

CAP'EM

Cycle Assessment Procedure for Eco-impacts of Materials

Investing in Opportunities



This project has received
European Regional
Development Funding
through INTERREG IV B.



INTERREG IVB

GBS J A90 Performance Specification

NGS Preliminaries section & Appendix

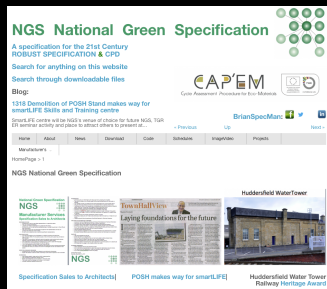


Cycle Assessment Procedure for Eco-impacts of Materials



What is it?

- It starts with a Briefing Document for the design team
- Employer's Requirements in D&B
- Performance Spec in any situation
 - In front of a prescriptive specification
- Or a completion of design requirement with CDP Contractor's Design Portion
- Or a spec clause sub-item
 - Fire door to BS 476: Part 20-23: FR30S

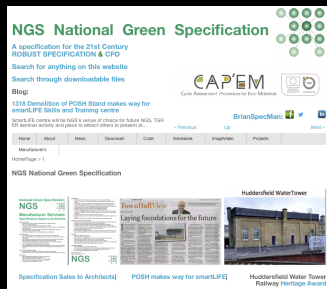


Cycle Assessment Procedure for Eco-impacts of Materials



Use with CDP

- Contractor's Design Portion
- Where the Contractor is required to complete the design
- D&B (+reality = B&D) or DMC contracts
- PFI, PPP and BOOT
- Other contracts:
 - Other procurement routes
 - Usually somebody concocted a hybrid



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What is the approach?

- Here is a proposal from the designer:
 - It is fully designed, it works
 - Tender for this
 - But if you want to tender for another method design it fully and submit it as an alternative tender
 - It is partially designed
 - It needs completing in these respects:
 - Complete the design and build it
 - Tender for all of this

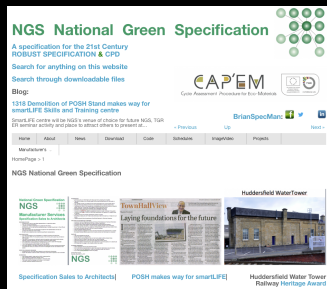


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Why?

- **QS or PM thinks the Tenderer can provide the building cheaper**
 - Offer Tenderer room for competition
- **Programme too tight**
 - Demands overlap between design and construction
- **Designers acknowledge limits to their knowledge and skills**
 - Contractor's specialist skills brought to bare on project

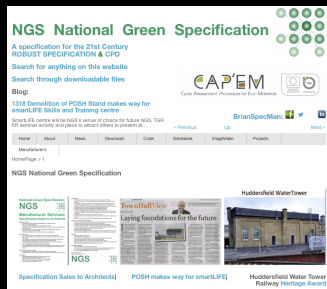


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For what? Structures

- **Steel frame:**
 - connections and fasteners
 - Reclaimed steel:
 - section upper and lower dimension
 - & lyy Ryy requirements
 - Fire performance: encased or painted
- **Concrete: recipe could require low carbon**
- **Thermal breaks at external envelope**
- **Partial or total structural design**
- **Pile driving: until supporting capacity is met**

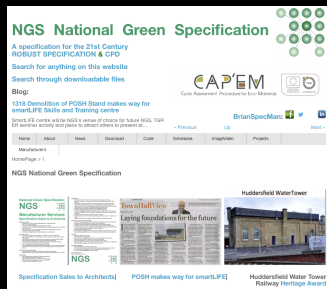


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For what? Elements

- **Curtain walling and cladding systems**
- **Fixings, fastenings wall ties and accessories**
- **Balustrades and stairs**
- **Suspended ceilings**
 - Restraining Partition heads
 - Congested ceiling voids
- **Platform floors**
 - Supporting partitions & Floor loadings
- **Fire doors Resistance periods**
- **Roof waterproofing**



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For what? Services

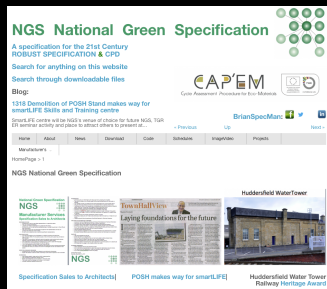
- Usually all of the Services on projects
 - M&E, PH
 - Lifts and Escalators
- Quite often inappropriately e.g. domestic
- M&E Interfaces in constructed elements
 - Smoke vent installations
 - Active solar controls
 - Access and Cleaning gantries
 - Door Ironmongery with Fire system interfaces

