially buried.The user is isolated from ground.The tester used inside a metal enclosure.Voltage range may vary exposing user to risks (90v-1000v) 27. Selecting The Proper Meter Not effective because: May not be fused to comply with CAT safety ratingsLow Voltage Threshold Wont register low voltage 70-90 voltsNeeds cool down period of 30 sec between readings or it will burn itself out 28. Electrical Equipment Hazards EXAMPLE:VFDs can still be energized even after performing LOTO Verification of 0-voltage must be checked on AC and DC meter settings PPE MUST BE WORN DURING THE VERIFICATION PROCESS 29. Electrical Equipment Hazards Many licensed electricians are not qualified to change out circuit breakers.Circuit breakers can be very different even though they may look alike. Dont make a decision based entirely on price.Some circuit breakers are manual switches, they will not turn off when there is an overloaded or a fault.In the event of a fault, some circuit breakers can explode or weld themselves closed if they dont have the proper fault current rating. 30. Electrical Equipment Hazards Know the difference between equipment protection and personal protection for GFCI breakers. The difference can kill. Locate GFCI cord sets on portable equipment to maximize protection, this may not always be convenient. (fatality) Test GFCIs per mfg. instructions to ensure they will work when you need them. (monthly) 31. NFPA-70E6-Steps for Electrical LOTOTO NOTE: Establishing an electrically safe work condition in itself is a hazardous process.Review electrical drawingsOpen disconnecting deviceVerify disconnecting device is OPENApply lock and tag to disconnecting deviceVerify 0-energy present (live-dead-live)Apply safety grounds if necessary (possibility of induced voltages or stored energy exists) 32. NFPA-70E Purchase a copy of NFPA-70EDo your homework.Take advantage of FREE trainingManage your contractorsGet involved with your plannerGet involved with your electricians and techniciansIf you fail to plan, you plan to fail 33. LOTO Presentation Information Obtained From The Following: www.DOL.govwww.OSHA.govwww.cdc.gov/niosh/face/www.osha.gov/SLTC/electrical/indexwww.osha.gov/dts/shib/indexwww.osha.gov/dts/osta/oshasoft/index 2009 34. Questions / CommentsJoe.MorrellJr@Pfizer.com ,the free encyclopedia that anyone can edit.117,937 active editors 7,001,591 articles in EnglishThe English-language Wikipedia thanks its contributors for creating more than seven million articles! Learn how you can take part in the encyclopedia's continued improvement.Members of the victorious Blondie crewThe Boat Race 2018 took place on 24March. Held annually, The Boat Race is a side-by-side rowing race between crews from the universities of Oxford and Cambridge along a 4.2-mile (6.8km) tidal stretch of the River Thames in south-west London, England. For the third time in the history of the event, the men's, the women's and both reserves' races were all held on the Tideway on the same day. The women's race saw Cambridge lead from the start, eventually winning by a considerable margin to take the overall record to 4330 in their favour. In the women's reserve race, Cambridge's Blondie (crew pictured) defeated Oxford's Osiris by nine lengths. The men's reserve race was won by Cambridge's Goldie, who defeated Oxford's Isis by a margin of four lengths. The men's race was the final event of the day and completed a whitewash as Cambridge won, taking the overall record to 8380 in their favour. The races were watched by around 250,000 spectators live, and broadcast around the world. (Fullarticle...)Recently featured: Radar, Gun Laying, Mk.I and Mk.IIAndrea NavageroNosy KombaArchiveBy emailMore featured articlesAboutKitty Marion... that Kitty Marion (pictured) was force-fed over 200 times during a hunger strike?... that the North Korean destroyer Choe Hyon is the largest ship constructed for the Korean People's Navy?... that after the release of High and Low, director Akira Kurosawa received telephone calls imitating his film that threatened