

10 Inspection

10.1 General

Once the project is finished, the paintwork should be inspected. On major projects, paintwork should be subject to a full inspection, i.e. inspection after each stage in the painting process.

NOTE 1 Sampling and testing of materials might be required if there are concerns regarding adherence to the specification.

NOTE 2 Inspection can take many forms on a project depending on the client, the scale of the project and the budget.

Inspection should be carried out to ensure compliance with the specification. It should not be considered as a substitute for proper supervision of the work by the contractor nor a means of compensating for an inadequate or incorrect specification.

Inspection should also be carried out to ensure that acceptable standards of workmanship and quality of finish are achieved. Because this can be subjective, where possible, reference standards on representative areas should be used to serve as a basis for tendering and inspection, but it is important to ensure that the standards set are realistic in relation to the system specified, the nature of the substrates and the conditions under which the work is done. Mock-ups should be arranged to avoid confusion and misinterpretation.

When work is subject to inspection, the intended procedure should be described in the specification. It should be ensured that resources are available to implement the procedure described, especially when the work is to be subject to inspection and approval at each stage of the painting process. If the inspector is empowered to suspend work (or take comparable action) or take samples, this should also be stated in the specification.

The responsibility for inspection should be independent from that for application.

NOTE 3 On large projects, the employment of a specialist inspection organization might be justified; in other cases, inspection might be carried out by members of the specifying authority's staff or a clerk of works.

Inspectors should have good knowledge of the materials, processes and techniques employed in the painting of buildings and should be suitably experienced and competent in the inspection of painting works. Wherever possible, there should be continuity of inspector, with the same standards applied throughout the project. Inspection should not be carried out by multiple individuals who are not suitably experienced.

10.2 Duties of the inspector

The inspector should assess whether compliance with the specification has been achieved in all respects. The inspector's duties should include the following, as appropriate:

- a) ensuring that surfaces are in fit condition for the application of coatings: this might include checking and recording the moisture content of substrates;
- b) ensuring that preparatory work is carried out as specified and, where applicable, to agreed standards;
- c) ensuring that defects from other trades, e.g. plaster or dry lining defects are identified, rectified and made good at the stage when only the first coat of paint (mist or priming) has been applied, in order to avoid costly re-application of a full paint system if such defects are identified at a later stage of inspection;

NOTE If repair works, e.g. fine surface filling, are attempted at too late a stage in the painting process then it becomes near impossible to mask the repairs through paint application.

- d) ensuring that work is carried out under suitable conditions, e.g. weather, temperature, humidity, ventilation and illumination;

- e) ensuring that materials are of the types and makes specified, and are properly stored;
- f) ensuring that the specified number and sequence of coats are applied, and that application is in accordance with the specification or the manufacturer's recommendations; this might include checking and recording film thickness;
- g) if so empowered, suspending work or taking comparable action when there are reasonable grounds for doing so, e.g. if conditions are unfavourable for painting, work should be stopped if it appears that materials might be faulty (see 5.9.1);
- h) taking samples for testing if this is a requirement of the specification or is necessary in order to investigate apparent defects;
- i) drawing the attention of the client or specifier to any modifications to the specification which might appear necessary in order to achieve a satisfactory result;
- j) maintaining work records and preparing progress reports; and
- k) where a separate painting schedule is provided, ensuring that all items are finished in the required colours and types of finish.

10.3 Inspection process

Inspection should be carried out in a reasonable manner taking into consideration the site conditions. No other trades should be working in the same area at that point in time.

Work should be inspected without the use of aids, e.g. torches/mirrors, and should be inspected from a distance of 1 m face on to the item using the same lighting conditions under which the project was carried out. Where possible, an inspection should be carried out prior to final lighting being switched on.

NOTE 1 This will highlight any defects which could reasonably have been identified and corrected whilst working under temporary lighting.

The following factors should be taken into account when determining the frequency and degree of inspection:

- a) the nature of the work and the functions of the coating system: for example, normal maintenance redecoration work might not require a full inspection, but this might be necessary for work involving the application of specialist coating materials;
- b) the cost of inspection in relation to the value of the contract;
- c) the resources available for inspection, especially when several locations are involved; and
- d) the quality of supervision likely to be exercised by the contractor.

