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Structural adhesives — Guidelines for the surface preparation of metals and plastics prior to adhesive bonding

Adhésifs structuraux — Lignes directrices pour la préparation de surface de métaux et de plastiques avant le collage par adhésif



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17212 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

This second edition cancels and replaces the first edition (ISO 17212:2004), which has been technically revised.

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Introduction

Some materials will bond far better than others and some will not bond at all without special treatment. The suitability of a surface for bonding depends upon the degree of surface preparation, the joint's design, the function it has to perform (joining, sealing, etc.) and the environment it has to perform in.

Prior to bonding, some degree of surface preparation is required for most adhesives — but not all. Material surfaces that are particularly prone to weak or loose surface layers, stress cracking or solvent attack usually require special treatment.

Following appropriate preparation, most common metals and their alloys can be bonded satisfactorily. Were it not for contamination and residual mould release agents, thermoset plastics (e.g. polyepoxy and polyester composites) would bond well without any preparation. By contrast, most thermoplastics require careful preparation because of their low surface energy.

Some paints — especially the cataphoretic, water-based primers used by the vehicle industries — can provide an excellent surface for bonding. However, the stability of the interface below the paint should be checked. The surface of the paint itself, even if fresh, can require treatment in order to raise its free energy and thus facilitate wetting.

Certain adhesives possess the ability to dissolve light oils and some polymeric materials. Consequently, for joints that are not “safety-critical” some surfaces do not require any preparation prior to bonding.

In order to achieve the optimum environmental durability from a bonded joint, the traditional preparative approach usually, though not necessarily, consisted of three sequential steps:

- the removal of contaminants;
- physically induced modification of the surface to be bonded;
- chemical treatment.

However, legislative pressure is driving development and the introduction of new methods. Consequently, the separate steps of the foregoing sequence are being combined and the more hazardous chemicals are being progressively eliminated.

The majority of both thermoset and thermoplastics materials can be prepared by commonly applicable techniques — though there will often be detailed differences. By contrast, metal and metal-alloy surfaces to be bonded generally require individual treatment. The optimization of the durability of a metal-based joint usually requires the introduction of progressively more complex and specific treatments.

Such process options are described for a number of metals and their alloys, and some plastics (see Clause 7).