

Safety in Design

Guidance for the Electricity Industry

Juliet Clendon, Technical Adviser EEA



Changes for Designers



New Zealand Legislation

Health and Safety Reform Bill

Hon Simon Bridges

Health and Safety Reform Bill

Government Bill
192.—1

Summary

1. Covers designers of a plant, a substance and/or a structure.
2. The designer must, as far as is reasonably practicable, ensure that the design is without risks to the health and safety of persons through the whole lifecycle of the asset.
3. The designer must carry out any calculations, analysis, testing or examination to achieve section (2)
4. The designer must provide with the design
 - (a) The purpose for which it was designed
 - (b) The results obtained from section (3)
 - (c) Conditions necessary for safe use
5. The designer must make a reasonable effort on request to provide relevant information to those working on site

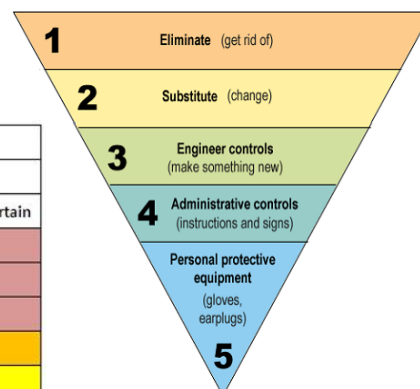
What is 'Safety in Design?'

"The integration of hazard identification and risk assessment methods early in the design process to eliminate or minimise the risks of injury throughout the life of the product being designed."

Design Process

- Risk identification
- Risk elimination, substitution, mitigation etc

	Likelihood				
Consequence	1	2	3	4	5
	Rare	Unlikely	Possible	Likely	Almost certain
5 Catastrophic	5	10	15	20	25
4 Major	4	8	12	16	20
3 Moderate	3	6	9	12	15
2 Minor	2	4	6	8	10
1 Negligible	1	2	3	4	5



Considerations



- Constructability
- Operating procedures
- Maintenance procedures
- Competence requirements
- Future proofing
- Decommissioning

Complications



- Understanding of O&M?
- Understanding of construction?
- Has SiD been built as designed? Verification?
- ALL the information? Who, when, what, how and **why**?
- How do you verify understanding?
- Maintaining information over time

EEA's Work

Steering Group

- Mike Whaley (Powerco)
- Norman Geary (Meridian Energy)
- Johan Hendriks (Alpine Energy)
- Andrew Renton (Transpower)

Requirements

- Scalable
- ESI specific
- Generic and flexible for different users (i.e. distribution, generation etc)
- Practical to use
- Address cultural as well as technical issues

Safety in Design Guide

Objectives

Assist electricity businesses to develop processes which:

- Provide designs that are safe
- Document design decisions
- Continuously improve the safety of designs
- Meet statutory obligations

Targeted to operational and maintenance workers, construction managers, project managers, safety professionals, executives, designers and engineers.

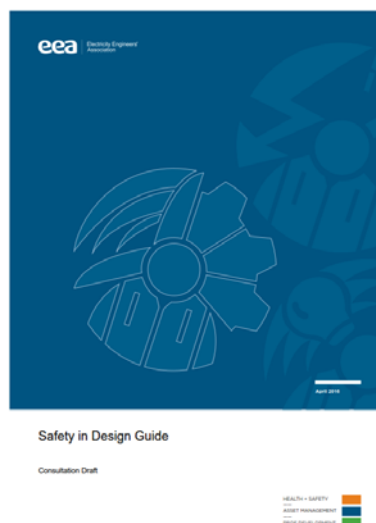
Safety in Design Guide

Development Process

- Scoping (Jun 2015)
- Tender process (Nov 2015)
- Guide drafting (Nov – April 2016)
- Consultation Workshop (March 2016)
- Industry consultation on draft (April – July 2016)
- Post Consultation review (July - Sep 2016)
- Approval (Sep 2016)
- Publication (Oct 2016)

Guide Structure

- Part A: An introduction
- Part B: A general overview of SiD
- Part C: SiD Framework
- Part D: Lifting Performance in SiD
- Part E: Supporting Information (Appendices)



Sid Framework – Enablers

Part C

- Leadership
- Awareness and Capability
- Design Standards
- Assurance



Activity	Board	Executive Leaders	Technical (engineering and safety)	Project Managers
Routinely ask for progress/performance/inclusion of SiD				
Hold the executive accountable for maintaining their obligations				
Ensure adequate funding and support is available for SiD requirements				
Incorporate adequate technical approval into business case approval processes				
Clearly define SiD obligations for outsourced providers				
Provide adequate resources to undertake SiD				
Establish KPIs and objectives for SiD				
Ensure assurance programmes (audits etc.) include SiD				
Maintain training and capability of teams for SiD				
Approve design changes based on SiD requirements				

SiD Framework - Process

Part C

- Preliminary Assessment
- Systematic Review
- Information Transfer
- Monitor and Review
- Change Management
- Decommissioning and Demolition



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Lifting Performance

Part D

Implementation Questions

- 1) Who should be the overall owner of the SiD process ?
- 2) Who should lead the development of the SiD process ?
- 3) Who should be the custodian of the SiD process ?
- 4) How should effectiveness of SiD be measured ?
- 5) What are the linkages with other processes ?
- 6) What structural boundaries does it cross ?
- 7) Who will have authority over critical decisions about safety in design ?

