

# Elektra

2023 ഡിസംബർ 08, 09 തീയതികളിൽ

വകനാട്ടിക്ക് ലൈച്ചറ്റ് നടക്കുന്ന

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**സാങ്കേതിക കൈവുസ്തകം**

# Elektra

*(A Technical Hand Book from Speed Team)*

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Published by

Speed Celebration Team, Wayanad

Layout & Printing

Jaya Printers  
Meppadi, Wayanad

Edition - December 2023

## ആശംസ

ഇന്ത്യൻവിലെ വൈദ്യുതി ഉൽപ്പാദന, (പ്രസരണ, വിതരണ രംഗത്ത് എന്നവഴം നല്ല നീതിക്രിയ സഹകാർ ചേവലക്രിയ (പ്രവർത്തനക്രമാന്വयന) (പ്രസ്ഥാനചാരണ) കേരള സംസ്ഥാന വൈദ്യുതി ബോർഡി ലിഖിറ്റഡ്. എന്നാൽ ഉപഭോക്തവു സേവന രംഗത്തും നേട്ടങ്ങൾ നിലനിർത്തിക്കൊണ്ട് പ്രോക്രിയ നാം നിരവധി വൈദ്യുതിക്രിയ നേരിട്ടുന്നുണ്ട്.

വൈദ്യുതി ബോർഡിയിലെ ജീവനക്കാരുടെ സ്വീകാർ ക്രമാവലീകരണ 10-10 വാർഷികത്വത്വാനുഭവിച്ചു സ്വീകാർ സെലിഞ്ചേരുപ്പിന്തെ പങ്കടക്കുന്നവർക്ക് സാങ്കേതിക കാര്യങ്ങൾ ഉൾപ്പെടെ തുണ്ടാക്കിയ ഇം കൈപ്പുണ്ടുകം ഒരു ക്രമത്തിൽ ക്രമാക്കട്ട എന്ന് ആശംസിക്കുന്നു.

സുരേന്ദ്ര .പി

ധയറക്ടർ, ഡിസ്ട്രിബ്യൂഷൻ

സജീ പാലോസ്

ധയറക്ടർ, ട്രാൻസ്മിഷൻ

## മുഖ്യാത്മക

1957 ത്ത് 85.5 മെഗാ വാട്ട് സ്ഥാപിത ശേഷിയും 1.06 ലക്ഷം വൈദ്യുതി ഉപഭോക്താക്കളുമായി രൂപീകൃതമായ കേരള സംസ്ഥാന ഇലക്ട്രിസിറ്റി ബോർഡ് നീണ്ട 66 വർഷങ്ങൾ പിനിക്ക് ഇപ്പോൾ 5000 മെഗാവാട്ട് സ്ഥാപിത ശേഷിയും 138 ലക്ഷത്തോളം ഉപഭോക്താക്കളുമുള്ള ഒരു മഹത്തായ ജനസേവന സ്ഥാപനമായി മാറിയത് നമ്മുടെ ജീവനക്കാരുടെ അർപ്പണ മനോഭാവ തോടെയുള്ള പ്രവർത്തന ഫലമായാണ്.

വ്യവസായങ്ങളുടെ വ്യവസായമാണ് വൈദ്യുതി. വൈദ്യുതി വ്യവസായം മാറ്റങ്ങൾക്ക് വിധേയമായി കൊണ്ടിരിക്കുകയാണ്. ജലവൈദ്യുത പദ്ധതികൾ, സൗര പാനൽ പദ്ധതികൾ, കാറ്റിൽ നിന്നും, തിരമാലകളിൽ നിന്നും, വേദ്ധിൽ നിന്ന് പോലും ഇന്ന് വൈദ്യുതി ഉൽപാദിപ്പിക്കുന്നതിനുള്ള നടപടികൾ ആരംഭിച്ചുകഴിത്തു. മാറ്റങ്ങൾ എപ്പോഴും ജനോപകാര പ്രദമാക്കുവാൻ ശ്രദ്ധിക്കേണ്ടതാണ്. ഗുണനിലവാരമുള്ള വൈദ്യുതി താങ്ങാവുന്ന വിലയിൽ എല്ലാവർക്കും ലഭ്യമാക്കുക അതാണ് വൈദ്യുത ബോർഡിന്റെ പ്രഖ്യാപിത ലക്ഷ്യം. അതിനായി പുതിയ ഉൽപ്പാദന പദ്ധതികളും പ്രസരണ വിതരണ ശ്രൂവലകളും ദ്രുതഗതിയിൽ വികസിപ്പിക്കേണ്ടതായുണ്ട്. അതിനായുള്ള പ്രവർത്തന കാഴ്ചപ്പാടുകൾ ജീവനക്കാരിൽ ഉണ്ടാക്കിയെടുക്കുന്നതിനുള്ള ചിന്തകൾ ഉയർന്ന് വരേണ്ടതായുണ്ട്. നമ്മുടെ വ്യവസായത്തിന്റെ അടിസ്ഥാന ഘടകവും പ്രധാന സേവന കേന്ദ്രവുമായ സൗക്ഷ്യൾ ഓഫീസുകളാണ് ജനങ്ങളെ വൈദ്യുത ബോർഡിയുമായി ബന്ധിപ്പിക്കുന്നത്. ഈ മേഖലയിലും മറ്റിരെ മേഖലകളിലും പ്രവർത്തനക്കുന്ന ജീവനക്കാർ അഭിമുഖീകരിക്കുന്ന പ്രശ്നങ്ങളെ ധ്യാനമായം നേരിട്ടുന്നതിനും, കൂട്ടായ്മയിലും മെച്ചപ്പെട്ട സേവനം കാഴ്ചവെക്കുന്നതിനും, മാനസികമായ പിരിമുറുക്കങ്ങൾ കുറയ്ക്കുന്നതിനും, പുതിയ പുതിയ അറിവുകളും കഴിവുകളും പരിപോഷിപ്പിക്കുന്നതിനും സ്വീഡ് ഗൃഹിപ്പിക്കിയാതെയുള്ള ചർച്ചകൾ സഹായകമായിട്ടുണ്ട്. തുടർന്നും സ്വീഡ് ഗൃഹിലുടെയുള്ള ചർച്ചകളും അറിവുകൾ പകുവെക്കുന്നതും നമ്മുടെ ജീവനക്കാരുടെ മുന്നോട്ടുള്ള പ്രധാനത്തിന് സഹായകരമാകും എന്ന് പ്രതീക്ഷിക്കുന്നു.

# ഉള്ളടക്കം

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# സ്പീഡ് നാർ വഴികളിലൂടെ

പ്രീയ സ്പീഡ് അംഗങ്ങളെ, സുഹൃത്തുക്കളെ

ഈ നമ്മുടെ സംബന്ധിച്ചിടത്തോളം വളരെ പ്രധാനപ്പെട്ട ഒരു ഭിവസമാണ്. KSEB ജീവന കാരായ നമുക്ക് എല്ലാവർക്കും ഒത്തുകൂടാൻ പറ്റുന്ന ഇങ്ങനെ ഒരു Plat form ഒരുക്കാൻ കഴി തെരിൽ എനിക്ക് അതിയായ സന്തോഷമുണ്ട്. തികച്ചും യാന്ത്രികവും, തിരക്കുപിടിച്ചും, സമയക്കുറവും ഉള്ള ഈ നൂതന ജീവിത സാഹചര്യത്തിൽ സ്പീഡ് എന്ന സോഫ്റ്റ് വെയർ റിലേഷ്ന് എത്തി ചേരാൻ ഉണ്ടായ കാരണങ്ങളും, സാഹചര്യങ്ങളുമാണ് ചുരുങ്ഗിയ വാക്കുകളിൽ ഞാനിവിട വിശകലനം ചെയ്യാൻ ശ്രമിക്കുന്നത്. കേരള സംസ്ഥാന ഇലക്ട്രിസിറ്റി ബോർഡിൽ 2005 തോണിൽ മീറ്റർ റീഡർ ആയി സർവ്വീസിൽ കയറിയ ഞാൻ 2011 തോണിൽ സബ് എഞ്ചിനീയർ റിലേയ്സ്ന് വന്നപ്പോൾ ഉണ്ടായ അവസ്ഥയിൽ നിന്നാണ് 2012ൽ സ്പീഡ് എന്ന ആശയം മനസിൽ തോന്നുന്നത്. ഒരു സബ് എഞ്ചിനീയർ എന്ന നിലയിൽ പലപ്പോഴും എസ്റ്റിമേറ്റ് നിർമ്മാണം തുടക്കക്കാരനായ എനിക്കും വലിയ ചലണിംങ്ങ് ആയിരുന്നു. മിക്കപ്പോഴും ഉണ്ടാക്കാറുള്ള എസ്റ്റിമേറ്റുകൾ പലതും അപൂർണ്ണവും പരിഹാസത്തിന് ഇടനൽക്കുന്നതുമായിരുന്നു. അന്ന് കുടുംബായിരുന്ന കോൺട്രാക്ടർ ശ്രീ. രമേഷ്, അസി. എഞ്ചിനീയർ ശ്രീ. പത്രോസ് സാർ, സബ് എഞ്ചിനീയർ ശ്രീ. രാജവൻ, വൈത്തിരി സെക്ഷണിൽ ജോലി ചെയ്തിരുന്ന കോൺട്രാക്ടർ ശ്രീ. ബാബു എന്നിവരുടെ കൈയ്യിൽ നിന്നും ഓരോ സ്ട്രക്ചർന്റിനും വേണ്ട മെറ്റീരിയലും ലേബറും കളക്കറ്റ് ചെയ്തു. പിന്നീട് ആ ധാരായിൽ നിന്നായിരുന്നു എസ്റ്റിമേറ്റ് നിർമ്മാണം അമവാ കോപ്പി പേസ്റ്റ് നടത്തിയിരുന്നത്. ഇതിന് ചിലവാകുന്ന സമയം എങ്ങനെ കുറയ്ക്കാം എന്ന ചിന്തയിൽ നിന്ന് വന്ന ഒരാഴയമായിരുന്നു പോൾ വാർമേകൾ എന്ന കൊച്ചു ആസ്റ്റിക്കേഷൻ. കമ്പ്യൂട്ടർ പരിജ്ഞാനമില്ലാത്ത എനിക്ക് ആ ആസ്റ്റിക്കേഷൻ തന്നെ വലിയ ഒരു നേടമായി തോന്തിയിരുന്നു. പിന്നീടാണ് ഒരു എസ്റ്റിമേറ്റ് പ്രിപ്പറേഷൻ എന്നത് ഒരു വർക്കിനെ സംബന്ധിച്ചിടത്തോളം ഏറ്റവും പ്രാഥമിക കാര്യമാണെന്നും, ബിൽ തയ്യാറാക്കൽ ഉൾപ്പെടെയുള്ള വളരെ സക്കിർണ്ണങ്ങളായ ധാരാളം പ്രവർത്തികളുണ്ട് എന്നും മനസിലാക്കാൻ കഴിഞ്ഞത്. അതിന്റെ വെളിച്ചത്തിൽ ലേബർ നിന്നു കൂടി പ്രാധാന്യം നൽകി കൊണ്ട് എസ്റ്റിമേറ്റ് മേകൾ എന്ന ഒരു ആസ്റ്റിക്കേഷൻ രൂപം നൽകി. ഓരോ അപ്പഡേഷൻ സമയത്തും കമ്പളക്കാട് എ ഇ ആയിരുന്ന ശ്രീ. വിപിന് സി ചാക്കോ സാറിന് ഓരോ കോപ്പികൾ അയച്ചു കൊടുത്തു കൊണ്ട് അഭിപ്രായങ്ങൾ തേടി. സ്പീഡ് ശുപ്പ് അംഗങ്ങളുടെ അഭിപ്രായങ്ങളും നിർദ്ദേശങ്ങളും സ്വീകരിച്ചുകൊണ്ട് ഒരു യുസർ എൻഡ് സോഫ്റ്റ് വെയർ ആയി മാറാൻ സ്പീഡിന് കഴിഞ്ഞു.

ഏകദേശം 2013 ആയപ്പോഴേക്കും KSEB യിലെ ജോലികളെ കുറിച്ച് കൂടുതൽ മനസിലാക്കുകയും മനസിലാക്കുന്ന ഓരോ കാര്യങ്ങളും ആപ്പിക്കേഷൻിൽ ഉൾപ്പെടുത്തുകയും ചെയ്തു. എക്കിലും എല്ലാത്തിനും വേഗം പോര എന്ന തോന്നലുണ്ടായി. തുടർന്ന് എല്ലാം വേഗത്തിൽ ചെയ്യാൻ കഴിയുന്ന നൃതനമായ ഒരു ആപ്പിക്കേഷനു വേണ്ടി ശ്രമിക്കുകയും, അങ്ങനെ പുതിയൊരു Software രൂപപ്പെടുകയും, അതിന് “Speed”എന്ന് പേര് നൽകുകയും ചെയ്തു. 2014 കാലാല്പദ്ധത്തിൽ കൽപ്പറ്റ സബ്സിവിഷൻ AEE ആയിരുന്ന ശ്രീ. ശിവദാസൻ സാർ Speed ബോർഡ് തലത്തിൽ എത്തിക്കാമെന്നും അതിനായി കോഴിക്കോട് വൈദ്യുതി ഭവനിൽ നടക്കുന്ന CE മീറ്റിങ്ങിൽ Speed പ്രസന്ന് ചെയ്യാമെന്നും ഒരു നിർദ്ദേശം മുന്നോട്ടു വച്ചു. അതിനായി ആപ്പിക്കേഷൻ രൂപവും ഭാവവും അടിമുടി മാറ്റിമറിച്ച് Speed എന്ന പേരിൽ നിന്നും Speed Work Management Tool എന്ന പേരിലേയ്ക്ക് മാറ്റം വരുത്തി. എന്നാൽ ആ ഉദ്യമം എവിടെയും എത്താതെ ബാധ്യതയിൽ തന്നെ കൊഴിഞ്ഞുപോയി. ഈ കാലാല്പദ്ധത്തിൽ കൽപ്പറ്റ ഡിവിഷൻ എക്സിക്യൂട്ടീവ് എഞ്ചിനീയർ ആയിരുന്ന ശ്രീ. പ്രസാദ് മാത്യു സാർ സ്പീഡിന്റെ വളർച്ചയിൽ പകാളിയായിരുന്നു.

ഈതെ സമാനമായ കാലാല്പദ്ധത്തിലാണ് Speed എന്ന ഒരു വാട്സാപ്പ് കൂടായ്മയ്ക്ക് 2013 ത്ത് രൂപം നൽകുന്നത്. സ്പീഡ് ഉപയോഗിക്കുന്നതിനും പുതിയ പുതിയ ആശയങ്ങൾ ഷൈറ്റ് ചെയ്യുന്നതിനും വേണ്ടിയായിരുന്നു ശുപ്പ് ആരംഭിച്ചത്. സ്പീഡ്‌മായി ബന്ധപ്പെട്ട ആവശ്യങ്ങൾക്ക് എന്നെ കോൺട്രാക്ട് ചെയ്തവരാണ് ശുപ്പ് അംഗങ്ങളായ പിനീട് മാറിയത്. ഓരോ ശുപ്പിലും ഉൾക്കൊള്ളിക്കാവുന്ന പരാമാവധി എന്നും കഴിയുമ്പോൾ പുതിയ ശുപ്പ് തുടങ്ങി കൊണ്ടിരുന്നു. അങ്ങനെ ഇന്ന് Speed എൻ്റെ എല്ലാ ശുപ്പുകളിലുമായി 1300 ഓളം KSEB ജീവനക്കാരുണ്ട്. പല വാട്സാപ്പ് ശുപ്പുകളിലും റാഷ്ട്രീയത്തിന്റെയും മതത്തിന്റെയും പേരിൽ തർക്കങ്ങൾ നടക്കാറുണ്ടും ഈ കൂടായ്മയിൽ ടെക്നീക്കൽ വിഷയങ്ങളും ബോർഡിനും മെമ്പർമാർക്കും ഗുണകരമായ കാര്യങ്ങൾക്കായാണ് സമയം ചിലവഴിക്കാറുള്ളത്.

ഈ Speed ശുപ്പ് ക്രിയാത്മകമായ പല പ്രവർത്തനങ്ങളിലും, ചാരിറ്റി പ്രവർത്തനങ്ങളിലും ശ്രദ്ധ ചെലുത്തി പോകുന്നു. വീട് നഷ്ടമായ ഒരു ശുപ്പ് മെമ്പർക്ക് വീടുവെക്കാൻ 12 ലക്ഷം ധനസഹായം നൽകാൻ കഴിഞ്ഞതും മറ്റാരു മെമ്പർക്ക് കരൾ മാറ്റി വെക്കാൻ 6 ലക്ഷം രൂപ ധനസഹായം നൽകാൻ കഴിഞ്ഞതും ശുപ്പ് മെമ്പർമാരുടെ പരസ്പര സഹകരണ മനോഭാവത്തിന്റെ ചെറിയ ഉദാഹരണം മാത്രമാണ്. കൂടാതെ നാളിതു വരെ ഈ ശുപ്പ്, ജീവനക്കാർക്കായി നടത്തിവരുന്ന പട്ട ക്ലാസ്സുകൾ എന്നും ഏറെ ശ്രദ്ധ നേടിയിട്ടുള്ളതാണ്. സമഗ്രാ സോഫ്റ്റ്‌വെയറിൽ ഉൾപ്പെടുത്താനായി 1000 തേരാളം സബ് എഞ്ചിനീയർമാരിൽ നിന്നും കളക്ട് ചെയ്ത ഫീൽഡിൽ ആവശ്യമായ ലേബൽ ഡാറ്റ, അതുപോലെ തന്നെ സെലിബ്രേഷൻ ഭാഗമായി നടത്തിയ ബോർഡിന്റെ റവന്യൂ എങ്ങനെ മെച്ചപ്പെടുത്താം എന്ന അഭിപ്രായ ശേഖരണം മുതലായവ ബോർഡിന് വേണ്ടി നടത്തിയ പ്രവർത്തനങ്ങൾക്ക് ഉദാഹരണമാണ്.

2018 ലെ കാലഘട്ടത്തിൽ Speed ആപ്പിക്കേഷൻ ആശയങ്ങൾ ഉൾപ്പെടുത്തി കൊണ്ട് ഈന് നമ്മോടൊപ്പം ഇല്ലാത്ത പ്രിയ കൃട്ടകാരൻ ശ്രീ. എൽദോ ജോസഫും, ശ്രീ. കെ.എം. എൽദോയും താനും ചേർന്ന നിർമ്മിച്ച ടീം ആപ്പിക്കേഷനും ജീവനക്കാരുടെ ജോലിഭാരം കുറയ്ക്കുന്നതിൽ വലിയ പങ്ക് വഹിച്ചിട്ടുണ്ട്. ഈന് ബോർഡിന്റെ നടപ്പായി പ്രവർത്തിക്കുന്ന സമഗ്രാദ എസ്റ്റിമേറ്റ് ഫ്രോണ്ട് എന്ന കോൺസൾട്ടിംഗ് പുർണ്ണമായും Speed ന്റെയും Team ന്റെയും ആശയം കടമെടുത്തതാണെന്നതും ഓരോ ശുപ്പം ഗങ്ങൾക്കും അഭിമാനിക്കാവുന്നതാണ്. അതു പോലെ തന്നെ കേരളത്തിന്റെ വിവിധ ഭാഗങ്ങളിൽ ചിതറി കിടക്കുന്ന KSEB ജീവനക്കാരെ ഒരു മാലയിലെ മുത്തുകൾ എന്ന പോലെ കോർത്തിനകുന്ന Speed e Directory എന്ന ശ്രദ്ധയാകർഷിച്ച മറ്റാരു നാഴികക്കല്ലാണ്. കേരളത്തിലെ ഏതു ജില്ലയിലും ആതാവശ്യത്തിനും രജിസ്റ്റർ ചെയ്ത അംഗങ്ങളെ പരസ്പരം ബന്ധപ്പാടുള്ള ഒരു പൂർണ്ണമോം എൻറ്റ് e Directory. അതിനായി എല്ലാ ജില്ലയിലും കോർഡിനേറ്റർമാർ ഏത് നിമിഷവും ആതാവശ്യത്തിനും സജ്ജരാണ് എന്നത് Directory. അതിനായി എല്ലാ ജില്ലയിലും കോർഡിനേറ്റർമാർ ഏത് നിമിഷവും ആതാവശ്യത്തിനും സജ്ജരാണ് എന്നത് Directory അംഗങ്ങൾക്ക് വളരെ പ്രയോജനകരമായ ഒരു നേട്ടമാണെന്നത് പറയാതെ വയ്ക്കുന്നതുമായി തന്നെ Speed ശുപ്പ് മെസ്റ്റർമാരുടെ വിജ്ഞാന ശൈലേഖായ ടുലലറ കൂടുതലും ആപ്പിക്കേഷൻ കേരളത്തിൽ ഉടനീളം ഉപയോഗിച്ചു വരുന്നു. ഇതിൽ ബോർഡ് ഓർഡറുകൾ, വിജ്ഞാന പ്രദമായ PPT കൾ, മൊബൈൽ ആപ്പുകൾ തുടങ്ങി ആവശ്യമായ നിരവധി കാര്യങ്ങൾ ലഭ്യമാണ്. സൈക്കണ്ടിലെ സബ്സൈഡിയർമാർക്കിടയിൽ ധാരാളം സമയം നഷ്ടമാകുന്നതും ഓഫൈസിലെ ജീവനക്കാർക്കിൽ ദയിൽ പലപ്പോഴും തർക്കങ്ങൾക്ക് ഇടനാളികുന്നതുമായ നേന്ത്ര ഡ്യൂട്ടി, ഹോജിഡേ ഡ്യൂട്ടി ഒരു മിനിറ്റിൽ നിർമ്മിക്കാവുന്ന ഓട്ടോമാറ്റിക്ക് ഡ്യൂട്ടിമേക്കർ എന്ന ആപ്പിക്കേഷൻ Speed ശുപ്പിന്റെ മറ്റാരു സംഭാവനയാണ്. കൂടാതെ ഡിപ്രിയേഷൻ കാൽക്കുലേറ്റർ, എല്ലാവർക്കും TA തുടങ്ങി ചെറിയ ചെറിയ ആപ്പിക്കേഷനുകൾ വേരെയും.