For what: Performance

- Fire, Structure
- Wind, dead and live loads
- Weather resistance
- Thermal, Acoustic,
- Lightning protection
- Design life and durability
- Reliability? Yes in services
- Quality? Difficult unless by example

Performance Spec Risks:

- Lack of skill in setting requirements
- Lack of understanding by any party
- Lack of attention at tender evaluation
- Reduction in design requirement in tender negotiations
- Lack of policing in design development
- Lack of testing to prove compliance

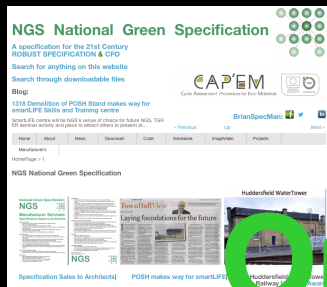


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What might it contain?

- Performance requirements for building
- Performance requirements for project
 - Sector requirements for building types
 - Environmental Compliance requirements
- Performance requirements for assemblies
- Assembly Descriptions and component parts
- T&CP Outline Spec to be adhered to
- Client/Designer/Constructor preferred materials/products
- Manufacturers detailed specifications



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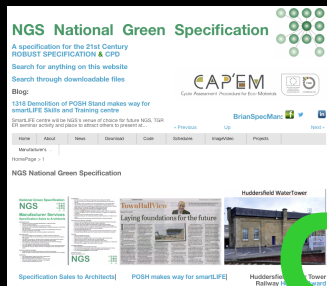


Opportunities: Buildability

- Contractor selects subcontractors
- Manufacturing capability
- Equipment availability
- Size and capacity limitations
- Sequence of assembly
- Specialist skills and know-how

Buildability: Risks

- **Lack of skills and know-how**
- **Unknown suppliers past performance**
- **Mismatch of requirements to specialist**



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Opportunities: Economy

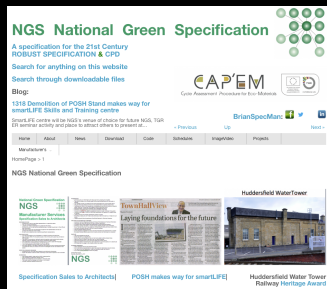
- Existing Supply Chain Relationships
- Familiar Products
- Existing discount rates
- Completion at all levels of supply chain

Risks:

- **Poor quality or cheap goods**
- **Not 'Or equivalent'**
- **Poor environmental choices**
- **Poor supply chain management**
- **Poor subcontractor performance**

How does it work with other documents

- **Planning Drawings and Outline Specification**
- **Room Data Sheets**
 - Furniture schedules
- **Schedules of specific individual assemblies**
 - Doors, Windows, Ironmongery, Finishes,
- **D&B Working Drawings (Performance?)**
- **Bill of Quants: unusual**
 - Schedule of Rates more common
 - Schedule of Rates to control variations
- **Lists of samples and prototypes**
- **Test and mock-ups**
 - On and off site



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Drawings:

- **Performance Drawings: not prescriptive**
- **Structure and peripheral construction**
- **Outer & inner face profiles and joint layouts and surface materials**
- **Transparent: inner and outer faces**
- **Penetrations and interfaces**
- **DPC/DPM GPM VB BM ATL in principal**
- **Performance Requirements?**



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How is it used?

- Set it in context
- Set the ground rules
- Educate the contractor on his obligations and opportunities
- Educate the Contract Administrator in his obligations and opportunities
- Proactively Contract Administer

Contractor' s Submissions

- Out to tender Performance Specification asks for:
- Tender Prescriptive Specification for Tender assessment
- Construction Specification adds detail and workmanship
- As Built Specification shows what actually got built

Other Contractor' s Submissions

- **Method Statement**
- **Programme showing sequencing**
- **H&S Data Sheets**
- **Substitution comparisons**
- **Product Literature**
- **Declaration of Conformity**
- **Declaration on Excluded Materials**
- **Manufacturer' s Conformation**
- **Enquiries on Specification**



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Risks?

