GENERATOR SET
POWER FACTOR EXPLAINED

POWER FACTOR

Power factor is defined as the ratio of real power (kW) to apparent power (kVA) in an AC electrical power system.
Power Factor = kW ÷ kVA (always a number between 0 and 1)

POWER FACTOR & GENERATOR SET KVA

Generator sets are rated in kVA at 0.8 power factor lagging.
This 0.8 power factor is not the load power factor.
It is a nominal power factor used to calculate the kW output of an engine to supply the power for a particular alternator kVA output.
Example:
Alternator output (kVA) : 100kVA
Engine power output (kW) : 100kVA x 0.8 = 80kW
Alternators are therefore designed to supply their rated kVA at 0.8 lagging power factor. At other power factors the generator set and alternator have certain output limitations as defined by the Generator Set Capability Curve.

LAGGING LOAD POWER FACTOR & ALTERNATOR KVA

Lagging power factor <0.8 : lagging power factor below 0.8 results in the heating of the rotor winding at 100% of alternator kVA output

LEADING LOAD POWER FACTOR & ALTERNATOR KVA

Leading power factor : leading power factor results in alternator stator end iron heating and the alternator automatic voltage control system becoming unstable

LAGGING LOAD POWER FACTOR & ENGINE KW

Lagging power factor >0.8 : lagging power factor above 0.8 results in the engine not having sufficient kW to power the alternator to 100% of its kVA rating

Lagging power factor <0.8 : lagging power factor below 0.8 results in the engine having surplus kW to power the alternator in excess of its 100% kVA rating