
Overview

This standard is for those who manage the development, testing and agreement of building service engineering project design solutions.

The individual undertaking the work must be able obtain and analyse information on project options and project design parameters and identify opportunities and constraints. They will be able to identify and select resources which will balance cost and quality and consider how they will influence the design solutions.

They will calculate, analyse and test the different designs to identify the most appropriate solution. They must be able to present the recommended building services engineering design to justify the choice in line with the project brief. They must also discuss the choice of design and agree any changes with the client and record these changes. They will also be able to interpret how the overall design concept can be met and advise all stakeholders on the implications and constraints of accepting, modifying or rejecting design proposals.

Performance criteria

You must be able to:

1. access current and relevant information about the project requirements and resources
2. allocate research tasks, as appropriate, to relevant others and self
3. analyse all research finding and develop detailed proposals including risk assessments
4. select, for further development by the project team, those design concepts which meet the requirements of the design brief and also resolve a number of opportunities and constraints on development
5. communicate the detailed design options to relevant others
6. identify, with relevant others, the most appropriate solutions in terms of the project requirements and resources
7. select tests which will give relevant information about how the design options match the parameters of the project brief
8. refine design options which meet the opportunities and constraints of the project requirements and resources and test them until their ability to meet the design parameters is established
9. reject any design options which fail to meet the design parameters and identify possible alternatives
10. present recommendations, proposals and design options and show how they are justified by the requirements of the project requirements and resources
11. assess and justify the features and benefits of the recommended design solution, including any environmental technologies selected for use
12. explain how the overall design concept can meet the opportunities and constraints in the project brief, the aesthetic requirements of the client and the project requirements and resources
13. inform relevant others of the implications and constraints of accepting, modifying or rejecting design proposals
14. agree and incorporate all final recommendations and requirements into the detailed design solution
15. confirm with relevant others what the recommended design solution will cost and how long it will take to implement
16. agree the detailed design solution with relevant others
17. complete and safely store all relevant documentation in accordance with organisational requirements
18. deal promptly and effectively with any problems within the scope and limitations of your own competence, responsibilities and accountability and report those which cannot be solved

Knowledge and understanding

You need to know and understand:

1. the current legislation, guidelines, policies, procedures and protocols which are relevant to your working practice and to which you must adhere
2. the scope and limitations of your own competence, responsibilities and accountability as it applies to your job role
3. how to access and interpret all relevant work instructions and information
4. specific procedures for reporting issues which are beyond your competence, responsibilities and accountability
5. information, options and design parameters which are relevant to the development of a project brief
6. how to identify those parts of a project which require detailed design
7. the factors, criteria and procedures which influence design and work activities, including resource availability
8. The types of documentation and methods to present research and design evaluation data and conclusions to relevant others
9. The design parameters, concepts and approaches and how to assess them against a project brief considering relevant factors, criteria and procedures
10. The resource implications of the different design options
11. The opportunities for and constraints on the use of environmental technologies
12. The different methods for communication around design
13. The implications of modifying a project brief
14. The types of design approaches that are likely to contribute to design ideas
15. How to sources information and ideas, where existing design options do not meet a project brief

16. how to develop design options
17. how to identify and use relevant design software packages
18. the types of tests which give relevant information about the design options
19. the different methods to refine and test design options
20. how to identify and reject design options which fail to meet the design parameters
21. the different techniques to record test results
22. the different methods to use to present recommendations, proposals, design options and associated information
23. the features and benefits of design solutions, including any environmental technologies
24. how recommendations, proposals and design options can be justified by the requirements of a project brief
25. what evidence may be valid to support changes to agreed criteria
26. the types of approaches to prompt stakeholders to ask questions and make comments during a presentation
27. how to agree and record any amendments and variations from an original project brief
28. the different methods to inform stakeholders about:
 - how well design concept proposals match criteria in a project brief
 - a designer's creative interpretation of a project brief and overall design concept
 - implications and constraints of accepting, modifying or rejecting design proposals
 - how much more advice, research and consultancy will be necessary to produce a detailed design which is acceptable
29. the costs involved in a detailed design solution
30. the organisational procedures for:
 - communicating the use, safety and control of the system to relevant others
 - confirming with relevant others those necessary variations to the

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- planned programme of work that may have the potential to introduce a hazard and/or impact on the installation work to be undertaken
 - confirming with relevant others the correct actions to be taken to confirm that any variations to the planned programme of work will not introduce a hazard and have minimum impact on the installation work to be undertaken
 - obtaining customer/client acceptance of the installed system and its associated equipment, accessories and components post work activity and how to deal with cases where acceptance is not received
 - the safe transport and/or disposal of any waste material, substances and liquids in accordance with suppliers' and manufacturers' instructions and legislation
31. how to complete and safely store all relevant documentation in accordance with organisational requirements

Scope/range

Information

- technical (design documentation, software, plans, installation specifications, equipment)
- specifications, manufacturers' data, manufacturer's instructions, tender documents, surveys, BIM data, physical models)
- functional (user instructions, including the circumstances when professional expertise should be called upon)
- client information (provided by the client including the invitation to tender, any
- drawings and specifications)
- contractual
- statutory consents
- quotations
- health and safety
- planning and pre-planning
- instructions (verbal, written)

Factors

- physical (e.g. hydrology, geology, exposure, solar gain, light levels, temperature range, wind speed)
- technical (e.g. resource availability, materials and equipment performance)
- structural forms, component life, heating and cooling, health and safety, fire protection, access, transportation, traffic generation)
- environmental (e.g. sustainability, energy use, local ecology, emissions, pollution risk)
- requirements (e.g. client and user needs, regulatory, legal, timescales, BIM protocols, contractual, cost, management of hazards and risks)

Criteria

- delivery (e.g. installation processes, schedule, resource)
- availability, quality control, initial cost, performance)
- design and in use performance (e.g. aesthetics, structural forms, heating and cooling, component life, whole life cost)
- environmental (e.g. energy in use, embedded energy, water use and recycling, carbon emissions, pollution)
- access
- heritage protection
- fire protection

Procedures

- information management
- project management
- risk assessment and management
- communication with relevant others
- implementing and monitoring requirements related to listed buildings or conservation areas
- estimating

Documentation

- graphical
- non graphical

Test(s)

- physical
- simulation
- comparative
- statistical
- computer modelling

Present

- verbally
- visually
- electronically
- written reports
- data

Environmental Technology Systems

- biomass
- grey water and rain water
- heat pumps
 - air source
 - ground source
 - water source
- micro combined heat and power (micro-CHP/ domestic CHP)
- micro hydro
- micro-wind turbine
- photovoltaic thermal (PVT)
- solar photo-voltaic
- solar thermal

Stakeholders

- clients
- occupiers/users
- regulatory authorities
- employees
- colleagues
- investors

- contractors and subcontractors
- consultants
- local people who may be affected by the work
- financiers

Client

- architect
- contract manager
- main/sub-contractor
- consultant(s)
- purchaser of installation and/or maintenance services or their representative
- other trades and services at the work site

****Relevant others**

- client representatives
- customers/clients
- members of the public
- other contractors/trades
- service providers
- site/contract manager
- supervisors
- work colleagues

BSENZ05

Develop, test and agree building services engineering project designs



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