ഇനിയും നമുക്ക് ഒരുപാട് മുന്നോറാനുണ്ട്. പുതിയ പുതിയ മേഖലകളിലേക്കും, ആശയങ്ങളിലേക്കും, ചാർട്ടി തുടങ്ങിയ പ്രവർത്തനങ്ങളിലേക്കും നമ്മുടെ ശ്രദ്ധ പതിയേണ്ടതുണ്ട്. ആയതു കൊണ്ട് എല്ലാവരുടേയും സഹകരണവും, പ്രോത്സാഹനവും തുടർന്നും ഉണ്ടാവുമെന്ന പ്രതീക്ഷിച്ചു കൊണ്ട് സ്പീഡ് വാട്സ് ആപ് കൂട്ടായ്മയുടെ 10-ാം വാർഷികത്തോടനുബന്ധിച്ച് പുറത്തിരക്കുന്ന ഈ Technical Hand Book ഉം ഈ റിപ്പോർട്ടും ഇവിടെ സമർപ്പിക്കുന്നു.

നന്ദി, നമസ്കാരം

സജീഷ് കുമാർ പി.ബി.

# TECHNICAL SPECIFICATION (MEDIUM VOLTAGE) AAA COVERED CONDUCTOR & ACCESORIES.

## 4. APPLICABLE STANDARDS :

Unless otherwise stipulated in this specification , the conductor shall conform to the following Indian/International Standards (amended upto date ).

SR. NO.	INDIAN/INTERNATIONAL STANDARDS	TITLE
1	IS : 398 ( Part IV) / 1994	Specification for aluminium conductors for overhead transmission purpose
2	EN 50397-1:2006	Covered Conductor Specification for voltage 1KV to 33KV.
3	IS : 10418	Reels and drums for bare conductors.

## 5. PROPERTIES OF CONDUCTOR :

The properties of stranded all aluminium alloy conductors of various sizes shall be as in Table - I.

**TABLE - I                            ALUMINIUM ALLOY STRANDED CONDUCTOR**

Actua l Area	Stranding & wire dia.	Approx. overall dia.	Approx. mass	Calculated resistance at 20 d.c. (max.)	Approx. calculated Breaking Load	Reactance per km	Current Rating
1	2	3	4	5	6	7	8
mm.s q.	mm	mm	Kg/km	Ohm/km	kN	Ohms	Amps
22	7 / 2.00	6.0	60.16	1.5410	6.45	0.3556	115
34	7 / 2.50	7.5	94.00	0.9900	10.11	0.3556	150
55	7 / 3.15	9.45	149.20	0.6210	16.03	0.3556	234
80	7 / 3.81	11.43	218.26	0.4250	23.41	0.3394	270
100	7 / 4.26	12.78	272.86	0.3390	29.26	0.3394	325
148	19 / 3.15	15.75	406.91	0.2290	43.50	0.3238	440
232	19 / 3.94	19.70	636.67	0.1471	68.05	0.3146	520

6 (a) PROPERTIES OF WIRES :

The properties of aluminium alloy wires to be used in the construction of the Stranded conductors shall be as in Table - II.

TABLE -

II ALUMINIUM ALLOY WIRES USED IN THE CONSTRUCTION  
OF STRANDED ALUMINIUM ALLOY CONDUCTORS.

Diameter		Cross sectional area of nominal dia. wire	Mass	Minimum breaking load after stranding	Resistance at 20 deg.c.
Nom.	Max.				
mm	mm	mm.sq.	kg/km	kN	Ohm/km
2.00	2.02	3.142	8.482	0.92	10.653
2.50	2.53	4.909	13.25	1.44	6.845
3.15	3.18	7.793	21.04	2.29	4.290
3.81	3.85	11.400	30.78	3.34	2.938
3.94	3.98	12.190	32.92	3.58	2.746
4.26	4.30	14.250	38.48	4.18	2.345

6 (b) TOLERANCE ON NOMINAL SIZES :

No negative tolerance shall be permitted on the nominal diameter aluminium wire used in the manufacture of AAA COVEREDC COVERED. However , positive tolerance in this respect shall be as provided in IS: 398 (Part IV)/1994 ( amended upto date ).

7. FREEDOM FROM DEFECTS :

The wire shall be smooth and free from all imperfections such as spills , splits, slag inclusion , dia. marks scratches, fittings, blow holes, projections, looseness, overlapping of strands, chipping of aluminium layers etc. and all such other defects which may hamper the mechanical and electrical properties of the conductor. Special care should be taken to keep away dirt, grit etc. during stranding.

## 8. JOINTS IN WIRES :

### 8.1 Conductors containing seven wires :-

There shall be no joint in any wire of a stranded conductor containing seven wires , except those made in the base rod or wire before final drawing.

### 8.2 Conductors containing more than seven wires :-

In conductors containing more than seven wires, joints in individual wires are permitted in any layer except the outermost layer ( in addition to those made in the brass rod or wire before final drawing) but no two such joints shall be less than 15 m apart in the complete stranded conductor, such joint shall be made by resistance or cold pressure butt welding. They are not required to fulfill the mechanical requirement of unjointed wires. Joints made by resistance butt welding shall, subsequent to welding , be annealed over a distance of at least 200 on each side of the joint.

## 9. STRANDING :-

9.1 The wires used in the construction of a stranded conductor shall , before stranding satisfy all the relevant requirements of this standard .

9.2 The lay ratio of the different layers shall be within the limits given in the Table-III .

TABLE - III : LAY RATIOS FOR ALUMINIUM ALLOY STRANDED CONDUCTORS

No. of wires in Conductors	Lay Ratio in			
	6 - wire layer		12 - wire layer	
	Min.	Max.	Min.	Max.
7	10	14	-	-
19	10	16	10	14

9.3 In all constructions, the successive layers shall have opposite directions of lay, the outer most layer being right handed . The wires in each layer shall be evenly and closely stranded .

9.4 In aluminium alloy stranded conductors having multiple layers of wires, the lay ratio of any layer shall not be greater than the lay ratio of the layer immediately beneath it.

10 FILLING (WATER BLOCKING):

The Stranded Conductor shall be longitudinally water tight by means of a water blocking material incorporated during the extrusion process. The use of grease /water swellable tape / water swellable powder etc is not permitted. The water blocking material shall be stable at maximum operating conductor temperature of 90 Deg. Cent.

The water blocking compound shall be compatible with the conductor material as well as the semi conducting polymer screen layer above it and not adversely affect its electrical or mechanical properties.

11 INSULATION:

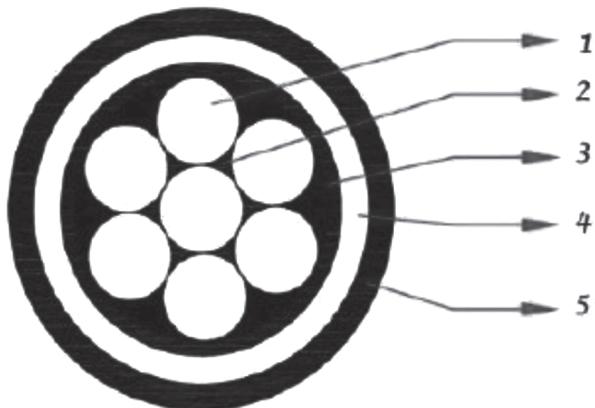
The Insulation should be dual layered with the Inner Layer being XLPE with a nominal thickness of 1.2 mm for Voltages up to 11 KV , **1.32 mm for Voltages for 22 KV** and 2.43 mm for 33 KV and the Outer Layer being a suitable XLPE which is UV Resistant, Non Tracking and Erosion Resistant with a nominal wall thickness of 1.1 mm for Voltages up to 22 KV and 1.2 mm for 33 KV. The minimum combined Insulation Thickness of both Layers should be 2.0 mm for Voltages up to 22 KV and 3.0 mm for Voltages upto 33 KV minimum.

The conductor manufacturing and stranding process shall incorporate the longitudinal water blocking also.

The Semi Conducting Screen, Inner Insulation and Outer Insulation should be extruded in one step ie triple extrusion to ensure a good, permanent bond between the three layers and also with the conductor.

It shall be possible to remove the Semi Conducting Screen, Inner and Outer Insulation Layers without damage to the conductor.

Figure 1 shows the Cross Section of a AAA COVERED Conductor.



Nos.	Description	Unit	Nominal Thickness		
			11 KV	22 KV	33 KV
1	Aluminium Alloy Wire	Sq.mm	AS PER REQUIREMENT		
2	Extruded Longitudinal Water Blocking Layer	mm	AS REQUIRED TO MAKE WATER BLOCKED ARRANGEMENT		
3	Extruded Semi conductive layer	mm	0.3	0.3	0.4
4	Inner Insulation of XLPE, without carbon black	mm	1.2	1.32	2.43
5	Outer Insulation with UV & Track Resistant XLPE	mm	1.1	1.1	1.2

## 12 TYPE TEST:

All the following type tests in accordance with EN 50397-1 : 2006 shall be performed on MVCC samples drawn by purchaser..

### 12.1 Electrical tests

#### 12.1.1 Conductor resistance

#### 12.1.2 High voltage test

##### 12.1.2.1 For CC without conductor screen:

Test voltage (a.c.)	1U
Number of specimen	1
Length of specimen (minimum)	5m
Duration of immersion in water (minimum)	1h
Temperature of water	(20 ± 5) deg C
Test duration	15 min (S) 1 h (T)

##### 12.1.2.2 For CC with conductor screen or upon agreement between customer and producer:

Test voltage (a.c.)	1U
Number of specimen	1
Length of specimen (minimum)	5m
Duration of immersion in water (minimum)	1h
Temperature of water	(20 ± 5) deg C
Test duration	4 h (S) 48 h (T)

#### 12.1.3 Spark test on the covering

Test voltage: a.c. 0,7 U or dc 1 U

#### 12.1.4 Leakage current

Test voltage: a.c. 0,7 U

#### 12.1.5 Tracking resistance

### 12.2 Construction and dimensions

#### 12.2.1 Compliance with the designs requirements

#### 12.2.2 Thickness of the covering

### 12.3 Construction and mechanical properties of the conductor

#### 12.3.1 Rated tensile strength

#### 12.3.2 Construction and dimensions

12.4 Non-electrical tests on the covering

12.4.1 Mechanical properties

a) before ageing of sample

b) after ageing of sample

12.4.2 Carbon black content

12.3.2 Resistance to UV rays

12.5 Tests of compatibility

Ageing of complete product sample

12.6 Thermal properties of the covering

12.6.1 Shrinkage test

Distance "L" between marks: (200± 5) mm

12.6.2 Hot-set-test

12.6.3 Pressure test at high temperature (For PE cables)

12.7 Further tests on the covering

12.7.1 Water absorption

12.7.2 Shore D hardness

12.8 Test of the longitudinal water tightness

12.8.1 With heat cycle

Number of specimen	1
Length of specimen	3m
Test duration	24 h
Bending radius	20 D

12.8.2 Without heat cycle

Number of specimen	1
Length of specimen	1m
Test duration	1h

12.9 Marking

12.9.1 Content, legibility

12.9.2 Durability

12.10 Slippage test

### 13 ROUTINE TESTS:

All the Routine tests as per EN 50397-1 : 2006 amended upto date shall be carried out on each and every delivery length of MVCC . The result should be given in test report.

The details of facility available in the manufacturer's works in this connection should be given in the bid.

14 ACCEPTANCE TESTS:

All Acceptance tests as per EN 50397-1 : 2006 as amended upto date including the optional And should offered Anti tracking testing on selective samples in manufacturer's work during acceptance test.

15 TESTING FACILITIES AND DETAILS OF EQUIPMENTS :

The supplier / tenderer shall clearly state as to what testing facilities are available in the works of manufacturer and whether the facilities are adequate to carry out type, routine and acceptance tests And Anti Tracking as mentioned in EN 50397-1 : 2006 on the MVCC. The facilities shall be provided by the bidder to purchaser's representative for witnessing the tests in the manufacturer's works. If any test cannot be carried out at manufacturer's works reason should be clearly stated in the tender.

13 END SEALING :-

Heat Shrinkable end caps with sealant shall be used for effectively sealing the end terminals of the covered conductor. The inner diameter range of cap shall be such that it shall tightly fit to the covered conductors to prevent moisture ingress.

14 PACKING AND MARKING :

The conductors shall be wound in reels or drums conforming to the latest versions of IS : 10418 ( amended upto date ), ' Specification for Drums for cables .

14.1 PACKING :

14.1.1 The gross mass of packing for various conductors shall not exceed by more than 10% of the values given in the following table .

Conductor Size in sq.mm.	Gross Mass in kg
22 ( 7/ 2.00 mm )	1100
34 ( 7/ 2.50 mm )	1100
55 ( 7/ 3.15 mm )	1500
80 ( 7/ 3.81 mm )	1600
100 ( 7/ 4.26 mm )	2000
148 (19/ 3.15 mm )	2000
232 (19/ 3.94 mm )	2400

14.1.2 The normal length of various conductors shall be as given in the following table:

Conductor Size in sq.mm.	Normal Length in km
22 ( 7 / 2.00 mm )	2.0
34 ( 7 / 2.50 mm )	2.0
55 ( 7 / 3.15 mm )	2.0
80 ( 7 / 3.81 mm )	1.0
100 ( 7 / 4.26 mm )	1.0
148 (19/ 3.15 mm )	1.0
232 (19/ 3.94 mm )	1.0

#### 14.1.2.1 LENGTHS AND VARIATION IN LENGTHS :

The standard length of AAA COVEREDC Covered shall be as per mentioned in clause. No 14.1.2 Tolerance of +/- 5% ( plus or minus five percent ) shall be permitted in this standard length. All the lengths outside these limits of tolerances shall be treated as random length.

Random length shall not be less than 80% ( eighty percent ) of the standard length specified as above and the total acceptable quantity of such random lengths shall be within 7% ( seven percent ) quantity of the allotted quantity to each consignee of the respective size of the conductor.

#### 14.2 MARKING :

##### IDENTIFICATION MARKS ON COVERED CONDUCTOR:

The following particulars shall be properly legible embossed/Printing on t1 covered conductor at the intervals of not exceeding one meter through out the length of the cable. The covered conductor with poor and illegible embossing/Printing shall be liable for rejection.

- a) Manufacturers name and/or Trade name.
- b) Voltage grade.
- c) Year of manufacture.
- d) M.S.E.D.C.L.
- e) Successive Length.
- f) Size of cable
- g) EN 50397-1 : 2006

Also The following information be marked on each package :

- a) Manufacturer's name
- b) Trade mark ,if any
- c) Drum or identification number
- d) Size of conductor Number and lengths of conductors
- e) Gross mass of the package
- f) Net mass of conductor
- g) EN 50397-1 : 2006.

15 . INSPECTION :

All tests and inspection shall be made at the place of manufacturer unless otherwise especially agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities without charges , to satisfy him that the material is being furnished in accordance with this specification.

16 . VERIFICATION OF LENGTH OF CONDUCTOR :

- i ) The Company shall ascertain the length of AAA COVERED Conductor at supplier's works and at the receiving store centers by measuring the actual length by length measuring machine used for the purpose. The supplier should ensure that length measuring machine is available for measurement of the length by our inspecting officer.
- ii ) Both ends of the AAA COVERED Conductor will be sealed by the supplier and seals will be contained in the drum and not exposed out of drum.
- iii ) The declared length will be measured between manufacturer's seals at both ends of AAA COVERED Conductor.
- iv ) The weight of AAA COVERED Conductor will also be checked for ensuring correct lay and length of the AAA COVERED Conductor .
- v) For the verification of the length of the conductor, 10 %of total lot (in Drums) should be selected at the works. The physical verification of the length of the conductor should be carried out for maximum up to 5 (five) drums. If there are anymore drums left for verification, then weight of each verified drum should be carried out and average weight may be calculated.

Then the weight of each of all the remaining selected drums may be taken and if these weights are matching with the average weight, then that particular lot may be accepted otherwise rejected.

- vi) Verification of length of conductor will also be carried out at each stores center for two drums out of each lot. If the average length is found correct or more, the lot will be accepted. If the average length is found to be less than the declared, the percentage of such short length will be applied for reduction for the entire quantity supplied in the lot at respective stores for acceptance.
- vii) In case of dispute, joint inspection alongwith the representative of the supplier shall be carried out after giving 10 (ten) days notice to the supplier to remain present at stores center for the purpose. If the representative fails to attend on stipulated date for joint inspection, the decision of the consignee shall be final and binding.

17      REJECTION :

- i) While measuring the length , the sample piece from each length shall be taken for carrying out the test as per IS: 398 (Part IV) / 1994 ( amended upto date ) & EN 50397-1 : 2006 . All the values of each sample should not exceed the value as per the relevant specification. In case of deviation , whole lot will be rejected at works.
- ii ) Specific resistivity of Aluminium Alloy wire used should not exceed 0.0328 ohm sq.mm./m at 20 degree centigrade as prescribed in IS: 398 ( Part IV )/1994 ( amended upto date ). If the results are at variance , whole lot shall be rejected.

18      EN CERTIFICATION MARK :

The AAA COVERED Conductor with EN 50397-1 marking only is required by the MSEDCL against this tender specification and as such , only those tenderer who Make covered conductor as per EN 50397-1 for AAA COVERED Conductor need against this invitation of tender.

19      SCHEDULES :

The tenderer shall fill in the following schedules which form part of the tender specification and offer.

## **SCHEDULE 'C'**

### **SCHEDULE OF TENDERER'S EXPERIENCE**

Tenderer shall furnish here a list of similar orders executed/under execution by him to whom a reference may be made by Purchaser in case he considers such a reference necessary.

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Sr. Name of Client Value Period of supply Name & Address to No. & Description of order and commissioning whom reference may be made

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1            2

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3

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4

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5

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NAME OF FIRM \_\_\_\_\_

NAME & SIGNATURE OF TENDERER\_\_\_\_\_

DESIGNATION \_\_\_\_\_

DATE\_\_\_\_\_

SEAL & SIGNATURE OF THE TENDERER

**TECHNICAL SPECIFICATIONS FOR 11/22/33 KV MEDIUM VOLTAGE COVERED CONDUCTOR (MCCC) ACCESSORIES**

**INDEX**

Clause No.	Clause
1	SCOPE
2	SERVICE CONDITIONS
3	APPLICABLE STANDARDS
4	TYPE OF ACCESSORIES for (MVCC)
5	MARKING
	Annexure-I
	Annexure-II

## 1 SCOPE:

This specification covers design, manufacture, assembly, testing and supply of Accessories for All Aluminium Alloy Stranded Covered Conductors for use on 33 kV , 22 kV, 11 kV distribution system.

## 2 SERVICE CONDITIONS :

The Accessories to be supplied against this specifications shall be suitable for satisfactory continuous operation under the following tropical conditions.

- i) Maximum ambient temperature (Degree C) ----- 50
- j) Minimum temperature of air in shade (Degree C) ----- 3.5
- k) Relative Humidity (%) ----- 10 to 100
- l) Maximum Annual Rainfall (mm) ----- 1450
- m) Maximum Wind Pressure (kg/sq.m.) ----- 150
- n) Maximum altitude above mean sea level (meter) ----- 1000
- o) Isoceraunic level (days/ year) ----- 50
- p) Seismic level ( Horizontal acceleration) ----- 0.3g

## 3 APPLICABLE STANDARDS :

Unless otherwise stipulated in this specification , the accessories of conductor shall conform to the following Standards (amended upto date ).