to kidnap his daughter?... that May Bradford Shockley is why Silicon Valley is where it is?... that the conservation of a goat might endanger the survival of Aquilegia paui?... that Joy Laking predicted in a school writing assignment that within ten years she would be making a living as an artist?... that the Taiwanese restaurant chain Formosa Chang drew inspiration from McDonald's for its non-greasy atmosphere and corporate practices?... that Haridas Mitra had his death sentence commuted after the intervention of Mahatma Gandhi?... that "Steve's Lava Chicken" recently became the shortest song to enter the UK Top 40?ArchiveStart a new articleNominate an articleNgg wa Thiong'oKenyan writer and activist Ngg wa Thiong'o (pictured) dies at the age of 87.In sumo, nosato Daiki is promoted to yokozuna.In association football, Liverpool win the Premier League title.In motor racing, lex Palou wins the Indianapolis 500.In basketball, the EuroLeague concludes with Fenerbahe winning the Final Four Playoff.Ongoing: Gaza warM23 campaignRussian invasion of UkrainetimelineSudanese civil wartimelineRecent deaths: Harrison Ruffin TylerPhil RobertsonMary K. GaillardPeter DavidAlan YentobGerry ConnollyNominate an articleMay 31: Dragon Boat Festival in China and Taiwan (2025); World No Tobacco DayBessarion455 Petronius Maximus, the ruler of the Western Roman Empire, was stoned to death by a mob as he fled Rome ahead of the arrival of a Vandal force that sacked the city.1223 Mongol invasion of Kievan Rus': Mongol forces defeated a Kievan Rus' army at the Battle of the Kalka River in present-day Ukraine.1468 Cardinal Bessarion (pictured) announced his donation of 746 Greek and Latin codices to the Republic of Venice, forming the Biblioteca Marciana.1935 A magnitude-7.7 earthquake struck Balochistan in British India, now part of Pakistan, killing between 30,000 and 60,000 people.2013 A tornado struck Central Oklahoma, killing eight people and injuring more than 150 others.Albertino Mussato (d.1329)Joseph Grimaldi (d.1837)Dina Boluarte (b.1962)Mbaye Diagne (d.1994)More anniversaries: May 30May 31June 1ArchiveBy emailList of days of the yearAboutCucumis metuliferus, the African horned cucumber, is an annual vine in the cucumber and melon family, Cucurbitaceae. Its fruit has horn-like spines, hence the name "horned melon". The ripe fruit has orange skin and lime-green, jelly-like flesh. It is native to Southern Africa, where it is a traditional food. Along with the gemsbok cucumber and the citron melon, it is one of the few sources of water during the dry season in the Kalahari Desert. This photograph, which was focus-stacked from 25 separate images, shows two C.metuliferus fruits, one whole and the other in cross-section.Photograph credit: Ivar LeidusRecently featured: Ignace TonenAustralian white ibisHell Gate BridgeArchiveMore featured picturesCommunity portal The central hub for editors, with resources, links, tasks, and announcements.Village pump Forum for discussions about Wikipedia itself, including policies and technical issues.Site news Sources of news about Wikipedia and the broader Wikimedia movement.Teahouse Ask basic questions about using or editing Wikipedia.Help desk Ask questions about using or editing Wikipedia.Reference desk Ask research questions about encyclopedic topics.Content portals A unique way to navigate the encyclopedia.Wikipedia is written by volunteer editors and hosted by the Wikimedia Foundation, a non-profit organization that also hosts a range of other volunteer projects: CommonsFree media repository MediaWikiWiki software development Meta-WikiWikimedia project coordination WikibooksFree textbooks and manuals WikidataFree knowledge base WikinewsFree-content news WikiquoteCollection of quotations WikisourceFree-content library WikispeciesDirectory of species WikiversityFree learning tools WikivoyageFree travel guide WiktionaryDictionary and thesaurusThis Wikipedia is written in English. Many other Wikipedias are available; some of the largest are listed below. 