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Part E

Tools

Routine Tools

- Inherent Safety Assessment
- Field Checklist
- Hazard Identification Review (HAZID)
- HAZID Guidewords
- Risk Registers

Specialist Tools

- Hazard and operability study
- Safety Integrity level review
- Failure modes and effects analysis
- CHAIR study
- Bow tie Review
- Human factors review

Part E

Running a Successful Review


 Design Sections (Nodes)

Attendees

Facilitation

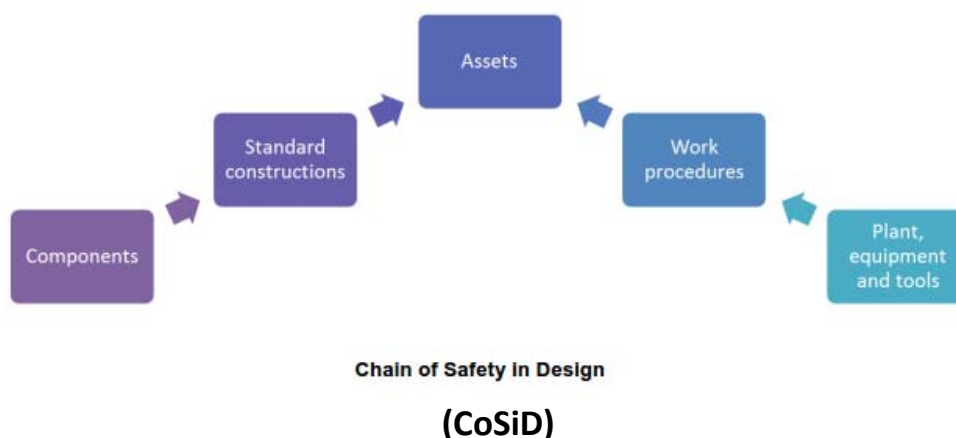
Information availability

Clear Terms of Reference

Time Use

Part E

Case Studies – Network Example



Part E

CoSiD – Pole Step (Component)

Hazard ID	Lifecycle Stages						Risk Assessment			Treatment and Residual Risk
	Design	Procurement	Installation	Commissioning	Operation, Fault & Repair	Decommissioning	Consequence Ranking	Frequency/ Recurrence	Risk Level	
Slipping on pole step while climbing			yes		yes	yes	Moderate - Serious injury or recurring health issues	1 - 10 years	High	Three points of contact at all times, secured at all times, wear full PPE
Falling onto pole step			yes		yes	yes	Low - Any lost time injury	1 - 10 years	High	Three points of contact at all times, secured at all times, wear full PPE Remove all sharp edges during fabrication - Noted on drawing
Laceration/Abrasion resulting from scraping pole step while climbing			yes		yes	yes	Low - Any lost time injury	1 - 10 years	High	Three points of contact at all times, secured at all times, wear full PPE Remove all sharp edges during fabrication
Dropping pole step onto someone below			yes		yes	yes	Moderate - Serious injury or recurring health issues	1 - 10 years	High	Install pole steps on the ground where possible
Pole step falling							High - Fatality, multiple serious injuries or permanent disability	10 - 100 years	Critical	Proof load every new step to 150kg at cold temperature Stop climbing poles Ensure polesteps are used as designed. Add note to drawing stating that polesteps are designed to be stood on within the stumps Ensure polestep design is in accordance with applicable standards and has been through appropriate engineering review processes

Excerpt from HAZID record

CoSiD – Multi Element Hazards

Part E

Hazard description	Design element type	Example design element	Applicable?	Example explanation for HAZID
Falling while accessing a pole from pole steps	Components	Pole step design	Yes	Pole step design can change the pole step strength, quality, grip and reduce exposed sharp edges
	Standard constructions	Pole standard construction	Yes	Pole steps could be eliminated, the spacing could be reduced or positions optimised for accessing pole equipment
	Assets	Line design	Yes	The overall design of the line will influence the methods which can be used to access structures.
	Work procedures	Pole climbing procedure	Yes	The procedure may influence the component and standard construction design. It specifies whether the pole steps should be used for specific tasks, within which conditions and with which controls.
	Plant, equipment, tools	N/A	No	Use of a bucket truck would eliminate this hazard however that is a work procedure
Pole failing	Components	Pole design	Yes	Applying appropriate assessment during product approval and quality control during procurement and logistics
	Standard constructions	Pole standard construction	No	The selection of the appropriate pole size is determined in the line design
	Assets	Line design	Yes	Ensuring that pole maximum loads are not exceeded
	Work procedures	Stringing procedure	Yes	Ensuring that pole working loads are not exceeded during construction
	Plant, equipment, tools	N/A	No	

Example HAZID Elements

Next Steps

- Publication of Final guide (end of October 2016)
- Industry promotion
- Safety in Design Portal
- Ongoing information sharing i.e. workshops

Questions and Comments?

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