

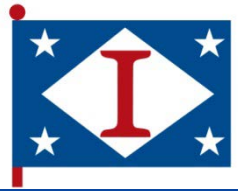
Ingalls Shipbuilding

A Division of Huntington Ingalls Industries

NSRP Project: Hanger Standardization

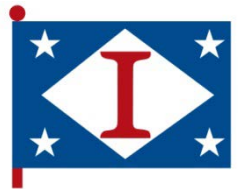
Sean Murphy
Ingalls Shipbuilding

Introduction to the Hanger Standardization Panel Project



- This paper is a summary of the National Shipbuilding Research Program (NSRP) Panel Project
- Sponsored by the Ship Design & Material Technologies Panel
 - The purpose of the panel is to sponsor projects that discuss the parametric design rules, metrics, detail design, and materials standards, engineering data, and advanced product designs and materials to support the rapid and efficient development of the next generation of high performance ships.
- The Objective of the Hanger Standardization Panel Project is to improve the accessibility to hanger documentation across shipyards and across classes of ships.
 - Makes hanger information accessible across ship programs (parts commonality) in a digital medium
 - Reduces the labor of re-engineering hanger specifications
 - Guidance document and templates will streamline the process for new hanger approval

Summary of Plan



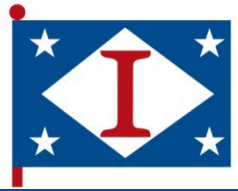
- 3 Parts to the Project:

- Part 1 - Hanger database creation
- Part 2 - Research of Hanger qualification information and population of database
- Part 3 - Development of guidance documents and procedure templates for the standard hanger qualification process

- Deliverables:

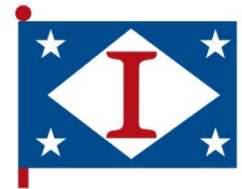
- A Microsoft database design that provides a means for storing the information and documentation required for each hanger installation and extension
- A Microsoft Access database of the gathered hanger information
- A guidance document and test procedure templates for new hanger qualification

Part 1: Hanger Database Development



- Switchboard for Database Startup 
 - Tables:
 - Basic Hanger And Qualification Information 
 - Cableway Hanger Details 
 - Pipe Hanger Details 
 - Hot Hanger Details 
 - File Attachment input and management 
 - Forms
 - Input for Cableway Hangers 
 - Input for Pipe Hangers 
 - Input for Hot Hangers 
 - Reports
 - Pipe Hanger by Size Report 
 - Pipe Hanger by Shipyard Qualification Report 
 - Cableway Hanger Query Report 
-  = Complete

Initial Hanger and Qualification Information



BASIC HANGER AND QUALIFICATION INFORMATION

Item Number	Database Generated Identification Number
Shipyards Hanger ID	Shipyards Specific Identification Number
Hanger Type	Pipe, Cableway, or Hot
Nomenclature and Manufacturer	Detailed Hanger Description including manufacturer, if applicable
Original Shipyards	Shipyards Hanger is qualified for
Original Class Design Contract	Ship Class Hanger is qualified for
Drawing Number	Drawing Number for Hanger
Drawing Revision	Revision of the Hanger Drawing
Drawing Date	Date of the Hanger Drawing
Shock Grade of Hanger Assembly (A or B)	A or B
Mounting Location (Deck, Hull, Shell)	Deck, Hull, or Shell
Shock Test Report	Title of Shock Test Report
Shock Extension Report	Title of Shock Extension Report (If Applicable)
Vibration Test Report	Title of Vibration Test Report
Vibration Extension Report	Title of Vibration Extension Report (If Applicable)
CDRL/ Item No./ Date Reference #1	Shipyards or Contract Specific Report (Instance #1)
Approval Letter Reference #1	Approval Letter (Instance #1)
CDRL/ Item No./ Date Reference #2	Shipyards or Contract Specific Report (Instance #2)
Approval Letter Reference #2	Approval Letter (Instance #1)
Shock Qualified (Y/N)	Yes or No
Vibration Qualified (Y/N)	Yes or No
Limitations	Description of any limitations
Comments	Any additional Comments

Hanger Submittal Form

Shipyards Hanger ID Shipyards Internal Report:

Hanger Manufacturer

Hanger Nomenclature

Shipyards Design Contract Original Class Design Contract

Hanger Drawing Number Hanger Drawing Revision Hanger Drawing Date

Shock Test Report

Shock Extension Report

Vibration Test Report

CDRL/Item Number/Date

Approval Letter

CDRL/Item Number/Date (2nd Submittal)

Approval Letter (2nd Submittal)

Shock Qualified? Vibration Qualified?

