The National Accreditation Scheme

- **G. W. Anderson, Special Adviser,
CSIRO Division of Building,
Construction and Engineering.**

The progressive conversion of Australian building regulations into performance requirements is providing manufacturers and designers with more and more opportunities to be innovative. But performance requirements do present a problem wherever, in their present state of development, they cannot be specific about criteria of acceptance. To overcome this problem (and only this problem) the regulators have set up the National Accreditation Scheme. To understand the application of the National Accreditation Scheme, it must be seen in the context of the overall approvals process. This paper discusses accreditation in that context.

One of the policies of the Australian Uniform Building Regulations Co-ordinating Council is to provide designers and builders with the freedom to adopt any means that will ensure that a building functions cost-effectively within the constraints imposed by community aspirations to safety and amenity. It is implementing this policy by the progressive transformation of technical regulations into statements of how and how effectively the building and its components should function - commonly referred to as performance requirements.

The first and second editions of the Building Code of Australia are not performance codes nor do they represent the first introduction of performance requirements into Australian building regulations, but the Council had indicated its intentions for the future very clearly by putting the BCA largely in the form of a performance code.

It has also introduced the concept of national accreditation of building products and building systems and the impression has been created that, with the adoption of the BCA, accreditation will be essential for all building products and building systems. This is true only in the broadest sense; every product controlled through the regulations must be accredited but comparatively few of them will need to be accredited in the narrow sense implicit in the national scheme.

The first thing to note in the BCA - it is set out in Part A2* - is that all the old ways by which buildings, building systems and building products gained local government approval under the old regulations - under, for example, Ordinance 70 in New South Wales - are still there. The National Accreditation Scheme is a newcomer but it doesn't supplant the old approval processes. It is an additional way of gaining the building inspector's approval and it is there for a special purpose.

What does the word "accreditation" mean? The most pertinent definition (from the Oxford dictionary) is

> "Accredited - authoritatively sanctioned."

If a product is accredited, its use in building is authoritatively sanctioned. You are legally entitled to use it. Nobody can stop you.

There are only two types of organisation that are empowered to sanction the use of building products and building systems. These are state governments - that is, the department of local government in each state - and local government - that is, the local council in its own shire or municipality.

Accreditation in this broad sense of sanctioning the use of things in building is not new. It has been going on as long as governments have controlled building - for centuries before the word entered the language. The traditional way in which a product achieved accreditation was by fulfilling a prescriptive requirement. There are still a number of these in the Building Code of Australia. If you look at D1.2(a) of the BCA you find that:

> "Every building must have at least one exit from each storey."

Quite unambiguous and although prescriptive [this provision is] not likely to hamper the imaginative designer. If you turn, however, to clause 3.1(d) of Specification C1.1 you are told that:

> "a loadbearing internal wall and a loadbearing fire wall (including those that are part of a loadbearing shaft) must be of concrete or masonry."

This is an example of the old fashioned sort of prescriptive requirement that puts a damper on initiative in the building industry. A manufacturer can do all the R & D in the world to develop a loadbearing, fire-rated wall system that is better than anything we have already, but unless it is of concrete or masonry he is not allowed to use it - and the building inspector is not allowed to let him use it. Prescriptions like this one will be progressively removed from the BCA as the results of research allow AUBRCC to identify the function each attempts to epitomise. AUBRCC can then set out that function as a performance requirement or set of performance requirements.

The great advantage of the prescriptive requirement is that everybody knows exactly what to do. The building inspector can take one look at your plans and accredit them. The disadvantage is that if the prescription is inadequate, inefficient, expensive - if it isn't the best solution to a building problem - the industry and the community just have to grin and bear it. You're stuck with it.

A performance code avoids this problem by replacing

the prescriptive requirement with a performance requirement; by stating what a product or system must do instead of what it must be. We could say, for example, that a roof must stay in place indefinitely and keep the rain out. That's the performance the regulators expect of the roof. The only trouble is that, if the regulations state only the intention of the regulators in such broad terms, the builder isn't too sure what he has to do and the building inspector isn't too sure that he's done it.

The regulation writers anticipate these difficulties by doing - usually - two things.

First, they put back into the code all the old prescriptions with a statement that they fulfil the performance requirements - they become the so-called "deemed-to-comply" provisions. But the prescription is no longer the way you must comply with the regulations. It is now no more than one of the host of ways in which you may comply with the regulations.

For example, Specification A2.3 contains fifteen pages of walls, floors, ceilings, roofs, columns, beams and trusses that are deemed to have various fire-resistance levels. An architect can design a building without getting anything tested - without even consulting a manufacturer's catalogue - just by choosing components from Specification A2.3 and the building inspector can accredit his design after checking it against Specification A2.3.

The second thing that the regulation writers do is much more important. And it's much more important because it's the one that gives the industry the opportunity for research and development, for innovation, for radical solutions. So far as they can, the regulation writers specify a method whereby we can tell whether a performance requirement will be fulfilled. This second method of fulfilling the intention comprises:

(i) a method of demonstration, a method of measurement or a method of test; and
(ii) a criterion of acceptance.

