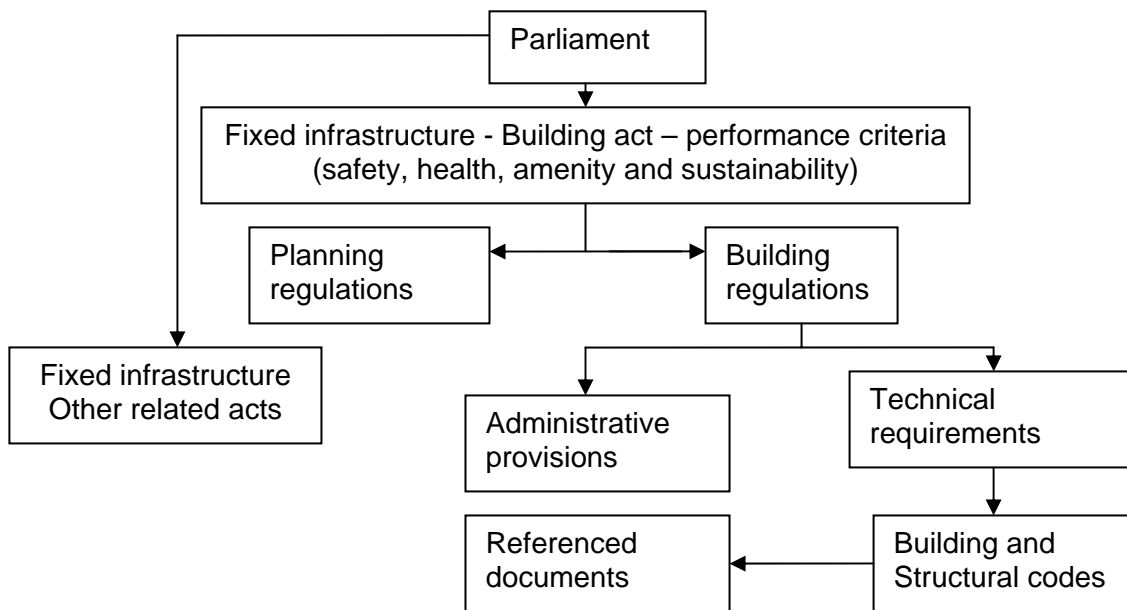


How do “Deemed to Satisfy” rules affect designers?

How does the suite of design approaches fit with the country legislation?

The following figure shows the flow path to the standards:



Introduction to codes/standards

The codes/standards are intended to facilitate achievement of the required performance criteria (safety, health, amenity and sustainability – including durability). They are compiled or selected by groups of experts and tested against user acceptance. Standards tend to reflect a specific culture; generally EN gives principles to be applied, the (old) BS give instruction and recommendations, while the US are more prescriptive. Standards should be read as a whole. Most building codes and standards include “deemed to satisfy” provisions. The question that arises is the view of courts regarding these provisions in the event of challenge.

“Deemed to satisfy” (DTS) is one of several approaches used by competent designers in the achievement of minimum standards related to technical performance requirements. Equivalent solutions are solutions that achieve the required outcomes by means other than that which is deemed to satisfy. An equivalent solution must be proven to satisfy the required performance outcomes, either directly or by showing its performance is at least equivalent to that of the “deemed to satisfy” solution in satisfying required performance criteria.

The benefit of adopting a “deemed to satisfy” solution is that there is no onus on the applicant to prove that the solution meets the corresponding performance standard.

The benefit of using an equivalent solution is that it greatly increases the options available for achieving the required outcome, allowing for innovations and the adoption of new technology. However in adopting an equivalent solution, the designer must bear the cost of proving that the equivalent solution meets the applicable required outcomes.

The equivalent solutions embrace statistical design methods, partial factor design by calculation, and avoidance of reaction design (expert judgement supported by laboratory or practical experimentation), these all generally intended to achieve some acceptable minimum performance standard. The approach chosen takes the consequences of failure, number of repeats and the value of increasing design sophistication into account.