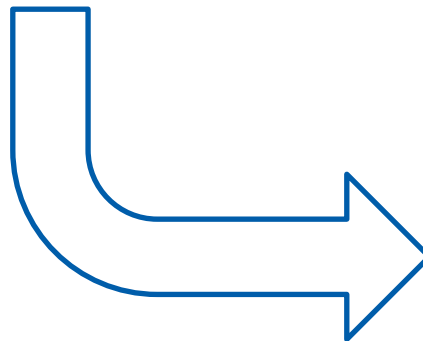
HANGER TYPE

Documentation: (Double Click to Attach)

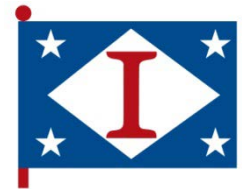
Limitations

Comments

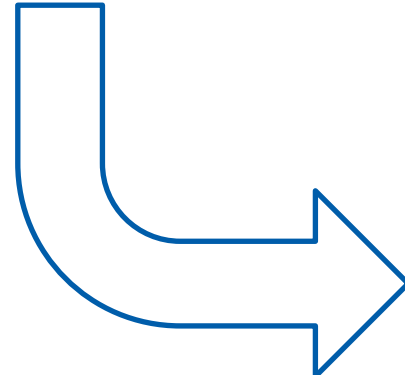
NEW HANGER



Cableway Hanger Details



CABLEWAY HANGER INFORMATION	
Downcomer	Downcomer Type
	Downcomer Material
	Downcomer Length
	Downcomer Size
	Downcomer Attachment Method
Crosstier	Crosstier Type
	Crosstier Material
	Crosstier Length
	Crosstier Size
	Crosstier Attachment Method
	Crosstier Quantity
	Number/ Size of Cables per crosstier
Miscellaneous	Load Rate per crosstier (Lbs)
	Hanger attachment Method
	Hanger Spacing
	Load Rate per Hanger (lbs)
	Cable Banding Size/ Type/ Material
Cable Orientation	



Cableway Hanger Details

Shipyard Hanger ID:

Downcomer Material:

Downcomer Length (In):

Downcomer Size:

Downcomer Attachment:

Crosstier Type:

Crosstier Material:

Crosstier Length (In):

Crosstier Size:

Crosstier Attachment:

Crosstier Quantity:

Number/Size of Cables per Crosstier:

Max Load rate per Crosstier (Lbs):

Hanger Attachment:



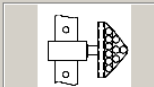


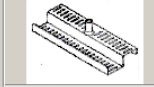
Hanger Spacing (In):

Load rate per Hanger (Lbs):

Cable Banding/Size/Type:

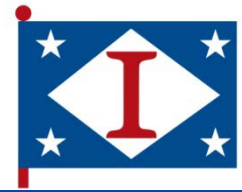
Cable Orientation:

Cableway Type

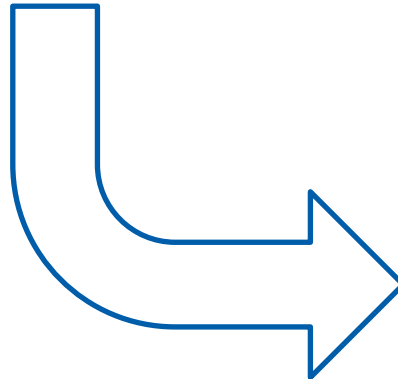
- Trapeze 
- Invert T 
- T Bar 
- U Bracket 
- Crimp Type 
- Shotgun Plate 

Close Form To Return to Hanger Basic

Pipe Hanger Details



PIPE HANGER INFORMATION	
Downcomer	Downcomer Type
	Downcomer Material
	Downcomer Length
	Downcomer Size
	Downcomer Attachment Method
Clamping Assembly	Clamping Unit Type
	Clamping Material
	Clamp Attachment Method
	Number/ Size of Bolts
	Insulation/ Liner/ Shielding
Miscellaneous	Hanger attachment Method
	Hanger Spacing
	Load Rate per Hanger (lbs)
	Pipe Size
	Pipe Material
	Pipe System Limitation



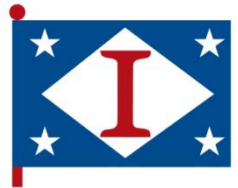
Pipe Hanger Details

Shipyard Hanger ID:

