Aker Kværner Subsea

DALIA SUBSEA PRODUCTION SYSTEM

HANDBOOK & SYSTEM DESCRIPTION

61-NS0195-00 AO32-2-100-000-00-03-TY-001

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The 'Dalia Handbook' was created for
Aker Kværner Subsea by Xvision AS in 2006.

NOTE: The drawings, illustrations and other content of this book was concidered correct on the day the book was released. Keep in mind that the information here could be revised, so always look up the drawings for the latest release.

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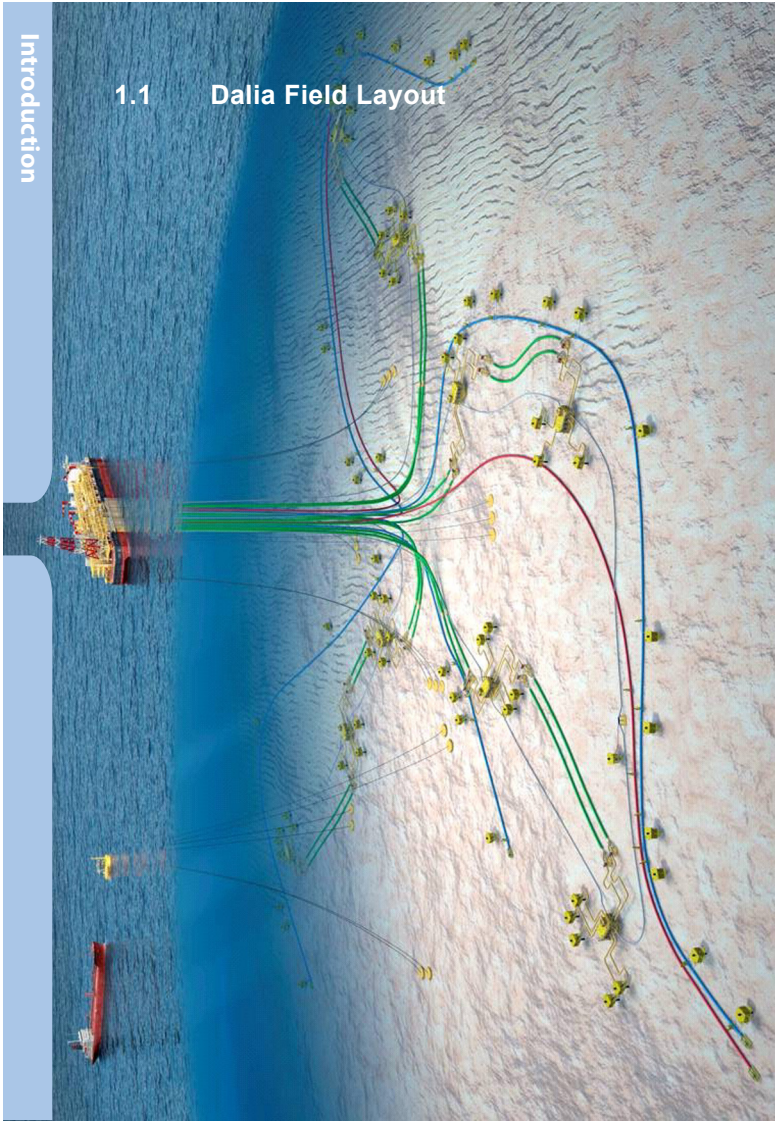
1.1 Dalia Field Layout



1.2 System Overview

The Dalia field is located in Block 17 offshore of the “Republica Popular de Angola”. The field is approximately 230 km offshore at a water depth of between 1200 m to 1400 m, and covers an area of approximately 230 km^2.

The Dalia subsea production and injection system consists of several subsea stations with flowlines and umbilicals connecting the stations to a process facility as indicated on the figure refer section 2.2.

The Subsea Station is defined to include the following systems:
- Wellhead System
- X-Mas Tree System including the work-over system
- Subsea Production Control System including topside equipment
- Tie-in System
- Structures (including manifolds)

The production wells are clustered around nine manifolds, with each manifold supporting up to six wells. The manifolds are tied back to the FPSO by 4 dual production flowlines, and are arranged in a daisy chain fashion.

The Water and Gas injection wells are daisy chained along four water and two gas injection flowlines.

The Dalia field development is defined within the Top Assembly, whereby the initial field development is to consist of 67 wells and nine manifolds tied back to an FPSO (34 production wells, 30 water injection wells and 3 gas injection wells).

The maximum development case is for 101 wells (52 production wells, 46 water injection wells and 3 gas injection wells).

1.2.1 General Design Parameters

Water depth at location is maximum 1400 m. The depth rating for specific KOP equipment designed and qualified for Dalia is minimum 1500 m.

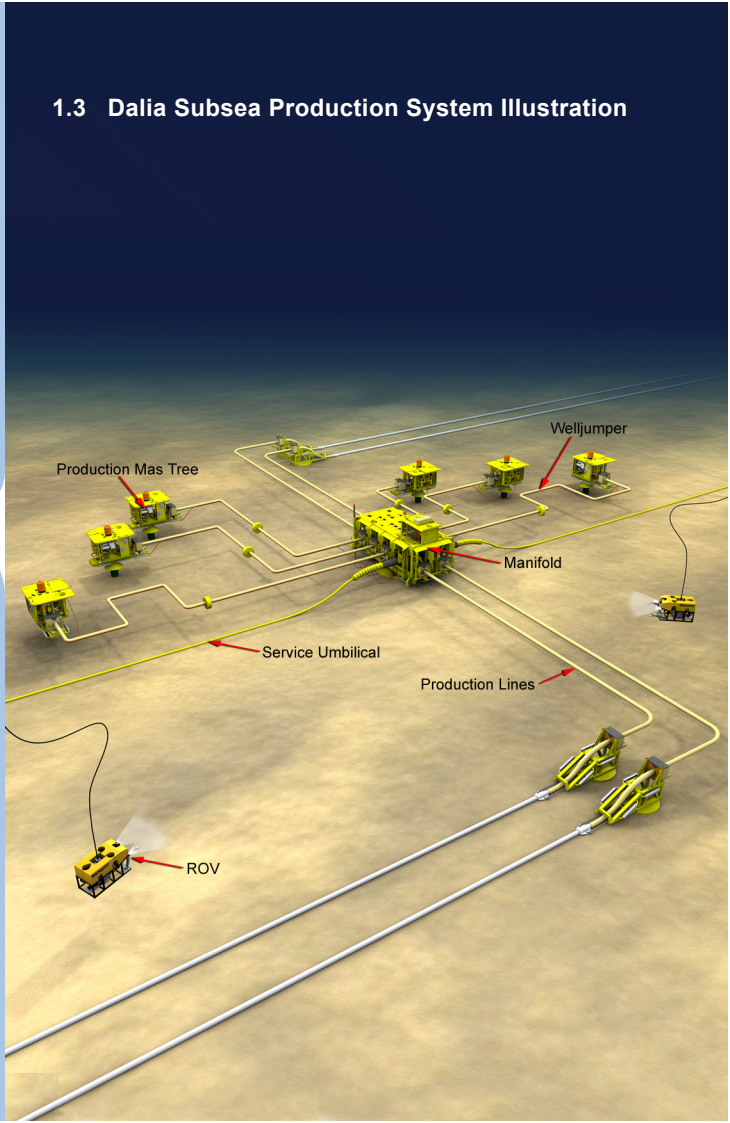
Design Pressures

System	Design Pressure	Comments
Wellhead System	690 bar, 10.000 psi	
XT System	345 bar, 5.000 psi	Applicable parts of the Xmas Tree System are rated to SCSSV design pressure.
Manifold System	345 bar, 5.000 psi	
Hydraulic System LP HP	 228 bar, 3.300 psi 759 bar, 11.000 psi	
Scale & corrosion Inhibitor	345 bar, 5.000 psi	
Service	345 bar, 5.000 psi	

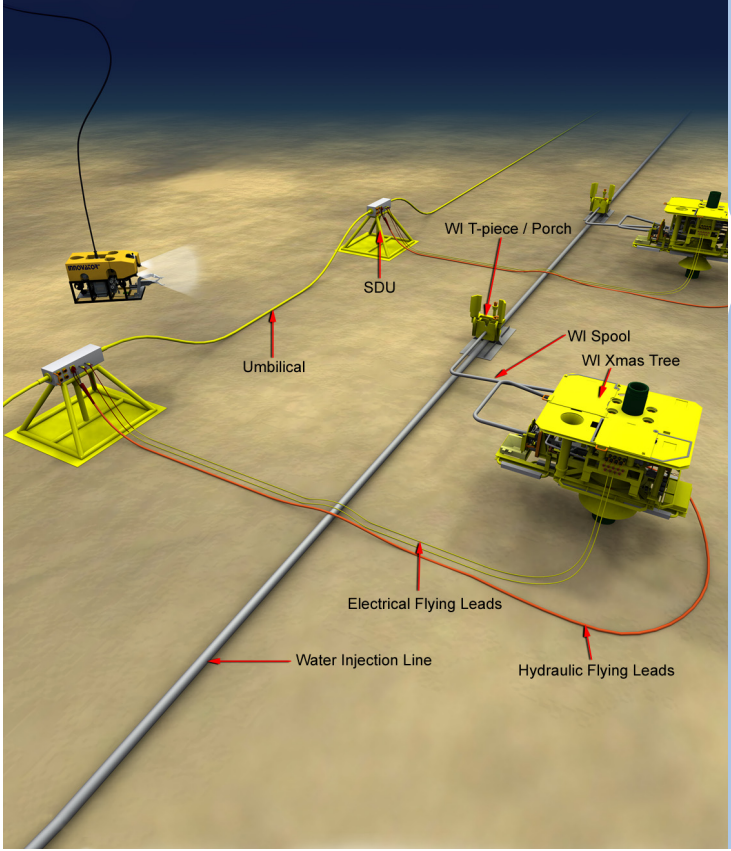
Hydraulic Analysis/Design Data
System Hydraulic Analysis: 39-KC0141-18 / AO32-2-101-020-NK-12-TN-100

Electrical Power and Signal Analysis/Design Data
SPCS, System Power & Signal Analysis: 39-KC0101-21 / AO32-2-101-020-NK-12-TN-101

1.3 Dalia Subsea Production System Illustration



1.4 Dalia Water Injection Illustration



1.5 Dalia Field Layout and Subsea System

Drawing: 12-NS1400-00 / AO32-2-100-000-00-03-DW-001

1.6 Production Cluster Layouts

Manifold ME 3011

Drawing: AO32-4-201-000-00-20-DW-025 and AO32-4-201-000-00-20-DW-026

Manifold ME 3012

Drawing: AO32-4-201-000-00-20-DW-027 and AO32-4-201-000-00-20-DW-028

Manifold ME 3021

Drawing: AO32-4-201-000-00-20-DW-029 and AO32-4-201-000-00-20-DW-030

NOTE:-
BATHYMETRY DATA ARE EXTRACTED FROM GEOPHYSICAL SURVEY REPORT
A-032-4-207-000-00-21-TC-001,Rev0.

WELLHEADS COORDINATES

	EAST	NORTH
1-FUTURE	141869	9150711
2-D1P07 (01)	141834	9150676
3-FUTURE	141848	9150729
4-FUTURE	141821	9150681
5-FUTURE	141834	9150722
6-D5P02 (66)	141819	9150695

MANIFOLD COORDINATES

HEADING	EAST	NORTH
106°	141850	9150700

WELLHEAD REFERENCE

1	FUTURE
2	D1P07 (04)
3	FUTURE
4	FUTURE
5	FUTURE
6	D5P02 (66)

Manifold ME 3022

Drawing: AO32-4-201-000-00-20-DW-031 and AO32-4-201-000-00-20-DW-032

NOTE:-
BATHYMETRY DATA ARE EXTRACTED FROM GEOPHYSICAL SURVEY FINAL REPORT
A-032-4-201-000-00-21-TC-001,Rev0.

WELLHEADS COORDINATES

	EAST	NORTH
1-D1P06 (20)	142250	9152031
2-D1P04 (47)	142265	9152064
3-FUTURE	142264	9152028
4-FUTURE	142278	9152079
5-D1P05 (03)	142273	9152040
6-FUTURE	142280	9152065

MANIFOLD COORDINATES

HEADING	EAST	NORTH
286°	142250	9152060

WELLHEAD REFERENCE

1	D1P06 (20)
2	D1P04 (47)
3	FUTURE
4	FUTURE
5	D1P05 (05)
6	FUTURE

Manifold ME 3031

Drawing: AO32-4-201-000-00-20-DW-033 and AO32-4-201-000-00-20-DW-034

NOTE :
BATHYMETRY DATA ARE EXTRACTED FROM GEOPHYSICAL SURVEY FINAL REPORT A-032-4-207-000-00-21-TC-001,Rev0.

WELLHEADS COORDINATES

	EAST	NORTH
1–FUTURE	144320	9151208
2–D3P05 (16)	144281	9151178
3–D3P06 (34)	144302	9151229
4–D2P01 (26)	144269	9151185
5–D3P04 (65)	144288	9151224
6–FUTURE	144269	9151200

MANIFOLD COORDINATES

HEADING	EAST	NORTH
115°	144300	9151200

WELLHEAD REFERENCE

1	FUTURE
2	D3P05 (16)
3	D3P06 (34)
4	D2P01 (26)
5	D3P04 (65)
6	FUTURE

Manifold ME 3032

Drawing: AO32-4-201-000-00-20-DW-035 and AO32-4-201-000-00-20-DW-036

Manifold ME 3041

Drawing: AO32-4-201-000-00-20-DW-037 and AO32-4-201-000-00-20-DW-038

Manifold ME 3042

Drawing: AO32-4-201-000-00-20-DW-039 and AO32-4-201-000-00-20-DW-040

Manifold ME 3043

Drawing: AO32-4-201-000-00-20-DW-041 and AO32-4-201-000-00-20-DW-042

NOTE:
BATHYMETRY DATA ARE EXTRACTED FROM GEOPHYSICAL SURVEY FINAL REPORT A-032-4-207-000-00-21-TC-001,Rev0.

WELLHEADS COORDINATES

	EAST	NORTH
1-D4P03 (39)	147772	9146408
2-D4P02 (09)	147819	9146378
3-FUTURE	147766	9146396
4-D4P04 (29)	147810	9146367
5-D4P01 (08)	147774	9146384
6-D4P05 (50)	147796	9146369

MANIFOLD COORDINATES

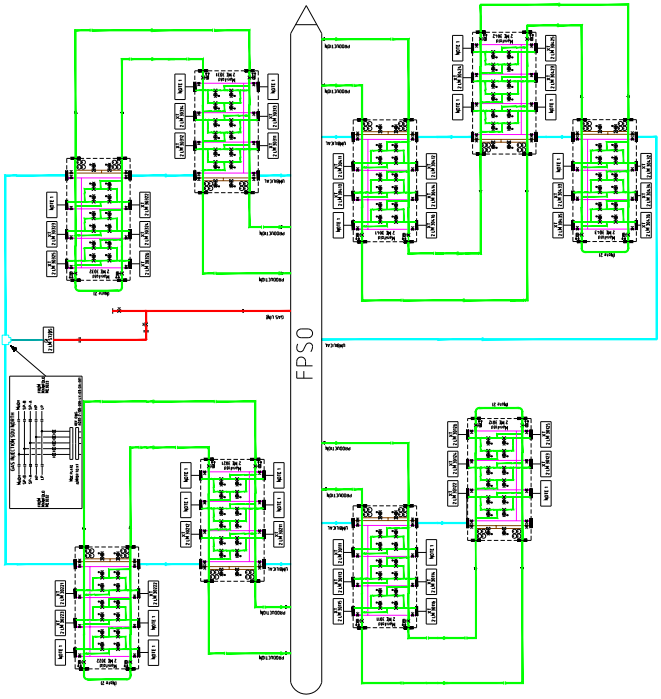
HEADING	EAST	NORTH
33°	147800	9146400

WELLHEAD REFERENCE

1	D4P03 (39)
2	D4P02 (09)
3	FUTURE
4	D4P04 (29)
5	D4P01 (08)
6	D4P05 (50)

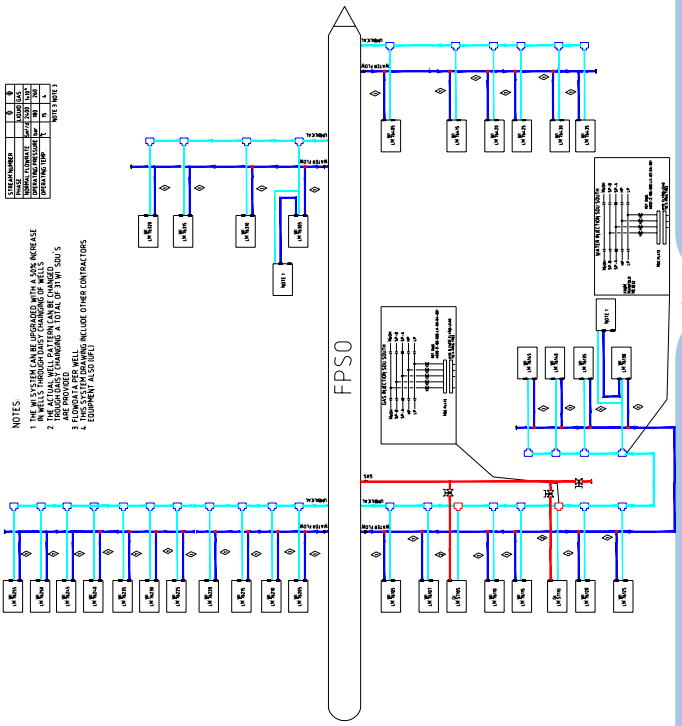
1.7 Production and Northern Gas Injection

Drawing: 12-NS1400-01 / AO32-2-100-000-00-03-DA-002



1.8 Water Injection and Southern Gas Injection

Drawing: 12-NS1400-02 / AO32-2-100-000-00-03-DA-003



1.9 Main Deliverables

For a detailed listing of all deliverables (excluding options) reference is made to Dalia SPS Master Equipment List AO32-2-100-000-00-03-LX-001/10-NS0034-02.

Work Package	Description	Top-Assembly Drawing
WP06 Subsea Structures	Foundation Bottom Structure Manifold Module Pigging Loop Module	AO32-2-100-300-ME-06-DM-007 / 11-NS-0202-00
WP07 Wellhead System	Light Architecture Wellhead Heavy Architecture Wellhead Running Tools and Ancillary Equipment	AO32-2-100-000-LO-09-LZ-001 / 10-NS0035-00 AO32-2-100-000-LO-09-LZ-002 / 10-NS0036-00
WP08 Guide Bases	Guide Base Water Injection Guide Base Gas Injection Guide Base Production Running Tools	A032-2-100-000-ME-09-DZ-002 / 11-NS0197-00 AO32-2-100-000-LM-09-LZ-001 / 10-NS0033-00
WP09 X-Mas Tree System	Production XT Gas Injection XT Water Injection XT Tubing Hanger Tree Running Tools	AO32-2-100-000-LM-09-LZ-001 / 10-NS0033-00
WP10 Workover System	Workover Control System Workover/Completion Riser Components Auxiliary Equipment	AO32-2-100-012-NM-10-DK-019 / 10-NE0002-00 AO32-2-100-000-LN-10-DK-001 / 10-NE0003-00 AO32-2-100-012-NM-10-DK-065 / 10-NE0004-00
WP11 Well Jumper	Production Well Jumper	AO32-2-100-014-LT-11-DL-001 / 32-NT2005-00 AO32-2-100-014-LT-11-DL-002 / 32-NT2005-01
WP12 Production Control System	Top Side Located Control System X-Mas tree located SPCS equipment Manifold located SPCS equipment Electrical flying leads Hydraulic flying leads SPSC Test equipment	AO32-2-101-020-NK-12-DN-100 / 10-KC0012-00
WP13 Tie-In Equipment	Set of Tie-In Tools Connectors with seal assy Inboard and Outboard Hubs Pressure Caps Hydrostatic Pressure Caps Porches Test Caps	AO32-2-100-014-LT-13-DK-017 / 32-NT2000-00
WP14 ROV Tools	Remote Operated Tools ROV Tools Jumper Deployment Skid Fluid Sampling Unit Multipurpose Basket	AO32-2-100-000-LS-14-DK - 001 / 10-NT0008-00

1.10 Functional Location (Tag N°) Summary

Content sheet & Symbols - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 1 & 2 / 12)

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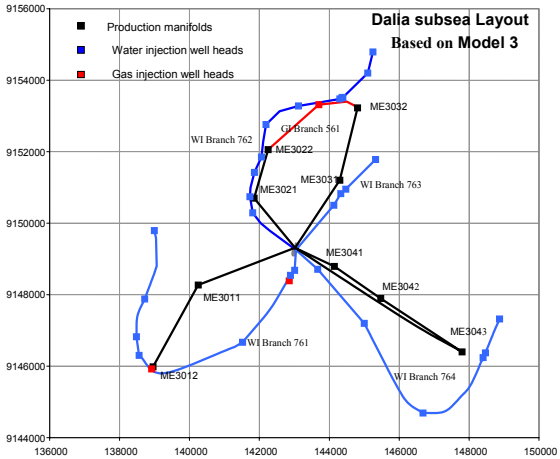


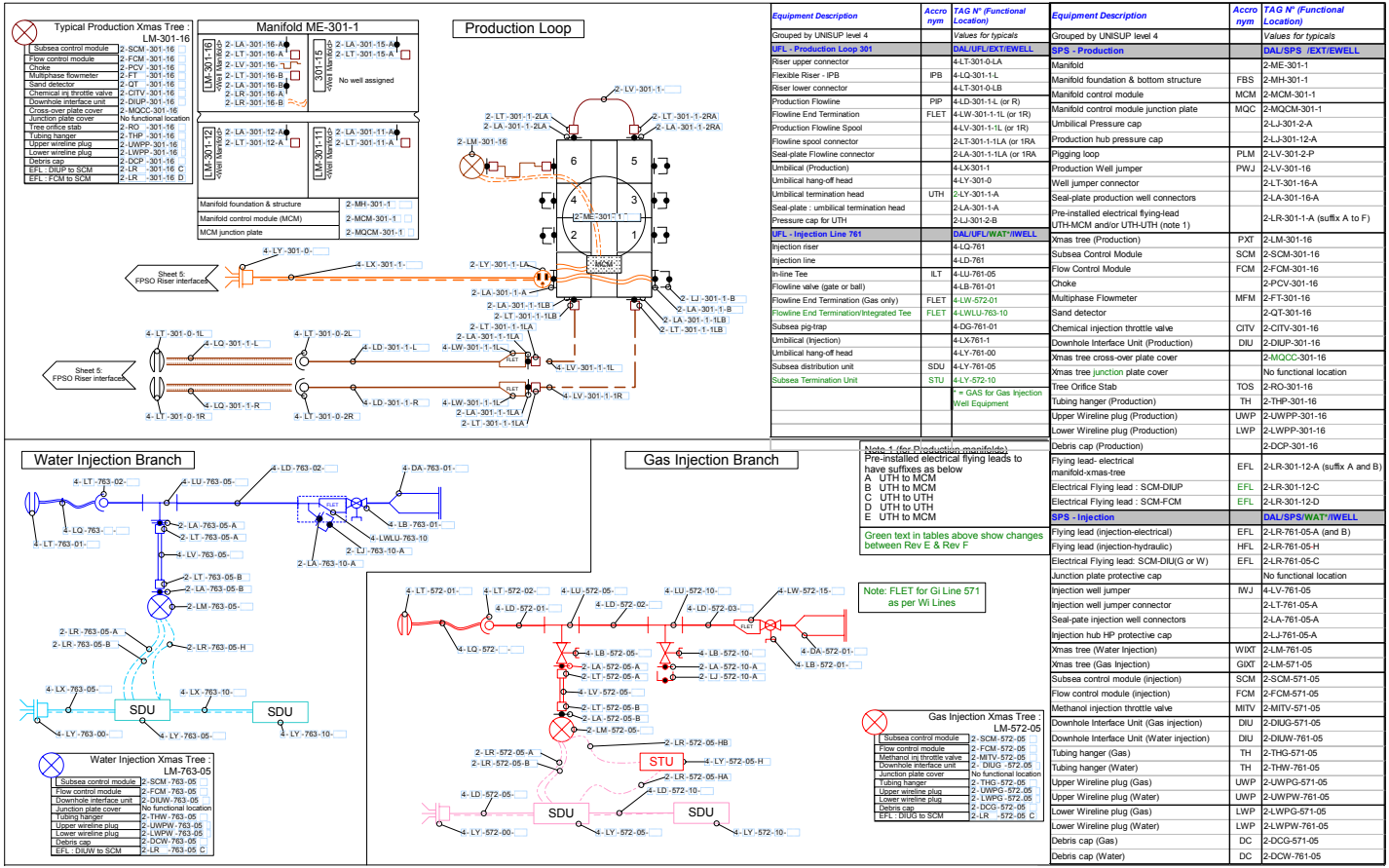
Flowline, Riser & Xmas tree

FL code	Description	Accronym	Symbol
LQ	Flexible Riser	IPB	
LA	Riser to FPSO Graylok connector		
LT	Riser / flowline connection		
LD	Production Flowline	PIP	
LW	Flowline end termination	FLET	
LT	Flowline spool connector (Production / Water inj / Gas injection)		
LA	Seal-plate		
LV	Production flowline spool		
LV	Pigging loop	PLM	
LD	Injection Flowline (Water / Gas)		
LU	In-line tee	ILT	
LQ	Injection Riser		
DG	Pig trap		
LV	Well jumper (Production / Water injection / Gas injection)	PWJ / WIWJ / GIWJ	
LM	Xmas tree (Production / Water injection / Gas injection)	PXT / WIXT / GIXT	

Manifold, Valves, Umbilical, Links (electrical & hydraulic)

FL code	Description	Accronym	Symbol
ME	Production manifold		
LJ	Pressure cap		
LJ	Protective cap		
LB	Ball Valve : ROV & hydraulically operated		
LB	Ball Valve ROV operated		
LB	Gate Valve ROV operated		
LX	Umbilical		
LA	Umbilical connector Seal-plate		
LY	Umbilical termination head	UTH	
LY	Umbilical hang-off head		
LY	Subsea distribution unit	SDU	SDU SDU
LY	Subsea umbilical termination	SUT	SUT
LR	Electrical flying lead (Injection XT)	EFL	
LR	Hydraulic flying lead (Injection XT)	HFL	
LR	Pre-installed Electrical flying lead (Manifolds only)		
LR	Electrical flying leads (Manifolds to Prod XT)	F/L	
	UNISUP battery limit : SPS / UFL		

Codification principles & Typicals - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 3/12)



Equipment Description	Accro nym	TAG N° (Functional Location)
Grouped by UNISUP level 4		Values for typicals
UFL - Production Loop 301		**DAL/UFL/EXT/EWELL**
Riser upper connector		4-LT-301-0-LA
Flexible Riser - IPB	IPB	4-LQ-301-1-L
Riser lower connector		4-LT-301-0-LB
Production Flowline	PIP	4-LD-301-1-L (or R)
Flowline End Termination	FLET	4-LW-301-1-1L (or 1R)
Production Flowline Spool		4-LV-301-1-1L (or 1R)
Flowline spool connector		2-LT-301-1-1LA (or 1RA
Seal-plate Flowline connector		2-LA-301-1-1LA (or 1RA
Umbilical (Production)		4-LX-301-1
Umbilical hang-off head		4-LY-301-0
Umbilical termination head	UTH	2-LY-301-1-A
Seal-plate : umbilical termination head		2-LA-301-1-A
Pressure cap for UTH		2-LJ-301-2-B
UFL - Injection Line 761		**DAL/UFL/WAT°/IWELL**
Injection riser		4-LQ-761
Injection line		4-LD-761
In-line Tee	ILT	4-LU-761-05
Flowline valve (gate or ball)		4-LB-761-01
Flowline End Termination (Gas only)	FLET	4-LW-572-01
Flowline End Termination/Integrated Tee	FLET	4-LWLU-763-10
Subsea pig-trap		4-DG-761-01
Umbilical (Injection)		4-LX-761-1
Umbilical hang-off head		4-LY-761-00
Subsea distribution unit	SDU	4-LY-761-05
Subsea Termination Unit	STU	4-LY-572-10
		= GAS for Gas Injection Well Equipment

Note 1 (for Production manifolds)
Pre-installed electrical flying leads to have suffixes as below
A UTH to MCM
B UTH to MCM
C UTH to UTH
D UTH to UTH
E UTH to MCM

Green text in tables above show changes between Rev E & Rev F

Equipment Description	Accro nym	TAG N° (Functional Location)
Grouped by UNISUP level 4		Values for typicals
SPS - Production		**DAL/SPS /EXT/EWELL**
Manifold		2-ME-301-1
Manifold foundation & bottom structure	FBS	2-MH-301-1
Manifold control module	MCM	2-MCM-301-1
Manifold control module junction plate	MQC	2-MQCM-301-1
Umbilical Pressure cap		2-LJ-301-2-A
Production hub pressure cap		2-LJ-301-12-A
Pigging loop	PLM	2-LV-301-2-P
Production Well jumper	PWJ	2-LV-301-16
Well jumper connector		2-LT-301-16-A
Seal-plate production well connectors		2-LA-301-16-A
Pre-installed electrical flying-lead UTH-MCM and/or UTH-UTH (note 1)		2-LR-301-1-A (suffix A to F)
Xmas tree (Production)	PXT	2-LM-301-16
Subsea Control Module	SCM	2-SCM-301-16
Flow Control Module	FCM	2-FCM-301-16
Choke		2-PCV-301-16
Multiphase Flowmeter	MFM	2-FT-301-16
Sand detector		2-QT-301-16
Chemical injection throttle valve	CITV	2-CITV-301-16
Downhole Interface Unit (Production)	DIU	2-DIUP-301-16
Xmas tree cross-over plate cover		2-MQCC-301-16
Xmas tree junction plate cover		No functional location
Tree Orifice Stab	TOS	2-RO-301-16
Tubing hanger (Production)	TH	2-THP-301-16
Upper Wireline plug (Production)	UWP	2-UWPP-301-16
Lower Wireline plug (Production)	LWP	2-LWPP-301-16
Debris cap (Production)		2-DCP-301-16
Flying lead- electrical manifold-xmas-tree	EFL	2-LR-301-12-A (suffix A and B)
Electrical Flying lead : SCM-DIUP	EFL	2-LR-301-12-C
Electrical Flying lead : SCM-FCM	EFL	2-LR-301-12-D
SPS - Injection		**DAL/SPS/WAT°/IWELL**
Flying lead (injection-electrical)	EFL	2-LR-761-05-A (and B)
Flying lead (injection-hydraulic)	HFL	2-LR-761-05-H
Electrical Flying lead: SCM-DIU(G or W)	EFL	2-LR-761-05-C
Junction plate protective cap		No functional location
Injection well jumper	IWJ	4-LV-761-05
Injection well jumper connector		2-LT-761-05-A
Seal-pate injection well connectors		2-LA-761-05-A
Injection hub HP protective cap		2-LJ-761-05-A
Xmas tree (Water Injection)	WIXT	2-LM-761-05
Xmas tree (Gas Injection)	GIXT	2-LM-571-05
Subsea control module (injection)	SCM	2-SCM-571-05
Flow control module (injection)	FCM	2-FCM-571-05
Methanol injection throttle valve	MITV	2-MITV-571-05
Downhole Interface Unit (Gas injection)	DIU	2-DIUG-571-05
Downhole Interface Unit (Water injection)	DIU	2-DIUW-761-05
Tubing hanger (Gas)	TH	2-THG-571-05
Tubing hanger (Water)	TH	2-THW-761-05
Upper Wireline plug (Gas)	UWP	2-UWPG-571-05
Upper Wireline plug (Water)	UWP	2-UWPW-761-05
Lower Wireline plug (Gas)	LWP	2-LWPG-571-05
Lower Wireline plug (Water)	LWP	2-LWPW-761-05
Debris cap (Gas)	DC	2-DCG-571-05
Debris cap (Water)	DC	2-DCW-761-05

Well designation cross-references - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 4/12)

Sorted by Reservoir Reference

Production Well References

Reservoir Department	Drilling	Xmas tree Functional Location	Manifold	Slot	Date in Operation (Planned)	
D1P01		LM-303-24	ME-303-2	4		
D1P02		LM-303-22	ME-303-2	2		
D1P03		LM-303-21	ME-303-2	1		
D1P04		LM-302-22	ME-302-2	2		
D1P05	DAL 704-1P	LM-302-25	ME-302-2	5	MSU	
D1P06	DAL-712-1P	LM-302-21	ME-302-2	1	MSU	g
D1P07	DAL 703-1P	LM-302-12	ME-302-1	2	MSU	
D1P08		LM-301-14	ME-301-1	4		
D1P09	DAL 701-1P	LM-301-13	ME-301-1	3	MSU	
D1P10		LM-301-11	ME-301-1	1		
D1P11		LM-301-25	ME-301-2	5	MSU	
D1P12		LM-301-24	ME-301-2	4		
D2P01		LM-303-14	ME-303-1	4		
D2P03		LM-304-15	ME-304-1	5	MSU	
D2P04	DAL 702-2P	LM-301-15	ME-301-1	5	MSU	
D2P05		LM-304-12	ME-304-1	2		
D2P06		LM-304-13	ME-304-1	3		
D2P07		LM-301-26	ME-301-2	6		
D2P08		LM-301-21	ME-301-2	1		
D2P09		LM-301-22	ME-301-2	2		
D3P01		LM-303-25	ME-303-2	5		
D3P02		LM-303-23	ME-303-2	3		
D3P04		LM-303-15	ME-303-1	5		
D3P05	DAL 706-3P	LM-303-12	ME-303-1	2	MSU	
D3P06		LM-303-13	ME-303-1	3		
D3P07		LM-304-26	ME-304-2	6		
D3P08		LM-304-14	ME-304-1	4		g
D3P09		LM-304-22	ME-304-2	2		
D3P10		LM-304-11	ME-304-1	1	MSU	g
D4P01	DAL 707-4P	LM-304-35	ME-304-3	5	MSU	
D4P02	DAL 708-4P	LM-304-32	ME-304-3	2	MSU	
D4P03		LM-304-31	ME-304-3	1		
D4P04		LM-304-34	ME-304-3	4		
D4P05		LM-304-36	ME-304-3	6		
D4P06		LM-304-23	ME-304-2	3		
D5P01		LM-301-16	ME-301-1	6		
D5P02		LM-302-16	ME-302-1	6		

MSU = Manifold Start-up date

Sorted by Functional Location

Production Well References

Reservoir Department	Drilling	Xmas tree Functional Location	Manifold	Slot	Date in Operation (Planned)	
D1P10		LM-301-11	ME-301-1	1		
Not assigned			ME-301-1	2		
D1P09	DAL 701-1P	LM-301-13	ME-301-1	3	MSU	
D1P08		LM-301-14	ME-301-1	4		
D2P04	DAL 702-2P	LM-301-15	ME-301-1	5	MSU	
D5P01		LM-301-16	ME-301-1	6		
D2P08		LM-301-21	ME-301-2	1		
D2P09		LM-301-22	ME-301-2	2		
Not assigned			ME-301-2	3		g
D1P12		LM-301-24	ME-301-2	4		
D1P11		LM-301-25	ME-301-2	5	MSU	
D2P07		LM-301-26	ME-301-2	6		
Not assigned			ME-302-1	1		
D1P07	DAL 703-1P	LM-302-13	ME-302-1	2	MSU	
Not assigned			ME-302-1	3		
Not assigned			ME-302-1	4		
Not assigned			ME-302-1	5		
D5P02		LM-302-16	ME-302-1	6		
D1P06	DAL-712-1P	LM-302-21	ME-302-2	1	MSU	g
D1P04		LM-302-22	ME-302-2	2		
Not assigned			ME-302-2	3		
Not assigned			ME-302-2	4		
D1P05	DAL 704-1P	LM-302-25	ME-302-2	5	MSU	
Not assigned			ME-302-2	6		
Not assigned			ME-303-1	1		g
D3P05	DAL 706-3P	LM-303-12	ME-303-1	2	MSU	
D3P06		LM-303-13	ME-303-1	3		
D2P01		LM-303-14	ME-303-1	4		
D3P04		LM-303-15	ME-303-1	5		
Not assigned			ME-303-1	6		
D1P03		LM-303-21	ME-303-2	1		
D1P02		LM-303-22	ME-303-2	2		
D3P02		LM-303-23	ME-303-2	3		
D1P01		LM-303-24	ME-303-2	4		
D3P01		LM-303-25	ME-303-2	5		
Not assigned			ME-303-2	6		
D3P10		LM-304-11	ME-304-1	1	MSU	g
D2P05		LM-304-12	ME-304-1	2		
D2P06		LM-304-13	ME-304-1	3		
D3P08		LM-304-14	ME-304-1	4		g
D2P03		LM-304-15	ME-304-1	5	MSU	
Not assigned			ME-304-1	6		
Not assigned			ME-304-2	1		
D3P09		LM-304-22	ME-304-2	2		
D4P06		LM-304-23	ME-304-2	3		
Not assigned			ME-304-2	4		
Not assigned			ME-304-2	5		
D3P07		LM-304-26	ME-304-2	6		
D4P03		LM-304-31	ME-304-3	1		
D4P02	DAL 708-4P	LM-304-32	ME-304-3	2	MSU	
Not assigned			ME-304-3	3		g
D4P04		LM-304-34	ME-304-3	4		
D4P01	DAL 707-4P	LM-304-35	ME-304-3	5	MSU	
D4P05		LM-304-36	ME-304-3	6		

Sorted by Reservoir Reference

Injection Well References

Reservoir Department (Water)	Drilling	Xmas tree Functional Location	Date in Operation (Planned)	
D1W01		LM-762-55		
D1W02		LM-762-35		
D1W03		LM-762-30		
D1W03B		LM-762-40		
D1W04		LM-762-25		
D1W05		LM-762-20		
D1W06		LM-762-10		
D1W07	DAL 709-1Wi	LM-762-05	BSU	
D1W08		LM-761-35		
D1W09		LM-761-25	BSU	
D1W10		LM-761-30		
D2W01		LM-762-15		
D2W02		LM-764-05		
D2W03		LM-761-10		
D2W05		LM-763-05	(not BSU)	g
D2W06		LM-761-05		
D2W07		LM-761-20		
D2W08	DAL 711-2Wi	LM-761-15	BSU	
D3W01		LM-762-45		
D3W02		LM-762-50		
D3W05		LM-763-15	BSU	
D3W06		LM-763-20		
D3W07		LM-761-07		
D3W09		LM-763-10		
D4W01	DAL 713-4Wi	LM-764-35	BSU	g
D4W02	DAL 710-4Wi	LM-764-25	BSU	
D4W03		LM-764-30		
D4W04		LM-764-20		
D4W05		LM-764-15		
D5W01		LM-761-45		
D5W02		LM-761-40		
Reservoir Gas				
D1G01	DAL 705-1Gi	LM-572-05	BSU	
D1G02		LM-571-10		
D3G08		LM-571-05		

Sorted by Functional Location

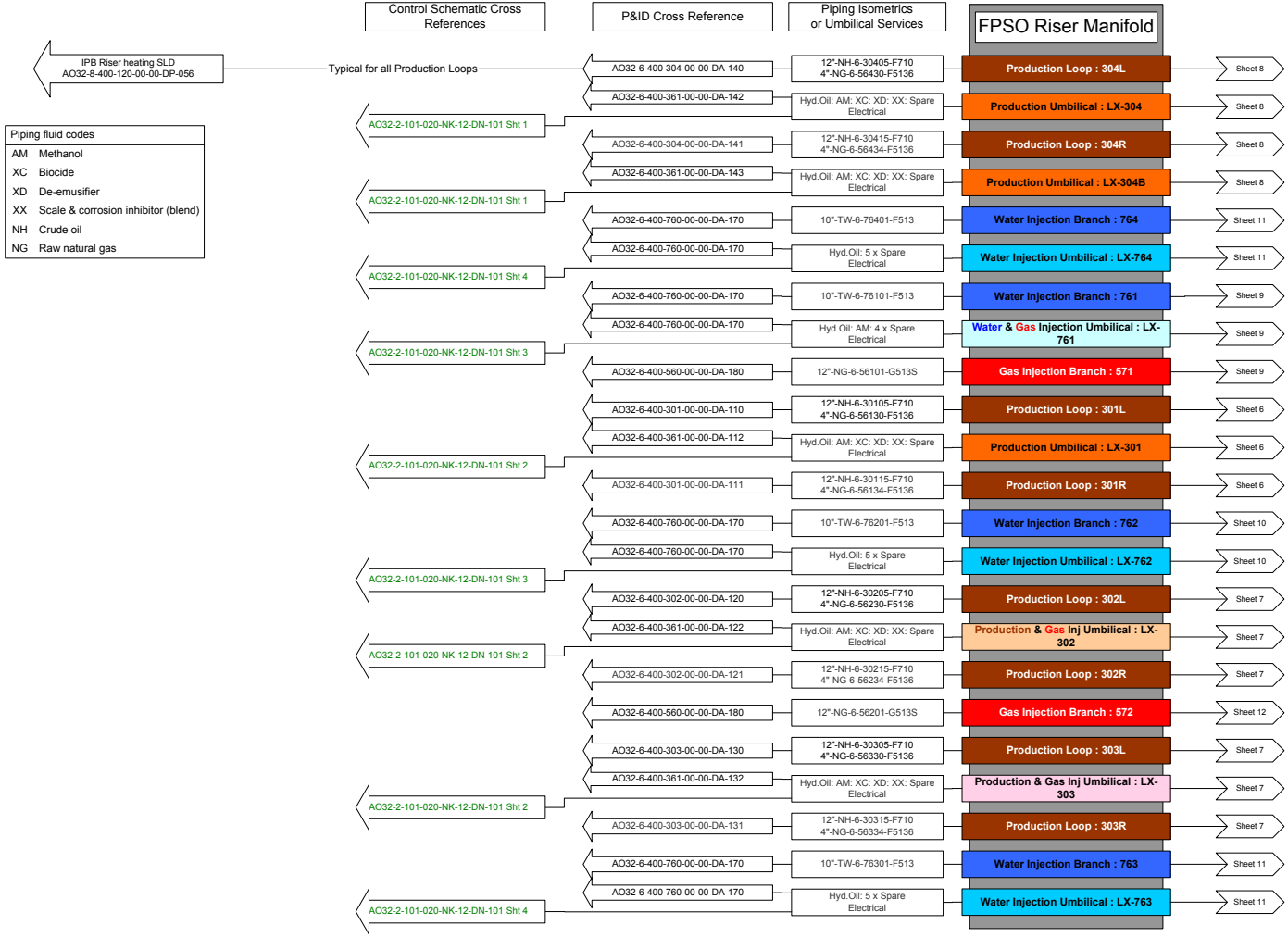
Injection Well References

Reservoir Department (Water)	Drilling	Xmas tree Functional Location	Date in Operation (Planned)	
D2W06		LM-761-05		
D3W07		LM-761-07		
D2W03		LM-761-10		
D2W08	DAL 711-2Wi	LM-761-15	BSU	
D2W07		LM-761-20		
D1W09		LM-761-25	BSU	
D1W10		LM-761-30		
D1W08		LM-761-35		
D5W02		LM-761-40		
D5W01		LM-761-45		
D1W07	DAL 709-1Wi	LM-762-05	BSU	
D1W06		LM-762-10		
D2W01		LM-762-15		
D1W05		LM-762-20		
D1W04		LM-762-25		
D1W03		LM-762-30		
D1W02		LM-762-35		
D1W03B		LM-762-40		
D3W01		LM-762-45		
D3W02		LM-762-50		
D1W01		LM-762-55		
D2W05		LM-763-05		g
D3W09		LM-763-10		
D3W05		LM-763-15	BSU	
D3W06		LM-763-20		
D2W02		LM-764-05		
D4W05		LM-764-15		
D4W04		LM-764-20		
D4W02	DAL 710-4Wi	LM-764-25	BSU	g
D4W03		LM-764-30		
D4W01	DAL 713-4Wi	LM-764-35	BSU	g
Reservoir Gas				
D3G08		LM-571-05	BSU	
D1G02		LM-571-10		g
D1G01	DAL 705-1Gi	LM-572-05		g

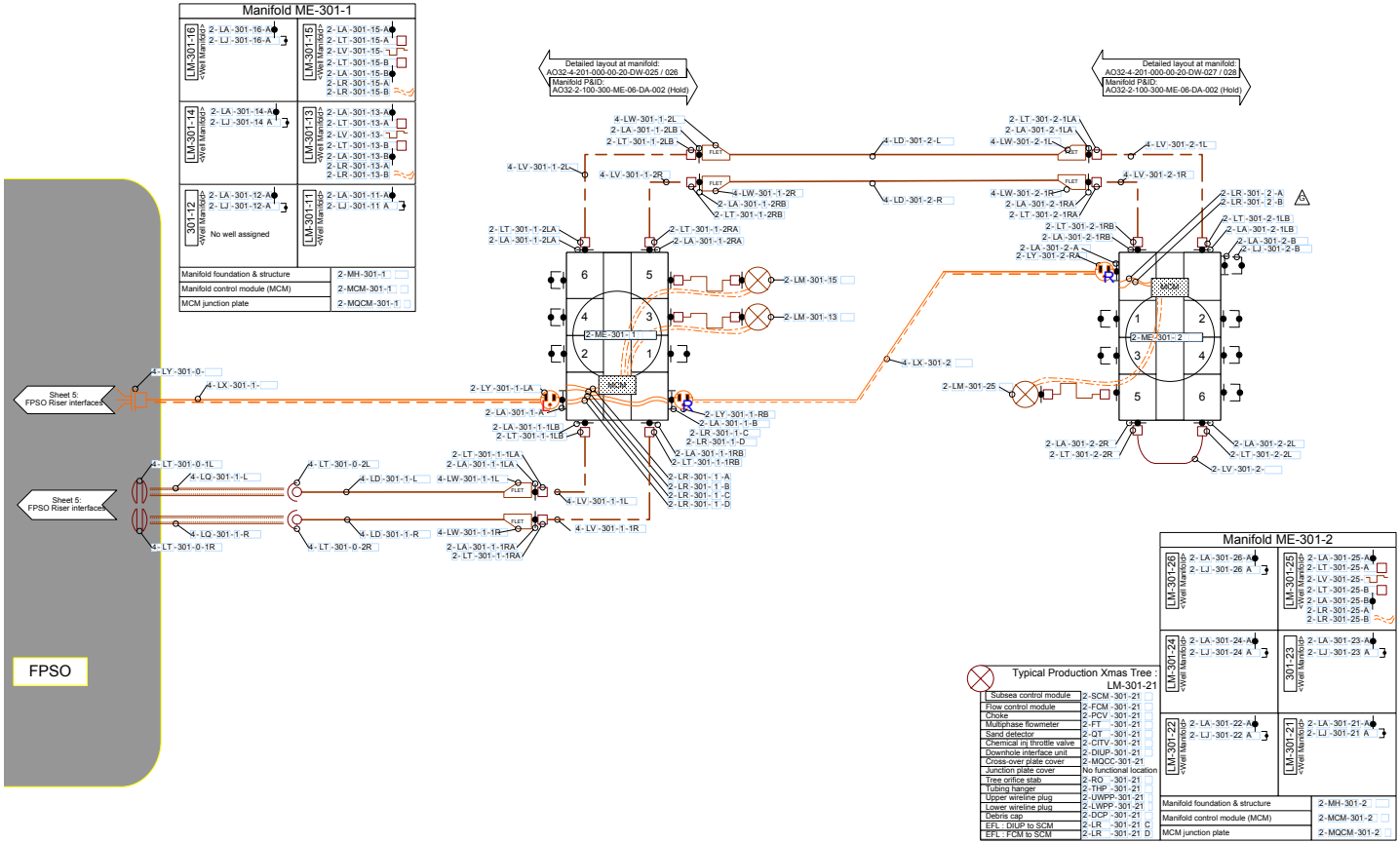
BSU = Branch Start-up

MSU = Manifold Start-up

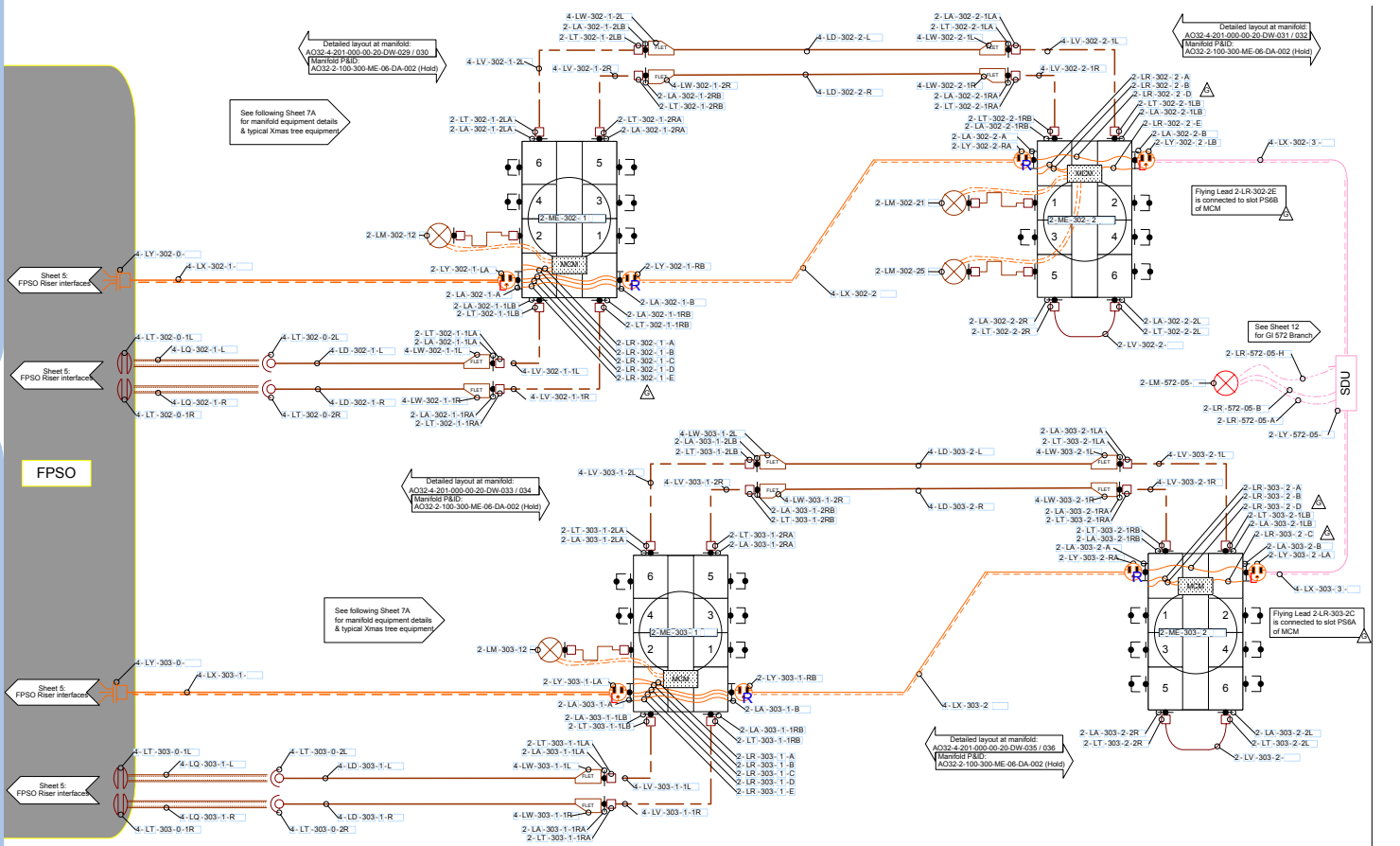
FPSO / Riser Interfaces - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 5/12)



Production Loop 301 - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 6/12)



Production Loops 302 & 303 - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 7/12)



Production Loops 302 & 303 (Manifold & Xmas Tree Data) - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 7A/13)

Manifold ME-302-1

302-16 <Well Manifold>	2-LA-302-16-A 2-LJ-302-16 A	302-15 <Well Manifold>	2-LA-302-15-A 2-LJ-302-15-A No well assigned
302-14 <Well Manifold>	2-LA-302-14-A 2-LJ-302-14-A No well assigned	LM-302-13 <Well Manifold>	2-LA-302-13-A 2-LJ-302-13-A No well assigned
302-12 <Well Manifold>	2-LA-302-12-A 2-LT-302-12-A 2-LV-302-12- 2-LT-302-12-B 2-LA-302-12-B 2-LR-302-12-A 2-LR-302-12-B	302-11 <Well Manifold>	2-LA-302-11-A 2-LJ-302-11-A No well assigned

Manifold foundation & structure	2-MH-302-1
Manifold control module (MCM)	2-MCM-302-1
MCM junction plate	2-MQCM-302-1