- **Specification Substitution with or without the knowledge of the design team or Contract Administrator**
- **Equivalency not verified**
- **Novated designers handcuffed, blindfolded and chaperoned**
 - Unless whistle blower clause added
- **Reduction in standards negotiated on cost alone**

Other Sus/Env Documents

- All the documents produced for Planning Permission
- Transfer commitments into contract
- EIA Env Impact Assessment
- Use with EcoHomes, BREEAM, NEET, etc.
- Set Criteria for success
- Tool to ensure compliance is realised

Performance Specification Parts

Preliminaries

A90

Performance
specification of
whole building
Testing
Mock-ups

Work sections

B03

Elemental
Assembly
System
Performance

Work sections

B04

Elemental
Assembly
System
Specification

Work sections

B05

Services
System
Performance

Work sections

B06

Services
System
Assembly
Specification

Work sections

C10-
Q99

Services sections

R10-
W99

Services Reference

Y10-Y99

Building Reference

Z10-Z34

Inter-connectivity

Preliminaries

A90

Performance
specification of
whole building:

Structural

Fire

Durability

Acoustic

Thermal

etc.

Testing

Mock-ups

Samples

Work sections

B03

Elemental
System
Performance

Element

Structure

Fire

Durability

Acoustic

Thermal

Work sections

B04

Elemental
System
Assembly
Specification

Element

Components list

Structural

Fire Resistance

Acoustic Insulation

Thermal Insulation

Xref to work section
clauses

Structural

Fire

Durability

Acoustic

Thermal

etc.

Testing

Mock-ups

Samples

Element

Structure

Fire

Durability

Acoustic

Thermal

Element

Components list

Structural

Fire Resistance

Acoustic Insulation

Thermal Insulation

Xref to work section
clauses

Inter-connectivity

Preliminaries

B04

Elemental
System
Assembly
Specification

Element ←

Components list ←

Structural ←

Fire Resistance ←

Acoustic Insulation ←

Thermal Insulation ←

Xref to work section
clauses

Work sections

L20

Elemental
System
Assemblies

Components ←

Structure

Fire

Acoustic

Thermal

Durability

Finishes ←

Treatments

Decoration

Protection

Reference sections

Z34

Protection
System
Specification

Schedule
Of Components

Individual
Component
Treatment
Requirements

Simpler inter-connectivity

Preliminaries

A90

Performance
specification of
whole building:

Structural ←

Fire ←

Durability ←

Acoustic ←

Thermal ←

etc.

Testing
Mock-ups
Samples

Work sections

L30

Trade or Elemental
System

Performance

Structure

Fire

Durability

Acoustic

Thermal

Elements

Components

Assemblies

Reference sections

Z34

Protection
System
Specification

Schedule
Of Components

Individual
Component
Treatment
Requirements



Simpler inter-connectivity

Preliminaries

A90

Performance
specification of
whole building:

Fire
Durability
Acoustic
Thermal
etc.