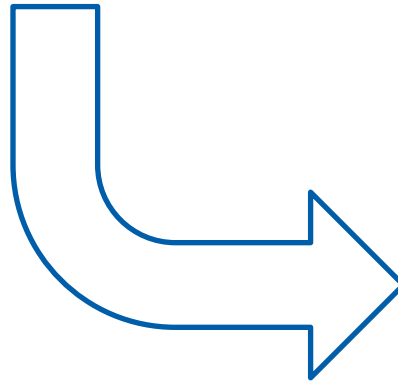
Downcomer Type	<input type="text"/>	Hanger Orientation:	<input type="text"/>																																												
Downcomer Material	<input type="text"/>	Hanger Spacing (ft)	<input type="text"/>																																												
Downcomer Length (max in)	<input type="text"/>	Load rate per Hanger (lbs)	<input type="text"/>																																												
Downcomer Size	<input type="text"/>	Pipe Material	<input type="text"/>																																												
Downcomer Attachment	<input type="text"/>	Pipe System Limitation	<input type="text"/>																																												
Clamping Unit Type	<input type="text"/>	APPLICABLE PIPE SIZE <table border="0"> <tr> <td>1/8 NPS</td><td><input type="checkbox"/></td> <td>3 NPS</td><td><input type="checkbox"/></td> </tr> <tr> <td>1/4 NPS</td><td><input type="checkbox"/></td> <td>3-1/2 NPS</td><td><input type="checkbox"/></td> </tr> <tr> <td>3/8 NPS</td><td><input type="checkbox"/></td> <td>4 NPS</td><td><input type="checkbox"/></td> </tr> <tr> <td>1/2 NPS</td><td><input type="checkbox"/></td> <td>5 NPS</td><td><input type="checkbox"/></td> </tr> <tr> <td>3/4 NPS</td><td><input type="checkbox"/></td> <td>6 NPS</td><td><input type="checkbox"/></td> </tr> <tr> <td>1 NPS</td><td><input type="checkbox"/></td> <td>8 NPS</td><td><input type="checkbox"/></td> </tr> <tr> <td>1-1/4 NPS</td><td><input type="checkbox"/></td> <td>10 NPS</td><td><input type="checkbox"/></td> </tr> <tr> <td>1-1/2 NPS</td><td><input type="checkbox"/></td> <td>12 NPS</td><td><input type="checkbox"/></td> </tr> <tr> <td>2 NPS</td><td><input type="checkbox"/></td> <td>14 NPS</td><td><input type="checkbox"/></td> </tr> <tr> <td>2-1/2 NPS</td><td><input type="checkbox"/></td> <td></td><td></td> </tr> <tr> <td></td><td></td> <td>Tubing</td><td><input type="checkbox"/></td> </tr> </table>		1/8 NPS	<input type="checkbox"/>	3 NPS	<input type="checkbox"/>	1/4 NPS	<input type="checkbox"/>	3-1/2 NPS	<input type="checkbox"/>	3/8 NPS	<input type="checkbox"/>	4 NPS	<input type="checkbox"/>	1/2 NPS	<input type="checkbox"/>	5 NPS	<input type="checkbox"/>	3/4 NPS	<input type="checkbox"/>	6 NPS	<input type="checkbox"/>	1 NPS	<input type="checkbox"/>	8 NPS	<input type="checkbox"/>	1-1/4 NPS	<input type="checkbox"/>	10 NPS	<input type="checkbox"/>	1-1/2 NPS	<input type="checkbox"/>	12 NPS	<input type="checkbox"/>	2 NPS	<input type="checkbox"/>	14 NPS	<input type="checkbox"/>	2-1/2 NPS	<input type="checkbox"/>					Tubing	<input type="checkbox"/>
1/8 NPS	<input type="checkbox"/>			3 NPS	<input type="checkbox"/>																																										
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1/2 NPS	<input type="checkbox"/>			5 NPS	<input type="checkbox"/>																																										
3/4 NPS	<input type="checkbox"/>	6 NPS	<input type="checkbox"/>																																												
1 NPS	<input type="checkbox"/>	8 NPS	<input type="checkbox"/>																																												
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2-1/2 NPS	<input type="checkbox"/>																																														
		Tubing	<input type="checkbox"/>																																												
Clamping Material	<input type="text"/>	Tube Size (OD-In):	<input type="text" value="0"/>																																												
Clamping Attachment	<input type="text"/>																																														
Number/Size of Bolts	<input type="text"/>																																														
Insulation/Liner/Shielding	<input type="text"/>																																														
Hanger Attachment	<input type="text"/>																																														