Manifold ME-302-2

LM-302-26 <Well Manifold>	2-LA-302-26-A 2-LJ-302-26-A	LM-302-25 <Well Manifold>	2-LA-302-25-A 2-LT-302-25-A 2-LV-302-25- 2-LT-302-25-B 2-LA-302-25-B 2-LR-302-25-A 2-LR-302-25-B
302-24 <Well Manifold>	2-LA-302-24-A 2-LJ-302-24-A No well assigned	302-23 <Well Manifold>	2-LA-302-23-A 2-LJ-302-23 A No well assigned
LM-302-22 <Well Manifold>	2-LA-302-22-A 2-LJ-302-22 A	LM-302-21 <Well Manifold>	2-LA-302-21-A 2-LT-302-21-A 2-LV-302-21- 2-LT-302-21-B 2-LA-302-21-B 2-LR-302-21-A 2-LR-302-21-B

Manifold foundation & structure	2-MH-302-2
Manifold control module (MCM)	2-MCM-302-2
MCM junction plate	2-MQCM-302-2

Typical Production Xmas Tree : LM-302-12

Subsea control module	2-SCM-302-12
Flow control module	2-FCM-302-12
Choke	2-PCV-302-12
Multiphase flowmeter	2-FT-302-12
Sand detector	2-QT-302-12
Chemical inj throttle valve	2-CITV-302-12
Downhole interface unit	2-DIUP-302-12
Cross-over plate cover	2-MQCC-302-12
Junction plate cover	No functional location
Tree orifice stab	2-RO-302-12
Tubing hanger	2-THP-302-12
Upper wireline plug	2-UWPP-302-12
Lower wireline plug	2-LWPP-302-12
Debris cap	2-DCP-302-12
EFL : DIUP to SCM	2-LR-302-12 C
EFL : FCM to SCM	2-LR-302-12 D

See Sheet 7 for Production Loop equipment details

Manifold ME-303-1

303-16 <Well Manifold>	2-LA-303-16-A 2-LJ-303-16-A No well assigned	LM-303-15 <Well Manifold>	2-LA-303-15-A 2-LJ-303-15 A
LM-303-14 <Well Manifold>	2-LA-303-14-A 2-LJ-303-14 A	LM-303-13 <Well Manifold>	2-LA-303-13-A 2-LJ-303-13 A
LM-303-12 <Well Manifold>	2-LA-303-12-A 2-LT-303-12-A 2-LV-303-12- 2-LT-303-12-B 2-LA-303-12-B 2-LR-303-12-A 2-LR-303-12-B	303-11 <Well Manifold>	2-LA-303-11-A 2-LJ-303-11-A No well assigned

Manifold foundation & structure	2-MH-303-1
Manifold control module (MCM)	2-MCM-303-1
MCM junction plate	2-MQCM-303-1

Manifold ME-303-2

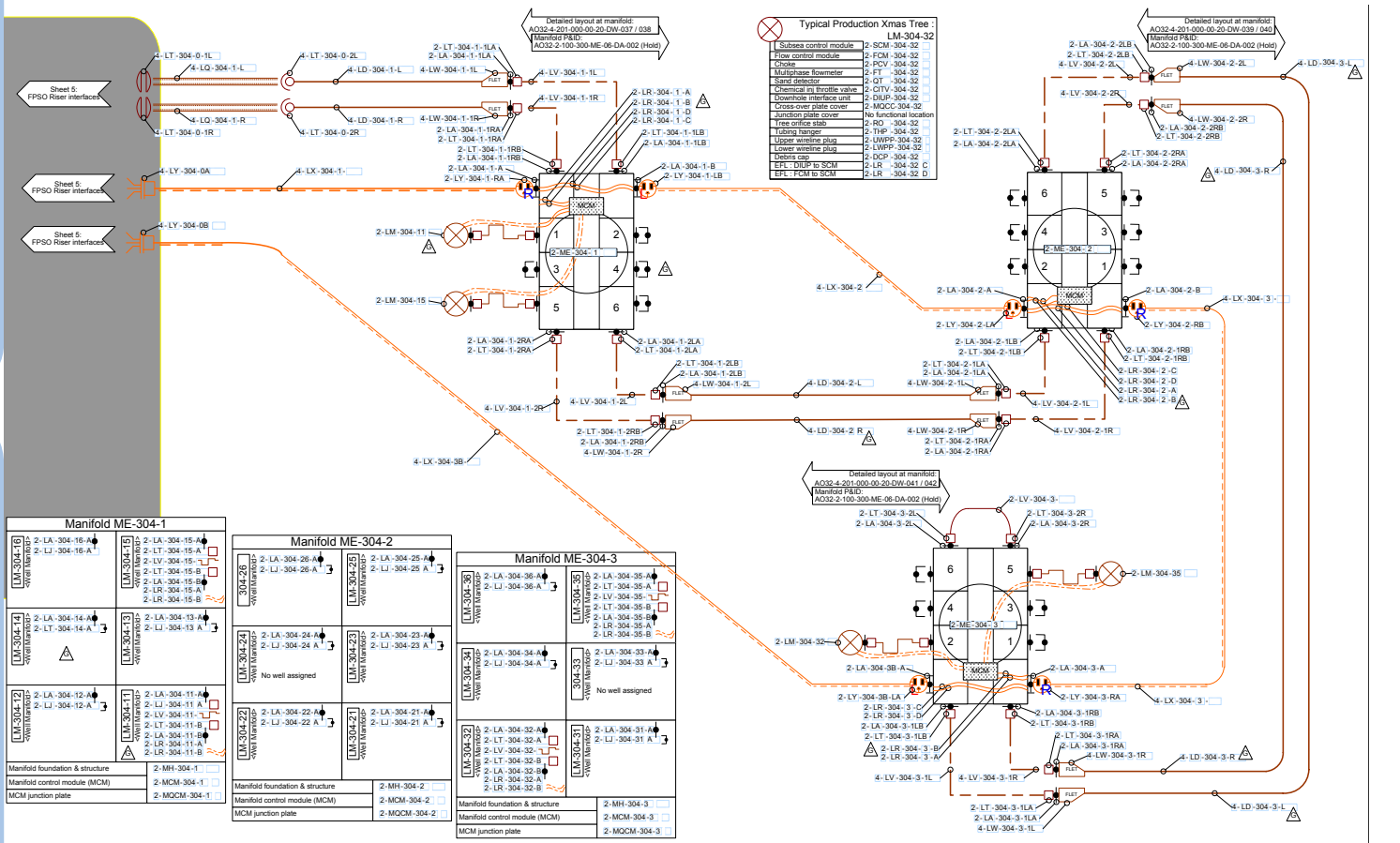
303-26 <Well Manifold>	2-LA-303-26-A 2-LJ-303-26-A No well assigned	LM-303-25 <Well Manifold>	2-LA-303-25-A 2-LJ-303-25 A
LM-303-24 <Well Manifold>	2-LA-303-24-A 2-LJ-303-24 A	LM-303-23 <Well Manifold>	2-LA-303-23-A 2-LJ-303-23 A
LM-303-22 <Well Manifold>	2-LA-303-22-A 2-LJ-303-22 A	LM-303-21 <Well Manifold>	2-LA-303-21-A 2-LJ-303-21 A

Manifold foundation & structure	2-MH-303-2
Manifold control module (MCM)	2-MCM-303-2
MCM junction plate	2-MQCM-303-2

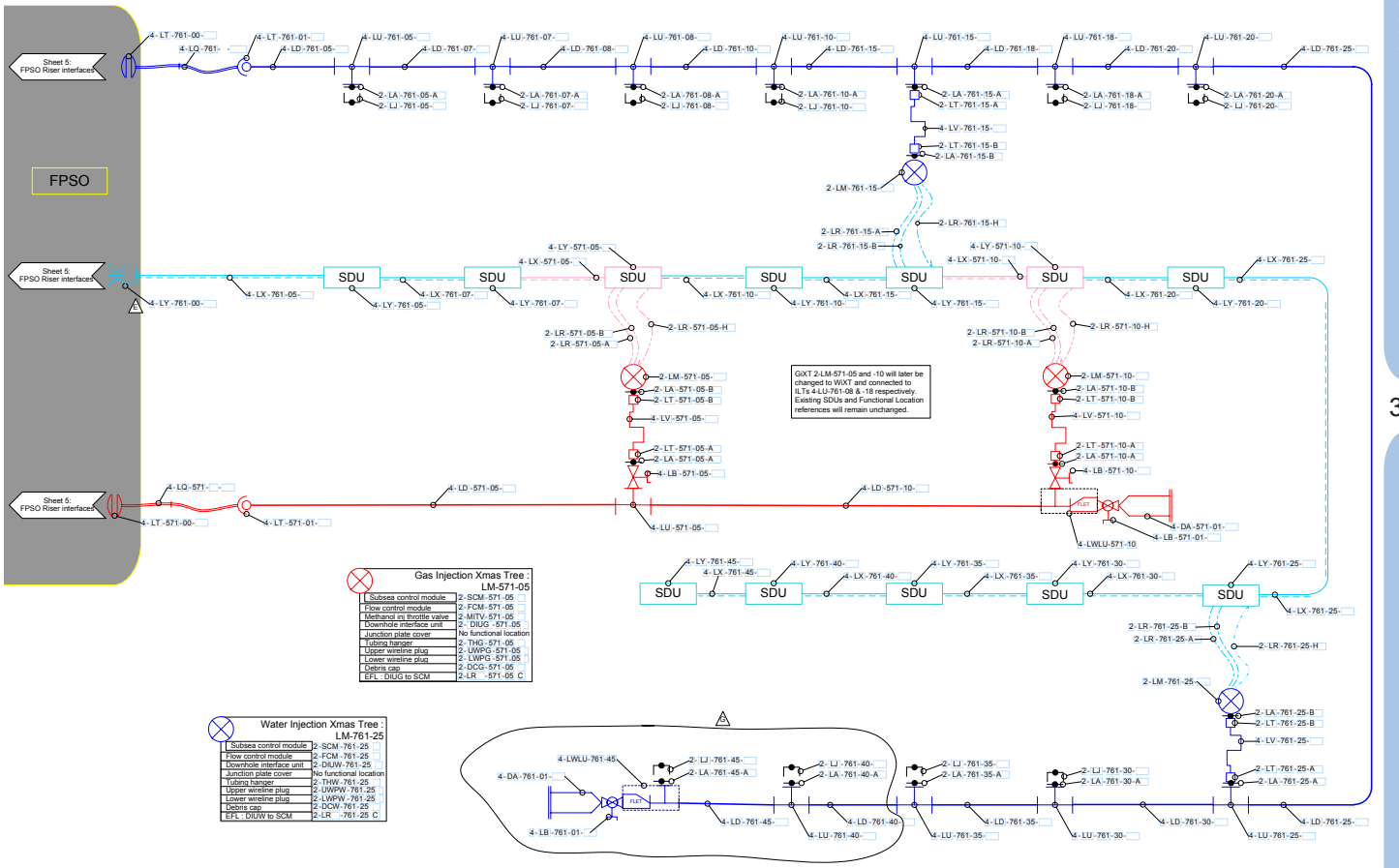
Typical Production Xmas Tree : LM-303-23

Subsea control module	2-SCM-303-23
Flow control module	2-FCM-303-23
Choke	2-PCV-303-23
Multiphase flowmeter	2-FT-303-23
Sand detector	2-QT-303-23
Chemical inj throttle valve	2-CITV-303-23
Downhole interface unit	2-DIUP-303-23
Cross-over plate cover	2-MQCC-303-23
Junction plate cover	No functional location
Tree orifice stab	2-RO-303-23
Tubing hanger	2-THP-303-23
Upper wireline plug	2-UWPP-303-23
Lower wireline plug	2-LWPP-303-23
Debris cap	2-DCP-303-23
EFL : DIUP to SCM	2-LR-303-23 C
EFL : FCM to SCM	2-LR-303-23 D

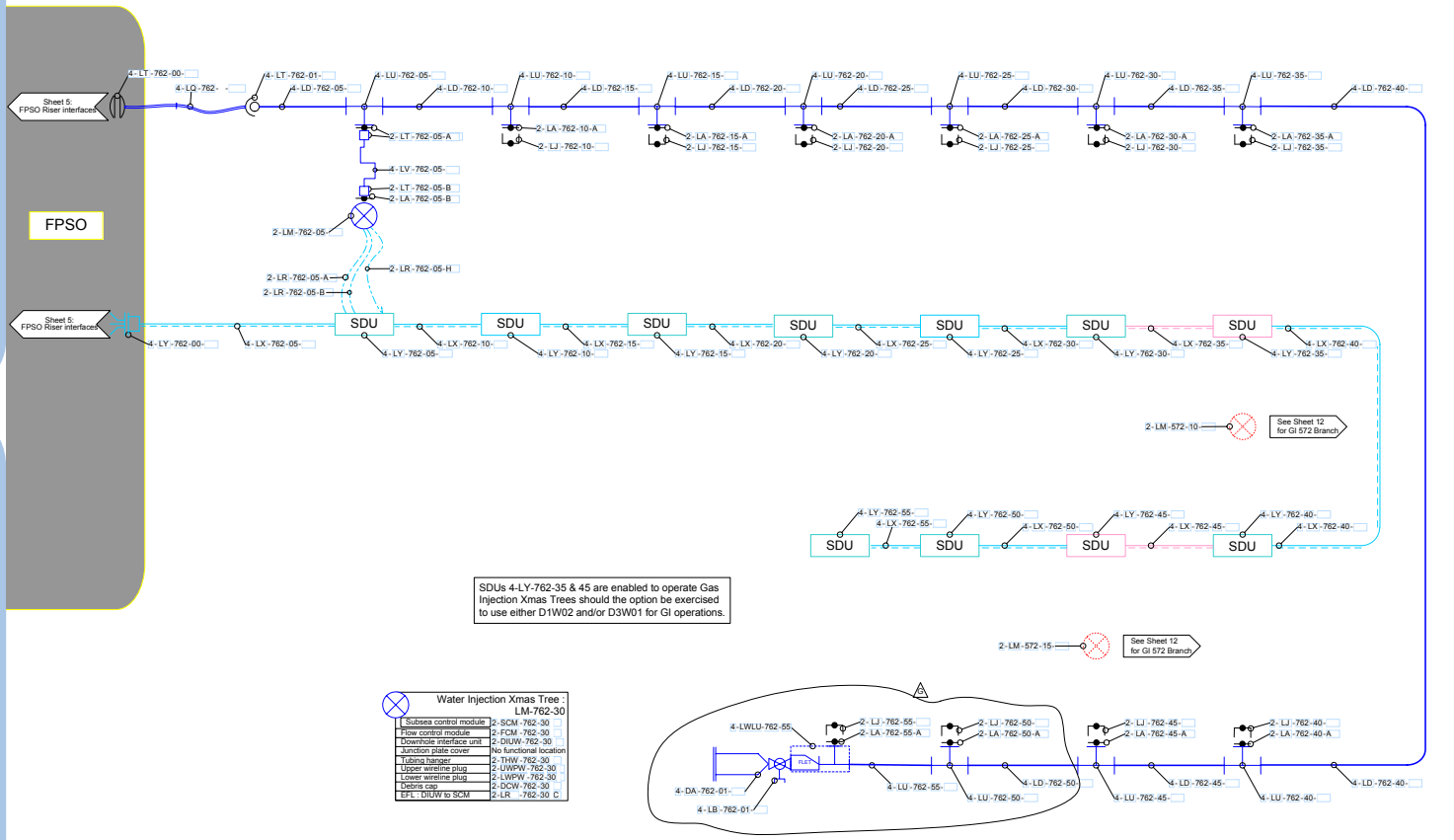
Production Loop 304 - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 8/12)



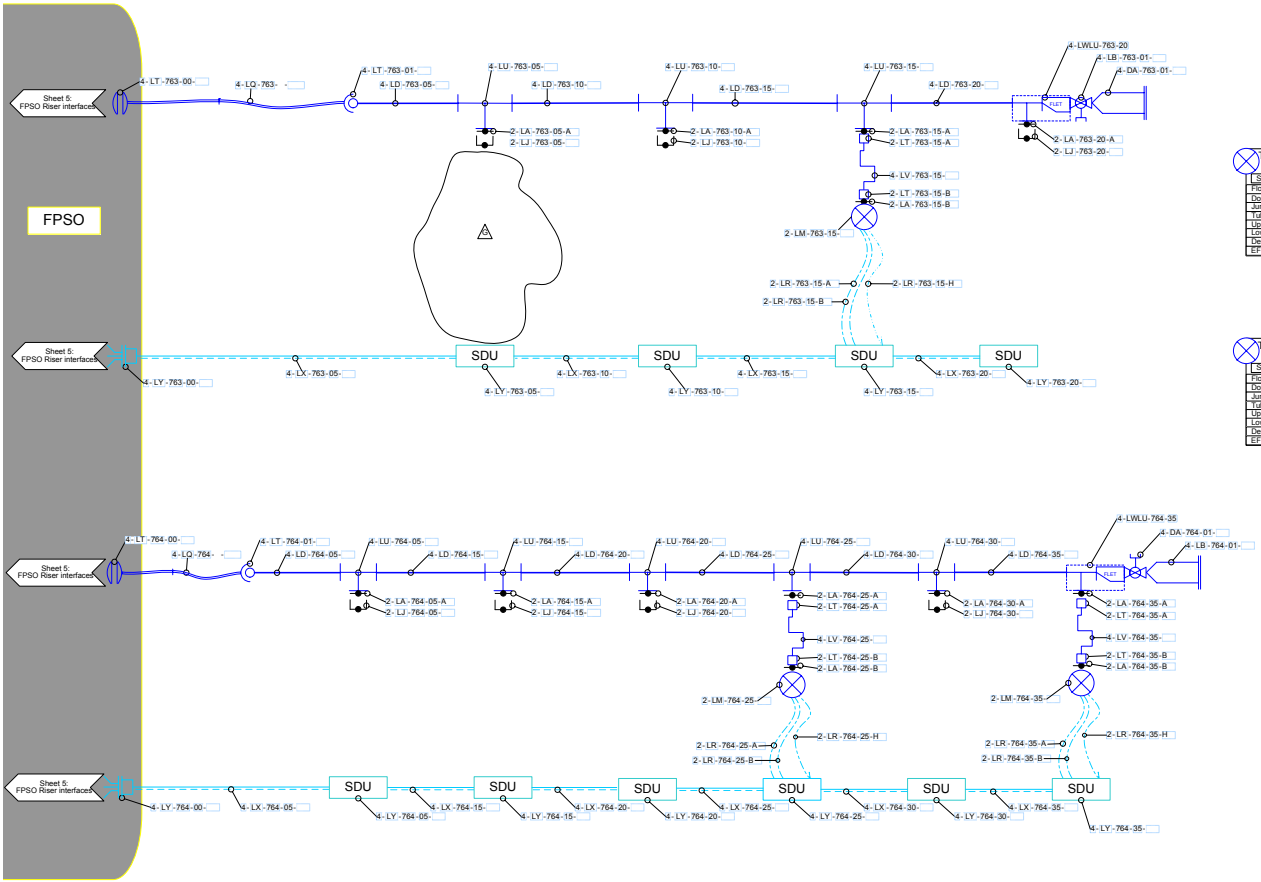
Southern Gas Injection Branch 571 & Water Injection Branch 761 - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 9/12)



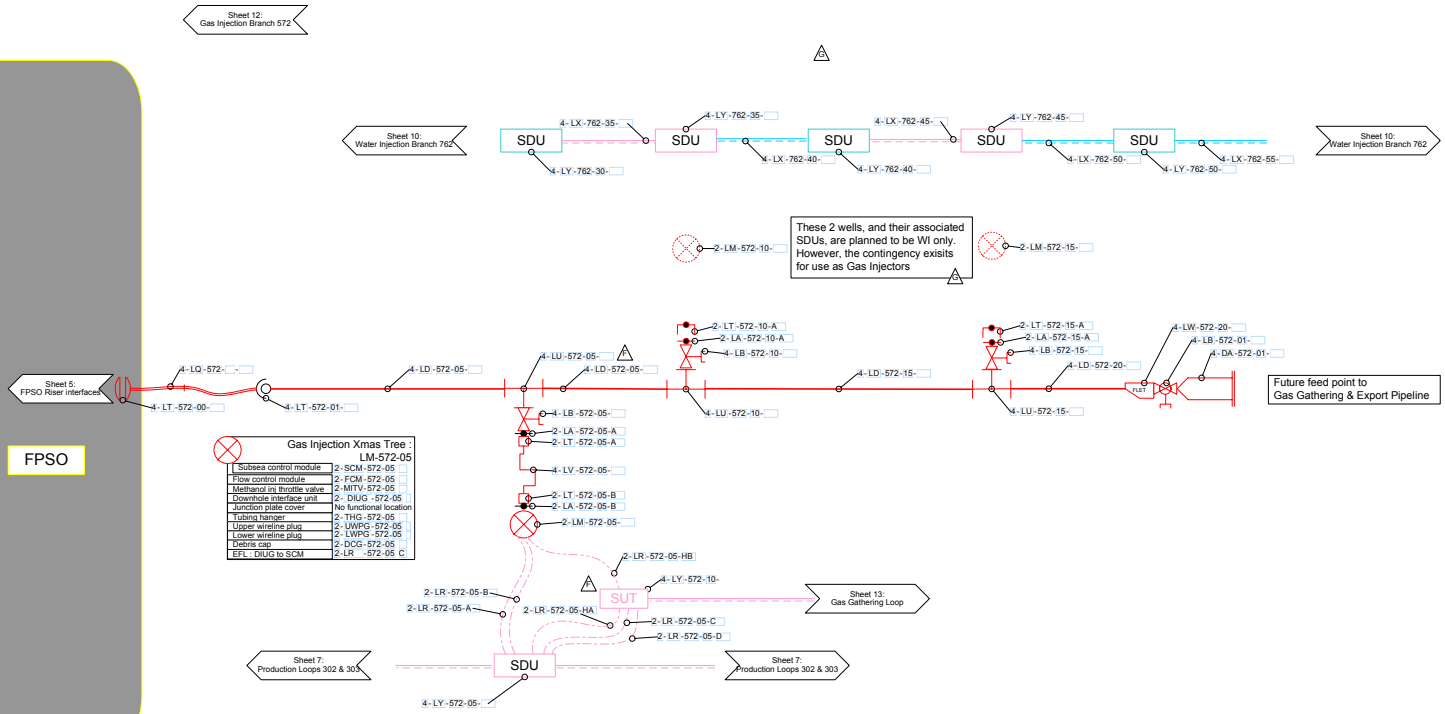
Northern Water Injection Branch 762 - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 10/12)



Water Injection Branches 763 & 764 - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 11/12)



Northern Gas Injection Branch 572 - Drawing: AO32-1-018-000-00-00-NW-003 (Sheet 12/12)



1.11 Definitions and Abbreviations

The following abbreviations are used in this handbook:

AAV	Annulus Access Valve
ADL	Acoustic Data Logger
AMV	Annulus Master Valve
API	American Petroleum Institute
ASP	Additional Sensor Package
AV	Annulus Vent
AVV	Annulus Vent Valve
AWV	Annulus Wing Valve
BMVG	Bleed Monitoring Valve Gallery
BOP	Blow Out Preventer
BP	Bore Protector
BPRT	Bore Protector Running Tool
BS	Bottom Structure
CITV	Chemical Injection Throttle Valve
CIV	Chemical Injection Valve
CTTF	Coil Tubing Tension Frame
DC	Debris Cap
DHPT	Downhole Pressure and Temperature
DHSV	Downhole Safety Valve
DIU	Downhole Interface Unit
DIV	Downhole Injection Valve
DPS	Dual Port Stab
DWP	Dirty Work Package
EFL	Electrical Flying Leads
EJ	Electrical Jumpers
ESD	Emergency Shut Down
FAI	Fail As Is
FBS	Foundation & Bottom Structure
FCM	Flow Control Module
FPSO	Floating Production Storage and Offloading
FSC	Fail Safe Close
FSU	Fluid Sampling Unit
FTU	Fluid Transfer Unit
GB	Guide base
GBRT	Guide Base Running Tool
GHO	Guide & Hinge Over
GI	Gas Injection
GIV	Gallery Isolation Valve
HCT	Hub Cleaning Tool
HP	High Pressure
HPU	Hydraulic Power Unit
HTC	Hydraulic Test Container
ICSS	Information Control and Safety System
IMIV	Isolation Methanol Injection Valve
IRT	Integrated Running Tool
ITC	Internal Tree Cap
JDS	Jumper Deployment Skid
JDT	Jumper Deployment Tool
kNm	Kilo Newton Meter
LAOT	Linear Actuator Override Tool
LJ	Landing Joint w/Sealing Mandrel
LMRP	Lower Marine Riser Package
LP	Low Pressure
LRP	Lower Riser Package
LS	Landing String
LV	Lubricator Valve
MB	Multi Bore
MCM	Manifold Control Module
MCMMB	Manifold Control Module Mounting Base
MFV	Methanol Flushing Valve
MIV	Methanol Injection Valve
MLV	Manifold Loop Valves
MLV-L	Manifold Line Valve Left
MLV-R	Manifold Line Valve Right
MM	Manifold Module
MMIV	Manifold MeOh Injection Valve
MPB	Multi Purpose Basket
MPV	Manifold Production Valves
MQC	Multi Quick Connector
OMM	Operation And Maintenance Manual
OPC	OLE for Process Control
OS	Operator Workstation
P&ID	Piping and Instrument Diagram
PCV	Production Choke Valve
PGB	Production Guide Base
PLM	Pigging Loop Module
PMV	Production Master Valve
PT	Pressure Transmitter
PTT	Pressure & Temperature Tranducer
PTV	Plug Test Valve
PWV	Production Wing Valve
RAM	Riser Accumulator Module
RCM	Riser Control Module
ROV	Remote Operated Vehicle
RPC	Remote Power Controller
RV	Retainer Valve
SB	Single Bore
SCM	Subsea Control Module
SCMMB	Subsea Control Module Mounting Base
SCSSV	Surface Controlled Subsurface Safety Valve
SCU	Subsea Control Unit
SD	Shut Down
SDU	Subsea Distribution Unit
SEM	Subsea Electronic Module
SFT	Surface Flow Tree
SLV	Service Line Valve
SPCS	Subsea Production Control Unit
SPS	Subsea Production System
SSTT	Subsea Test Tree
ST	GHO Stroke Tool
STT	Surface Test Tree
SU	Service Umbilical
SVIV	Safety Valve Isolation Valve
TH	Tubing Hanger
THRT	Tubing Hanger Running Tool
TRT	Tree Running Tool
TT	Temperature Transmitter
UTH	Umbilical Termination Head
WH	Wellhead
WI	Water Injection
WO	Workover
WO/C	Workover Completion
WOCS	Workover Control Station
WP	Work Package
WST	Wellhead Seal Test Valve
XT	Xmas Tree

1.12 Other References

Other References

User Manuals

WBS CODE	DESCRIPTION	KOP. Doc Number	O&M Manual
WP03.00.00	**ENGINEERING**		
	OMM SPS System		AO32-2-100-003-34-03-TY-001
WP06.00.00	**MANIFOLDS & STRUCTURE**		
	OMM Foundation Bottom Structure	61-MX0003-00	AO32-2-100-003-34-06-TY-001
	OMM Manifold Module	61-MX0002-00	AO32-2-100-003-34-06-TY-002
	OMM Pigging Loop Module	61-MX0004-00	AO32-2-100-003-34-06-TY-003
WP07.00.00	**WELLHEAD SYSTEMS**		
	SB Wellhead System, 13.62" Light Architecture, W/O Tree	61-HS0001-50	AO32-2-102-003-34-07-TY-001
	SB Wellhead System, 18.75" Heavy Architecture	61-HS0001-40	AO32-2-102-003-34-07-TY-002
	SB Wellhead System, 13.62" Light Architecture, W/O Tree	61-HS0001-60	AO32-2-102-003-34-07-TY-003
WP08.00.00	**GUIDE BASES**		
	OMM Guide Bases	61-NS0114-25	AO32-2-100-003-34-08-TY-001
	OMM Guide Base Running Tool		Incl in TY-001
WP09.00.00	**XMAS TREE SYSTEM**		
	OMM Tubing Hanger	61-NS0114-01	AO32-2-100-003-34-09-TY-001
	OMM XMAS Trees	61-NS0114-02	AO32-2-100-003-34-09-TY-002
	OMM Wireline Plugs	61-NS0114-03	AO32-2-100-003-34-09-TY-003
	OMM Flow Control Modules	61-NS0114-04	AO32-2-100-003-34-09-TY-004
	OMM XMAS Tree Running Tool	61-NS0114-05	AO32-2-100-003-34-09-TY-005
	OMM Tubing Hanger Running Tool	61-NS0114-06	AO32-2-100-003-34-09-TY-006
	OMM Bore Protector Running Tool	61-NS0114-07	AO32-2-100-003-34-09-TY-007
	OMM XT Transportation Base Frame	61-NE0161-00	AO32-2-100-003-34-09-TY-008
	OMM Tubing Hanger 350 ton Hangoff Tool	61-NS0114-09	AO32-2-100-003-34-09-TY-009
	OMM TH Washout Tool Spool Body	61-NS0114-10	AO32-2-100-003-34-09-TY-010
	OMM Tubing Hanger Shipping Basket	61-NE0160-00	AO32-2-100-003-34-09-TY-011
	OMM Wireline Tools and Associated Equipment	61-NS0114-12	AO32-2-100-003-34-09-TY-012
	OMM Tubing Hanger Bore Protector Handling Tool	61-NS0114-13	AO32-2-100-003-34-09-TY-013
	OMM THRT Handling and Test Tool	61-NS0114-14	AO32-2-100-003-34-09-TY-014
	OMM TRT Transportation Base Frame	61-NS0116-00	AO32-2-100-003-34-09-TY-015
	OMM THRT Test Stump	61-NS0114-16	AO32-2-100-003-34-09-TY-016
	OMM Control Coupler Charge and Test Tool	61-NS0114-17	AO32-2-100-003-34-09-TY-017
	OMM XMAS Tree Handling Too	61-NS0114-18	AO32-2-100-003-34-09-TY-018
	OMM Debris Cap, 18 3/4" H4 Profile	61-NS0114-19	AO32-2-100-003-34-09-TY-019
	OMM XMAS Tre Bore Protector	61-NS0114-20	AO32-2-100-003-34-09-TY-020
	OMM XT Test Skid	61-NS0114-21	AO32-2-100-003-34-09-TY-021
	OMM XT Offshore Inspection Stand	61-NS0114-22	AO32-2-100-003-34-09-TY-022
	OMM FCM Test and Transportation Equipment	61-NS0114-23	AO32-2-100-003-34-09-TY-023
	OMM LTRT	61-NS0114-24	AO32-2-100-003-34-09-TY-024
	OMM Tubing Hanger Pulling Tool	61-NS0115-00	AO32-2-100-003-34-09-TY-025
	OMM Tree Tool Shipping Skid	61-NE0159-00	AO32-2-100-003-34-09-TY-026
WP09.00.00	**XTMAS TREE PROCEDURES**		
	Tubing Hanger Retrieval Procedure	61-NS0114-29	AO32-2-100-000-00-09-PX-008
	Washout Tool, Washing of TH Procedure		AO32-2-100-000-00-09-PX-011
	Washout Tool, Washing of XT Spool Procedure		AO32-2-100-000-00-09-PX-012
	Commissioning Procedure for Subsea Phase Watcher VX	P114260-0032	AO32-2-100-00-00-FN-001
	Make Up Procedure		N/A
WP10.00.00	**WORKOVER SYSTEM**		
	OMM Surface Flow Tree 7 3/8" Nominal Bore, 5K	61-UW0104-00	AO32-2-100-003-34-10-TY-001
	OMM Coil Tubing Tension Frame 500 ton Capacity	61-UW0105-00	AO32-2-100-003-34-10-TY-002
	OMM Upper Workover Riser 7 3/8" Nominal Bore, 5K	61-UW0103-00	AO32-2-100-003-34-10-TY-003
	OMM Schlumberger WO/C Riser System	P114438-0021	AO32-2-100-003-34-10-TY-007
	OMM WOCS Container	P109217-0030	AO32-2-100-003-34-10-TY-011
	OMM Auxiliary Equipment F/ Upper Workover Riser	61-UW0106-00	AO32-2-100-003-34-10-TY-014
	OMM XT/LV/NIS Umbilical Reels	P116182-0036	AO32-2-100-003-34-10-TY-015

WP11.00.00	**FLOW JUMPERS**		
	OMM Production Well Jumpers	22-NT0008-00	AO32-2-100-003-34-11-TY-001
		22-NT0008-00	AO32-2-100-014-LT-13-PK-012
WP12.00.00	**PRODUCTION CONTROL SYSTEM**		
	OMM UTH and SDU Located SPCS Equipment	61-KC0020-09	AO32-2-101-003-34-12-TY-001
	OMM User Guide OPC Engineering Interface	61-KC0029-04	AO32-2-101-003-34-12-TY-002
	OMM Surface ETU	61-KM0029-01	AO32-2-101-003-34-12-TY-003
	OMM Subsea Control Unit	35-KM0000-43	AO32-2-101-003-34-12-TY-004
	OMM Sand Detector	35-KC0209-27	AO32-2-101-003-34-12-TY-005
	OMM Chemical Throttle Valve	35KC0209-20	AO32-2-101-003-34-12-TY-006
	OMM Test Subsea Power & Communication Unit	61-KE0380-87	AO32-2-101-003-34-12-TY-007
	OMM Subsea Power and Communication Unit	61-KE0380-81	AO32-2-101-003-34-12-TY-008
	OMM Test Container	35-KC0079-11	AO32-2-101-003-34-12-TY-009
	OMM Test Hydraulic Power Unit	35-KC0197-11	AO32-2-101-003-34-12-TY-010
	OMM Hydraulic Power Unit	35KC0196-11	AO32-2-101-003-34-12-TY-011
	OMM Test and Transportation Equipment	61-KC0020-08	AO32-2-101-003-34-12-TY-012
	OMM Electrica Flying Leads	61-KC0020-07	AO32-2-101-003-34-12-TY-013
	OMM Hydraulic Flying Leads	61-KC0020-06	AO32-2-101-003-34-12-TY-014
	OMM Manifold Control Module	61-KC0020-05	AO32-2-101-003-34-12-TY-015
	OMM Subsea Control Module	61-KC0020-04	AO32-2-101-003-34-12-TY-016
	OMM XMAS Tre Located Subsea Equipment	61-KC0020-03	AO32-2-101-003-34-12-TY-017
	OMM Manifold Located Subsea Equipment	61-KC0020-02	AO32-2-101-003-34-12-TY-018
	OMM Subsea Production Control System	61-KC0020-01	AO32-2-101-003-34-12-TY-019
	OMM High Accuracy Sensor Test Unit	61-KM0054-01	AO32-2-101-003-34-12-TY-020
	OMM Subsea Electronic Test Unit	61-KM0029-02	AO32-2-101-003-34-12-TY-021
	OMM Down Hole Interface Unit	61-KC0020-10	AO32-2-101-003-34-12-TY-022
	OMM Voided	35-KM0051-03	AO32-2-101-003-34-12-TY-023
	OMM Sand Detector Simulator	35-KC0209-10	AO32-2-101-003-34-12-TY-024
	OMM CITV / MITV Simulator	35-KC0209-12	AO32-2-101-003-34-12-TY-025
	OMM High Accuracy SensorSimulator	35-KC0209-14	AO32-2-101-003-34-12-TY-026
	OMM Master Control Station	61-KM0023-01	AO32-2-101-003-34-12-TY-027
	OMM Accoustic Data Logger	35-KM0000-71	AO32-2-101-003-34-12-TY-028
	OMM Chemical Injection Flushing Valve	35-KC0209-40	AO32-2-101-003-34-12-TY-029
	OMM Subsea Procuction Control System OPC Gateway	61-KM0029-05	AO32-2-101-003-34-12-TY-030
	OMM Subsea Production Control System System Manual	61-KC0020-11	AO32-2-101-003-34-12-TY-031
WP13.00.00	**Tie-In (Connection)**		
	OMM Clamp Connectors with Seal Assemblies	61-NT2008-01	AO32-2-100-003-34-13-TY-001
	OMM 6" Seal Replacement Tool	61-NT2008-02	AO32-2-100-003-34-13-TY-002
	OMM 6" Seal Surface Cleaning Tool	61-NT2008-03	AO32-2-100-003-34-13-TY-003
	OMM Stroke Tool	61-NT2008-04	AO32-2-100-003-34-13-TY-004
	OMM Caps	61-NT2008-05	AO32-2-100-003-34-13-TY-005
	OMM Hubs and Terminations	61-NT2008-06	AO32-2-100-003-34-13-TY-006
	OMM 12" Seal Replacement Tool	61-NT2008-07	AO32-2-100-003-34-13-TY-007
	OMM 12" Surface Cleaning Tool	61-NT2008-08	AO32-2-100-003-34-13-TY-008
	OMM 12" SU Offshore Monitoring Cap	61-NT20006-09	AO32-2-100-003-34-13-TY-009
WP14.00.00	**Intervention**		
	OMM Intergrated Running Tool	61-NT2055-03	AO32-2-100-003-34-14-TY-001
	OMM 2.7 KNm Torque Tool Class 4	22-NT2074-00	AO32-2-100-003-34-14-TY-002
	OMM Linear Actuator Override	61-NT2061-00	AO32-2-100-003-34-14-TY-003
	OMM Sub Sea Stab System	61-NT2069-00	AO32-2-100-003-34-14-TY-004
	OMM Fluid Transfer Unit	61-NT2063-00	AO32-2-100-003-34-14-TY-005
	OMM 18 3/4" Gasket Change Out Tool	22-NT2075-00	AO32-2-100-003-34-14-TY-008
	OMM FCM Hub Cleaning Tool	61-NT2055-04	AO32-2-100-003-34-14-TY-009
	OMM Dirty Work Package	22-NT2073-00	AO32-2-100-003-34-14-TY-010
	OMM Lock Open Tool	61-NT2060-00	AO32-2-100-003-34-14-TY-011
	OMM Fluid Sampling	61-NT2054-00	AO32-2-100-003-34-14-TY-013
	OMM Multi Purpose Tooling Basket	61-NT2053-00	AO32-2-100-003-34-14-TY-014
	OMM 17 KNm Torque Tool and Analyzer	61-NT2058-00	AO32-2-100-003-34-14-TY-015
	OMM Jumper Deployment Tool	61-NT2055-05	AO32-2-100-003-34-14-TY-016
	OMM Jumper Deployment Skid	61-NT2055-06	AO32-2-100-003-34-14-TY-017
	OMM Hub Inspection Camera	61-NT2062-00	AO32-2-100-003-34-14-TY-018

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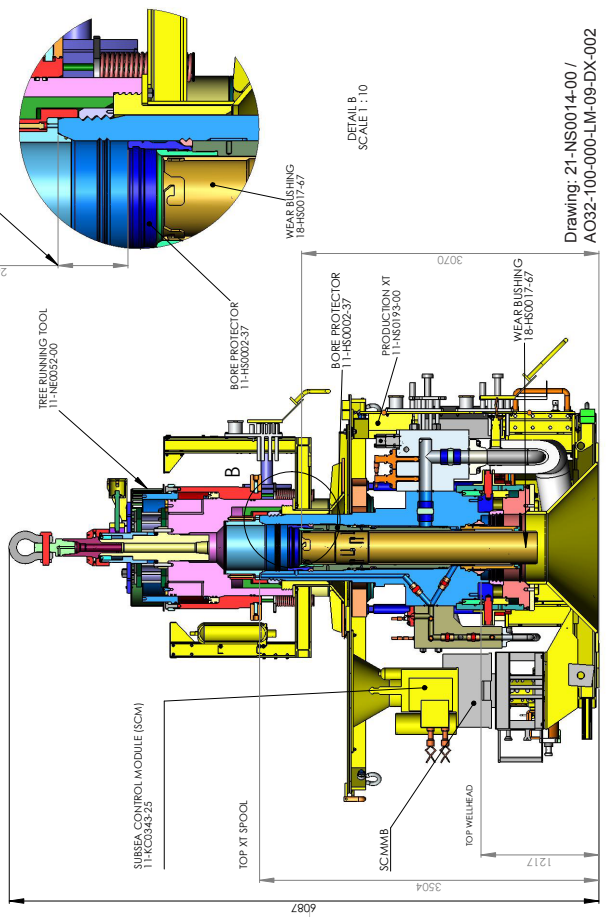
2.1 Production XT w/ TRT, Bore Protector and Wear Bushing

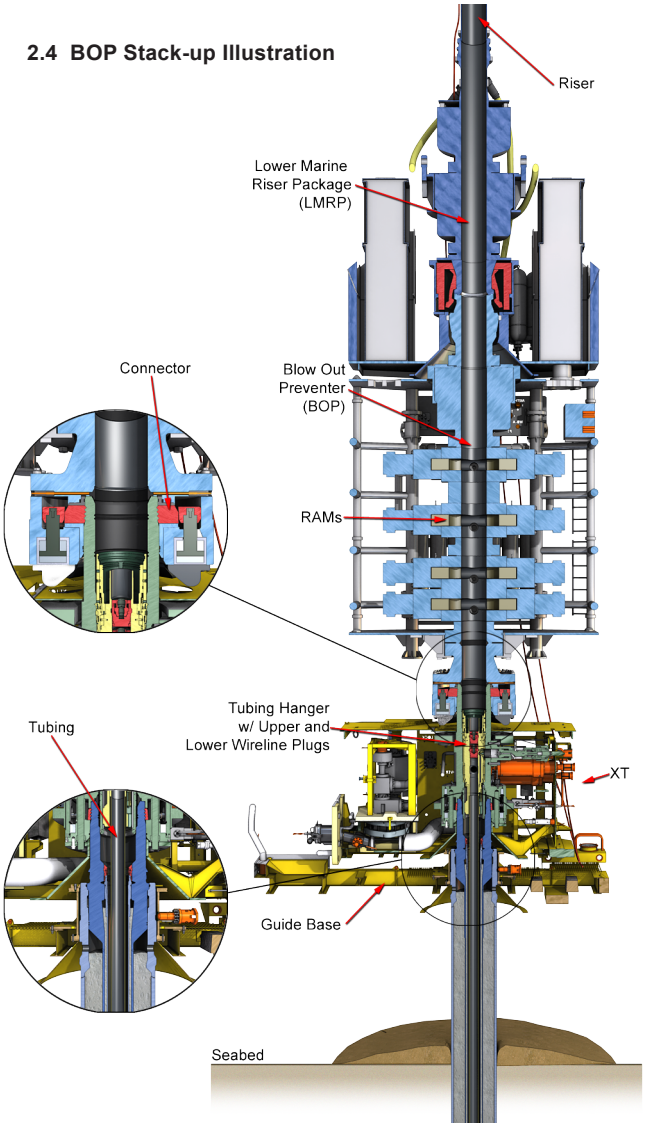


2.2 Production XT w/ Tubing Hanger and Debris Cap

Drawing: 21-NS0015-00 / AO32-100-000-LM-09-DX-003

2.3 Production XT on Well w/ Bore Protector

2.4 BOP Stack-up Illustration



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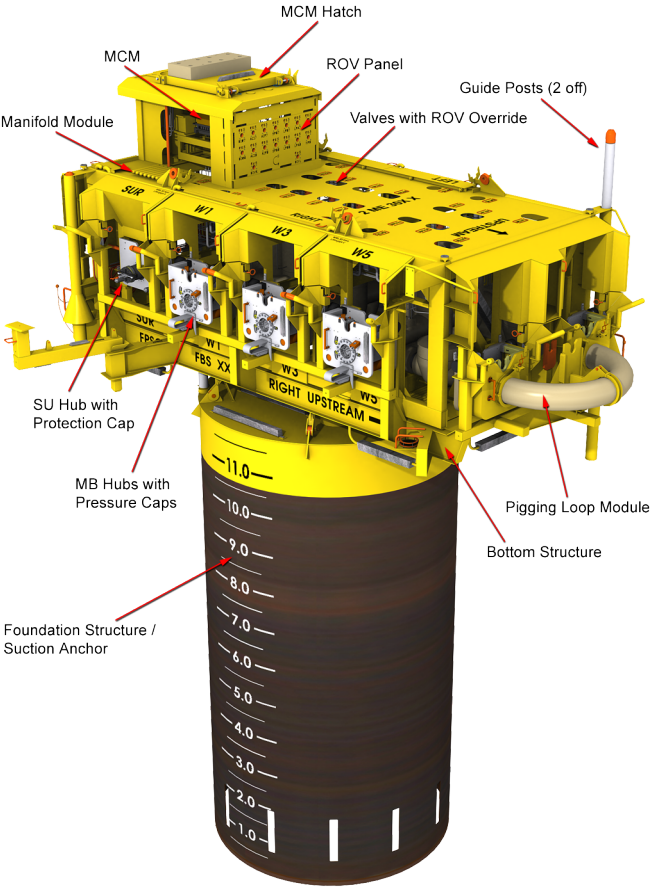
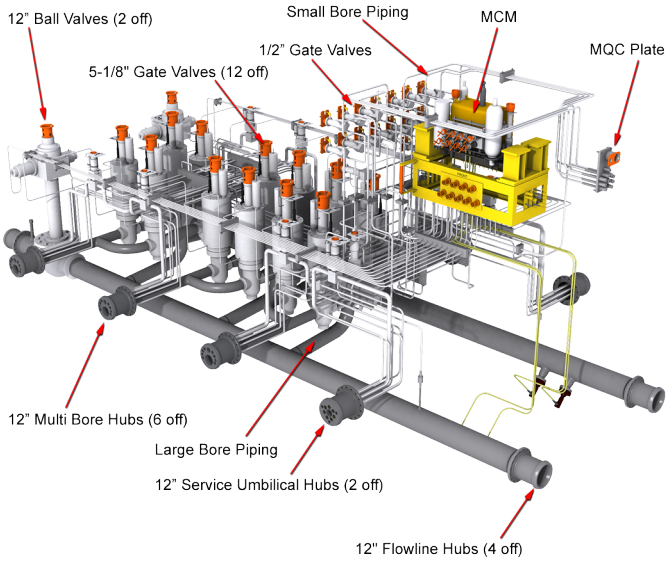
3.1 Subsea Structure Main Assembly / Manifold Main Assembly

GA drawing: 11-NS0202-00 / AO32-2-100-300-ME-06-DM-007



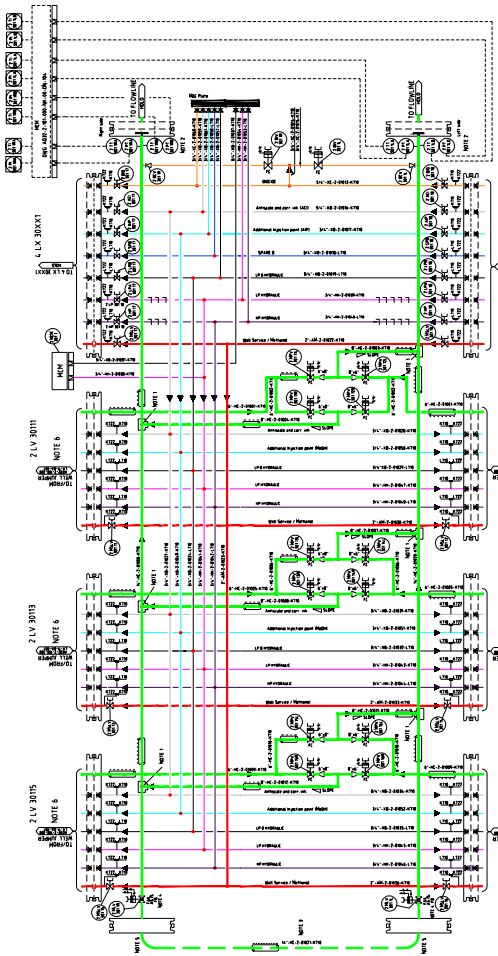
3.2 Process and Hydraulic Schematics

Piping and Valves Overview illustration:



3.2.1 Manifold P&ID

Drawing: 12-NS1400-15 / AO32-2-100-300-ME-06-DA-002



3.3 Valve list

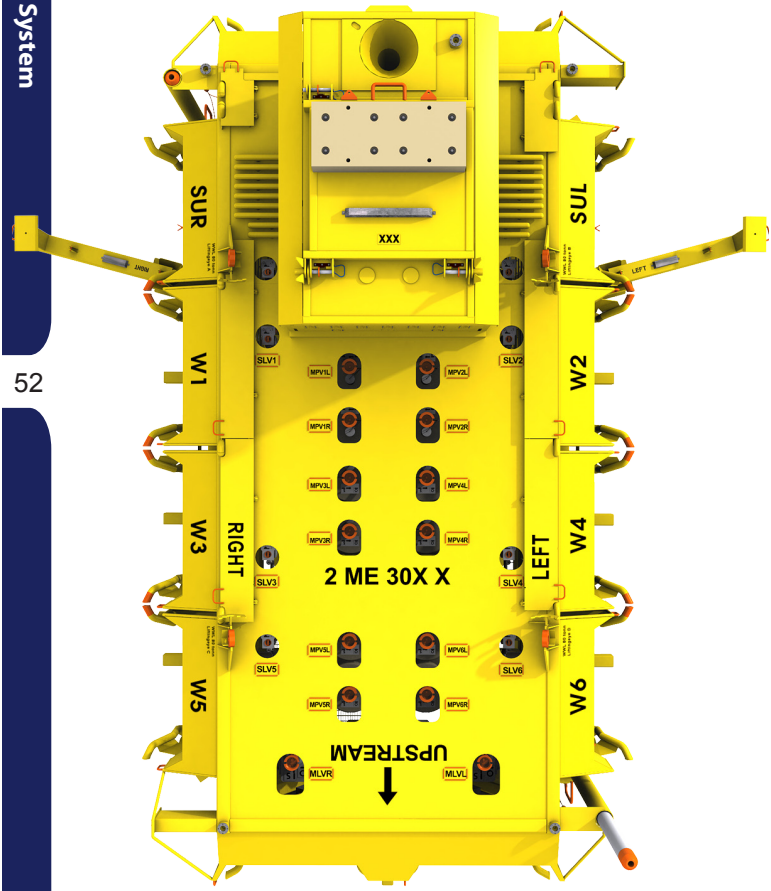
This table contains the number of valves required for one manifold:

Number of Valves for One Manifold	2	12	8	2	2	26	18
Valve Type	Ball , ID=285mm	5 1/8" Gate	1 ¼" Gate	½" Check	½" Gate (note 1)	½" Gate (note 1)	½" Gate (note 1)
Pressure rating	5 000 psi	5 000 psi	5 000 psi	5 000 psi	5 000 psi	5 000 psi	10 000 psi
Medium	Production Hydrocarbons	Production Hydrocarbons	Service Methanol	Biocide	Biocide	Biocide, Antisc. & Corr. inh., Additional Methanol inj., Hydraulic LP	Hydraulic and spare lines
Hydraulic Actuated	Yes	Yes	No	N/A	Yes	No	No
Fail Mode	Fail as is	Fail Close	N/A	N/A	Fail Close	N/A	N/A
ROV override	Yes	Yes	Yes	N/A	Yes	Yes	Yes
Material	22 Cr. Duplex	22 Cr. Duplex	22 Cr. Duplex	22 Cr. Duplex	22 Cr. Duplex	22 Cr. Duplex	22 Cr. Duplex

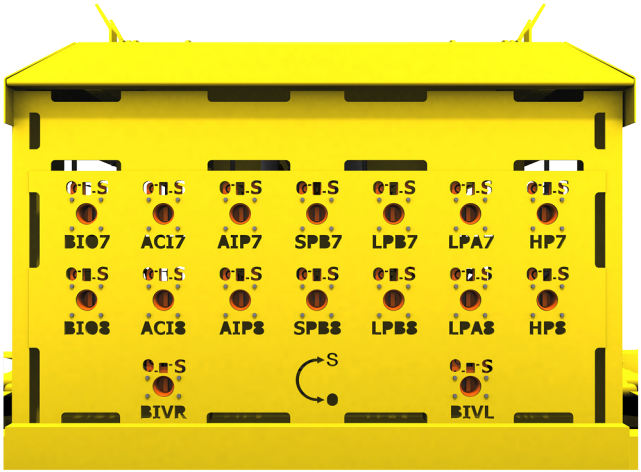
Note 1): Minimum ID requirements, ID ≥ 12,7mm