Testing
Mock-ups
Samples

Work sections

L20

Trade or Elemental
Systems

All possible
Performance levels

Fire
Glazing
Acoustic
Thermal

All possible
Components

Schedule

L20

Schedule
Of Assemblies or
Components

Individual
Requirements

Unique combinations
of requirements



SECOND EDITION

CAP'EM

Investing in Opportunities



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INTERREG IVB

Performance Spec <> Drawings

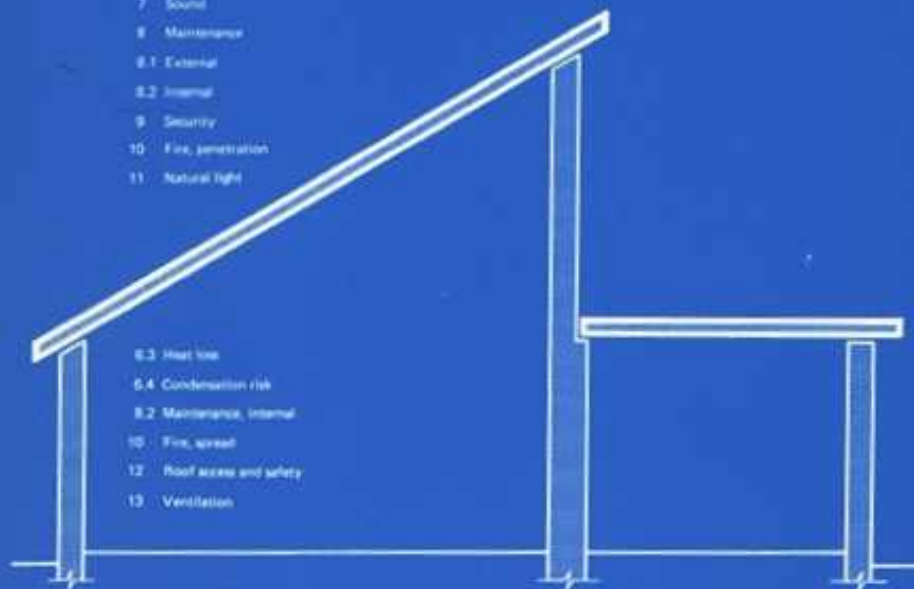
- Consider the differences between:
Performance v Prescriptive Spec.
- Translate that into:
- Performance v Prescriptive Drawings
- Can you do Performance Drawings?
- What will they look like?

Roofs general factors

(see POED 9 and POED 10 for Flat roofs and POED 11 for Pitched roofs)

Key factors	Action	Counteraction
Gravity	Downward pull	Support
Wind	Moisture force (action), destructive, penetrative	Rigidity, resilience, sealing
Rain	Moisture deposition	Deflection, impervious skin, absorption and drainage, sealing
Snow	Moisture deposition, loading	Deflection, impervious skin, absorption and drainage, sealing
Sun	Temperature variation, movement, heat gain, chemical decomposition	Movement joints, insulation, shielding, invulnerable materials, reflection
Dirt and dust	Infiltration, deposition, surface pollution	Repulsion, exclusion, shielding, cleaning
Chemicals	Corrosion, disintegration, decomposition	Invulnerable materials, exclusion
Sound	Noise nuisance	Insulation

1. Roof form and type of waterproofed covering
2. Structural strength and stability
3. Weather shield
 - 3.1 Rain
 - 3.2 Snow
 - 3.3 Wind
 - 3.4 Sun
 - 3.5 Dirt and dust
4. Drainage
5. Durability
6. Thermal performance
 - 6.1 Thermal movement
 - 6.2 Heat gain
 - 6.3 Heat loss
 - 6.4 Condensation risk
7. Sound
 - 8.1 External
 - 8.2 Internal
9. Security
10. Fire, penetration
11. Natural light



- 6.3 Heat loss
- 6.4 Condensation risk
- 8.2 Maintenance, internal
10. Fire, spread
12. Roof access and safety
13. Ventilation

Windows general factors

(see POED 17 for Specific factors)



Key factors	Action	Counteraction
Gravity	Downward pull	Support
Wind	Moisture force, destructive, penetrative	Rigidity, resilience, sealing
Rain	Moisture deposition	Deflection, impervious skin, absorption and drainage, sealing
Snow	Moisture deposition, loading	Deflection, impervious skin, absorption and drainage, sealing
Sun	Temperature variation, movement, heat gain, chemical decomposition	Movement joints, insulation, shielding, invulnerable materials
Dirt and dust	Infiltration, deposition, surface pollution	Repulsion, exclusion, shielding, cleaning
Chemicals	Corrosion, disintegration, decomposition	Invulnerable materials, exclusion
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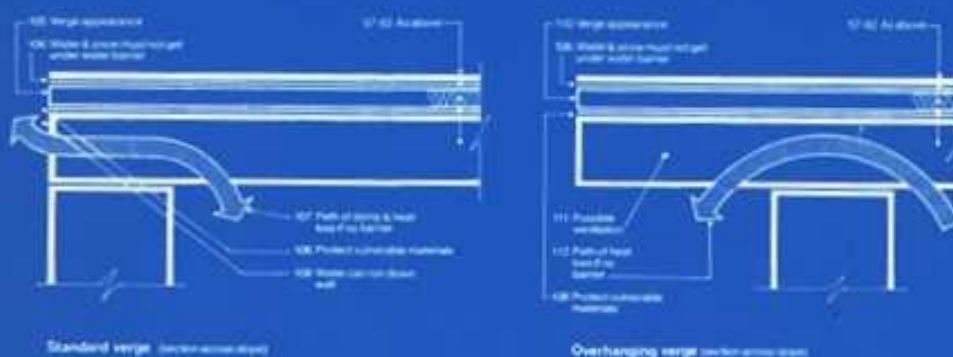
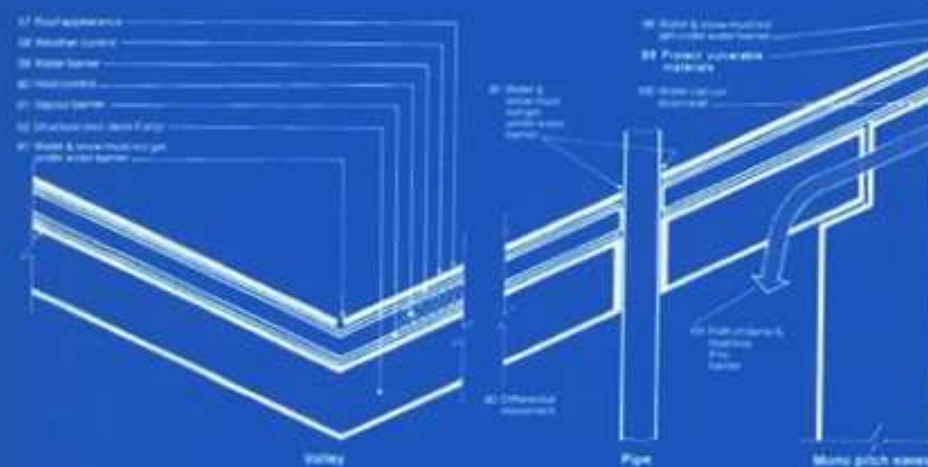
Outside

