

# LANL Conduct of Engineering Scope and Major Activities

Processes

Standards

Training & Qualification

Governing Institutional Documents		LANS Contract								
		IP 340, Engineering								
		IMP 341, Conduct of Engineering								
Type of Work		Facility Work				Programs/ Non-Facility Projects/ R&D Work				Nuclear Weapons Work
Engineering Standard Types and Major Topics	Subtopics LANL ESM, LLNL DSS, PRS DG Subject, etc.	Higher Hazard <sup>(1)</sup>	LANL ESM Section or other Document	Lower Hazard <sup>(2)</sup>	LANL ESM Section or other Document	Higher Hazard <sup>(1)</sup>	LANL ESM Section or other Document	Lower Hazard <sup>(2)</sup>	LANL ESM Section or other Document	Product Realization Stds and Tech. Bus. Practices
<b>Design Criteria (by LANL Eng Standards Manual ISD 341-2 Chapter/Discipline)</b>										
<a href="#">Introduction</a>	General program administration at LANL	M	Introduction	M	Introduction	M	Introduction	M	Introduction	Product Realization Stds
1. <a href="#">General</a>	General Requirements for All Disciplines (ESM)	M	Z10	M	Z10	M	Z10	M	Z10	Product Realization Stds
	Equipment and Component Numbering & Labeling (ESM Ch 1)	M	200-230	M	200-230	G	200-230	G	200-230	TBP-302, Product and Equipment Designations
2. <a href="#">Fire Protection</a>	Fire Protection Ch	M	D40	M	D40					
3. <a href="#">Civil</a>	General Civil Requirements	M	G10-30GEN	M	G10-30GEN					
	Site Preparations	M	G10	M	G10					
	Site Improvements	M	G20	M	G20					
	Site Civil / Mechanical Utilities	M	G30	M	G30					
4. <a href="#">Architectural</a>	General Architectural Requirements	M	B-C GEN	M	B-C GEN					
	Building Shell	M	B Shell	M	B Shell					
	Building Interior	M	C Interior	M	C Interior					
5. Structural	<a href="#">General Criteria</a>	M	Section I	M	Section I	M	Section I	G	Section I	
	<a href="#">PC-0, PC-1, and PC-2 Design &amp; Analysis Reqrmts</a>	M	Section II	M	Section II	M	Section II	G	Section II	
	<a href="#">PC-3 and PC-4 Design &amp; Analysis Requirements</a>	M	Section III			M	Section III			
	<a href="#">Geotechnical Investigations</a>	M	Section IV	M	Section IV					
	Seismic Design and Evaluation Criteria (LLNL)	G	LLNL*	G	LLNL*	G	LLNL*	G	LLNL*	
	Concrete Anchorage Design (LLNL)	G	LLNL*	G	LLNL*	G	LLNL*	G	LLNL*	
	Safety Factors (LLNL)					G	LLNL*	G	LLNL*	
	Personnel and Equipment Shields (LLNL)	G	LLNL*			G	LLNL*			
6. Mechanical (and materials)	General Mechanical ( <a href="#">D10-30GEN</a> )	M	D10-30GEN	M	D10-30GEN	M	D10-30GEN	M	D10-30GEN	
	Fatigue Analysis of Metals—The Stress-Life Method (LLNL)					G	LLNL*	G	LLNL*	
	Fracture-Critical Metal Components (LLNL)					G	LLNL*	G	LLNL*	
	Friction, Wear, & Lubrication (LLNL) (ops & maint)	G	LLNL*	G	LLNL*	G	LLNL*	G	LLNL*	
	Conveying ( <a href="#">D10+E10</a> re: cranes, elevators, lifts)	M; G	D10+E10; LLNL*	M; G	D10+E10; LLNL*	M; G	D10+E10; LLNL*	M; G	D10+E10; LLNL*	
	Cryogenic Systems ( <a href="#">FermiLab/FNAL ESH 5030</a> )	G	FermiLab ESH 5030*	G	FermiLab ESH 5030*	G	FermiLab ESH 5030*	G	FermiLab ESH 5030*	
	Gloveboxes (LANL <a href="#">D10+E10</a> ; LLNL*)	M; G	D10+E10; LLNL*	M; G	D10+E10; LLNL*	M; G	D10+E10; LLNL*	M; G	D10+E10; LLNL*	
	Hazardous Materials Shipping Containers (LLNL)					G	LLNL*			
	HVAC and nuc. air treatment systems <a href="#">D30HVAC</a>	M	D30HVAC	M	D30HVAC	M	D30HVAC			

M = Required. G = Guidance

DG = Product Realization Standard Design Guide maintained by Sandia National Lab for Nuclear Weapons Complex. LANL participates in the PRS program and can utilize the PRS Guides, Standards, etc.

