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Reading ISO 12944 before you write a coating specification

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ISO 12944 is the standard most protective coating specifications are written against, and it is also the standard most often cited without being read. Two misunderstandings account for most premature failures we investigate: the corrosivity category is chosen carelessly, and the durability range is treated as a guarantee.

The corrosivity category

Part 2 classifies atmospheric environments by the first-year corrosion loss of unprotected low-carbon steel. The categories run from C1 to CX, and the steps between them are large.

Category	Description	First-year loss	Typical environment
C1	Very low	up to 1.3 µm	Heated buildings, clean atmospheres
C2	Low	1.3 - 25 µm	Unheated buildings, rural inland
C3	Medium	25 - 50 µm	Urban, coastal with low salinity
C4	High	50 - 80 µm	Industrial areas, coastal
C5	Very high	80 - 200 µm	Industrial with high humidity, marine
CX	Extreme	200 - 700 µm	Offshore, tropical with pollution

The category is a property of the site, not of the project. Where a structure spans environments, it needs more than one category and more than one system. There are separate categories for water and soil immersion (Im1 to Im4), which are not interchangeable with the atmospheric ones.

Durability is not a warranty

Part 1 defines durability ranges: low, up to 7 years; medium, 7 to 15 years; high, 15 to 25 years; and very high, more than 25 years. The standard is explicit that these are a technical expectation used to plan maintenance, and not a guarantee period. Durability is defined as the time to first major maintenance.

Surface preparation decides the outcome

- Cleanliness to ISO 8501-1. Sa 2.5 is the normal requirement for the systems in Part 5.
- Profile to ISO 8503, typically medium (G), giving roughly 50 to 85 µm.
- Soluble salts to ISO 8502-6 and 8502-9. Chloride left on the surface draws moisture through the film and causes blistering that no amount of coating thickness prevents.

Conditions during application

Steel temperature must be at least 3 °C above the dew point during application and cure. Relative humidity limits, minimum and maximum overcoating intervals, and minimum steel temperature all come from the product data

sheet, and all are routinely exceeded when a programme slips. Exceeding the maximum overcoating interval produces an intercoat adhesion failure that will not be visible at handover and will be obvious in three years.

A specification that states a requirement but does not say who verifies it, when, and against what record, is a specification that will be met on paper. Surface cleanliness, profile, salt level, dew point and wet film thickness all need to be recorded before the next layer is applied.

Standards and further reading

1. ISO 12944-1 — General introduction, including durability ranges.
2. ISO 12944-2 — Classification of environments.
3. ISO 12944-5 — Protective paint systems.
4. ISO 12944-8 — Development of specifications for new work and maintenance.
5. ISO 8501-1, 8502-6, 8502-9, 8503 — Preparation of steel substrates.