Close Form To Return to Hanger Basic

Hot Hanger Details



HOT HANGER INFORMATION	
Downcomer	Downcomer Type
	Downcomer Material
	Downcomer Length
	Downcomer Size
	Downcomer Attachment Method
Hanger Clip Assembly	Hanger Clip Type
	Hanger Clip Material
	Hanger Clip Size
	Hanger Clip Bolt Size
Miscellaneous	Hanger Strap Detail
	Hanger Wrapper Detail
	Hanger Attachment
	Hanger Spacing
	Load Rate per Hanger (lbs)
	Hanger Orientation



Hot Hanger Details

Shipyards:

Hanger ID:

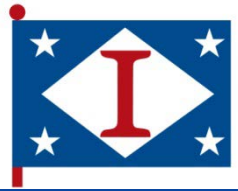
Downcomer Type	Hanger Strap Detail
Downcomer Material	Hanger Wrapper Detail
Downcomer Length	Hanger Attachment
Downcomer Size	Hanger Spacing
Downcomer Attachment	Load rate per Hanger
Hanger Clip Type	Hanger Orientation
Hanger Clip Material	
Hanger Clip Length	
Hanger Clip Size	
Hanger Clip Bolt Size	



- **Tasks of Part 2**
 - Collection of hanger data
 - Adding data into database
 - Scanning of documents
 - Generation of Hanger Reports

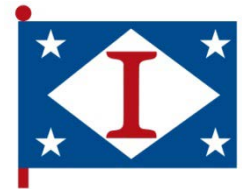
Part 2: Project Status

(HII-Ingalls Shipbuilding Info only)

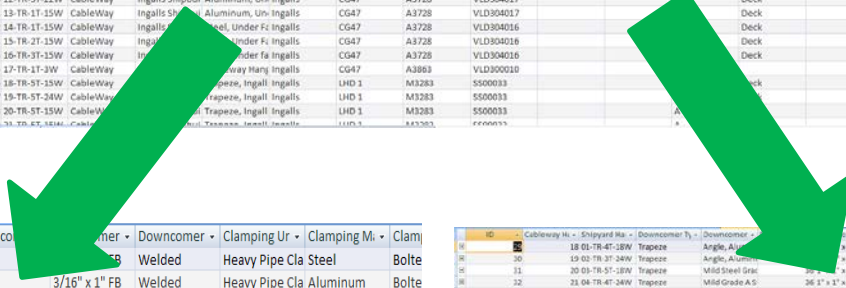


- Collection of Hanger Data (82% complete)
 - Cableway Hangers 95%
 - Pipe Hangers 95%
 - Hot Hangers 0%
- Adding Data into database (68% Complete)
 - Cableway Hangers 95%
 - Pipe Hangers 50%
 - Hot Hangers 0%
- Scanning of File (60% Complete)
 - Cableway Hangers 95%
 - Pipe Hangers 20%
 - Hot Hangers 0%