1	EN 50397-1:2006	Covered Conductor Specification- Up to 33 KV
2	EN 50397-2:2006	Covered Conductor Accessories Specification- UP to 33 KV
3	NF C 33-041 (SEPTEMBER 2013)	Insulated cables and their accessories for power systems – Anchoring devices for overhead distribution with bundle assembled cores, of rated voltage 0.6/1 kV.
4	EN 50483-4 (MARCH 2009)	Test requirements for low voltage aerial bundled cable joints
5	EN 50397-2 (MARCH 2010)	Covered conductors for overhead lines and the related accessories for rated voltages above 1kV a.c. and not exceeding 36kV a.c. PART 2 : Accessories for covered conductors : tests and acceptance criteria
6	EN 50182	Conductors for overhead lines- Round wire concentric lay conductors

#### 4 TYPE OF MEDIUM VOLTAGE COVERED CONDUCTOR ACCESSORIES:

The Accessories of Medium Voltage Covered Conductor (MVCC) are specified below and shall consist of the following:

S1.No	Description	Application
1	Tension Assembly (TA)	For fitting onto a pole for tensioning at the beginning or end of a length of MVCC, or for anchoring while a major change in direction. The Tension assembly consists of one wedge type Tension / anchoring clamp and one Tracking protection IPC.
2	Insulator Clamp / Tie (IC)	For supporting and aligning MVCC at an intermediate pole in a length, with small angle of deviation. The Insulator Clamp hold the MVCC in its position on top of the pin or post insulator. Insulator Tie consists of either an "Insulated Plastic" or "Metallic helical" Type for Line Alignment.
3	Suspension Clamp (SC)	For supporting a length of MVCC at an intermediate pole in a length, with large angle of deviation with a disc insulator. The suspension clamp consists of an "Assembly with one locking type Suspension clamp with provision to fix in Insulators.
4	Insulation Piercing Connector for "Bare to Covered interconnection" (IPC – Type 1)	For main (Bare) to main (MVCC) networking connection. This connector is to ensure the electrical characteristics with in the required limits, while ensuring necessary insulation protection against tracking and water penetration on MVCC.
5	Insulation Piercing Connector for Networking / Branching / Looping (IPC – Type 2)	For main (MVCC) to main (MVCC) networking or branching of MVCC to another MVCC Or Branch Cable or Looping for transformer junctions. This connector is to ensure the electrical characteristics with in the required limits, while ensuring necessary insulation protection against tracking and water penetration on MVCC.
6	Insulation Piercing Connector with	For Temporary Earthing Provision from MVCC Cable for maintenance purpose.

	Aluminum Bail for earthing (IPC – Type 3)	This connector is to ensure the electrical characteristics within the required limits, while ensuring necessary insulation protection against tracking and water penetration on MVCC.
7	Tension Joints (TJ)	Mid-span tension joints for jointing MVCC over a span

#### 4.1 Tension / Anchoring Clamp:

Anchoring assemblies are used to firmly hold the MVCC to a concrete or steel pole and transmit the mechanical tension.

at the end of a run

at a major change in direction of over 20 degrees.

The clamp should consist of an Aluminum alloy corrosion resistant casted body, Rigid sling ("bail") of stainless steel with Tracking IPC and self-adjusting plastic wedges which shall anchor/hold the cable. The following key criterion to be followed for the design of the same

There shall be no losable part (except Tracking IPC and bail) in the process of clamping arrangement

Locking mechanism should be wedge type self-locking. Wedges are to be made of high strength, climatic resistance Engineering Plastic with glass fibre.

The fittings shall be able to withstand the specific minimum failure load (SMFL) and shall not damage the covering. SMFL is the minimum load specified by the purchaser or declared by the supplier at which mechanical failure will not take place.

##### 4.1.1 Rigid Sling (Bail) of Anchor Assembly

The Anchoring assembly shall be supplied with a Galvanized steel rod to connect the Tension Clamp to the Insulator clamp on the pole.

The Rigid Bail forming part of clamp should have sufficient distance between bracket and body of clamp and shall have sufficient mechanical strength to withstand the mechanical test for the complete assembly tests in this specification.

Flexible bail is not acceptable due to the reason to withstand the load.

Rigid Bail should be fitted with provision to remove from the clamp to have easy installation.

##### 4.1.2 Wedge Type Tension Clamp for Anchoring Assembly

Wedge type clamps shall be used for clamping the MVCC without damaging the insulation and shall be capable of clamping an uncut MVCC so that it can continue without break to the connecting point or next span.

The clamp shall be of aluminum with fully insulating type of mechanical and weather resisting thermoplastic wedges.

No tools shall be needed for fitting the MVCC into the clamp.

Type tests as per IEC and specification shall be conducted from NABL accredited independent Lab of India/the International Laboratory Accreditation corporation, Mutual Recognitions Arrangement (ILAC, MRA) signatory Laboratory like COFRAC.

#### 4.1.3 Testing Requirements for an Anchoring Assembly.

The following tests are intended to establish design characteristics as per EN 50397 - 2 and NFC 33-041.

#	Test	Type test	Acceptance Test	Routine test
1	Visual examination	x	x	x
2	Dimensional verification	x	x	x
3	Mechanical tests	x		
3.1	Tensile test at ambient temperature	x	x	
3.2	Tensile test at low temperature	x		
3.3	Tensile test at high temperature	x		
3.4	Slippage test at ambient temperature	x	x	
4	Environmental tests			
4.1	Corrosion test	x		
4.2	Climate ageing test	x		
4.3	Resistance against tracking in heavy polluted areas	x		
5	Check for permanent marking	x	x	

#### 4.2. Insulator Clamps / Ties

The Clamps / ties shall be designed suitably to hold the MVCC in its position on top of the insulator. The Clamps is preferred to be made of Insulating Plastic materials or protected with Insulating Plastic material to ensure tracking resistance and to avoid any insulation damage to covered conductor due abrasion while mechanical or wind induce vibration.

#### 4.2.1 Testing Requirements for an Insulator Clamps / Tie.

Tests shall meet the requirement of EN Standard 50397 - 2

S1. No.	Test	Type test	Acceptance Test	Routine test
1	Visual examination	x	x	x
2	Dimensional verification	x	x	x
3	Check for Marking	x	x	x
4	Mechanical tests	x	x	x
4.1	Failure Load Tests	x	x	x
4.2	Slip Load Tests	x	x	x
4.3	Lift / Side Load Tests	x	x	x
4.4	Thermal Tests under load	x		
4	Environmental tests			
4.1	Corrosion test	x		

4.2	Climate ageing test	x		
4.3	Resistance against tracking in heavy polluted areas	x		

#### 4.3. Suspension Clamps

The Suspension Clamps shall be made of Insulating Plastic to ensure tracking resistance and to avoid any insulation damage to covered conductor due abrasion while mechanical or wind induce vibration.

##### 4.3.1 Testing Requirements for Suspension Clamps

Tests shall meet the requirement of EN Standard 50397 - 2

Sl. No.	Test	Type Test	Acceptance Test	Routine test
1	Visual examination	x	x	x
2	Dimensional verification	x	x	x
3	Check for Marking	x	x	x
4	Mechanical tests	x	x	x
4.1	Failure Load Tests	x	x	x
4.2	Slip Load Tests	x	x	x
4.3	Lift / Side Load Tests	x	x	x
4.4	Thermal Tests under load	x		

#### 4.4 Insulation Piercing Connectors for MVCC .

Insulation Piercing Connectors (IPC) are used for making Tee / Tap-off/ connections to an MVCC / Bare Overhead Line.

Insulation Piercing Connectors are designed to make a connection between the uncut main conductor and a branch cable conductor without having to strip either cable to expose the conductor. Instead, the tightening action of the IPC will first pierce the Insulation, then make good electrical contact between the main and branch conductor while simultaneously insulating and sealing the connection.

The insulation piercing connectors shall be of the following type(s) depending on the applications.

##### 4.4.1 Insulation Piercing Connectors

The connector bodies shall be made entirely of mechanical and weather resistant plastic insulation material made of weather & UV resistant reinforced polymer and no metallic part outside the housing is acceptable except for the tightening bolt or nuts. Any metallic part that is exposed must be free from potential during or after connector installation.

Screws or nuts assigned for fitting with IPC (Insulating Piercing connector), must be fitted with torque limiting shear heads to prevent over tightening or under tightening. While the min & max torque values are to be specified by Manufacturer, these should not exceed 27 N mtr for IPC for main conductor < 95 sq mm, and 42 Nmtr for main conductor >95, but < 240 sq mm.

The IPC must perform piercing and connection on Main and Branch cable simultaneously using single bolt for tightening as multiple bolts do not ensure even tightening. The shear bolt/nut shall be suitable for tightening with a hexagonal socket of 13 mm or 17mm.

The contact teeth or blade of the connector is made of tinned copper with equivalent cross

Section with respect to %IACS to suit the max branch cable size declared.

The IPCs shall be water proof and the water tightness shall be ensured by appropriate elastomeric materials and not by grease, gel or paste alone. Grease can be applied to protect the contact blade alone and shall not be visible on the outer surface of the connector. Connector should not be dipped in grease.

Each IPC should be provided with a cap to seal the cut end of the Branch cable. It should be of a design that once the connector is installed, it shall not be possible to remove the cap without dismantling the connector.

All the metallic parts of the connector should be corrosion resistant and there should not be any appreciable change in contact resistance & temperature after overloads & load cycling and should conform to the long duration tests specified in this standard.

#### 4.4.2 Testing Requirements for Suspension Clamps

The following tests are intended to establish design characteristics as per NFC 33-003, 004, 020 and EN 600068 - 1

Sl. No.	Test	Type test	Acceptance Test	Routine test
1	Visual examination		x	x
2	Dimensional verification		x	x
3	Mechanical tests	x	x	x
4	Voltage and Water Tightness test	x	x	x
5	Climatic Ageing Test	x		
6	Corrosion Test	x		
7	Electrical Ageing Test	x		
8	Check for marking	x	x	

#### 4.5 Mid Span Insulated Jointing Sleeves

The sleeves should be Pre-Insulated type. Sleeve should be made of Aluminum, insulated with an Anti-UV black thermoplastic tube hermetically sealed two ends with 2 flexible rings. Strip length, Hexagonal crimping die reference and size to be marked on the outer surface of plastic sleeve.

Reference standard, type test and design requirements as per NFC 33 021

Sl. No.	Test	Type Test	Acceptance Test	Routine test

1	Visual examination	x	x	x
2	Dimensional verification	x	x	x
3	Check for Marking	x	x	x
4	Voltage and Water Tightness test	x	x	x
5	Climatic Ageing Test	x		
6	Corrosion Test	x		
7	Electrical Ageing Test	x		

#### 4.5.1 Heat Shrinkable End Cap

The Insulated End Cap with sealant shall be suitable for effectively sealing the end terminal of the covered conductors. The inner diameter range of the Cap shall be such that it shall tightly fit to the covered conductors to prevent entry of moisture.

#### 5.0 MARKING:

##### 5.1 On Covered Conductor

The covered conductors shall carry the following marking as per CENELEC 50397-1 or as agreed.

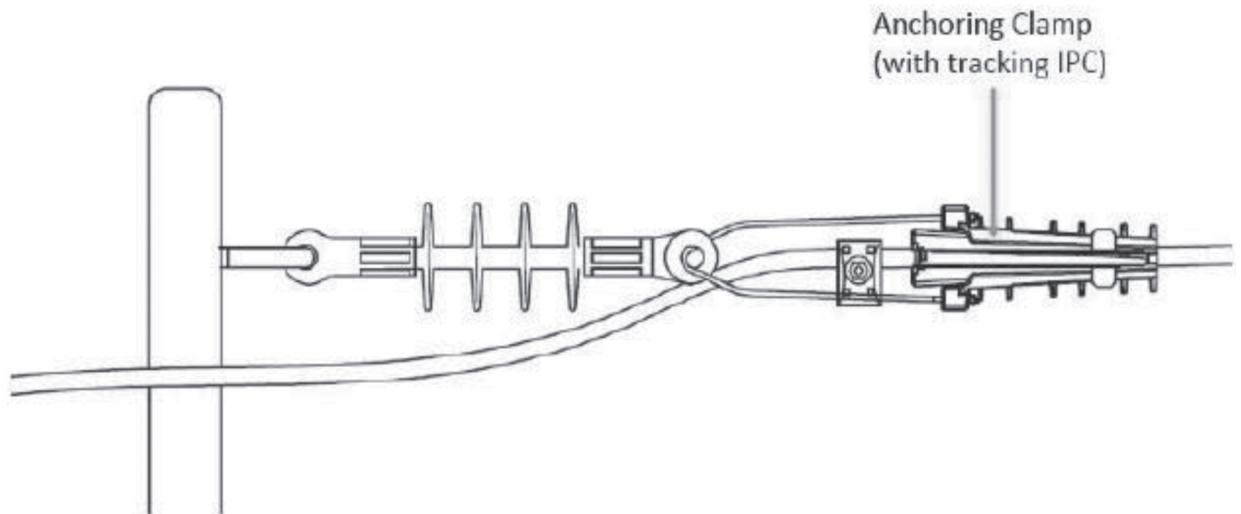
##### 5.2. On Accessories

Manufacturer's name with designation if any.

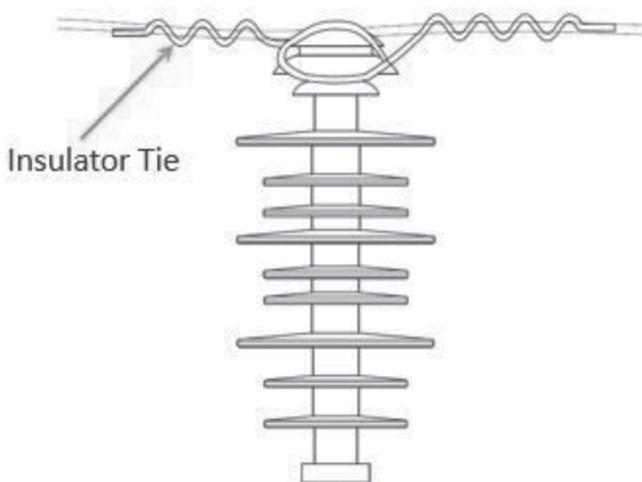
Batch code and Manufacturing period (MM/YY) is to be marked.

**ANNEXURE I : - TYPICAL GENERAL ARRANGEMENT DIAGRAM AND DRAWINGS**  
**Tension Assembly (TA) with Anchoring clamp and one Tracking protection IPC**

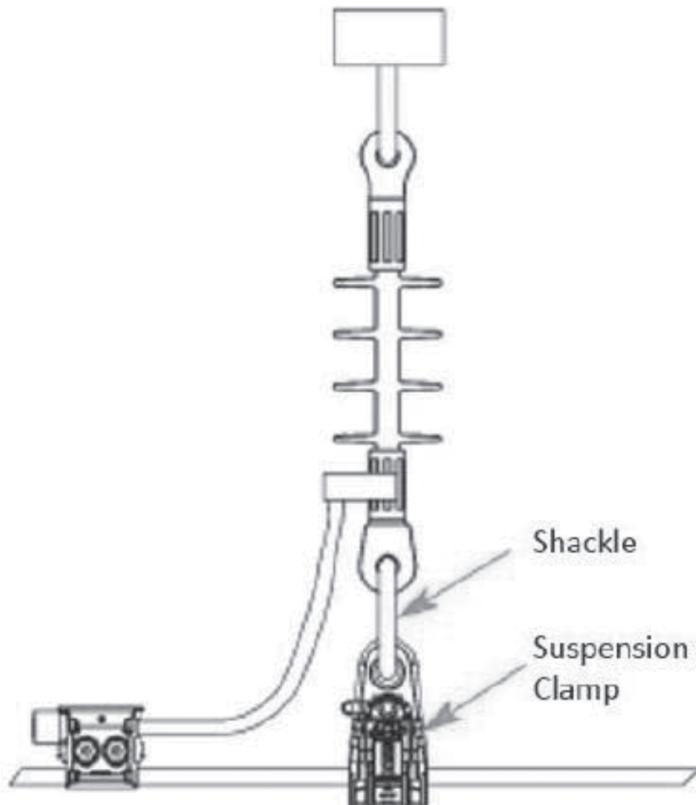
**Anchoring with protection against Tracking.**



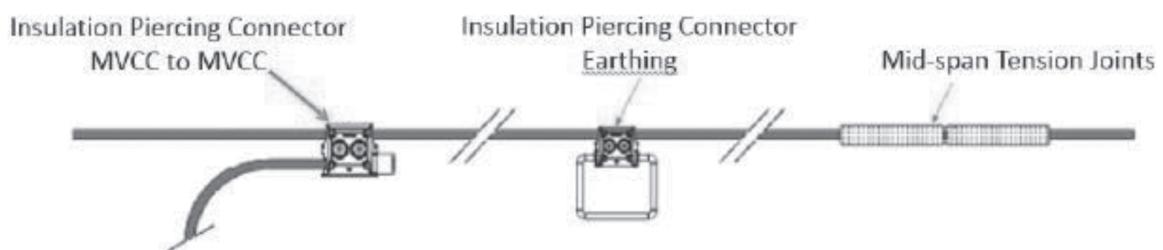
**2. Insulator Clamp / Tie (IC)**



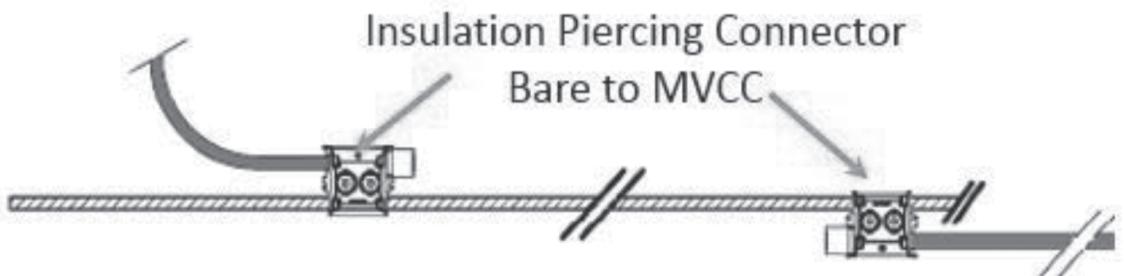
### 3. Suspension Clamp (SC)



4. TYPE-1 : Insulation Piercing Connector for Networking / Branching /Looping, TYPE - 3: Insulation Piercing Connector with Aluminum Bail for earthing and Tension Joints (TJ)



## 5. Insulation Piercing Connector for Bare to Covered interconnection



# TECHNICAL SPECIFICATION

## A.B. CABLE

### **1.0 NATURE OF WORK**

The work covered by this Specification is for L.T lines in A.B cable as specified herein and in the attached Schedules. The overhead distribution lines will form part of the SOUTHCO's distribution System.

### **1.1 GENERAL PARTICULARS OF THE SYSTEM**

The following are the general particulars governing the design and working of the complete system of which the Works will form a part.

The system will be in continuous operation during the varying atmospheric and climatic conditions occurring at all seasons.

### **1.2 SCOPE-**

#### **AB Cabling works.**

The contractor will provide different size conductors and different size AB Cables only. Also other items required for construction of New lines, up gradation or replacement of conductors, AB cabling works with inter posing of poles, repair of old damaged poles, replacement of damaged X-arms, Post insulators with GI pin, replacement of tension fittings with Insulators(70KN ), Mid-span joint, Al. tape, H/W fittings armoured rods concreting materials etc, along with suspension clamp , 'Eye' hook with shackle insulators, insulation piercing connector and dead end clamps reqd. for AB Cables etc are to be supplied by contractor.

#### **DISCLAIMER**

This Document includes statements, which reflect various assumptions, which may or may not be correct. Each Bidder/Bidding Consortium should conduct its own estimation and analysis and should check the accuracy, reliability and completeness of the information in this Document and obtain independent advice from appropriate sources in their own interest.

Neither Purchaser nor its employees will have any liability whatsoever to any Bidder or any other person under the law or contract, the principle of restitution or

unjust enrichment or otherwise for any loss, expense or damage whatsoever which may arise from or be incurred or suffered in connection with anything contained in this Document and matter deemed to form part of this document, provision of services and any other information supplied by or on behalf of purchaser or its employees, or otherwise arising in any way from the selection process for the supply.

Though adequate care has been taken while issuing the Bid document, the Bid document, the Bidder should satisfy itself that documents are complete in all respects. Intimation for any discrepancy shall be given to this office immediately.

### **Stringing of Aerial Bunched Cable (ABC)**

#### **Fixing of Suspension & Tension/ Dead end fittings to the Poles.**

The suspension clamp is to be hung on eye hook/ suspension hook, which is fixed to the pole at a minimum distance of 0.15 mt. from top end of the pole. The messenger wire of bunched cable resting on a pulley is separated from the cable by separating wedges and inserted in the conductor groove of the suspension clamp.

The bolt is tightened to a torque of 20 N after which the pulley and wedges are to be removed. The cable is tied to the messenger wire with nylon tie on both sides of clamps. Pole clamps 50 x 8 mm flat shall be used. Eye hook of 20mm dia MS rod to be used as per the drawing. The pole clamp shall be made to suite the pole width. This shall be installed as per Fig. No. 2 (a) of REC Construction Standard.

### **Fittings & Accessories**

The following hardware fittings and accessories shall be used to install, erect & join the aerial bunched cable.

a) Suspension Clamp with Eye-Hook – The Contractor shall install the suspension clamp with eye hook. This hook shall be used to attach the AB cable on the pole by means of a dead end clamp in terminal poles and for attaching a suspension clamp suitable for holding AB cables of size  $35\text{mm}^2$  to  $95\text{mm}^2$  in straight lines and angle up to 90 Deg.-

**b)** Suspension fittings & the corresponding eye hook shall be as per REC Construction Standard No. e – 34. The eye hooks shall be made from minimum 20mm dia MS rods with eye on one end and the other end being suitably flattened with two holes for M16 bolt & nut to fix with the back clamps made from minimum 50x8mm flats as per drawing. The eye hook, back clamp and bolts & nuts are to be hot dip galvanized.