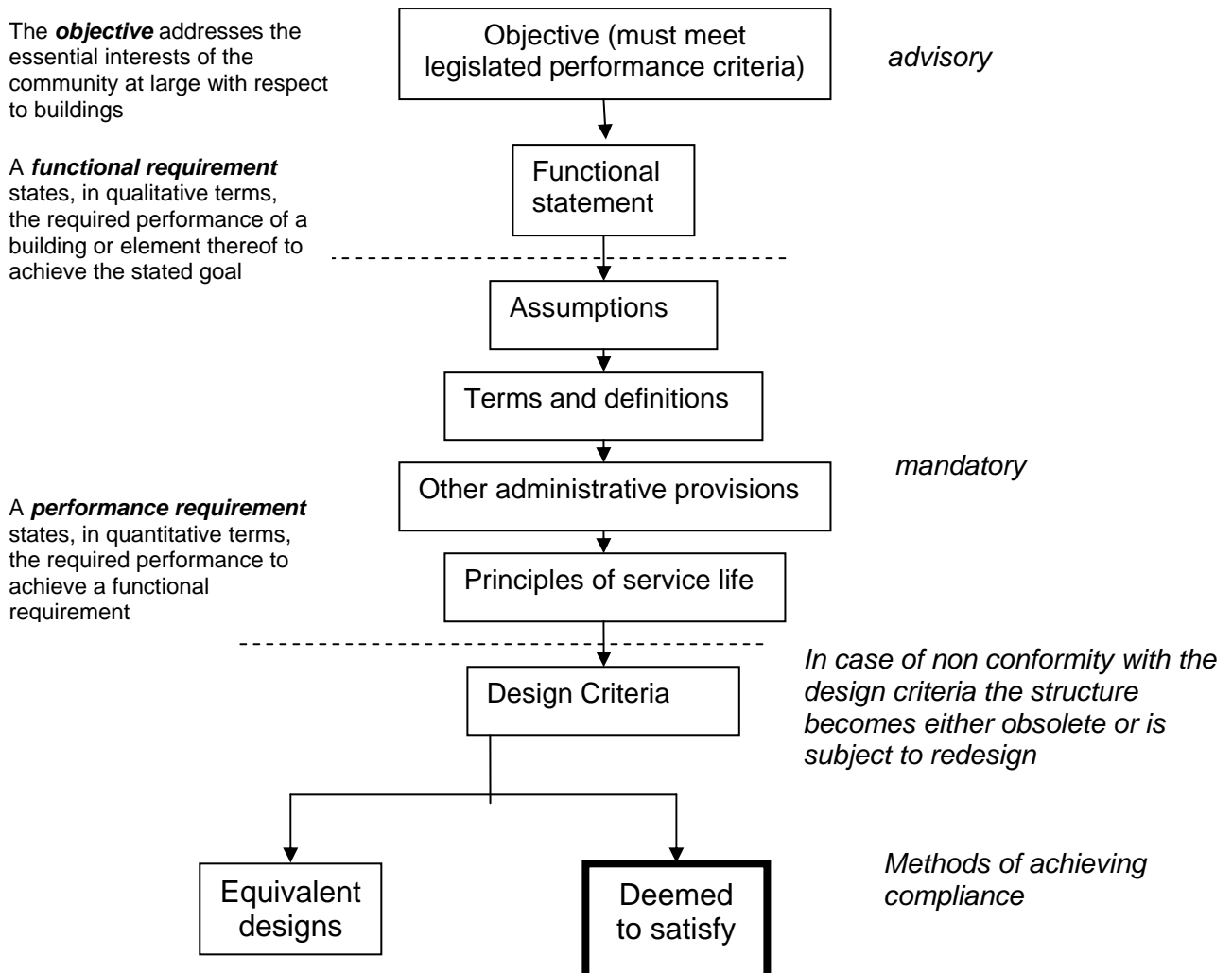
Laboratory and practical experimentation is normally limited to high number, high consequence of failure projects such as those in the motor industry, eg automotive wheel testing.