3.4 ROV Markings

3.4.1 Manifold roof



3.4.2 ROV panel



Subsea Marking	Medium	Valve Type	Article No. (Part)
ACI	Antiscale & Corrosion Inhibitor	1/2" Gate Valves	15-MX0472-00
AIP	Additional Inj. (methanol)	1/2" Gate Valves	15-MX0472-00
BIO	Biocide	1/2" Gate Valves	15-MX0472-00
BIV	Biocide	1/2" Gate Valves	15-MX0471-00
HP	Hydraulic HP	1/2" Gate Valves	15-MX-0472-00
LPA	Hydraulic LP	1/2" Gate Valves	15-MX0472-00
LPB	Hydraulic Spare Lines HP	1/2" Gate Valves	15-MX0472-00
MLV	Production Line	12" Ball Valves	15-MX0453-00
MPV	Production Line	5 1/8" Gate Valves	15-MX0455-00
O	Open	-	-
S	Shut	-	-
SLV	Methanol	1 1/4" Gate Valves	15-MX0469-00
SPB	Spare Line	1/2" Gate Valves	15-MX0472-00
SUL	Service Umbilical Left	-	-
SUR	Service Umbilical Right	-	-
W1-6	Well 1 to 6	-	-
-	Biocide	1/2" Check Valves	14-MX0470-00

Complete Valve List: 24-NS1410-02 / AO32-2-100-300-LD-06-LL-009

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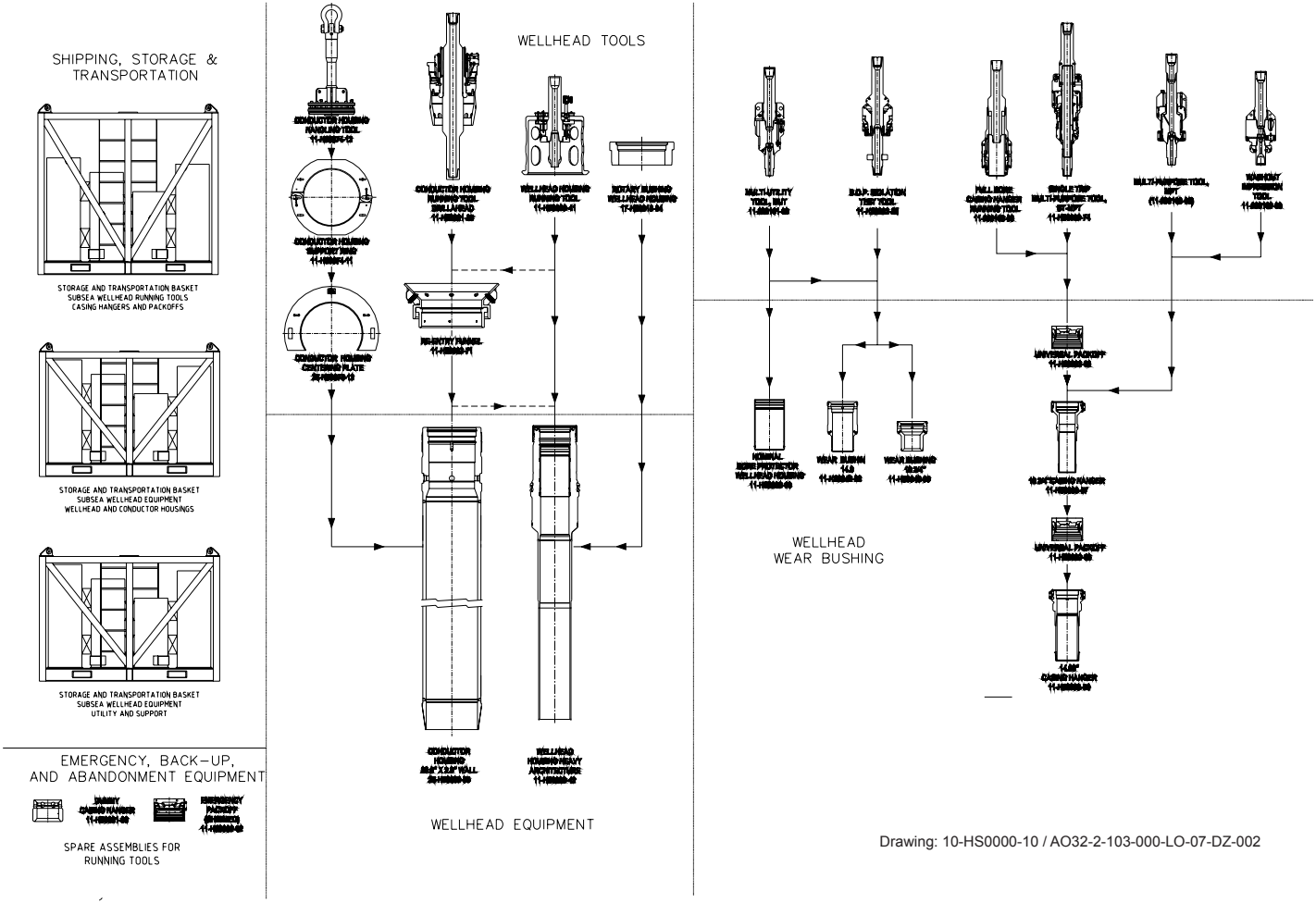
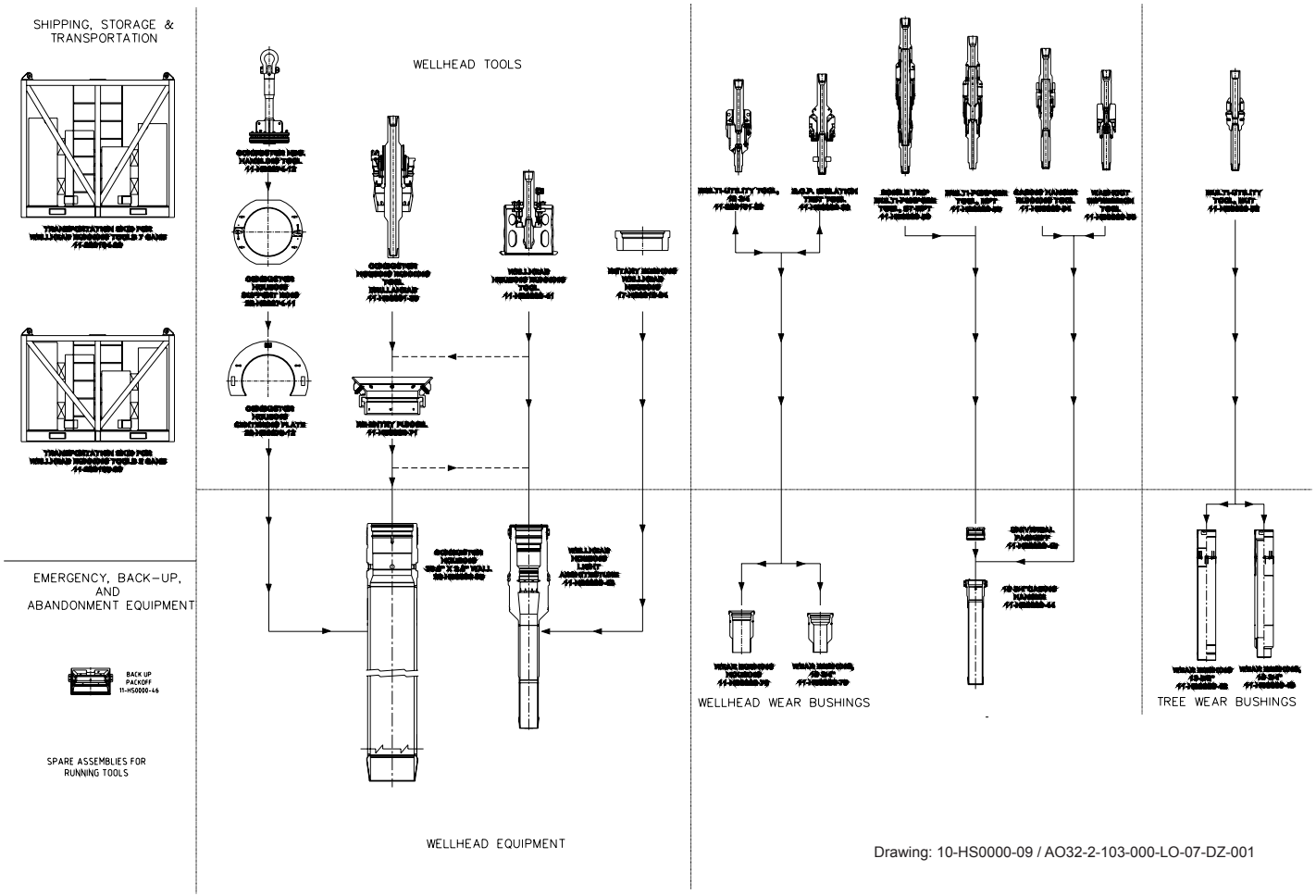
4.1 Wellhead Scope of supply

4.1.1 Heavy Architecture Scope of Supply



Drawing: 10-HS0000-10 / AO32-2-103-000-LO-07-DZ-002

4.1.2 Light Architecture Scope of Supply

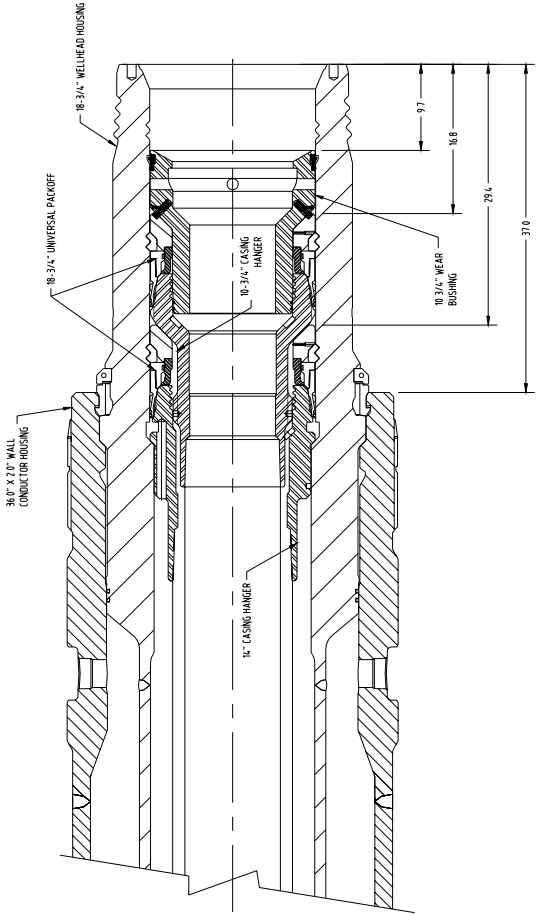


Drawing: 10-HS0000-09 / AO32-2-103-000-LO-07-DZ-001

4.2 Wellhead Stack-up

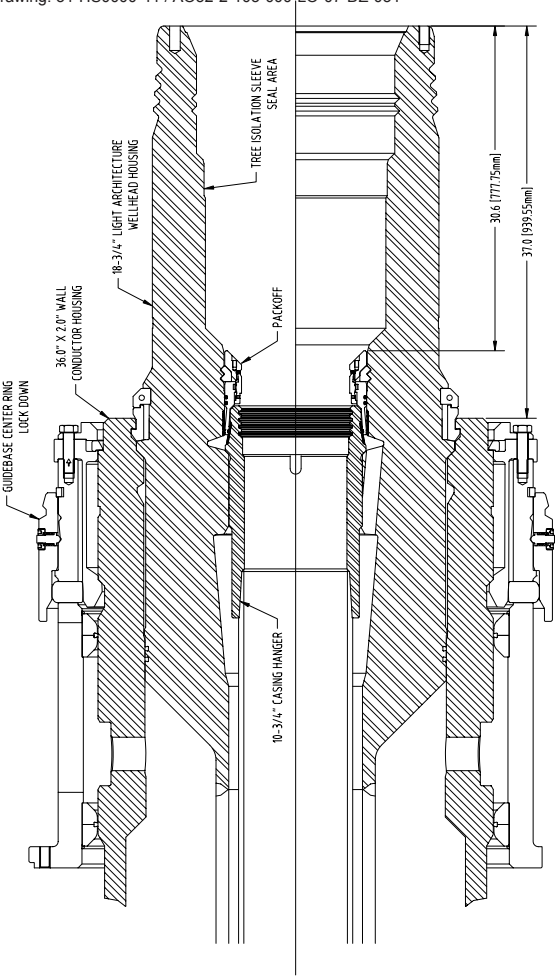
4.2.1 Wellhead Stack-up Heavy Architecture

Drawing: 31-HS0000-40 / AO32-2-103-000-LO-07-DZ-030



4.2.2 Wellhead Stack-up Light Architecture

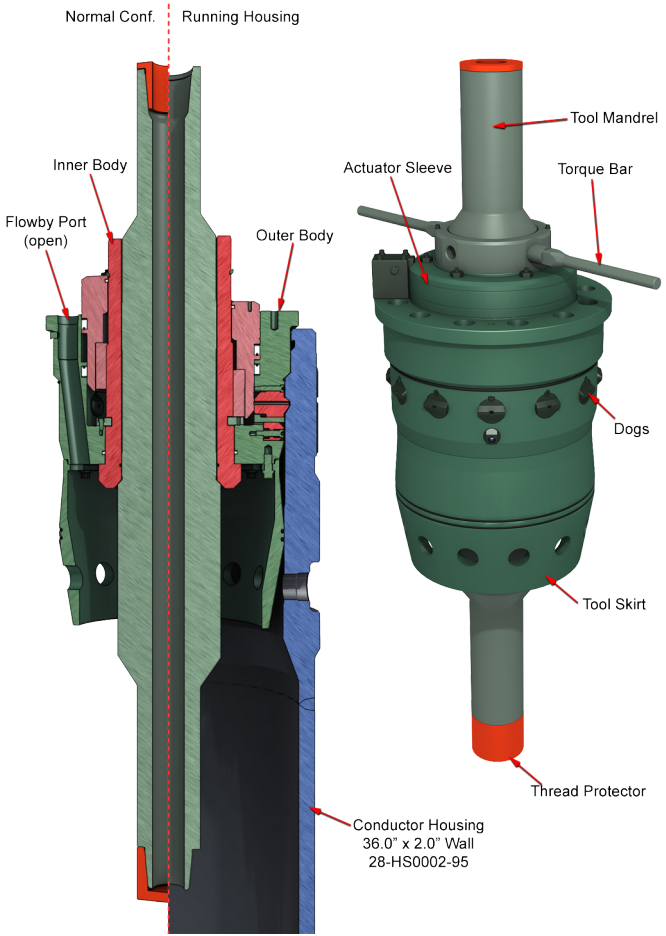
Drawing: 31-HS0000-41 / AO32-2-103-000-LO-07-DZ-031



4.3 Wellhead Tools

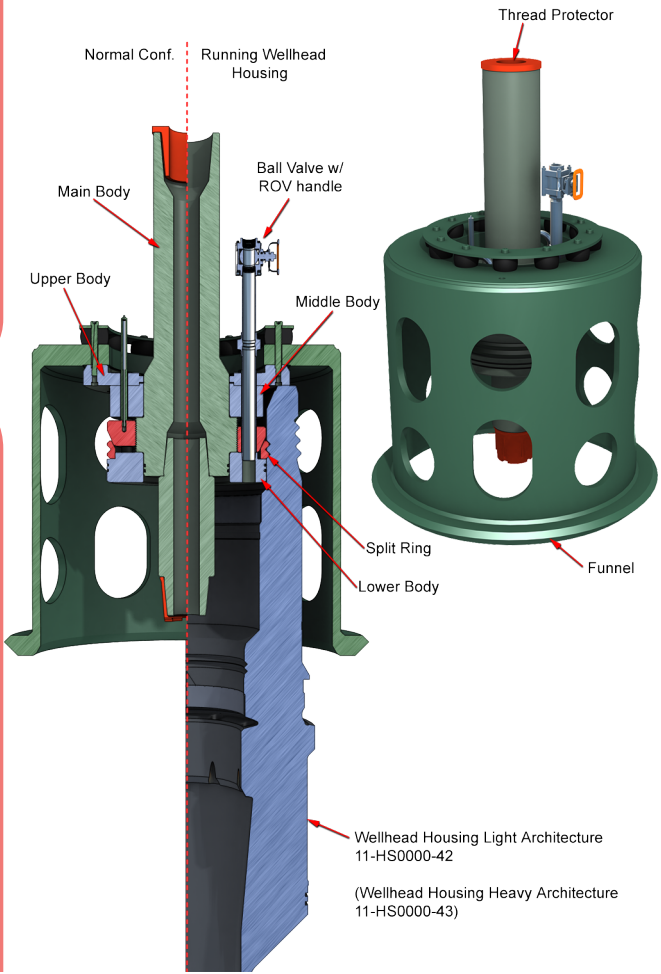
4.3.1 Conductor Housing Running Tool Drillahead

Drawing: 11-HS0001-35



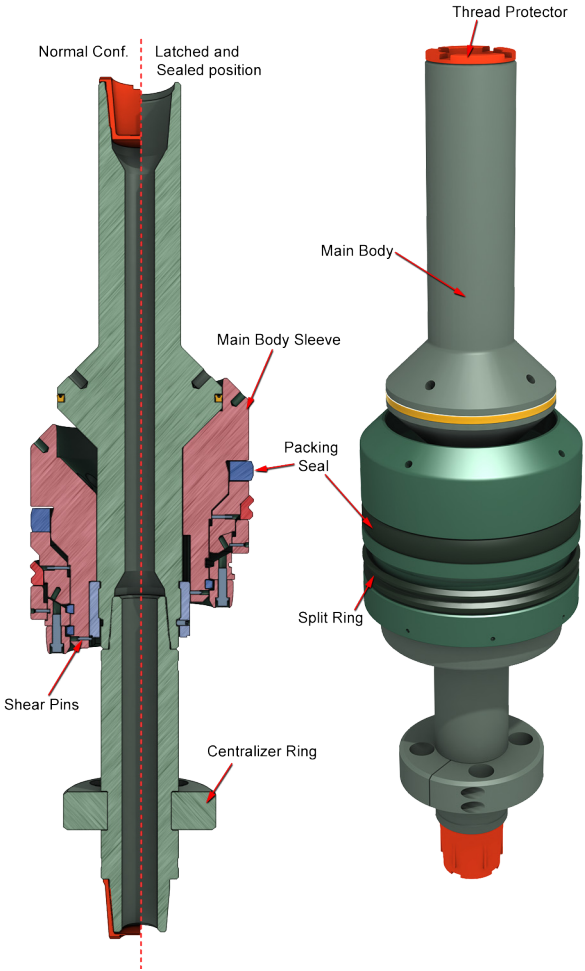
4.3.2 Wellhead Housing Running Tool, 18 3/4”

Drawing: 11-HS0000-41



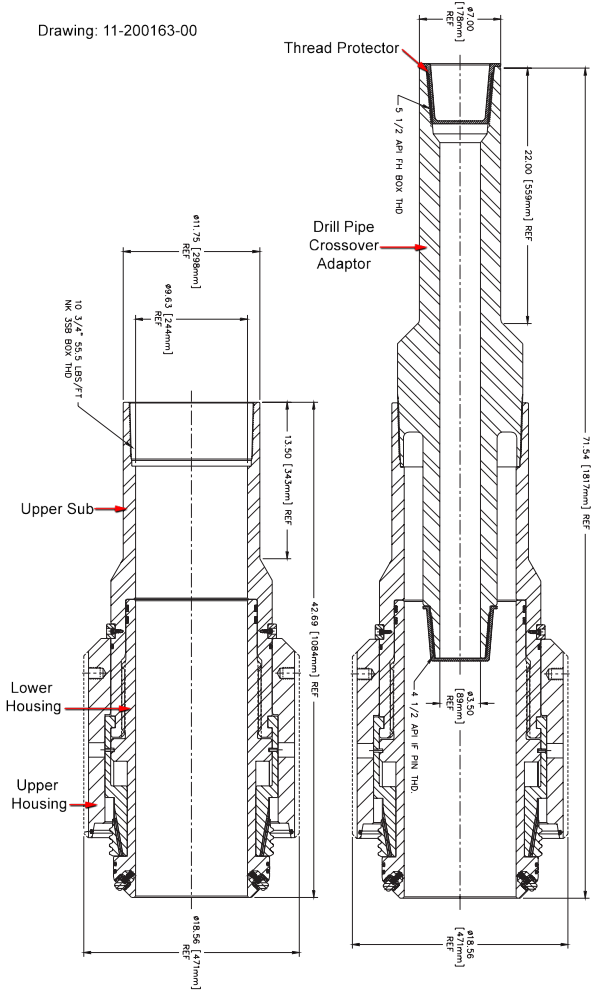
4.3.3 BOP Isolation Test Tool, 18 3/4”

Drawing: 11-HS0002-38



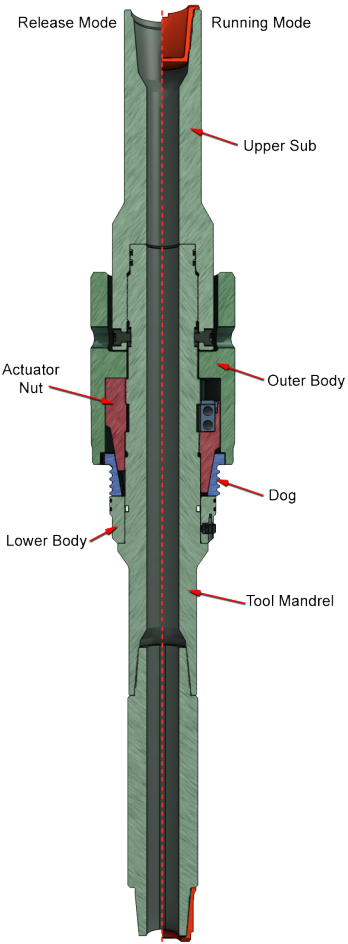
4.3.4 Full Bore Casing Hanger Running Tool, 18 3/4”

Drawing: 11-200163-00



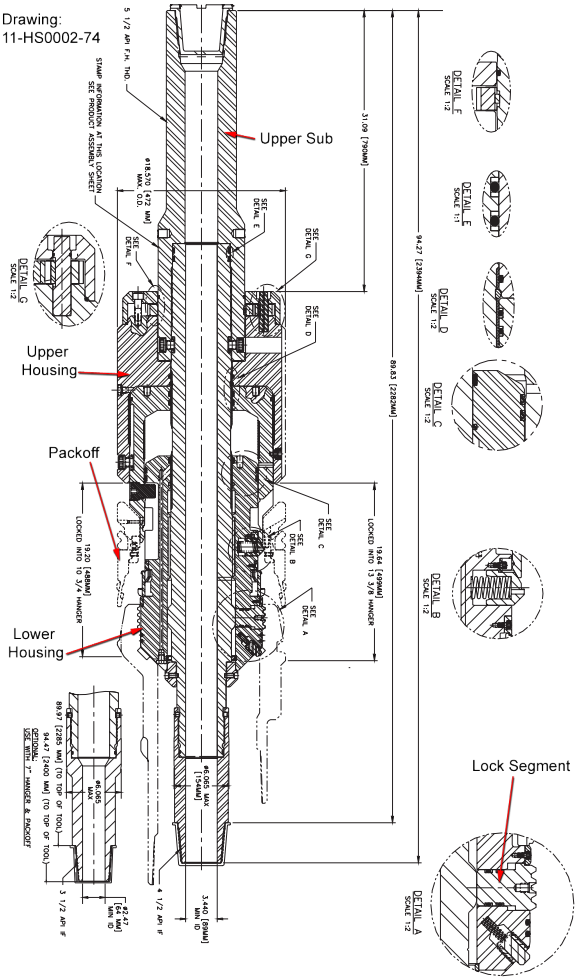
4.3.5 Casing Hanger Running Tool, 13 5/8”

Drawing: 11-HS0000-54



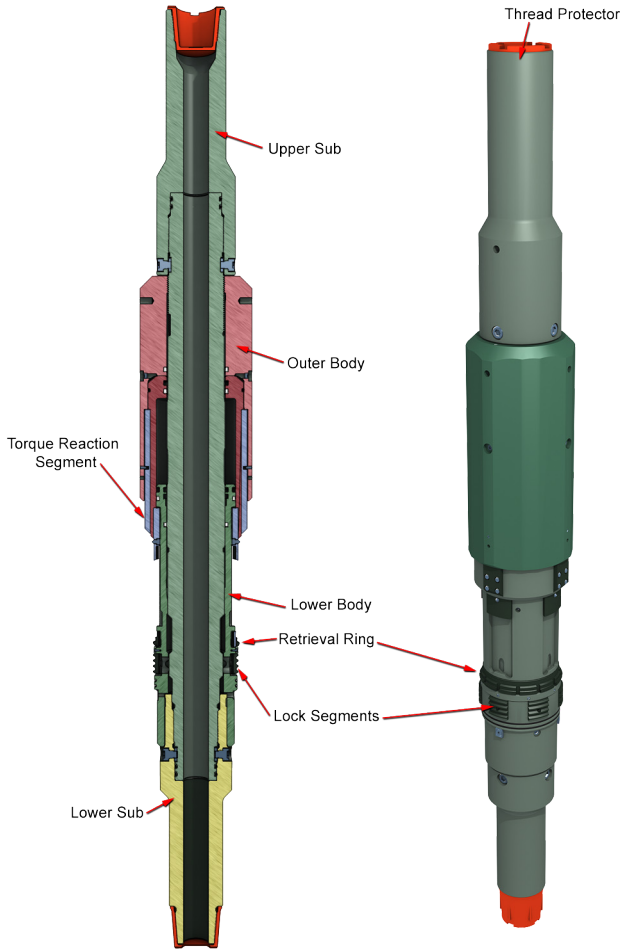
4.3.6 Single Trip Multi Purpose Tool, 18 3/4”

Drawing:
11-HS0002-74



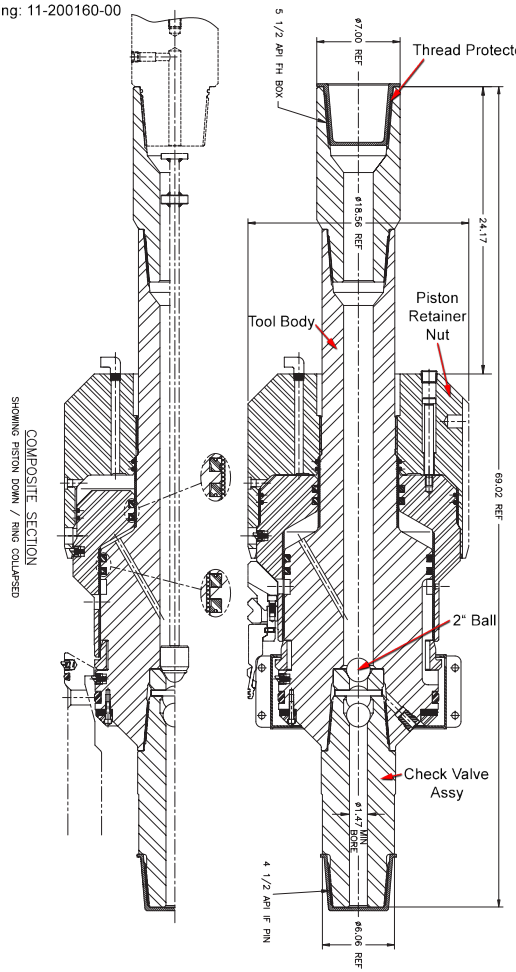
4.3.7 Single Trip Multi Purpose Tool, 13 5/8”

Drawing: 11-HS0000-50



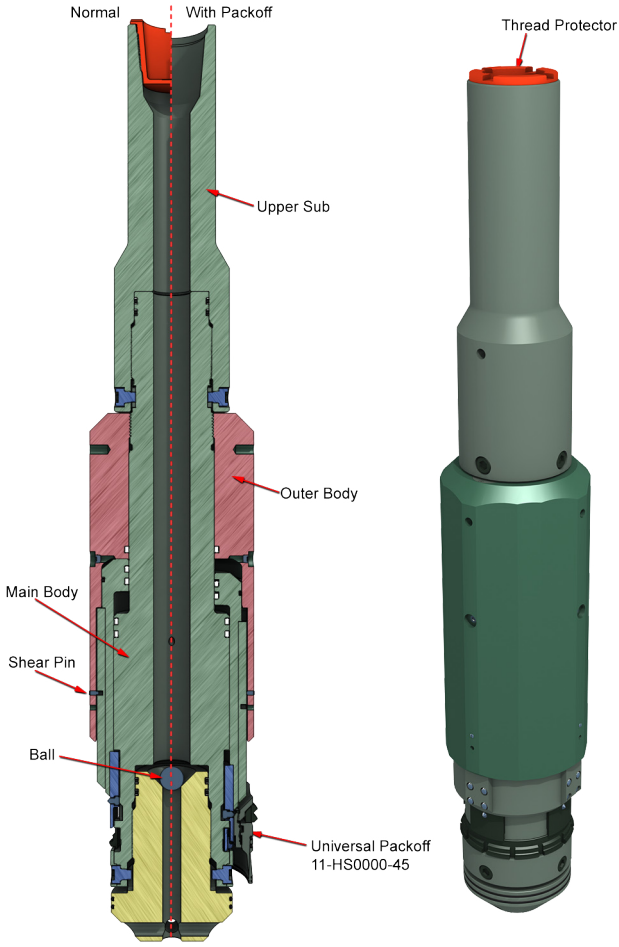
4.3.8 Multi Purpose Tool, 18 3/4”

Drawing: 11-200160-00



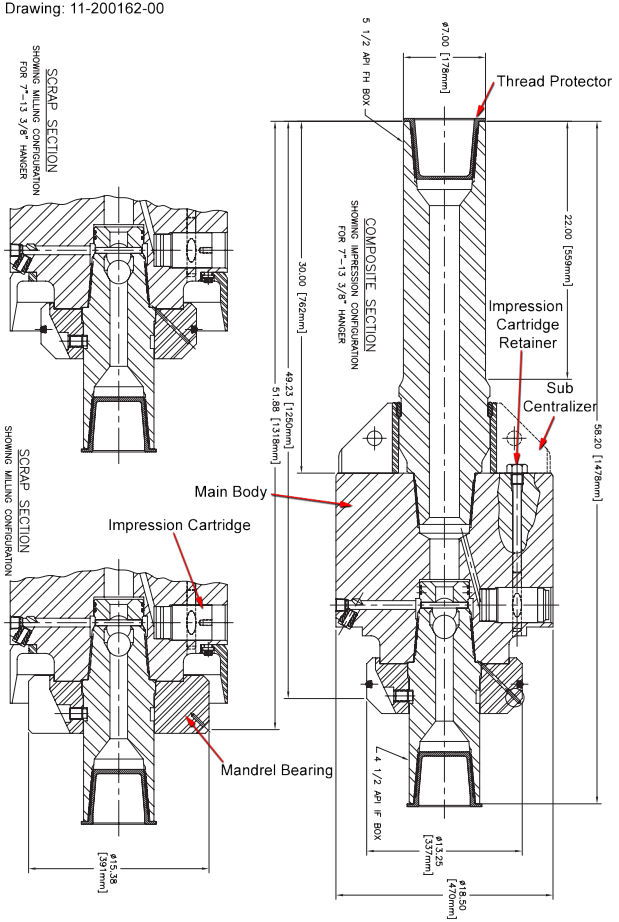
4.3.9 Multi Purpose Tool, 13 5/8”

Drawing: 11-HS0000-55



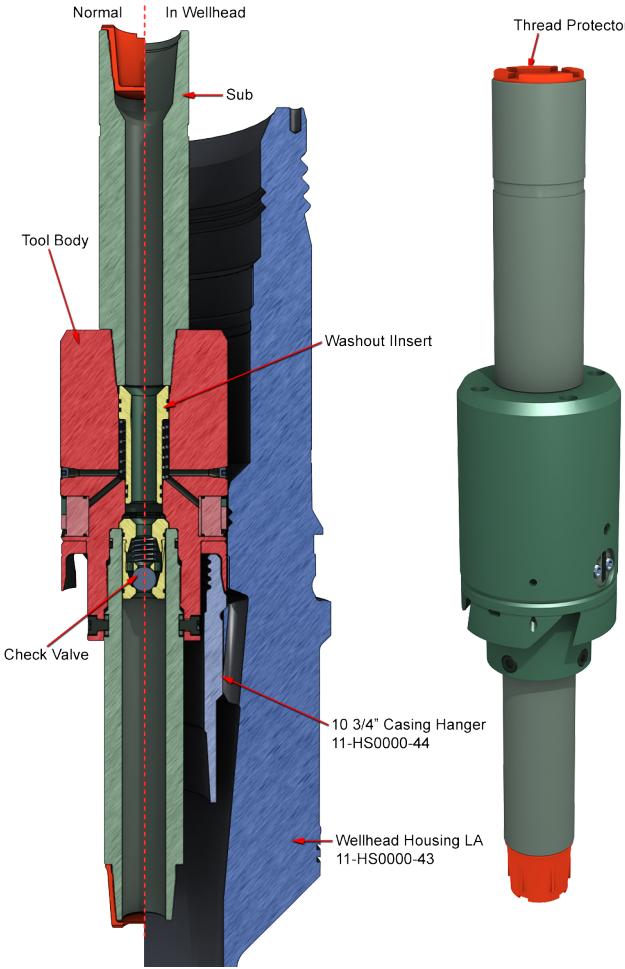
4.3.10 Impression and Washout Tool, 18 3/4”

Drawing: 11-200162-00



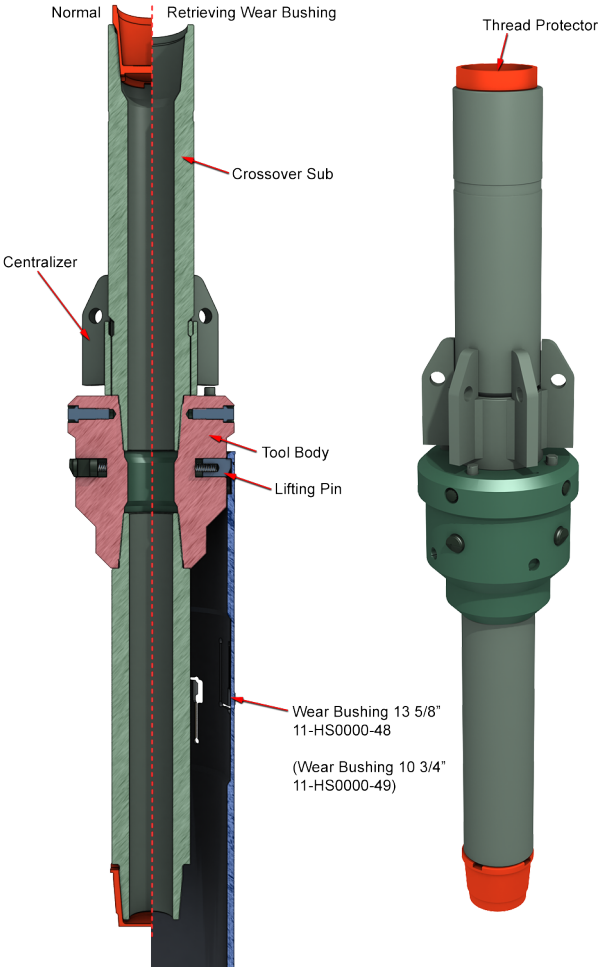
4.3.11 Impression and Washout Tool, 13 5/8”

Drawing: 11-HS0000-53



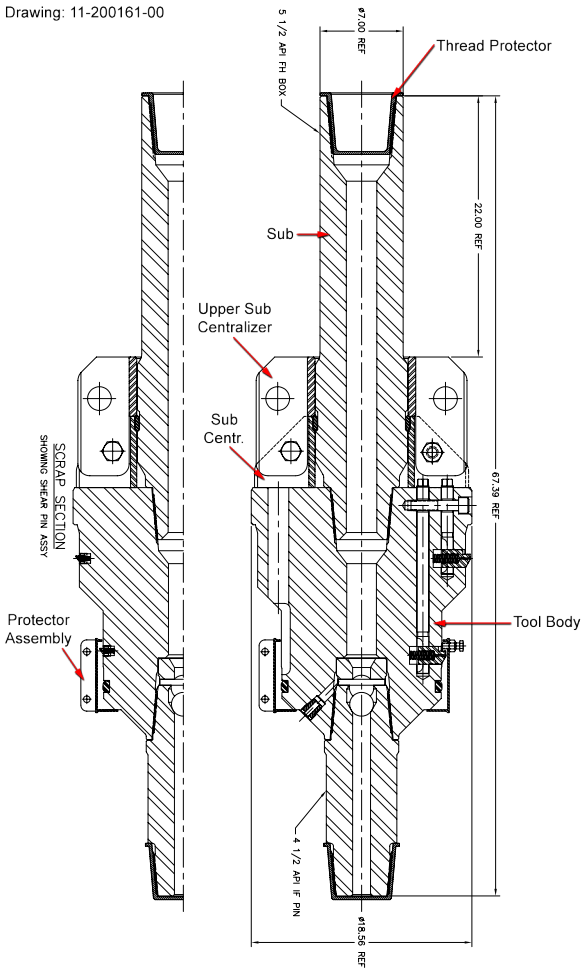
4.3.12 Multi Utility Tool, 13 5/8”

Drawing: 11-HS0000-52



4.3.13 Multi Utility Tool, 18 3/4”

Drawing: 11-200161-00



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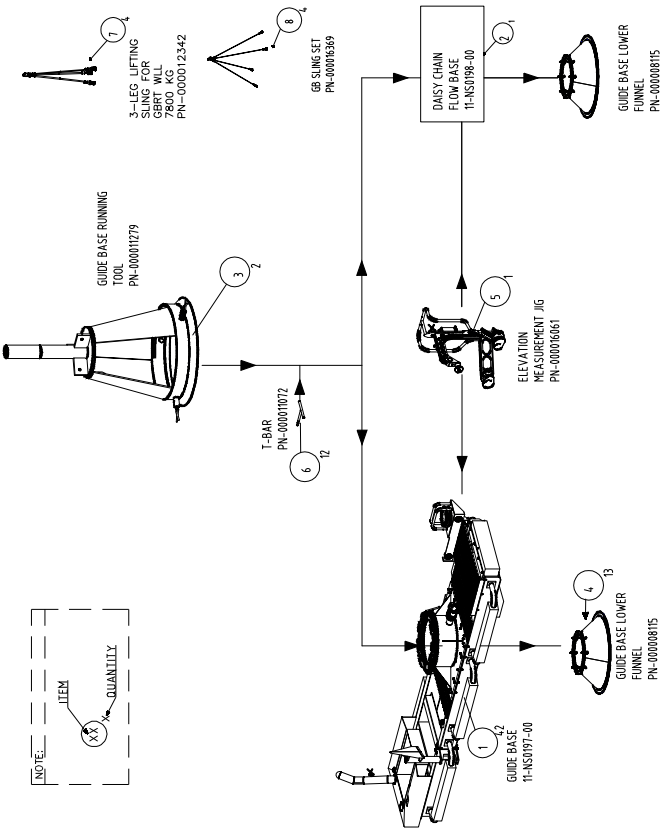
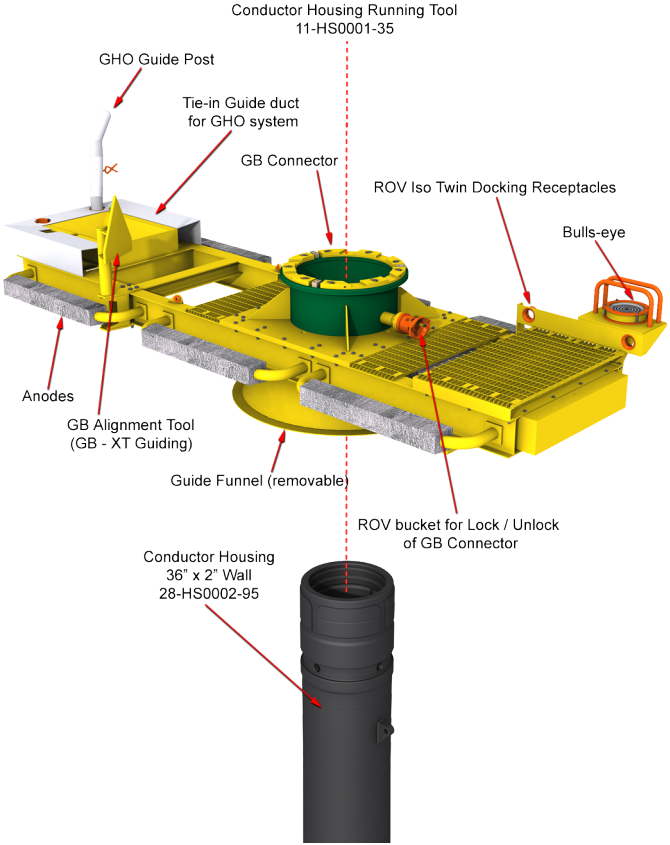
5.1 Guide Base Scope of Supply

Drawing: 10-NS0046-00 / AO32-2-100-000-LM-08-DX-001



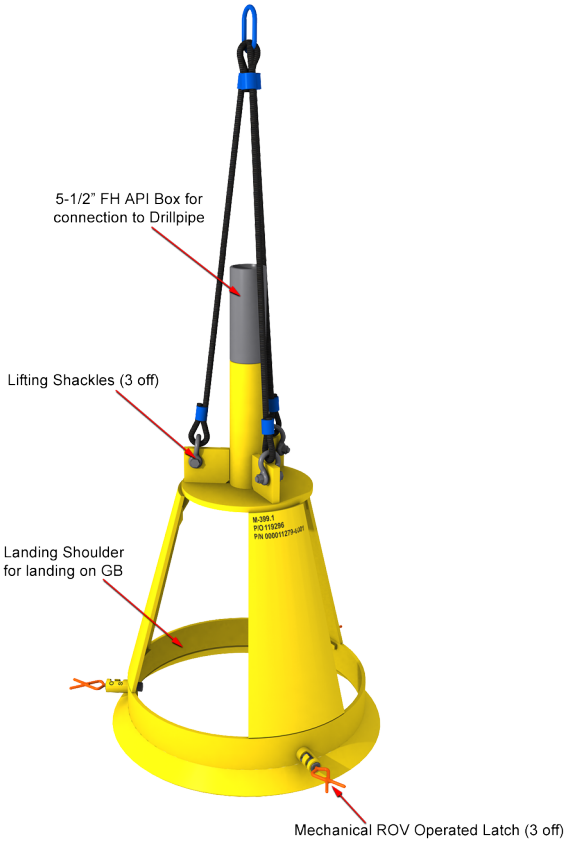
5.2 Guide Base Assembly

GA drawing: 11-NS0197-00 / AO32-2-100-000-ME-09-DZ-002
Data Sheet: 61-NS0084-00 / AO32-2-100-000-ME-08-EZ-001



5.3 Guide Base Running Tool

GA drawing: 31-NE0031-00 / AO32-2-100-000-LK-08-DX-001
Data Sheet: 61-NE0084-00 / AO32-2-100-013-LK-08-EZ-001



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Symbols and Abbreviations for the X-Mas Tree Schematics section 6.1.2, 6.1.3 and 6.1.3

Valves:		Size & Type:
AAV (NC)	ANNULUS ACCESS VALVE	2 1/16" GATE
AWV (NO)	ANNULUS WEST VALVE	2 1/16" GATE
AWV (NC)	ANNULUS WEST VALVE	3/8"
AWV (NC)	ANNLUS WING VALVE	2 1/16" GATE
BMVG (NO)	BLEED MONITORING VALVE GALLERY	3/8"
CITV	CHEMICAL INJECTION THROTTLE VALVE	3/8"
CIV-A (NC)	CHEMICAL INJECTION VALVE	3/8" GATE
CIV-B (NO)	CHEMICAL INJECTION VALVE	3/8" GATE
GIV (NC)	GALLERY ISOLATION VALVE	3/8"
DIV (1-2)	DOWNHOLE ISOLATION VALVE	3/8"
IMIV (NO)	ISOLATION METHANOL INJECTION VALVE	1"
MFV (NC)	METHANOL FLUSHING VALVE	2 1/16"
MIV (NC)	METHANOL INJECTION VALVE	1"
PCV	PRODUCTION CHOKE VALVE	5"
PMV (NO)	PRODUCTION MASTER VALVE	5 1/8" GATE
PTV (NO)	PLUG TEST VALVE	3/8"
PWV (NO)	PRODUCTION WING VALVE	5 1/8" GATE
SCSSV	SURF. CONTR. SUB. SAFETY VALVE	-
SLV (NO)	SERVICE LINE VALVE	2 1/16" GATE
SVV (NO)	SAFETY VALVE ISOLATION VALVE	3/8"
SWV (1-3)	SMART WELL VALVE	3/8"
TFS	TREE FLUID SAMPLING	
TOS	TREE ORIFICE STAB	
WST	WELLHEAD SEAL TEST VALVE	3/8" GATE

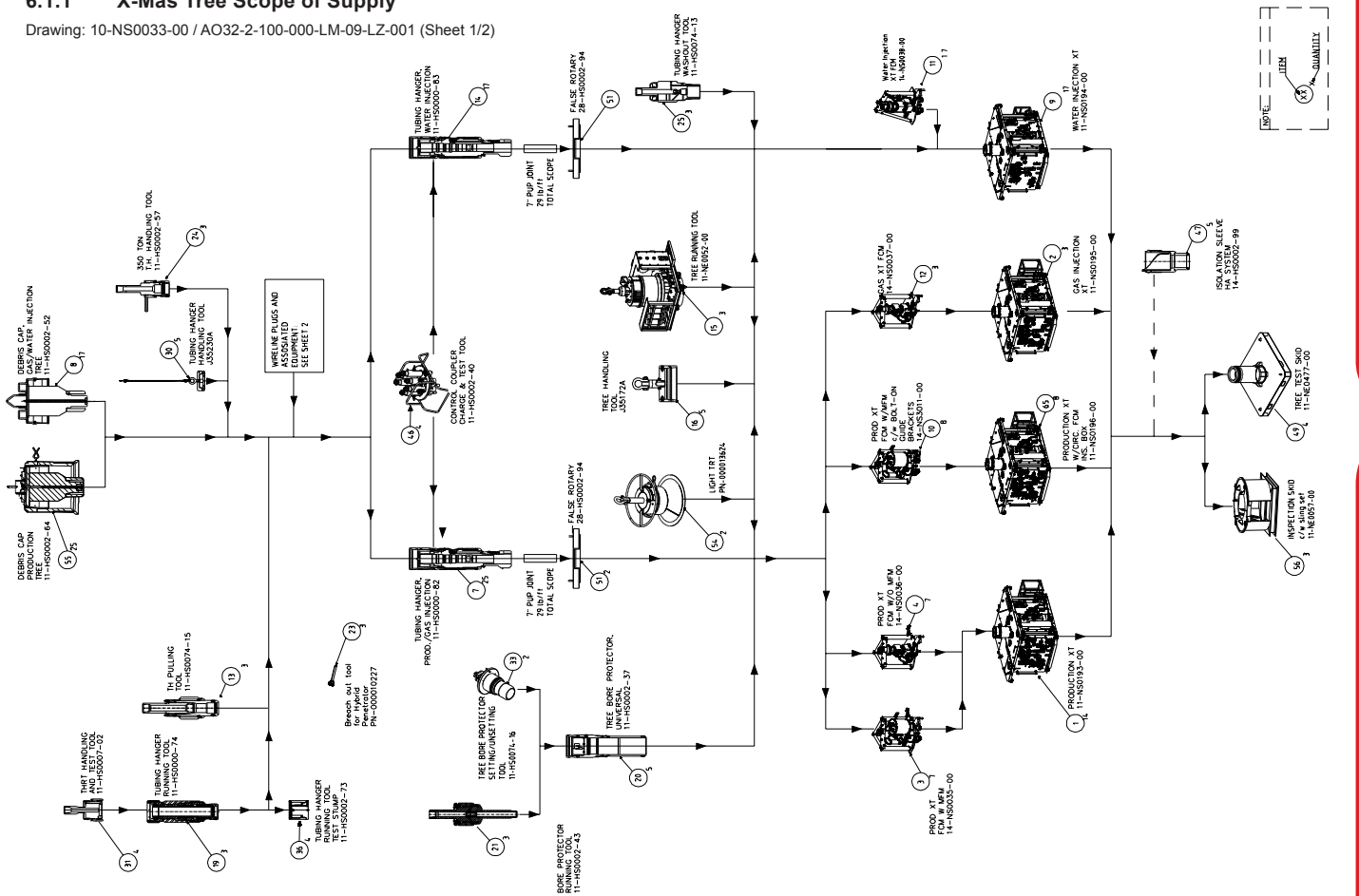
Abbreviations:	
ACI	ANTISCALE AND CORROSION INHIBITOR
AIP	ADDITIONAL INJECTION POINT
AV	ANNULUS VENT
COR	CHOKE OVERRIDE
DHPT	DOWNHOLE PRESSURE AND TEMPERATURE TRANSDUCER
DIU	DOWNHOLE INTERFACE UNIT
FCM	FLOW CONTROL MODULE
HP	HIGH PRESSURE SUPPLY
HPEN	HYBRID PENETRATOR
LP	LOW PRESSURE SUPPLY
LP-R	LOW PRESSURE RETURN
PCV-C	PRODUCTION CHOKE VALVE CLOSE
PCV-O	PRODUCTION CHOKE VALVE OPEN
SCM	SUBSEA CONTROL MODULE
SCMMB	SUBSEA CONTROL MODULE MOUNTING BASE
SCSSV	SURFACE CONTROLLED SUBSURFACE SAFETY VALVE
SW 1, 2, 3	SMART WELL 1, 2, 3
TCI	TREE CONNECTOR LOCK (SURFACE ONLY)
TCU	TREE CONNECTOR UNLOCK
TGR	TREE CONNECTOR GASKET RELEASE
THTL	TUBING HANGER TEST LINE
VXT	VX GASKET TEST LINE

Symbol:	Description/Function:
	ROVSTAB
PT	PRESSURE TRANSDUCER
TT	TEMPERATURE TRANSDUCER
ZT	POSITION TRANSDUCER
QT	QUALITY TRANSMITTER (SAND SENSOR)
	ROV OPERATED
	HYDRAULIC FAIL SAFE CLOSE WITH ROV OVERRIDE
	ORIFICE FLANGE ASSEMBLY
	GATE VALVE
	GATE VALVE WITH CHECK VALVE
	RIGHT ANGLE EXTERNAL SLEEVE CHECK VALVE
	SPRING LOADED CHECK VALVE
	HYDRAULIC COUPLING WITH CHECKVALVE
	OPEN CHECKVALVE
	VALVE
	FILTER
	ELECTRONIC CONNECTION STABPLATE MAKE UP
	CUTTING LOOP
	ELECTRONIC CONNECTION ROV MAKE UP
9/16"	9/16" OD x .395 ID TUBE
3/8"	3/8" OD x .203 ID TUBE
5/4"	3/4" OD x .516 ID TUBE
2 1/2"	73mm OD x 53,94 mm ID

6.1 X-Mas Tree Overview

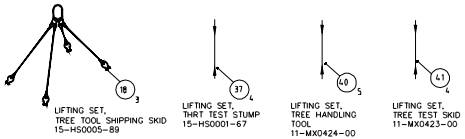
6.1.1 X-Mas Tree Scope of Supply

Drawing: 10-NS0033-00 / AO32-2-100-000-LM-09-LZ-001 (Sheet 1/2)

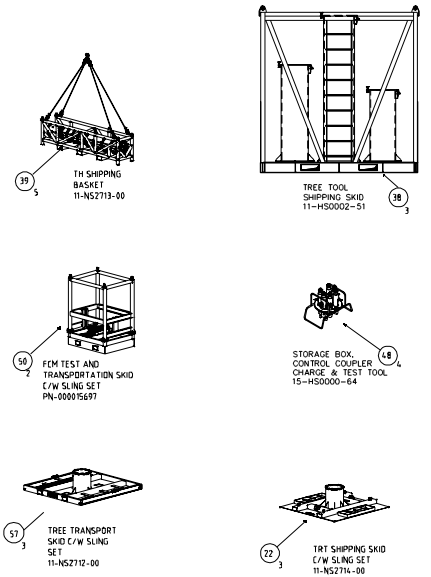


Scope of Supply drawing: 10-NS0033-00 / AO32-2-100-000-LM-09-LZ-001 (Sheet 2/2)