1,000,000+ articles DeutschEspaolFranaisItalianoNederlandsPolskiPortugusSvenskaTing Vit 250,000+ articles Bahasa IndonesiaBahasa MelayuBn-lm-gCataletinaDanskEestiEsperantoEuskaraMagyarNorsk bokmlRomnSimple EnglishSloveninaSrpskiSrpskohrvatskiSuomiTrkeOzbekcha 50,000+ articles AsturianuAzrbaycancaBosanskiFryskGaeilgeGalegoHrvatskiKurdLatvieuLietuviNorsk nynorskShqipSlovenina Retrieved from " 2This article is about the year 455. For other uses, see 455 (disambiguation).This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources:"455"news newspapers books scholar JSTOR (April 2019) (Learn how and when to remove this message)Calendar yearYearsMillennium1stmillenniumCenturies4thcentury5thcentury 6thcenturyDecades430s440s450s 460s470sYears452453454455 456457458vte455 by topicLeadersPolitical entitiesState leadersReligious leadersCategoriesBirthsDeathsDisestablishmentsvte455 in various calendarsGregorian calendar455CDLVAb urbe condita1208Assyrian calendar5205Balinese saka calendar376377Bengali calendar139 138Berber calendar1405Buddhist calendar999Burmese calendar183Byzantine calendar59635964Chinese calendar (WoodHorse)3152 or 2945to (WoodGoat)3153 or 2946Coptic calendar171172Discordian calendar1621Ethiopian calendar447448Hebrew calendar42154216Hindu calendars- Vikram Samvat511512- Shaka Samvat376377- Kali Yuga35553556Holocene calendar10455Iranian calendar167 BP 166 BPIslamic calendar172 BH 171 BHJavanese calendar340341Julian calendar455CDLVKorean calendar2788Minguo calendar1457 before ROC1457Nanakshahi calendar1013Seleucid era766/767 AGThai solar calendar997998Tibetan calendar(male Wood-Horse)581 or 200 or 572to(female Wood-Goat)582 or 201 or 571King Genseric sacks Rome (455)Year 455 (CDLV) was a common year starting on Saturday of the Julian calendar. At the time, it was known as the Year of the Consulship of Valentinianus and Anthemius (or, less frequently, year 1208 Ab urbe condita). The denomination 455 for this year has been used since the early medieval period, when the Anno Domini calendar era became the prevalent method in Europe for naming years.March 16 Emperor Valentinian III, age 35, is assassinated by two Hunnic retainers of the late Flavius Aetius, while training with the bow on the Campus Martius (Rome), ending the Theodosian dynasty. His primicerius sacri cubiculi, Heraclius, is also murdered.March 17 Petronius Maximus, former domesticus ("elite bodyguard") of Aetius, becomes (with support of the Roman Senate) emperor of the Western Roman Empire. He secures the throne by bribing officials of the imperial palace. Maximus consolidates his power by a forced marriage with Licinia Eudoxia, widow of Valentinian III.Maximus appoints Avitus, most trusted general, to the rank of magister militum and sends him on an embassy to Toulouse, to gain the support of the Visigoths. He elevates his son Palladius to Caesar and has him marry Eudocia, eldest daughter of Valentinian III.May 31 Maximus is stoned to death by an angry mob while fleeing Rome. A widespread panic occurs when many citizens hear the news that the Vandals are plundering the Italian mainland.June 2 Sack of Rome: King Genseric leads the Vandals into Rome, after he has promised Pope Leo I not to burn and plunder the city. Genseric sacks the city for a period of two weeks. Eudoxia and her daughters, Eudocia and Placidia, are taken hostage. The loot is sent to the harbour of Ostia and loaded into ships, from whence the Vandals depart and return to Carthage.July 9 Avitus is proclaimed Roman emperor at Toulouse, and later recognised by the Gallic chiefs in Viernum (near Arles).September 21 Avitus enters Rome with a Gallic army. He restores the imperial authority in Noricum (modern Austria) and leaves a Gothic force under Remistus, Visigoth general (magister militum), at Ravenna.The Ostrogoths conquer Pannonia and Dalmatia.Battle of Aylesford: Prince Vortimer rebels against the pro-Anglo-Saxon policies of his father, Vortigern. He is defeated in the battle at Aylesford (Kent). Hengist and his son Oisc become king of Kent. Horsa and Catigern, brother of Vortimer, are killed. The Britons withdraw to London (according to the Anglo-Saxon Chronicle).Skandagupta succeeds Kumaragupta I as ruler of the Gupta Empire (India). During his reign he crushes the Hun invasion; however, the expense of the wars drains the empire's resources and contributes to its decline.Gaero becomes king of the Korean kingdom of Baekje.