**c)** Dead End fittings shall be bolted type as per REC Construction Standard No. E-35 & the corresponding eye hook shall be as specified above. The dead clamps are to be anchored with the pole with similar arrangement of eye hook & back clamp. In this case, the back clamp shall have two nos. of holes on both sides for M16 bolts. One side of the clamp shall be used for holding the eye hook with dead end clamp and the other side shall be used for anchoring the Stay.

**d)** Nylon Tie- The contractor shall supply nylon ties. These ties shall be used for tying the conductors with the messenger wire to prevent the phase conductors from chatting against suspension clamp. The nylon tie is made of weather resistant black nylon.

**e)** Connectors- The contractor shall supply connector. These shall be used as non-tension aluminum to aluminum connections for conductor joints.

**f)** Plastic Covers for Connectors- The contractor shall install Plastic Covers for Connectors. These covers shall be used with aluminum/aluminum connectors to protect connectors against corrosion caused by climatic conditions.

### **Installation of Cable**

The contractor shall be fully responsible for all activities related to installation of AB cable. His responsibilities consists of handling, pulling, stringing & jointing of the cable and effecting service connection to consumers as per direction of the Engineer-in-charge. The total no. of consumers per KM in urban area and rural area is approximately 200 & 50 nos. respectively. But payment shall be made as per actual use of piercing connectors to effect service connection to the consumers.

## **Handling of AB Cable**

The contractor shall observe following precautions while handling the AB Cable:

The cable drums must be stored and transported in an upright position.

While loading/unloading, the drums shall not be thrown from transport vehicles.

Cable contact with sharp articles shall be avoided.

In order to prevent damage to the insulation, the cable shall not be dragged on the ground.

Pulleys shall be used for this purpose.

In order to prevent strands from spreading, always cut the cable with a cutter.

Use nylon ties or electrical tape to prevent the cable from spreading away from messenger wire after the cutting. Staple the end of the cable on to the drum in order to prevent loosening.

Do not remove the protective boards from the cable drum before the cable is pulled off the drum.

While moving the drum by rolling it on ground, always roll the drum in the direction indicated by the arrow on the flange. When pulling the cable, the spinning direction must be opposite.

Do not store the drums on wet soil, sandy or humid places.

Store the accessories in good order for quick easy and correct handling.

## **Pulling the Cable**

The principle is to pull the cable under mechanical tension so that contact with the ground or any other obstacles is avoided. The cable drum should be perfectly in alignment with line to be strung and fixed about 15-20 mts.

From the holding the first pulley. Open the cover of the drum to check and ensure that the insulation is not damaged.

The pulling which is sent up upto the cable drum is about 15-20 mts from the pole holding to the last pulley. The pulleys are directly hung to such hook on the poles. The pulley tandem is to be used on angle poles if the line is deviating more than 60° Pull the guiding rope through all the pulleys.

Normal care shall be taken to assume a smooth passage of whole cable through the pulleys, especially in the first pole and on angle poles. One worker should act s brakeman at the cable drum so that the cable is not loosened during the pulling. One worker should follow the cable going through the pulleys and stop the pulling if anything goes wrong.

## **Stringing Operations.**

The contractor shall follow one of the following methods for stringing.

### **1. Sag Method**

Fix a dead end clamp on the neutral messenger wire at the pole. The messenger shall be bent behind the clamp to ensure sufficient friction between the messenger and the clamp in the initial stays during stringing.

Bind the conductor together beside the dead end clamp using a nylon tie.

Hand the clamp on the hook at the end pole Rewind simultaneously the slack cable length on the cable drum.

Attach the ‘come along’ on the neutral messenger wire at the first pole of the line.

Tighten the cable by the shackle or the winch when required sag is obtained.

Hand the dead end clamp on the hook and install it on the neutral messenger.

Remove the come along

Bind the conductors together on the messenger wire using a nylon tie

Check the length of the cable needed and cut it at an appropriate point.

### **2. Dynamometer Methods**

Start the operation as above up to the stage.

Install the dynamo meter on the come-along

Tighten the cable at the required value by reading the Dynamo meter

Finish the stringing as in the sag method operation.

## **Jointing of Cables**

Jointing of cable shall be in accordance with clause 12.3.3 of IS 1255:1993 and manufacturers special instructions given hereunder. This joining is to be done by skilled personnel.

**Cable Damage and Repairs:** If the cable is damaged for whatever reasons, it shall be brought to the notice of the engineer and shall not be used without his approval.

No joint or splice shall be made in spans crossings over main roads, small rivers or in tension spans.

Not more than one joint in the cable shall be allowed in one span.

The stringing rate include rates for paving, stringing, clamping, jointing, tensioning and fitting of all necessary accessories.

Insulated piercing connectors suitable for AB cable size from 16mm<sup>2</sup> to 95mm<sup>2</sup> and service connection cable of size 2.5mm<sup>2</sup> to 35mm<sup>2</sup> shall be used for effecting service connections to the consumers.

### **Final Checking, Testing and Commissioning**

After stringing have been done as approved by the engineer, to ensure that everything is complete in all respects, the works shall be thoroughly inspected keeping in view the following main points.

All the bolts and nuts should be of hot dip galvanized materials as per relevant IS.

The stringing of the cable has been done as per the approved sag and desired clearances are achieved.

No damage, minor or major to the cable, messenger wire and accessories

The contractor shall submit a report to the above effect to the Engineer in Charge, who shall inspect and verify the correctness of the report. In case it is noticed that some or any of the above is not fulfilled, the engineer shall get such items rectified by the contractor no extra cost to the purchaser.

After final checking, the line shall be tested for insulation resistance in accordance with IS 1255:1983.

All arrangements for such testing or any other test desired by the Engineer-in-charge shall be done by the contractor and necessary labour, transport and equipment shall be provided by him. Any defect found out as a result of such tests shall be rectified by the contractor, forthwith at no extra cost to the purchaser.

In addition to the above, the contractor shall be responsible for testing and ensuring that the total and relative sags of the cable as within the specified tolerance. Such tests shall be carried out at selected points along the route as required by the Engineer-in-charge and the contractor shall provide all necessary equipment and labour to enable the tests to be carried out. After satisfactory test on the line and approval by the Engineer in Charge, the line shall be energized at full operating voltage before handing over. The cable shall be megger tested before and after jointing. The AB cable shall be tested for.

- i) Continuity of messenger wire and conductors**
- ii) Absence of cross phasing**
- iii) Insulation resistance to earth**
- iv) Insulation resistance between conductors**
- v) DC Resistance**
- vi) Capacitance**

As per IS 1255:1983 of the latest issue and as per manufacturers instructions.

Sufficient backfilled earth covers each foundation pit and is adequately compacted.

All poles are used strictly according to final approved drawing and are free of any defect or damage whatsoever.

The stringing of the conductors and earth wire has been done as per the approved sag and tension charts and desired clearances as clearly available.

All conductor and messenger wire accessories are properly installed.

All other requirements for completion of works such as fixing of danger plate and anti-climbing device have been fulfilled.

The insulation of the line as a whole is tested by the Contractor through provision of his own equipment, labour etc., to the satisfaction of the owner. Proper earthing of the poles.

### **HT/LT/Road Crossing Guarding**

The contractor shall provide & install protective guarding as per REC construction standard for the line, The guarding shall be provided at all the crossing i.e. road, telecommunication & power lines, railway line, nallaha etc.

The contractor is required to follow local statutory regulations stipulated in Electricity (Supply) Act 1948, Indian

Electricity Rules 1956 as amended and other local rules and regulations referred in these specifications.

### **Reference Standards**

The codes and/or standards referred to in the specifications shall govern, in all cases wherever such references are made. In case of a conflict between such codes and/or standards and the specifications, latter shall govern. Such codes and/or standards, referred to shall mean the latest revisions, amendments/changes adopted and published by the relevant agencies unless otherwise indicated. Other internationally accepted standards which ensure equal or better performance than those specified shall also be accepted, subject to prior approval by the owner. In case no reference is given for any item in these specifications, latest REC specification & Construction Standards shall be referred to.

**GUARANTEED TECHNICAL PARTICULARS FOR LT XLPE AB Cable ( Size :  
3X95 +1X70+1X16mm2)**

Sl No	Description	3X 95 + 1X70 + 1X16mm2
		Requirement
1	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV
2	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS 8130/84 / XLPE insulation ( IS 14255/95)
3	Material of Neutral Catenary	Aluminium alloy as per IS 398 Pt - IV
4	Voltage Class	0.65/1.1 KV
5	No. of Strands of Phase Conductor	19
5(a)	No. of strands/ Average /Minimum Strand Dia. In mm. (Finished Phase conductor.)	19/2.54
6	Approximate Overall Dia. Of compacted phase conductor after removal of insulation.(in mm.)	12.7
7	No. Of Strands / Average Strand Dia. In mm. ( Neutral Catenary.)	7/3.6
8	Minimum Overall Dia. Of compacted Bare Neutral Caternary .(in mm.)	10.8
9	No. Of Strands / Average strand dia. / Nominal cross sectional area of conducting part In No / mm <sup>2</sup> . ( St. Light Conductor)	7 /1.75 / 16mm <sup>2</sup>
10	Minimum average thickness of insulation of phase Cond. (mm)	1.5
11	Minimum thickness of insulation of Phase Cond. (mm )	1.25
12	Minimum thickness of insulation at any point in street light conductor (mm)	0.98
13	Maximum DC resistance of Phase conductor at 20 ° C Ohm/ KM	0.32
14	Maximum DC resistance of street light conductor Ω / Km	1.91
15	Maximum DC resistance of neutral cond. Ω / Km	0.492
16	Ultimate tensile strength of neutral conductor (KN)	19.7
17	Maximum temperature (Continuous)	90°C for phase and 75 °C for neutral
18	Embossing on insulation at each one meter interval	As per Technical Specification
19	Cable drum length	250 / 500 / 1000m
20	Volume Resistivity of insulation at 27°C	1X10 <sup>13</sup> Ω - cm min.
21	Volume Resistivity of insulation at 70°C	1X10 <sup>11</sup> Ω - cm min.

**GUARANTEED TECHNICAL PARTICULARS FOR LT XLPE AB Cable ( Size :  
3X70+1X50+1X16mm2)**

Sl No	Description	3X 70 + 1X50 + 1X16mm2
		Requirement
1	Ref. ISS / IEC followed	IS 14255/95, IS 398 Part IV
2	Phase Conductor material / Insulation type	H2 / H4 E.C grade aluminium as per IS 8130/84 / XLPE insulation ( IS 14255/95)
3	Material of Neutral Catenary	Aluminium alloy as per IS 398 Pt - IV
4	Voltage Class	0.65/1.1 KV
5	No. of Strands of Phase Conductor	19
5(a)	No. of strands/ Average /Minimum Strand Dia. In mm. (Finished Phase conductor.)	19/2.18
6	Approximate Overall Dia. Of compacted phase conductor after removal of insulation.(in mm.)	10.8
7	No. Of Strands / Average Strand Dia. In mm. ( Neutral Catenary.)	7/3.05
8	Minimum Overall Dia. Of compacted Bare Neutral Caternary .(in mm.)	9.15
9	No. Of Strands / Average strand dia. / Nominal cross sectional area of conducting part In No / mm2. ( St. Light Conductor)	7 /1.75 / 16mm2
10	Minimum average thickness of insulation of phase Cond. (mm)	1.5
11	Minimum thickness of insulation of Phase Cond. (mm )	1.25
12	Minimum thickness of insulation at any point in street light conductor (mm)	0.98
13	Maximum DC resistance of Phase conductor at 20 ° C Ohm/ KM	0.443
14	Maximum DC resistance of street light conductor Ω / Km	1.91
15	Maximum DC resistance of neutral cond. Ω / Km	0.689
16	Ultimate tensile strength of neutral conductor (KN)	14
17	Maximum temperature (Continuous)	90°C for phase and 75 °C for neutral
18	Embossing on insulation at each one meter interval	As per Clause 9 of this P.O
19	Cable drum length	250 / 500 / 1000m
20	Volume Resistivity of insulation at 27°C	1X10 <sup>13</sup> Ω - cm min.
21	Volume Resistivity of insulation at 70°C	1X10 <sup>11</sup> Ω - cm min.

**N.B: 1) For values not available in relevant ISS, values indicated in our GTP / Tender Specification shall be valid.**

**2) In case of discrepancies between values of ISS & GTP, better will prevail.**

**3) Average diameters of strands of each cable shall be ascertained by physical measurement after opening the strands of each phase of a finished AB Cable offered for inspection.**

**TECHNICAL SPECIFICATIONS FOR AERIAL BUNCHED CABLE HAVING XLPE INSULATED L.T. CABLE FOR WORKING VOLTAGE UPTO 1100 VOLT**

<b>1.</b>	<b>SCOPE :</b>
	The specification covers design, manufacture, testing before despatch, transportation, supply and delivery of ISI marked 1100V Aerial Bunched Cable having XLPE insulated Cable (three Power Core) with stranded compact circular aluminium conductors twisted over an insulated aluminium alloy messenger wire for use as overhead distribution feeders, with/without one street lighting core with stranded compacted circular aluminium conductor XLPE insulated suitable for use on 3-Phase AC System conforming to IS-14255/1985 with up to date amendments.
<b>2.</b>	<b>LOCATION :</b>
	Aerial bunched Cables for use in L.T. overhead lines are preferred than conventional L.T. overhead lines with bare conductors as those are not subjected to frequent faults as happens with the bare conductors and also to minimise problem of tree clearance etc. ABC System is safer and eliminates use of insulators and associated hardwares required for bare conductors.
<b>3.</b>	<b>APPLICABLE STANDARDS :</b>
	Unless otherwise stipulated in this specification, the following standard with up to date amendment shall be applicable.
	IS 14255-1995   Specification for AERIAL Bunched Cables for working Voltage Up to & including 1100 Volts.
	IS : 8130   Specification for Conductors for Insulated Cables.
	IS : 398 (Part-IV)   Specification for Aluminium Alloy Conductor.
<b>4.</b>	<b>RATED VOLTAGE :</b>
	The rated Voltage of LT AB Cables shall be 1100 Volts.
<b>5.</b>	<b>CONDUCTORS :</b>
	The Aluminium Conductors for phase/street lightning conductor shall be H2 of H4 grade Aluminium complying with the requirements of IS-8130-1984 with up to date amendments. For messenger wire stranded All Aluminium Conductor shall be of heat treated Aluminium Magnesium-Silicon Alloy Wires containing approximate 0.5% magnesium and 0.5% silicon conforming to IS-398 (Part-IV)/1984 with up to date amendments. The stranded conductor shall be clean & reasonably uniform in size and shape and its surface shall be free from sharp edges. Not more than two joints shall be allowed in any of the wires forming every complete length of conductor and no joint shall be within 300 mm. of any other joint in the same layer. The joint shall be brazed, silver soldered or electric or gas welded. No joint shall be made in the conductor, once it has been stranded.
<b>6.</b>	<b>INSULATION :</b>
	The Conductor (with protective barrier, wherever applied) shall be provided with cross linked polyethylene applied by extrusion conforming to the standard Specification as per IS 14255/95.  The average thickness of insulation when measured in accordance with relevant clause of the specification, shall not be less than standard value specified. Upper surface of Cable insulation should be Ultra Violet Ray resistant Colour of insulation shall be black.
<b>7.</b>	<b>CORE IDENTIFICATION :</b>
	The Phase Conductors shall be insulated with black weather resistant, XLPE suitable for 1100 Volt insulation. The Phase Conductor shall be provided with one, two and three ridges for quick identification. The individual cores thus formed shall then be laid up around insulated messenger wire. The insulated messenger wire shall have four ridges as per IS 14255:1995. The insulated street lighting conductor shall not have any identification mark.

**9. LAYING UP :**

Three Power Cores having Ridges one, two and three and one street lighting without any ridge, if any should be twisted over insulated messenger wire with right hand direction of lay. This will form the Aerial Bunched Cable. Lay ratio shall be as specified in IS:14255/1995.

**10. TESTS FOR CABLES :**

10.1 Type test reports not older than 5 years of at least two sizes of Aerial Bunched Cables with & without street lighting core being procured and as specified in relevant IS & IEE and detailed in Clause 5.1 got conducted from independent recognised Test House shall be furnished by the bidders along with the bid. The bid not accompanied with test reports may not be considered for evaluation.

**TYPE TEST REPORTS SHALL CONTAIN DETAILS OF  
FOLLOWING TYPE TESTS AS PER IS 8130-1984 & IS 10810**

1.	Tests on Phase/Street Light Conductor :
i)	Tensile Test
ii)	Wrapping Test.
iii)	Resistance Test.
2.	Test on Messenger Conductor ;
i)	Breaking Load.
ii)	Elongation Test.
iii)	Resistance Test.
3.	Physical Test for XLPE insulation :
i)	Tensile Strength and elongation at break.
ii)	Ageing in oven.
iii)	Hot Set Test.
iv)	Shrinkage Test.
v)	Water Absorption (Gavimetric)
4.	Test for thickness insulation.
5.	Insulation performance (Volume resistivity) Test.
6.	High Voltage Test.  Report of above and any other type test provided in the relevant Indian Standards shall also be supplied.

**10.2 ROUTINE TEST :**

These shall be carried out on all sizes of all drums of unarmoured Cables by the supplier as given in Clause 5.1 and shall be got approved before despatch.

The Cable shall be inspected and tested at the manufacturer's works before despatch as per ISS mentioned in schedule of requirement. The manufacturer shall arrange all the necessary machinery, apparatus and labour required for the testing purpose.

The routine tests embodied in the respective ISS are as per list given below :

1. Conductor Resistance Test.
2. High Voltage Test at room temperature.
3. Cold Bend Test (optional)

Any other routine test provided in the relevant Indian Standards shall also be got conducted by the supplier.

the acceptance tests.

- (a) Tensile Test (for phase/street light conductor)
- (b) Wrapping Test (for phase/street light conductor)
- (c) Breaking Load Test for messenger Conductor.
- (d) Elongation test for messenger conductor.
- (e) Conductor resistance test.
- (f) Test for thickness of insulation.
- (g) Tensile Strength and Elongation at Break Test.
- (h) Hot Set Test for XLPE insulation.
- (i) Insulation resistance test and
- (j) High Voltage Test.

**11. SEQUENTIAL MARKING :**

Due to technical difficulty Marking of the Sequential Length is not required. Instead the Weight of Cable for all sizes shall have to be mentioned for Per K.M. Length.

**12. PACKING & MARKING :**

The Cable shall be supplied on suitable sized wooden non-returnable drum of robust construction for each length of Cables as per I.S. 10418. A layer of water proof paper shall be applied to the surface of the drums and over the outer cable layer. A clear space at least 40 mm. shall be left between the Cable and Logging. Wood preservative shall be applied to the entire drum. Each metre length shall be embossed with the Trade Name of Manufacturer and the work 'ELECTRIC WBSEDCL'. Packing shall be sturdy to protect the Cable from any injury during transportation handling and storage. Both Cable ends shall be sealed with PVC/Rubber Caps to eliminate ingress of moisture. Each Cable Drum shall have following information stenciled on it.

- a) Manufacturer's Name, Brand Name of Trade Mark.
- b) Year of Manufacture.
- c) Nominal Cross-Sectional area of the Cable Conductor.
- d) Type of Cable and Voltage Grade.
- e) Length of the Cable.
- f) Number of the Cores.
- g) ISI Certification Mark, IS reference.
- h) Colour of outer sheath.
- i) No. of lengths in Drum (if more than one)
- j) Cable Code.
- k) Direction of rotation of drum (by means of an arrow)
- l) Approximate gross weight in Kg./Km.

The standard Drum Length will be 500 mtrs. in each Drum for all sizes subject to a tolerance of  $\pm$  5%.

**13. INSPECTION :**

The Cable shall be inspected at manufacturer's works before despatch as per IS-7098 (Part-I)/1988 (with upto date amendments) & IS 14255/1995. All the acceptance tests embodied in the above shall be performed by the Inspecting Officer. The Manufacturer shall arrange without making any extra charges with all the necessary machinery, apparatus and labour requirement for the testing purpose. The Cable requirement for testing shall be Firm's Account.

**14. LITERATURE AND MANUAL :**

To be submitted as per General Terms & Conditions of Contract.

**15. GUARANTEED TECHNICAL PARTICULARS :**

To be submitted along with Tender documents.