It is very common in this context to express performance, not as performance in a real building in the real world, but as performance of a sample in a laboratory. It is so much easier and infinitely more economical to test things in a laboratory before we are committed to a form of construction than to test a building a pull it down if it doesn't pass.

Clause 9 in Specification C1.9 is a typical performance requirement of this type:

> "Any sarking-type material used in a Class 1 building must have a Flammability Index of not more than 5."

You don't have to use sarking - so the regulators aren't particularly interested in requiring a sarking to be impervious. What they are concerned about is, if you do use a sarking, you don't introduce a fire hazard into the building.

The intention behind the regulation (the objective to be fulfilled) is set out on page C-3 of the code:

> "Materials used in the construction must be such that if there is a fire in the building-
>
> (i) the spread of fire .... will be minimised;"

The method of measurement or demonstration is specified in the definitions:

> "Flammability Index means the index number determined under AS1530.2."

And the criterion for the acceptance of a sarking material is a flammability index of 5 or less.

To have a sarking accredited, the manufacturer presents the building inspector with a test certificate, or even better, he points out that the product bears a Standards Mark.

Note that, in this form, the performance requirement is quite prescriptive. The freedom allowed the innovator is to develop all sorts of materials as sarkings provided they have flammability indexes of no more than 5 when they are tested to Australian Standard 1530.2. You cannot test to any other standard; no other method of demonstration is permissible under the regulations nor is any other criterion of acceptance. Doing it this way does, therefore, lose some of the flexibility of performance regulations.

The regulators don't have to do it this way. They can make the method of demonstration a mere deemed-to-comply. The structural provisions of the BCA are no more than just that. B1.1 is the usual requirement for a safe and serviceable structure:

> "A building or structure and its materials and components must be capable of sustaining at an acceptable level of safety and serviceability-
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> (a) The most adverse combination of loads (including combinations of loads that might result in a potential for progressive collapse); and
> (b) other actions
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> to which they may reasonably be subjected."

B1.2 then goes on to say that, so far as design loads are concerned, the requirements of B1.1 are satisfied if the designer adopts Australian Standard 1170 for dead, live, wind and snow loads and Australian Standard 2121 for earthquake loads. B1.3 states that the requirements of B1.1 with respect to materials and forms of construction are satisfied if designer and builder adopt AS3600 for concrete construction, AS1250 for steel construction and so on. Provided you adopt one of these codes, the building inspector can accredit your solution to the performance requirement by accepting a certificate from an appropriately qualified designer. Note that you are not forced to adopt one of these codes.

But there is a difficulty; we have a performance requirement and a deemed-to-comply but no test and no criterion of acceptance. We could claim however (and we shall return to this point later) that the test and the criterion are implicit in the codes that are deemed to satisfy the performance requirement.

The performance required of a stairway (D2.13) is a more mundane example of the same thing. Part (a) of the clause specifies what a stairway must do:

> "A stairway must be suitable to provide safe passage in relation to the nature, volume and frequency of likely usage."

Part (b) of the clause then sets out the proportions of stairs that are deemed to comply with the requirements of (a).

The building regulators have written a design and construction code for stairs that are deemed "to provide safe passage in relation to the nature, volume and frequency of likely usage". You don't have to do it this way but if you do, the building inspector can run his rule over your plans and accredit the stairway.

Again we have a performance requirement and a deemed-to-comply but no test and no criterion of acceptance.

An interesting situation has arisen about stairways. What is deemed to satisfy the performance requirement in New South Wales and Victoria differs slightly from the construction described in the BCA. The two states also differ slightly. No doubt all these stairs "provide safe passage in relation to the nature, volume and frequency of likely usage". None of the states would adopt deemed-to-comply construction that didn't comply. Seeing that the construction described is not mandatory, one would assume that the BCA and New South Wales constructions could be accredited in Victoria, the BCA and Victorian constructions in New South Wales and the Victorian and New South Wales constructions everywhere else.

In F1.7 there is an even more interesting type of requirement; one in which only the objective to be fulfilled is specified:

> "The following parts of a building must be impervious to water:
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> (a) In any building - the floor surface or substrate in a shower enclosure ..."

In this case there is not even a deemed-to-comply. The building inspector will continue to approve the methods of making a shower enclosure impervious that he's familiar with but where is the test for new methods?

What if you really want to take advantage of the opportunities presented by the performance requirements of the BCA? What if you wish to adopt an approach to structural design that is not listed in Section B? How are you going to demonstrate that you have fulfilled the requirements of the BCA - in this case, that your building has an "acceptable level of safety and serviceability"?

What if you wish to build a stairway that is not constrained by the deemed-to-comply provisions of D2.13? How are you going to demonstrate that your stairway provides "safe passage in relation to the nature, volume and frequency of likely usage"?

