

## CHAPTER 12 PORTABLE POWER

*IEC receptacles for hazardous areas are designed only to accept plugs from the same manufacturer.*

### 12.1 APPLICATIONS

Heavy-duty receptacles and cord connectors are used in various applications:

- To supply power to portable electrically operated motor generator sets, compressors, heating and cooling units, welders, conveyors, lighting systems or other similar equipment.
- Where temporary power is needed, such as at trailers, building units, heavy machinery or similar equipment.
- Whatever electrical loads must be quickly disconnected from power source.
- In installations where large machines utilize electrical motor drives. For ease of adjustments, maintenance and replacement, each motor is connected to power by plugs and receptacles and portable cord/cable rather than fixed wiring.

Typically, the most common applications are for welding outlets and portable power in industrial process facilities, shipyards, manufacturing plants, oil rigs and chemical plants where dust, dirt and moisture are present.

#### 12.1.1 SPECIAL CONSIDERATIONS

Many plugs, receptacles and cord connectors are designed for quick-disconnect of equipment under full rated load or locked rotor currents, in emergency situations. However, in all cases, a circuit breaker or disconnect switch as shown in Chapter 11 should be the primary means of circuit disconnect. If more severe conditions exist, other load interrupting means such as receptacles interlocked with circuit breakers, fuses or disconnect switches must be used. Note that if the receptacle is located in a hazardous area, the interlock must be explosion protected.

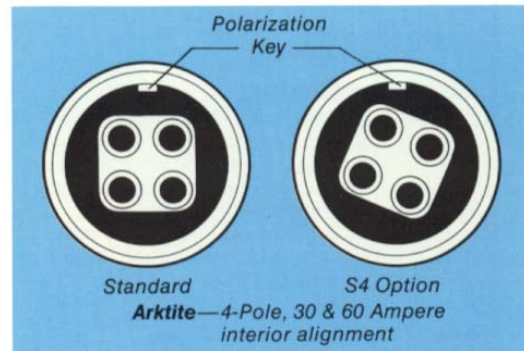


*Cooper Crouse-Hinds offers Arktime and IEC 309 configured plugs and receptacles with switches, circuit breakers and fuses.*

#### 12.1.2 POLARIZATION

Plugs, cord connectors and receptacles are available with different ratings and polarization to provide means of preventing interconnections of different ratings, voltages or frequencies. Equipment connected to circuits having different voltage, frequency or type of current on the same premises must have plugs and/or receptacles that are not interchangeable.

Non-interchangeability is provided through 2 methods. The first is with different sizes and configurations of the contacts. The second is with various keying arrangements of the plug sleeve and receptacle housing. By varying these parameters, sufficient configurations are available to avoid improper interchangeability on the same premises.



*Arktime Plugs and receptacle interiors can be rotated 22-1/2 degrees at factory. This is designated as the S4 option.*

### 12.2 CONFIGURATIONS

When exporting electrical and electronic equipment to foreign countries, there are three basic power plug and receptacle configuration systems in use in most countries of the world. They are the national configurations, IEC 309 configurations and IEC 320 configurations.

#### 12.2.1 NATIONAL CONFIGURATIONS

National configurations are plug / receptacles of a blade or pin design that are commonly used in a general geographical area or a specific country for the connection of electrical / electronic equipment to a power source. Generally, plugs and receptacles rated as 16 ampere-250 volts or less are used on computers, appliances, medical equipment, small machines, portable tools and other light duty/medium duty electrical equipment. Many countries have configuration standards for 2 pole-2 wire, 2 pole-3 wire and 3 pole-4 wire type plugs/receptacles. However, the widespread usage is the 2 pole-3 wire grounding configuration. Usage of the 2 pole-3 wire grounding configurations in foreign countries is similar to the use and application of NEMA 5-15 plugs and receptacles in the United States. All *National* configuration plugs, receptacles, connectors, power strips, cords and cord sets are approved by the appropriate testing agency where applicable.

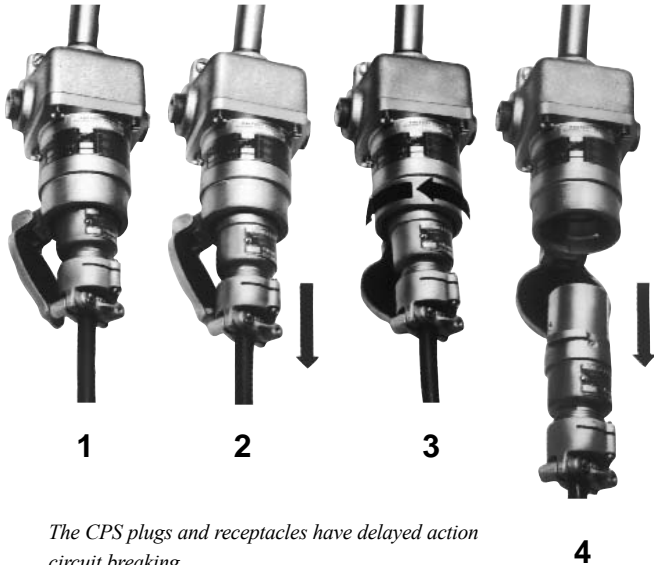




*The FSQ is available in for Class I, Division 1 areas in 30, 60 & 100 amps. Rotating the plug after insertion activates this switch and locks the plug in place.*