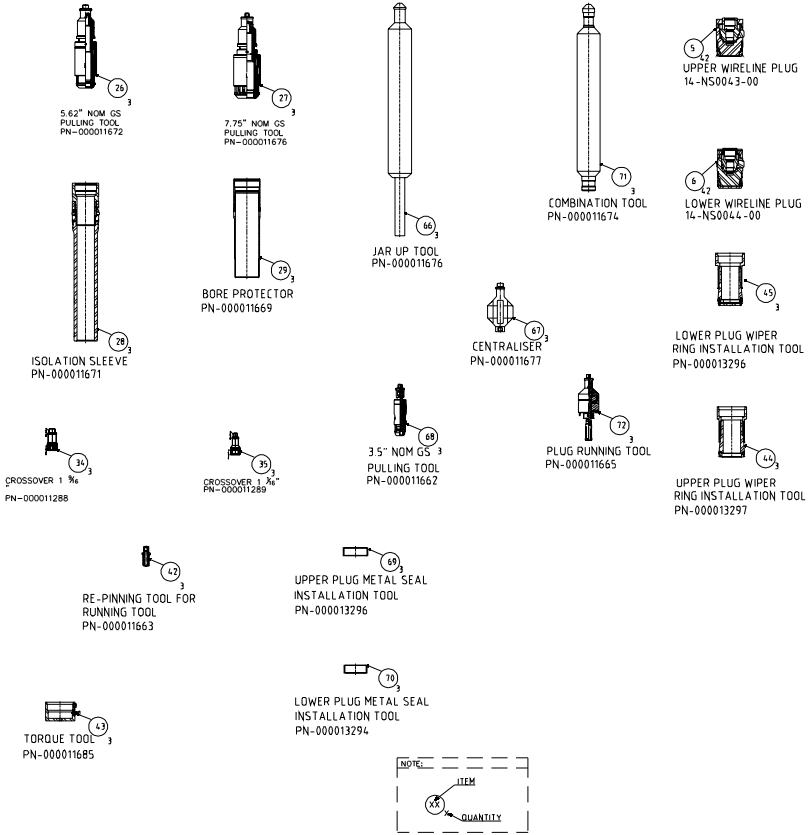
Lifting Sets



Transportation Skids

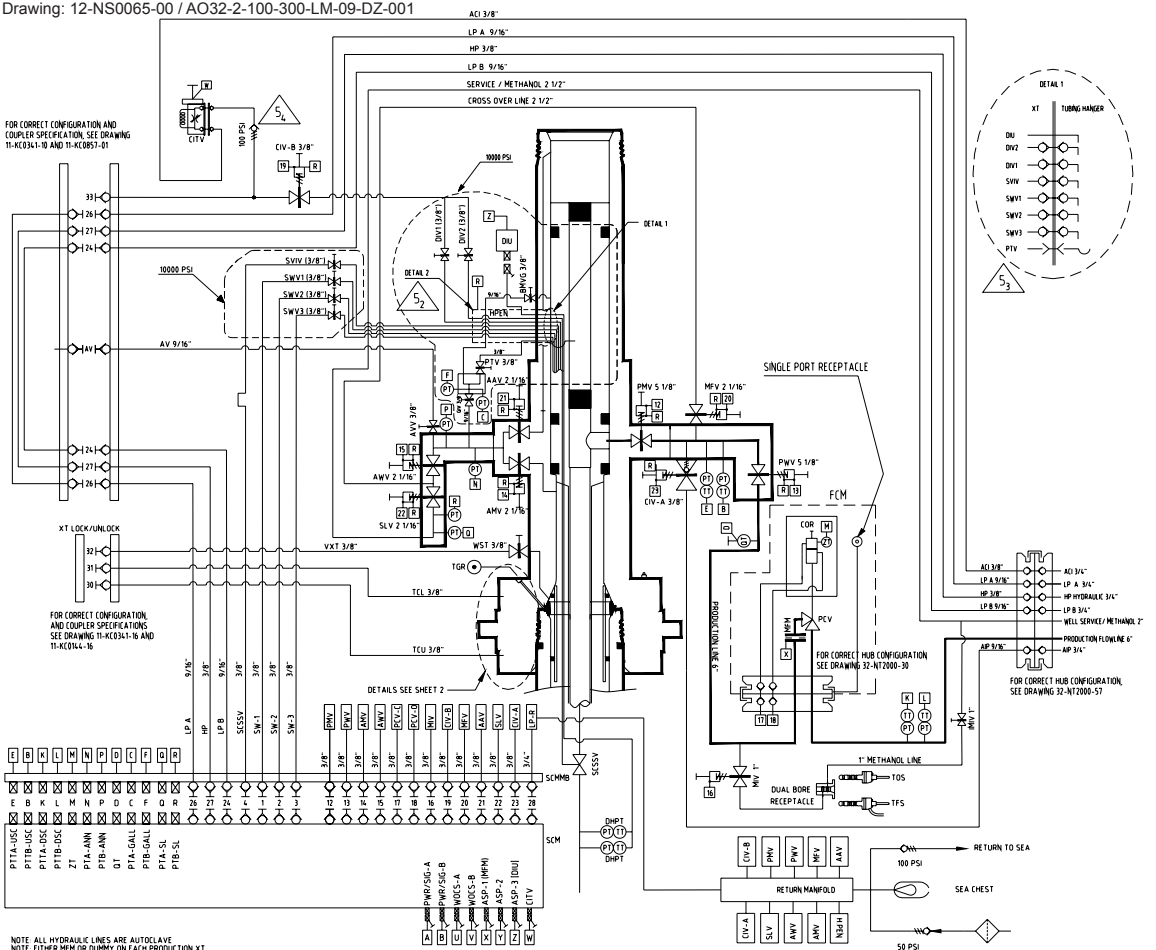


Wireline Plugs and Assosiated Equipment



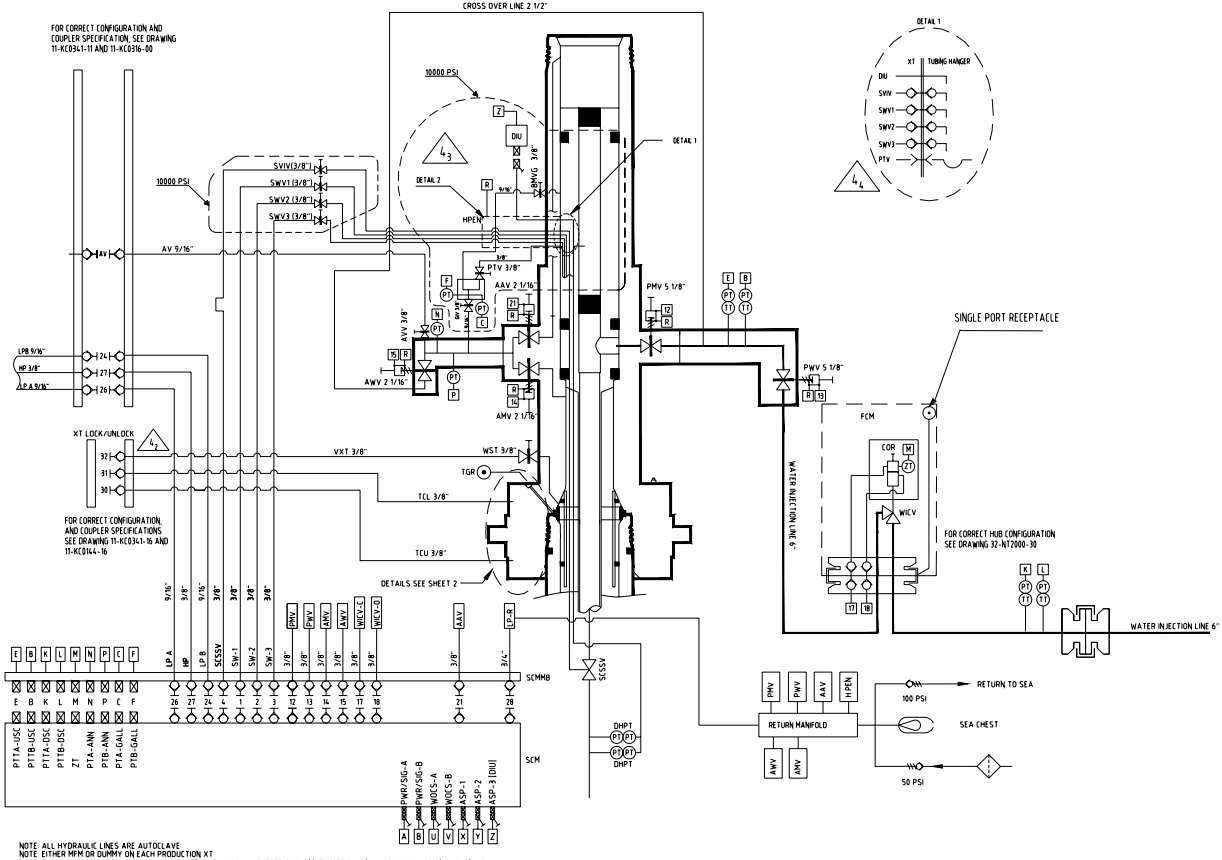
6.1.2 Production X-Mas Tree Schematics

Drawing: 12-NS0065-00 / AO32-2-100-300-LM-09-DZ-001



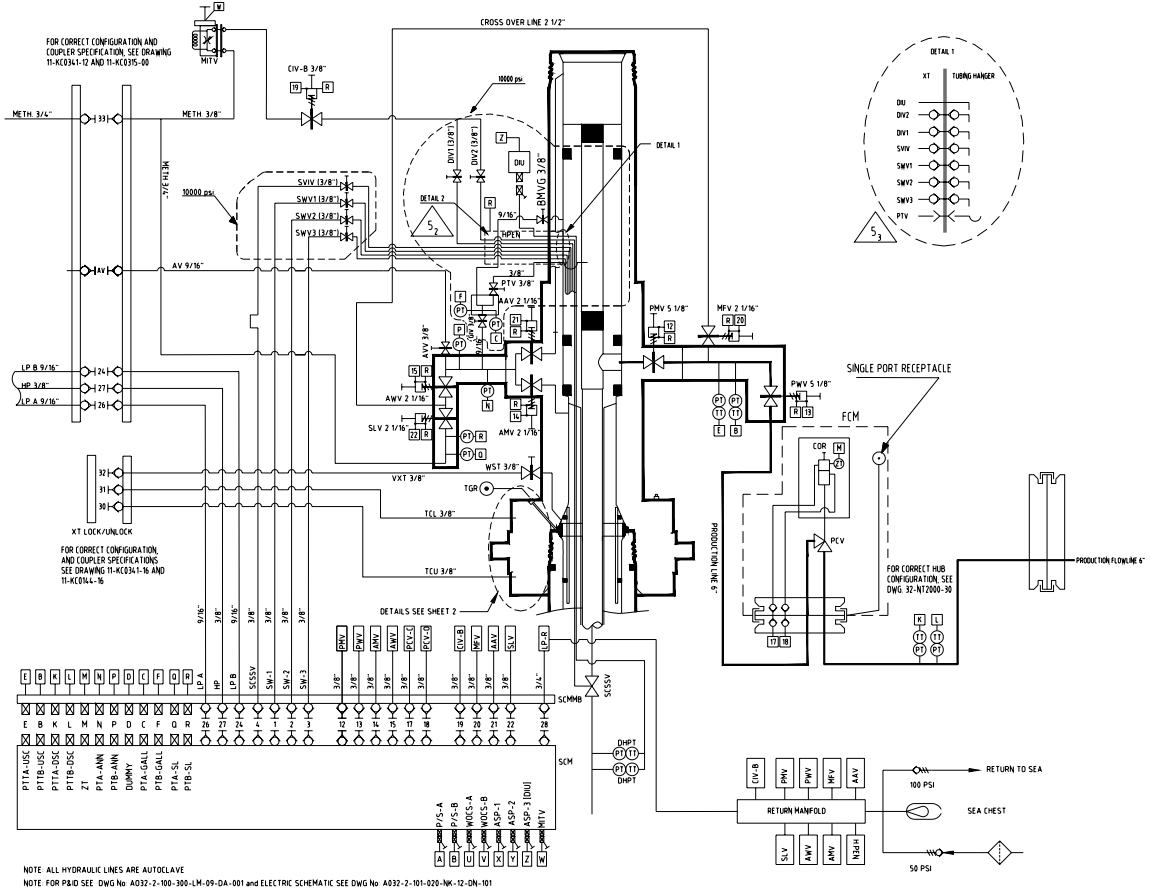
6.1.3 Water Injection X-Mas Tree Schematics

Drawing: 12-NS0066-00 / AO32-2-100-760-LM-09-DZ-002



6.1.4 Gas Injection X-Mas Tree Schematics

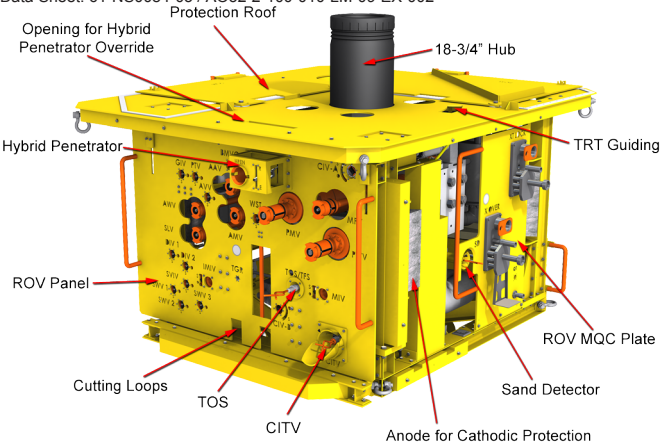
Drawing: 12-NS0067-00 / AO32-2-100-570-LM-09-DZ-001

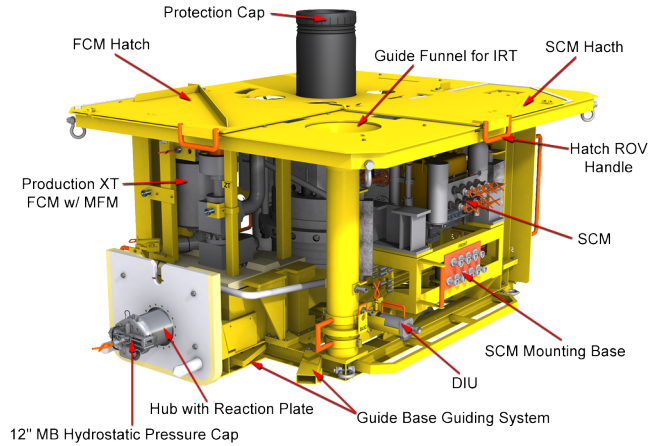


6.2 Dalia X-Mas Tree

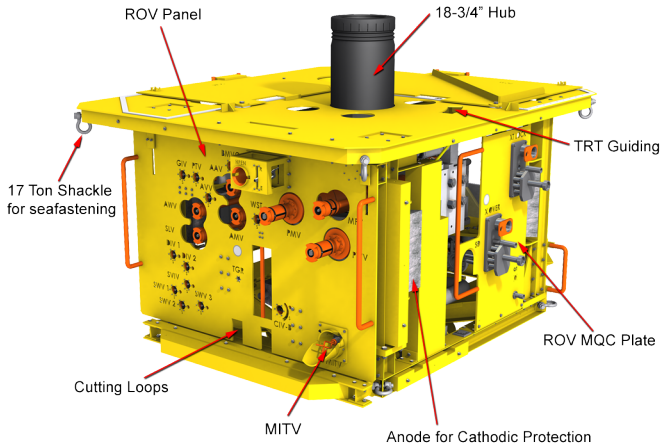
6.2.1 Dalia X-Mas Trees

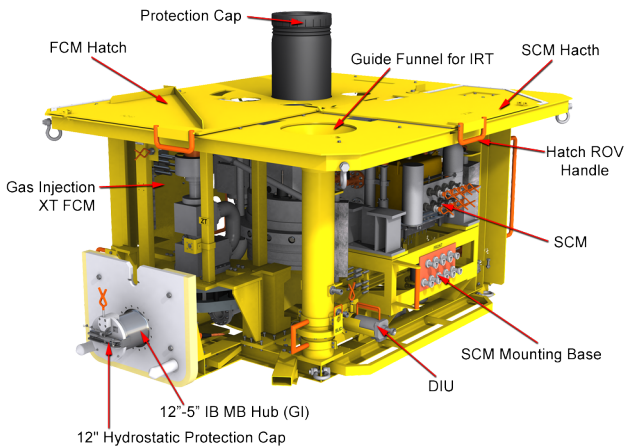
Production Tree:
GA drawing: 31-NS0048-00 / AO32-2-100-000-LM-09-DZ-003
GA drawing XT w/ Circular Hatch FCM Insulation Box: 31-NS0072-00
Data Sheet: 61-NS0084-03 / AO32-2-100-010-LM-09-EX-002



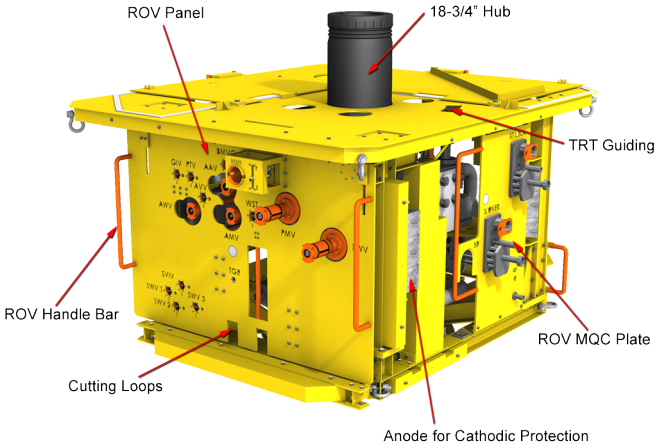


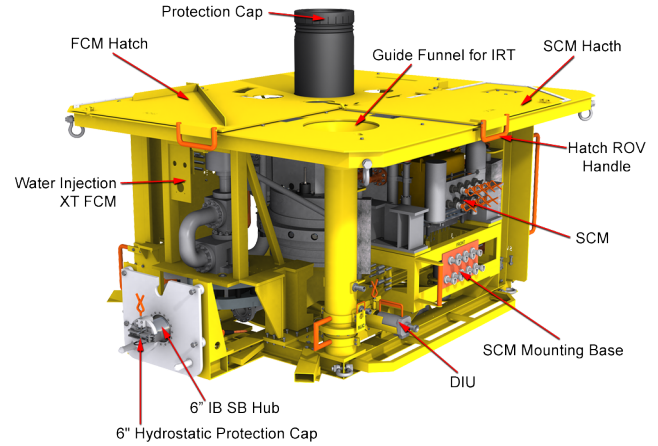
Gas Injection Tree:
GA drawing: 31-NS0050-00 / AO32-2-100-570-LM-09-DZ-017
Data Sheet: 62-NS0265-01 / AO32-2-100-010-LM-09-EX-001





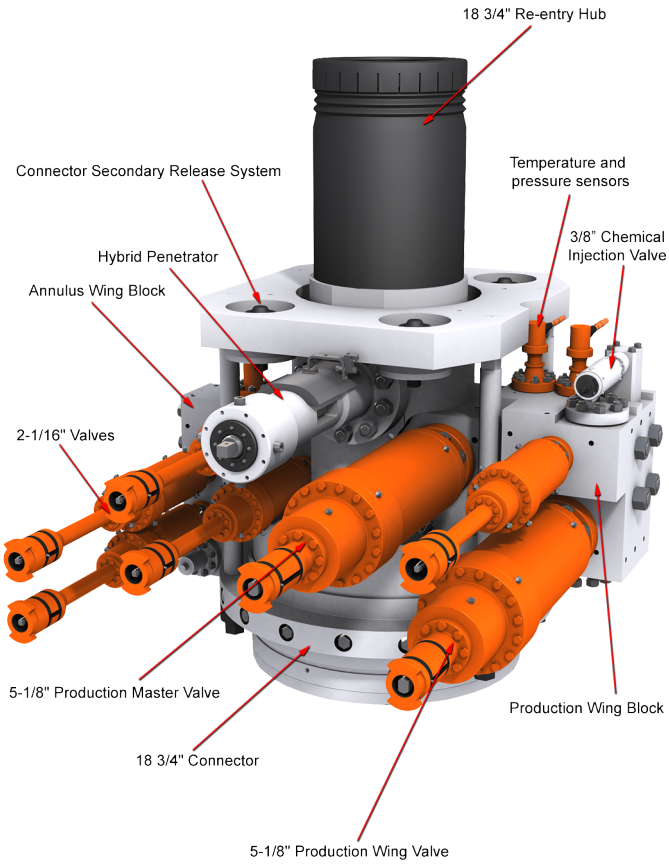
Water Injection Tree:
GA drawing: 31-NS0049-00 / AO32-2-100-000-LM-09-DZ-010
Data Sheet: 61-NS0084-05 / AO32-2-100-010-LM-09-EX-033



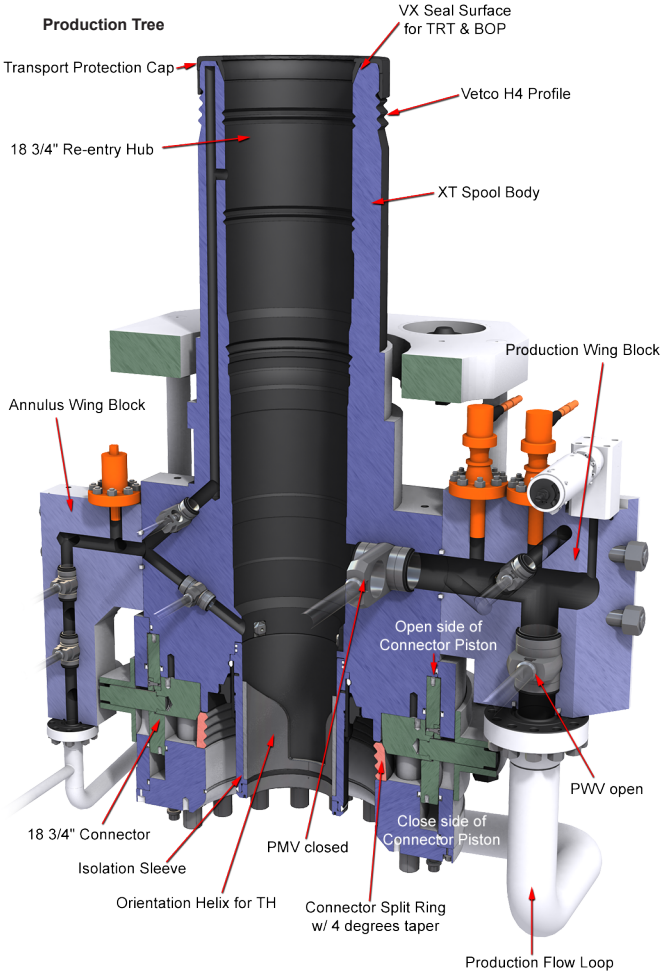


6.2.2 Tree Stalk Front

Production Tree

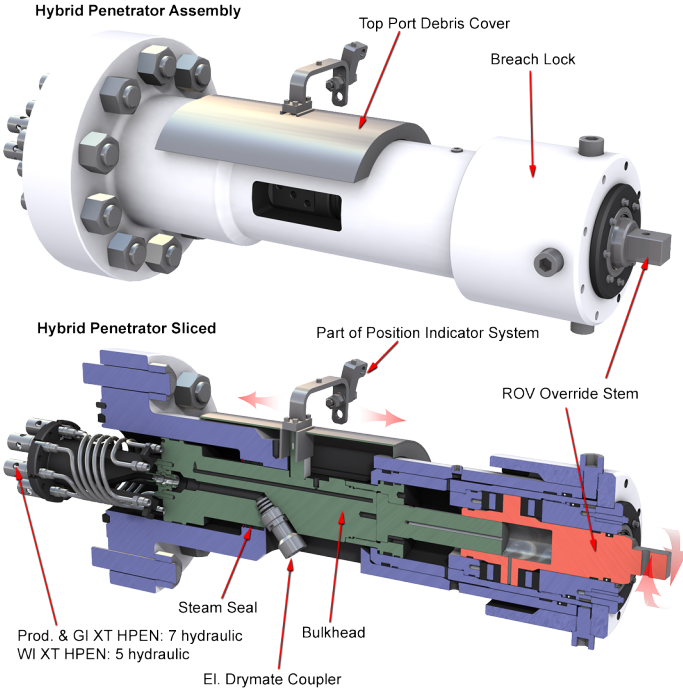


6.2.3 Tree Stalk Front Sliced



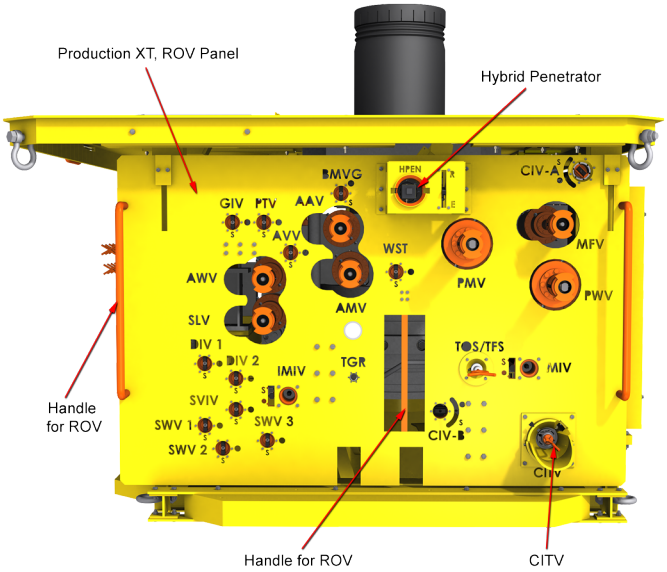
6.2.4 Hybrid Penetrator Assembly

GA Drawing Prod. & GI XT HPEN: 31-HS0001-52 / A032-2-103-000-LM-09-DZ-003
GA Drawing WI XT HPEN: 31-HS0001-66 / AO32-2-103-000-LM-09-DZ-008
Data Sheet: 62-NS0265-05 / AO32-2-100-010-LM-09-EX-005

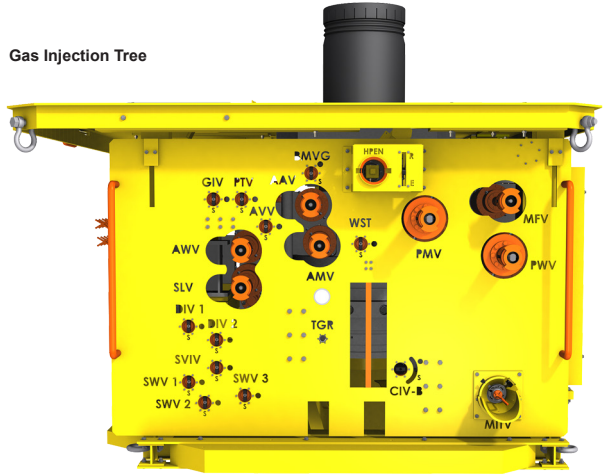


6.2.5 X-Mas Tree ROV panels

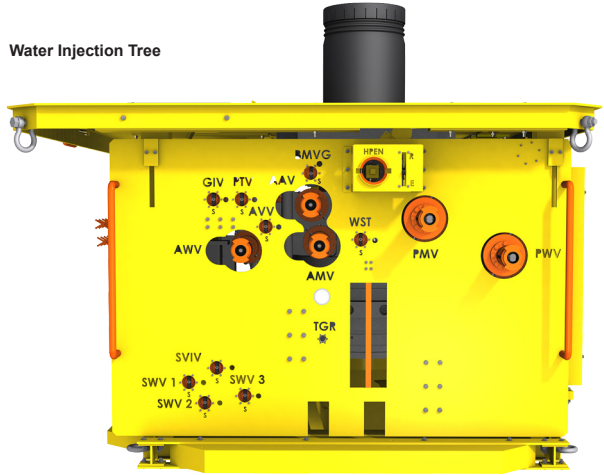
Production Tree



Gas Injection Tree



Water Injection Tree

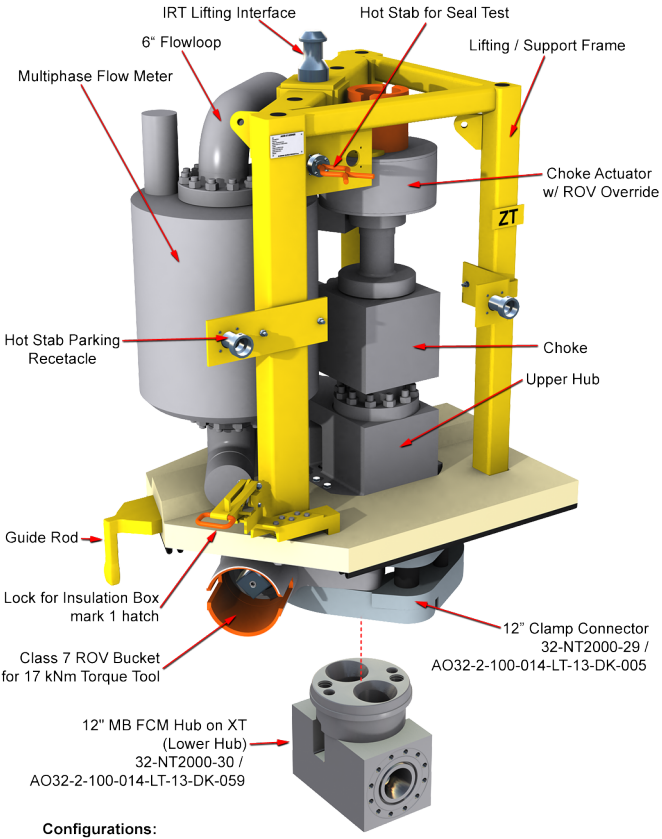


ROV Panel Marking

Production	Water Injection	Gas Injection	Description
AAV	AAV	AAV	Annulus Access Valve (Linear Override), KOP Valve with Linear Actuator Override Tool (LAOT)
AMV	AMV	AMV	Annulus Master Valve (Override), LAOT
AVV	AVV	AVV	Annulus Vent Valve (ROV Opr. Open/ Shut), Bentley 90º
AWV	AWV	AWV	Annulus Wing Valve (Override), LAOT
BMVG	BMVG	BMVG	Bleed Monitoring Valve Gallery (ROV Opr. Open/ Shut), Bentley 90º
		MITV	Methanol Injection Throttle Valve (ROV opr.)
CITV			Chemical Injection Throttle Valve (ROV opr.)
CIV-A			Chemical Injection Valve –A (Override), Bentley 90º
CIV-B		CIV-B	Chemical Injection Valve –B (Override) , Bentley 90º
GIV	GIV	GIV	Gallery Isolation Valve (ROV Opr Open/ Shut) , Bentley 90º
DIV 1		DIV 1	Downhole Isolation Valve (ROV Opr. Open/ Shut) , Bentley 90º
DIV 2		DIV 2	Downhole Isolation Valve (ROV Opr. Open/ Shut) , Bentley 90º
IMIV			Isolation Methanol Injection Valve (ROV Opr. Open/ Shut, Packson (Opens with 300 Nm torque)
MFV		MFV	Methanol Flushing Valve (Override), LAOT
MIV		MIV	Methanol Injection Valve (Override), Packson (Opens with 300 Nm torque)
PMV	PMV	PMV	Production Master Valve (Override), LAOT
PTV	PTV	PTV	Plug Test Valve (ROV Operated Open/ Shut) , Bentley 90º
PWV	PWV	PWV	Production Wing Valve (Override), LAOT
SLV		SLV	Service Line Valve (Override)
SVIV	SVIV	SVIV	Safety Valve Isolation Valve (ROV Opr. Open/ Shut) , Bentley 90º
SWV 1	SWV 1	SWV 1	Smart Well Valve 1 (ROV Opr. Open/ Shut) , Bentley 90º
SWV 2	SWV 2	SWV 2	Smart Well Valve 2 (ROV Opr. Open/ Shut) , Bentley 90º
SWV 3	SWV 3	SWV 3	Smart Well Valve 3 (ROV Opr. Open/ Shut) , Bentley 90º
WST	WST	WST	Wellhead Seal Test Valve (ROV Opr. Open/ Shut)
TGR	TGR	TGR	Tree Connector Gasket Release (Hotstab, Blind stab normally installed)
TOS/ TFS			Tree Orifice Stab / Tree Fluid Sampling (Hotstabs)
Cutting Loops			Access for cutting loops (XT connector lock line, XT connector unlock line and TRSCSSV)

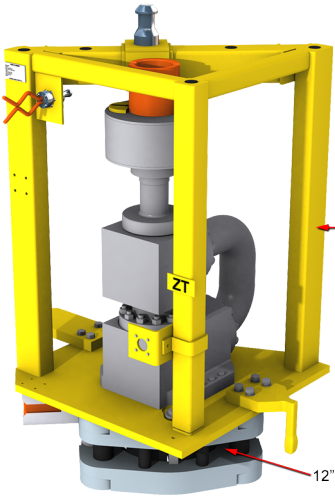
6.2.6 Flow Control Modules

GA drawing: 31-NS0059-00 / AO32-2-100-000-LM-09-DZ-016
Data Sheet: 62-NS0301-00 / AO32-2-100-000-LM-09-EX-009



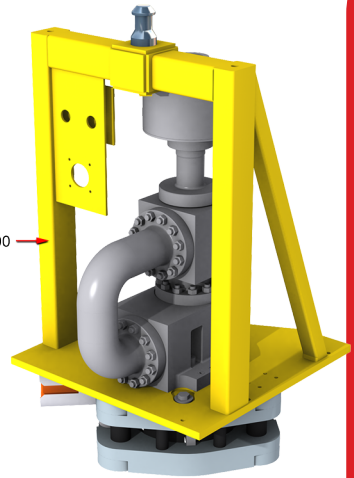
Configurations:

- **Production XT FCM** w/ Multiphase Flow Meter (as shown above) - 14-NS0035-00
- **Production XT FCM** w/o Multiphase Flow Meter - 14-NS0036-00
  GA drawing: 31-NS0069-00 / AO32-2-100-000-LM-09-DZ-018
- **Production XT FCM** w/ MFM c/w Bolt-On Guide Brackets - 14-NS3011-00
  GA drawing: 31-NS0073-00 / AO32-2-100-000-LM-09-DZ-022



Gas Injection XT FCM - 14-NS0037-00
GA drawing: 31-NS0070-00 /
AO32-2-100-000-LM-09-DZ-021
Data Sheet: 62-NS0299-00 /
AO32-2-100-000-LM-09-EX-004

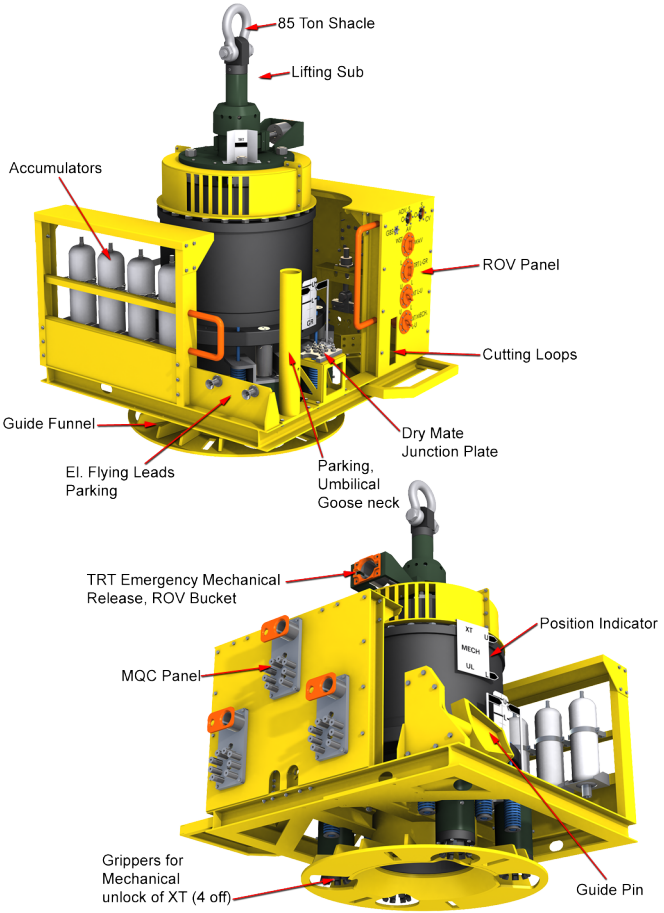
12" Clamp Connector



Water Injection XT FCM - 14-NS0038-00
GA drawing: 31-NS0071-00 /
AO32-2-100-000-LM-09-DZ-019
Data Sheet: 62-NS0300-00 /
AO32-2-100-000-LM-09-EX-019

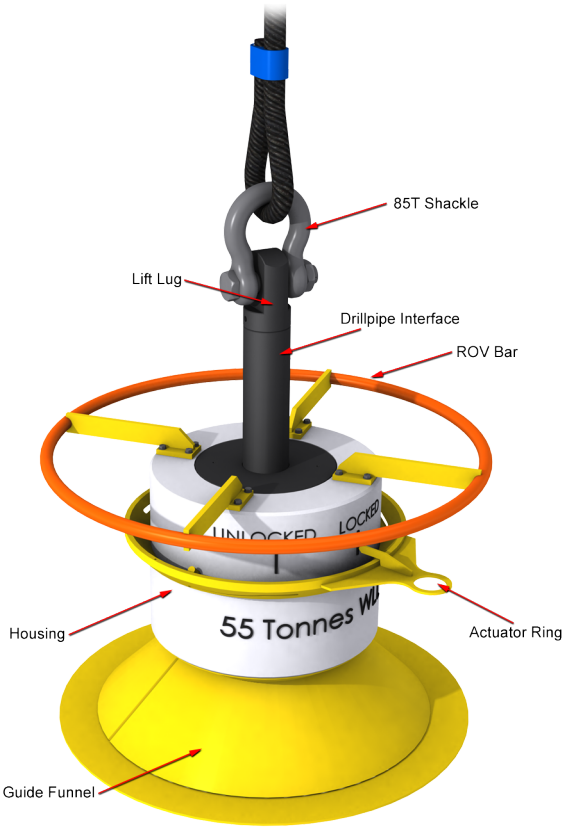
6.2.7 X-Mas Tree Running Tool

GA drawing: 31-NE0014-00 / AO32-2-100-000-LK-09-DZ-875
Data Sheet: 61-NE0084-01 / AO32-2-100-010-LM-09-EX-044



6.2.8 Light Tree Running Tool

GA drawing: 11-NE0269-00 / AO32-2-100-000-LK-09-DZ-007

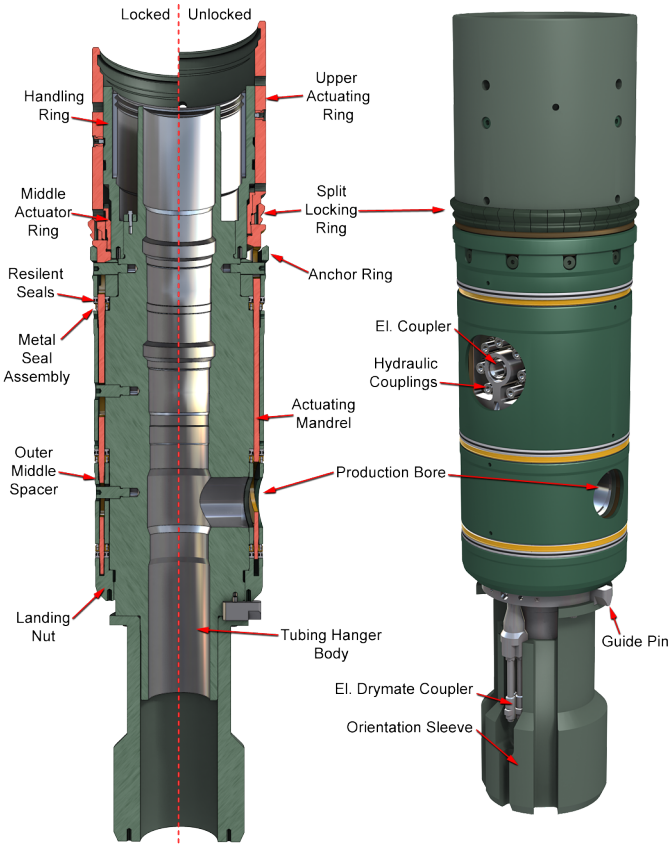


6.3 Tubing Hanger System

6.3.1 Tubing Hanger

Production/Gas Injection:
GA drawing: 31-HS0001-59 / AO32-2-103-000-LO-00-DZ-004
Data Sheet: 62-NS0265-31 / AO32-2-100-010-LM-09-EX-031

Water Injection:
Data Sheet: 62-NS0265-42 / AO32-2-100-010-LM-09-EX-042

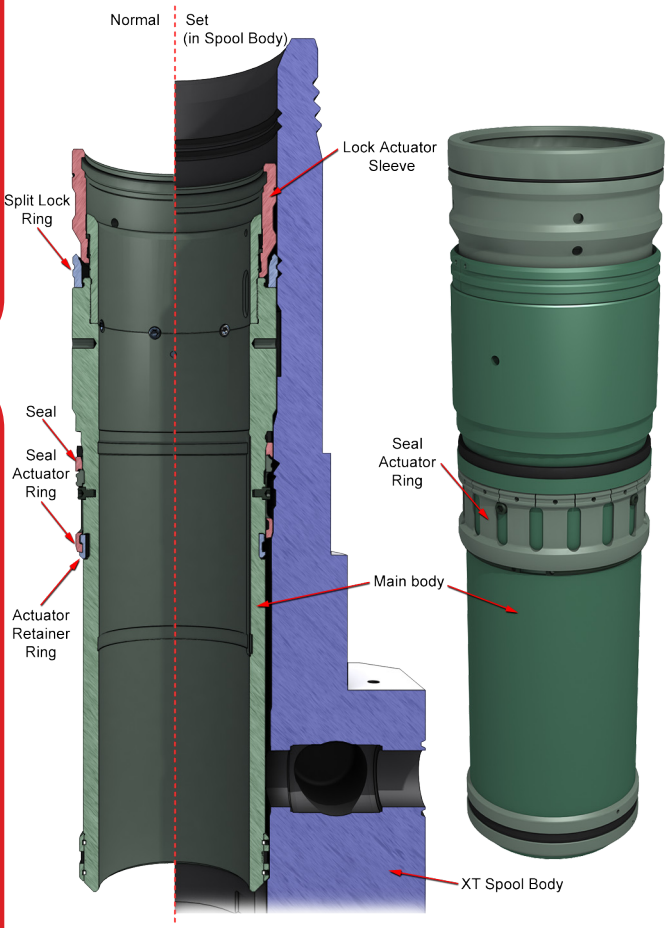


6.3.2 Tubing Hanger Running Tool

Drawing: 31-HS0000-20 / AO32-2-103-000-LO-09-DZ-044
Data Sheet: 62-NS0265-48 / AO32-2-100-010-LM-09-EX-048

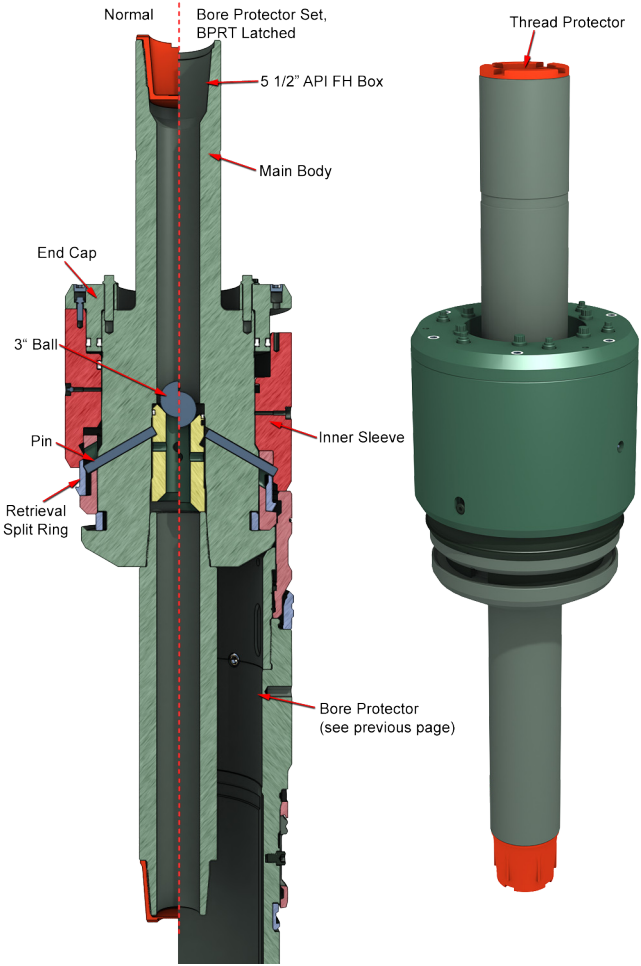
6.3.3 Bore Protector

GA Drawing: 31-HS0001-61 / AO32-2-103-000-LM-00-DZ-005
Data Sheet: 62-NS0265-46 / AO32-2-100-010-LM-09-EX-046



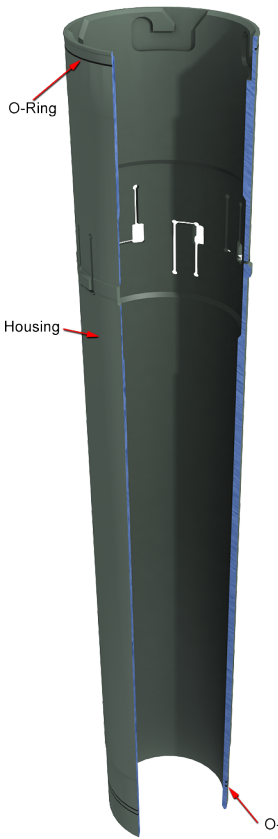
6.3.4 Bore Protector Running Tool

GA drawing: 31-HS0002-11 / A032-2-103-000-LM-09-DZ-019
Data Sheet: 62-NS0265-49 / AO32-2-100-010-LM-09-EX-049



6.3.5 Wear Bushings

Wear Bushing 13 5/8”
Drawing: 11-HS0000-48

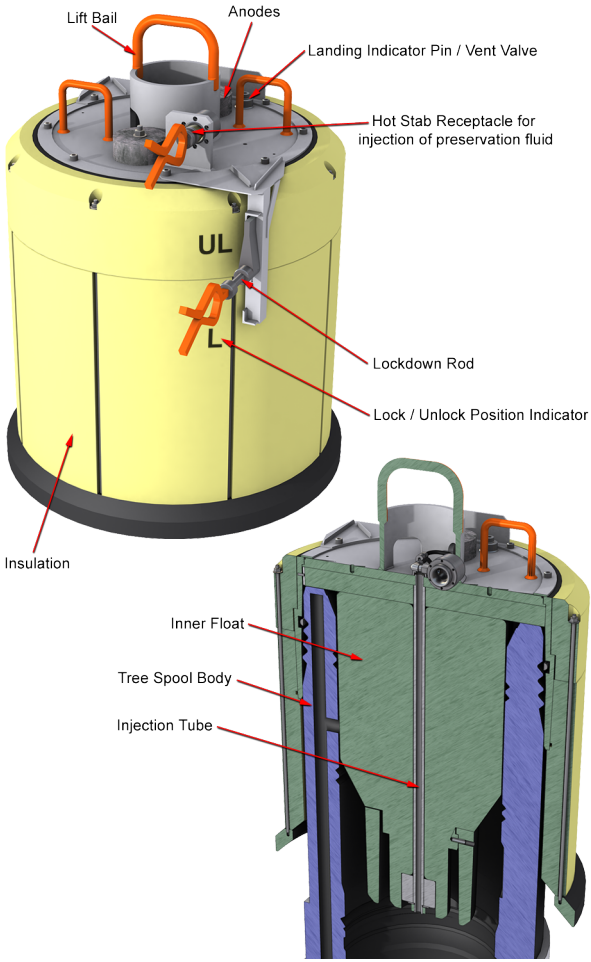


Wear Bushing 10 3/4”
Drawing: 11-HS0000-49

6.4 Debris Caps

6.4.1 Production Tree Cap

GA drawing: 31-HS0001-67 / AO32-2-103-000-LM-09-DZ-010
Data Sheet: 62-NS0265-32 / AO32-2-100-010-LM-09-EX-032



6.4.2 Gas/Water Injection Tree Cap

GA drawing: 31-HS0000-39 / AO32-2-103-000-LM-09-DZ-033
Data Sheet: 62-NS0265-43 / AO32-2-100-010-LM-09-EX-043

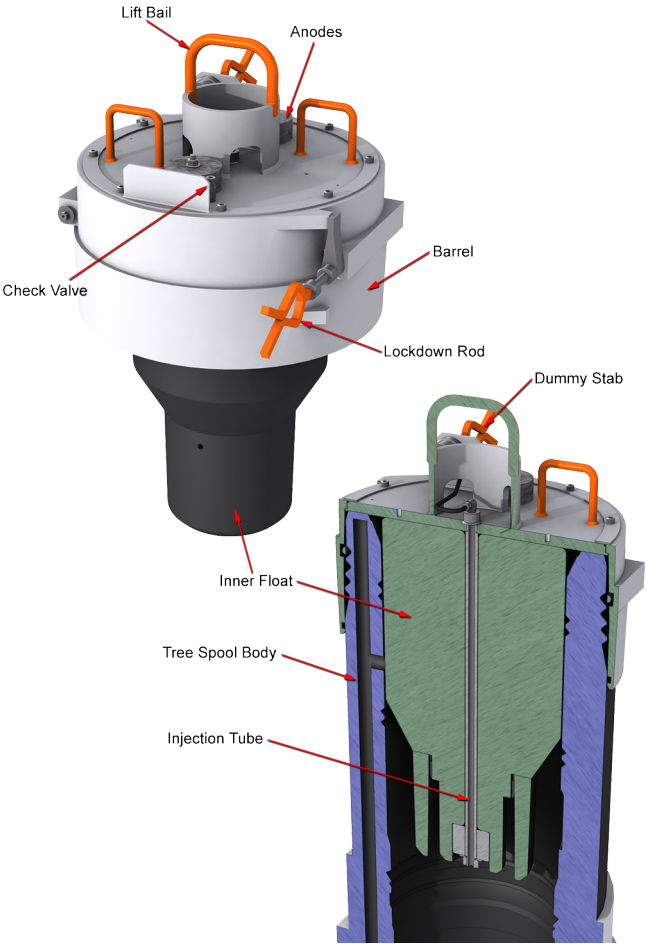
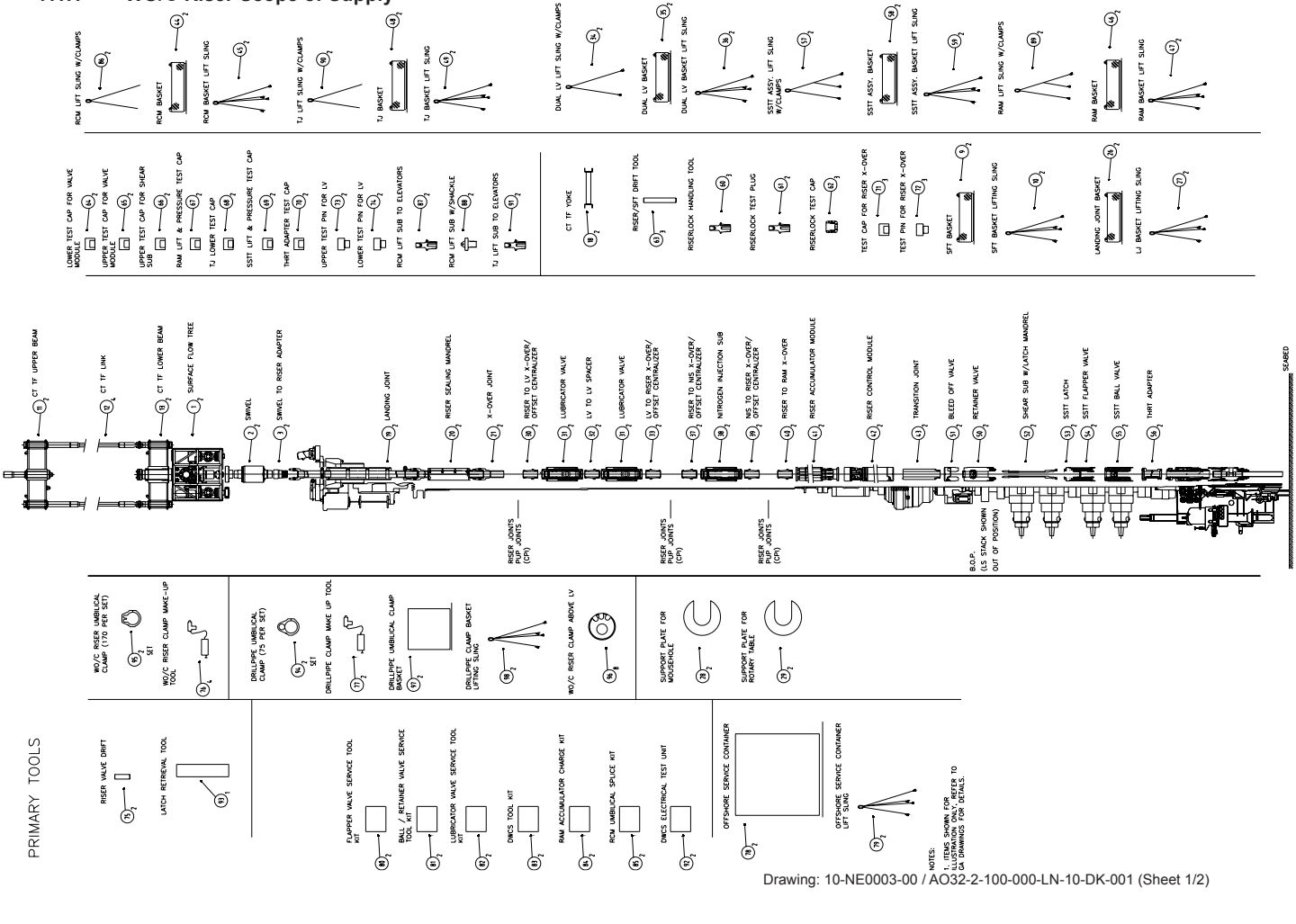