Part 2: Screen Shot Of Database



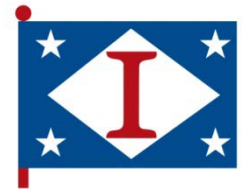
ID	Shipyards	Hanger Type	Hanger Man	Hanger Nom	Shipyards	Original Clas	Shipyards	Hanger Draw	Hanger Draw	Hanger Draw	Shock Grade	Mounting Lc	Shock Test R	Shock E
12	H-01	CableWay	Ingalls Shipbu	Double Leg Ste	Ingalls	CG 47	G2777	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
13	H-03	Pipe	Ingalls Shipbu	Double Leg Ste	Ingalls	CG 47	G2777	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
14	H-03	Pipe	Ingalls Shipbu	Double Leg Ste	Ingalls	CG 47	G2348	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
15	H-04	Pipe	Ingalls Shipbu	Double Leg Ste	Ingalls	CG 47	G2777	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
16	H-04	Pipe	Ingalls Shipbu	Double Leg Ste	Ingalls	CG 47	G2348	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
17	H-05	Pipe	Ingalls Shipbu	Single Leg Stee	Ingalls	CG 47	G2777	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
18	H-05	Pipe	Ingalls Shipbu	Single Leg Stee	Ingalls	CG 47	G2348	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
19	H-06	Pipe	Ingalls Shipbu	Single Leg Alur	Ingalls	CG 47	G2777	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
20	H-06	Pipe	Ingalls Shipbu	Single Leg Alur	Ingalls	CG 47	G2348	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
21	H-07	Pipe	Ingalls Shipbu	Double Leg Ste	Ingalls	CG 47	G2348	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
22	H-07H	Pipe	Ingalls Shipbu	Double Leg Ste	Ingalls	CG 47	G2348	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
23	H-08	Pipe	Ingalls Shipbu	Double Leg Alu	Ingalls	CG 47	G2348	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
24	H-08H	Pipe	Ingalls Shipbu	Double Leg Alu	Ingalls	CG 47	G2348	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
25	H-09	Pipe	Ingalls Shipbu	Double Leg Ste	Ingalls	CG 47	G2348	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
26	H-09H	Pipe	Ingalls Shipbu	Double Leg Ste	Ingalls	CG 47	G3617	S5000035	W	1/6/1999	A	Hull	Aero-Nav Labo	Aero-N
27	H-10	Pipe	Ingalls Shipbu	Double Leg Alu	Ingalls	CG 47	G2348	S5000035	A			Hull	Lockheed Elect	Lockhe
28	H-11	Pipe	Ingalls Shipbu	Single Leg Stee	Ingalls	CG 47	J3922	S5000035	W	1/6/1999	A	Hull	Lockheed Elect	Lockhe
29	01-TR-4T-18W	CableWay	Ingalls Shipbu	Aluminum, Ov	Ingalls	CG 47	A3728	VLD300010	ECI		A	Deck	Lockheed Elect	Lockhe
30	02-TR-3T-20W	CableWay	Ingalls Shipbu	Aluminum, Ov	Ingalls	CG 47	A3728	VLD300010	ECI		A	Deck	Lockheed Elect	Lockhe
31	03-TR-5T-18W	CableWay	Ingalls Shipbu	Steel, Overhea	Ingalls	CG 47	A3728	VLD300010	ECI		A	Deck	Lockheed Elect	Lockhe
32	04-TR-4T-24W	CableWay	Ingalls Shipbu	Steel, Overhea	Ingalls	CG 47	A3728	VLD300010	ECI		A	Deck	Lockheed Elect	Lockhe
33	05-TR-3T-20W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3728	VLD304016			A	Deck	Lockheed Elect	Lockhe
34	06-TR-3T-20W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3728	VLD304017			A	Deck	Lockheed Elect	Lockhe
35	07-TR-1T-15W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3728	VLD304017			A	Deck	Lockheed Elect	Lockhe
36	08-TR-2T-10W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3728	VLD304017			A	Deck	Lockheed Elect	Lockhe
37	09-TR-2T-15W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3728	VLD304017			A	Deck	Lockheed Elect	Lockhe
38	10-TR-3T-10W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3728	VLD304017			A	Deck	Lockheed Elect	Lockhe
39	11-TR-3T-15W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3728	VLD304017			A	Deck	Lockheed Elect	Lockhe
40	12-TR-3T-22W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3728	VLD304017			A	Deck	Lockheed Elect	Lockhe
41	13-TR-1T-15W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3728	VLD304017			A	Deck	Lockheed Elect	Lockhe
42	14-TR-1T-15W	CableWay	Ingalls Shipbu	Steel, Under F	Ingalls	CG 47	A3728	VLD304016			A	Deck	Lockheed Elect	Lockhe
43	15-TR-2T-15W	CableWay	Ingalls Shipbu	Steel, Under F	Ingalls	CG 47	A3728	VLD304016			A	Deck	Lockheed Elect	Lockhe
44	16-TR-3T-15W	CableWay	Ingalls Shipbu	Steel, Under F	Ingalls	CG 47	A3728	VLD304016			A	Deck	Lockheed Elect	Lockhe
45	17-TR-1T-3W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3863	VLD300010			A	Deck	Lockheed Elect	Lockhe
46	18-TR-3T-15W	CableWay	Ingalls Shipbu	Aluminum, Un	Ingalls	CG 47	A3863	VLD300010			A	Deck	Lockheed Elect	Lockhe
47	19-TR-5T-24W	CableWay	Ingalls Shipbu	Trapeze, Ingall	Ingalls	LHD 1	M3283	S5000033			A	Deck	Lockheed Elect	Lockhe
48	20-TR-5T-15W	CableWay	Ingalls Shipbu	Trapeze, Ingall	Ingalls	LHD 1	M3283	S5000033			A	Deck	Lockheed Elect	Lockhe
49	21-TR-5T-15W	CableWay	Ingalls Shipbu	Trapeze, Ingall	Ingalls	LHD 1	M3283	S5000033			A	Deck	Lockheed Elect	Lockhe