<b>Description</b>	<b>Size</b>
1100V Grade L.T. Aerial Bunched Cable having three Power Core & One Neutral-Cum-Messenger Core of stranded compacted circular Aluminium Black coloured XLPE insulated & Core identification by ridges, one, two and three & four respectively. One Street Lighting Core of stranded, compacted Circular Aluminium Conductor, Black coloured XLPE insulated without any identification mark. Messenger-Cum-Neutral Wire should be of stranded compacted Circular Aluminium Alloy Conductor conforming to IS 8130/1984, IS-398(Part-IV)/1979 and IS-14255/1995 with upto date amendments, if any.	Ph.Wire + St.Light Wire + Messenger-Cum-Neutral Wire 1) 3x25 + 1x16 + 1x25 sq.mm. 2) 3x35 + 1x16 + 1x25 sq.mm. 3) 3x50 + 1x16 + 1x35 sq.mm. 4) 3x70 + 1x16 + 1x50 sq.mm.  (Provision for street light conductor is optional and as per requirement)

[ Sizes of Power Conductor & Messenger Wire may vary as per requirement ]

#### **B. ACCESSORIES REQUIRED FOR DRAWAL OF L.T. OVERHEAD LINE WITH 1100V GRADE AERIAL BUNCHED CABLES ON PCE POLE SUPPORT**

- | Sl. No. | <u>Description</u>   |
|---------|--|
| 1.      | Anchor Clamp (3-Bolt and 2 Bolt Type)  |
| 2.      | Eye hook with Suspension Clamp Assembly.   |
| 3.      | PCC Pole Clamp.  |
| 4.      | Insulation Piercing Connectors with cover or P.G.Connectors with insulation cover. |
| 5.      | Water Proof pre-insulated Hexagonal Compression Connectors & Lugs.                 |

**NOTE :** Offer for L.T. Aerial Bunched Cables should cover required accessories with details of dimensions, materials and provisional quantity per K.M. of L.T. O/H Line.

#### **DIMENSIONAL AND ELECTRICAL PARAMETERS :**

LTABC : The standard sizes and technical characteristics for Single Core Cable.

Nominal Sectional Area of Conductors (sq.mm.)

Parameters	16	25	35	50	70
No. of Strands	4	7	7	7	7
Dia. of Compacted Conductor (MM)	4.4	5.5	6.8	7.9	9.4
Approx. Mass (Kg./Km.)	42	65	95	127	170
Max. DC resistance at 20°C (ohm/km.)	1.91	1.20	0.868	0.641	0.443
Insulation Thickness (mm.)	1.2	1.2	1.2	1.5	1.5
Current rating at 40°C in air.	60	85	100	120	155

Note : The resistance values given in the Table are the max. permissible one.

#### **TECHNICAL CHARACTERISTIC OF INSULATED MESSENGER-CUM-NEUTRAL WIRE FOR LT ABC :**

Nominal Sectional Area (mm.)	Dia. of Compacted Conductor(mm.)	Approx. mass (Kg./Km.)	Max. D.C. resistance At 20C (Ohm./Km.)	Minimum Tensile Strength (KN)
25	5.9	65	1.38	7.4
35	6.9	95	0.986	10.3
50	7.9	127	0.689	14.0

**SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS FOR L.T. ABC CABLES**

Sl. No.	Description	Size-1	Size-2	Size-3
1.	Manufacturer's Name & Address			
2.	Lists of Standard applicable.			
3.	Power/Neutral-Cum-Messenger Core Conductors.			
3.1	Nominal cross sectional area, no. of standards and strand dia. i) Power Cross(mm.)n/mm. ii) Neutral-Cum-Messenger Core(mm)/n/mm. iii) Street Lighting Core(mm.)/n/mm. B. Max. DC resistance of conductor at 20°C i) Power Cross (Ohm/Km.) ii) Neutral-Cum-Messenger Core (Ohm/Km.) iii) Street Lighting Core (Ohm/Km.) C. Approximate diameter of Conductor. i) Power Cross (mm.) ii) Neutral-Cum-Messenger Core (mm.) iii) Street Lighting Core (mm.) D. Approximate dia over insulation. i) Power Cores. ii) Neutral-Cum-Messenger Core. iii) Street Lighting Core.			
3.2	Insulation Minimum Thickness i) Power Cross (mm.) ii) Neutral-Cum-Messenger Core (mm.) iii) Street Lighting Core (mm.)			
4.	Messenger Wire (Insulated) i) Nom. Cross Sectional area (sq.mm.) ii) Approx. breaking load (KN)			
5.	Current ratings Continuous current carrying capacity of Cable in Air at Ambient Temp. 40°C (Amp.) i) Power Cores ii) Neutral-Cum-Messenger Core iii) Street Lighting Core			
6.	Approx. Weight (Kg./Km.)			
7.	No. of Cores i) Power Core (No.) ii) Street Lighting Core (No.) iii) Insulated Messenger (No.)			
8.	Derating factor Derating factors for variation in Air Temp. Air Temp. °C			
9.	Rating Factor.			
9.1	Identification of Power Cores, Neutral-Cum- Messenger Core & Street Lighting Core.			
9.2	Laying.			
10.	Details of Power/Neutral-Cum-Messenger Core			
10.1	Conductor : a) Material b) Flexibility Class as per IS : 8130/84 c) Form of Conductor.			
10.2	Insulation a) Material. b) Form of Conductor			
11.	Voltage Grade of Cable. a) Service Voltage. b) Neutral Earthing.			
12.	Maximum Conductor Temperature. a) Continuous (in Deg.C) b) Short time (in Deg.C)			
13.	Type of curing of XLPE Insulation Completed Cable.			

**ANNEXURE - C**  
 Recommended Values of Static capacitor in KVAR  
 for power factor improvements

**A. INDUCTION MOTORS (LT)**

Sl.No	Total Motor Rating (hp)	KVAR rating of capacitors insisted	Sl.No	Total Motor Rating (hp)	KVAR rating of capacitors insisted
1	Upto 3	1	8	Above 25 up to 30	10
2	Above 3 up to 5	2	9	Above 30 up to 40	12
3	Above 5 up to 7.5	3	10	Above 40 up to 50	14
4	Above 7.5 up to 10	4	11	Above 50 up to 60	18
5	Above 10 up to 15	5	12	Above 60 up to 80	22
6	Above 15 up to 20	6	13	Above 80 up to 100	25
7	Above 20 up to 25	7.5	14	Above 100 up to 130	35

**B. WELDING TRANSFORMERS (LT)**

Sl.No	Rating of welding transformers in KVA	KVAR rating of capacitors insisted	Sl.No	Rating of welding transformers in KVA	KVAR rating of capacitors insisted
1	1	1	16	16	12
2	2	2	17	17	13
3	3	2	18	18	13
4	4	3	19	19	14
5	5	4	20	20	15
6	6	4	21	Above 20 up to 22	16
7	7	5	22	Above 22 up to 24	17.5
8	8	6	23	Above 24 up to 26	18
9	9	7.5	24	Above 26 up to 28	20
10	10	7.5	25	Above 28 up to 30	21
11	11	8	26	Above 30 up to 35	24
12	12	9	27	Above 35 up to 40	27.5
13	13	10	28	Above 40 up to 45	32.5
14	14	10	29	Above 45 up to 50	35
15	15	11			

### BURDEN IMPOSED BY VARIOUS INSTRUMENTS ON CT & PT

Name of the instrument	Analog meter	Digital meter
Ammeters	3VA	0.5 VA
Current element of wattmeters and PF Meter	5VA	0.1 VA
Current element of kWh and kVAR Meters	5VA	0.1 VA
Voltmeter	5 VA	1 VA
Voltage element of Wattmeter and P.F. Meters	5 VA	0.1 VA
Voltage element of kWh and kVAR Meters	7.5 VA	0.1 VA
Voltage element of Frequency Meters	7.5 VA	1 VA

### MINIMUM CLEARANCE BETWEEN OH LINES CROSSING EACH OTHER (IN METRES)

Sl.No.	Voltage	11-66kV	110-132kV	220kV	400kV	800kV
1	Low & Medium	2.44	3.05	4.58	5.46	7.94
2	11-66kV	2.44	3.05	4.58	5.49	7.94
3	110-132 kV	3.05	3.05	4.58	5.49	7.94
4	220 kV	4.58	4.58	4.58	5.49	7.94
5	400 kV	5.49	5.49	5.49	5.49	7.94
6	800 kV	7.94	7.94	7.94	7.94	7.94

### STATUTORY CLEARANCE - OH LINES

Voltage level	Above Ground				From Buildings		Between Conductors	
	Across any Street	Along any Street	Other areas		Vertical	Horizontal		
			Bare	Insulated				
M	M	M	M	M	M	M		
230 & 400 V	5.8	5.5	4.6	4	2.5	1.2	1.22	
11kV	6.1	5.8	4.6	4	3.7	1.2	1.83	
22kV & 33kV	6.1	6.1	5.8		3.7	2.0	2.44	
66kV	6.1	6.1	6.1		4	2.3	3.05	
110kV	6.1	6.1	6.1		4	2.3	3.05	
220kV	7	7	7		5.5	3.8	3.05	
400 kV	8.8	8.8	8.8		7.3	5.6	3.05	

### IF FOR TESTING POWER TRANSFORMER

2026	Specification
10028	Selection, installation
1180	Specification upto 100 KVA in 11 KV
335	New insulatin oil
1866	Maintenance if Insulating oil in service
6792	Dielectric strength if insulating oil
6103	Specific resistance of insulating oil
6262	Power of factor and dielectric constant oil
1448	Neutrakisation value (Acidity) Flash point
2362	Water content in the oil
6104	Test for interfacial tension
9434	Dissolved gas analysis

### RIGHT - OF - WAY CLEARANCE

AS PER IS 5613 (PART II SECTION 2):1976	
Transmission Vo Itage (kV)	Recommended Right-of-way (meters)
33	15
66	18
110	22
132	27
220	35
400	52

### ABBREVIATIONS

OTI	Oil temperature indicator	REF	Restricted earth fault
WTI	Winding temperature Indicator	RTD	Resistance temperature Device
AVR	Automatic voltage regulator	PE	Protective earthing
NGR	Neutral grounding transformer	PI	Polarisation index
OLTC	On load tap changer	IDMIL	Inverse definite minimum time lag
PCC	Power control centre	IR	Insulation resistance
PMCC	Power motor control Centre	IR	Ingress Protection
		BDV	Break down voltage

CLEARANCE OF LINES WITH RAILWAY TRACKS, RIVER	
Voltage	Distance in Meter
Upto and including 11kV	2.90
Above 11 kV including 33 kV	2.90
Above 33 kV including 66 kV	3.20
Above 66 kV including 110 kV	3.51
For 220 kV	4.11
For 400 kV	6.25
Minimum 3.48 m over the highestdt flood level for river which are not navigable. For navigable rivers tallest mast in consultation with authorities.	

**Annexure-I**  
**DEPRECIATION SCHEDULE**

<b>Description of Assets</b>		<b>Depreciation (Straight line) (%)</b>
A.	Land owned under full title	--
B.	Assets Purchased New:	
a.	Plant and machinery in generating stations including plant foundations	
	i) Hydro-electric	5.28
	ii) Steam electric	5.28
	NHRS & Waste Heat Recovery Boiler s/Plants	
	iii) Diesel-electric and gas plant	5.28
b.	Cooling towers and circulating water systems	5.28
c.	Hydraulic works forming part of Hydro-electric systems including:-	
	i) Dams, Spillways, weirs, canals, reinforced concrete Flumes and siphons	5.28
	ii) Reinforced concrete pipelines and surge tanks, steel pipelines, sluice gates, steel surge (tanks) hydraulic control valves and other hydraulic works	5.28
d.	Building & civil engineering works of permanent character	
	i) Offices & showrooms	3.34
	ii) Containing thermo-electric generating plant	3.34
	iii) Containing hydro-electric generating plant	3.34
	iv) Temporary erection such as wooden structures	100
	v) Roads other than kutcha roads	3.34
	vi) Others	3.34
e.	Transformers, transformer (Kiosk) substation equipment & other fixed apparatus (including	

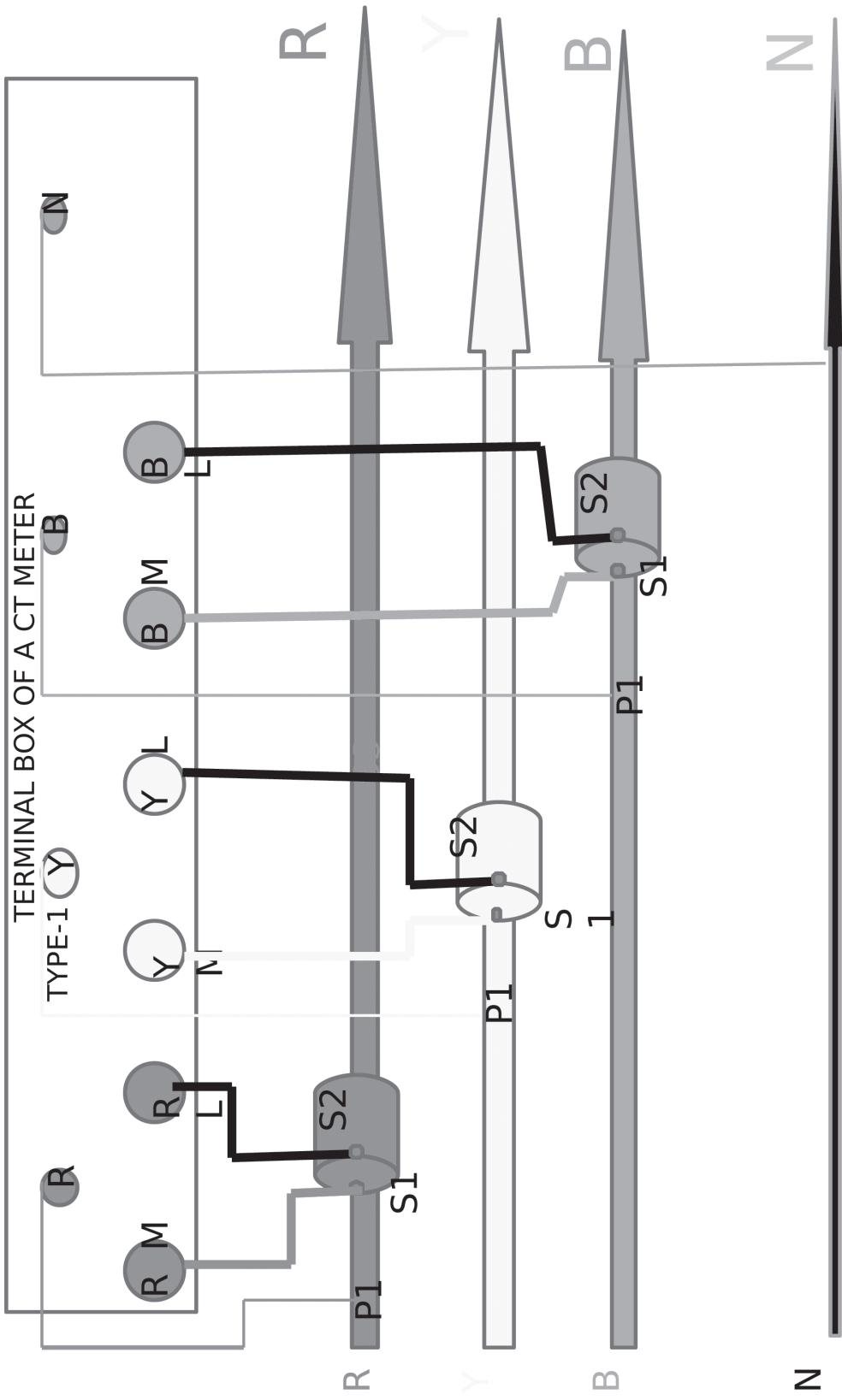
<b>Description of Assets</b>			<b>Depreciation (Straight line) (%)</b>
		plant foundations)	
	i)	Transformers (including foundations) having a rating of 100 kilo volt amperes and over	5.28
	ii)	Others	5.28
f.		Switchgear including cable connections	5.28
g.		Lightning arrestors	
	i)	Station type	5.28
	ii)	Pole type	5.28
	iii)	Synchronous condenser	5.28
h.		Batteries	5.28
	i)	Underground Cable including joint boxes and disconnected boxes	5.28
	ii)	Cable duct system	5.28
i.		Overhead lines including supports:	
	i)	Lines on fabricated steel operating at nominal voltages higher than 66 kV	5.28
	ii)	Lines on steel supports operating at nominal voltages higher than 13.2 kilovolts but not exceeding 66 kilovolts	5.28
	iii)	Lines on steel or reinforced concrete supports	5.28
	iv)	Lines on treated wood supports	5.28
j.		Meters	5.28
k.		Self propelled vehicles	9.50
l.		Air conditioning plants:	
	i)	Static	5.28
	ii)	Portable	9.50
m.	i)	Office furniture and fittings	6.33
	ii)	Office equipments	6.33
	iii)	Internal wiring including fittings and apparatus	6.33
	iv)	Street light fittings	5.28
n.		Apparatus let on hire	
	i)	Other than motors	9.50

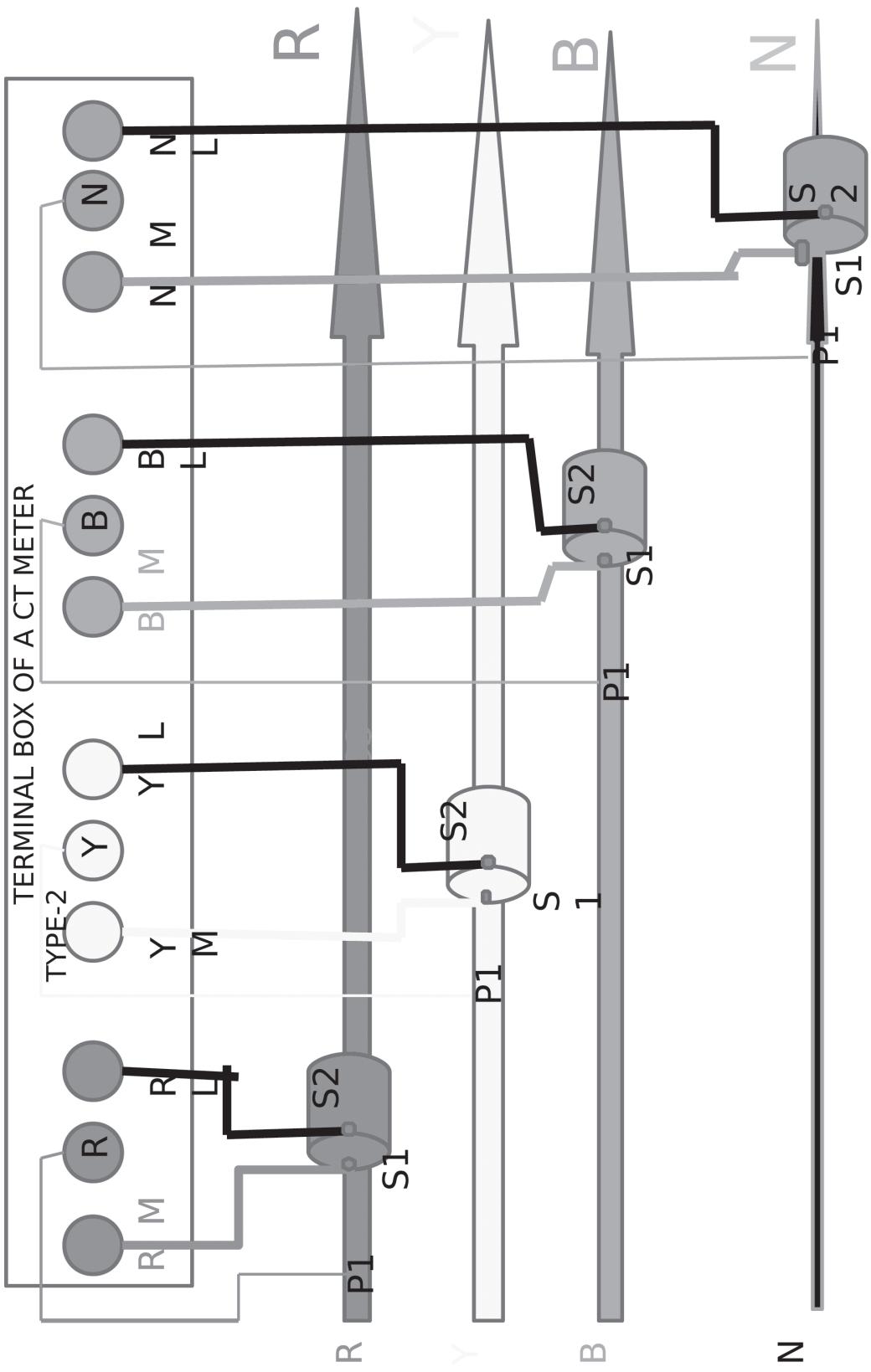
<b>Description of Assets</b>			<b>Depreciation (Straight line) (%)</b>
	ii)	Motors	6.33
o.		Communication equipment:	
	i)	Radio and high frequency carrier system	6.33
	ii)	Telephone lines and telephones	6.33
p.		I.T. equipments	15.00
q.		Assets purchased second hand and assets not otherwise provided for in the Schedule	5.28