Table of contents

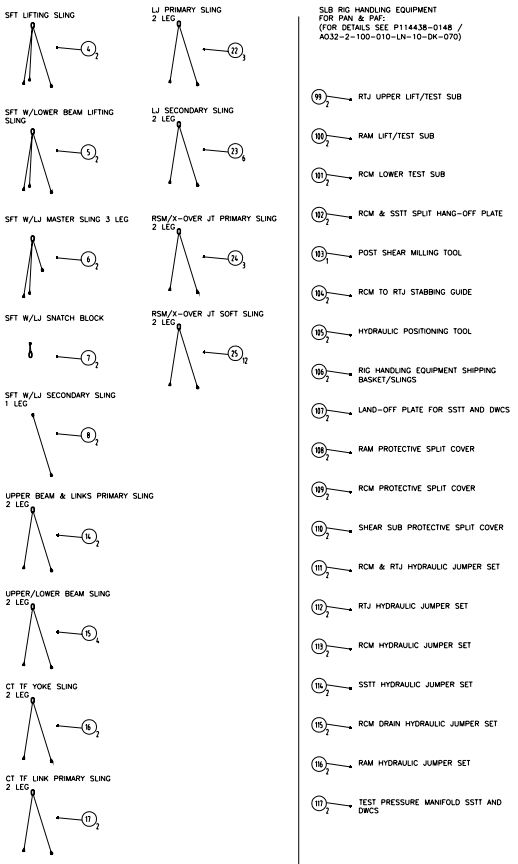
7.1 WOS Scope of Supply

7.1.1 WO/C Riser Scope of Supply

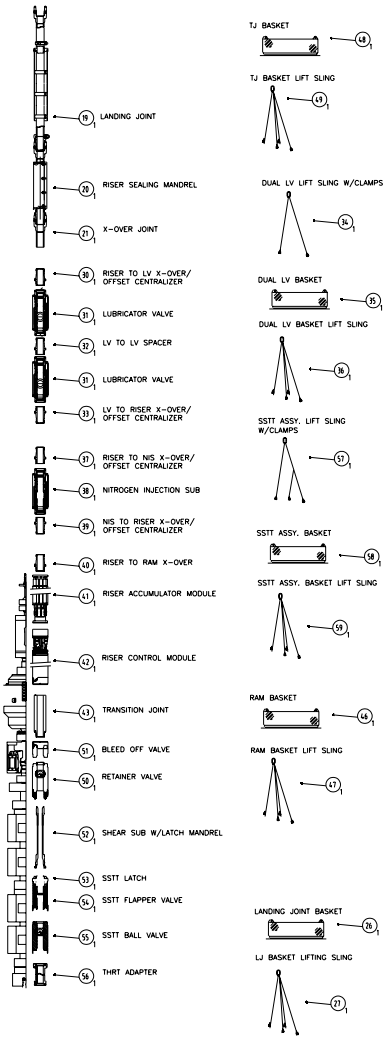


Drawing: 10-NE0003-00 / AO32-2-100-000-LN-10-DK-001 (Sheet 1/2)

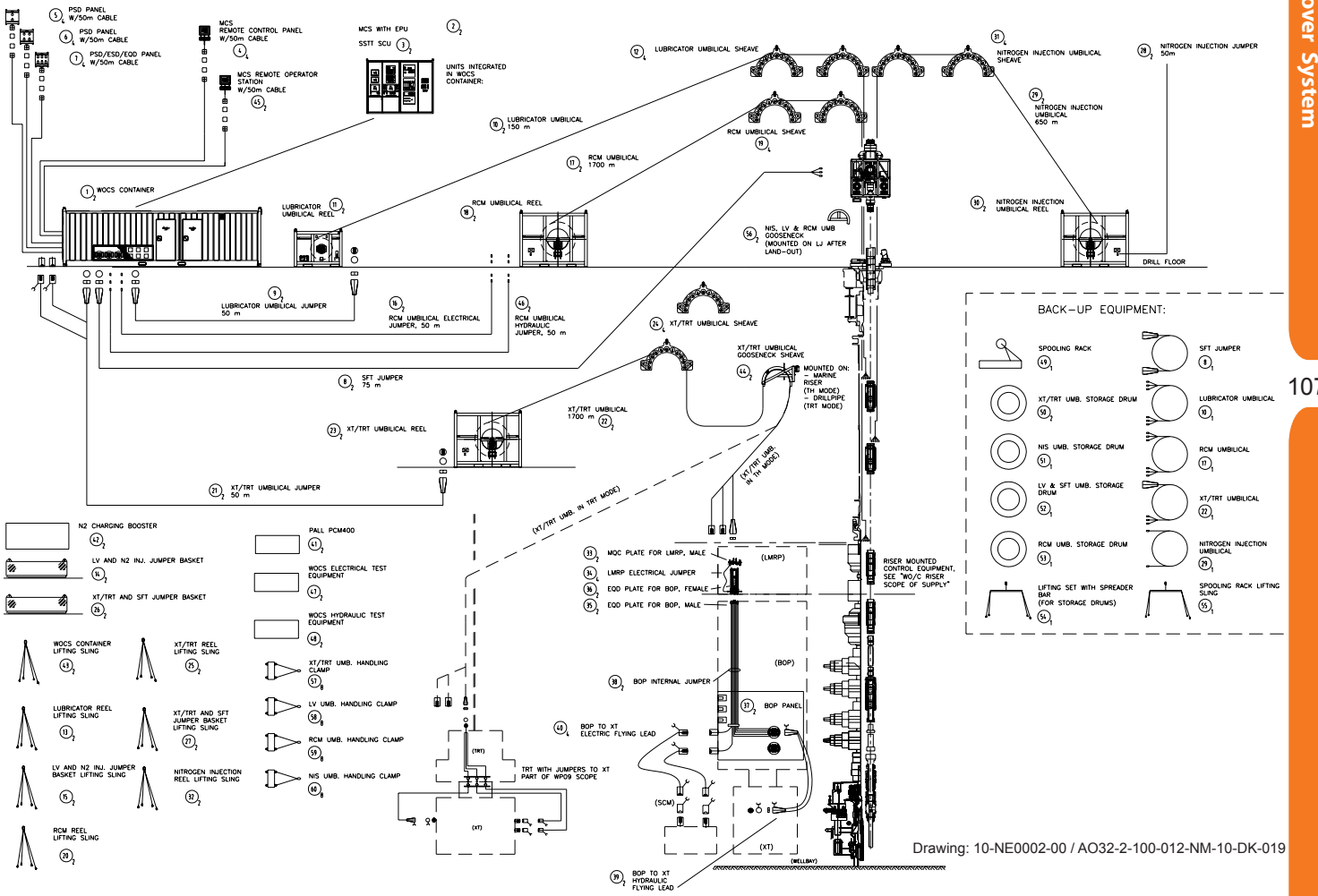
CONTINUED FROM PAGE 1:



BACK-UP OF MAIN TOOLS RUN BELOW ROTARY:

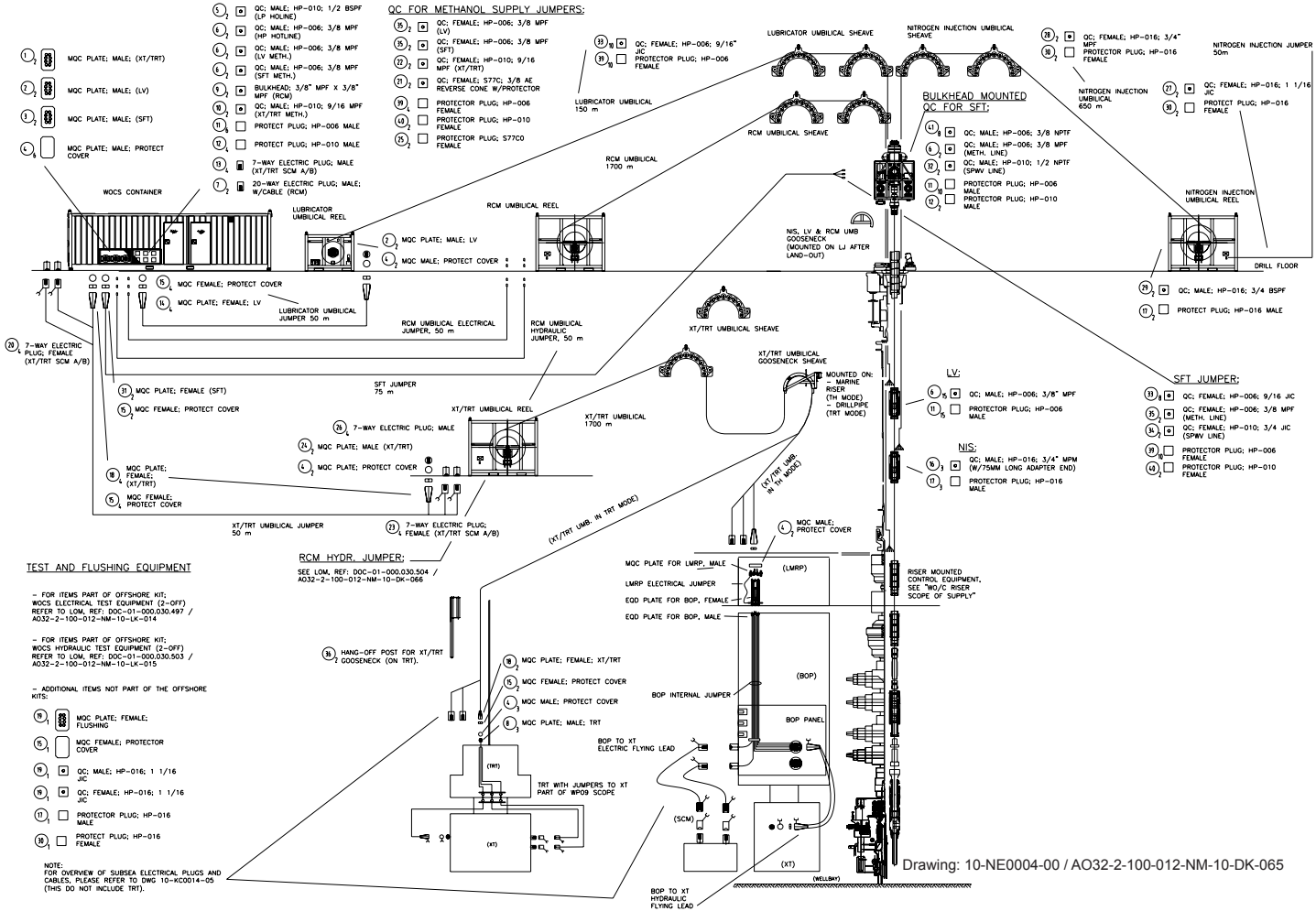


7.1.2 WOCS Scope of Supply



Drawing: 10-NE0002-00 / AO32-2-100-012-NM-10-DK-019

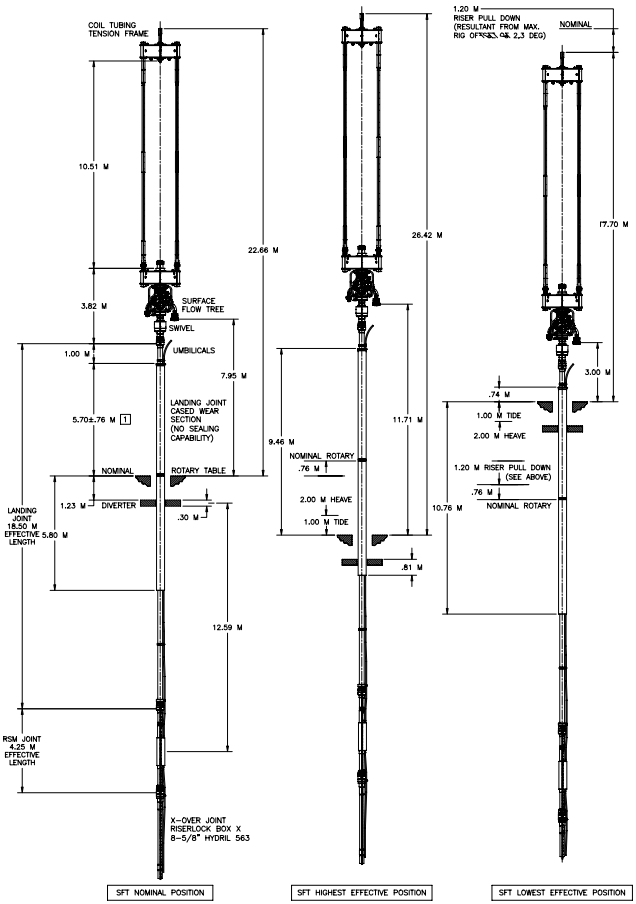
7.1.3 WOCS Sub Items Scope of Supply



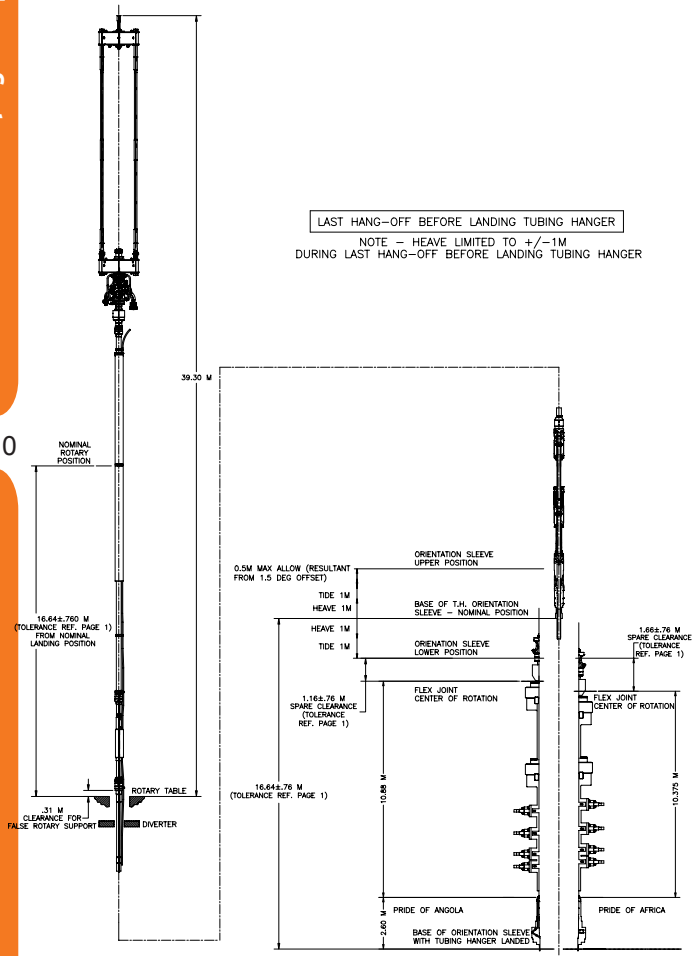
Drawing: 10-NE0004-00 / AO32-2-100-012-NM-10-DK-065

7.2 Stack-up drawings

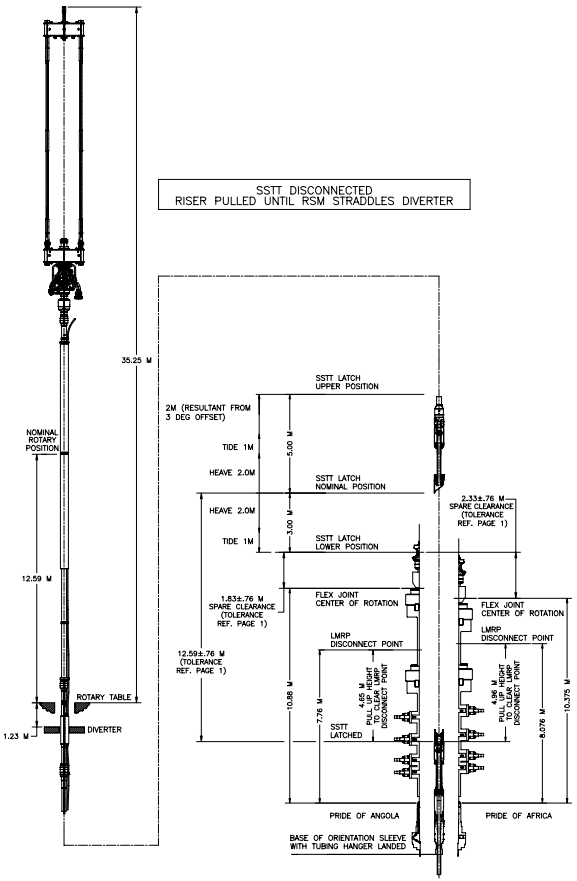
7.2.1 Upper WO/C Riser Stack-up through rotary



Drawing: 32-UW0690-00 / AO32-2-102-000-LN-10-DW-004 (Sheet 1/3)

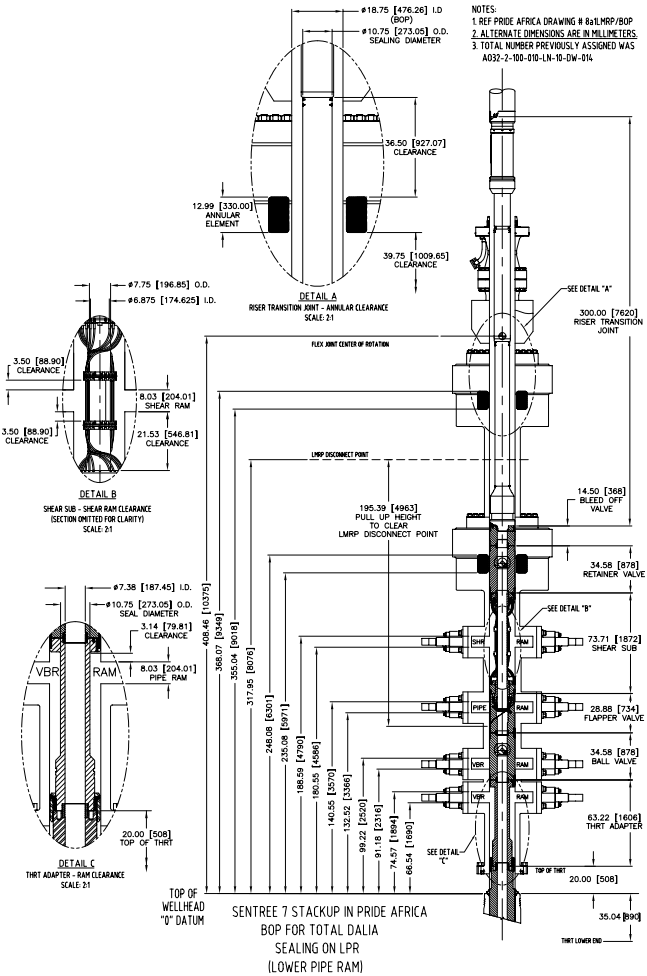


Drawing: 32-UW0690-00 / AO32-2-102-000-LN-10-DW-004 (Sheet 2/3)

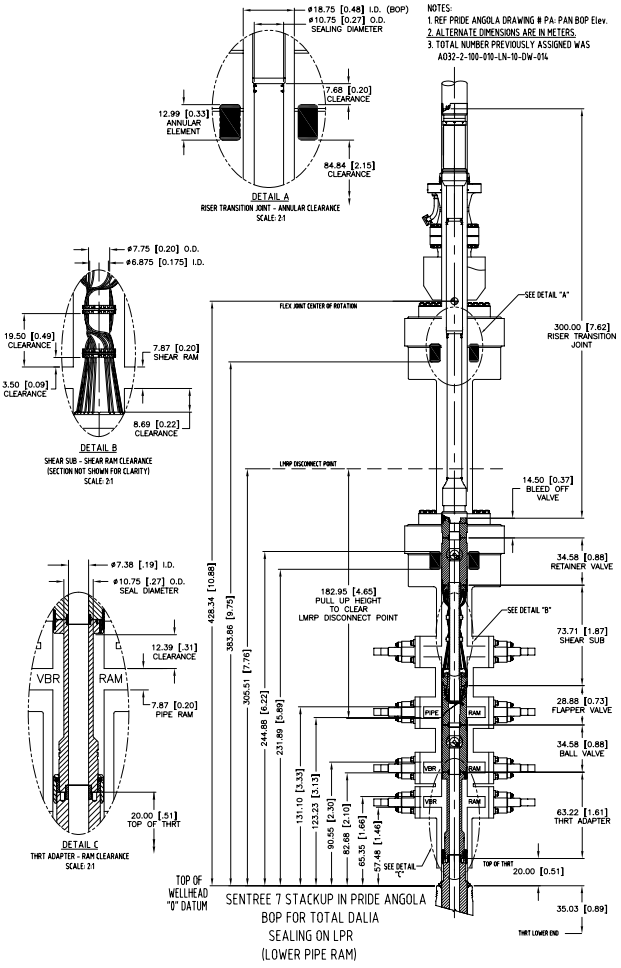


Drawing: 32-UW0690-00 / AO32-2-102-000-LN-10-DW-004 (Sheet 3/3)

7.2.2 Lower WO/C Riser BOP Stack-up

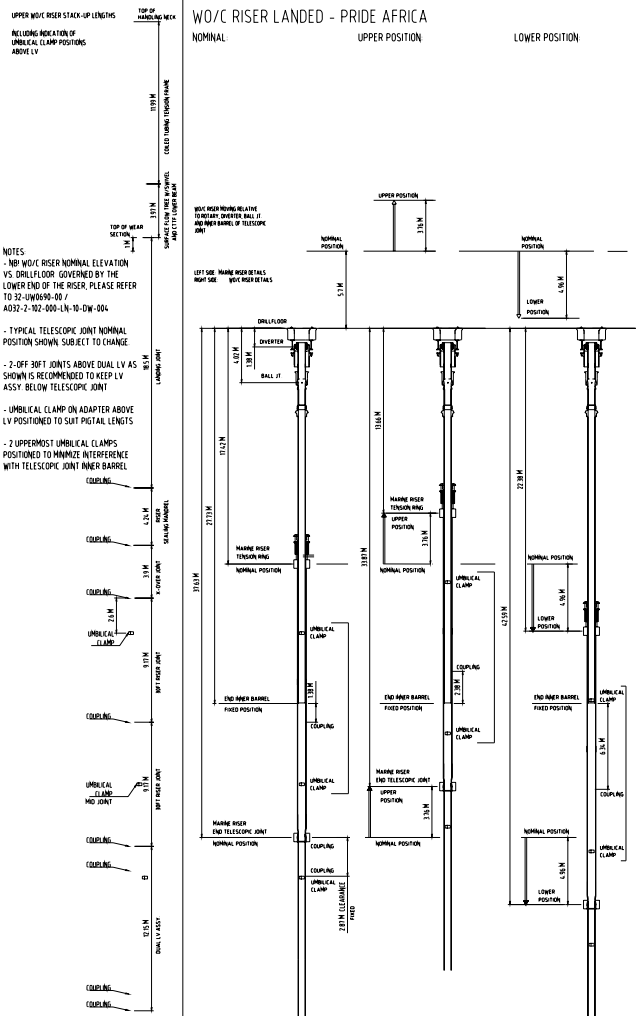


Drawing: P114438-0011 / AO32-2-100-010-LN-10-DK-067 (Sheet 1/2)

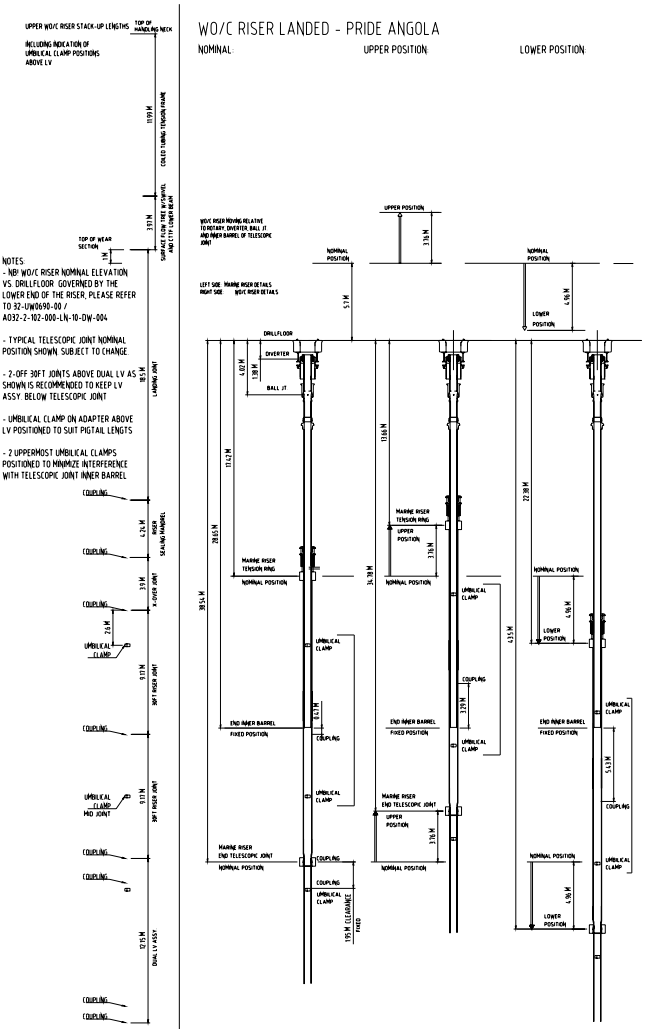


Drawing: P114438-0011 / AO32-2-100-010-LN-10-DK-067 (Sheet 2/2)

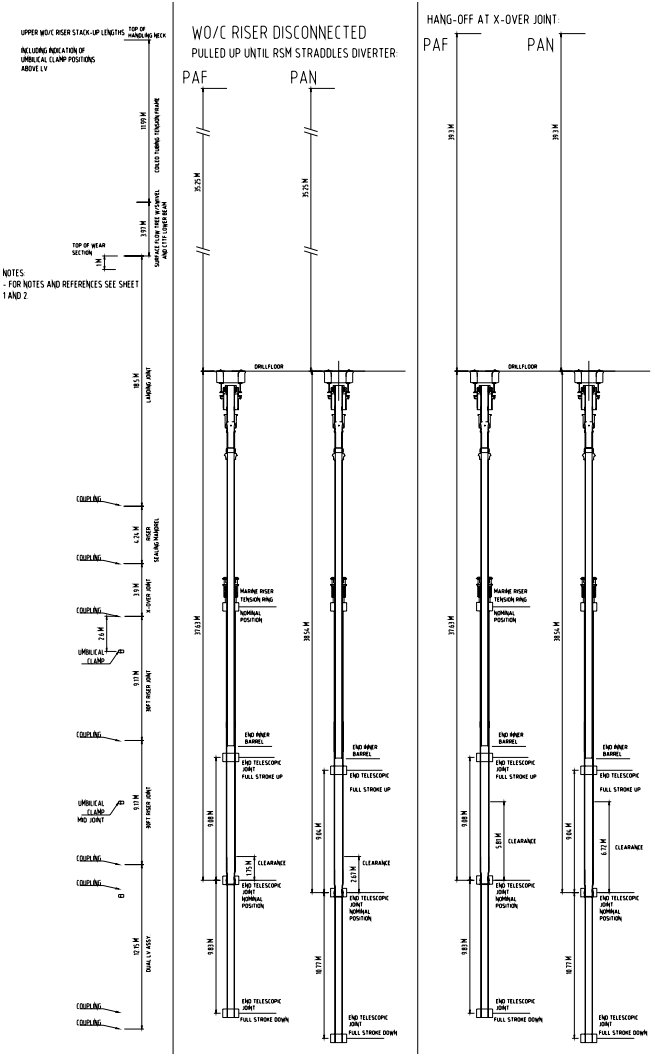
7.2.3 Upper WO/C Riser Stack-up



Drawing: 31-NE0017-00 / AO32-2-100-010-LN-10-DK-092 (Sheet 1/3)

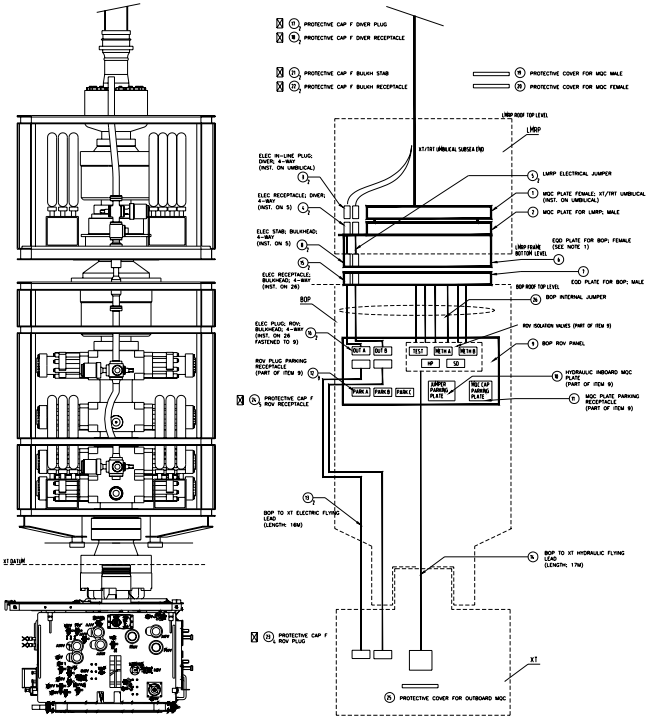


Drawing: 31-NE0017-00 / AO32-2-100-010-LN-10-DK-092 (Sheet 2/3)



Drawing: 31-NE0017-00 / AO32-2-100-010-LN-10-DK-092 (Sheet 3/3)

7.2.4 XT/TRT Umbilical BOP Interface



NOTES:

1.)
EQD PLATE EXTEND AND RETRACT TO BE CONTROLLED FROM BOP, 2 CONTROL LINES.
DUAL ACTING PISTON; SPRING RETURN (TO RETRACT).
NORMAL OPERATING PRESSURES: 1500 PSI EXTEND AND 1500 PSI RETRACT.
(RETRACT BOOST PRESSURE OF 3000 PSI ALLOWED WHEN PERFORMING EMERGENCY QUICK DISCONNECT).

2.)
ELECTRICAL SCHEMATIC REF. 24-NE0001-00 (A032-2-100-012-NM-10-DN-042)

3.)
HYDRAULIC SCHEMATIC REF. 12-NE0009-00 (A032-2-100-012-NM-10-DN-019).

4.)
THIS DRAWING IS ESTABLISHED FOR ILLUSTRATION PURPOSE.
FOR OVERALL SCOPE OF SUPPLY OF WHICH THE ABOVE ITEMS ARE PART OF, REFER TO THE FOLLOWING:
- MOCS SOS 10-NE0002-00 (A032-2-100-012-NM-10-DK-019)
- MOCS SUB-ITEMS SOS 10-NE0004-00 (A032-2-100-012-NM-10-DK-065)

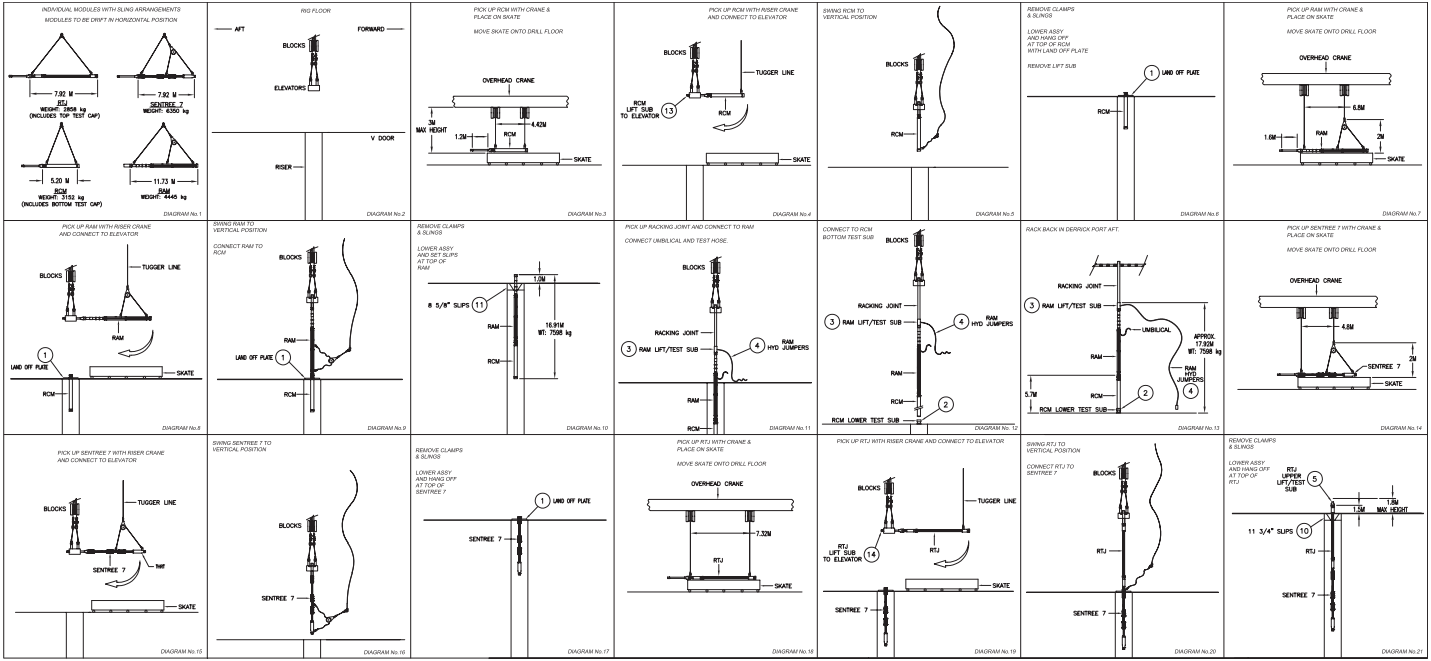
5.)
ONLY MAIN PART OF ELECTRICAL PLUGS LISTED ABOVE.
FOR DETAILS, WITH LISTING OF TERMINATION SLEEVES AND CABLE GLANDS PLEASE REFER TO SCOPE DRAWING 10-HE0014-05.

6.)
QUANTITIES SHOWN ON DRAWING IS FOR 1 SYSTEM // BOP.
QUANTITIES ON LIST OF MATERIALS IS FOR 2 SYSTEMS / BOP'S.

Comments / Notes

7.3 Sequence drawings

7.3.1 Lower WO/C Riser Installation Sequence

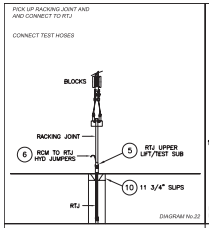


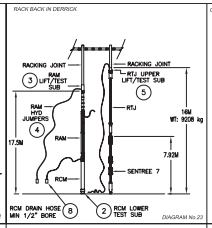
ITEM No	QTY	DESCRIPTION	P/N
14	2	RTJ LIFT SUB TO ELEVATORS	100059564
13	2	RCM LIFT SUB TO ELEVATORS	100059814
12	2	COMPLETION SPIDER	RIG SUPPLIED
11	2	8 5/8" MODIFIED SLIPS	RIG SUPPLIED
10	2	11 3/4" SLIPS	RIG SUPPLIED
9	2	GA/INTERFACE, HYDRAULIC POSITIONING TOOL	100189097
8	2	GA/INTERFACE, JUMPER SET, HYDRAULIC, DRAIN, RCM	100189088
7	2	GA/INTERFACE, HANG OFF ELEVATORS	100188437
6	2	GA/INTERFACE, JUMPER SET, HYDRAULIC, RCM/RTJ	100189076
5	2	GA/INTERFACE, SUB, UPPER, LIFT/TEST, RTJ	100188434
4	2	GA/INTERFACE, JUMPER SET, HYDRAULIC, RAM	100189081
3	2	GA/INTERFACE, SUB, LIFT/TEST, RAM	100188435
2	2	GA/INTERFACE, SUB, LOWER TEST, RCM	100188436
1	2	GA/INTERFACE, PLATE, LAND OFF, RIG HANDLING	100188439

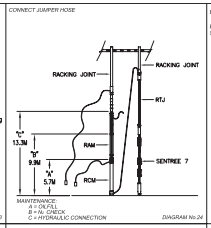
NOTE:

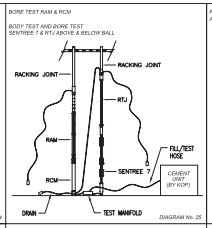
1. DO NOT SCALE, IF IN DOUBT – ASK

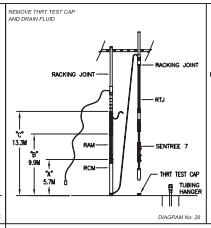
Drawing: P114438-0023 / AO32-2-100-010-LN-10-DK-066 (Sheet 1/2)

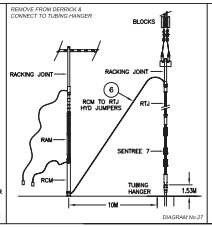


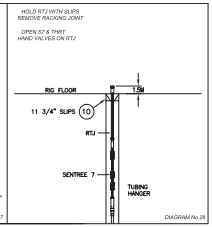


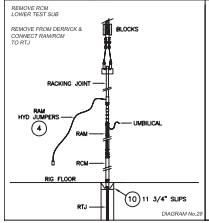


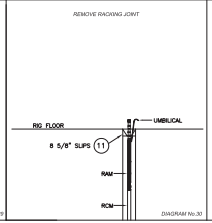


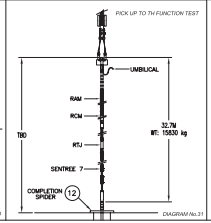


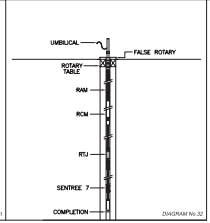




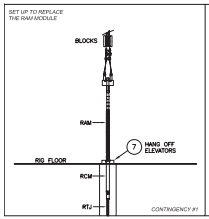


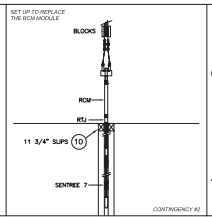


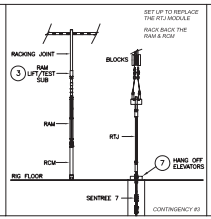


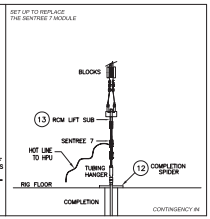


REPLACEMENT OF INDIVIDUAL MODULES

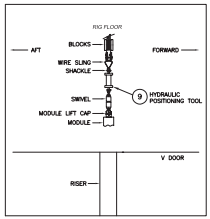








HYDRAULIC POSITIONING TOOL CONFIGURATION



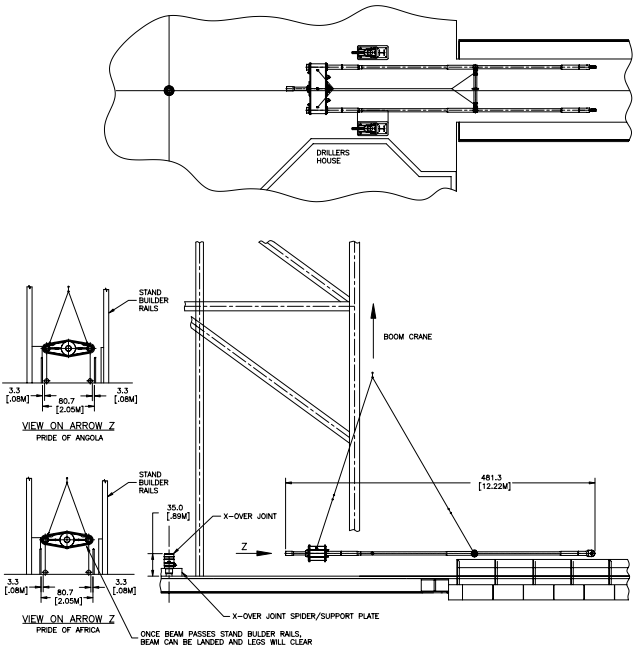
NOTE:

1. DO NOT SCALE, IF IN DOUBT – ASK

Drawing: P114438-0023 / AO32-2-100-010-LN-10-DK-066 (Sheet 2/2)

7.3.2 Upper WO/C Riser Installation Sequence

Drawing: 32-UW0899-00 / AO32-2-102-010-LN-10-DK-011 (Sheet 1/8)

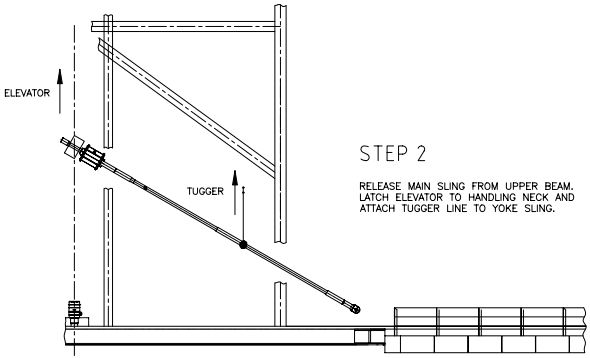


STEP 1

WITH X–OVER JOINT SUPPORTED IN ROTARY TABLE, LIFT TENSION FRAME UPPER SUB–ASSY FROM CATWALK AND LAND UPPER BEAM INSIDE DRILL FLOOR AREA.

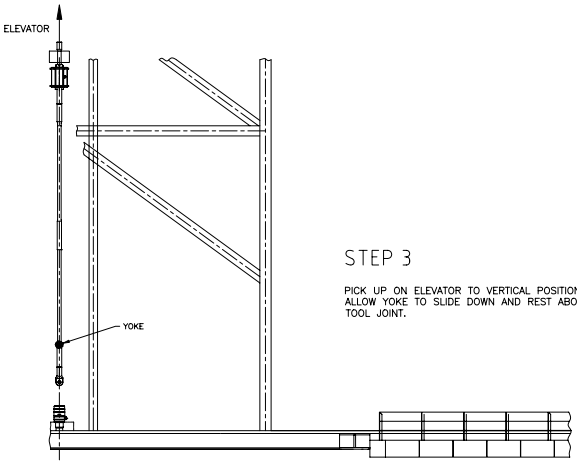
NOTE – REFER TO DRAWING 11–UW0375–00 (AO32–2–102–010–LN–10–DK–012) FOR DETAILS OF SLING ARRANGEMENTS.

Drawing: 32-UW0899-00 / AO32-2-102-010-LN-10-DK-011 (Sheet 2/8)



STEP 2

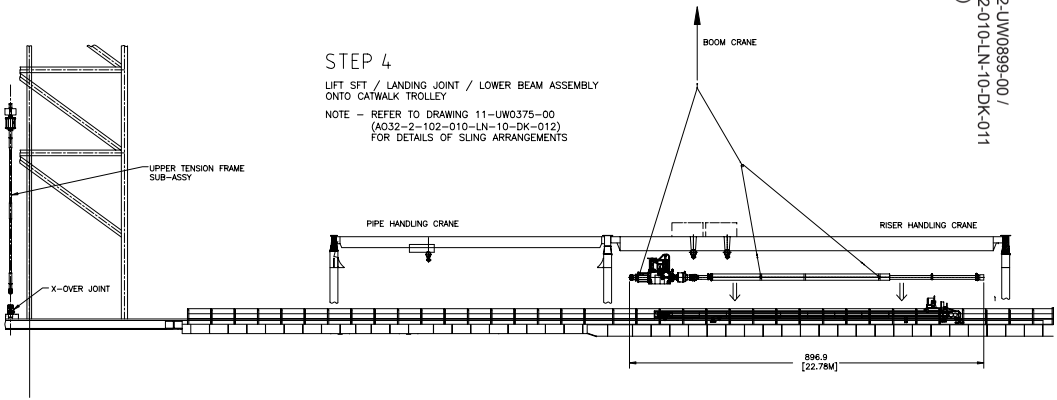
RELEASE MAIN SLING FROM UPPER BEAM. LATCH ELEVATOR TO HANDLING NECK AND ATTACH TUGGER LINE TO YOKE SLING.

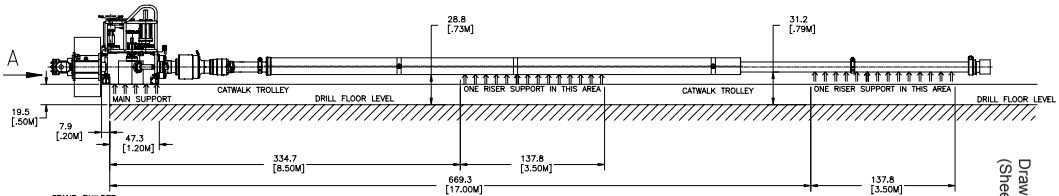


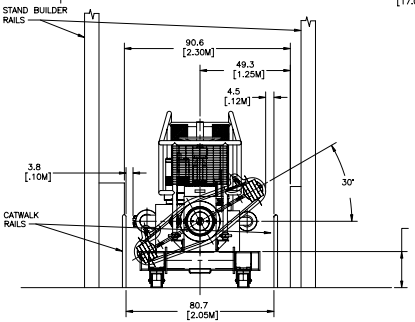
STEP 3

PICK UP ON ELEVATOR TO VERTICAL POSITION. ALLOW YOKE TO SLIDE DOWN AND REST ABOVE TOOL JOINT.

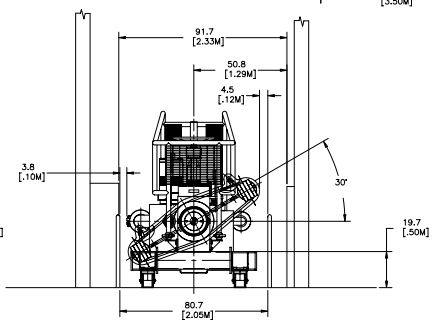
Drawing: 32-UW0899-00 /
AO32-2-102-010-LN-10-DK-011
(Sheet 3/8)







VIEW ON ARROW 'A'
'PRIDE OF AFRICA
SCALE 40:1

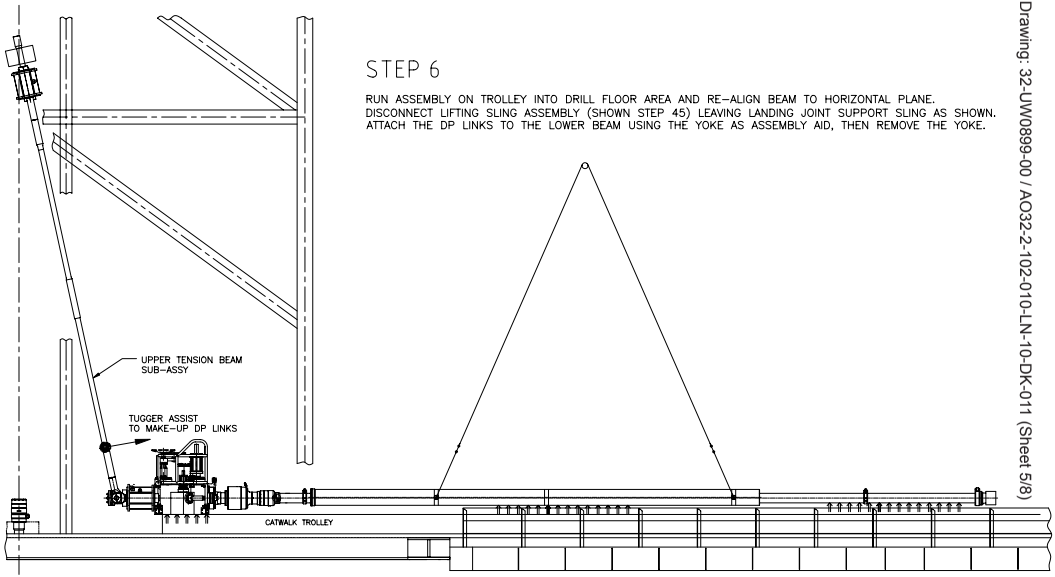


VIEW ON ARROW 'A'
PRIDE OF ANGOLA
SCALE 40:1

STEP 5

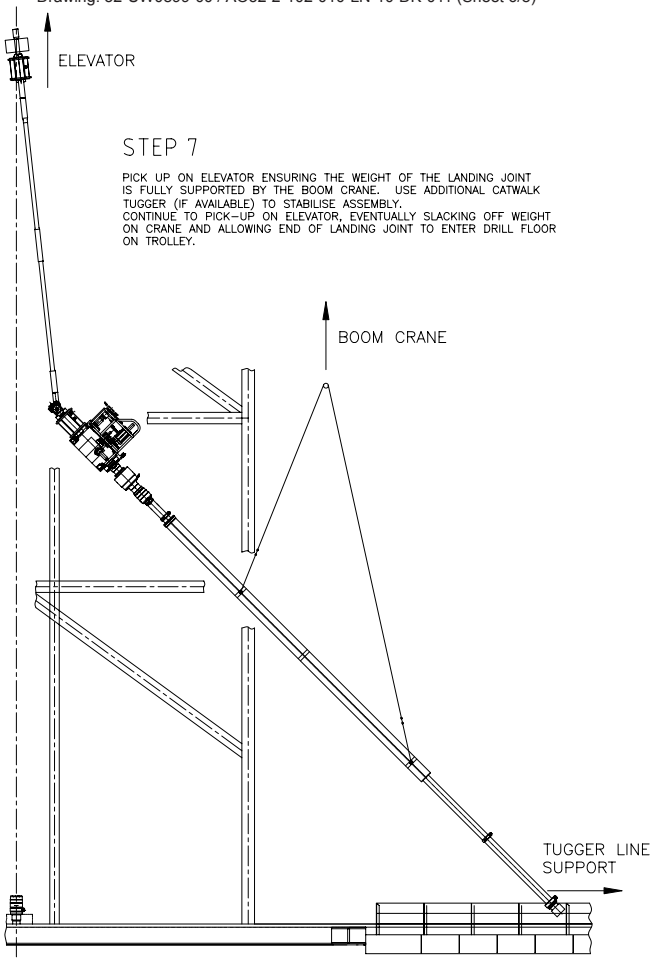
ASSEMBLY SHALL BE SUPPORTED ON TROLLEY AT THREE LOCATIONS AS SHOWN.
UNLOCK ANTI-ROTATION KEYS AT BEAM/SFT INTERFACE AND ROTATE BEAM APPROX 30 DEG TO ALLOW PASSAGE INTO DERRICK. (REFER TO 'VIEW ON ARROW A')

Drawing: 32-UW0899-00 / AO32-2-102-010-LN-10-DK-011 (Sheet 4/8)



Drawing: 32-UW0899-00 / AO32-2-102-010-LN-10-DK-011 (Sheet 5/8)

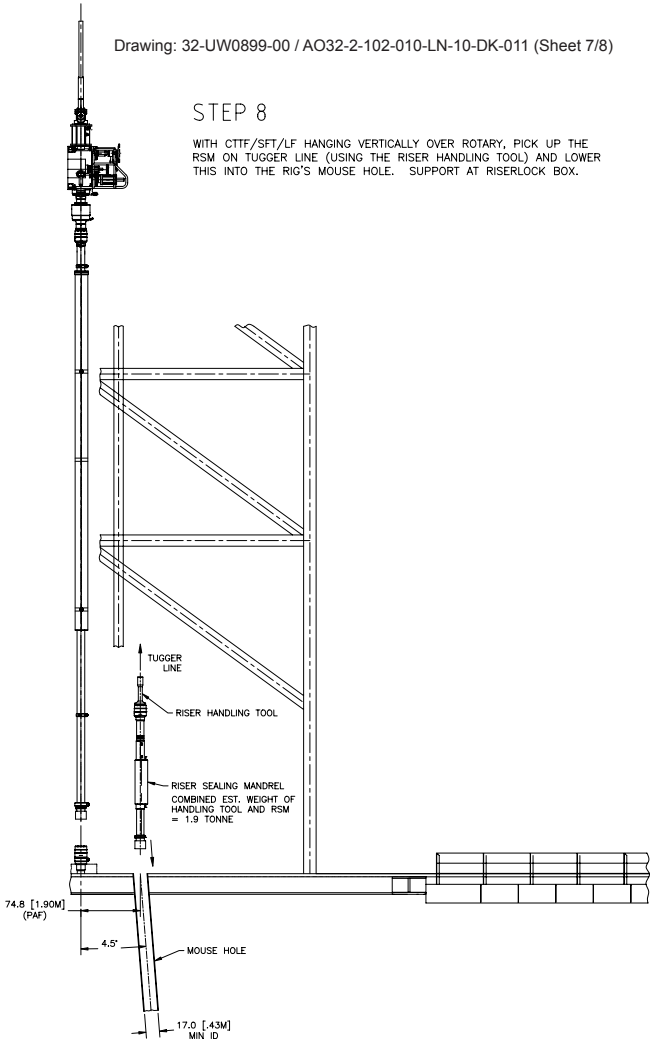
Drawing: 32-UW0899-00 / AO32-2-102-010-LN-10-DK-011 (Sheet 6/8)



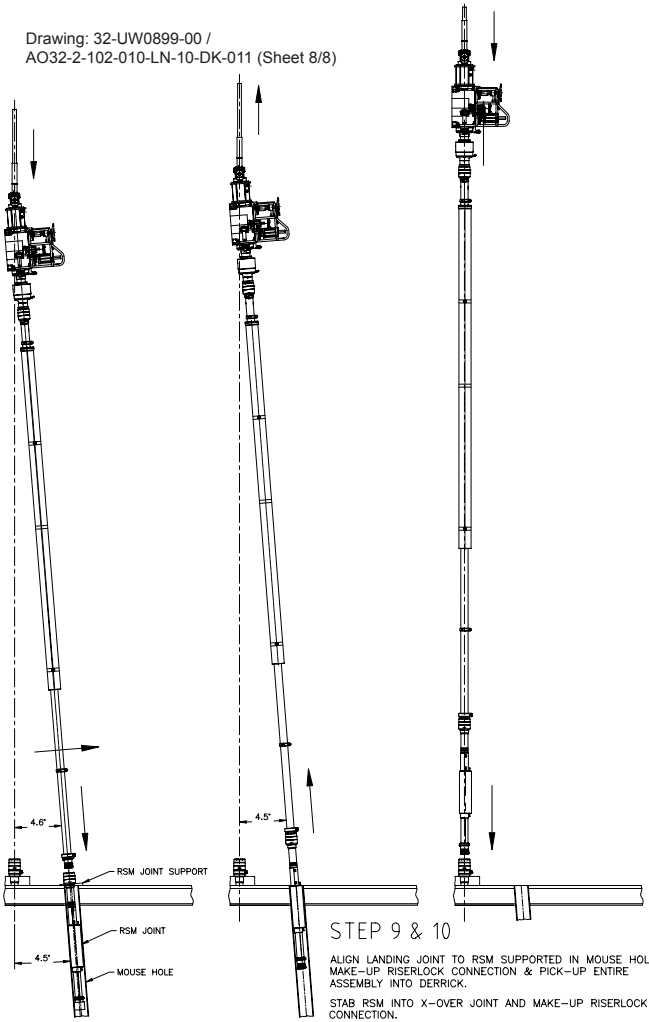
Drawing: 32-UW0899-00 / AO32-2-102-010-LN-10-DK-011 (Sheet 7/8)

STEP 8

WITH CTTF/SFT/LF HANGING VERTICALLY OVER ROTARY, PICK UP THE RSM ON TUGGER LINE (USING THE RISER HANDLING TOOL) AND LOWER THIS INTO THE RIG'S MOUSE HOLE. SUPPORT AT RISERLOCK BOX.



