

Answer on Question #42958, Physics, Other

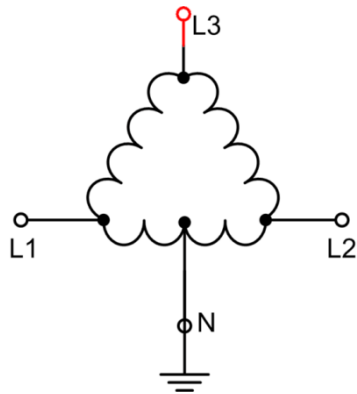
Task:

Explain briefly what is meant by three phase electrical installation, indicating why is beneficial in some commercial and industrial. why it is necessary for the different phases to be identified by different colours of insulation or labels the consumer

Answer:

In electrical engineering, three-phase electric power systems have at least three conductors carrying alternating current voltages that are offset in time by one-third of the period. A three-phase system may be arranged in delta (Δ) or star (Y) (also denoted as wye in some areas). A wye system allows the use of two different voltages from all three phases, such as a 230/400V system which provides 230V between the neutral (centre hub) and any one of the phases, and 400V across any two phases. A delta system arrangement only provides one voltage magnitude, however it has a greater redundancy as it may continue to operate normally with one of the three supply windings offline, albeit at 57.7% of total capacity. Harmonic currents in the neutral may become very large if non-linear loads are connected.

Conductors of a three-phase system are usually identified by a color code, to allow for balanced loading and to assure the correct phase rotation for induction motors. Colors used may adhere to International Standard IEC 60446, older standards or to no standard at all and may vary even within a single installation.



Country	L1	L2	L3	Neutral	Ground / protective earth
Australia and New Zealand as per AS/NZS 3000:2007 Figure 3.2 (or as per IEC 60446 as approved by AS:3000)	Red (or brown)	White (or black) (prev. yellow)	Dark blue (or grey)	Black (or blue)	Green/yellow striped (green on very old installations)

Canada (mandatory)	Red	Black	Blue	White or Grey	Green or bare copper
Canada (isolated three-phase installations)	Orange	Brown	Yellow	White	Green
European Union and all countries who use European CENELEC standards April 2004 (IEC 60446), Hong Kong from July 2007, Singapore from March 2009	Brown	Black	Grey	Blue	Green/yellow striped
Older European (IEC 60446, varies by country)	Red	Yellow	Blue	Black	Green/yellow striped (green on installations before c. 1970)
UK until April 2006, Hong Kong until April 2009, South Africa, Malaysia, Singapore until February 2011	Red	Yellow	Blue	Black	Green/yellow striped (green on installations before c. 1970)
India and Pakistan	Red	Yellow	Blue	Black	Green/yellow striped, or green
Former USSR (Russia, Ukraine, Kazakhstan) and People's Republic of China (per GB 50303-2002 Section 15.2.2)	Yellow	Green	Red	Sky blue	Green/yellow striped
Norway	Black	White/Grey	Brown	Blue	Yellow/green striped, older may be only yellow or bare copper

United States (common practice)	Black	Red	Blue	White, or grey	Green, green/yellow striped, or a bare copper wire
United States (alternative practice)	Brown	Orange (delta), violet (wye)	Yellow	Grey, or white	Green

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