1. General purpose of window
2. Daylight
3. Sunlight
4. Glare
5. Solar heat gain
6. Sound insulation
7. Fresh air and ventilation
8. Wind-driven rain and snow
9. Privacy from overlooking
10. Cleaning
11. Security
12. Insects



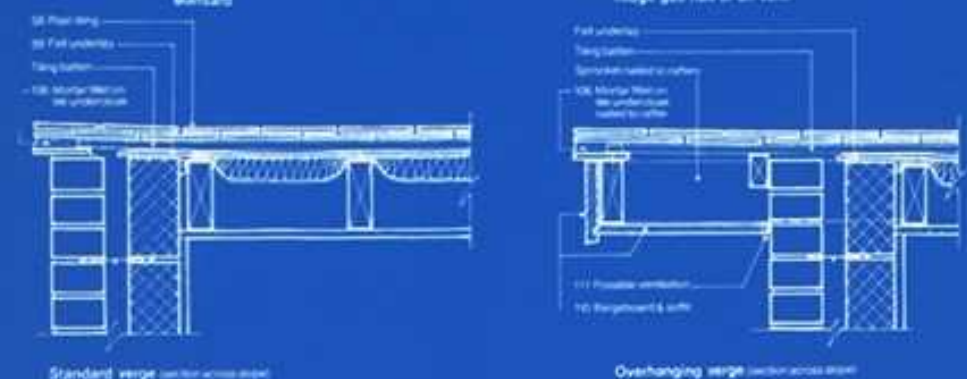
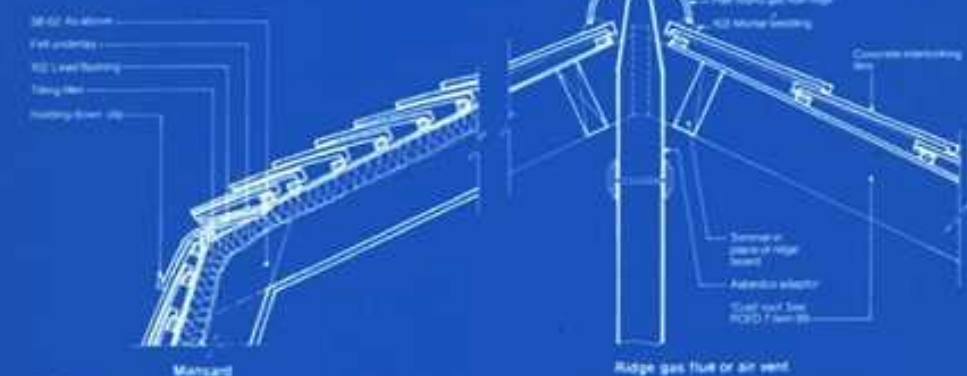
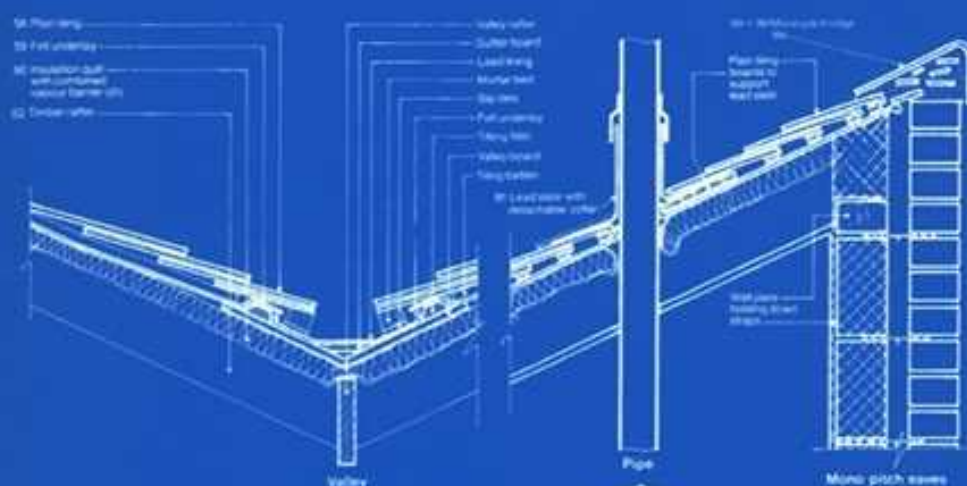
Inside

