Guide to Good Practice for Facades

CENTRE FOR WINDOW AND CLADDING TECHNOLOGY

2nd edition

This document was written and revised by representative members of the Centre for Window & Cladding Technology. The document was reviewed by all the members.

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FOREWORD

The contents of this document were first published as part of 'Standard & Guide to Good Practice for Curtain Walling' in 1993. The second edition comprises three volumes:

Standard for curtain walling
Guide to good practice for facades
Test methods for curtain walling

For ease of reference, the original numbering system has been retained.

The aim of these documents is to assist those who specify, design, manufacture or install curtain walling. They set performance criteria in a rational framework and provide a means for the consistent specification of curtain wall performance. The documents are not a design guide and are intended for use by experienced designers. Designers may wish to seek guidance from BS 8200 'Code of Practice for the design of non-loadbearing external vertical enclosures of buildings'.

Each document should be read in conjunction with the other volumes.

Standard for curtain walling sets out a framework for the specification of a curtain wall, establishes specific requirements for its performance and defines the tests by which compliance with particular aspects of these requirements may be demonstrated. The text in the left-hand column is prescriptive, while that in the right hand column gives background information or guidance on interpretation of the clause against which it is placed.

The Standard introduces the concept of classifying proprietary curtain walls according to their ability to achieve performance targets. Generally, the performance will be assessed by tests on specimens of the curtain wall. It is felt that such grading will be of benefit to both manufacturers and specifiers alike by providing a rational basis for the comparison of one system with another.

Guide to good practice for facades gives advice on the choice of materials, components and finishes, as well as quality assurance, fabrication, transportation, storage and installation and maintenance. It is intended that the Guide should apply to many different types of facade and amendments covering issues relevant to other types of facade will be published in due course.

Test methods for curtain walling describes test procedures by which compliance with particular aspects of the 'Standard for curtain walling' may be demonstrated.

However, there are many aspects of a curtain wall that cannot be evaluated by these tests alone and so the testing requirements in the Standard should not be regarded as a substitute for proper assessment of a curtain wall.

The documents use the words 'shall' and 'should' in their text. In 'Standard for curtain walling' and 'Test methods for curtain walling' the word 'shall' is used throughout as the requirements for performance criteria and testing are mandatory and must be complied with.

Guide to good practice for facades: Foreword

'Guide to good practice for facades' is written as a guidance document giving recommendations as to best current practice and the user may or may not decide to follow the advice given; hence the word 'should' is generally used. However, where an operation or material is selected and it is considered unacceptable to offer a lower standard then the word 'shall' has been used.

In drafting these documents, it has been assumed that the provisions will be applied intelligently, that the design will be undertaken by appropriately qualified and experienced designers, and the construction will be carried out by trained operators under the direction of qualified supervisors.

Changes from the first edition 'Standard & Guide to Good Practice for Curtain Walling', 1993, are indicated by a vertical line in the margin.

CONTENTS

Guide to good practice for facades

2nd edition

4 MATERIALS AND COMPONENTS

4.1 General

All materials and components should be fit for their intended purpose, they should be durable, with a life expectancy where applicable equal to that of the element of walling in which they are located. They must be at least equal in standard to the minimum standards contained in the relevant British Standard, where such exists.

4.2 Aluminium Alloy Components

4.2.1 All extruded aluminium alloy framing members should be fabricated from the most appropriate grade of aluminium alloy complying with BS 1474. In addition, the alloy should be selected to satisfy the requirements of the chosen finishing process.

4.2.2 The aluminium extrusions forming the structural framing members, excluding glazing beads, nibs, interlocks and other similar features affixed to them should be designed in accordance with the guidelines given in BS 8118. In any event the aluminium extrusions should have the web, wall and flange thicknesses sufficient to satisfy all structural requirements and eliminate distortion to the finished surfaces.

4.2.3 All components, including flashings, closers and infill panels, formed from aluminium alloy sheets, should be fabricated from the most appropriate grade and thickness of material complying with BS 1470, in a temper suitable for the particular type of application and degree of forming to be used.

In addition the alloy should be selected to satisfy the requirements of the chosen finishing process.

Aluminium sheet for flashings should be at least 1.6 mm thick. Aluminium sheet for copings, panels and visible closers should be sufficiently thick to provide a visually flat surface and to eliminate excessive distortion and permanent deformation caused by solar gain.