[1]Earliest recorded date at Chichen Itza on the Yucatn Peninsula (Mexico) (approximate date).Barter economy replaces organized trade as Romans and other citizens desert their towns for the countryside, where they will be less vulnerable to barbarian raids (approximate date).The city of Vindobona (Vienna) is struck by an epidemic that spreads through the Roman provinces. The disease is probably streptococcus or a form of scarlet fever with streptococcus pneumoniae (approximate date).Rusticus, archbishop of Lyon (approximate date)Wang Baoming, empress of the Southern Qi (d. 512)March 16Valentinian III, emperor of the Western Roman Empire (b. 419)Heraclius, Roman courtier (primicerius sacri cubiculi)May 31 Petronius Maximus, emperor of the Western Roman EmpireBiyu of Baekje, king of Baekje[1]Catigern, prince and son of Vortigern (approximate date)Horsa, leader of the Anglo-Saxons (approximate date)Kumaragupta I, ruler of the Gupta Empire (India)Niall Noigiallach, High King of Ireland (approximate date)Palladius, son of Petronius Maximus (approximate date)Prosper of Aquitaine, disciple and Christian writer (approximate date)^ a b "List of Rulers of Korea". www.metmuseum.org. Retrieved April 20, 2019.Retrieved from " 3One hundred years, from 301 to 400Millennia1stmillenniumCenturies3rdcentury4thcentury5thcenturyTimelines3rdcentury4thcentury5thcenturyState leaders3rdcentury4thcentury5thcenturyDecades300s310s320s330s340s350s360s370s380s390sCategories:Births Deaths Establishments DisestablishmentsvteEastern Hemisphere at the beginning of the 4th century CE.Eastern Hemisphere at the end of the 4th century CE.The 4th century was the time period from 301 CE (represented by the Roman numerals CCCI) to 400 CE (CD) in accordance with the Julian calendar. In the West, the early part of the century was shaped by Constantine the Great, who became the first Roman emperor to adopt Christianity. Gaining sole reign of the empire, he is also noted for re-establishing a single imperial capital, choosing the site of ancient Byzantium in 330 (over the current capitals, which had effectively been changed by Diocletian's reforms to Milan in the West, and Nicomedeia in the East) to build the city soon called Nova Roma (New Rome); it was later renamed Constantinople in his honor.The last emperor to control both the eastern and western halves of the empire was Theodosius I. As the century progressed after his death, it became increasingly apparent that the empire had changed in many ways since the time of Augustus. The two-emperor system originally established by Diocletian in the previous century fell into regular practice, and the east continued to grow in importance as a centre of trade and imperial power, while Rome itself diminished greatly in importance due to its location far from potential trouble spots, like Central Europe and the East. Late in the century Christianity became the official state religion, and the empire's old pagan culture began to disappear.[citation needed] General prosperity was felt throughout this period, but recurring invasions by Germanic tribes plagued the empire from 376[1][2] CE onward. These early invasions marked the beginning of the end for the Western Roman Empire.In China, the Jin dynasty, which had united the nation prior in 280, began rapidly facing trouble by the start of the century due to political infighting, which led to the insurrections of the northern barbarian tribes (starting the Sixteen Kingdoms period), which quickly overwhelmed the empire, forcing the Jin court to retreat and entrench itself in the south past the Yangtze river, starting what is known as the Eastern Jin dynasty around 317. Towards