LLNL\* = LANL is currently reviewing a LLNL programmatic "Design Safety Standard" on this for usefulness and possible adoption as a LANL Design Guide.

Note 1: Higher Hazard facilities include nuclear hazard category 2 & 3 and high and moderate hazard non-nuclear facilities

Note 2: Lower Hazard facilities include radiological facilities, low hazard, and no hazard non-nuclear facilities T. H. Oruch, Eng Standards Program, 5-8475, oruch@lanl.gov

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	Piping: ASME B31.3 Process Piping Guide	G	D20 Att A	G	D20 Att A	G	D20 Att A	G	D20 Att A	
	Plumbing/Piping/Vessels ( <a href="#">LANL D20</a> )	M	D20	M	D20	M	D20	M	D20	
	Pressure Vessels and Systems (LLNL)	G	LLNL*	G	LLNL*	G	LLNL*	G	LLNL*	
	Process & Instrumentation Diagrams ( <a href="#">D10-30PFD</a> )	M	D10-30PFD	M	D10-30PFD	M	D10-30PFD	M	D10-30PFD	
	Stands, Dollies, Lifting, Handing, Fixtures					G	LLNL*; PRS DG10221, DG10240	G	LLNL*; PRS DG10221, DG10240	PRS DG10221, DG10240
	Threaded Fasteners (LLNL)	G	LLNL*	G	LLNL*	G	LLNL*	G	LLNL*	PRS Des Guide DG10080/B
	Vacuum Systems (LLNL)	G	LLNL*	G	LLNL*	G	LLNL*	G	LLNL*	
	Vessels, Explosion Containment (LLNL)					G	LLNL*			
7. Electrical	General Electrical Requirements ( <a href="#">D5000</a> )	M	D5000	M	D5000	M	D5000	M	D5000	
	Electrical Service & Distribution Systems ( <a href="#">D5010</a> )	M	D5010	M	D5010					
	Lighting & Branch Circuit Wiring ( <a href="#">D5030</a> )	M	D5020	M	D5020					
	Communications ( <a href="#">D5030</a> )	M	D5030	M	D5030					
	Other Electrical Systems ( <a href="#">D5090</a> )	M	D5090	M	D5090					
	Site Electrical Distribution ( <a href="#">G4010</a> )	M	G4010	M	G4010					
	Site Lighting ( <a href="#">G4020</a> )	M	G4020	M	G4020					
	Site Communication & Security ( <a href="#">G4030</a> )	M	G4030	M	G4030					
	Other Site Electrical Utilities ( <a href="#">G4090</a> )	M	G4090	M	G4090					
	Designing and Fabricating Safe Electrical Equipment (LLNL)					G	LLNL*	G	LLNL*	
	Rack Power Distribution and Enclosure Design					G	TBD	G	TBD	
	Spec for Electrical Equipment Fabrication (LLNL)					G	LLNL*	G	LLNL*	
	Acquiring Electrical Equipment and Components (LLNL)	G	LLNL*	G	LLNL*	G	LLNL*	G	LLNL*	
	High Energy Electrical System Design	G	TBD	G	TBD	G	TBD			
	Electrical Testers for Use with Nuclear Explosives					G	PRS DG10001			PRS Des Guide DG10001
8. Instrumentation & Control	Instrumentation & Control [ <a href="#">LANL; process &amp; HVAC</a> ]	M	D3060/F1050	M	D3060/F1050	M	D3060/F1050	M	D3060/F1050	
	Instrumented Systems used in SS & Hazardous Processes Design Guidance	G	Ch 8 App A			G	Ch 8 App A			
	Fail-Safe Design of Process Control Loops Guidance	G	Ch 8 App B			G	Ch 8 App B			
	I & C Design Review Guidance	G	Ch 8 App C	G	Ch 8 App C	G	Ch 8 App C	G	Ch 8 App C	
	Installation & Calibration of Instruments Guidance	G	Ch 8 App D	G	Ch 8 App D	G	Ch 8 App D	G	Ch 8 App D	
	Alarm Management Guidance	G	Ch 8 App E			G	Ch 8 App E			
	Instrument Loop Diagrams Guidance	G	Ch 8 App F	G	Ch 8 App F	G	Ch 8 App F	G	Ch 8 App F	
	Control Logic Diagrams Guidance	G	Ch 8 App G	G	Ch 8 App G	G	Ch 8 App G	G	Ch 8 App G	
	Schematic (Elementary) Diagrams Guidance	G	Ch 8 App H	G	Ch 8 App H	G	Ch 8 App H	G	Ch 8 App H	
	Hybrid microcircuits, printed wiring boards/assys, integr circuit pkg & dies, Li(Si)/FeS2 thermal batteries, leadless chips, solderability, unique signal					G	PRS Design Guides DG 10172, 10173, 10174, 10176, 10177, 10178, 10179, 10214	G	PRS Design Guides DG 10172, 10173, 10174, 10176, 10177, 10178, 10179, 10214	PRS Design Guides DG 10172, 10173, 10174, 10176, 10177, 10178, 10179, 10214