### **Useful Life**

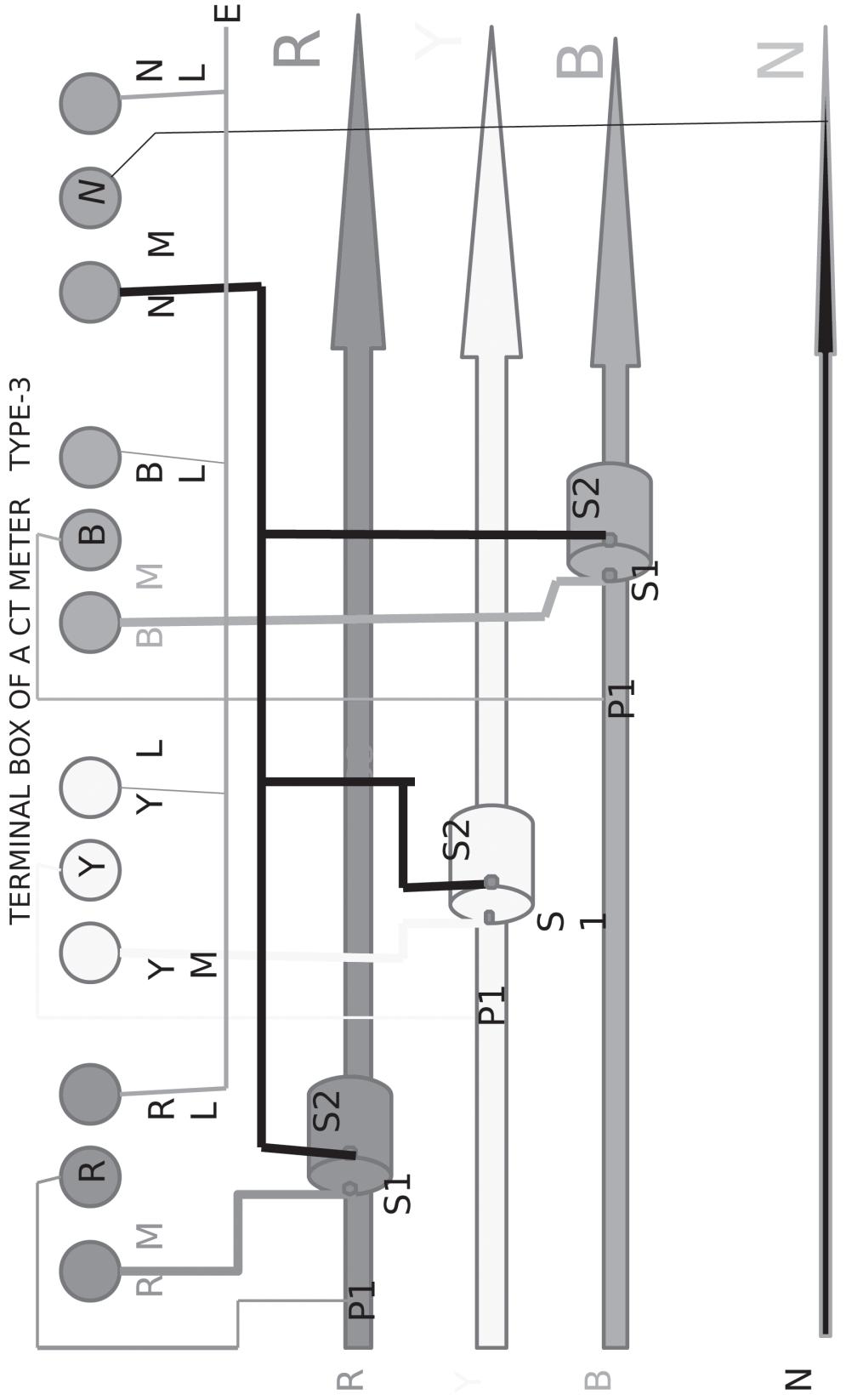
- (i) Gas/ Liquid fuel based thermal generating station:25 years
- (ii) Coal/Lignite based thermal generating station: 25 years
- (iii) Hydro generating station: 35 years
- (iv) AC and DC sub-station: 25 years
- (v) Gas Insulated sub-station (GIS): 25 years
- (vi) Transmission line and transmission system  
(including HVAC and HVDC): 35 years
- (vii) Distribution lines and distribution system: 35 years

# CT METER CONNECTION - WITH THREE CTs

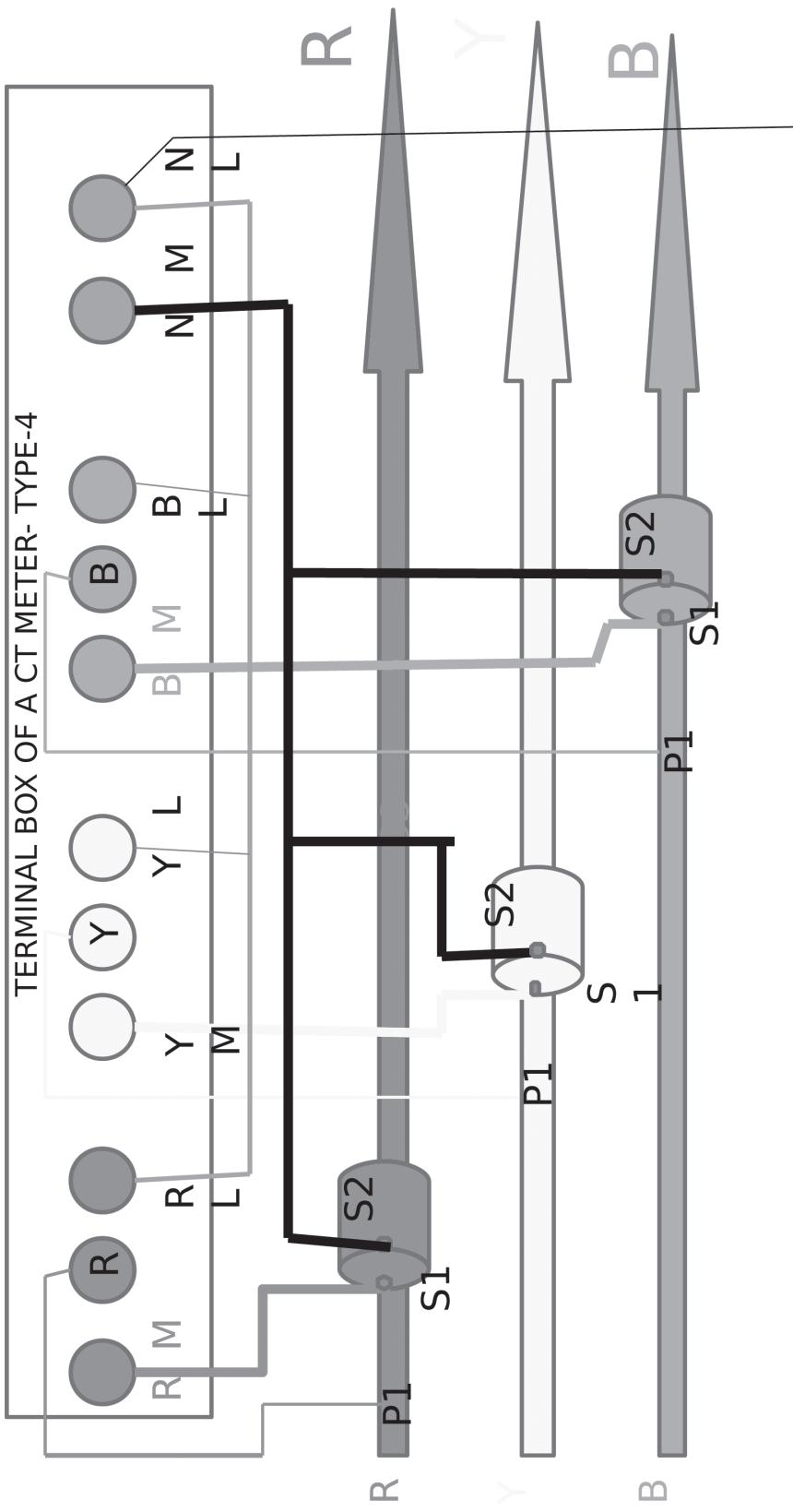




## CT METER CONNECTION - WITH FOUR CTS



**CT METER CONNECTION - 4 CT METER WITH  
NEUTRAL VOLTAGE TERMINAL AND USING THREE CTS**



**CT METER CONNECTION - 4 CT WITHOUT  
NEUTRAL VOLTAGE TERMINAL AND USING THREE CTS**



No.D(D&S)/D1/Gen/594/2015

Dated:25.07.2015

### **CIRCULAR**

Sub:- Energisation charge collected from individual consumers of high rise building – adopting KSERC approved rate – Regarding.

Ref:-1.Board' s Circular No.D(D&S)/D1/Gen/594/2015 dated 22.06.2015.

2.Order dated 01.07.2015 in O.P. No.4 of 2015 of KSERC.

3.B.O.(FTD)No.1735/2015(KSEB/TRAC/SOP/2014-15/R3)dtd 16.07.2015.

Board vide Circular cited 1<sup>st</sup> above ordered that estimated cost of service connection amount need not be collected from individual consumers of high rise building, colony, residential, commercial or industrial complexes etc. where the developer incur the cost of construction of the required internal distribution network as per Regulation 49 of Kerala Electricity Supply Code, 2014 and to collect an amount of ₹330/- as provisional charges for the service rendered, until approved rate for energisation charge is issued by the Hon'ble KSERC.

The Hon' ble KSERC vide ref(2) has authorised K.S.E.B.Ltd. to realise energisation charges at the rates of ₹300/- per consumer located in colonies, high rise buildings or commercial / industrial /residential complexes developed by promoters / builders etc.

As per B.O. (FTD) No.1735/2015(KSEB/TRAC/SOP/2014-15/R3) dated 16.07.2015, Board adopted the order dated 01.07.2015 of the Hon' ble KSERC with effect from 01.09.2015.

Board having considered the matter directed to collect only ₹300/- towards energisation charges forthwith while effecting service connection as per Regulation 49(6) & 49(7)(c) of Kerala Electricity Supply Code, 2014 to consumers located in colonies, high rise buildings or commercial/ industrial/ residential complexes developed by promoters/ builders etc.

Sd/-  
Secretary (Administration)

To

The Chief Engineer, Distribution (South/Central/North).  
All Deputy Chief Engineers, Electrical Circles.

Copy to:-

All Chief Engineers.  
All Executive Engineers, Electrical Divisions.  
All Assistant Executive Engineers, Electrical Sub Divisions  
All Assistant Engineers, Electrical Sections.  
The TA to Chairman & Managing Director.  
The TA to Director (Generation & HRM/ Transmission & System Operation/  
Distribution & Safety/Corporate Planning & Supply Chain Management/).  
The PA to Director (Finance)/ Senior C.A. to the Secretary (Administration).  
The Fair Copy Superintendent / Library / Stock File.

# KERALA STATE ELECTRICITY BOARD LTD.

## Abstract

Kerala Electricity Supply Code, 2014 – implementation of various regulations – providing connections to Board Employees and Retired Board Employees– Clarification - orders issued

### **Corporate Office (Tariff and Regulatory Affairs Cell)**

B.O.(FTD) No.**2026/2014** (KSEB/TRAC/SupplyCode2014/R2/2014) Thiruvananthapuram dated **25-07-2014**

- Read : 1. B.O. (FB) No. 2338/2007 (DPC 1/C-G1/31/2003) dated 15-10-2007  
2. B.O.(FM)(Genl) No.224/2012 (DPC1/C-GI/31/2003) dated 28-01-2012  
3. Gazette notification No. 215/DD/T&D (Rev.) 2014/KSERC dated 13-02-2014  
4. Note No. KSEB/TRAC/Supply Code 2014/R2/2014 dated 07-07-2014 of Chief Engineer (C&T) submitted to FTD

## O R D E R

Prior to the notification of Kerala Electricity Supply Code 2005, the service connections for domestic purpose in respect of Board Employees and Retired Board Employees were granted under Out of Turn Priority (OTP) without realizing the expenditure for providing electric connection. There was no provision for releasing connection to Board Employees under Out of Turn (OTP) priority in the Kerala Electricity Supply Code, 2005. In view of the service conditions prevailing in the Board, it was decided to continue releasing connections as per the directions contained in the Board Order dated 15-10-2007 read (1) above.

Subsequently, vide Board Order dated 28-01-2012 read as (2) above, the benefit to the Board Employees and Retired Board Employees were allowed to continue.

In the backdrop of the new Supply Code, 2014 notified by KSERC, apprehensions were raised by various trade unions and associations on the continuation of the facility and represented for issuing necessary orders.

Having considered the recommendations of the Chief Engineer (Commercial & Tariff) contained vide note read (4) above, Board issues the following orders in the subject matter.

1. Field officers are directed to continue the practice in the matter of releasing electric connection to the Board Employees and Retired Board Employees as per the conditions prescribed in the Board Order, B.O. (FB) No. 2338/2007 (DPC 1/C-G1/31/2003) dated 15-10-2007 and book the expenditure under separate head under employee cost.
2. Financial Advisor is authorized to communicate the appropriate accounting head under employee cost for booking the cost of providing electric supply to Board Employees and Retired Board Employees to the field officers concerned.

Orders are issued accordingly.

By order of the FTD

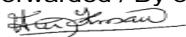
Sd/-

**M. Shahul Hameed**  
**Secretary(Administration)**

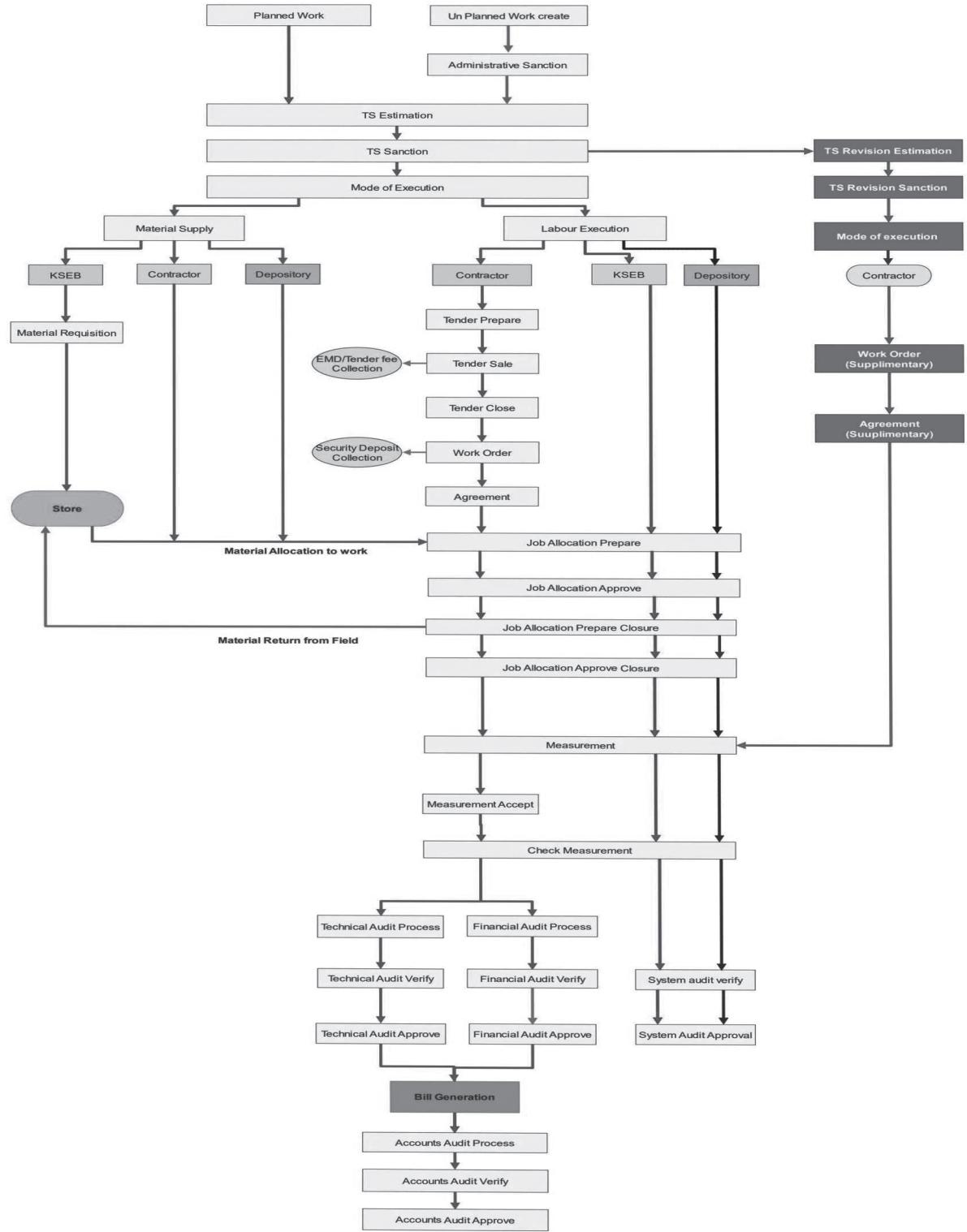
To : The Chief Engineer (Commercial & Tariff)  
The Chief Engineer-(Corporate Planning)/IT

The Chief Engineer (Distribution-South/Central/North)  
The Chief Engineer (Transmission South / North)  
The Financial Adviser / Chief Internal Auditor

Forwarded / By order



Asst. Executive Engineer



## BOLT & NUT SIZES AND WEIGHT

Sl. No.	Inches	mm	Kg / No.
1	2 1/2 X 1/2	12 X 65	0.11
2	2 1/2 X 5/8	16 X 65	0.165
3	3 X 5/8	16 X 75	0.175
4	4 X 1/2	12 X 100	0.15
5	4 X 5/8	16 X 100	0.205
6	5 X 5/8	16 X 152	0.24
7	6 X 1/2	12 X 152	0.155
8	6 X 5/8	16 X 150	0.26
9	6 X 3/4	20 X 150	0.5
10	8 X 1/2	12 X 200	0.25
11	8 X 5/8	16 X 200	0.36
12	8 X 3/4	20 X 200	0.565
13	10 X 5/8	16 X 254	0.425
14	12 X 5/8	16 X 305	0.52
15	12 X 3/4	20 X 305	0.76
16	14 X 3/4	20 X 356	0.925
Brass	1 1/2 X 3/8	10 X 40	0.034

## **Functional organisation including staff strength, duties & responsibilities of staff of the proposed model sections**

### **A. Staff Strength**

The personnel in Electrical Section's may be rearranged into the following functional grouping. There will be three functional groups in the model section offices.