the end of the century, Emperor of the Former Qin, Fu Jin, united the north under his banner, and planned to conquer the Jin dynasty in the south, so as to finally reunite the land, but was decisively defeated at the Battle of Fei River in 383, causing massive unrest and civil war in his empire, thereby leading to the fall of the Former Qin, and the continued existence of the Eastern Jin dynasty.According to archaeologists, sufficient archaeological evidence correlates of state-level societies coalesced in the 4th century to show the existence in Korea of the Three Kingdoms (300/400668 CE) of Baekje, Goguryeo, and Silla.Historians of the Roman Empire refer to the "Long Fourth Century" to the period spanning the fourth century proper but starting earlier with the accession of the Emperor Diocletian in 284 and ending later with the death of Honorius in 423 or of Theodosius II in 450.[3]See also: Christianity in the 4th centuryGregory the Illuminator mosaic, converted Armenia from Zoroastrianism to ChristianityContemporary bronze head of Constantine I (r. 306337 AD)Early 4th century Former audience hall now known as the Basilica, Trier, Germany, is built.Early 4th century The Gupta Empire is established.301: Armenia first to adopt Christianity as state religion.304439: The Sixteen Kingdoms in China begins.306337: Constantine the Great, ends persecution of Christians in the Roman Empire (see also Constantinian shift) and Constantinople becomes new seat of government (New Rome).Tikal had a population of about 100,000 when it was conquered by Teotihuacan, less than a fourth of its peak population[4]320: Butuan Boat One, the oldest known Balangay, a multi-purpose ship native to the Philippines is built.325328: The Kingdom of Aksum adopts Christianity.325: Constantine the Great calls the First Council of Nicaea to pacify Christianity in the grip of the Arian controversy.335380: Samudragupta expands the Gupta Empire.337: Constantine the Great is baptized a Christian on his death bed.350: About this time the Kingdom of Aksum conquers the Kingdom of Kush.350400: At some time during this period, the Huns began to attack the Sassanid Empire.[2]350: The Kutai Martadipura kingdom in eastern Borneo produced the earliest known stone inscriptions in Indonesia known as the Mulavarman inscription written in the Sanskrit language using Pallava scripture.[5]Mid-4th century Dish, from Mildenhall, England, is made. It is now kept at the British Museum, London.Mid-4th century Wang Xizhi makes a portion of a letter from the Feng Ju album. Six Dynasties period. It is now kept at National Palace Museum, Taipei, Taiwan, Republic of China.365: An earthquake with a magnitude of at least eight strikes the Eastern Mediterranean. The following tsunami causes widespread destruction in Crete, Greece, Libya, Egypt, Cyprus, and Sicily.376: Visigoths appear on the Danube and are allowed entry into the Roman Empire in their flight from the Huns.378: Battle of Adrianople: Roman army is defeated by the Visigoth cavalry. Emperor Valens is killed.378395: Theodosius I, Roman emperor, bans pagan worship, Christianity is made the official religion of the Empire.378: Siyaj K'ak' conquers Waka on (January 8), Tikal (January 16) and Uaxactun.Wall painting of the Council of Constantinople (381) in the Stavropoleos monastery, Romania381: First Council of Constantinople reaffirms the Christian doctrine of the Trinity by adding to the creed of Nicaea.383: Battle of Fei River in China.395: The Battle of Canhe Slope occurs.395: Roman emperor Theodosius I dies, causing the Roman Empire to split permanently.Late 4th century: Cubiculum of Leonis, Catacomb of Commodilla, near Rome, is made.Late 4th century: Atrium added in the Old St. Peter's Basilica, Rome.For a more comprehensive list, see Timeline of historic inventions 4th century.The Stirrup was invented in China, no later than 322.[6][1]Kama Sutra, dated between c.400 BC to c. 300 AD.[7][8]Iron pillar of Delhi, India is the world's first Iron Pillar.