The difficulty arises because the regulation writers have not always been able to specify a method of analysis, a method of measurement or method of test whereby it can be demonstrated that the performance demanded of a system will be achieved. The research and development has not yet been done.

In all these cases the designer, the builder, the manufacturer must tackle the performance requirement head on. An engineer could take a radical approach to the design of a reinforced concrete building and submit to the city council "I have designed a reinforced concrete building. I have not used AS3600 but my mathematical modelling indicates that the risk of damage to the building and of injury to people in my building is no higher than in buildings designed to AS3600." A designer could submit an innovative stairway to the local council with a claim that it is as safe as a stairway that is deemed-to-comply with the requirements of D2.13. A host of companies are developing new ways to waterproof the wet areas of buildings.

But - and we still have this big but - how does the building inspector know whether the system you devise will fulfil the objectives of the regulations?

The responsibility for making this decision is removed from the shoulders of the building inspector by the departments of local government acting either singly (by conferring state accreditation on the system) or acting in concert (by conferring national accreditation on the system).

The departments of local government (acting in concert under the banner of AUBRCC - the Australian Uniform Building Regulations Co-ordinating Council) assert their authority and sanction the use of the system. They issue a certificate of national accreditation which states that the product complies with the building regulations throughout Australia.

The decision as to whether a product or system fulfils a specific objective of the Code and can therefore be accredited demands comprehensive technical expertise. This expertise is provided by the CSIRO Division of Building, Construction and Engineering.

One of the responsibilities that CSIRO took over, when it took over NBTC, is to maintain the national accreditation scheme on behalf of AUBRCC. It does this, first, by nominating an "Accreditation Officer" within the Division to receive and process applications, to advise applicants and to channel expert advice from the Division to the Executive Committee of AUBRCC, and secondly by providing commercial appraisal services to the industry.

Before the Accreditation Officer can advise AUBRCC as to whether a building system should be accredited, the system must be appraised as to whether it can fulfil the performance requirement - in short, whether it is fit for the purpose intended. If you apply to AUBRCC or to the Accreditation Officer you will be sent away to have your product appraised. You must obtain an expert opinion that the product will perform as the regulations require it to do.

Whether you go to the Australian Building Systems Appraisal Council (That's ABSAC), to the Building Research Association of New Zealand (that's BRANZ), to the commercial arm of one of the universities or to CSIRO direct, that organisation will have to decide what information it will need in order to determine whether the system will perform as the building regulations require and how that information can be obtained.

The practice with ABSAC and with CSIRO is to choose a person who is expert in the appropriate field to be

the appraisal officer.

In the case of the shower enclosure the question is how can we be sure that it - and the joints in it - and the joints between it and the rest of the building will be impermeable - and not just when it is first installed but for the use of the building.

The appraisal officer for a shower enclosure will require specifications and installation manuals and she will examine them carefully to ensure that they are clear, practicable and comprehensive. The appraisal officer will decide what design has to be done, what analysis, what testing. The appraisal will go further. It will involve, for example, assurances of resistance to soaps and detergents and the unlikelihood of any adverse effects on health or safety.

Apart from specifications and installation manuals, the information that the appraiser needs will require that the applicant arrange for the product to be tested in a variety of ways. The appraiser will try to choose standard tests readily available from NATA-registered laboratories but in some cases tests will have to be devised and developed.

Applicants for appraisal will therefore find that they are presented with a list of information that they must provide and a list of tests that they must arrange to have done. But they will be presented also with a list of organisations that can develop the information and a list of laboratories that can do the tests. In the case of the building not designed to AS3600, expert appraisal of the validity of the mathematical modelling will be needed. This will embrace resistance to all the forces of nature and the man-made environment (including resistance to fire). A comprehensive team of experts will have to be assembled and they might not be restricted to Australia.

In the case of the stairway, there are people who research egress systems and there is an international expert at the University of Technology, Sydney.

Once you have provided the appraisal organisation with all the information it has asked for and proved to its satisfaction that your product, be it a shower tray or a whole building, will perform as the regulations demand, you will receive an appraisal report which can be submitted to the accreditation officer.

The accreditation officer will look at the appraisal very closely. He might even send the applicant away again to get more information. But once he is convinced that the appraisal is satisfactory, that it demonstrates that the product will fulfil the intentions of the building regulations, he will recommend to AUBRCC that the product be accredited.

His accreditation report will state that the product complies with one or more of the requirements of the BCA provided certain specific conditions are fulfilled. Those conditions - typically a specification of the product and its installation - will be listed as will the regulations with which the system complies. If all the states agree, the product will be accredited nationally. (If not all the states agree, the product can be accredited in those states that do agree).

In summary, the National Accreditation Scheme is not for the systems and products that we have been using for years and which have well established methods of entree into the building process. It is for the new, the innovative response to the performance challenge.

The regulations are being transformed into performance regulations in order to open up the system, to encourage the innovator. Accreditation based on an expert appraisal is to provide the local authority with the assurance - actually to relieve the local authority of the responsibility to decide - that the innovation will perform.