Verification methods showing that a design fulfils the performance criteria

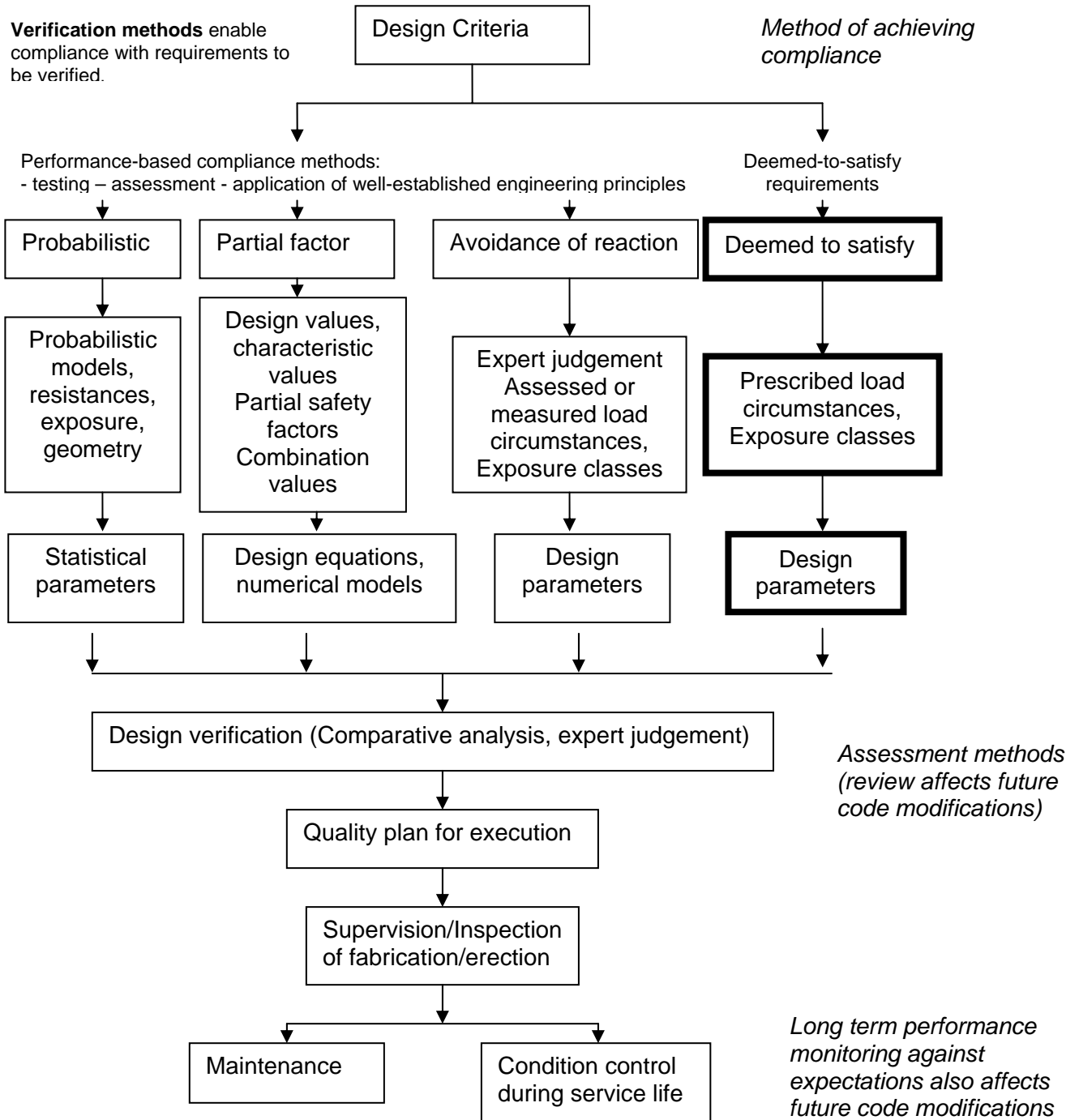
- Statistical design is normally limited to products where there are a sufficient number of repeats. It is rarely used in new structural design. For assessment of existing structures, relevant data may be derived from the structure. Statistical design is well suited to this case.
- Partial factor design is based on long term field experience and encoded to ensure that the partial factors adopted sufficiently embrace the uncertainties. Partial factor design is the basis of the well known allowable stress and limit state codes.
- Avoidance of reaction design gives the most robust design. It implies that the design excludes detrimental reaction. It is based on expert judgement. Simple examples include avoidance of poor corrosion detail, use of suitable selected materials, surface finishing choices, etc. Its application is most appropriate in high volume or high consequence of failure circumstances and is typically supported to laboratory or real event testing (such as load and load effect testing of commercial transport applications).
- The “deemed to satisfy” method is a set of prescriptive rules for dimensioning, material and product selection as well as execution procedures that ensures the fulfilment of the performance criteria. This is the traditional method in today’s operative standards. The calibration of the “deemed to satisfy” method has to be done by the standardisation body in the same way as the partial factor method. Such a verification takes infield practical experience into account.

In practice codes/standards are intended to be applied by trained people and are supported by design aids such as computer finite element analysis programmes and manufacturers literature.

How are codes/standards structured?



How are the performance standards achieved?



International trade requirements

As “deemed to satisfy” or “deemed to comply” clauses are regarded as a major non tariff barrier, the WTO requires signatories to use performance requirements in preference for evaluating a products fitness for purpose and in accepting new and or innovative products into their markets.

Deemed to satisfy clauses – conclusion

From a technical challenge point of view, it is not sufficient to present an alternative without showing that the equivalent solution meets the appropriate performance criteria. The methods of approaching such an equivalent solution are briefly discussed above. Thus the “deemed to satisfy” standards set minimum performance criteria for acceptance.

From a legal challenge point of view it is sufficient to show that the design followed “deemed to satisfy” rules without further justification. This does not suffice with alternative solutions. They need to demonstrate performance that is at least equal to the “deemed to satisfy” rules.