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9. <a href="#">Security</a>	Facility Protection and Security	M	F1033	M	F1033	M	F1033	M	F1033	
10. Hazardous Process	Hazardous Process Requirements ( <a href="#">LANL F1030/A</a> )	M	F1030.1 and App A			M	F1030.1 and App A			
	Airborne Payloads; Aircraft Compatibility					G	LLNL*; PRSDG10222	G	LLNL*; PRSDG10222	PRS Design Guide 10222
	Explosives Assemblies (LLNL)					G	LLNL*			
	Fracture-Critical Optical Components (LLNL)					G	LLNL*	G	LLNL*	
	Laser Systems -- Design Considerations, etc.					M; G	LIR and LIG 402-400; TBD*	M; G	LIR and LIG 402-400; TBD*	
11. Radiation Protection	Radiation Protection ( <a href="#">LANL F1030.2 and App A</a> )	M; G	F1030.2 and App A			M; G	F1030.2 and App A			
	Radiation Shields	G	TBD*			G	TBD*			
12. Nuclear	Nuclear ( <a href="#">LANL F1030.3 and Att A</a> )	M	F1030.3 and Att A			M	F1030.3			
13. Welding and Joining	Welding and Joining ( <a href="#">LANL Welding Prgrm Vol 1-5</a> )	M	Volumes 1-5	M	Volumes 1-5	M	Volumes 1-5	M	Volumes 1-5	
	Welded Assemblies	G	LLNL*; DG10139/C	G	LLNL*; DG10139/C	G	LLNL*; DG10139/C	G	LLNL*; DG10139/C	PRS Des Guide DG10139/C
14. Sustainable Design	<a href="#">Sustainable Design Requirements for Facilities</a>	M	Ch 14	M	Ch 14					
15. Commissioning	<a href="#">buildings and systems</a>	M	Draft available, expect 2008	M	Draft available, expect 2008					
16. IBC Program	Plan review, inspection, special inspection per IBC, certificate of occupancy	M	IBC-GEN, IBC-IP, IBC-TIA, IBC-FAB	M	IBC-GEN, IBC-IP, IBC-TIA, IBC-FAB					
<b>Specifications</b> Detailed fabrication or construction specs, normally in CSI 3-part format	Note: <a href="#">LANL Master Specifications Manual</a> is applicable to programmatic when noted by the referring ESM Chapter's text.	M	LANL Master Specifications Manual	M	LANL Master Specifications Manual	M/G; see note to left	LANL Master Specifications Manual	M/G; see note to left	LANL Master Specifications Manual	TBP-303, Seven-Digit Material and Process specifications; various 7-digit spec under PRS
<b>Standard Drawings, Example Drawings, and Repeatable Details</b>	Notes: <a href="#">LANL Standard Drawings and Details</a> is applicable to programmatic when noted by the referring ESM Chapter's text. TA-55 has repeatable details outside LANL Eng Stds Program	M	LANL Standard Drawings and Details	M	LANL Standard Drawings and Details	M/G; see note to left	LANL Standard Drawings and Details	M/G; see note to left	LANL Standard Drawings and Details	
<b>Drafting Standards</b> 2D or 3D representation requirements using CAD	NOTES: LANL Drafting Standards Manual ( <a href="#">LDSM</a> ) exists. Pro-E drafting standards are in development (B. Baas/ Pro-E Working Group)	M	LDSM	M	LDSM	G	LDSM; former ESA and DX-5 Drafting Stds may also be adopted locally	G	LDSM; former ESA and DX-5 Drafting Stds may also be adopted locally	Various PRS and Drawing Stds <a href="https://prs.sandia.gov/home.asp">https://prs.sandia.gov/home.asp</a>
<b>Design Guides -- Misc</b>	Accelerator design							G	TBD	
	High-reliability design (e.g., NASA)					G	TBD	G	TBD	
	Manufacturability Improvement					G	TBD	G	TBD	
	Physical, Mechanical, and Electrical Properties of Common Materials (LLNL)					G	LLNL*	G	LLNL*	

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