Although better than no inspection, ad hoc inspection of work in progress might be all that circumstances permit but should not be regarded as an effective method of ensuring compliance with the specification.

NOTE 2 In some circumstances, e.g. when work is of short duration, it might not be possible to do more than inspect the work on completion. This might suffice where finished appearance is the main criterion, but it does little to establish that the work specified has actually been carried out and, in particular, that the surfaces have been correctly prepared.

10.4 Final inspection

Whether or not work has been subject to stage inspection, it should be inspected on completion. Inspection should be under the same conditions of adequate lighting that were used when painting was carried out (see 5.5.2). However, completed work should not be viewed or snagged under a greater lux than the final lighting scheme. As with stage inspection, work should be inspected from a distance of 1 m face on to the finished item. In some circumstances, as noted in 10.3, this might be the only inspection carried out.

Final inspection should be made in the presence of the contractor or the contractor's representative. Arrangements should be made to inspect work which will subsequently be inaccessible before removal of scaffolding.

Visual inspection of the finished work should be judged on the following main points, as applicable:

- a) satisfactory stopping and filling: if overall filling of surfaces to achieve a high standard of finish is required, this should be clearly specified;
- b) uniformity of gloss, sheen and texture;
- c) with pigmented finishes, uniformity of colour and satisfactory hiding of the substrate or previous colour;
- d) freedom from conspicuous film defects such as runs, sags, wrinkling or fat edges; entrapped dust, dirt or paint skins; bare or starved areas; prominent brushmarks, excessive roller stipple or spray mottle;
- e) freedom from tackiness;
- f) accuracy of cutting-in; and
- g) general cleanliness, with no soiling or disfigurement of adjacent surfaces.

In assessing the general quality of work, the significance of any observed defect should be considered in relation to the functions of the coating system.

NOTE For example, defects that affect appearance might not be important where protection is the sole or essential function.

Allowance should also be made for the influence of conditions or circumstances outside the control of the contractor, such as the condition of the substrate, which might, for example, be highlighted by low angle illumination.

The information in Table 5 should be used to assign a treatment for paint film defects on inspection after a period of exposure.

Table 5 – Paint film defects arising after a period of exposure

Defect	Typical causes	Remedial treatment
Adhesion failure	Application to damp, dirty or weather-degraded substrates, substrates contaminated by biological growth or subsequent entry of moisture, e.g. through open joints in woodwork	Flaking, peeling or poorly adhering coating should be removed (see 9.1.2) and any damaged substrate repaired. Biological growths should be removed (see 9.1.3). Where moisture is the cause, ensure that the substrate is dry before repainting. See 9.2.2.2 in relation to sources of moisture in woodwork
	Failure to prepare or pre-treat non-ferrous metals	Defective material should be removed. See 9.4.2.4 for preparation of non-ferrous metals
	Omission of primer or use of unsuitable primer	Defective material should be removed. Refer to the appropriate substrate in Clause 9 for information on priming
	Application to powdery or friable substrates	Defective material should be removed. Application of a penetrating primer or sealer might be necessary (see Table B.3)
	Application to hard, dense substrates, e.g. glass or glazed surfaces	Defective material should be removed. See 9.7 for subsequent preparatory treatment and manufacturer's recommendations