13. Views out and eye level
14. Thermal insulation and heat loss
15. Safety
16. Fire
17. Statutory window area
18. Statutory ventilation



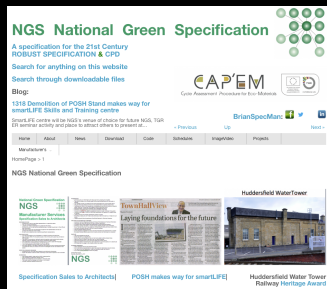
Standard verge (section across slope)

Overhanging verge (section across slope)



Standard verge (section across slope)

Overhanging verge (section across slope)



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How is it structured?

- With or without Prescriptive Specification clauses
- M&W Spec with Performance front end

Performance Specification

- Need to state requirements
- Need to state performance levels
- A90 Performance Specification exists for Violet construction (undergoing changes)
- GBS DETR Pil fund application to Green up A90 passed first hurdle but fell at the next.

EACD Enquiries About Contract Documents

- **Does the Contractor understand the Specification?**
- **If not declare before progressing**
 - Using pro-forma
- **Engage consultant who do understand**
- **Or let specifier educate them**

SoMR Statement of Manufacturers Review

- To protect Architects from themselves
- Ask the manufacturers to review proposals and confirm or otherwise:
- they comply with their:
 - Recommendations, Requirements, Agreement Certificates, Products designed functions, specification, method statements

DofC Declaration of Conformity

- BS EN 45014:1998:General Criteria for supplier's declaration of conformity
- Appendix to specification
- Contractor's Director signs to declare products used meet specification
- Need standards or specification to declare against
- Can enforce FSC, ZODP, CFC-Free, etc.

DoEM Declaration of Excluded Materials

- Appendix to specification
- Contractor's Director signs to declare none are used in project
- Need a list of excluded materials to declare against
- GBS has started that list from many sources: EWC, CHIP, COSHH, CDM, etc.

Deleterious materials lists

- Despite CIRIA/ARUP report
- They still persist for all the wrong reasons
- Green Construction is justification for lists
- Most of the materials to be removed for health and environment are permitted in violet construction

Excluded materials lists

- Whilst HSE publish MEL Maximum exposure limits and OEL occupational exposure limits
 - HSE Guidance Note EH40
 - mistakes are made e.g. BSE
- Greenies err on caution
 - MEL and OEL = Zero
- e.g. PVC, CCA, Formaldehyde, Solvents in paints

DoRR Declaration of REACH Requirements

- 0.1% of listed ingredients is threshold for notifying purchasers of contents.
- GBS has started that list from many sources:
- Lists include:
- RoHS, REACH, SVHC, SIN-List, etc.