ID	Pipe Hanger	Shipyards	Downcomer Ty	Downcomer	Downcomer	Downcomer	Clamping Ur	Clamping M	Clamp
12	H-01	Flat Bar (Double)	Steel	18	Welded	Heavy Pipe Cla	Steel	Aluminum	Bolte
13	H-02	Double Leg Flatb	Aluminum	18	3/16" x 1" FB	Welded	Heavy Pipe Cla	Aluminum	Bolte
14	H-03	Double Leg Flatb	Steel	18	3/16" x 1" FB	Welded	Heavy Pipe Cla	Steel	Bolte
15	H-04	Double Leg - Ang	Steel	18	1 1/4" x 1 1/4"	Welded	Heavy Pipe Cla	Steel	Bolte
16	H-04	Double Leg Flat B	Aluminum	18	3/16" x 1" FB	Welded	Heavy Pipe Cla	Aluminum	Bolte
17	H-04	Double Leg Angle	Aluminum	18	1 1/2" x 1 1/2"	Welded	Heavy Pipe Cla	Aluminum	Bolte
18	H-05	Single Leg Flatba	Steel	18	3/16" x 1" FB	Welded	Heavy Pipe Cla	Steel	Bolte
19	H-05	Single Leg Angle	Steel	36	1 1/4" x 1 1/4"	Welded	Heavy Pipe Cla	Steel	Bolte
20	H-06	Single Leg Flatba	Aluminum	18	3/16" x 1" FB	Welded	Heavy Pipe Cla	Aluminum	Bolte
21	H-06	Single Angle	Aluminum	36	1 1/4" x 1 1/4"	Welded	Heavy Pipe Cla	Aluminum	Bolte
22	H-07	Double Leg Angle	Steel	36	1 1/4" x 1 1/4"	Welded	Heavy Pipe Cla	Steel	Bolte
23	H-07H	Double Leg Angle	Steel	24	1 1/4" x 1 1/4"	Welded	Heavy Pipe Cla	Steel	Bolte
24	H-08	Double Leg Angle	Aluminum	36	1 1/4" x 1 1/4"	Welded	Heavy Pipe Cla	Aluminum	Bolte
25	H-08H	Double Leg Angle	Aluminum	24	1 1/4" x 1 1/4"	Welded	Heavy Pipe Cla	Aluminum	Bolte
26	21-099	Double Leg Angle	Steel	36	1" x 1" x 1/4"	[1] Welded	Heavy Pipe Cla	Steel	Weld
27	23-09H	Double Leg Angle	Steel	18	1" x 1" x 1/4"	[1] Welded	Heavy Pipe Cla	Steel	Weld
28	24-10	Double Leg Angle	Aluminum	18	See S5000033	Welded	Heavy Pipe Cla	Aluminum	Bolte
29	26-11	Single Flat Bar	Steel	18	1" x 3/16" FB	Welded	Nelson Type	Steel	Bolte

