

## Ingress Protection Ratings (IP)

Per IEC60529-1, EN60529-1, and similar standards

### Number format: IPXX

- IP = Ingress Protection
- Each digit identifies the level of compliance
- "0" or "X" = not evaluated
- Examples: IP54, IP62, IP4X, IPX3....
- Minimum IP code level required is defined by the end product standard based on the intended product environment.

### 1<sup>st</sup> Characteristic Numeral: Protection against solid bodies

<u>Code</u>	<u>Protected Against</u>	<u>Definition</u>
<b>IP0X</b>	<ul style="list-style-type: none"> <li>• Non-protected</li> </ul>	-
<b>IP1X</b>	<ul style="list-style-type: none"> <li>• Access to hazardous parts with the back of a hand.</li> </ul>	An accessibility probe, with a sphere of 50 mm diameter, shall have adequate clearance from hazardous parts.
	<ul style="list-style-type: none"> <li>• Solid foreign objects of <math>\geq 50</math> mm diameter.</li> </ul>	An accessibility probe, with a sphere of 50 mm diameter, shall not fully penetrate the enclosure.
<b>IP2X</b>	<ul style="list-style-type: none"> <li>• Access to hazardous parts with finger.</li> </ul>	A jointed test finger of 12 mm diameter, 80 mm length, shall have adequate clearance from hazardous parts.
	<ul style="list-style-type: none"> <li>• Solid foreign objects of <math>\geq 12.5</math> mm diameter.</li> </ul>	A jointed test finger of 12 mm diameter, 80 mm length, shall not fully penetrate the enclosure.
<b>IP3X</b>	<ul style="list-style-type: none"> <li>• Access to hazardous parts with a tool.</li> </ul>	An access probe of 2.5 mm diameter shall not penetrate the enclosure.
	<ul style="list-style-type: none"> <li>• Solid foreign objects of <math>\geq 2.5</math> mm diameter.</li> </ul>	An object probe of 1.0 mm diameter shall not penetrate the surface of the enclosure.
<b>IP4X</b>	<ul style="list-style-type: none"> <li>• Access to hazardous parts with a wire.</li> </ul>	An access probe of 1.0 mm diameter shall not penetrate the enclosure.
	<ul style="list-style-type: none"> <li>• Solid foreign objects of <math>\geq 1.0</math> mm diameter.</li> </ul>	An object probe of 1.0 mm diameter shall not penetrate the surface of the enclosure.
<b>IP5X</b>	<ul style="list-style-type: none"> <li>• Access to hazardous parts with a wire.</li> </ul>	An access probe of 1.0 mm diameter shall not penetrate the enclosure.
	<ul style="list-style-type: none"> <li>• Dust protected.</li> </ul>	Ingress of dust is not totally prevented, but dust shall not penetrate in a sufficient quantity to interfere with proper operation or safety of the test sample.
<b>IP6X</b>	<ul style="list-style-type: none"> <li>• Hazardous parts with a wire.</li> </ul>	An access probe of 1.0 mm diameter shall not penetrate the enclosure.
	<ul style="list-style-type: none"> <li>• Dust tight.</li> </ul>	No ingress of dust.



**2<sup>nd</sup> Characteristic Numeral: Protection against liquid**

<b>Code</b>	<b>Protected Against</b>	<b>Definition</b>
<b>IPX0</b>	<ul style="list-style-type: none"> <li>• Non-protected</li> </ul>	-
<b>IPX1</b>	<ul style="list-style-type: none"> <li>• Vertically falling water drops.</li> </ul>	Vertically falling drops shall have no harmful effects.
<b>IPX2</b>	<ul style="list-style-type: none"> <li>• Vertically falling water drops with enclosure tilted up to 15°.</li> </ul>	Vertically falling drops shall have no harmful effects when the enclosure is tilted at any angle up to 15° on either side of the vertical.
<b>IPX3</b>	<ul style="list-style-type: none"> <li>• Spraying water</li> </ul>	Water sprayed at an angle up to 60° on either side of the vertical shall have no harmful effects.
<b>IPX4</b>	<ul style="list-style-type: none"> <li>• Splashing water</li> </ul>	Water splashed against the enclosure from any direction shall have no harmful effects.
<b>IPX5</b>	<ul style="list-style-type: none"> <li>• Water jets</li> </ul>	Water projected in jets against the enclosure from any direction shall have no harmful effects. (with the 6.3 mm nozzle)
<b>IPX6</b>	<ul style="list-style-type: none"> <li>• Powerful water jets</li> </ul>	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects. (with the 12.5 mm nozzle)
<b>IPX7</b>	<ul style="list-style-type: none"> <li>• Temporary immersion in water</li> </ul>	Ingress of water in quantities causing harmful effects shall be prevented when the enclosure is immersed in 1m of water for 30 minutes.
<b>IPX8</b>	<ul style="list-style-type: none"> <li>• Continuous immersion in water (specify depth and time)</li> </ul>	Ingress of water in quantities causing harmful effects shall be prevented when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and user (>IPX7).

**IP/NEMA Testing Services available from CertifiGroup**