Prescriptive Codes: A Cure or a Curse?

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Prescriptive Codes: A Cure or a Curse?
The Context

• Historically, residential building codes have been prescriptive in nature with a strong product bias and reliance on visual inspection and enforcement.

• While prescriptive codes may be simpler to implement, easier to verify, and provide certainty for the designer and builder, they tend to be ill-suited to properly prescribe complex, dynamic, and interactive systems.
  — For further simplicity and clarity, they are usually developed around well-established products and practices.

• And this approach inevitably limits or stifles flexibility, innovation, and least-cost solutions.
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More Context

• Assume a particular code provision is not working!
• Code changes are predicated on “need and reasonableness”.
  • It takes several code cycles for a problem to become apparent.
  • It takes a few code cycles to identify a solution.
  • It takes a couple of code cycles for consensus/adoPTION by ICC.
  • It takes a cycle or two to be adopted by states.
  • It takes a cycle or so to get sound enforcement.

• A code cycle is 3 years
  – Congratulations – in 15 to 30 years you have an improved solution on the street!
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Some More Context

• Fundamental Rules for Building Codes (in order)
  – Don’t require the wrong thing!
  – Don’t prevent the right thing!
  – Discourage (disincentivize) the wrong thing!
  – Encourage (incentivize) the right thing!
Prescriptive Codes: A Cure or a Curse? What’s the Problem?

• Modern, buildings are complex, dynamic, and interactive systems (or a system of systems).
  – However, prescriptive codes are better suited to singular and independent measures or components.
  – As the complexity of an assembly or system increases, a prescriptive approach will tend to require overly conservative, often restrictive, more costly, and poorly optimized solutions.
Prescriptive Codes: A Cure or a Curse? What’s the Problem?

• Properly managing heat, air flows, pressures, moisture, and key system interactions is critical for a successful and cost effective high performance building.
  – But, prescriptive codes are highly challenged to attend to these non-visual, dynamic, complex, and interconnected phenomenon.
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For Example

• Vapor Retarder
  – Is more a function than a product.
  – Is highly dependent on climate, boundary conditions, assembly materials, and sequencing.
  – Must provide adequate vapor resistance in conjunction with the desired thermal resistance to avoid condensation or accumulation in moisture susceptible materials over some annual cycle.
  – Is it possible to describe and prescribe a universal solution for the code?
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For Example

• Air Barrier
  — How does one prescriptively describe what, where, when, and how to install a functional air barrier?
  — It has proven difficult to deliver and enforce building airtightness using prescriptive code language.
  — But today we can set a performance criteria, the designer specifies accordingly, the builder develops the necessary QA/QC, and we can verify through commissioning.
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The Premise

• It is not easy to build a safe, healthy, efficient, durable, and affordable house with a simple prescriptive-based code.

• If you think that is possible, I challenge you to show me a prescriptive path to build a safe, healthy, efficient, durable, and affordable car.
  – If you find it, I’m guessing it won’t be easy, simple, or cheap!
Prescriptive Codes: A Cure or a Curse?
The Premise

• For many reasons, current codes are tipped in favor of prescriptive “no-thought, commonly accepted, low-risk” solutions.
  – And demonstrating alternative performance compliance tends to be more onerous and costly.
• One reason code changes are so arduous is that there aren’t based on explicit, clearly stated, and accepted performance goals or criteria.
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The Premise

• In 2012,
  – Our buildings have become complex enough and
  – Our performance goals have become stringent enough,
  – That an engineered solution is necessary and justified.

• Few engineered systems are designed and built from a simple recipe or prescription.
  – There may be select prescriptive paths or solutions,
  – But they are usually built upon established and accepted performance criteria.
Prescriptive Codes: A Cure or a Curse? What’s the Solution?

• We can continue with prescriptive codes where
  – Outcomes are more visually-oriented,
  – Systems interactions are limited, and
  – HAM impacts are likely to be small.

• We must move to a performance codes where
  – Outcomes are performance-oriented,
  – Systems interactions are critical, and
  – HAM impacts are likely to be significant.
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Recommended Guidance

- We need a new approach where difficult system dynamics and interactions are anticipated and planned for in the design phase.
- The builder has tools and processes to confidently deploy these solutions in the field.
- And commissioning is used to verify critical performance measures to ensure desired outcomes.
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Recommended Guidance

• Develop specific performance criteria.
  – Once these are set and an engineered solution is designed, there may be specific prescriptive measures and QA/QC procedures that can successfully implement that solution.

• This will tip the incentives to the innovative, creative, optimized, and cost-effective designer, builder, or manufacturer!
  – In the current system a progressive builder will be faced with proving his better performance-based approach is sufficiently equivalent to the primitive, parochial, and product-focused prescriptive code.
Prescriptive Codes: A Cure or a Curse? Value

• Performance Codes ...
  – Promote flexibility and innovation
  – Support optimized, cost-effective solutions
  – Provide incentives to the clever and innovative product supplier, designer, and builder who can develop the most cost effective solutions to meet the overall performance requirements.
Prescriptive Codes: A Cure or a Curse? Market Readiness

• Market is not prepared to move immediately from prescriptive to performance codes.
• However, we can begin by establishing and inserting performance-based criteria into the current code.
  – Not as a onerous alternative.
  – But as the baseline for all solutions.
  – Prescriptive approaches are then developed to specifically meet the performance criteria.
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Market Readiness

• Set specific performance criteria for materials, assemblies, systems, and the house.
• Then, as needed and where possible, develop prescriptive guidance to provide an assured path to reduce builder burden and uncertainty.
  — However, these would likely need to be more conservative to ensure all possible combinations would still meet the set performance criteria.
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Potential Costs

• Presumably there is a large up front cost to develop the proper performance criteria and provide sufficient education for the code enforcement community

• However, since these codes would be less influenced by ongoing technology and product changes, the long-term cost might be lower.
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Implementation Issues

• Education for designers, contractors, and code officials.
  – Though some might argue that is already an ongoing need and cost due to frequent changes.

• New tools and processes would be need to be developed and available.
  – To ensure designer and contractor confidence in the designs, materials, and techniques being used to ensure code compliance, as well as long-term performance.
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Pros and Cons

• Pros
  – Achieve selected performance goals, while supporting maximum flexibility and cost-effective solutions.
  – Puts the incentive for systems-based, performance-oriented, engineered solutions in the hands of the innovative and designer and builder.

• Cons
  – Requires a major transition by codes bodies.
  – Will need to be supported by the building industry
    • Who has traditionally pushed for the prescriptive approach.
  – A new wave of code education would be necessary.
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Bottom Line

• In the end, regardless of how good the code is and how it has been structured, high performance houses require
  – properly guided design,
  – carefully executed construction, and
  – appropriate verification.

• And last, but not least, a means to ensure
  – proper operation and
  – maintenance.
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References

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