BASIC PROTECTION: SECTION 416, IP2X AND IP4X

WHAT DOES IP4X MEAN FOR AN ENCLOSURE?

Section 416 is provisions for **basic protection** — stopping you touching a live part in the first place. Two methods.

INSULATION OF LIVE PARTS

Live parts shall be completely covered with insulation which can **only be removed by destruction**. That's the exam word: **destruction**.

> Why "destruction"? Because once you strip a cable you cannot put that insulation back. If you could peel it off and refit it, it wouldn't be reliable protection — and a patched-up sleeve would fail an insulation resistance test anyway.

BARRIERS AND ENCLOSURES

A consumer unit is an **enclosure**; its lid, and the little shield in front of the terminals, are **barriers**. The IP rating required depends on **which surface**:

REGULATION	SURFACE	MINIMUM IP	KEEPS OUT
416.2.1	Front and sides — live parts inside enclosures or behind barriers	IP2X	A finger (12.5 mm)
416.2.2	**Horizontal top surface** that is readily accessible	IP4X	A wire (1 mm)

> ↓ **Why the top is stricter.** Things fall *down*. Screws, offcuts and swarf land on the top of a board far more readily than they arrive at its front or sides — so the top has to keep out something as small as 1 mm, not merely a finger.

> **IP first digit reminder.**
> The first digit is solid bodies — fingers, wires, dust. IP2X = no finger. IP4X = nothing over 1 mm. The X means the liquid digit isn't specified.

IP ratings crop up all over the book, not just here. **Section 701** (bathrooms) sets its own ratings for each zone — **701.512.2** — and the special locations in Part 7 each have their own.

✋ **The classic trap.** "What prevents electric shock in a room containing a bath or shower?" Your instinct says Chapter 41, protection against electric shock. But the words "bath or shower" send you to **Section 701**. Read the whole question before you commit to a part.

416 · provisions for basic protection

416.2.1 · IP2X, front and sides

416.2.2 · IP4X, readily accessible horizontal top surface

701.512.2 · IP ratings in a location containing a bath or shower

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