### 12.3.2 DELAYED ACTION

The plug and receptacle are constructed so that any electrical arcs that may occur at the contacts will be confined inside explosionproof chambers. This type design also prevents the rapid withdrawal of the plug from the receptacle, thereby giving any heated metal parts or particles time to cool before they come into contact with the surrounding atmosphere.



*The CPS plugs and receptacles have delayed action circuit breaking.*

In the picture above, Step 1 shows a Cooper Crouse-Hinds CES receptacle assembly with CPH plug fully engaged. Step 2 shows the plug withdrawn until it is stopped by the delayed action sleeve. In this position the circuit has been broken and the arc has been snuffed in the contact chambers. Step 3 shows the delayed action receptacle sleeve rotated approximately 45° to allow withdrawal of plug from receptacle. Step 4 shows the plug completely withdrawn.

### 12.4 IEC PLUGS FOR HAZARDOUS AREAS

While the IEC 309 configuration is interchangeable for normal industrial locations, this is not the case for hazardous locations. Receptacles are designed to accept only plugs from the same manufacturer. For example, a Zone 1 plug can be used in a receptacle for Zone 2 or ordinary locations. However, the converse is not true. An ordinary location plug will not operate a Zone 1 or 2 receptacle. This is to prevent usage of non-rated portable equipment in hazardous locations.



*The Cooper Crouse-Hinds Zone 1 plug will operate the Zone 1, Zone 2 and ordinary location receptacle. The Zone 2 and ordinary plugs will not operate the Zone 1 receptacle. This is to prevent non-rated portable equipment from being used in a classified location.*

### 12.5 PERIODIC MAINTENANCE

All electrical equipment used in industrial and other heavy-use situations must be inspected regularly and repaired if necessary, to ensure proper function and safety.

#### 12.5.1 INSPECTION SCHEDULE

Inspection of all fixed receptacles must be conducted at least once a year but more frequently if conditions warrant as in severely corrosive atmospheres or high use areas. Plugs and cord connectors must be inspected more frequently than once a year if subjected to mechanical abuse such as being dropped on hard surfaces or dragged on the ground. It is especially important to check the integrity of cord connector polarization.

#### 12.5.2 STRAIN RELIEF

Cord and cable strain relief mechanism on plugs and cord connectors must be inspected to ensure no external force can be transmitted through the cord or cable to the conductor/wire terminations. Tighten clamps screw or other means of applying clamping force to values specified in the individual product inspection sheet. Make sure the outer cord/cable jacket is completely within the clamping area and there are no breaks, cracks or cuts in the cable jacket.



*The new, improved Arktime plug has an expanded cord grip range, making it ideally suited for the oil patch OEMs.*

**Expanded Cord Grip Ranges**

30 Amp	.390" - 1.20"
60 Amp	.500" - 1.45"
100 Amp	.875" - 1.94"

**12.5.3 CONTACTS**

Discoloration of contact terminations in plugs, receptacles and cord connectors is usually due to excessive heat and is a clear indication of a problem that must be corrected before further use of the equipment. Loose conductor connections, equipment operated at greater than rated current, too high ambient temperature, repeated disconnection under load, poor pin to sleeve contact and too small of a wire size are all possible contributors to circuit resistance and overheating. All "individual" wire strands must be contained in the termination area, and the termination must be tight. Use of a ferrule is recommended for finely stranded wire.

Plugs should fit firmly when inserted into the mating connector and receptacle. Insufficient mating force of contacts can result in contact erosion/pitting caused by arcing of the contacts and accidental engagement.



*Cooper Crouse-Hinds pins and sleeves in the Arktime series are built to exact tolerances and have specific construction to ensure a proper fit. Under no circumstances should any other plug be interchanged with Cooper Crouse-Hinds Arktime plugs.*

Connectors and receptacles must be checked to ensure that adequate contact pressure is present. The complete interior (insulator and contacts) should be replaced if there is severe discoloration of the insulator or erosion of contacts such that their original shape has been altered.

**12.5.4 ADDITIONAL CHECKS**

Other checks that must be made during inspection and must be corrected before further use of the equipment are:

- Cracked or broken housings
- Cracked, broken or dirty insulators
- Grounding conductor secured
- Deteriorated or misplaced gaskets
- Loose or missing screws
- Insulation resistance of power contacts between themselves and to ground. Resistance value should never be less than 1 megohm.

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