ID	CableWay	Shipyards	Downcomer Ty	Downcomer	Downcomer	Crossbar M	Crossbar L	Crossbar Alt	Crossbar Qu	Item
10	18 01-TR-4T-18W	Trapeze	Angle, Alu	36	1" x 1" x 1/4"	Welded	So. Tubing	Aluminum 6061	18 1/8" x 7/8" x 6/16"	CRES C 4
11	19 02-TR-3T-20W	Trapeze	Angle, Alu	36	1" x 1" x 1/4"	Welded	So. Tubing	Aluminum 6061	24 7/8" x 7/8" x 6/16"	CRES C 3
12	20 03-TR-5T-18W	Trapeze	Mild Steel Gr	36	3" x 3/16"	Welded	So. Tubing	Carbon Steel	18 1/8" x 7/8" x 6/16"	3/8" Gr 5
13	21 04-TR-4T-24W	Trapeze	Mild Grade AS	36	1" x 1" x 1/4"	Welded	So. Tubing	Carbon Steel	24 7/8" x 7/8" x 6/16"	3/8" Gr 4
14	22 05-TR-3T-20W	Trapeze	Aluminum	36	2" x 2" x 1/4"	Welded	So. Tubing	Aluminum 6061	20 7/8" x 7/8" x 6/16"	CRES C 3
15	23 06-TR-3T-20W	Trapeze	Aluminum	36	2" x 2" x 1/4"	Welded	So. Tubing	Aluminum 6061	20 7/8" x 7/8" x 6/16"	CRES C 3
16	24 07-TR-2T-15W	Trapeze	Aluminum	36	1" x 1" x 1/4"	Welded	So. Tubing	Aluminum 6061	15 7/8" x 7/8" x 6/16"	CRES C 1
17	25 08-TR-2T-15W	Trapeze	Aluminum	36	1" x 1" x 1/4"	Welded	So. Tubing	Aluminum 6061	16 7/8" x 7/8" x 6/16"	CRES C 2
18	26 09-TR-1T-15W	Trapeze	Aluminum	36	1" x 1" x 1/4"	Welded	So. Tubing	Aluminum 6061	15 7/8" x 7/8" x 6/16"	CRES C 1
19	27 10-TR-3T-20W	Trapeze	Aluminum	36	1" x 1" x 1/4"	Welded	So. Tubing	Aluminum 6061	18 7/8" x 7/8" x 6/16"	CRES C 3
20	28 11-TR-1T-15W	Trapeze	Aluminum	36	1" x 1" x 1/4"	Welded	So. Tubing	Aluminum 6061	15 7/8" x 7/8" x 6/16"	CRES C 3
21	29 12-TR-3T-22W	Trapeze	Aluminum	36	1" x 1" x 1/4"	Welded	So. Tubing	Aluminum 6061	22 7/8" x 7/8" x 6/16"	CRES C 3
22	30 13-TR-1T-15W	Trapeze	Aluminum	36	1" x 1" x 1/4"	Welded	So. Tubing	Aluminum 6061	15 7/8" x 7/8" x 6/16"	CRES C 1
23	31 14-TR-3T-20W	Trapeze	Steel	36	1" x 1" x 3/16"	Welded	So. Tubing	Carbon Steel	15 7/8" x 7/8" x 6/16"	3/16" St 3
24	32 15-TR-1T-15W	Trapeze	Steel	36	1" x 1" x 3/16"	Welded	So. Tubing	Carbon Steel	15 7/8" x 7/8" x 6/16"	3/16" St 3
25	33 16-TR-3T-15W	Trapeze	Steel	36	1" x 1" x 3/16"	Welded	So. Tubing	Carbon Steel	15 7/8" x 7/8" x 6/16"	3/16" St 3
26	34 17-TR-1T-15W	Trapeze	Steel	36	3/2" x 1/2"	Welded direct	Steel		15 7/8" x 7/8" x 6/16"	Studs/Bt Up to 5
27	35 18-TR-3T-20W	Trapeze	Angle, Steel	65	1" x 1" x 3/16"	Welded direct	Steel		24 7/8" x 7/8" x 6/16"	Nuts/Bolt Up to 5
28	36 19-TR-2T-24W	Trapeze	Angle, Steel	80	1" x 1" x 3/16"	Welded direct	Steel		15 7/8" x 7/8" x 6/16"	Nuts/Bolt Up to 5
29	37 20-TR-1T-15W	Trapeze	Angle, Steel	66	1" x 1" x 3/16"	Welded direct	Steel		15 7/8" x 7/8" x 6/16"	Nuts/Bolt Up to 5
30	38 21-TR-3T-20W	Trapeze	Angle, Steel	52	1" x 1" x 3/16"	Welded direct	Steel		15 7/8" x 7/8" x 6/16"	Nuts/Bolt Up to 5
31	39 22-TR-3T-20W	Trapeze	Angle, Alu	65	1" x 1" x 1/4"	Welded direct	Aluminum		15 7/8" x 7/8" x 6/16"	Nuts/Bolt 3
32	40 23-TR-2T-15W	Trapeze	Angle, Alu	48	1" x 1" x 1/4"	Welded direct	Aluminum		15 7/8" x 7/8" x 6/16"	Nuts/Bolt 2
33	41 24-TR-3T-15W	Trapeze	Angle, Alu	33	1" x 1" x 1/4"	Welded direct	Aluminum		15 7/8" x 7/8" x 6/16"	Nuts/Bolt 4
34	42 25-TR-3T-20W	Trapeze	Angle, Alu	52	1" x 1" x 1/4"	Welded direct	Aluminum		15 7/8" x 7/8" x 6/16"	Nuts/Bolt 2
35	43 26-TR-2T-15W	Trapeze	Angle, Steel	54	1" x 1" x 3/16"	Welded direct	Steel		15 7/8" x 7/8" x 6/16"	Nuts/Bolt 2
36	44 27-TR-2T-24W	Trapeze	Angle, Steel	4	1" x 1" x 3/16"	Welded direct	Steel		15 7/8" x 7/8" x 6/16"	Nuts/Bolt 2
37	45 28-TR-1T-15W	Trapeze	Angle, Alu	4	1" x 1" x 1/4"	Welded direct	Aluminum		15 7/8" x 7/8" x 6/16"	Nuts/Bolt 2
38	46 29-TR-3T-20W	Trapeze	Angle, Alu	37	1" x 1" x 1/4"	Welded direct	Aluminum		15 7/8" x 7/8" x 6/16"	Nuts/Bolt 2
39	47 30-TR-5T-20W	Trapeze	Angle, Steel w	65	1" x 1" x 3/16"	Welded direct	Steel		24 7/8" x 7/8" x 6/16"	Nuts/Bolt 5
40	48 31-TR-3T-20W	Trapeze	Steel	35	29-TR-3T					5
41	49 32-TR-3T-20W	Trapeze	Steel	60	37 30-TR-3T-20W					5
42	50 33-TR-3T-20W	Trapeze	Steel	61	38 31-TR-3T-20W					2
43	51 34-TR-3T-20W	Trapeze	Inverted T	62						