[citation needed]Trigonometric functions: The trigonometric functions sine and versine originated in Indian astronomy.[9]Codex Sinaiticus and the Codex Vaticanus Graecus 1209, are the earliest Christian bibles.[10][11]Book of Steps, Syriac religious discourses.[citation needed]^ a b "The invention and influences of stirrup". 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Retrieved 16 March 2013.Retrieved from " 4The following pages link to 4th century External tools(link counttransclusion countsorted list) See help page for transcluding these entriesShowing 50 items.View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)List of decades, centuries, and millennia (links | edit)Religion in pre-Islamic Arabia (links | edit)Rosetta Stone (links | edit)20th century (links | edit)15th century (links | edit)16th century (links | edit)17th century (links | edit)18th century (links | edit)14th century (links | edit)1st century (links | edit)13th century (links | edit)397 (links | edit)12th century (links | edit)11th century (links | edit)7th century (links | edit)10th century (links | edit)9th century (links | edit)8th century (links | edit)6th century (links | edit)5th century (links | edit)3rd century (links | edit)2nd century (links | edit)405 (links | edit)4th century BC (links | edit)432 (links | edit)200s (decade) (links | edit)300s (decade) (links | edit)1st century BC (links | edit)2nd century BC (links | edit)3rd century BC (links | edit)5th century BC (links | edit)6th century BC (links | edit)400s (decade) (links | edit)310s (links | edit)320s (links | edit)321 (links | edit)21st century BC (links | edit)11th century BC (links | edit)286 (links | edit)476 (links | edit)385 (links | edit)7th century BC (links | edit)410 (links | edit)325 (links | edit)380s (links | edit)381 (links | edit)470s (links | edit)430s (links | edit)430 (links | edit)510s (links | edit)View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Retrieved from " WhatLinksHere/4th_century" This website uses cookies to improve your experience while you navigate through the website. Out of these, the cookies that are categorized as necessary are stored on your browser as they are essential for the working of basic functionalities of the website. We also use third-party cookies that help us analyze and understand how you use this website. These cookies will be stored in your browser only with your consent. You also have the option to opt-out of these cookies. But opting out of some of these cookies may affect your browsing experience. 1. NFPA 70B & 70EChanges andAdditions 2024+Curt GeetingSales Applications Manager Northeast U.S. 2. AgendaIntroduction What is NFPA 70B & 70E70E Changes and Additions70B Changes and AdditionsArc Flash, Electrical Fires & Safety, oh my! 3. What is NFPA 70B & 70E The NFPA, or National Fire Protection Association, is a nonprofit organizationdedicated to promoting fire prevention and safety. It develops and publishescodes and standards related to fire protection and electrical safety. Codes and regulations enforced by Fire Departments, State Fire Marshals,Building Departments, Electrical Inspectors, OSHA and the EPANFPA 70B is the Standard forElectrical EquipmentMaintenance (Updated for2023)NFPA 70E is the Standard forElectrical Safety in theWorkplace (Updated for 2024) 4. Whats New for 70E and 70BNFPA 70E Article 100 Definitionadditions General Safety, Batteries andBattery Systems, andCapacitance New Reference Annex S Safety/MaintenanceRelationship Clarification to ElectricShock Boundaries andThermography StandardsNFPA 70B Recommended vsStandard Electrical Equipment to beInspected and Maintained Maintenance Intervals Environmental Conditions Condition of Maintenance 5. New Definitions - General Safety HearingProtectionWorker distance at which a 1 percent probability of eardamage exists from a 20 kPa (3.0 psi) shock wave.Boundary, LungProtectionWorker distance at which a 1 percent probability oflung damage exists from a 70 kPa (10 psi) shock wave.Hazard, Arc BlastA source of possible injury or damage to health fromthe energy deposited into acoustical shock wave andhigh-velocity shrapnel.CompetentPersonOne who has received safety training and hasdemonstrated skills to identify and avoid the hazardsinvolvedProtector A glove or mitten designed to be worn over rubberinsulating gloves.NEW DEFINITIONS- Highlighting thePressure Wave ofan Arc BlastIncident.No longer justElectric Shock andArc Flash Hazards. 