Drawing: 32-UW0899-00 /
AO32-2-102-010-LN-10-DK-011 (Sheet 8/8)



STEP 9 & 10

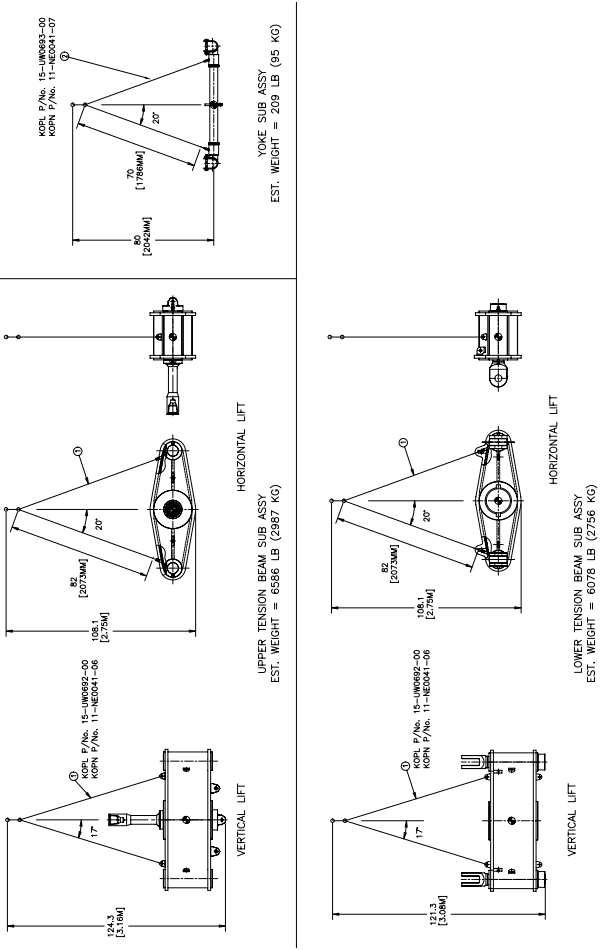
ALIGN LANDING JOINT TO RSM SUPPORTED IN MOUSE HOLE. MAKE-UP RISERLOCK CONNECTION & PICK-UP ENTIRE ASSEMBLY INTO DERRICK.

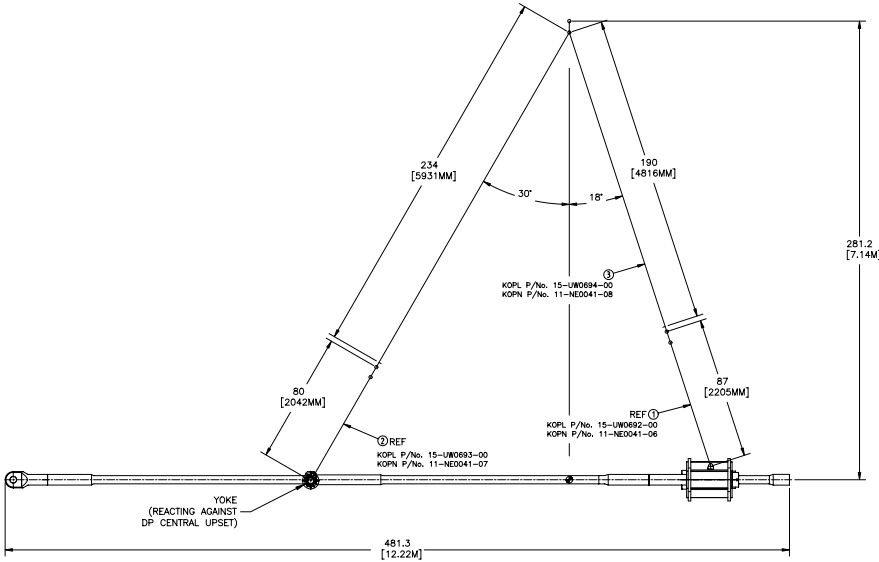
STAB RSM INTO X-OVER JOINT AND MAKE-UP RISERLOCK CONNECTION.

PROCEED TO LAND TUBING HANGER. REFER TO LAYOUT DRG 32-UW0690-00 (A032-2-102-000-LN-10-DW-004) FOR FULL STACK-UP HEIGHT.

7.3.3 Upper WO/C Riser Lifting/Handling Arrangements

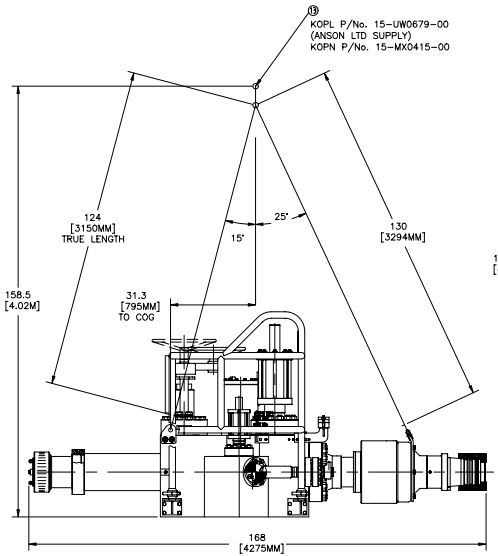
Drawing: 11-UW0375-00 / AO32-2-102-010-LN-10-DK-012 (Sheet 1/7)



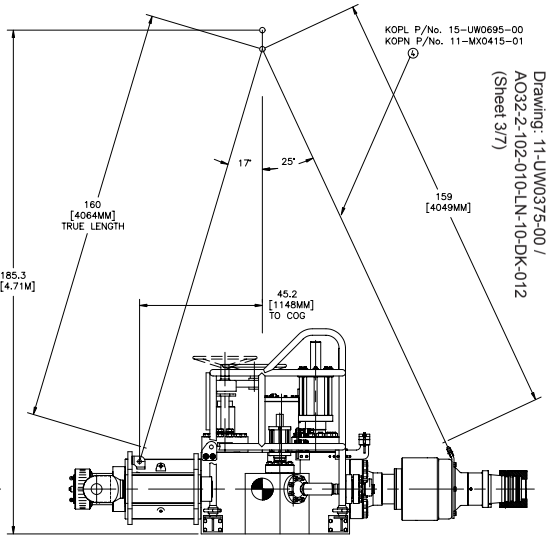


TENSION FRAME UPPER SUB-ASSEMBLY
EST. WEIGHT = 11,538 LB (5,233 KG)

Drawing: 11-UW0375-00 / AO32-2-102-010-LN-10-DK-012 (Sheet 2/7)



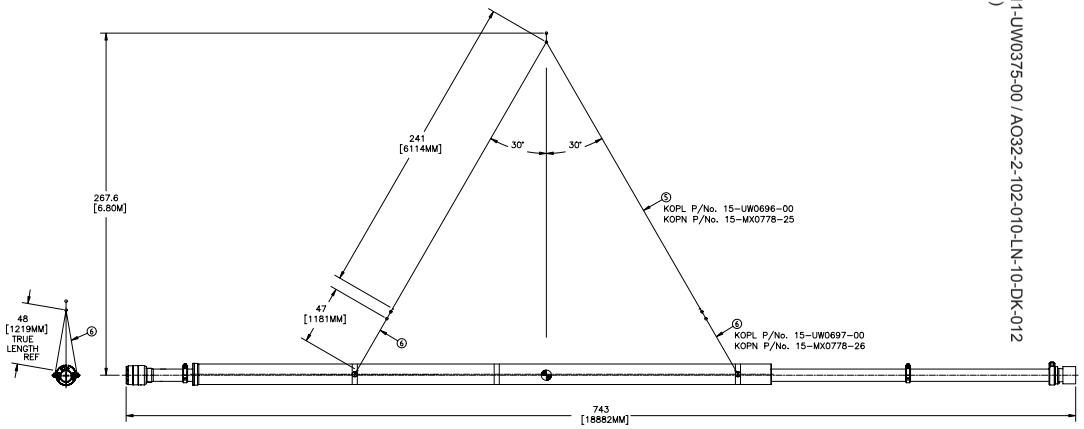
SURFACE FLOW TREE ASSY.
EST. WEIGHT = 18,571 LB (8,424 KG)



SURFACE FLOW TREE (C/W LOWER TENSION BEAM)
EST. WEIGHT = 24,706 LB (11,206 KG)

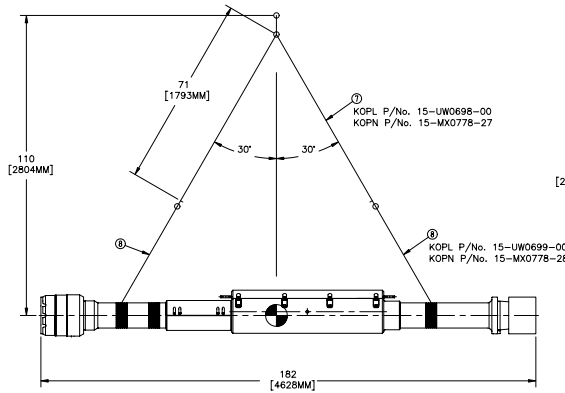
Drawing: 11-UW0375-00 /
AO32-2-102-010-LN-10-DK-012
(Sheet 3/7)

Drawing: 11-UW0375-00 / AO32-2-102-010-LN-10-DK-012
(Sheet 4/7)

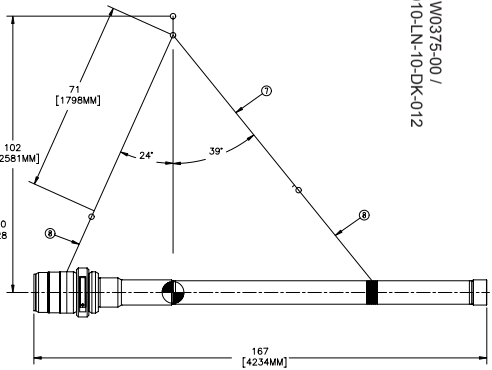


LANDING JOINT ASSEMBLY
EST. WEIGHT = 7,980 LB (3,619 KG)

Drawing: 11-UW0375-00 /
AO32-2-102-010-LN-10-DK-012
(Sheet 5/7)

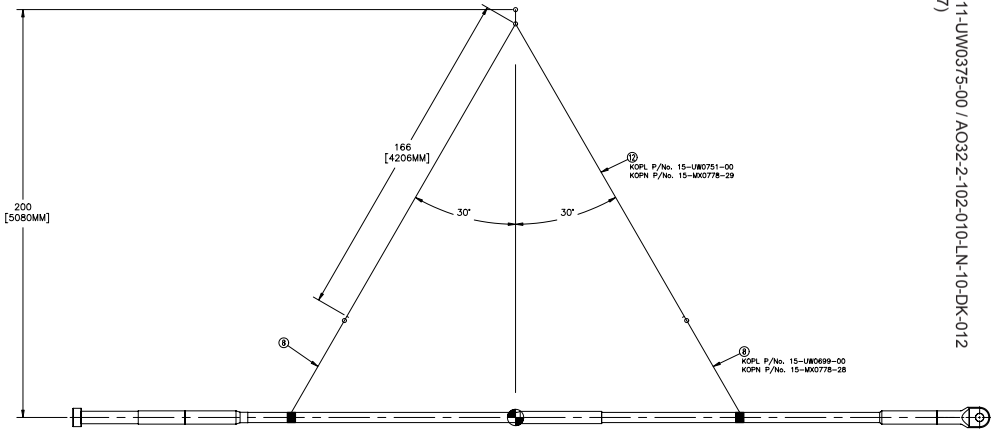


RSM JOINT ASSEMBLY
EST. WEIGHT = 3,456 LB (1,567 KG)



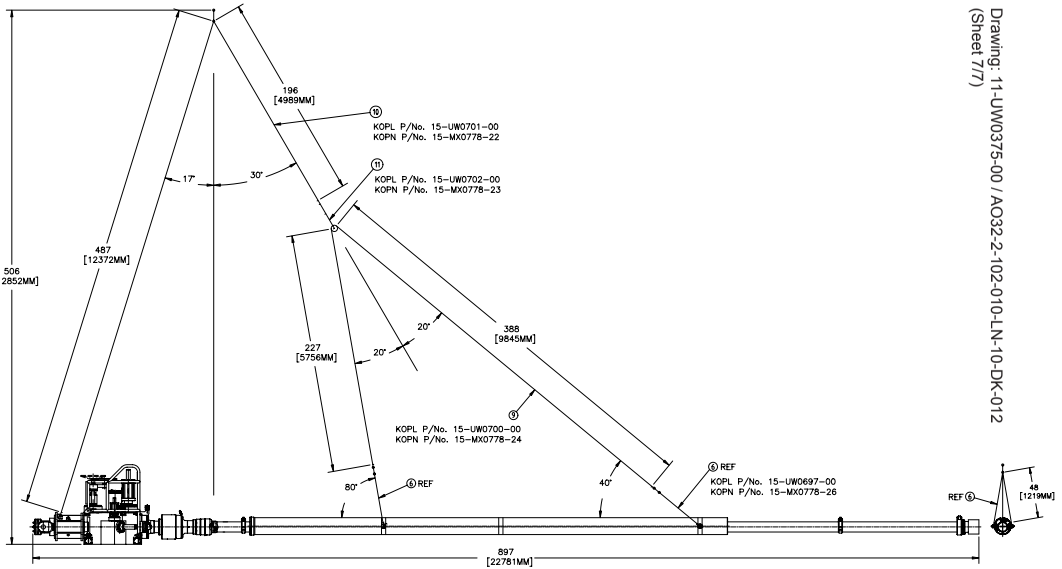
X-OVER JOINT ASSEMBLY
EST. WEIGHT = 1602 LB (726 KG)

Drawing: 11-UW0375-00 / AO32-2-102-010-LN-10-DK-012
(Sheet 6/7)



CTTF TENSION LEG SUB-ASSY
EST. WEIGHT = 2372 LB (1076 KG)

Drawing: 11-UW0375-00 / AO32-2-102-010-LN-10-DK-012
(Sheet 7/7)



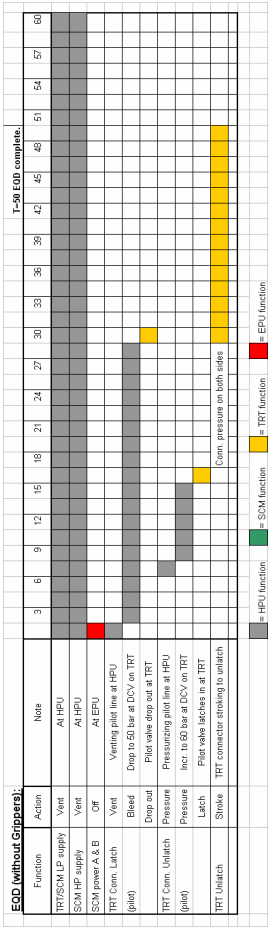
SURFACE FLOW TREE / LOWER TENSION BEAM / LANDING JOINT
EST. WEIGHT = 32,686 LB (14,826 KG)

7.4 System Schematics and logics

7.4.1 Workover System PSD, ESD and EQD sequences

TH Mode

TRT Mode



Legend for the WOCS System Schematics (TH and TRT mode) - Next 6 pages:

SYMBOL	DESCRIPTION/FUNCTION
	- ROV STAB
PT	- PRESSURE TRANSDUCER
TT	- TEMPERATURE TRANSDUCER
ZT	- POSITION TRANSMITTER
P	- PRESSURE GAUGE
	- ROV OPERATED
	- HYDR. FAIL SAFE CLOSE W/ROV OVERRIDE
	- MANUALLY OPERATED
	- ORIFICE FLANGE ASSEMBLY
	- GATE VALVE
	- RIGHT ANGLE EXTERNAL SLEEVE CHOKE VALVE
	- SHUTTLE VALVE
	- CHECK VALVE
	- HYDRAULIC COUPLING WITH CHECK VALVE
	- VENTING HYDRAULIC COUPLING
	- DUMMY HYDRAULIC COUPLING
	- VALVE
	- FILTER
	- ELECTRICAL CONNECTION STABPLATE MAKE-UP
	- ELECTRICAL CONNECTION ROV MAKE-UP
	- PILOT VALVE
	- RELIEF VALVE

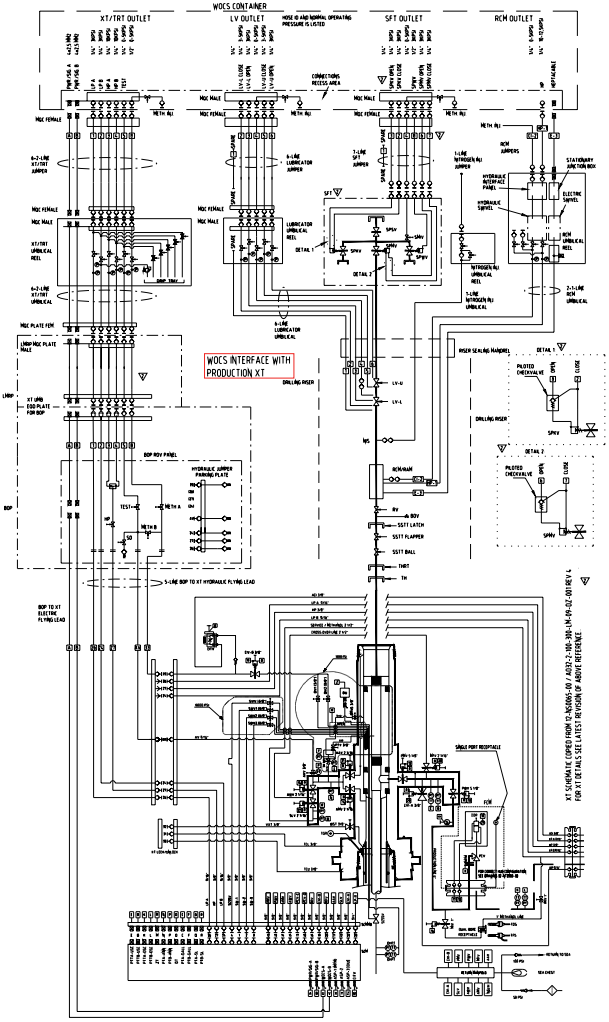
WO VALVE/FUNCTION DESCRIPTIONS:	
- HP	HP LINE ISOLATION VALVE
- SD	SEA DUMP ISOLATION
- TEST	TEST LINE ISOLATION
- METH A	METH LINE ISOLATION
- METH B	TEST LINE TO METH LINE X-OVER
- SPKV	SURFACE PRODUCTION KILL VALVE
- SPMV	SURFACE PRODUCTION MASTER VALVE
- SMV	SURFACE METHANOL INJECTION VALVE
- SPSV	SURFACE PRODUCTION SWAB VALVE
- SPWV	SURFACE PRODUCTION WING VALVE
- LV-U	UPPER LUBRICATOR VALVE
- LV-L	LOWER LUBRICATOR VALVE
- RV	RETAINER VALVE
- BOV	BLEED OFF VALVE
- SSIT	SUBSEA TEST TREE
- THRT	THRT, LATCH/UNLATCH
- TH	TH, LOCK/UNLOCK
- N/S	NITROGEN INJECTION SUB

	- ROV OPERATED
	- 2 POSITIONS 3 WAY VALVE, HYDRAULIC PILOTED
	- 2 POSITIONS 4 WAY VALVE, HYDRAULIC PILOTED
	- 3 POSITIONS, 4 WAY VALVE, ROV OPERATED
	- ISOLATION VALVE, ROV OPERATED
	- 3 WAY VALVE, ROV OPERATED
	- ISOLATION VALVE, HAND OPERATED
	- RELIEF VALVE
	- CHECK VALVE
	- ACCUMULATOR (BLADDER)
	- CUTTING LOOP

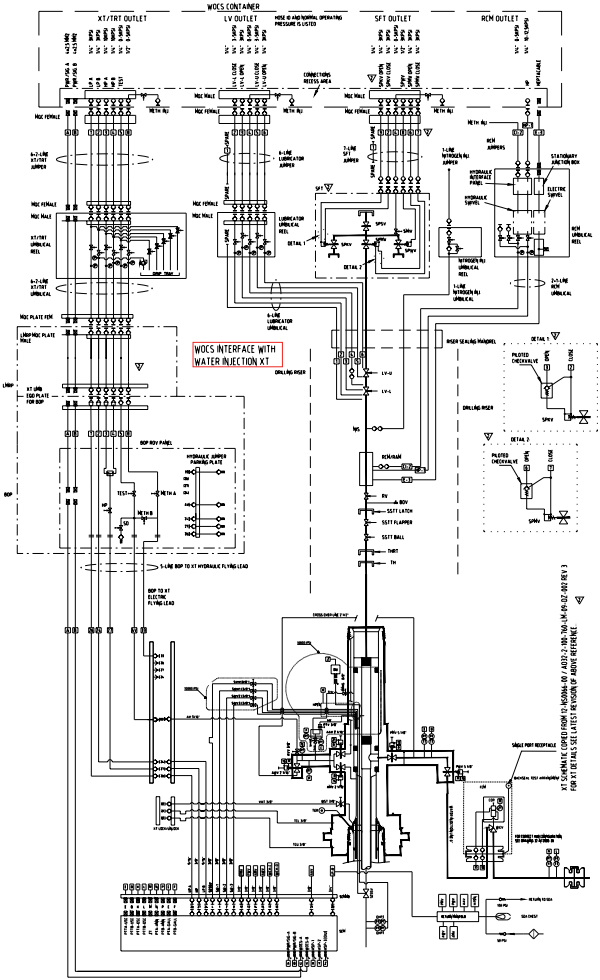
ADV	- ACCUMULATOR DRAIN VALVE
AV	- ANNULUS VENT
CV	- CUTTING VALVE
LP	- LOW PRESSURE
WST	- WELLHEAD SEAL TEST
WAV	- WST / AV
HP	- HIGH PRESSURE
TRT C L/U	- TRT CONNECTOR LATCH / UNLATCH
TRT GR L/U	- TRT GRIPPERS LATCH/ UNLATCH
XT MECH L/U	- XT MECHANICAL LOCK/ UNLOCK
XT L/U	- XT LOCK / UNLOCK
PWR./SIG	- POWER AND SIGNAL
MECH.	- MECHANICAL
GBS	- GUILLOTINE BLINDSTAB

7.4.2 WOS System Schematics - TH Mode

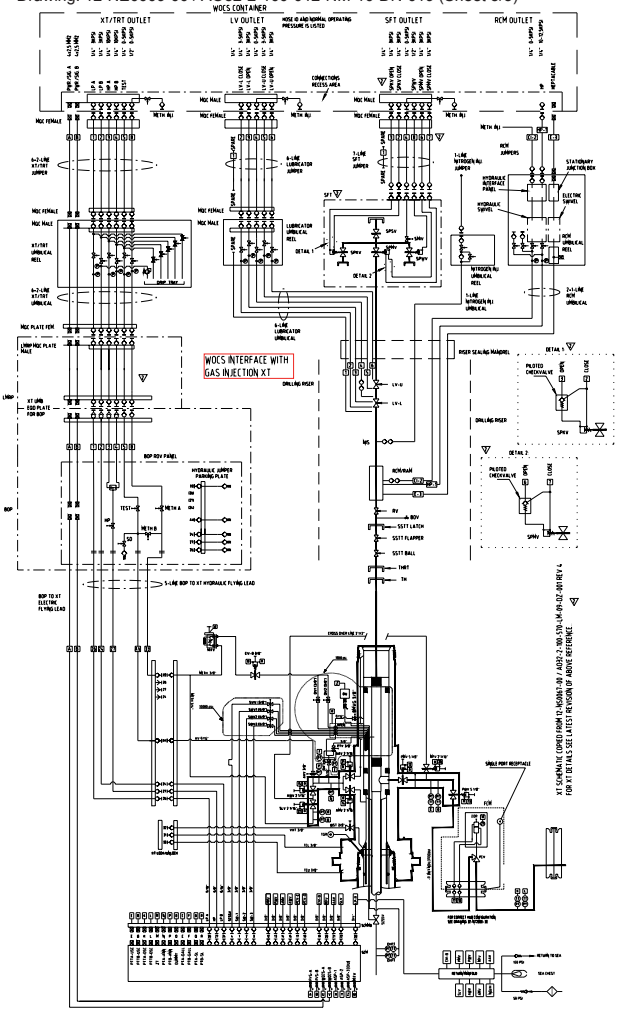
Drawing: 12-NE0009-00 / AO32-2-100-012-NM-10-DN-019 (Sheet 1/3)



Drawing: 12-NE0009-00 / AO32-2-100-012-NM-10-DN-019 (Sheet 2/3)

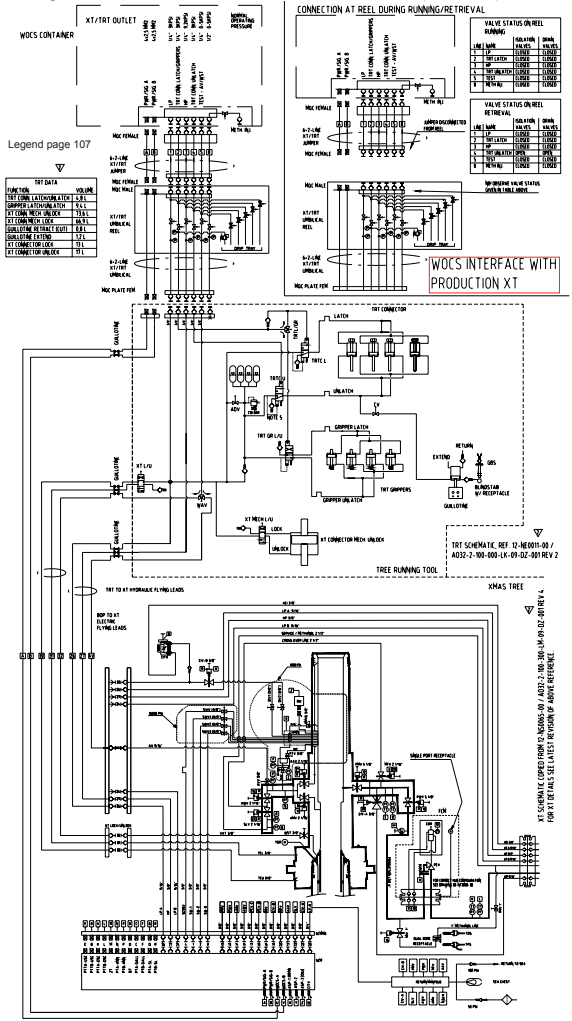


Drawing: 12-NE0009-00 / AO32-2-100-012-NM-10-DN-019 (Sheet 3/3)

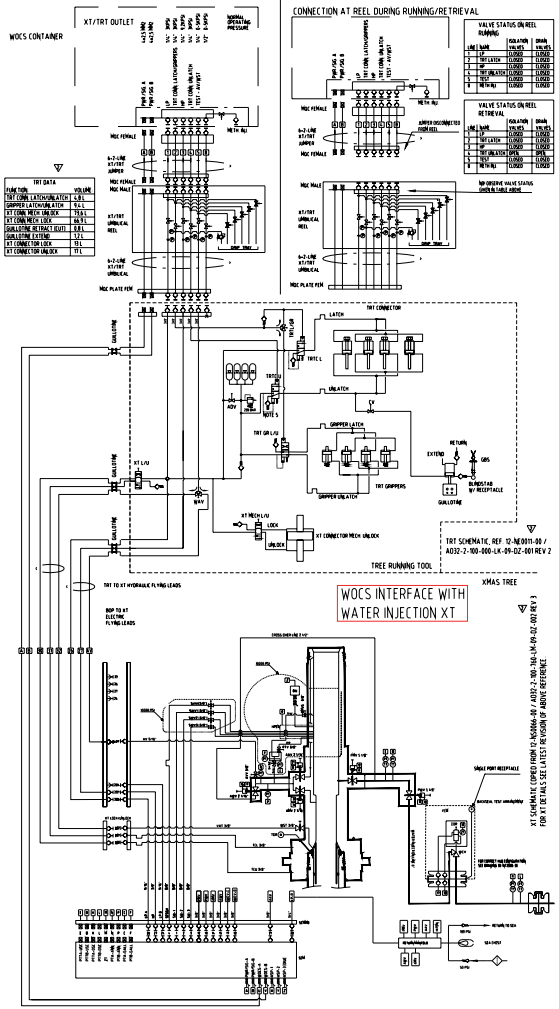


7.4.3 WOS System Schematics - TRT Mode

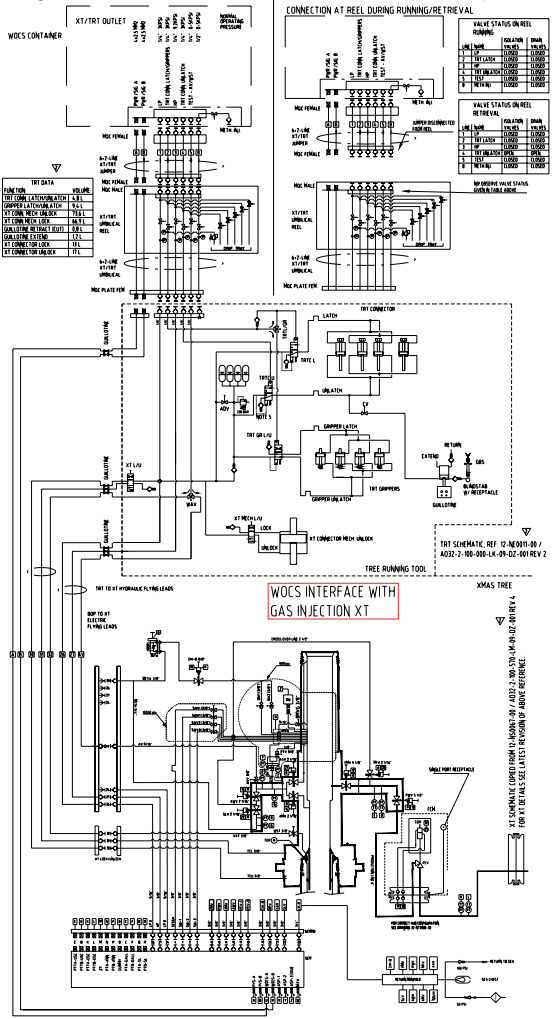
Drawing: 12-NE0010-00 / AO32-2-100-012-NM-10-DN-018 (Sheet 1/3)



Drawing: 12-NE0010-00 / AO32-2-100-012-NM-10-DN-018 (Sheet 2/3)



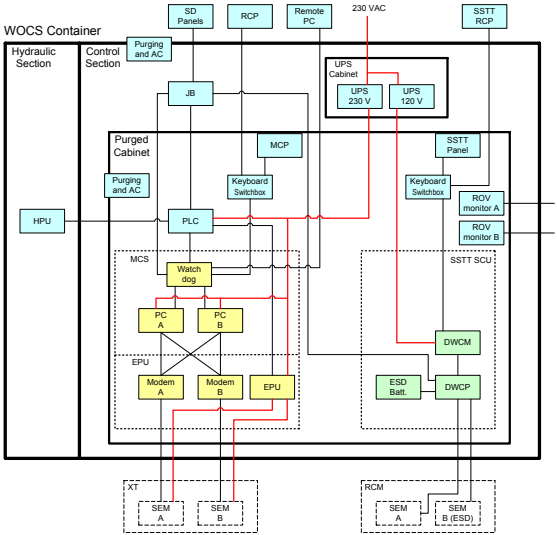
Drawing: 12-NE0010-00 / AO32-2-100-012-NM-10-DN-018 (Sheet 3/3)



7.5 WOCS Schematics and logics

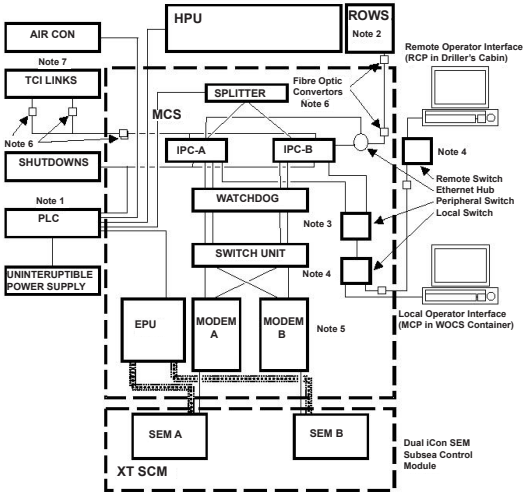
7.5.1 WOCS General Arrangement

The WOCS Container to be split in hydraulic section and control section. The hydraulic section holds tanks, pumps, accumulators, filters, flowmeters, regulators, control valves and flushing facility. The control section holds MCS, PLC, MCP, SSTT SCU, ROV monitors and UPS. All non Ex equipment shall be inside a common air purged cabinet.



The Dalia Workover Control System (WOCS) is a standard KOP dual-redundant Master Control Station (MCS), consisting of two Industrial Personal Computers (IPC) running KOP SMACS5 software in a hot standby configuration. A watchdog system promotes the standby IPC to online in the event of the online IPC failing.

The KOP scope of supply is the MCS and the Electrical Power Unit (EPU) within the purged cabinet, and the Remote Operator Workstation (ROWS). The following diagram shows the MCS and its interfaces to external equipment.



1. This will be a third-party PLC that interfaces to the Hydraulic Power Unit, Purging and Air Conditioning (for the WOCS container), Electrical Power Unit and Shutdown panels. It will communicate with the MCS via a serial link.

2. The Remote Operator Workstation will provide facilities to monitor the MCS but not control it. It will be possible to offload MCS data at the ROWS. It will communicate with the MCS via Ethernet over a fibre optic connection.

3. The Peripheral Switch (Servswitch unit) will connect the MCS peripherals (2-off display screen, keyboard and tracker ball, supplied by Hitec and at local and remote locations) to the online or standby IPC, as selected by the operator. The online IPC will normally be used for MCS control and monitoring

4. The Local and Remote switches (supplied by Hitec) will connect either the Local Operator Interface or the Remote Operator Interface to an IPC (either the online or standby, as determined by the Peripheral Switch).

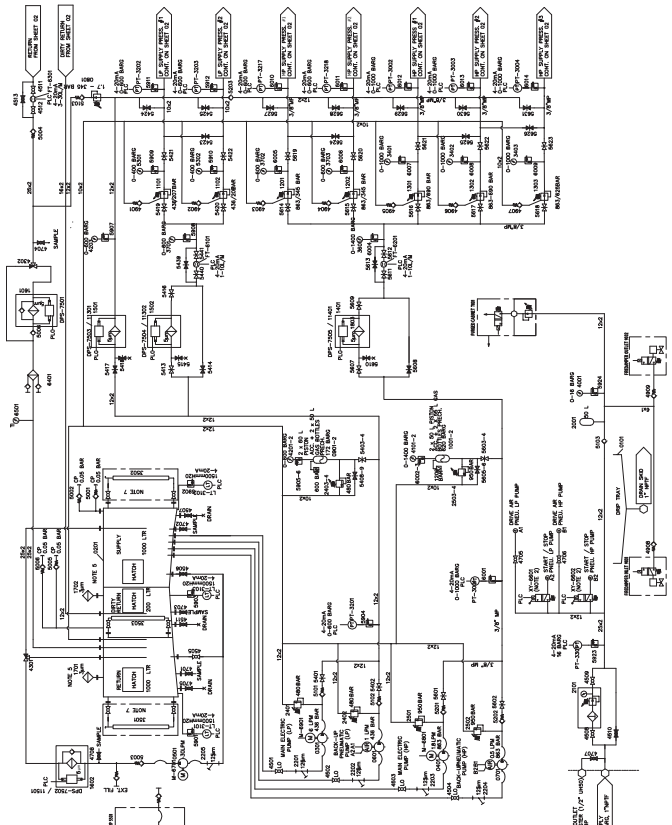
5. Two modems will be provided for two subsea communications lines, one communications line to each SEM (A and B) of the iCon SCM.

6. Fibre optic converters and cabling, for connection to the ROWS and the Remote Operator Interface, and for the Transparent Communications Interface (TCI) links, will be supplied by Hitec.

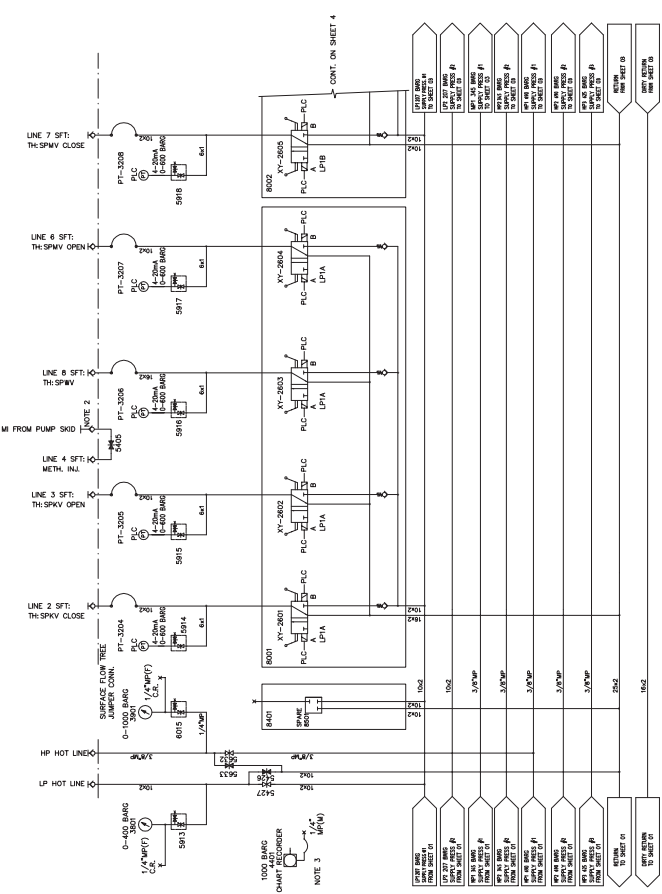
7. The TCI links will consist of RS-232 sockets external to the purged cabinet. Third-party vendors will be able to connect their computer equipment to these sockets and communicate with the serial devices attached to each SEM of each iCon SCM via TCI software in the MCS.

7.5.2 WOCS Container Hydraulic Schematic

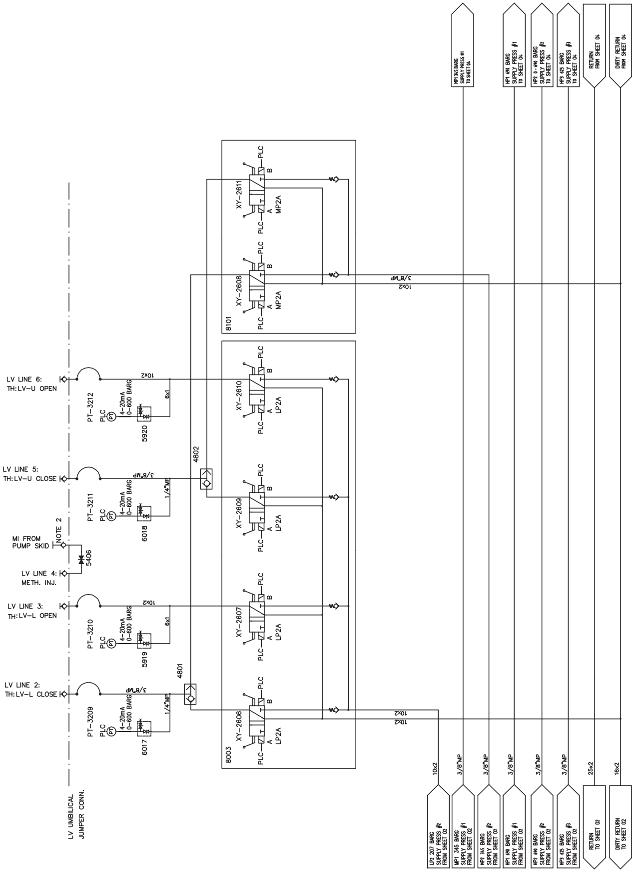
Drawing: P109217-0012 / AO32-2-100-012-NM-10-DN-010 (Sheet 1/4)



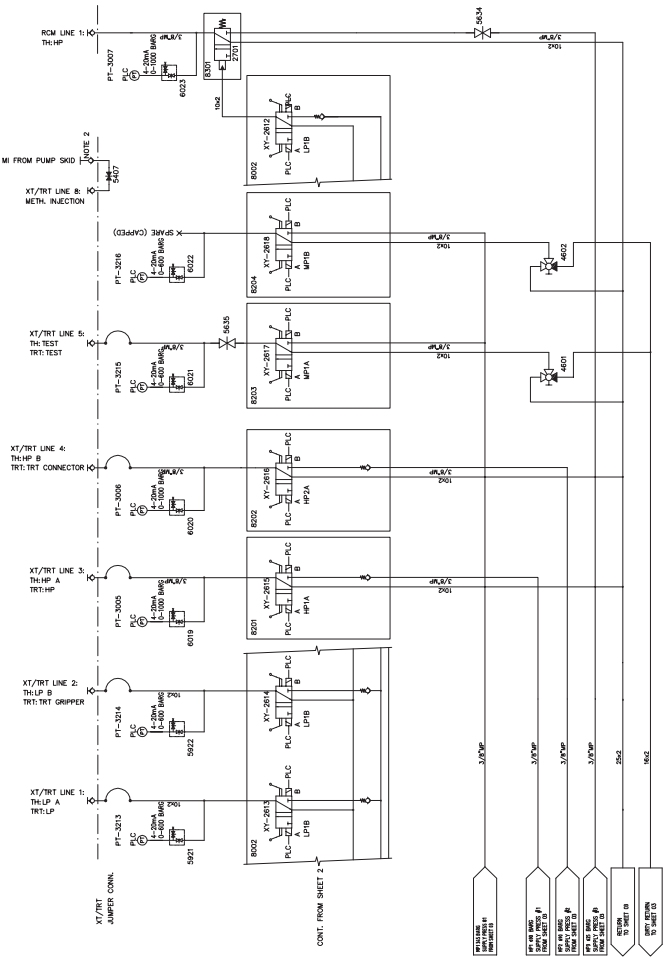
Drawing: P109217-0012 / AO32-2-100-012-NM-10-DN-010 (Sheet 2/4)



Drawing: P109217-0012 / AO32-2-100-012-NM-10-DN-010 (Sheet 3/4)

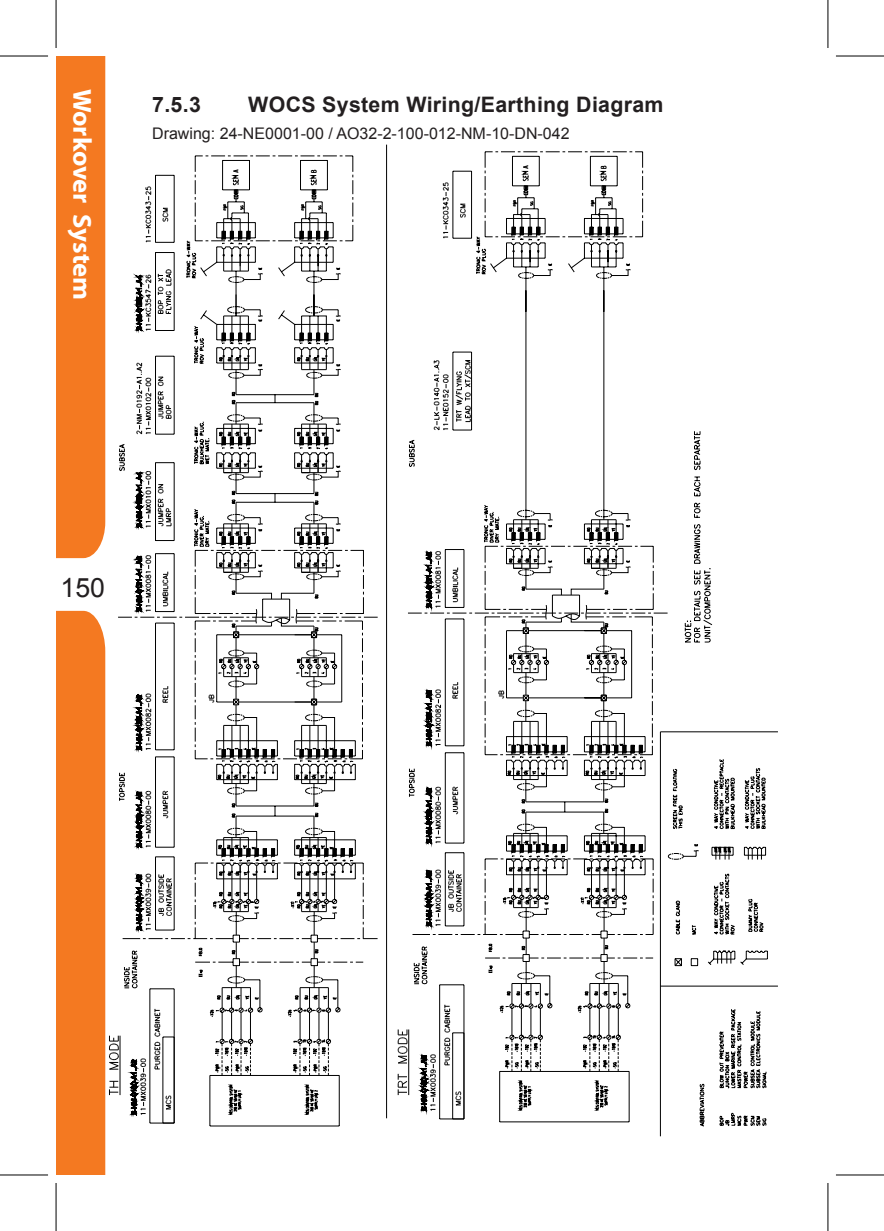


Drawing: P109217-0012 / AO32-2-100-012-NM-10-DN-010 (Sheet 4/4)



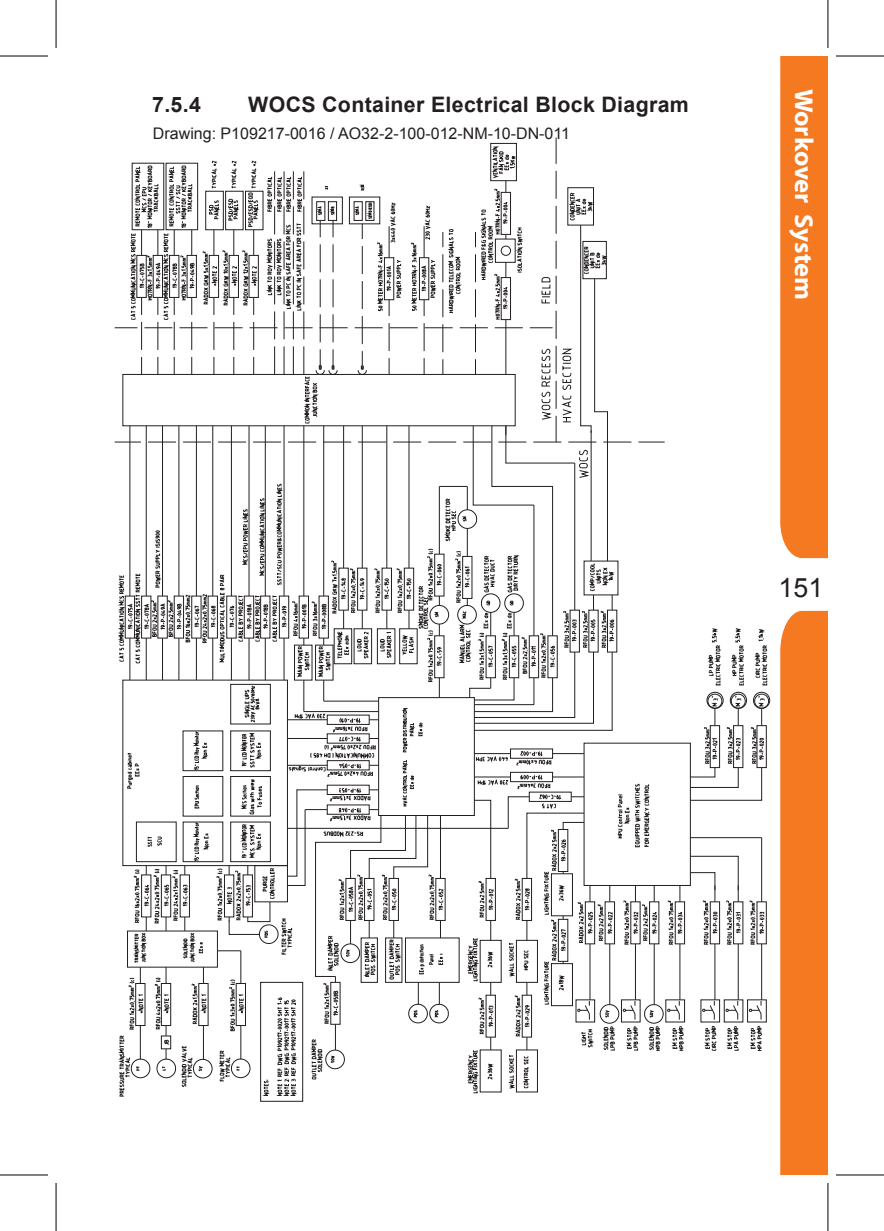
7.5.3 WOCS System Wiring/Earthing Diagram

Drawing: 24-NE0001-00 / AO32-2-100-012-NM-10-DN-042



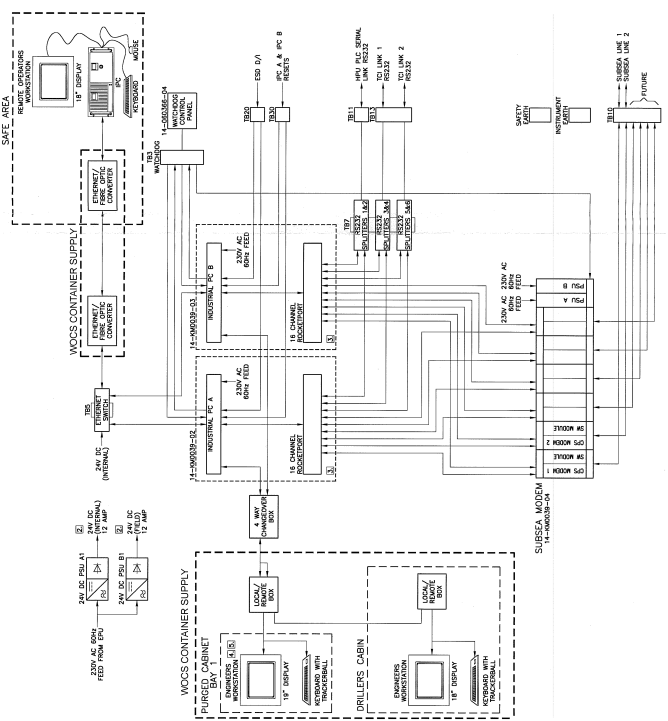
7.5.4 WOCS Container Electrical Block Diagram