1. Breakdown Wing
2. Maintenance and Capital Work Wing
3. Revenue Wing.

#### **1. Breakdown Wing**

**The functions to be attended by personnel in the breakdown wing will include:**

1. Attend in fuse-off call.
2. Switching on/off of streetlights.
3. Attending 33 kV/11 kV interruptions.
4. Attending night duty (Where shift system is not followed). Where shift system is presently functioning□ the same will continue.
5. Maintaining operations diary/interruption register.
6. Avail permit to work□ issue non back feeding certificate
7. Back feeding and normalization of supply.
8. Duty arrangement of breakdown gang.
9. Maintaining all mandatory registers

#### **Staff pattern**

<b>Category</b>	<b>Sections having shift duty</b>	<b>Other sections</b>
1. Sub Engineer	2	1
2. Overseer	4	3
3. Line Man	10	8

**The following facilities shall be made available to the breakdown wing.**

- |                            |                    |
|----------------------------|--------------------|
| 1. Vehicle                 | 1                  |
| 2. Mobile phone            | 2                  |
| 3. Toolkit                 | 1                  |
| 4. Adjustable fiber ladder | 1                  |
| 5. Earthing Rod            | 3                  |
| 6. Safety belt             | 2                  |
| 7. Helmet                  | 12                 |
| 8. 11 kV gloves            | 3 pairs            |
| 9. Torch                   | 1                  |
| 10. Lock & Key             | As per requirement |

## **2. Maintenance and Capital Work Wing**

**The functions to be attended by personnel in the Maintenance and Capital Work Wing will include:**

1. Preparation of maintenance schedule
2. Periodical maintenance
  - a. 33 kV/11 kV line maintenance.
  - b. LT line maintenance
  - c. Transformer maintenance
  - d. 33 kV/ 11 kV structure maintenance
  - e. Clearing line touching in 33 kV / 11 kV & LT
3. Streetlight maintenance
4. Material procurement□ supply and store keeping and preparation of MASA
5. Estimate preparation (including planned works) except service connection
6. Work arranging and supervision
7. Major breakdown works (damaged/ dashed poles etc)
8. Ensuring safety standards as per norms
9. Complaint receiving and Redressal
10. Receiving all types of applications□ categorizing and distributing them to the concerned employees
11. Registering service connection
12. Maintaining cleanliness of office and office premises
13. Maintaining transformer register and maintenance register
14. Processing requirement for power allocation□ Checking feasibility and necessary documentation
15. Maintaining blue book and all technical registers
16. Carrying out all capital works including 11 kV / LT line construction /transformer structure construction□ transformer installation□ Line conversion Deposit works (Except meter shifting) etc.
17. Energy audit
18. Avail permit to work□ issue non back feeding certificate in consultation with Sub Engineer of breakdown wing
19. Identifying capital works for providing uninterrupted quality power
20. Maintaining all mandatory registers

### **Staff pattern**

Sub Engineer	1
Overseer	2
Line Man	2
Electricity Worker	4

**The following facilities shall be made available to the Capital/Maintenance wing.**

- i. Computer 1
- ii. Printer 1
- iii. Toolkit 1

iv.	Adjustable fiber ladder	1
v.	Enquiry counter	1
vi.	Safety equipments (set)	1
vii.	Lock and key	as per requirement

### 3. Revenue Wing

**The functions to be attended by personnel in the Revenue Wing will include:**

1. Bi-monthly reading and billing
2. Monthly reading and billing
3. Streetlight billing
4. Cash collection and remittance
5. Disconnection and reconnection
6. Carrying out Inspection as part of section squad for theft/anomaly detection
7. Invoice preparation (ACD/APTS/section squad)
8. Preparation of arrear notices & dismantling notices and revenue recovery
9. Preparation of accounts
10. Changing of faulty meters
11. Renewing of service wires and GI wires
12. Preparation of estimates for service connection and work deposits (Meter changing / Meter shifting)
13. Effecting of new service connection
14. Tariff change and ownership changes
15. Preparation of working estimates□ tenders/quotatio□ local orders and work agreements and maintaining respective registers
16. Maintaining all registers related to revenue
17. Check reading
18. Implementing RI Act
19. Inspection of consumer premises for detecting of abnormalities
20. Maintaining all mandatory registers

### Staff pattern

Senior Supt	1
Sub Engineer	1
Overseer	1
Line Man	2
Electricity Worker	2
Meter Reader	as per requirement
Cashier	do
Senior Assistant	do

**The following facilities shall be made available to the Revenue wing.**

1. Computer server	1
2. Computer client	1
3. PDA	as per requirement
4. Printer	1
5. Currency counting machine	1

	Revenue	Maintenance & Capital	Breakdown		Total	
			For shift	Others	For shift	Others
Assistant Engineer			1			1
Senior Superintendent	1					1
Sub Engineer	1	1	2	1	4	3
Overseer	1	2	4	3	7	6
Lineman	2	2	10	8	14	12
Electricity Worker	2	4	0	0	6	6
Senior Assistant	As per requirement				As per requirement	
Cashier	As per requirement				As per requirement	
Meter Reader	As per requirement				As per requirement	

## **B. Duties & Responsibilities of Staff of Proposed Model Sections**

### **Electricity Worker**

Work as per the instruction of superiors concerned

### **Lineman**

#### **1. Breakdown**

Maintaining power supply is the main function of this gang. The major duties and responsibilities include:

- a. Fuse off call attending
- b. HT/LT supply interruption attending
- c. Switching ON/OFF of streetlight
- d. Attending Shift duty/Night duty
- e. Any other work specifically assigned by superior officers

#### **2. Maintenance & Capital**

The major duties and responsibilities include:

Assisting and carrying out the following works as per directions of superior officers under supervision

- 1. Periodical patrolling and maintenance of
  - a. 33 & 11 KV line and structures
  - b. LT line
  - c. Transformer & allied items
- 2. 33 KV □ 11KV and LT line periodical touching Clearing
- 3. Assisting Major breakdown maintenance
- 4. Assisting in Post insertion works
- 5. Assisting in line conversion works
- 6. Assisting Execution of LT deposit works excluding meter shifting.
- 7. Any other work specifically assigned by superior officers

#### **3. Revenue**

The major duties and responsibilities include:

- a. Effecting service connection
- b. Faulty meter changing
- c. Renewing service wire & guy wire
- d. Disconnection □ Reconnection & dismantling
- e. Serving monthly bill
- f. Serving arrear notice & dismantling notice and other invoices.
- g. Meter shifting (work deposit)
- h. Any other work specifically assigned by superior officers

## **Meter Reader**

The major duties and responsibilities include:

- a. Daily meter reading & billing as per pre-arranged area in the prescribed zone.
- b. Posting of meter reading in reading register daily
- c. Upload reading details from PDA to computer & down load reading details from computer.
- d. If any abnormalities noted enter in abnormality register and inform the concerned official
- e. Assist revenue SE as and when required.
- f. Clarify complaints about reading & billing to the higher authorities.
- i. Any other work specifically assigned by superior officers

## **Overseer**

### **1. Breakdown**

The major duties and responsibilities include:

- a. Complaint registering & telephone duty
- b. Attending LT supply interruption & HT under supervision
- c. Arrange switching ON/OFF of streetlights.
- d. Attending Shift duty/Night duty.
- e. Any other work specifically assigned by superior officers

### **2. Maintenance & Capital**

The major duties and responsibilities include:

Assisting and carrying out the following works as per directions of superior officers under supervision

#### 1. Periodical Maintenance of

- a. 33 & 11 KV line & structure under supervision
- b. Transformer & allied items under supervision
- c. LT line

#### 2. Arranging 33 KV/11KV/LT line periodical touching clearing

#### 3. Major breakdown maintenance

#### 4. Post insertion

#### 5. Line conversion

#### 6. Execution of LT deposit works

#### 7. Ensuring safety norms.

#### 8. Assist Sub Engineer to ensure cleanliness of office & office premises.

#### 9. Supervising street light maintenance & inspection of street lights

#### 10. Any other work specifically assigned by superior officers

### **3. Revenue**

The major duties and responsibilities include:

- a. Single phase faulty meter changing with the assistance of Lineman
- b. Single phase service connection effecting with the assistance of Lineman

- c. Arranging Disconnection□ Reconnection and dismantling & note down FR/IR and meter details
- d. Supervising service wire & guy wire changing.
- e. Arrange to serve arrear notice & dismantling notice and other invoices.
- f. Meter shifting (work deposit) with the assistance of Lineman
- g. Check reading minimum 100 consumers/month.
- h.** Any other work specifically assigned by superior officers

## **Sub Engineer**

### **1. Breakdown**

#### **Maintaining power supply is the responsibility of Sub Engineer**

The major duties and responsibilities include:

- 1. Supervising complaint registering regarding supply interruption & telephone duty
- 2. Arranging and Supervising HT/LT supply interruption rectification works
- 3. Arranging shift duty/Night duty for a month in advance and make substitute arrangement as and when required
- 4. Maintaining operations diary/interruption register
- 5. Avail permit to work□ issue & receive Non Back feeding Certificate
- 6. Back feeding & normalization of supply
- 7. Any other work specifically assigned by superior officers

### **2. Maintenance & Capital**

The major duties and responsibilities include:

- 1. Periodical Maintenance of
  - a. 33/11 KV line & structure
  - b. LT line
  - c. Transformer and allied items

Arranging and supervising of:

- 2. 33 KV/11KV/LT line periodical touching clearing
- 3. Major breakdown maintenance
- 4. Post insertion
- 5. Line conversion
- 6. Execution of LT deposit works
- 7. Ensuring safety norms.
- 8. Ensure cleanliness of office & office premises.
- 9. Monthly reading if necessary
- 10. Arranging street light maintenance & procuring street light materials from local bodies.
- 11. Arranging of materials procurement□ supply and storkeeping & preparation of MASA
- 12. Estimate preparation (including planned works) except service connection

13. Work arranging & work supervision
14. Complaint Redressal
15. Registering of service connection in the absence of AE.
16. Maintaining transformer register & maintenance register
17. Estimate preparation for power allocation
18. Preparation of maintenance schedule for a month in advance
19. Avail permit to work for maintenance works
20. Preparation of working estimate
21. Conduct energy audit
22. Assist AE in implementing RI Act
23. Maintenance and upkeep of distribution map of section office
24. Tree cutting & allied works in connection with construction of new lines
25. Assist Assistant Engineer in obtaining PTCC and necessary other clearance for drawal of line
26. Identifying capital works for providing uninterrupted quality power
27. Any other work specifically assigned by superior officers

### **3. REVENUE**

The major duties and responsibilities include:

1. Monthly reading
2. Estimate preparation for service connection/additional load/tariff change
3. Arranging three phase faulty meter changing
4. Supervising effecting of three phase service connection
5. Arranging Disconnection and Reconnection of monthly billed consumers
6. Inspecting consumer premises for detecting abnormalities if any
7. Arranging Service connection
8. Updating and up keeping of all mandatory registers
9. Check reading minimum 100 numbers /month
10. Assist AE in sanctioning of working estimate  tenders/quotation  local order  work agreement and survey reporting
11. Complaint Redressal related to revenue
12. Ensure spot billing work done as per schedule
13. Verify abnormality register conduct spot inspection and take necessary action.
14. Any other work specifically assigned by superior officers
15. Preparation of petitions to be filed before District Collector to remove the objections over property crossing of service connection line
16. Entry of details of service connections  disconnections  reconnections  dismantling  meter changing  phasing  tariff changing  ownership changing data in the computer

**Where there is no shift duty, Sub Engineers, Overseers and Linemen of that section will attend peak duty and holiday duty on rotation basis.**

### **Cashier**

The major duties and responsibilities include:

1. Cash collection & remittance as per the direction of Senior Superintendent daily
2. Note down disconnection /reconnection list in concerned register daily
3. All other works related to cash collection entrusted by Senior Superintendent

### **Senior Assistant**

The major duties and responsibilities include:

1. Reading entry & billing
2. Invoice preparation (ACD/APTS/Section Squad)]
3. Arrear notice□ dismantling notice & Revenue Recovery letter preparation
4. Accounts preparation
5. Maintaining tariff changing register & all other revenue registers including CD register
6. Cash collection/remittance in exigencies
7. Attend complaints regarding billing in the absence of senior superintendent
8. All other works related to billing & cash collection entrusted by senior superintendent
9. Attend all duties of Senior Superintendent in the absence of Senior Superintendent
10. Preparing reply to audit queries
11. Assist Senior Superintendent as Assistant Engineer in legal matters
12. Assist Senior Superintendent implementing RI Act.
13. Collect cheque /MO/DD and maintain registers concerned and its timely crediting to Board's account.
14. Any other work specifically assigned by superior officers

### **Senior Superintendent**

Responsible for all billing and revenue matters in the section office.

The major duties and responsibilities include:

1. Arrange cash collection without hindrance
2. Responsible for 100% verification of all collection□ accounting and remittance including division cash on all days
3. Supervise preparation of accounts & submit to the concerned in time
4. Submit details called for by higher offices within the stipulated time
5. Check DC/RC register and inform immediately to the Assistant Engineer if any discrepancies noted
6. Attend the works related to cash collection□ billing and accounts in the absence of Cashier/Senior Assistant.
7. Cash remittance in exigencies.
8. Ensure meter reading□ billing and collection of alive consumers.
9. Attend/Redressal of all complaints regarding revenue & billing.
10. Disbursement of salary/other claims & maintenance of acquittance register
11. Ensure invoice preparation (ACD/APTS/Section squad)
12. Ensure maintenance and upkeep of tariff changing register and all mandatory registers relating to billing and revenue.
13. Ensure availability of materials required for cash collection.
14. Rendering necessary help to Assistant Engineer in legal matters
15. Implementing RI Act.
16. Submit reply to audit queries.

17. Checking the details of addition/ deletions disconnections etc of services from the field staff and for incorporating them in the relevant records maintained in the section office
18. He/she shall check all monthly and adjustment bills
19. Faulty meter remained unchanged for long period shall be brought to the notice of Assistant Engineer
20. Responsible for monitoring revenue arrears and initiate Revenue Recovery action wherever necessary as per rules.
21. Preparation and Issuing door lock notice wherever necessary.
22. Monitor abnormalities in consumption pattern of consumers and bring to the notice of Assistant Engineer if required
23. Upkeeping of attendance register and casual leave register
24. Help Assistant Engineer in enforcing discipline among staff
25. Any other work specifically assigned by superior officers

### **Assistant Engineer**

#### **Head of the Section office**

The major duties and responsibilities include:

1. Overall responsibility for the functioning of section office.
2. Ensure proper functioning of all functional teams
3. Receiving all applications/complaints & entrust the concerned for Redressal. Ensure timely Redressal of complaints
4. Supervising all works of the section office and ensuring that the works conform to specifications construction standards and statutory provisions
5. Ensure safety norms impart safety training & inspection of work site.
6. Conduct sunrise meeting (daily review of pending works and issues before commencement of daily works) staff meeting load advisory committee etc.
7. Arrange procurement and issue of materials as per requirement
8. Identifying Proposing Preparing Scheduling uttore and timely commissioning of planned works with the help of capital & maintenance Sub Engineer
9. Sanctioning of working estimate tender/quotation bcal order work agreement as per delegation. Ensure correctness and technical soundness of estimate of all works under the section
10. Measuring of work bill ensure that work bills are prepared and forwarded to higher office for payment in time.
11. Ensure energy auditing with the help of Capital/Maintenance Sub Engineer
12. Ensure that all reports/details are send to the higher authorities in time
13. Take meter reading of HT service connection prepare and forward HT meter reading statement to the concerned authority. Check reading a minimum of 100 consumers/month
14. Ensure office discipline
15. Arrange publication of notices regarding supply interruptions through media.
16. Display notices in the office about cash collection safety fees to be remitted service connection priority list and all other matters related to consumers/applicants.
17. Arranging plant & machinery and amenities for the staff to work properly and safely

18. Ensure inspection of Tools and Plant and equipments maintained in the section office and maintain T&P Register
19. Ensure that MASA is prepared and submitted in time
20. Pre-arrange daily spot billing area and zone in consultation with Senior Superintendent & Sub Engineer (Revenue) and ensure that the work is completed within the stipulated time
21. Ensure compliance of Service connection procedure and raising demands such as AF IF TF CD SCC OYEC WD etc
22. Sanctioning ownership change effecting tariff change sanctioning OTP OYEC deposit works etc. as per rule.
23. Maintain and render accounts of vehicle under his control and ensure effective utilization between functional units
24. Arrange for survey of line routes lay out of distribution mains and major line extension works
25. Ensure that inspection of meter complaints and replacement of faulty meters are carried out in time
26. Ensure proper maintenance and upkeep of all mandatory registers
27. Periodically check abnormality register and ensure promptness of action
28. Proper deployment of staff among the functional groups sanction of leaves and make/ensure substitute arrangement as and when required.
29. Supervise important capital works like HT service connection and CT meter connection commissioning of 11Kv lines transformer installation etc. major maintenance works like replacement of faulty transformers cable faults and major breakdown works.
30. Ensure proper upkeep of office and surroundings
31. Organizing customer contact programmes including demand side management activities
32. To obtain sanctions required for drawal of lines
33. Any other work specifically assigned by superior officers

**These duties and functions now in vogue other than specified in this order could also be adhered**

Sd/-  
**Secretary**

## **STRESS MANAGEMENT**

Why is managing stress important?

How stress affects your well-being.?

### **Understanding Stress**

- *Stress is a natural response.*



### **Different types of stress**

- **Acute Stress:** This is the most common form of stress and is often short-term. It results from specific situations or events, such as a challenging work deadline, a minor conflict, or a temporary life disruption.
- **Chronic Stress:** Chronic stress is long-term and ongoing, often resulting from persistent issues like financial problems, family conflicts, or chronic health conditions.
- **Eustress:** Eustress is a positive form of stress that arises from exciting or challenging situations, like getting married, starting

*a new job, or taking on a personal project. It can be motivating and invigorating.*

**Distress:** *Distress is negative stress that results from challenging, unpleasant, or traumatic events. This type of stress can lead to mental and physical health issues if not managed effectively*

**Psychosocial Stress:** *Stress related to social and psychological factors, such as interpersonal conflicts, discrimination, or bullying. It can have a significant impact on mental well-being.*

**Environmental Stress:** *Environmental stressors arise from factors like pollution, natural disasters, noise, or overcrowding. These stressors can affect both physical and mental health.*

**Work-Related Stress:** *Stress stemming from job-related pressures, including high workloads, tight deadlines, and difficult colleagues. Occupational stress can lead to burnout and health problems.*

**Financial Stress:** *Money-related stress occurs when individuals experience financial instability, debts, or financial worries. It can cause significant anxiety and negatively impact overall well-being.*

**Secondary Traumatic Stress:** *Also known as vicarious trauma, this stress results from exposure to others' traumatic experiences. It is common among healthcare professionals, first responders, and caregivers.*

**Post-Traumatic Stress:** *Often experienced after a traumatic event, this type of stress can lead to recurring thoughts, nightmares, and emotional distress.*

**Developmental Stress:** Stress related to life transitions, such as moving to a new city, starting college, or becoming a parent. These changes can be exciting but also challenging.

**Daily Hassles:** Everyday stressors, like traffic jams, misplacing keys, or arguments, can add up and contribute to overall stress levels.

### **How stress can be both good and bad?**

*Stress can indeed be both good and bad, depending on how it is experienced and managed*



### **Good Stress (Eustress):**

**Motivation:** A certain level of stress can motivate individuals to achieve goals and complete tasks. It can act as a driving force, helping you stay focused and work efficiently.

**Performance:** Some stress can enhance performance. For example, the pressure of a competition or a challenging project can improve concentration and result in better outcomes.

**Growth and Learning:** Overcoming stressors can lead to personal growth and increased resilience. Facing and overcoming challenges can build confidence and self-esteem.

**Adaptation:** Stress can signal the need for change and adaptation. It can help individuals become more flexible and open to new experiences.

### **Bad Stress (Distress):**

**Physical Health:** Prolonged or severe distress can lead to physical health problems such as high blood pressure, heart disease, and weakened immune function.

**Mental Health:** Chronic stress is a major contributor to mental health issues like anxiety and depression. It can lead to emotional and psychological distress.

**Burnout:** Excessive stress, especially in the workplace, can lead to burnout, characterized by exhaustion, reduced performance, and a feeling of detachment from one's job or responsibilities.

**Interpersonal Conflicts:** Stress can lead to irritability and strained relationships, causing conflicts with family, friends, and colleagues.

**Behavioural Changes:** Some people may resort to unhealthy coping mechanisms when stressed, like overeating, substance abuse, or neglecting self-care.

**Reduced Productivity:** While some stress can enhance performance, excessive stress can overwhelm individuals, leading to decreased productivity and errors.

**Sleep Disturbances:** Stress can disrupt sleep patterns, resulting in insomnia or poor-quality sleep, which can further exacerbate stress.

## **The Effects of Stress**

***Stress can affect your body and mind.***

*Physical symptoms.*

*Emotional impact*

## **Identifying Your Stressors**

**Self-Reflection:** Take time to think about what situations or circumstances have caused you stress in the past.

**Stress Journal:** Keep a journal to record daily experiences and emotional responses, noting what happened and how you felt.

**Physical Signs:** Pay attention to physical signs of stress, such as tension, headaches, or sleep disturbances.

**Emotional Awareness:** Recognize your emotional reactions and what makes you feel anxious, frustrated or overwhelmed.

**Behavioural Patterns:** Identify patterns in your behaviour, especially coping mechanisms or avoidance strategies.

**Life Domains :** Examine different life domains such as work, relationships and finances to identify stress sources.

**Major Life Events:** Consider major life events, both positive and negative, that may be causing stress.

**Current Stressors:** Identify ongoing sources of stress, such as deadlines, conflicts, and responsibilities.

**Relationship Dynamics:** Assess how relationships and interpersonal interactions may be causing stress.

**Work Stress:** Recognize job-related stressors, including workload, deadlines, and workplace dynamics.

**Health and Well-Being:** Identify health-related sources of stress, like medical conditions or lifestyle choices.

**Unresolved Issues:** Consider unresolved problems or unmet goals that contribute to your stress.

**Future Concerns:** Anticipate potential future stressors, such as upcoming events or deadlines, and plan proactively.

### **Practical Stress Reduction Techniques**

**Deep Breathing:** Take slow, deep breaths. Inhale through your nose, hold briefly, and exhale slowly through your mouth. It calms the nervous system.



**Progressive Muscle Relaxation:** Progressive Muscle Relaxation (PMR) is a relaxation technique that involves tensing and then relaxing different muscle groups in your body to reduce physical tension and stress. Here's how it works:

**Find a Quiet Space:** To practice PMR, find a quiet and comfortable space where you won't be disturbed. You can sit or lie down.

**Start at Your Head:** Begin at your head and work your way down to your toes. You can start with your facial muscles, for instance. Close your eyes and take a few deep breaths to center yourself.

**Tense the Muscles:** Focus on a specific muscle group, such as your forehead or jaw. Tense those muscles as tightly as you can, but don't strain or hurt yourself. Hold the tension for about 5-10 seconds.

**Release the Tension:** Suddenly and completely release the tension in that muscle group. Let go of the tension and allow the muscles to relax. You may feel a sense of relief as the tension fades.

**Rest and Breathe:** Take a moment to breathe and enjoy the sensation of relaxation in that muscle group. It's a contrast to the tension you felt before.

**Move to the Next Muscle Group:** Progressively move through your body, from head to toe, tensing and relaxing each muscle group one at a time.

**Stay Mindful:** As you go through the process, focus on the difference between tension and relaxation. Pay attention to the sensations in each muscle group.

**Complete the Full Body:** Finish by working your way down to your toes. By the end, your entire body should feel more relaxed and tension-free.