6. New Definitions Battery, Battery Systems, andCapacitanceWhy Should We Care?NFPA sees the growing use of Batteries and Battery Systems: Proliferating throughout industrial applications Especially important for renewable energy applications (Solar, Wind) Defining terms around the safe handling of de-energized energy storagesystemsBattery Effect:When conductive materialsbecome electrically charged,potentially causing electricalshock or fireRegulated Cell:A battery cell that is subject toregulations regarding its use,handling, and disposalDielectric Absorption:The property of certain capacitorsto recharge after beingdischargedDischarge Time:The time required to discharge acapacitor to below electricalhazard thresholdsCharge Transfer:Improper discharging of capacitornetworks that results intransferring charge from onecapacitor to another capacitorinstead of fully discharging thestored energy Cell:A test cell that is used to measurethe electrolyte's performancecharacteristics in a battery 7. Discusses the term Condition of Maintenance Is electrical equipment well maintained or poorly maintained? In short Effective Maintenance of Electrical Equipment Improves Safety.NFPA 70E Annex S New for 2024Electrical safety programs contain requirementsto consider the condition of maintenance ofelectrical equipment and systems. Theobjective of these requirements is toemphasize the inherent risk to workersassociated with performing tasks on electricalequipment that is not properly rated, not properlyinstalled, has not been properly maintained, orotherwise exhibits evidence of an increased risklevel for electrical workers or operators. NFPA 70E Annex S IntroductionInformative Annex S provides guidanceto assist qualified workers to identifysources of information that are usefulwhen assessing the condition ofmaintenance of electrical equipment.See NFPA 70B, Standard for ElectricalEquipment Maintenance, foradditional information. 8. Discusses methods for determining condition of maintenance:NFPA 70E Annex S New for 2024, Continued InspectionMaintenance History of Electrical Equipment: Should be kept and readily accessible. Labels Digital & Electronic Methods (CMMS Software)Infrared ThermographyElectrical Measurements: Voltage & Current Insulation ResistanceTests Battery ImpedanceTestingCondition MonitoringOther Possible Methods:Ultrasound for PartialDischarge and Corona 9. Changes to Electric Shock Boundary and Thermography70E 2024 clarifies standard for the ElectricShock Boundary when performingThermographic inspections.Only Qualified Thermographers canperform inspection within Arc Flash andLimited Approach Boundaries as long as They are wearing proper PPE Cover is removed and replaced by aQualified Electrician NOT penetrate RestrictiveApproach Electric Shock Boundarywhile performing Thermography. 10. Starting in 2023NFPA 70B Standard for Electrical EquipmentMaintenancePrevious YearsElectricalMaintenancePrograms (EMP)are arecommendedpractice.ElectricalMaintenancePrograms (EMP)are a standardpractice. 11. NFPA 70B Standards for Electrical EquipmentMaintenance7.4 Infrared Thermography 7.4.1Infrared thermography shall be used when required toverify temperature differences (T) of the following: (1) Similar electrical components under similar loading (2) Comparison between electrical components andambient air temperatures 7.4.2All accessible and necessary covers shall be removed prior toinfrared thermography inspection to provide a clear line ofsight to the equipment being scanned. 7.4.3Temperature differences between the area of concern andthe reference area shall be documented. 7.4.4Infrared thermography inspections shall be performed atnormal circuit loading. 