Flatness tolerances, particularly for large panelled areas of building facades, should be agreed between the Specifier and the contractor/manufacturer. These tolerances should be agreed in relation to the specific project panel sizes and it is recommended that full size finished panel samples are presented and viewed in order to confirm the agreed tolerances.

In addition written Flatness Tolerance Standards should be obtained from the mill supplier, these are usually quoted relative to width of sheet.

4.2.4 Where extruded aluminium framing members are connected together with cleats, sleeves, spigots and the like, these connections shall be fabricated from one of the following:

- extruded aluminium alloy profiles in accordance with BS 1474
- zinc diecasting alloy A complying with BS 1004
- stainless steel as clause 4.4
- mild steel, hot dip galvanised as clause 5.2.1.

If there is any possibility of an electro-chemical couple developing between dissimilar metals, then the Specifier should ensure that isolation procedures are invoked.

4.3 Mild Steel Components

4.3.1 Where steel is used as a framing member or as reinforcement of a framing member it should be one of the following:

- the appropriate grade of mild steel complying with the requirements of BS 4360;
- hot rolled steel that, when tested in accordance with BS EN 10 002-1, has an ultimate tensile strength in the range 355 to 510 N/mm^2;
- mild steel sheet of grade NR14 complying with BS 1449: Part 1.

4.4 Stainless Steel Components

4.4.1 Stainless steel sheet incorporated into the works shall be of austenitic steel complying with Table 4 of BS 1449: Part 2.

Stainless steel sheet used externally shall be of grade 316.

Particular attention should be paid to the direction of the rolling grain on self finished stainless steel components. This should be clearly indicated by the designer where the finish is aesthetically important.

The rolling grain within stainless steel sheets runs parallel to the length of the sheet during mill production. This grain structure is readily visible to the eye on many of the standard polish finishes available.

4.5 Fixings

4.5.1 Fixing bolts, anchors, brackets, screws, rivets and nuts shall be manufactured from one of the following:

- stainless steel, grade A2 of BS 6105 (grade 304 for general use) or A4 of BS 6105 (grade 316 for severely corrosive climates);
- mild steel in accordance with BS 4190 and finished in accordance with clause 5.2.1;
- brackets, rivets, shear pins, etc, can also be provided from aluminium alloy of appropriate grade complying with BS 1474.

4.5.2 The type, size and positioning of all bolts, anchors, brackets, screws, rivets and nuts should be shown on the working drawings, together with full details of their installation technique and torque settings, where appropriate.

4.5.3 The Facade contractor should demonstrate to the Specifier that all such fixings and their use have been reviewed and approved by the fixing manufacturer.

4.6 Glass

4.6.1 Glass thickness and type shall be selected using the information contained in BS 6262 and BS 952: Part 1.

4.6.2 Particular regard should be given to the adequacy of glass thickness to withstand the calculated design wind pressure and types of location to satisfy safety recommendations.

4.6.3 Annealed glass should have a good clean as-cut edge or appropriate edge working to limit any defects.

4.6.4 Where toughened glass is incorporated into the construction, consideration should be given to limiting the risk in normal use of 'spontaneous breakage'. One factor bringing about this phenomenon, applicable to toughened glass is the presence of nickel sulphide inclusions within the glass pane. It is widely recognised that heat soaking the glass after toughening significantly reduces the risk of 'spontaneous breakage' resulting from the presence of nickel sulphide inclusions.

4.6.5 Hermetically sealed double glazing units shall comply with the provisions of BS 5713. In addition, the edges of the units shall be finished in a way which permits visual inspection of the glass edges, edge seal and the positioning of metal spacers.

4.7 Infill Panels and Facings

4.7.1 The materials and finish of infill panels, including thermal insulating materials shall be agreed between the Specifier and Facade contractor.

4.7.2 Only products manufactured without the use of CFC gases shall be used to form the insulating core of infill panels.

4.8 Gaskets

4.8.1 Extruded rubber gaskets shall comply with the provisions of BS 4255.
Cellular gasket profiles shall comply with ASTM-C509.
Guidance on the specification and use of gaskets is being developed at CWCT.

4.8.2 Glazing gaskets forming the weather seals of front-sealed facades and those forming the air seals of secondary defence and rainscreen pressure-equalised facades should be formed into complete frames with sealed joints. Appropriate methods of jointing should be applied such that the joints remain sealed for the design life of the gaskets. When vulcanisable rubbers are used the joint should be produced by factory-moulding of the rubber corner.

The front seals of secondary defence and rainscreen pressure-equalised facades should also be designed and installed to provide a positive barrier to the passage of rainwater.