**Mindfulness Meditation:** Focus on the present moment without judgment. It reduces anxiety and promotes relaxation.

**Exercise:** Physical activity releases endorphins, which are natural stress reducers. Even a short walk can help



**Yoga:** Yoga combines physical postures, breathing, and meditation. It enhances flexibility and relaxation



**Aromatherapy:** Aromatherapy is a holistic therapy that uses the scents of essential oils, such as lavender and chamomile, to promote relaxation, reduce stress, and improve mood through inhalation.

*It works by stimulating the brain's emotional centers when you breathe in the scents.*

**Journaling**: Write down your thoughts and emotions. It helps process stress and gain clarity.

**Music and Nature Sounds**: Listen to calming music or nature sounds to reduce stress and promote relaxation.

**Guided Imagery**: Visualize peaceful scenes or scenarios to relax your mind and reduce stress.

**Laughing**: Laughter releases endorphins, which combat stress. Watch a funny movie or share a joke.

**Social Support**: Talk to friends and family about your stress. Sharing can be comforting and reduce its impact.

**Time Management**: Organize tasks, set priorities, and break them into manageable steps to reduce stress.

**Disconnect from Technology**: Take breaks from screens and notifications to reduce digital stress.

**Healthy Eating**: Consume a balanced diet with whole foods. Proper nutrition helps manage stress.

**Sleep**: Prioritize good sleep habits, ensuring you get enough rest to cope with stress effectively.



**Limit Caffeine and Alcohol:** Reduce the intake of stimulants like coffee and alcohol, which can exacerbate stress.



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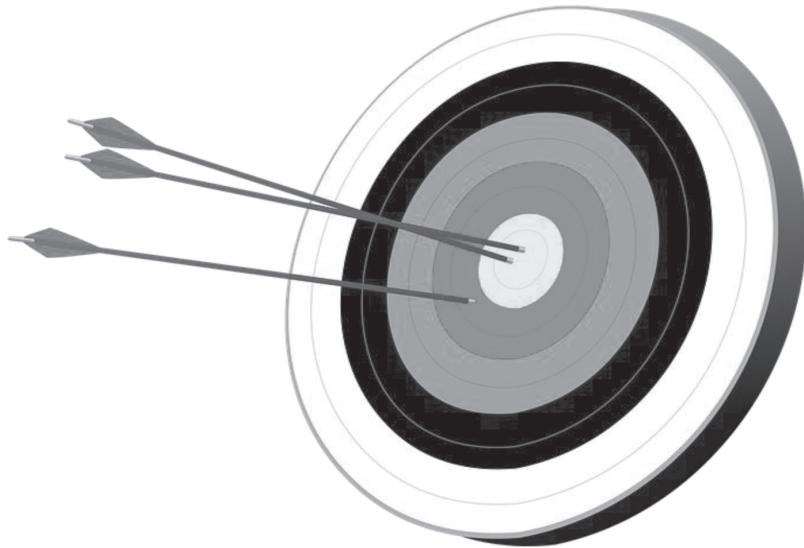
**Exercises:** Practice breathing techniques like 4-7-8 (inhale for 4 seconds, hold for 7, exhale for 8) for relaxation.

**Guided Relaxation Apps:** Use smartphone apps that offer guided relaxation exercises and mindfulness.

**Spend Time in Nature:** Being in nature, even briefly, can reduce stress and improve mood.

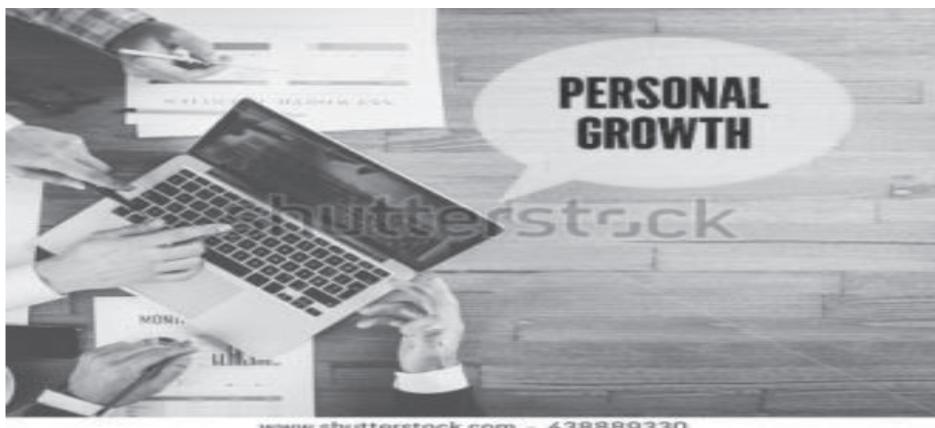
**Art and Creativity:** Engage in creative activities like painting, writing, or crafting as an outlet for stress.

# GOAL SETTING



You are born to win

Be a successful you



What is success?



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- Success is achieving goal



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## REASONS OF FAILURE

- Laziness
- Pessimism
- Lack of patience

## Fear is the worst enemy

- Fear of mistake
- Fear of failure



## Be successful

How to be successful?

- Be intelligent
- Be imaginative
- Be innovative



A black and white portrait of Bill Gates, smiling and wearing glasses and a button-down shirt. In the top right corner of the image frame, there is a watermark that reads "Well Said Quotes" with a small logo.

"I didn't even complete my university education"

- Bill Gates



**"My teachers used to  
call me a failure"**

- Tony Blair



**Sylvester Stallone** was rejected  
1500 times when selling his script &  
himself for famous Rocky film

**"I was rejected in the interview of Pilot"**

**- Abdul Kalam**

## DREAMS & GOALS

- Dreams are not time bound
- Goals should end up with a dead line
- Goal gives you direction and keeps you focused on where you want to end up

### How does a goal form?

Two types of goals

- Fixed & flexible



# TYPES OF GOALS

- Short-term goals
- Mid-term goals
- Long-term goals

# How to set your goal?

- What are the few things to achieve in
  - next week?
  - next month?
  - next year?
  - within five years?
  - Within ten years?

Goal should be SMART



Realistic &unrealistic goals



dreamstime.com

## **REALISTIC GOAL**

- ▶ Current situation
- ▶ Resource
- ▶ Available time

## **UNREALISTIC GOAL**

- Unrealistic goals require unavailable resources

### **Why should one set goal?**

- To take control on life
- To focus on important things
- To finish the task efficiently
- To be self confident
- To manage time effectively

### **Why don't people set goal?**

- Pessimist attitude

- Seeing pitfalls rather than possibilities
- Fear of rejection
- Procrastination
- Low self esteem
- Lack of ambition
- Lack of guidelines
- Be attentive
- Be optimistic
- Have a role model



Let the graph of your life grow up

- Next year?
- After five years?
- After ten years?

Go ahead

- Success is with you LET US PREPARE  
A GOAL CHART

Goal Area	What are the results I expect to accomplish this year in line with my long-range goals?	What actions will I take to make this happen?	When do I want to accomplish this?
Career			
Health			
Family			
Spiritual			
Social			
Financial			

## VISUALIZE YOUR GOAL

### OUTCOME VISUALIZATION & PROCESS VISUALIZATION

Visualization does not guarantee success. It also does not replace hard work and practice. **But when combined with diligent effort (and, I would add, a strong support network), it is a powerful way to achieve positive, behavioural change and create the life you desire**

## **TIME MANAGEMENT**

### Why Time Management Matters?

- *To Achieve your goals.*
- *To reduce stress, and regain control.*

### The Time Management Mind-set

- *Your Time, Your Life: Recognize that time is your most valuable resource.*
- *Mind-set Shift: Embrace a proactive, purpose-driven approach to time.*

### Time Audit

- *Self-Reflection: We begin with a time audit.*
- *Analyze Your Time: Understand where your time goes each day.*

### Setting Priorities

- *Your Priorities: Identifying what truly matters to you.*
- *The Power of No: Learning to say **no** to less important tasks*
- *The Power of No: Learning to say **no** to less important tasks*

### Goal Setting

- *Your Goals, Your Timeline: Setting SMART goals.*
- *Your Vision: Connect your goals to your long-term vision.*

### Planning Techniques

- *Mastering Your Calendar: Efficiently plan your day, week, and month.*
- *Time Blocking: Allocate focused time for specific tasks.*

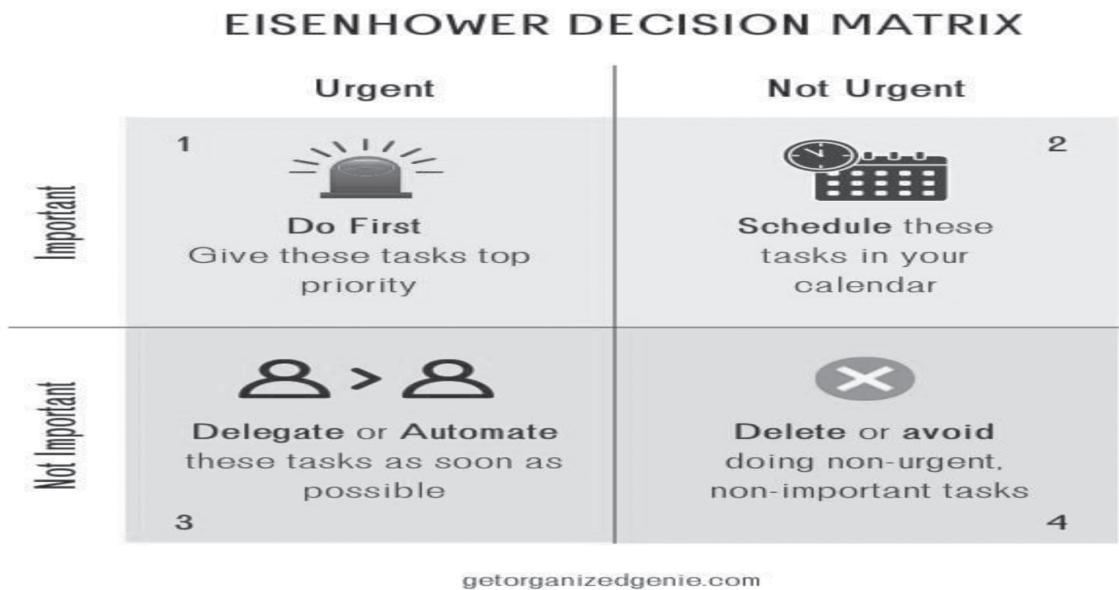
### Dealing with Procrastination

*Overcoming Resistance: Techniques to combat procrastination*

- *Tackle Your Tasks: Start small, build momentum (taking gradual and consistent steps toward your goal or task).*

### Prioritization Matrix

- *Urgent vs. Important: Using the Eisenhower Matrix.*



### Effective Task Management

- *The Power of Lists: Organize tasks with to-do lists.*
- *TooWorkshop Activity: Participants prioritize their tasks.*
- *Is and Apps: Explore helpful task management tools.*

### Time Wasters

- *Identifying Time Drains: Recognizing common time wasters.*
- *Workshop Discussion: Share personal experiences and solutions.*

#### a) Time-saving Techniques

- *Time Hacks:*

## **b) Time Management Ninja Moves: Practical tips and tricks.**

"Time Management Ninja Moves" are like super-efficient tricks for managing your time and tasks.

*They make you feel like a ninja (a "ninja" is a historical and cultural figure from Japan who was highly skilled in martial arts, espionage, and covert operations) because you can get things done quickly and effectively.*

### **Batching**

- *This is like doing similar tasks together at once, like answering all your emails in one go instead of doing them randomly throughout the day.*

### **Two-Minute Rule:**

- *If a task takes less than two minutes to do, just do it right away. It's a quick win.*

### **Pomodoro Technique**

*The "Pomodoro Technique" is a time management method developed by Francesco Cirillo in the late 1980s*

*It is named after the Italian word for "tomato" because Cirillo initially used a tomato-shaped kitchen timer to track his work intervals.*

*The technique is designed to help people improve their productivity and focus by breaking work into short, timed intervals separated by brief breaks.*

- *Work for 25 minutes, take a 5-minute break. It helps you stay focused.*

### **Time Blocking:**

- *Plan specific times on your calendar for different tasks. During those times, only work on that one thing.*

### **Eisenhower Matrix:**

- Sort tasks by what's urgent and important. Focus on what's both.



### Ivy Lee Method:

*Write down the six most important tasks for tomorrow. Do them in order.*

### Zero Inbox:

- Keep your email inbox clean by dealing with emails as they come in.

### Task Sprints:

- Set a short time to focus intensely on a task.

### Delegate:

- Give tasks to others when you can. You don't have to do everything yourself.

### Single Tasking:

- Focus on one thing at a time. It's better than trying to do many things at once.

### Managing Interruptions

- Minimizing Distractions: Techniques to stay focused.
- Workshop Activity: Participants create their distraction-minimizing plan.

### Stress Reduction

- *Stress and Time: How time management reduces stress.*
- *Relaxation Techniques: Incorporate relaxation into your daily routine.*

### **Making Time for Self-care**

- *Self-Care Matters: Allocate time for yourself.*
- *Workshop Activity: Participants create a self-care plan.*

### **Accountability and Tracking**

- *Staying Accountable: Techniques to maintain your time management progress.*
- *Tracking Progress: Measure your success over time.*

### **Commitment to Action**

- *Personal Pledge: Each participant sets a specific time management goal.*

## ABSTRACT OF LOADING AND UNLOADING STATEMENT

Item No.	Name of Material	Unit	Unit Weight
1	HT stay / strut clamp		1.8 kg
2	2 Line x - arm	No	2.75
3	2 Line x - arm with CBN	Set	3.5
4	4 Line x - arm with CBN	No	6.25
5	4 Line x - arm with CBN	Set	7.5
6	Clamp for 2 Line x - arm	No.	0.75
7	LT Stayrod	No.	3.2
8	LT Stay Wire	Kg	1 kg
9	LT Packing Clamp	No	0.28
10	GI wire 3.15 mm	Kg	1
11	GI wire 4 mm	Kg	1
12	GI wire 5 mm	Kg	1
13	VX - arm with CBN	Kg	13
14	VX - arm	No	11.17
15	Clamp for VX - arm	No	1.8
16	Earth Pipe	No	9
17	HT GI Stay road 20 mm	No	4.2 or 4.8
18	Channel X arm 3 m (31.88 CBN)	No	28.88
20	Channel X arm 3 m 2.4 with CBN	Set	21
21	Channel X-arm 1.8 m	No	13
22	Channel X - arm 1.8 m with CBN	Set	14.5
23	Clamp for Channel X - arm	No	1.5
24	11 KV HM Fittings	No	1.6
25	F-Type top bracker	No	1.4 or 1.5
26	HT Stay Wire	Kg	1
27	11 KV Turn Buckle	No	3.4 or 3.5
28	GI Cleat	No	0.92
29	PVC 1/1.4 mm SC	Coil	2
30	W/P wire 1/1.8 mm TC	Coil	7
31	W/P wire 1/2.8 mm TC	Coil	12
32	Iron Scrap	Kg	1
33	SCSR SCRAP	Kg	1
34	Oruma Spot bill forms	Bundle	15.5
35	Oruma receipt forms	Bundle	10.6
36	Stationary	Kg	1
37	LT XL PE SC Cable 50 mm	m	0.3
38	LT XL PE SC Cable 95 mm	m	0.4
39	LTXLPE SC Cable 120 mm	m	0.5
40	LTXLPE SC Cable 150 mm	m	0.7

Item No.	Name of Material	Unit	Unit Weight
41	LTXLPE SC Cable 185 mm	m	0.9
42	Safety Belt	No	1
43	Earth Rod	No	3
44	Safety Helmet	No	0.4
45	11 KV Rubber Hand Gloves	Pair	0.6
46	Rain Coat	No	1
47	AB Swith SPARE 400 A	Set	110
48	GI BOLT & NUT 14x3/4 (350x20)	Kg	1
49	GI BOLT & NUT 12 X 3/4 (300 x 20)	Kg	1
50	GI BOLT & NUT 10x3/4 (250x20)	Kg	1
51	GI BOLT & NUT 8x3/4 (200x20)	Kg	1
52	GI BOLT & NUT 8x1/2 (200x12)	Kg	1
53	GI BOLT & NUT 6x1/2 (150x12)	Kg	1
54	Stay Tightner LT	Kg	3.2
55	Stay Tightner HT	Kg	4.3
56	GI BOLT & NUT 5 x 1/2 (125x12)	Kg	1
57	GI BOLT & NUT 4 x 1/2 (100x12)	Kg	1
58	GO BOLT & NUT 3 x 1/2 (75x12)	Kg	1
59	GI BOLT & NUT 2 $\frac{1}{2}$ x 1/2 (65x12)	Kg	1
60	GI BOLT & NUT 2 $\frac{1}{2}$ x 1/2 (60x12)	Kg	1
61	GI BOT & NUT 2 x 1/2 (50x12)	Kg	1
62	GI BOLT & NUT 3 x 5/8 (75x16)	Kg	1
63	Transformer Oil	Barrel	200
64	Fuse Wire 100 A	Kg	1
65	Fuse Wire 200 A	Kg	1
66	Fuse Wire 300 A	Kg	1
67	LT Line Spacer for 2 Wire Line 450 mm	No	0.2
68	LT Line spacer for 2 Wire line 300 mm	No	0.14
69	LT Line spacer for 4 Wire line (3x300 mm)	No	0.3
70	Cable Lug 50 mm2	No	0.008
71	Cable Lug 70 mm2	No	0.014
72	Cable Lug 95 mm2	No	0.016
73	Cable Lug 120 mm2	No	0.022
74	Cable Lug 150 mm2	No	0.03
75	Cable Lug 185 mm2	No	0.038
76	Streat Light Meter box	No	5.6
77	ACSR SQUIRREL	m	0.085
78	ACSR WEASEL	m	0.128
79	Rabbit	m	0.214
80	Raccon	m	0.319



വിശ്വാരഫ് എം

പ്രശസ്തനായ എണ്ണിനിയർ, ആധുനിക മെമസുരിൻ്റെ ശിൽപ്പി, ജനനം 1861 സെപ്റ്റംബർ 15ന് കർണാടകത്തിലെ കോലാർ ജില്ലയിൽ. വിദ്യാഭ്യാസാനന്തരം ബോംബെ ഗവൺമെന്റിൽ സുപ്രഭാംഗ് എൻജിനീയർ ആയി. സുക്കൂറിലെ പ്രസിദ്ധമായ ശുഭജല വിതരണ പദ്ധതി ആസുത്രണം ചെയ്തു. പുനയിലെ ജലസേചന പദ്ധതി നവീകരിച്ചു. 1904 തോണിയിലെ സിവിൽ എണ്ണിനീയർമാരുടെ സാര്വൈസറിൽ അംഗമായി. 1909 തോണിയിലെ പൊതു ഗവൺമെന്റിൽ സേവനം അനുഷ്ഠിച്ചു. പിന്നീട് മെമസുരിലെ ചീഫ് എൻജിനീയറും ഗവൺമെന്റ് സെക്രട്ടറിയുമായി. മെമസുരിലെ പ്രസിദ്ധമായ കൃഷ്ണരാജ സാഗർ അണക്കെട്ട് ആസുത്രണം ചെയ്തു നിർമ്മിച്ചു. 1912ൽ മെമസുരി ദിവാനായി, 1915 തോണിയിൽ യൂണിവേഴ്സിറ്റി സ്ഥാപിച്ചു. 1923 തോണിയിൽ ഉരുക്കു നിർമ്മാണ ശാലയുടെ ചുമതല ഏറ്റൊടുത്തു പെട്ടീം രാജാവിൽ നിന്നും സർ സ്ഥാനവും ഇന്ത്യ ഗവൺമെന്റിൽ നിന്ന് ഭാരത തത്ത്വവും ലഭിച്ചു. 1962 ഏപ്രിൽ 14 അന്തരിച്ചു. അദ്ദേഹത്തിന്റെ ജമദിനമായ സെപ്റ്റംബർ 15 ലോക എൻജിനീയേഴ്സ് ഡേ ആയി ആശേഷിക്കുന്നു.

സന്ദർഭം: രാജാവൻ ടി.എ

# മുഖ്യ

പ്രിയ സ്പീഷ്യ് വാക്സ് ആപ്പ് ശുപ്പ് അംഗങ്ങളെ,

സ്പീഷ്യ് ശുപ്പിന്റെ 10-ാം വാർഷികത്തോടനുബന്ധിച്ച് നമ്മൾ പുരത്തിരക്കുന്ന Elektra എന്ന ഇന കൊച്ചു മാഗസിനിൽ ഇലക്ട്രിസിറ്റി ബോർഡിന്റെ അത്യാവശ്യമുള്ള ഡാറ്റകൾ മാത്രമേ സ്ഥല പരിമിതി മുലം ഉൾപ്പെടുത്താൻ സാധിച്ചിട്ടുള്ളു. വയനാട്ടിൽ വെച്ച് ഇങ്ങനെ ഒരു സെലിബ്രേഷൻ നടത്താൻ സാധിച്ചതിൽ, ഈ പ്രോഗ്രാമിൽ പങ്കെടുക്കുന്ന എല്ലാവരേയും സ്പീഷ്യ് വാക്സായപ്പ് കൂട്ടായ്മയുടെ പേരിൽ ഹൃദയംഗമായ കൃതജ്ഞത അറിയിക്കേണ്ട്.