7.4.5Where normal circuit loading is not feasible, circuit loadingof not less than 40 percent of nominal circuit loading shallbe permitted. 7.4.6Circuit loading characteristics shall be documented andretained for future reference.Standards are no longer a suggestion.NFPA 70B 3.2.5: Shall. - Indicates amandatory requirement.70B defines fundamental testing methodsand all the equipment that shall be testedand at what intervals, depending oncapacity, environment and condition.The very first Fundamental TestingMethod (NFPA 70B 7.2.1.1) is InfraredThermographic Inspection of ElectricalConnections.Infrared thermographic inspection ofelectrical connections andterminations shall be performed inaccordance with Section 7.4. 12. NFPA 70B Scope of WorkPrescribed scope of work maintenanceintervals vary depending on the followingfactors:Electrical EquipmentScope of MaintenanceCondition of Maintenance on EquipmentEnvironmental FactorsUse of Equipment outside of DesignedRatingLevel of Danger with Equipment FailurePrescribed areas for inspection and maintenanceLubrication Maintenance and TesVisual Inspection Electrical TestingCleaning Corona DetectionMechanical Inspection ServicingMechanical Servicing Special ProceduresMechanical Checks 13. NFPA 70B Maintenance IntervalsEquipment conditionassessment (ECA) depends onthe following conditions:1. Equipment physical condition2. Criticality3. Operating environmentEquipment Condition AssessmentProduct Scope of Work Condition 1 Condition 2 Condition 3All Equipment Infraredthermography12 months 12 months 6 monthsScope of Work ExampleThermal DetectionEquipment Condition AssessmentProduct Scope of Work Condition 1 Condition 2 Condition 3Substations CoronaDetection12 months 12 months 6 monthsHigh-VoltageSubstationsCoronaDetection12 months 6 months 4 monthsSubstation Scope of Work ExampleCorona DetectionNFPA 70B now providesmandatory scopes of work andmaintenance intervals brokenout by product type and basedon an equipment conditionassessment. 14. Battery ESSs Busways Cable Trays EV Charging Stations Electronic Equipment Fuses GFCIs Grounding and Bonding High-Voltage Substation Insulators Lighting Lighting Control Systems Low-Voltage ground-fault protection systems Medium-Voltage Medium-Voltage Power Circuit Breakers Molded-case/insulated-case/low-voltage power circuitbreakers Motor control equipment Panelboards and switchboards Photovoltaic systems Portable electrical tools and equipment Power and distribution transformers Power cables Power-factor correction capacitors Protective relays, electromechanical Protective relays, solid state and microprocessor Public pools, fountains and similar installations Rotating equipment Stationary standby batteries Substations Switches Switchgear Uninterruptible power supplies Wind power electric systems Wiring devicesNFPA 70B Asset Types for Required Inspections 17. What are youtrying to do?Conduct Electrical ThermographyInspections on all Electrical EquipmentSafely and efficiently conduct frequent,required inspections and maintenanceon all Electrical Equipment.Maintain or Improve Condition ofMaintenance on Electrical Equipment 18. Where Fluke Can Help NFPA 70E Safety & 70BMaintenanceStandards - Tools Fluke CV400 Infrared InspectionWindow Fluke 1670 Series Installation Meters Fluke ii915 Ultrasonic Leak Detectorwith Partial Discharge & MECQ Vibrationmeasurement Fluke 1587 FC Insulation Multimeter Fluke TiS75+ Thermal Camera Fluke 378 FC AC/DC 1000A Clampmeter with iFlex clamp and Field Sense 19. Where FlukeCan Help NFPA 70ESafety & 70BMaintenanceStandards -TrainingElectrical Safety TrainingASNT Level I, II and IIIThermography TrainingMotors and Drives TrainingMore 20. Questions?Pleasesendanyquestionsyouhaverightnowusingthequestionboxinyourwebinarcontrols.Afterthewebinar,ifyouthinkofanymorequestions,pleasefeelfreetocontactmeviaemailKatarinaOst:katarina.ost@transcat.comForrelatedproductinformation,goto:www.transcat.com/brand/fluke-store

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