4.8.3 Gaskets jointed by bonding with adhesive should not be generally accepted as a substitute for moulded frame gaskets. With the agreement of the Architect/Specifier this method of jointing gaskets is acceptable in certain limited instances where irregular shapes of gaskets are required in very small quantities necessitating prohibitive and unviable tooling costs, or where minor site rectifications are necessary.

4.8.4 Gaskets shall be free from contact and migration stain and shall be compatible with all substrates, sealants and finishes with which they are likely to come into contact. The gaskets shall be free of mould flash.

4.8.5 All glazing gaskets should normally be manufactured to a small but predetermined oversize tolerance, to ensure that when seated into position, the lineal lengths and corners of the gaskets are in slight compression.

4.9 Sealants

4.9.1 In general, sealants should be selected and applied in accordance with the guidance contained in BS 6213. Sealant systems displaying predominantly plastic characteristics may be used in certain types of fixed joint, but sealants displaying predominantly elastic characteristics are recommended.

4.9.2 Sealants utilised within the framing system to seal joints between components should withstand all stresses during assembly, transportation and installation, and shall provide an air and water-tight seal in service. The joints and/or the sealant shall be designed and/or formulated to maximise the life expectancy of the seal.

4.9.3 Sealants utilised to effect a seal between the facade and the structure shall be of a type suitable to form a seal against air and water penetration whilst allowing differential movement. Sealants used for this purpose shall display predominantly elastic characteristics and shall be either:

- polysulphide sealant complying with BS 4254 or BS 5215.
- silicone sealants complying with BS 5889.
- one or two part polyurethane sealants complying with the requirements contained in BS 4254 or BS 5889.

4.9.4 Sealants and their primers shall be compatible with the materials and finishes with which they are likely to come into contact.

4.9.5 Sealant systems can cause staining to certain natural or reconstituted stones and precast concrete and the Specifier is advised to consult the sealant manufacturer for advice. In these circumstances, one or two-part polyurethane sealants, meeting the requirements of BS 4254 or BS 5889 may be more appropriate.

4.9.6 The elastic sealants shall be applied over bond breakers/backer rods, set into the joint to control the depth of sealant and to prevent three sided adhesion.

4.9.7 Backing rods should be used strictly in accordance with sealant manufacturers recommendations and care must be taken to use appropriate open cell or closed cell foam sections.

4.9.8 Where closed cell sections are used, non-gassed products should be selected or great care should be taken in pressing the backer rod into position to avoid damage to the surface which could result in subsequent 'gassing' and 'bubbling' in the cured sealant.

4.9.9 Fillet seals, where movement of the joint is to be expected, should be applied over a bond breaker tape so as to minimise stress build up in the sealant joint. Such seals should be designed in consultation with/agreement of the sealant manufacturer.

4.10 Thermal Insulation

4.10.1 Thermal insulation shall be inert, durable, rot and vermin proof and should not be degradable by moisture or water vapour. Attention is drawn to the fire performance of some insulating materials as set out in the relevant Standard.

4.10.2 The material used and its method of attachment to the supporting component shall be selected to eliminate the risk of bulging, sagging, delamination or detachment of the insulation.

4.11 Vapour Control layers

4.11.1 The objective is to provide an effective and continuous vapour control layer on the warm side of those insulating layers which are incorporated/present in the facade. These insulating layers usually overlap or terminate against the building structure, as should the vapour control layer.

4.11.2 They should be manufactured from suitable grades of aluminium sheet, metal-coated steel sheet or stainless steel sheet, complying with the requirements for such materials contained in clauses 4.2, 4.3 and 4.4.

4.11.3 Vapour control layers may also be formed from aluminium foil or other thin or flexible vapour impermeable sheet materials. However, it should be noted that these can be subject to damage during installation or by following trades. In addition, vapour control layers held in place by adhesives can lose their integrity with the passage of time as a result of building movement and natural ageing of the adhesive.

4.12 PVC-U

4.12.1 The materials used for unplasticised PVC products shall comply with the materials requirements given in Table 1 of BS 7413 or Table 1 of BS 7414.

4.12.2 Extruded profiles for use in the manufacture of white PVC-U windows with heat welded corner joints shall comply with the requirements of BS 7413 or BS 7414 depending on the material used.

4.12.3 Windows manufactured from PVC-U profiles shall meet the requirements of BS 7412 and the requirements of clause 2.19 of 'Standard for curtain walling', CWCT.