Part 2: Hanger Report Example

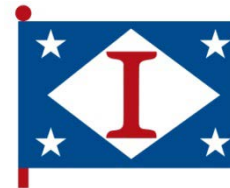


Reports for easy accessibility of information for designers, engineering, and quality assurance.

Pipe Size Report

Shipyards Hanger ID	1/8 NPS	1/4 NPS	3/8 NPS	1/2 NPS	3/4 NPS	1 NPS	1-1/4 NPS	1-1/2 NPS	2 NPS	2-1/2 NPS	3 NPS	3-1/2 NPS	4 NPS	5 NPS	6 NPS	8 NPS	10 NPS	12 NPS	14 NPS
H-01	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H-02	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H-03	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
H-03	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H-04	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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H-09	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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H-10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Part 3: Test Procedures and Guidance Document



- Part 3 of the project consists of developing a guidance document for future qualification of hangers
- Test plans and procedures from previously qualified hangers along with information from MIL-S-901D are being used to develop templates for the Medium Weight and Light Weight Shock Machines.
- A guidance document will also be developed and will include:
 - Procedures for Non standard test procedures
 - Lessons learned on the hanger qualification process
 - Detailed descriptions of the test procedure templates
- The guidance document and the test procedure templates will be stored in the database for ready access.

Part 3: Test Procedures Template Example



INTRODUCTION

This report presents the documentation required to demonstrate that HI-Shock Qualification, in accordance with MIL-S-901D, was attained for the equipment described below. The subject equipment was qualified by test.

This report is submitted in compliance with Contract Data Requirements List (CDRL) No. [Insert CDRL number](#) of Contract No. [Insert contract number](#) for Purchase Order No. listed below: [Insert PO numbers](#)

SUBJECT EQUIPMENT DESCRIPTION

General Description: [Equipment description](#)

Manufacturer: [Manufacturer name](#)

Cage: [Manufacturer cage number](#)

Description	Model	Drawing No.	Revision
Equipment description	Model number	Vendor drawing number	Drawing revision

TEST AND QUALIFICATION DATA

The subject equipment was qualified by testing in accordance with MIL-S-901D. Details of the tested equipment are as follows:

MIL-S-901D Shock Classification:

Shock Test Category: [Light Weight](#)

Shock Grade: Represented by Test: [Grade A or B](#)

Shock Class: Represented by Test: [Class](#)

Shock Test Type: [Type](#)

Mounting Locations: Represented by Test: [Hull](#)

What we have learned so far

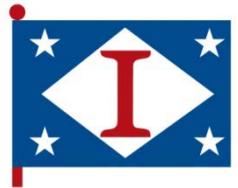


- Database needs to be flexible but still usable
 - Not every hanger easily fits into the forms
 - Queries have to still account for any unusual hangers
- Input forms best manner to put in data
- Database may be an issue when incorporation of hangers from other shipyards is started.
 - Electronic files of reports and approval letters increase required capacity
 - Database size is 450 Mb with only 150 items organized in the database. Microsoft Access limits is 2 GB per database.
- Reports from project already benefitting Ship Design
 - Cableway Hanger reports have helped LHA6 Designers with qualification pedigree of hangers being used.



- Database Development of Tables/Forms
 - Additional forms for editing existing data
 - File Attachment input and management
 - Development of Queries/Reports
 - Validation of overall database
- Collection of Remaining Hanger Data
- Adding Data into database
- Incorporation of advance database tool
 - Security
 - Configuration Management
 - Backup Database capability
 - Sectioning any proprietary information

Hanger Database- Post project completion



- Turn into a possible NSRP RA project
 - Incorporation of hangers from other shipyards/SUPSHIP/NAVSEA
 - Development of controls to allow access to other shipyards
 - Web Base accessibility
- Possible expansion to incorporate other qualification items
 - Light Legs
 - Electrical Standard Methods
 - Piping Standard Methods
 - Stud Mounting