Drawing: P109217-0016 / AO32-2-100-012-NM-10-DN-011



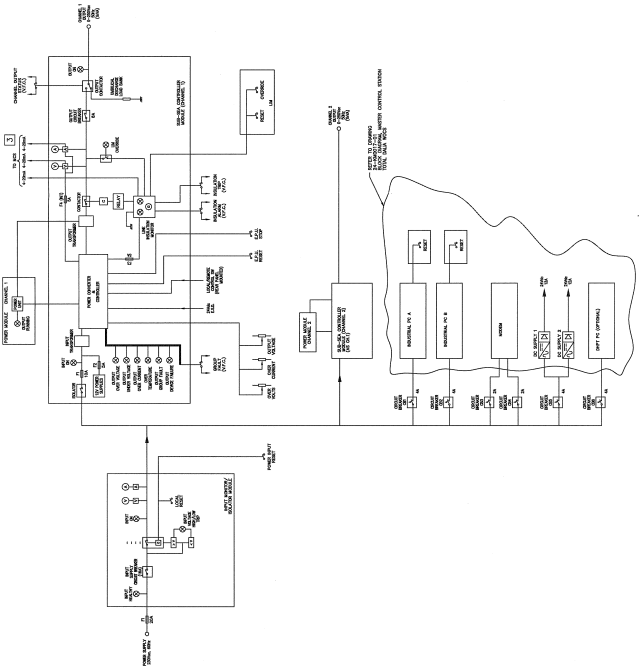
7.5.5 WOCS MCS & EPU Block Diagram

Drawing: 21-KM0017-01 / AO32-2-101-012-NM-10-DN-003



7.5.6 WOCS EPU Electric Schematic One-Line Diagram

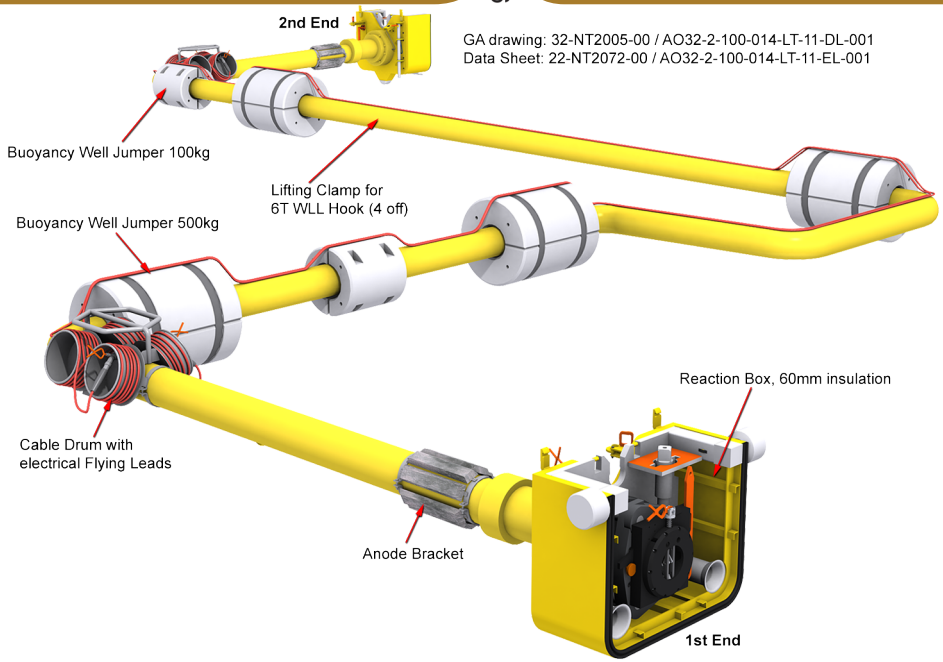
Drawing: 24-KE0210-86 / AO32-2-101-012-NM-10-DN-005



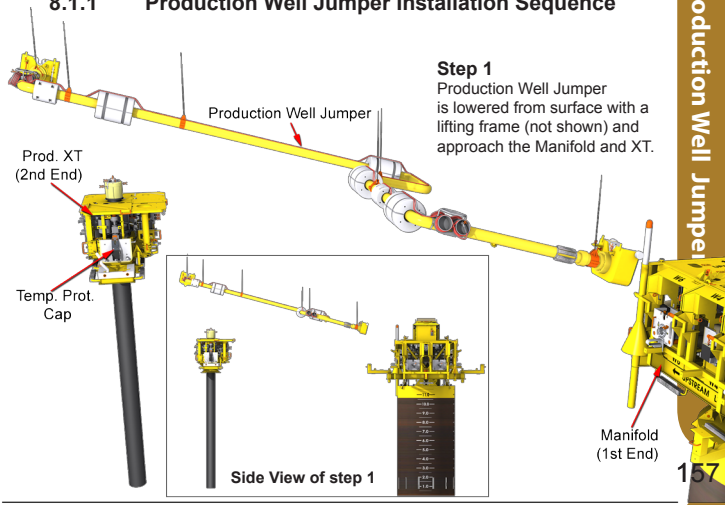
Comments / Notes

Table of contents

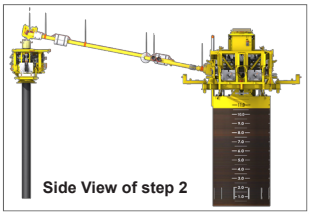
GA drawing: 32-NT2005-00 / AO32-2-100-014-LT-11-DL-001
Data Sheet: 22-NT2072-00 / AO32-2-100-014-LT-11-EL-001



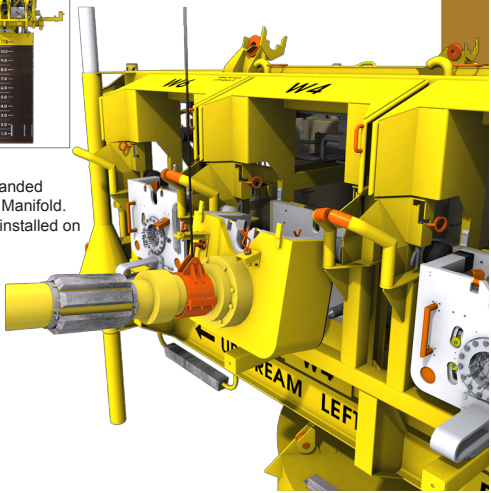
8.1.1 Production Well Jumper Installation Sequence

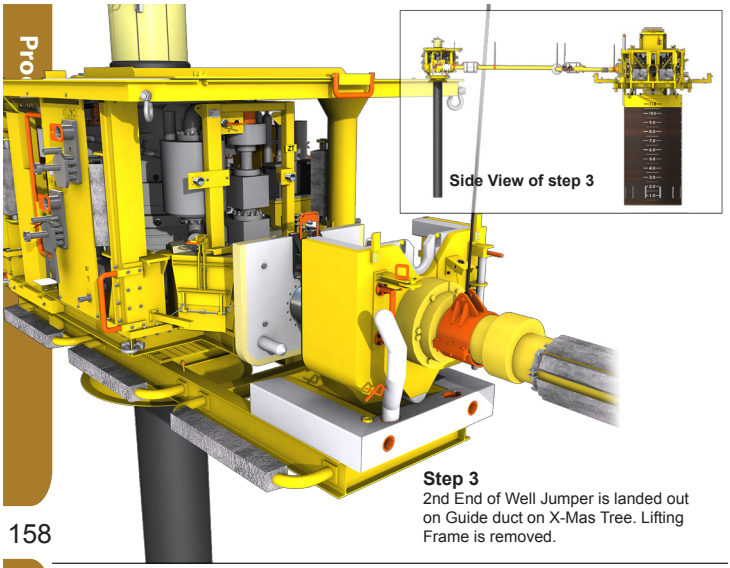


Step 1
Production Well Jumper is lowered from surface with a lifting frame (not shown) and approach the Manifold and XT.

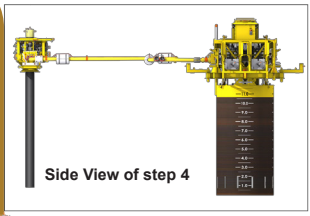


Step 2
1st End of Well Jumper is landed out and guided in place on Manifold. Temporary Protection Cap installed on Manifold Hub.

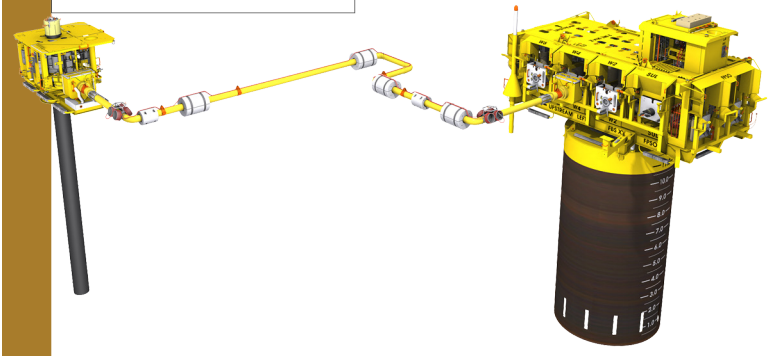




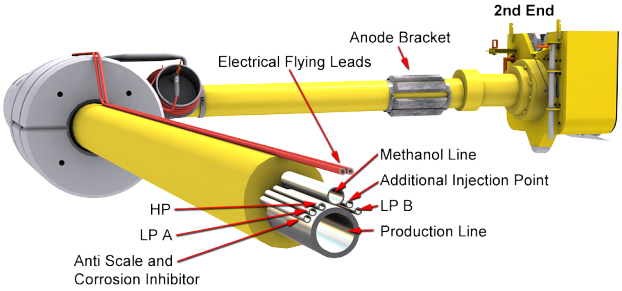
Step 3
2nd End of Well Jumper is landed out on Guide duct on X-Mas Tree. Lifting Frame is removed.

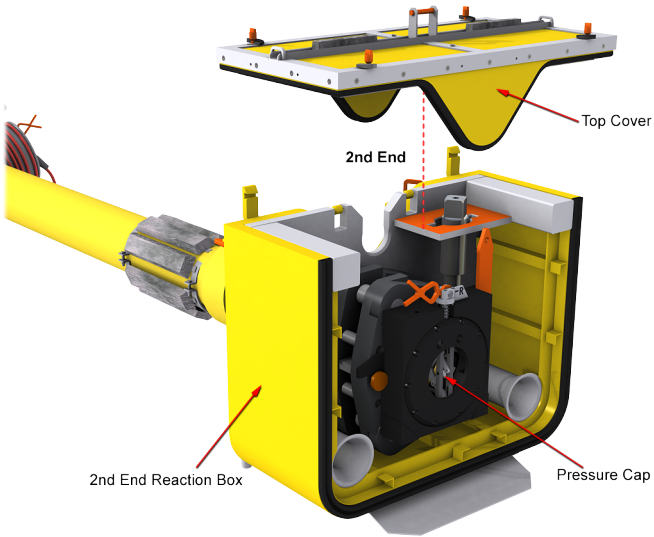


Step 4
Temporary Caps are removed and ROV equiped with Stroke Tool strokes 1st and 2nd End to final position. Then Top Covers are installed on both ends.



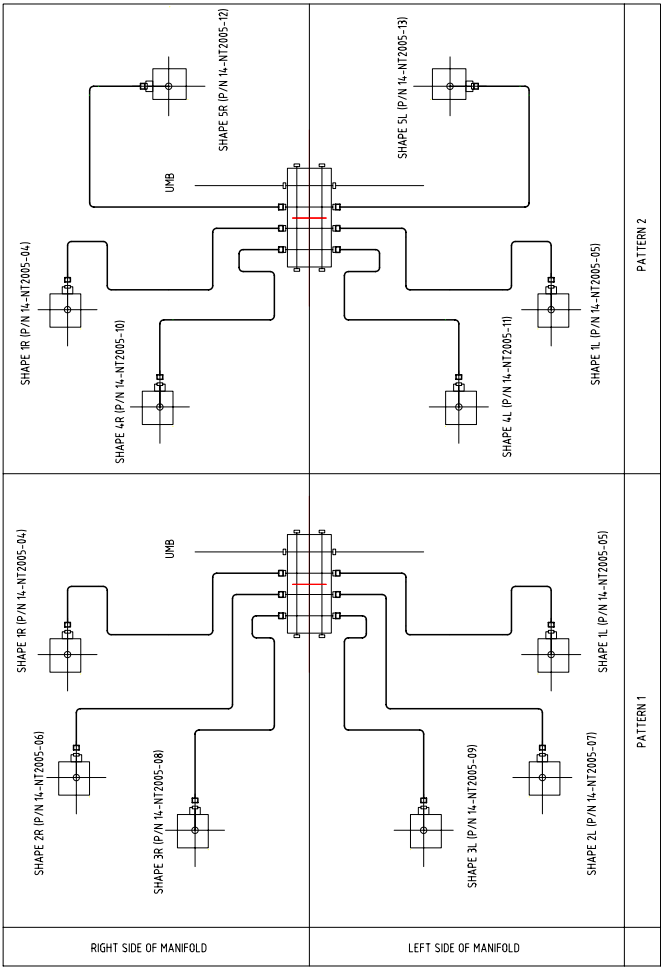
8.2 Production Well Jumper Details





8.3 Basic PWJ shapes

Drawing: 32-NT2005-03 / AO32-2-100-014-LT-11-DL-004



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9.1 Top Assembly List

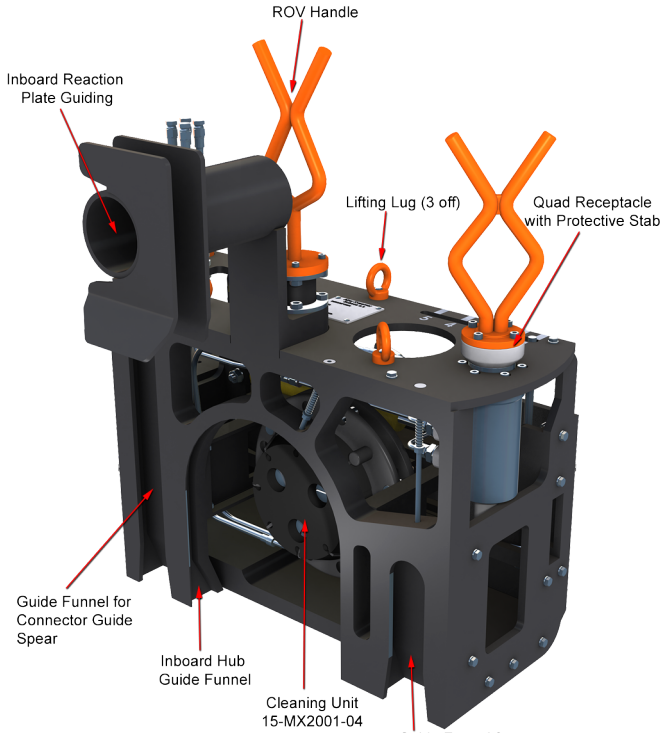
From 'Top Assembly Drawing': 32-NT2000-00 / A032-2-100-014-LT-13-DK-017

	GA drawing (AKS numbers)	GA drawing (TFEA numbers)
Tools		
Stroke Tool	32-NT2000-13	AO32-2-100-014-LT-13-DK-013
12"/MB/SU Seal Surface Cleaning Tool	32-NT2000-14	AO32-2-100-014-LT-13-DK-014
12"/MB/SU Seal Replacement Tool	32-NT2000-15	AO32-2-100-014-LT-13-DK-015
6" Seal Replacement Tool	32-NT2000-36	AO32-2-100-014-LT-13-DK-026
6" Seal Surface Cleaning Tool	32-NT2000-37	AO32-2-100-014-LT-13-DK-027
Connection System		
Umbilical Termination Head	32-NT2000-04	AO32-2-100-014-LY-13-DK-004
6" 1st & 2nd End Interface	32-NT2000-49	AO32-2-100-014-LT-13-DK-038
6" 1st & 2nd End Interface (Insulated)	32-NT2000-50	AO32-2-100-014-LT-13-DK-039
12" SB Spool 1st & 2nd End	32-NT2000-52	AO32-2-100-014-LT-13-DK-049
Gas Injection Jumper Connection Points	32-NT2000-53	AO32-2-100-014-LT-13-DK-050
Gas Injection SDU Valve Panel	32-NT2000-54	AO32-2-100-014-LY-13-DK-001
Water Injection SDU Valve Panel	32-NT2000-55	AO32-2-100-014-LY-13-DK-002
Umbilical Termination Head Orientation	32-NT2000-58	AO32-2-100-014-LY-13-DK-003
Umbilical Termination Lifting Yoke	32-NT2000-59	AO32-2-100-014-LT-13-DK-062
2nd End Porch	32-NT2000-46	AO32-2-100-014-LT-13-DK-035
2nd End Porch	32-NT2000-47	AO32-2-100-014-LT-13-DK-036
6" Orientable Porch	32-NT2000-48	AO32-2-100-014-LT-13-DK-037
Clamp Connectors & Seals		
6" Clamp Connector	32-NT2000-01	AO32-2-100-014-LT-13-DK-001
12" Clamp Connector	32-NT2000-02	AO32-2-100-014-LT-13-DK-002
Multi Bore Clamp Connector	32-NT2000-03	AO32-2-100-014-LT-13-DK-002
12" Clamp Connector Body	32-NT2000-11	AO32-2-100-014-LT-13-DK-011
Multi Bore Umbilical Clamp Connector	32-NT2000-18	AO32-2-100-014-LT-13-DK-030
12" MB FCM Clamp Connector	32-NT2000-29	AO32-2-100-014-LT-13-DK-005
Seals and Seal Casettes	32-NT2000-41	AO32-2-100-014-LT-13-DK-047
Hubs		
6" (146) Outboard Hub	32-NT2000-19	AO32-2-100-014-LT-13-DK-019
6" (146) Inboard Hub	32-NT2000-20	AO32-2-100-014-LT-13-DK-020
12" (285) Outboard Hub (CS+SD)	32-NT2000-21	AO32-2-100-014-LT-13-DK-028
12" (285) Inboard Hub (CS+SD)	32-NT2000-22	AO32-2-100-014-LT-13-DK-018
Multi Bore (MB) Outboard Hub	32-NT2000-23	AO32-2-100-014-LT-13-DK-024
MB 12"-5"/2" & 5 HC Inboard Hub Manifold	32-NT2000-24	AO32-2-100-014-LT-13-DK-025
Main Umbilical Outboard Hub	32-NT2000-25	AO32-2-100-014-LT-13-DK-021
Main Umbilical Inboard Hub	32-NT2000-26	AO32-2-100-014-LT-13-DK-022
MB 12"-5"/2" Outboard Hub GI (CS)	32-NT2000-27	AO32-2-100-014-LT-13-DK-051
12"-5" Inboard Hub GI XT	32-NT2000-28	AO32-2-100-014-LT-13-DK-004
12" MB Lower FCM Hub	32-NT2000-30	AO32-2-100-014-LT-13-DK-059
12" MB Upper FCM Hub	32-NT2000-31	AO32-2-100-014-LT-13-DK-060
MB 12"-5"/2" & 5 HC Inboard Hub XT	32-NT2000-57	AO32-2-100-014-LT-13-DK-056
Caps		
Inboard 6" Pressure Cap	32-NT2000-06	AO32-2-100-014-LT-13-DK-006
12" Test / Flush Cap Kit	32-NT2000-07	AO32-2-100-014-LT-13-DK-007
6" Test / Flush Cap Kit	32-NT2000-08	AO32-2-100-014-LT-13-DK-008
12" Test / Flush Cap (SB)	32-NT2000-09	AO32-2-100-014-LT-13-DK-009
12" OB Hydrostatic Pressure Cap (MB/SB)	32-NT2000-10	AO32-2-100-014-LT-13-DK-010
6" OB Pressure Cap XMT Side (WI)	32-NT2000-16	AO32-2-100-014-LT-13-DK-016
SU Pressure / Monitoring Cap (For offshore use)	32-NT2000-17	AO32-2-100-014-LT-13-DK-052
Inboard 12" MB Hydrostatic Pressure Cap	32-NT2000-32	AO32-2-100-014-LT-13-DK-053
Inboard 12" SU Hydrostatic Pressure Cap	32-NT2000-33	AO32-2-100-014-LT-13-DK-054
12" Test / Flush Cap (SU)	32-NT2000-34	AO32-2-100-014-LT-13-DK-032
Inboard 12" Multi Bore Pressure Cap	32-NT2000-35	AO32-2-100-014-LT-13-DK-023
6" Outboard Hydrostatic Pressure Cap ILT Side (WI/GI)	32-NT2000-38	AO32-2-100-014-LT-13-DK-029
Inboard 12" Hydrostatic Pressure Cap (SB)	32-NT2000-39	AO32-2-100-014-LT-13-DK-033
Outboard 12" Multi Bore Pressure Cap	32-NT2000-40	AO32-2-100-014-LT-13-DK-034
Inboard 6" Hydrostatic Protection Cap	32-NT2000-42	AO32-2-100-014-LT-13-DK-048
12" IB Temporary Protection Cap	32-NT2000-43	AO32-2-100-014-LT-13-DK-058
6" IB Temporary Protection Cap	32-NT2000-44	AO32-2-100-014-LT-13-DK-057
12" Inboard SB High Pressure Cap	32-NT2000-45	AO32-2-100-014-LT-13-DK-061
12" Inboard SU High Pressure Cap	32-NT2000-56	AO32-2-100-014-LT-13-DK-055

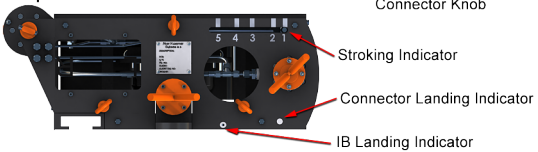
9.2 Tie-in ROV tools

9.2.1 6” Cleaning Tool

GA drawing: 32-NT2000-37 / AO32-2-100-014-LT-13-DK-027
Data Sheet: 22-NT2009-01 / AO32-2-100-014-LS-13-EK-015

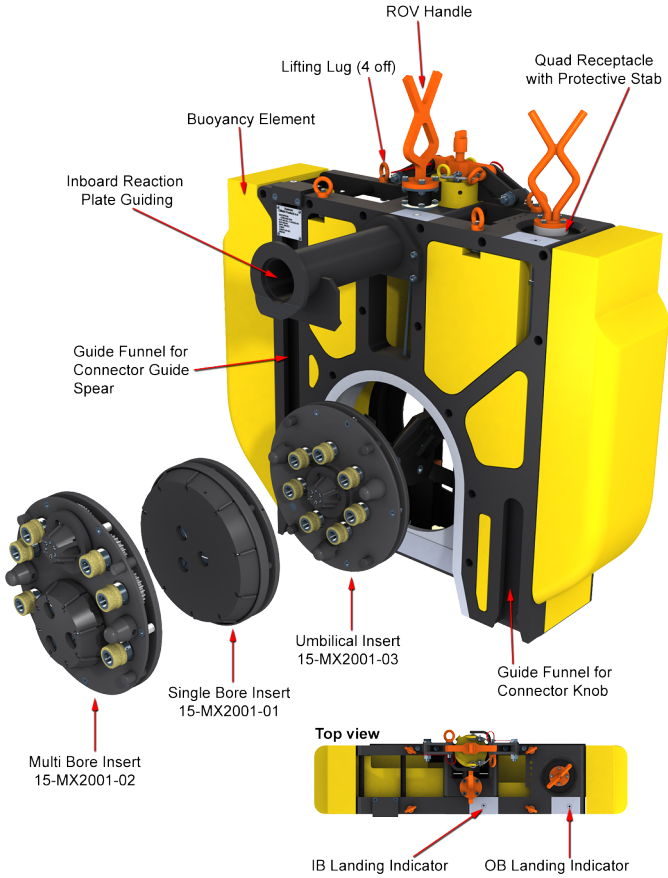


Top view



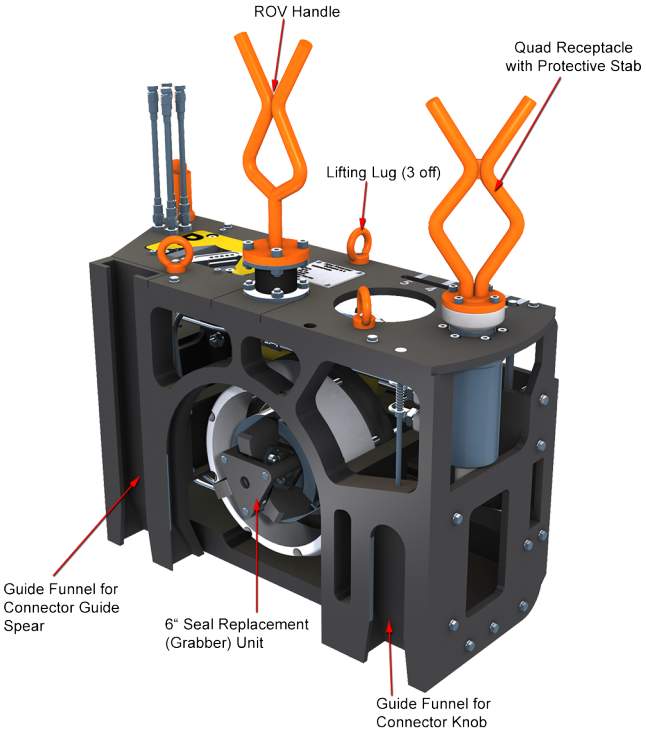
9.2.2 12” Cleaning Tool

GA drawing: 32-NT2000-14 / AO32-2-100-014-LT-13-DK-014
Data Sheet: 22-NT2009-03 / AO32-2-100-014-LS-13-EK-017



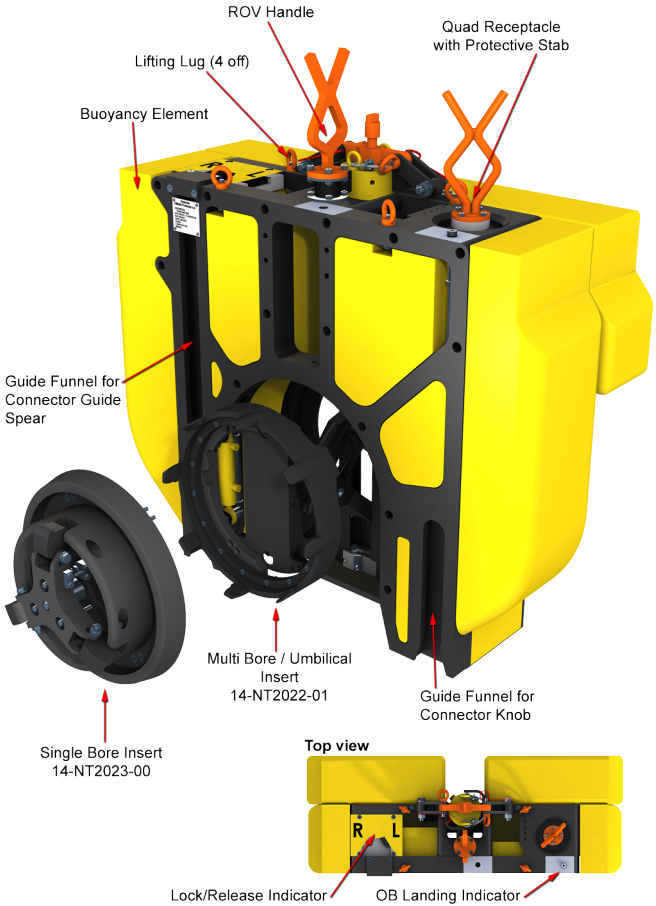
9.2.3 6” Seal Replacement Tool

GA drawing: 32-NT2000-36 / AO32-2-100-014-LT-13-DK-026
Data Sheet: 22-NT2009-02 / AO32-2-100-014-LS-13-EK-016



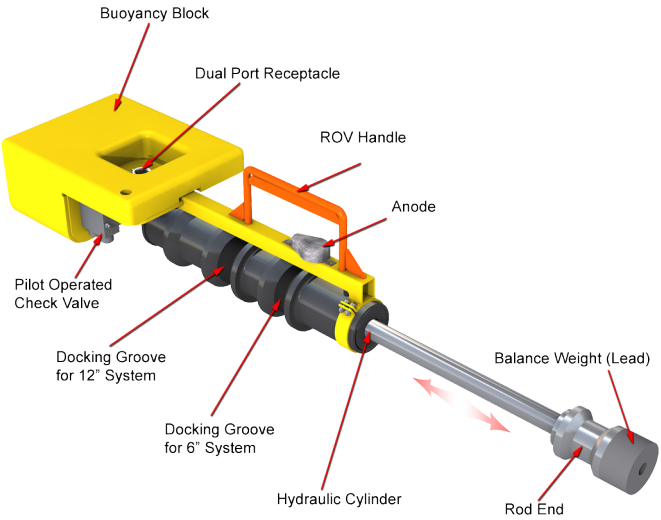
9.2.4 12” Seal Replacement Tool

GA drawing: 32-NT2000-15 / AO32-2-100-014-LT-13-DK-015
Data Sheet: 22-NT2009-04 / AO32-2-100-014-LS-13-EK-018



9.2.5 Stroking Tool

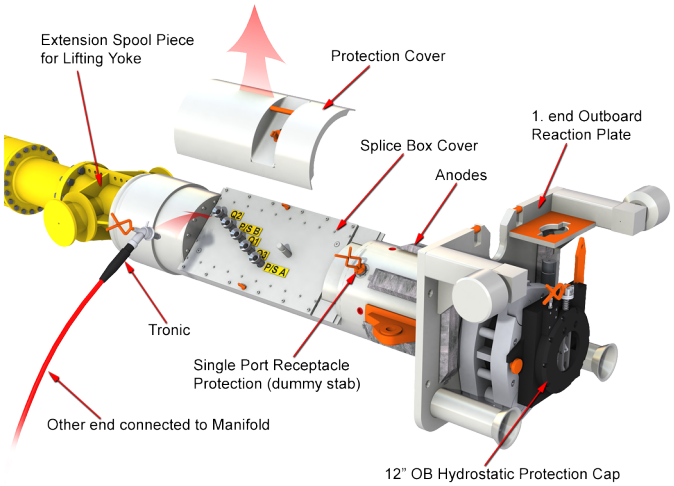
GA drawing: 32-NT2000-13 / AO32-2-100-014-LT-13-DK-013
Data Sheet: 22-NT2009-05 / AO32-2-100-014-LS-13-EK-019



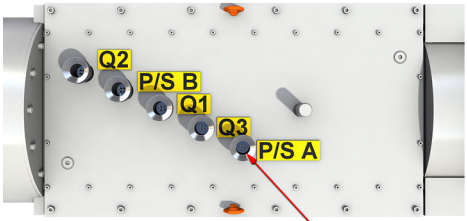
9.3 Tie-in Equipment and Parts

9.3.1 Umbilical Termination Head

GA drawing: 32-NT2000-04 / AO32-2-100-014-LY-13-DK-004
Data Sheet: 22-NT2009-81 / AO32-2-100-014-LY-13-EK-003



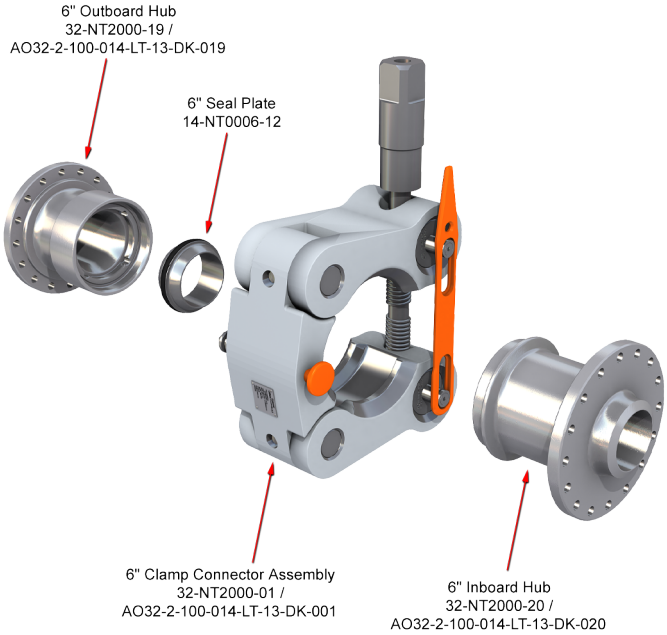
Splice Box Cover



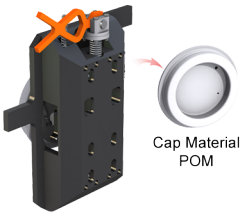
Q = Quad
P/S = Power / Signal

SPCS Dual Barrier
Umbilical Termination

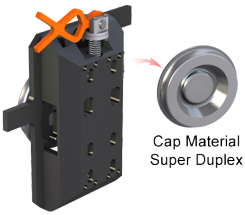
9.3.2 6” Clamp Connector / Seal Plate / Hubs



9.3.3 6” Caps

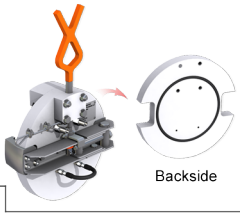


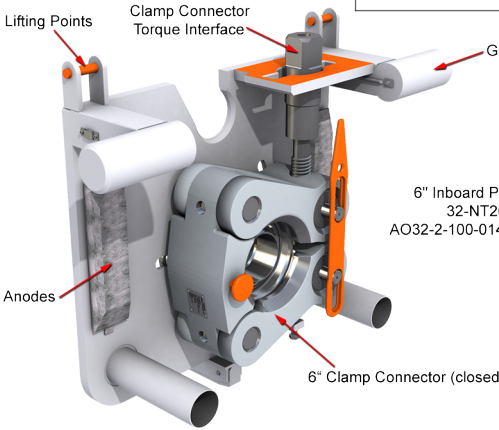
6" Outboard Hydrostatic Pressure Cap
(ILT Side WI/GI)
32-NT2000-38 /
AO32-2-100-014-LT-13-DK-029



6" Outboard Pressure Cap XMT side
(WI)
32-NT2000-16 /
AO32-2-100-014-LT-13-DK-016

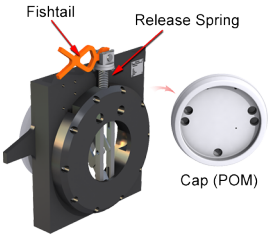
6" Inboard Hydrostatic Protection Cap
32-NT2000-42 /
AO32-2-100-014-LT-13-DK-048



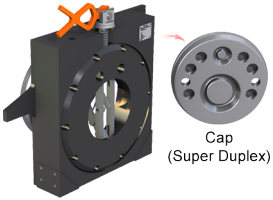


6" Inboard Pressure Cap
32-NT2000-06/
AO32-2-100-014-LT-13-DK-006

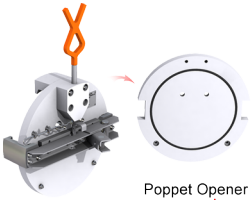
9.3.4 12” Caps



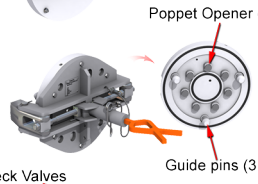
12” OB Hydrostatic Pressure Cap
32-NT2000-10 /
AO32-2-100-014-LT-13-DK-010



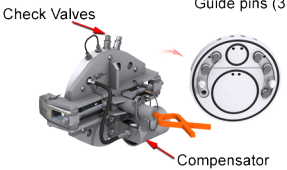
12” OB Multi Bore Pressure Cap
32-NT2000-40 /
AO32-2-100-014-LT-13-DK-034



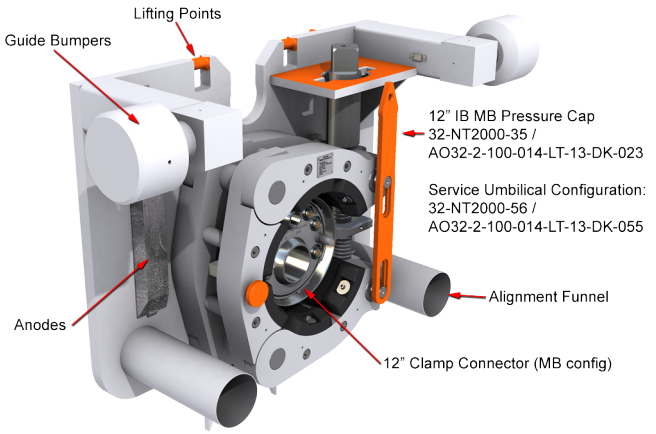
12” IB Hydrostatic Pressure Cap
32-NT2000-39 /
AO32-2-100-014-LT-13-DK-033

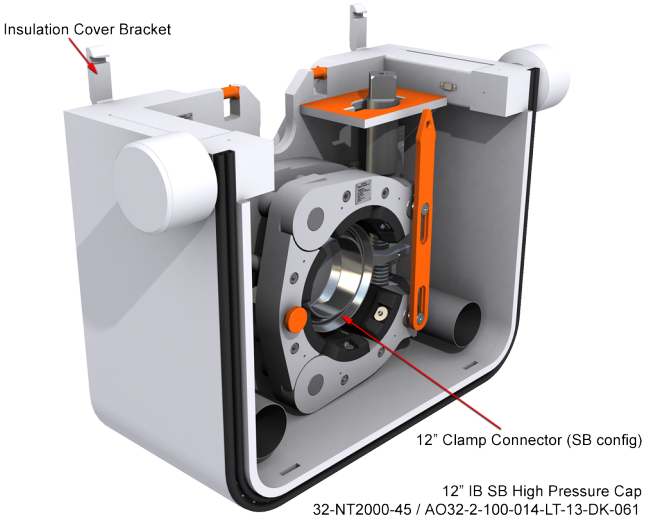


12” IB SU Hydrostatic Pressure Cap
32-NT2000-33 /
AO32-2-100-014-LT-13-DK-054

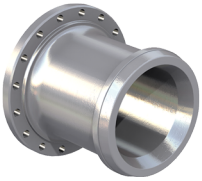
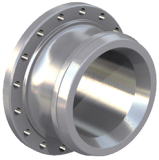
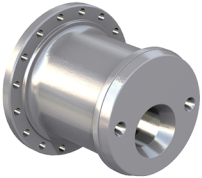
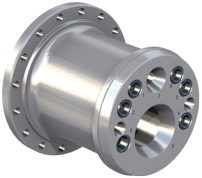
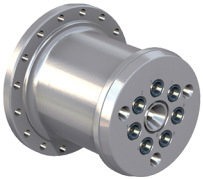


12” IB MB Hydrostatic Pressure Cap
32-NT2000-32 /
AO32-2-100-014-LT-13-DK-053

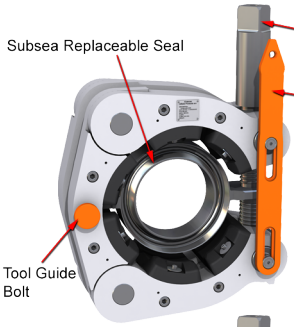

Lifting Points
Guide Bumpers
12" IB MB Pressure Cap
32-NT2000-35 /
AO32-2-100-014-LT-13-DK-023
Service Umbilical Configuration:
32-NT2000-56 /
AO32-2-100-014-LT-13-DK-055
Alignment Funnel
Anodes
12" Clamp Connector (MB config)


Insulation Cover Bracket
12" Clamp Connector (SB config)
12" IB SB High Pressure Cap
32-NT2000-45 / AO32-2-100-014-LT-13-DK-061

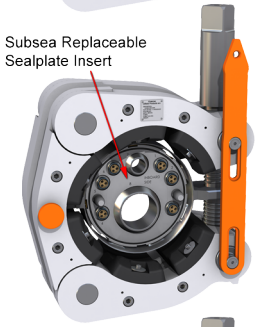
9.3.5 12” Hubs

	Inboard (IB)	Outboard (OB)
Single Bore (SB)		
	12” IB SB Hub 32-NT2000-22 / AO32-2-100-014-LT-13-DK-018	12” OB SB Hub 32-NT2000-21 / AO32-2-100-014-LT-13-DK-028
Multi Bore Gas Inj. (MB)		
	12”-5” IB MB Hub GI (CS) 32-NT2000-28 / AO32-2-100-014-LT-13-DK-004	12”-5” OB MB Hub GI (CS) 32-NT2000-27 / AO32-2-100-014-LT-13-DK-051
Multi Bore (MB)		
	12”-5”/2” IB MB Hub 32-NT2000-57 / AO32-2-100-014-LT-13-DK-056	12” OB MB Hub 32-NT2000-23 / AO32-2-100-014-LT-13-DK-024
Service Umbilical (SU)		
	Main Umbilical IB Hub 32-NT2000-26 / AO32-2-100-014-LT-13-DK-022	Main Umbilical OB Hub 32-NT2000-25 / AO32-2-100-014-LT-13-DK-021

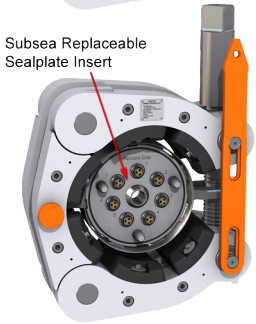
9.3.6 12” Clamp Connector Configurations



Single Bore Clamp Connector (open)
32-NT2000-02 / AO32-2-100-014-LT-13-DK-002



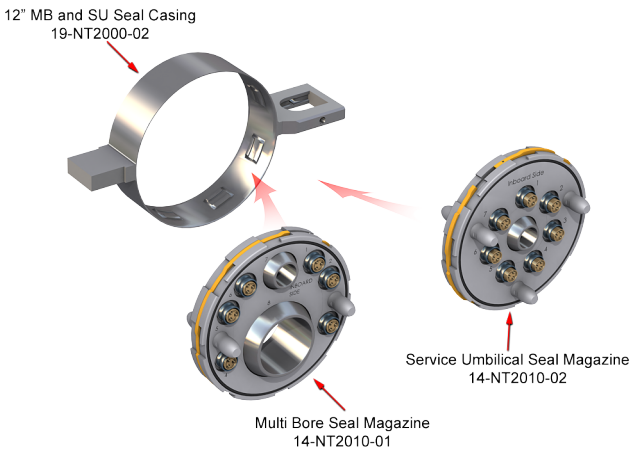
Multi Bore Clamp Connector (open)
32-NT2000-03 / AO32-2-100-014-LT-13-DK-003

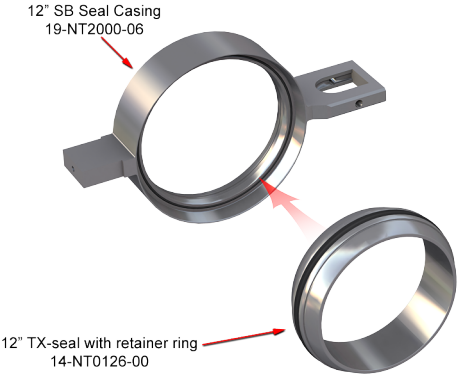


Multi Bore Umbilical Clamp Connector (open)
32-NT2000-18 / AO32-2-100-014-LT-13-DK-030

9.3.7 12” Seals and Seal Casettes

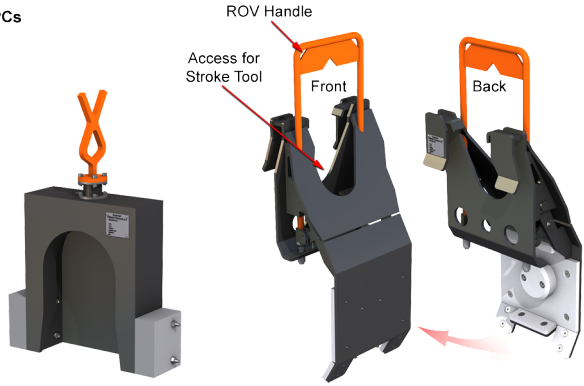
Seals and Seal Casettes GA drawing: 32-NT2000-41 \ AO32-2-100-014-LT-13-DK-047





9.3.8 Temporary Protection Caps

6" TPCs

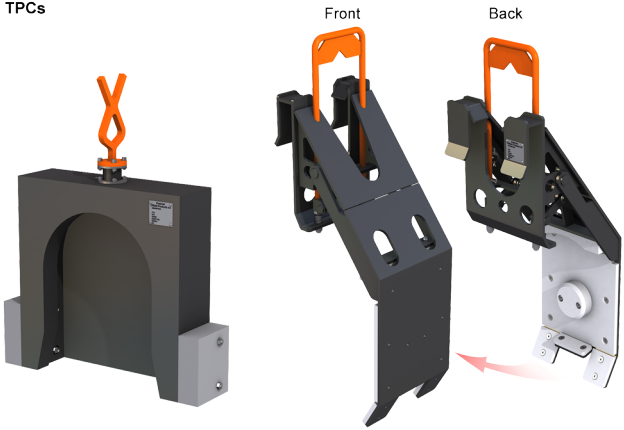


6" IB 1. End Temporary Protection Cap

6" IB 2. End Temporary Protection Cap (locked)

32-NT2000-44 / AO32-2-100-014-LT-13-DK-057

12" TPCs



12" IB 1. End Temporary Protection Cap

12" IB 2. End Temporary Protection Cap (locked)

32-NT2000-43 / AO32-2-100-014-LT-13-DK-058

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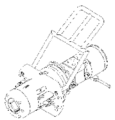
10.1 ROV Intervention Top Assembly Drawing

Top Assembly Drawing: 10-NT0008-00 / AO32-2-100-000-LS-14-DK-001

1

Multi Purpose Tooling Basket
Interface: 32-NT2050-08
Assy: 11-NT9014-00

2

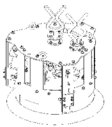


2,7 kNm Torque tool (Class 4)
GA / Interface: 32-NT2050-09
PART NO: 15-MX0477-00

3

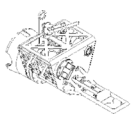
2,7 kNm Torque Analyzer
Interface: 32-NT2050-19
PART NO: 15-MX0496-00

4



FCM Hub Cleaning Tool
Interface: 32-NT2050-05
Assy: 11-NT2050-01

5



Linear Actuator Override Tool
Interface: 32-NT2050-01
PART NO: 15-MX0485-00

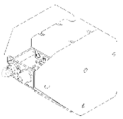
6

Integrated Running Tool
GA / INTERFACE: 32-NT2050-11
Assy: 11-NT2058-00

7

Integrated Running Tool Torque Analyzer
Interface: Incl In 32-NT2050-11
PART NO: 15-MX0480-01

8

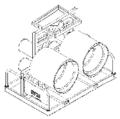


Jumper Deployment Tool
GA / INTERFACE: 32-XJ0002-02
PART NO: 11-XJ0006-03

9

Jumper Deployment Tool Torque Analyzer
Interface: 32-NT2050-23
PART NO: 15-MX0480-00

10

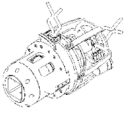


Jumper Deployment Skid
GA / INTERFACE: 32-XJ0002-03
PART NO: 11-XJ0004-04

11

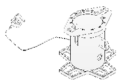
Subsea Stab System
Interface: 32-NT2050-07
PART NO: QUAD PORT 15-MX0473-08
PART NO: DUAL PORT 15-MX0473-00
PART NO: SINGLE PORT 15-MX0473-06

12



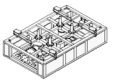
17 kNm Torque Tool
Interface: 32-NT2050-02
PART NO: 15-MX0478-00

13



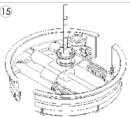
17 kNm Torque Analyzer
Interface: 32-NT2050-20
PART NO: 15-MX0492-00

14



Dirty Workpack
GA / Interface: 32-NT2050-10
PART NO. 15-MX0479-00

15

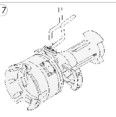


Gasket Replacement tool
Interface: 32-NT2050-03
PART NO: 15-MX0486-00

16

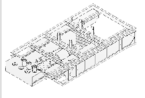
Hub Inspection Camera
GA / Interface: 32-NT2050-21
PART NO: 15-MX0530-00

17



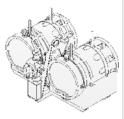
Lock Open Tool
Interface: 32-NT2050-16
Part no.: 15-MX0494-00

18



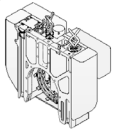
ROV Fluid Sampling system
Interface: 32-NT2050-06
Assy: 15-MX2050-00

19



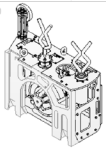
Fluid Transfer Unit
GA / INTERFACE: 32-NT2050-13
Assy: 15-MX0865-00

20



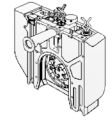
GHO Seal Replacement Tool 12"
GA / INTERFACE: A032-2-100-014-LT-13-DK-015
PART NO: 11-NT2022-00

21



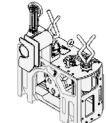
GHO Seal Replacement Tool 6"
GA / INTERFACE: A032-2-100-014-LT-13-DK-026
PART NO: 11-NT2011-00

22



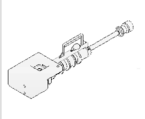
GHO Seal Surface Cleaning Tool 12"
GA / INTERFACE: A032-2-100-014-LT-13-DK-014
PART NO: 11-NT2021-00

23



GHO Seal Surface Cleaning Tool 6"
GA/Interface: A032-2-100-014-LT-13-DK-027
Assy: 11-NT2010-00

24

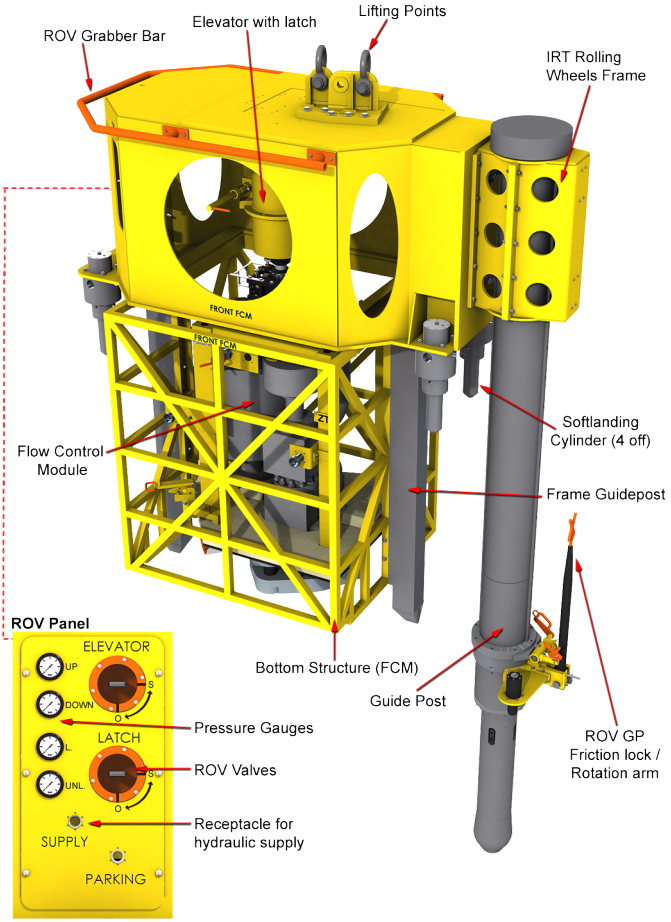


GHO Stroke Tool
GA / INTERFACE: A032-2-100-014-LT-13-DK-013
Assy: 11-NT2009-00

10.2 Remotely Operated Tools

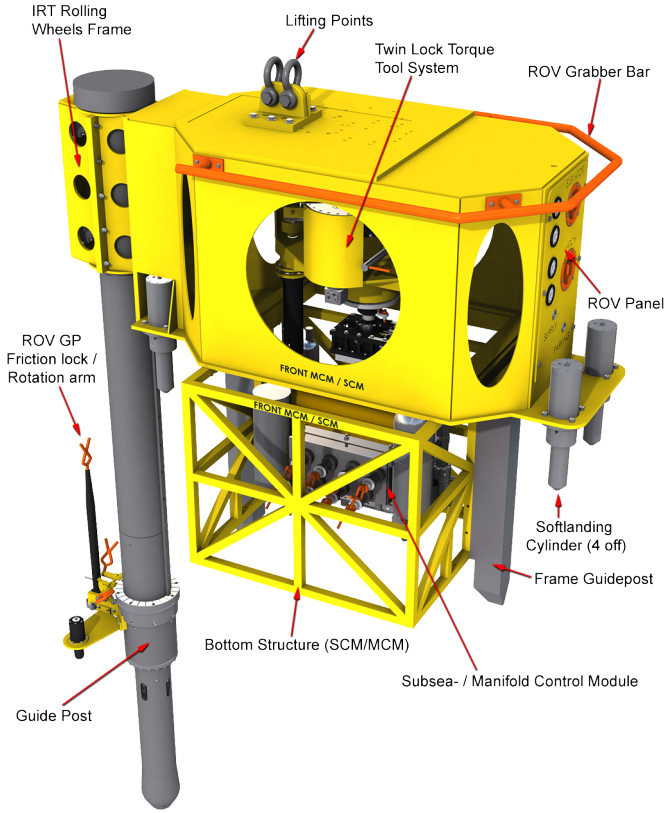
10.2.1 Integrated Running Tool (IRT) w/ Flow Control Module (FCM)

