



### **FAQ** Which materials are recommended for grounding clamps? Which screw materials?

#### **Background**

Years ago, die cast zinc was common for pipe clamp bodies due to low cost. But die-cast zinc is mechanically weak, and the clamps crack easily upon installation (or the following night when stresses relieve). Zinc clamps have poor corrosion resistance, even if plated.

Then later, brass (copper-zinc alloy) clamps came onto the market. But in some soil and electrical conditions, the zinc migrates to the surface of the brass; this degrades the integrity of the metal. So brass is not suitable, especially for burial nor for most outdoor situations. Also, cast brass has poor mechanical strength.

Now, bronze-body clamps are nearly universal. Bronze (copper-tin alloy) possesses superior strength and corrosion resistance. Clamps with bronze bodies and screws are suitable for outdoor and direct burial situations. Stainless steel screws are suitable for direct burial, and often used in bronze clamp bodies due to thread-strength and economy.

#### **Discussion**

For long-term reliability, materials must be suitable for the environment (climate and local conditions such as moisture, soil chemistry, other chemicals, and electrical leakage). For example, a dry mountain/desert climate is a benign outdoor environment where plated mild-steel screws typically perform well. In contrast, a semi-tropical urban environment with air pollution is a harsher environment, which calls for corrosion resistant materials; typically, direct-burial rated materials are used.

Harsh environments call for the most corrosion resistant materials available (bronze or stainless steel). Examples include water treatment plants, plating facilities, pulp mills, chemical plants, some mine-sites, and agricultural buildings with manure or fertilizers.

#### **Recommendations**

Bronze clamp bodies are recommended for nearly all situations. For some extreme environments, the addition of tin-plating is specified.

For screws, material selection depends on local environment, experience, and cost.

- For dry/indoor locations, plated steel screws are normally suitable.
- For outdoor locations, screw selection depends on local conditions, experience, and local authorities. Steel, brass, bronze, and stainless steel are possibilities.
- For most outdoor environments and for direct burial or other harsh locations, use bronze or stainless steel screws.

Greaves designates most direct burial connectors with "DB", which indicates "suitable for direct burial in earth or concrete".

#### **Summary**

Select ground clamp materials according to local conditions and authorities:

Dry indoor - Bronze body with plated steel screws

Outdoor - Bronze body with screws per local conditions

Direct burial and other harsh environments - Bronze body with bronze or st. steel screws.

**FAQGrMat**

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