	Apparent loss of adhesion on iron and steel, might be due to detachment of mill scale	Removal of mill scale, e.g. by blast-cleaning or flame cleaning, might be impracticable as a maintenance operation and is costly, hence the desirability of effective initial preparation. There might be no alternative to manual cleaning to remove mill scale as it loosens, but this might extend over several repaints
	Coating incompatibility, i.e. applying a conventional solvent-borne alkyd paint directly over a two-pack epoxy	Remove incompatible coating and recoat in a two-pack surface tolerant material
Blistering	Blistering is usually indicative of liquid or vapour beneath the coating. The presence of water is a frequent cause. On painted woodwork, migration of water vapour from the inside of a building through the wood can cause blistering if the internal and external coatings do not provide the recommended differential permeability system. Resinous knots might also cause localized blistering	Depending upon the extent and severity of blistering, preparation might be confined to removal of isolated blisters or complete stripping might be necessary. Where moisture is the cause, time should be allowed for drying out. (See also 9.2.2.2 in relation to sources of moisture in woodwork.) Blistering on resinous external woodwork might be influenced by choice of finishing colour
Chalking, powdering	Slow erosion and chalking on lengthy exposure, especially externally, is a characteristic of many paints and wood finishes. It is not usually regarded as a defect unless it occurs prematurely and profusely, when the causes might be as follows: a) conditions of exposure exceptionally severe; b) earlier coats in system have failed to satisfy porosity of substrate; or c) incorrect or unsuitable formulation	In the absence of other defects, lightly chalking surfaces might require only washing and light abrasion to provide a satisfactory base for further coats. Heavily chalked or powdery surfaces will require more vigorous cleaning or abrasion combined if necessary with application of a penetrating primer (see Table B.3)
Colour defects, e.g. fading, staining, bleeding, or other forms of discoloration	Some loss of paint colour might occur on lengthy exposure to bright sunlight but is not usually significant. Early loss of colour might be due to use in unsuitable conditions, e.g. external use of a colour intended only for interior use. Chemical attack might cause change or loss of colour	If necessary, consult the manufacturer regarding selection of colours or types of finish for repainting
	Solvent-borne finishes tend to yellow in situations where direct daylight is excluded or when exposed to vapours from other building materials typically containing amines. This is more obvious with white and light-coloured finishes	If freedom from yellowing is important, consult the manufacturer for guidance on the selection of suitable materials
	Apparent colour change might be due to the masking of colour by surface chalking or efflorescence, especially on external rendering or	Normal cleaning usually removes surface deposits. Efflorescence and diffusion of salts on plywood might reoccur until source is

	on external plywood treated with wood stain. It can also be caused by diffusion of water-soluble salts contained in adhesives	exhausted
	Failure of clear finishes on external woodwork might result in the discoloration of exposed wood	Clear finish should be removed completely. Sanding or scraping might remove discoloration or damaged timber, but application of coloured wood stain might be necessary to achieve uniform appearance
	Constituents of the substrate or previous coatings can cause discoloration	See 9.1.4
Cracking, other than that due to structural movement	Cracking is usually indicative of stresses within the coating film, caused, for example, by applying hard-drying coating materials over soft coating materials. It might also be the initial stage in adhesion failure. Cracks might be confined to the finishing coat or extend through the thickness of the film	If cracking is slight and confined to the finishing coat, light abrading might provide a satisfactory base for recoating. If cracking is severe or extends through the thickness of the film, complete removal might be necessary or a lining paper can be applied
Damage to coating	a) Mechanical damage, e.g. by abrasion, impact or vigorous cleaning; or b) Graffiti	Where surfaces are subject to hard wear, specialist coating materials might be required. Consideration should be given to the use of wear-resistant materials, e.g. ceramic tiles or plastics, where practicable. In relation to graffiti, see Annex J
Loss of gloss	Some loss of gloss is to be expected after lengthy exposure, especially externally, and might be the first stage in chalking. Where it occurs prematurely, possible causes are as described for chalking above	Loss of gloss in the absence of other defects is not usually significant in relation to maintenance treatment
Biological growths, i.e. moulds, algae, lichen, moss, blue stain	See 7.5 and 9.1.3	See 9.1.3. Consider modifications to design or environment which might eliminate or reduce causes of failure
Rust-spotting or rust-staining on painted iron and steel	This usually indicates that the thickness of the paint system is insufficient to provide protection on peaks and edges. It might result from application of an inadequate system initially or at the last repaint or from erosion of the film during exposure. A further possible cause is failure to use a rust-inhibitive primer	Depending upon the severity and extent of the defect, treatment might range from manual cleaning and priming of localized areas to overall removal of the coating and treatment as for new iron and steel (see 9.4.1). Consideration should be given to increasing the film thickness of the system or to reducing the intervals between repaints until an adequate thickness has been built up