GA drawing: 32-NT2050-11 / AO32-2-100-011-LS-14-DK-026
Data Sheet: 22-NT2060-02 / AO32-2-100-011-LS-14-EK-003



10.2.2 Integrated Running Tool (IRT) w/ Control Module (SCM or MCM)

GA drawing: 32-NT2050-11 / AO32-2-100-011-LS-14-DK-026
Data Sheet: 22-NT2060-02 / AO32-2-100-011-LS-14-EK-003



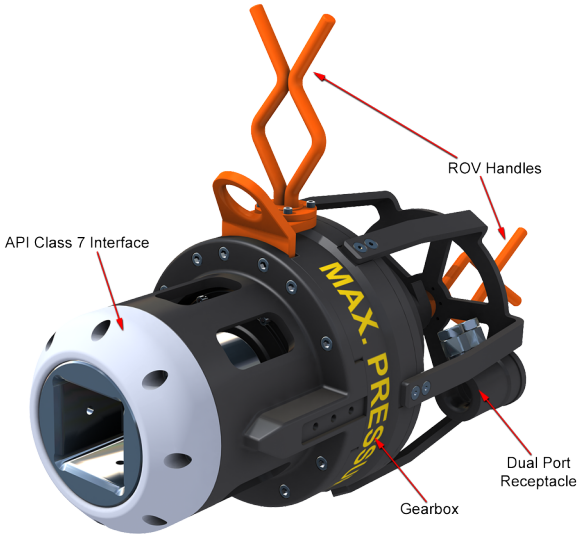
10.3 ROV Tools

10.3.1 2.7 kNm Torque Tool - Class 4

GA drawing: 32-NT2050-09 / AO32-2-100-011-LS-14-DK-008
Data Sheet: 22-NT2060-01 / AO32-2-100-011-LS-14-EK-002

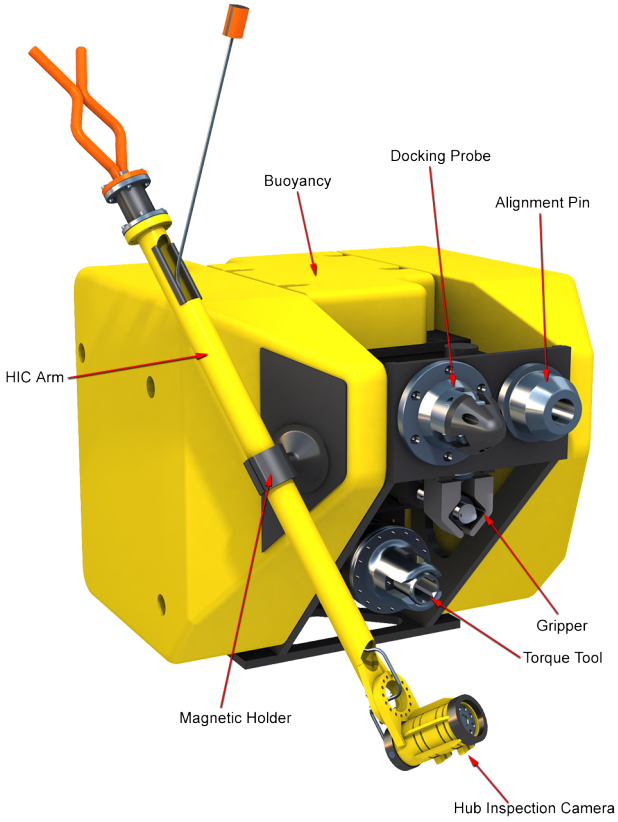
10.3.2 17 kNm Torque Tool - Class 7 + GHO

GA drawing: 32-NT2050-02 / AO32-2-100-011-LS-14-DK-001
Data Sheet: 22-NT2065-00 / AO32-2-100-011-LS-14-EK-008



10.3.3 Jumper Deployment Tool

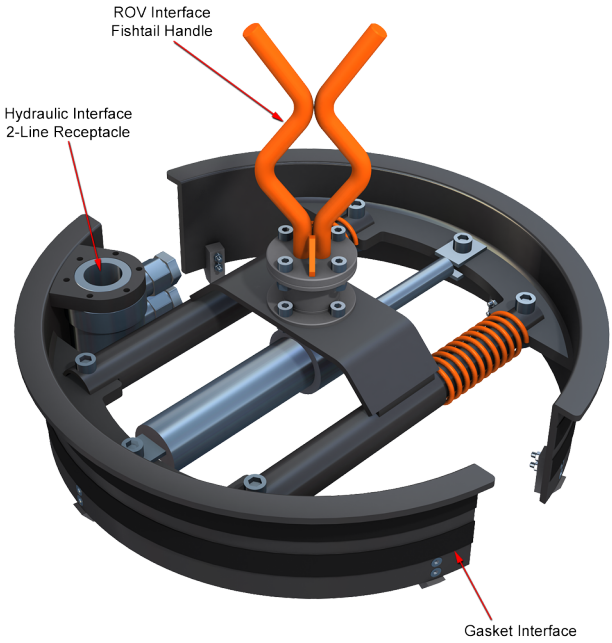
GA drawing: 32-KI0002-02 / AO32-2-104-000-LS-14-DJ-110
Data Sheet: 22-NT2068-00 / AO32-2-100-011-LS-14-EK-010



10.3.4 Torque Analyzers

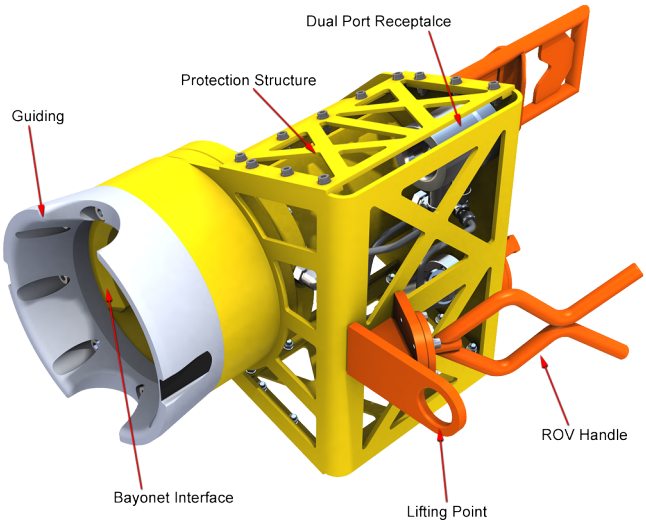
10.3.5 18 3/4” Gasket Change-Out Tool

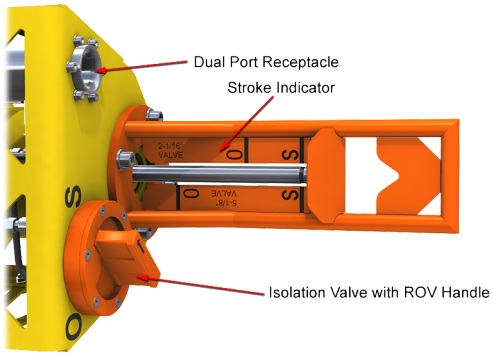
GA drawing: 32-NT2050-03 / AO32-2-100-011-LS-14-DK-006
Data Sheet: 22-NT2060-00 / AO32-2-100-011-LS-14-EK-001



10.3.6 Linear Actuator Override Tool

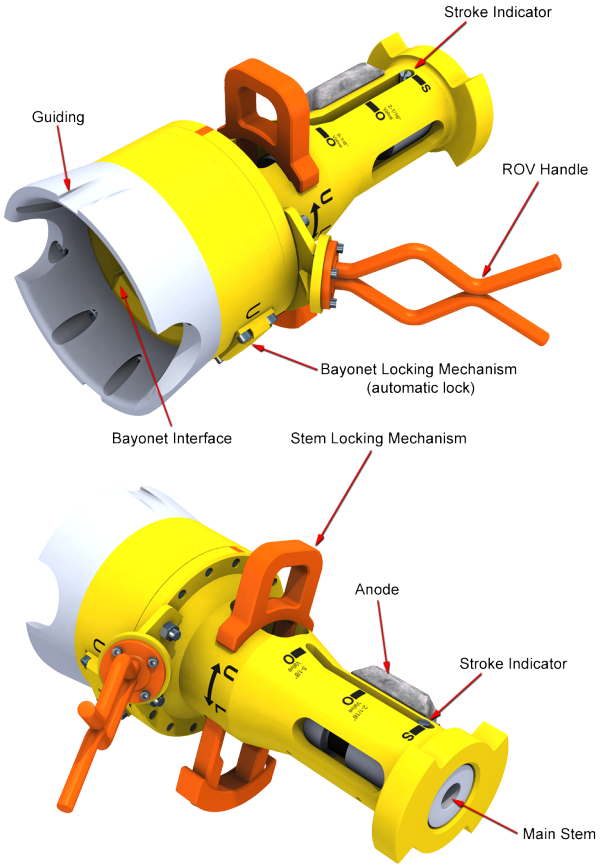
GA drawing: 32-NT2050-01 / AO32-2-100-011-LS-14-DK-003
Data Sheet: 22-NT2058-00 / AO32-2-100-011-LS-14-EK-013





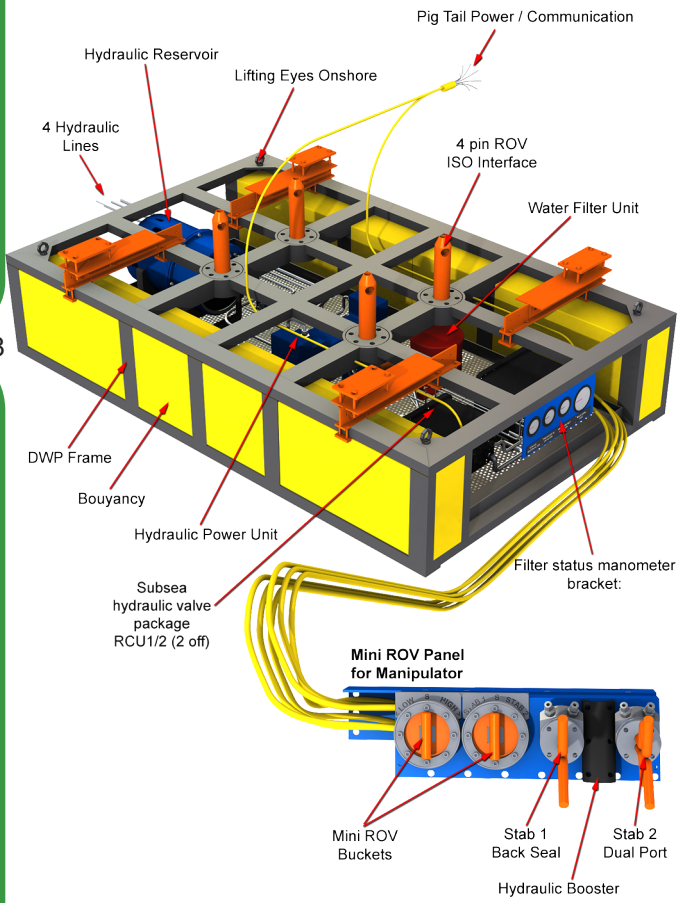
10.3.7 Lock-Out Tool

GA drawing: 32-NT2050-16 / AO32-2-100-011-LS-14-DK-031
Data Sheet: 22-NT2071-00 / AO32-2-100-011-LS-14-EK-012



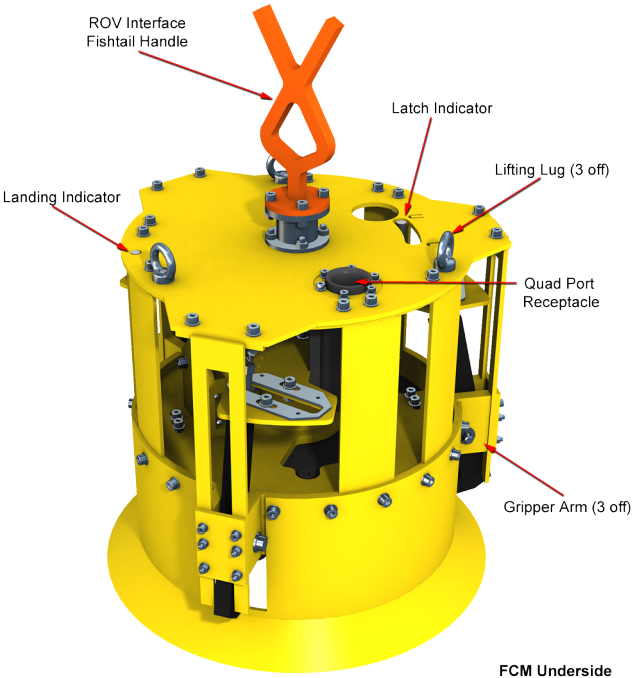
10.3.8 Dirty Work Package

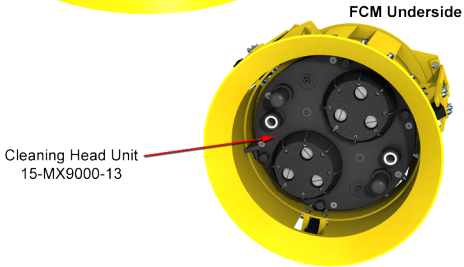
GA drawing: 32-NT2050-10 / AO32-2-100-011-LS-14-DK-027
Data Sheet: 22-NT2066-00 / AO32-2-100-011-LS-14-EK-009



10.3.9 FCM Hub Cleaning Tool

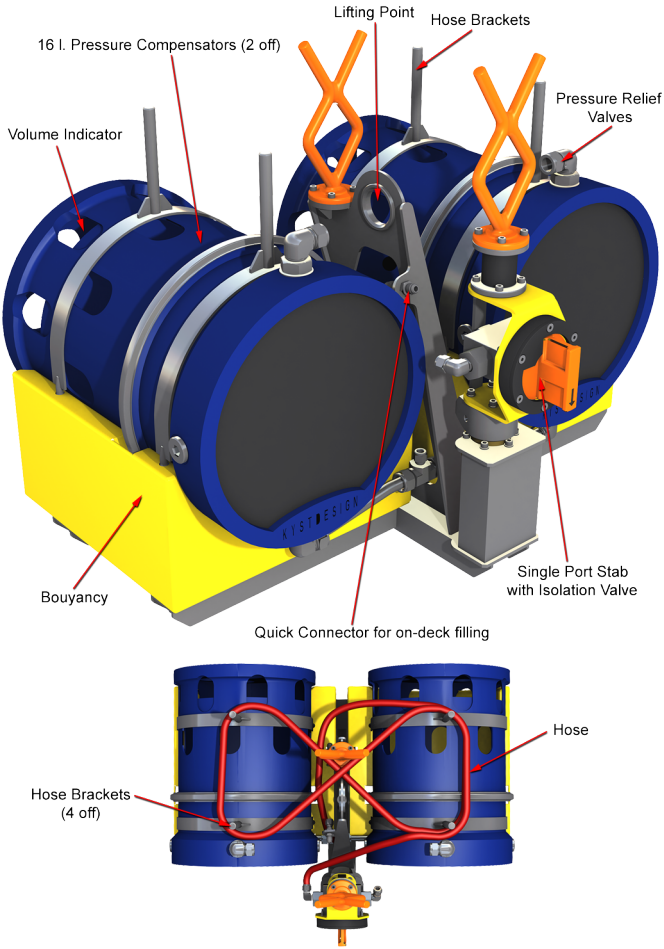
GA drawing: 32-NT2050-05 / AO32-2-100-011-LS-14-DK-002
Data Sheet: 22-NT2060-03 / AO32-2-100-011-LS-14-EK-004





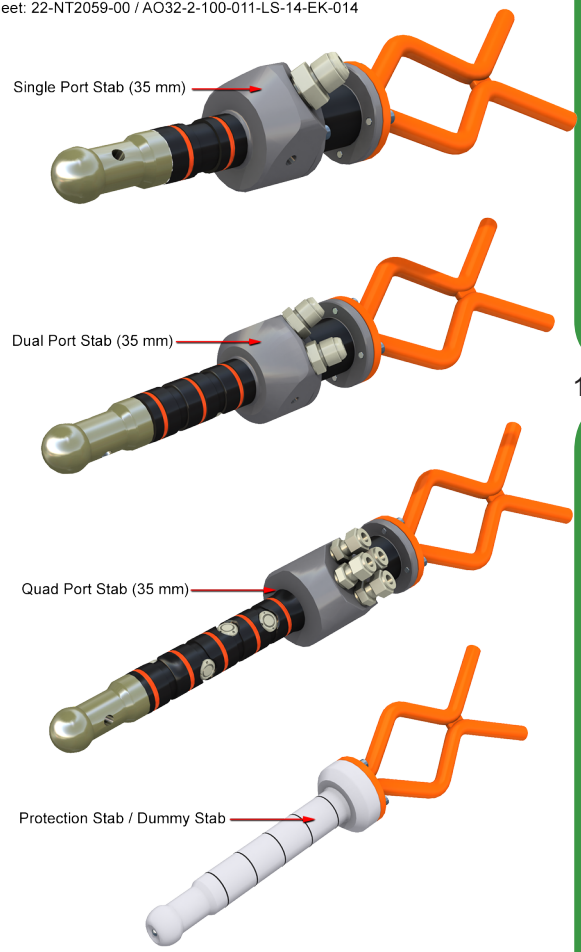
10.3.10 Fluid Transfer Unit

GA drawing: 32-NT2050-13 / AO32-2-100-011-LS-14-DK-039
Data Sheet: 22-NT2062-00 / AO32-2-100-011-LS-14-EK-005



10.3.11 Hot Stabs & Dummy Stab

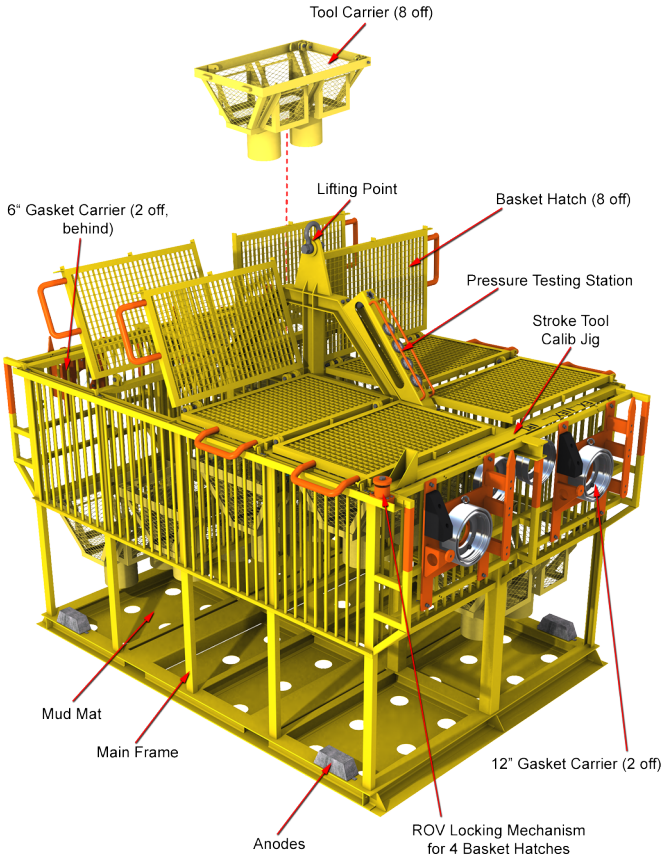
GA drawing: 32-NT2050-07 / AO32-2-100-011-LS-14-DK-004
Data Sheet: 22-NT2059-00 / AO32-2-100-011-LS-14-EK-014



10.4 Other Tools

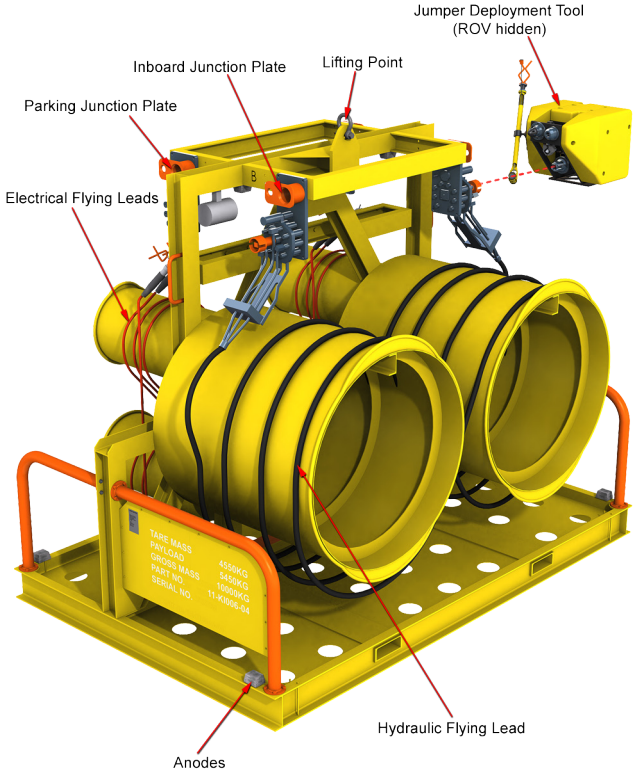
10.4.1 Multi Purpose Basket

GA drawing: 32-NT2050-08 / AO32-2-100-011-LS-14-DK-005
Data Sheet: 22-NT2063-00 / AO32-2-100-011-LS-14-EK-006



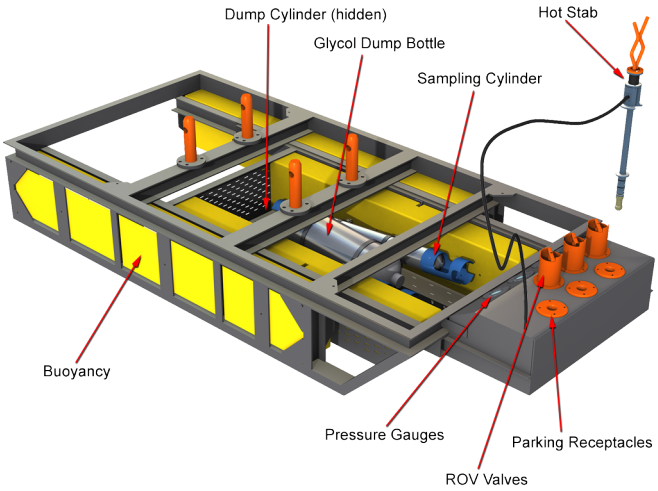
10.4.2 Jumper Deployment Skid

GA drawing: 11-KI0006-04 / AO32-2-104-011-LS-14-DW-104
Data Sheet: 22-NT2069-00 / AO32-2-100-011-LS-14-EK-011



10.4.3 Fluid Sampling Unit

GA drawing: 32-NT2050-06 / AO32-2-100-011-LS-14-DK-007
Data Sheet: 22-NT2064-00 / AO32-2-100-011-LS-14-EK-007



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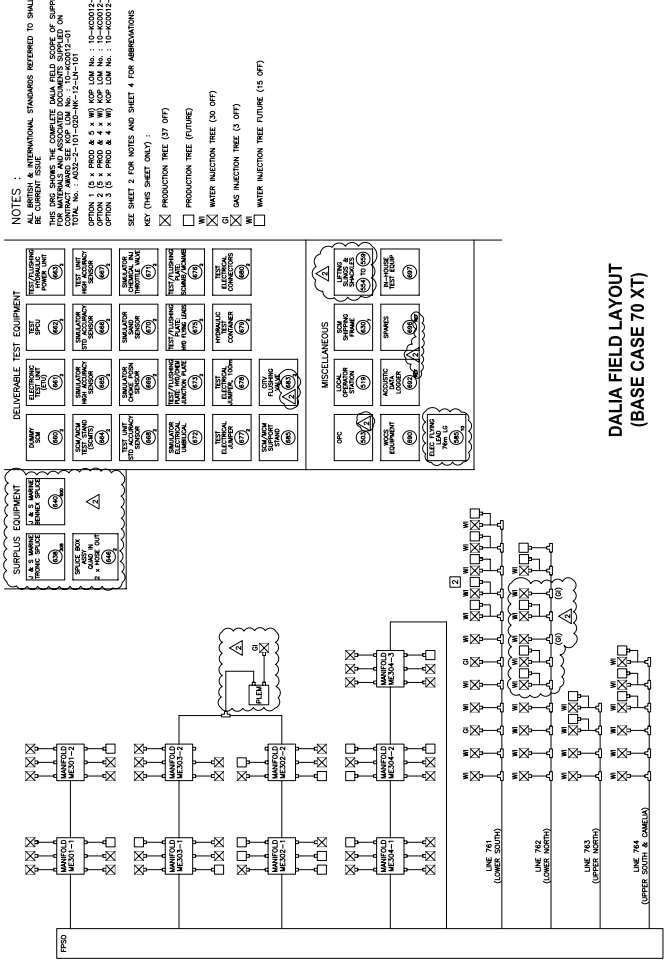
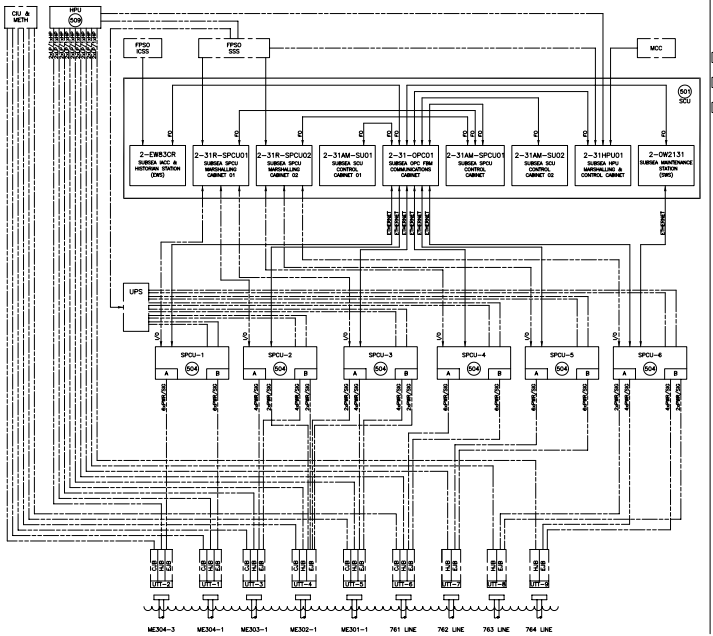
11.1 Top Assembly Drawings

Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 1/16)



DALIA FIELD LAYOUT (BASE CASE 70 XT)



NOTES :

SYSTEM HYDRAULIC FLUID OCEANIC HW 540

1 FOR FIELD LAYOUT & LOMS SEE SHEET 1

2 50% ADDITIONAL WATER INJECTION WELLS CAN BE CONNECTED TO ANY SDU

3 PARKING FOR MCM/SCM LEADS & CONNECTORS ARE LOCATED ON RELEVANT MOUNTING BASES

4 DUMMY CAPS (ITEM 656) ARE RETRIEVED TO SURFACE AFTER LEAD CONNECTION

KEY :-

- SELF SEALING HYD COUPLING
- NON SELF SEALING HYD COUPLING
- CONDUCTIVE CONNECTOR (FEMALE)
- CONDUCTIVE CONNECTOR (MALE)
- ROV PROTECTIVE PLUG WITH FISHTAIL HANDLE
- ROV PROTECTIVE PLUG WITH LANYARD
- STABPLATE CONNECTION
- SUPPLIED BY KOP (CONTROLS – WP12)
- SUPPLIED BY KOP (OTHER WORK PACKAGES)
- FACILITY BY OTHERS
- FUTURE

SYSTEM HYDRAULIC PRESSURES :-
DESIGN PRESSURE :-
LP 228 BAR
HP 690 BAR

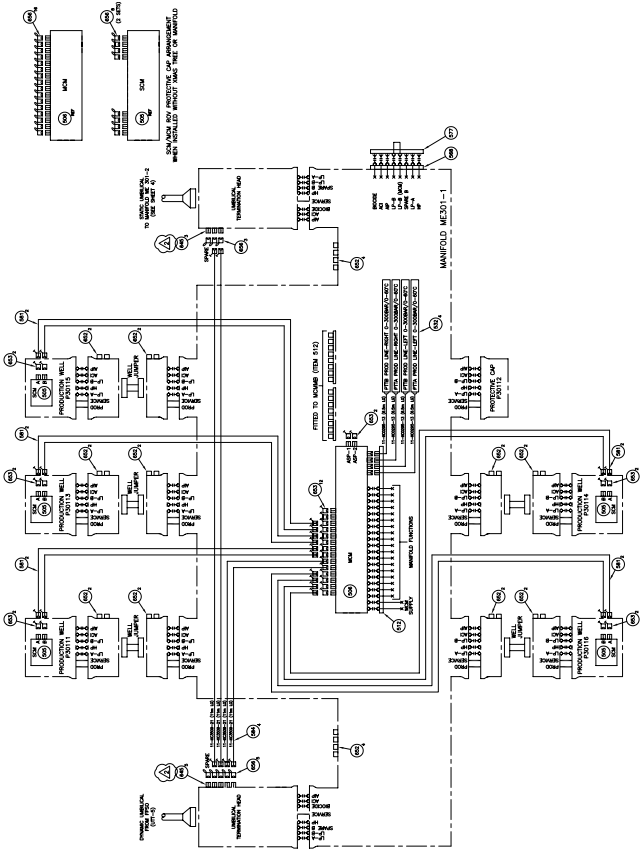
REFERENCE DRAWINGS :-

SYSTEM ELECTRICAL SCHEMATIC :
KOP No : 24-KC0746-13
TOTAL No : AO32-2-101-020-NK-12-DN-101

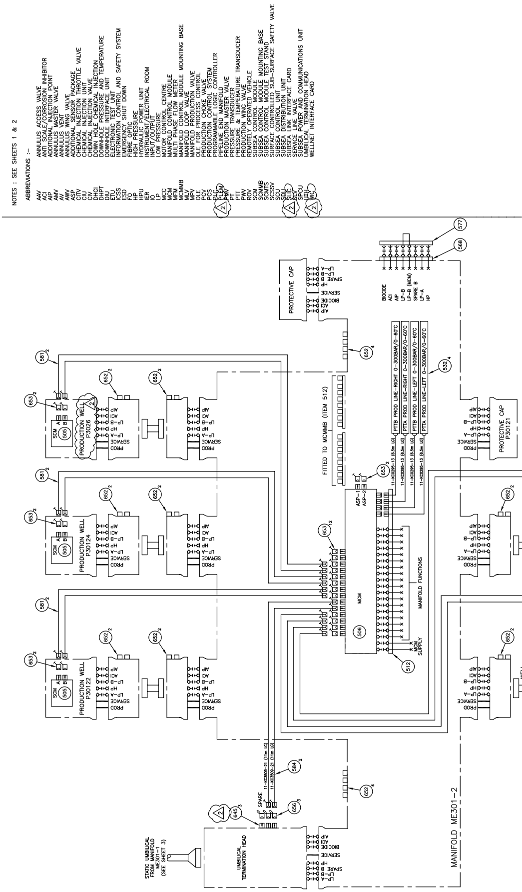
SYSTEM HYDRAULIC SCHEMATIC :
KOPN No : 12-NS1400-01
TOTAL No : AO32-2-100-00-00-DW-001
KOPN No : 12-NS1400-02
TOTAL No : AO32-2-100-00-00-DW-003

SEE SHEET 4 FOR ABBREVIATIONS

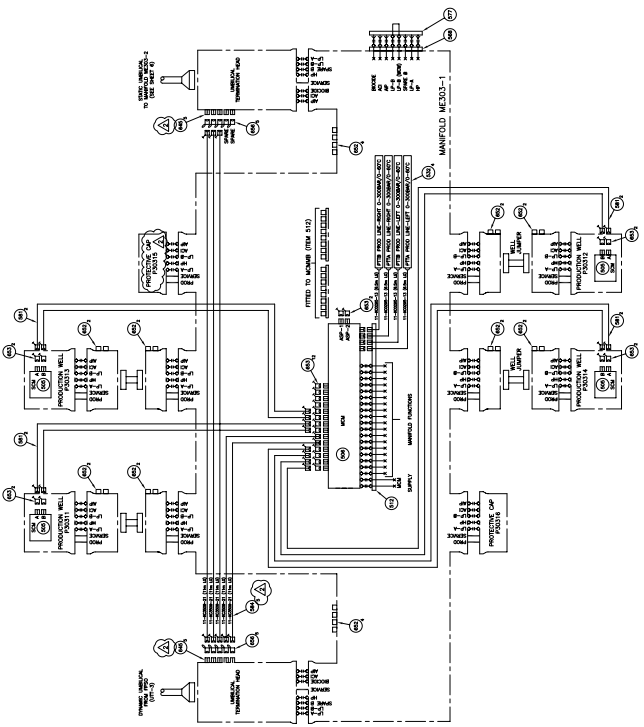
Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 3/16)



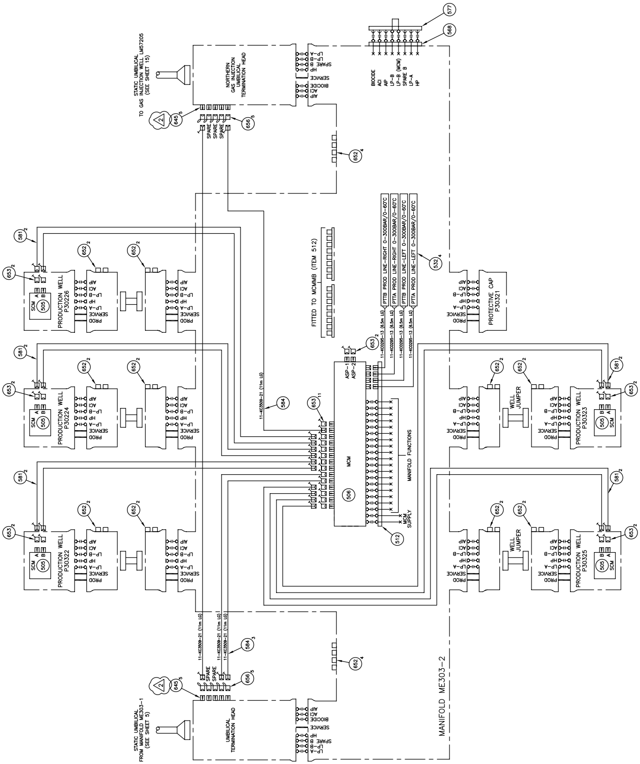
Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 4/16)



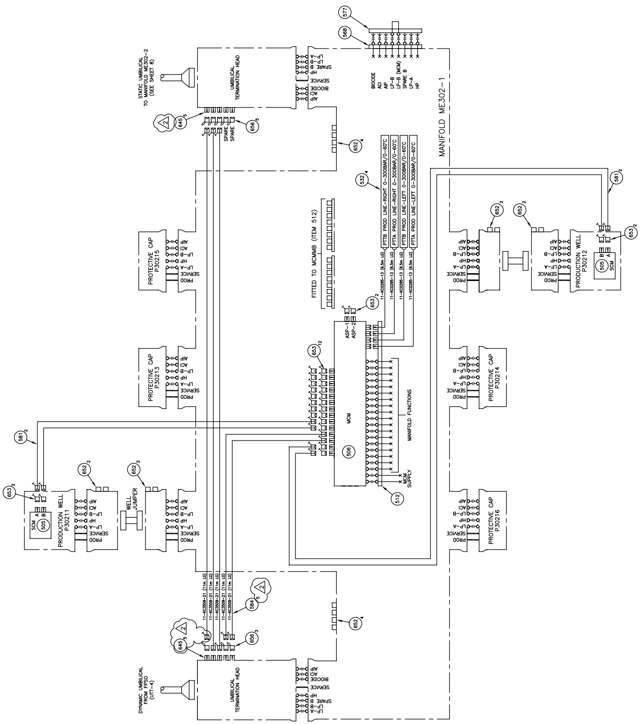
Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 5/16)



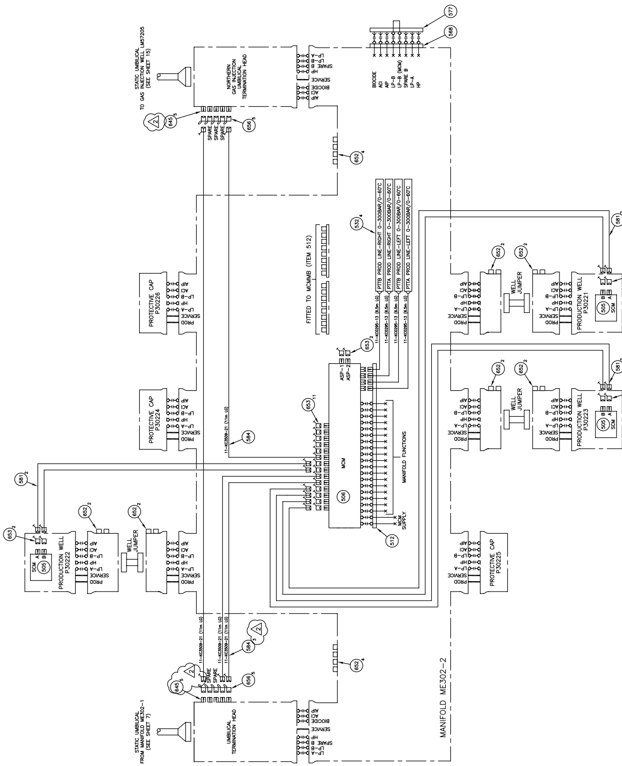
Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 6/16)



Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 7/16)



Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 8/16)



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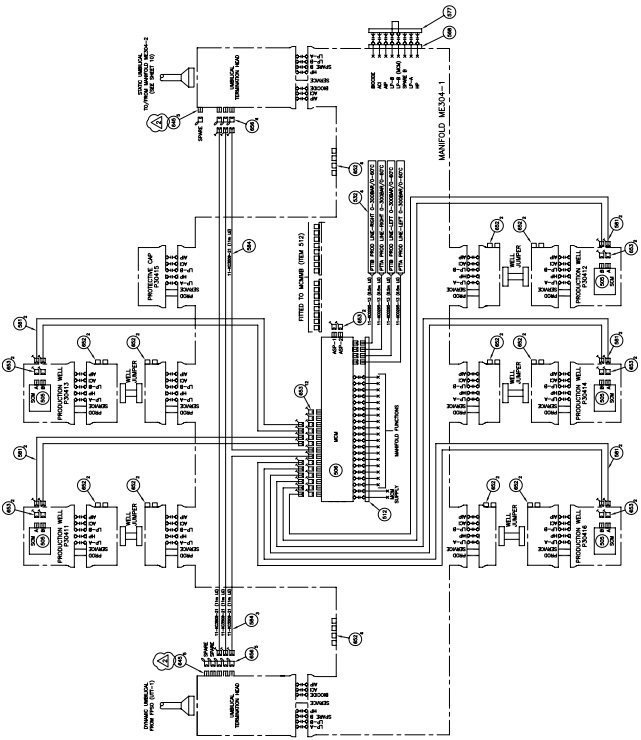

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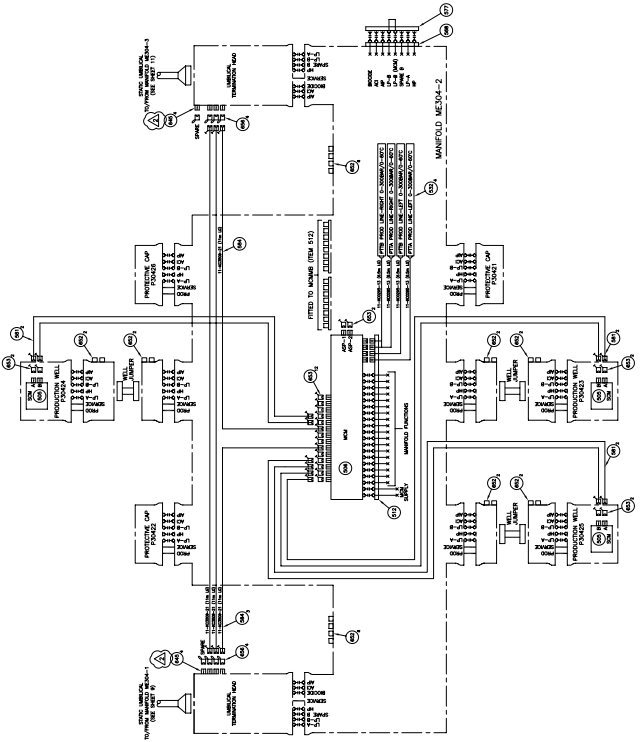
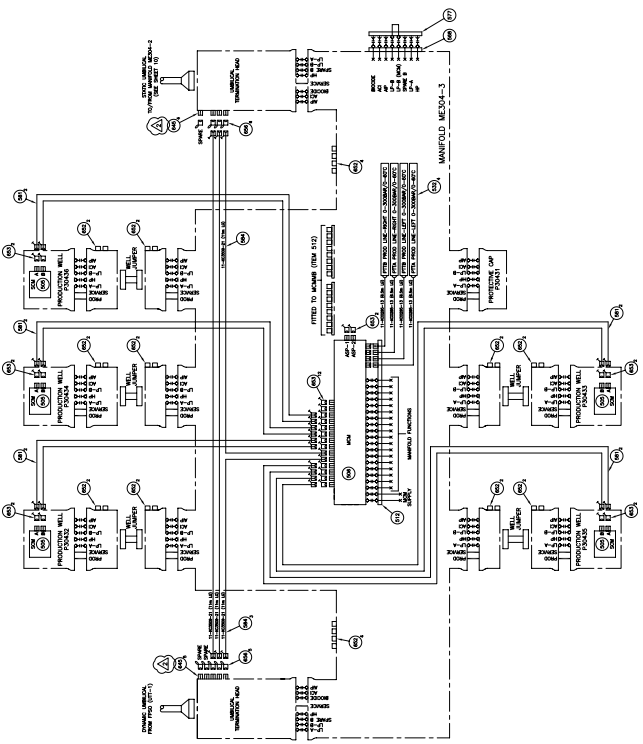
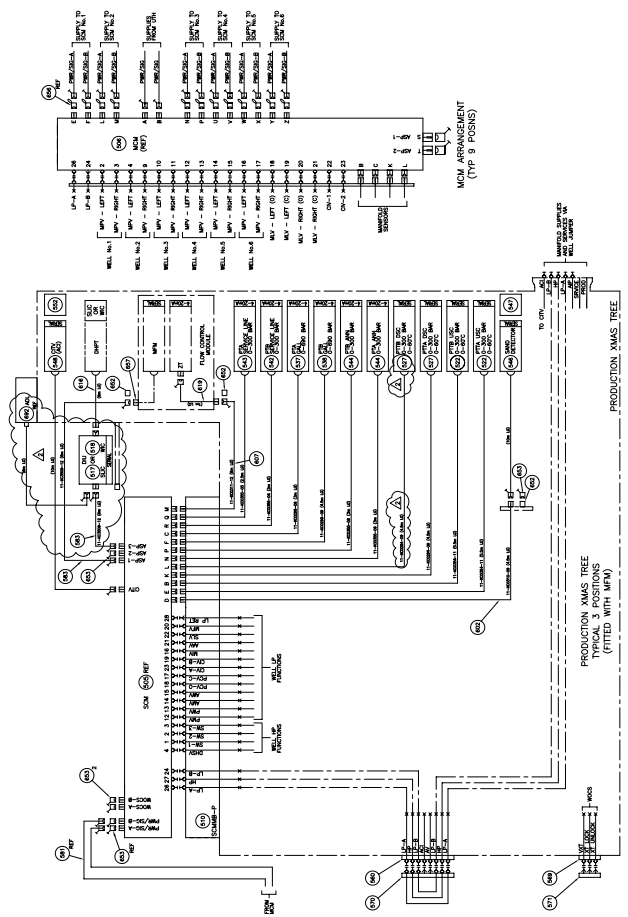


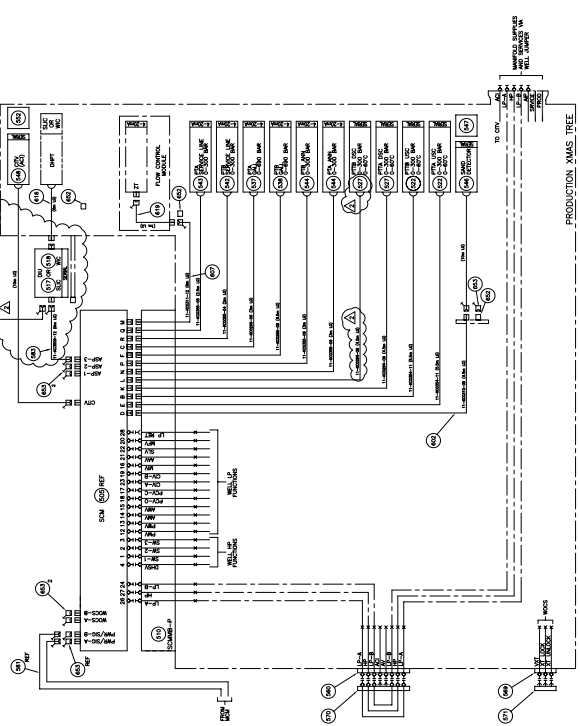
Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 11/16)



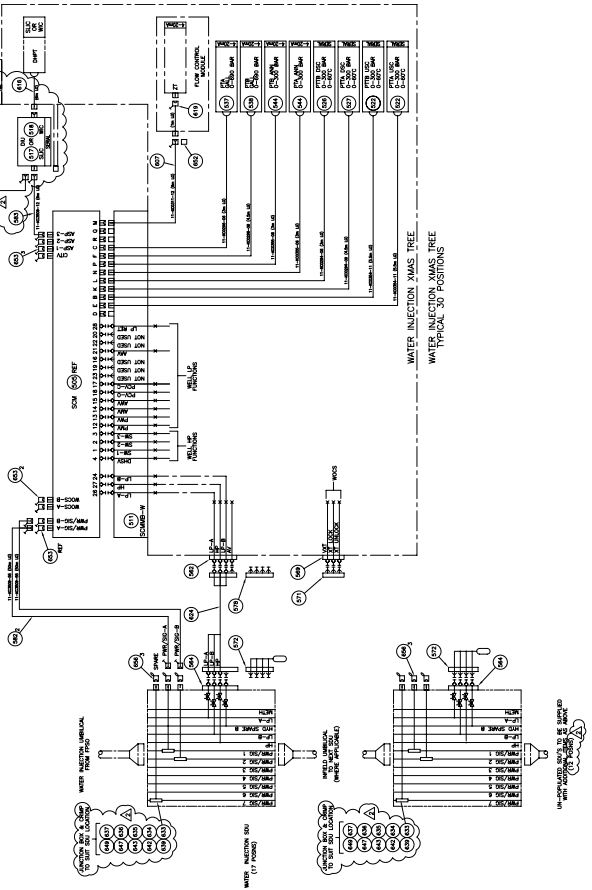
Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 12/16)



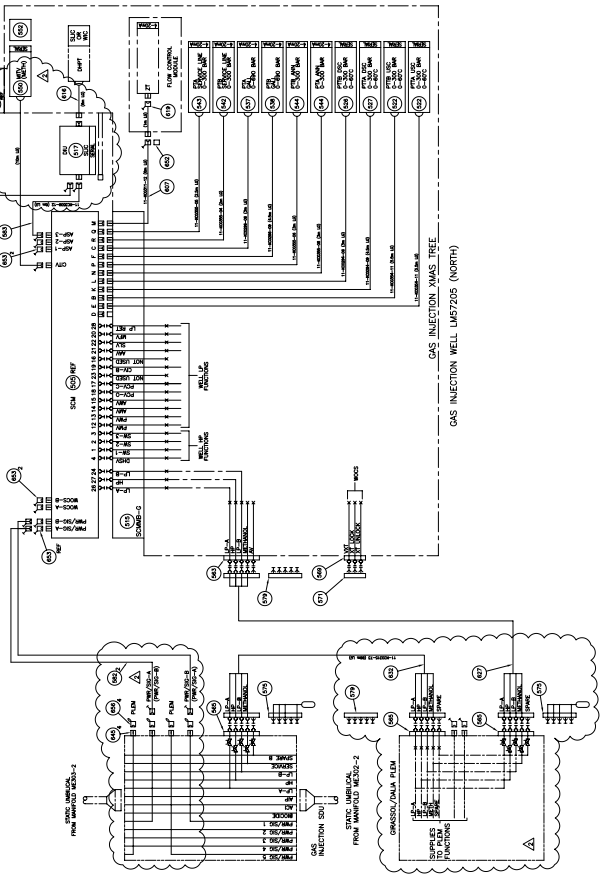
Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 13/16)



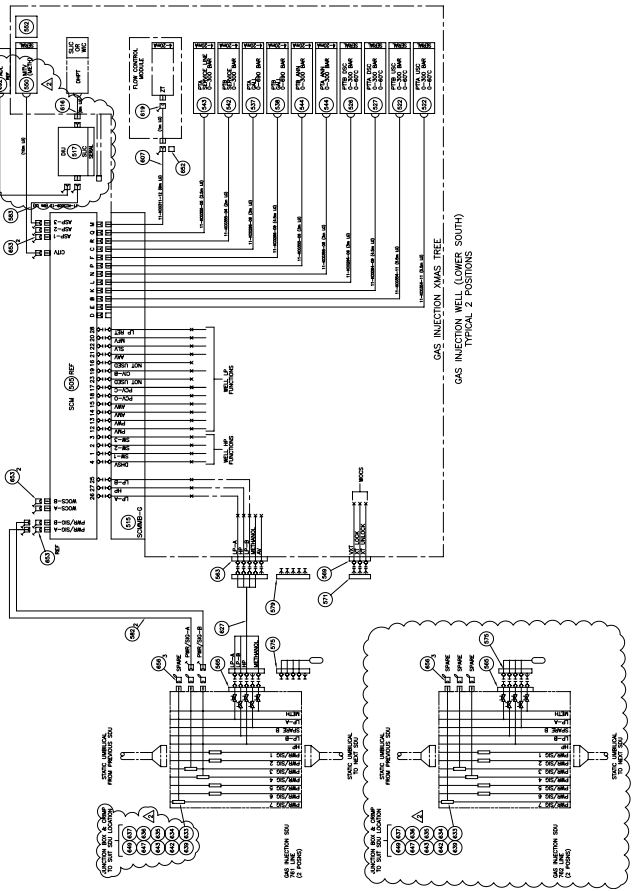
Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 14/16)



Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 15/16)



Drawing: 10-KC0012-00 / AO32-2-101-020-NK-12-DN-100 (Sheet 16/16)



11.2 Control Units

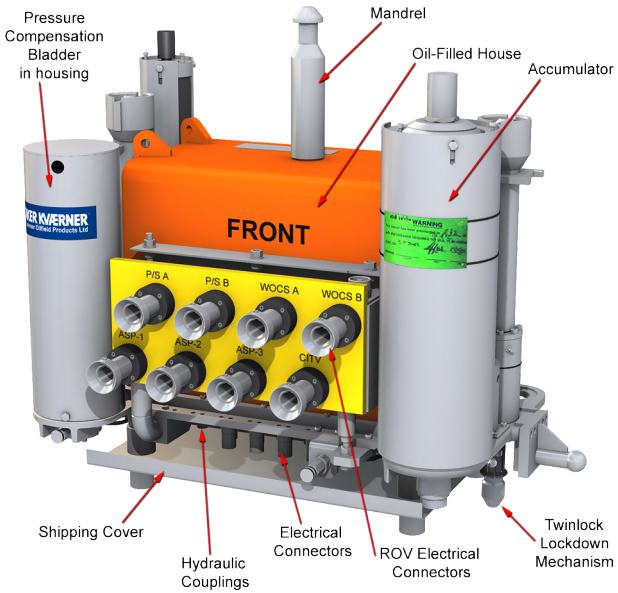
Note:
The **Multiphase Flow Meter (MFM)** and **Choke** does not have their own pages. Please look at chapter **6.2.6 Flow Control Modules.**

11.2.1 Subsea Control Module (SCM)

Subsea Control Module (SCM):
GA drawing: 11-KC0343-25 / AO32-2-101-020-NK-12-DN-106
Data Sheet: 21-KC0542-04 / AO32-2-101-020-NK-12-EN-112

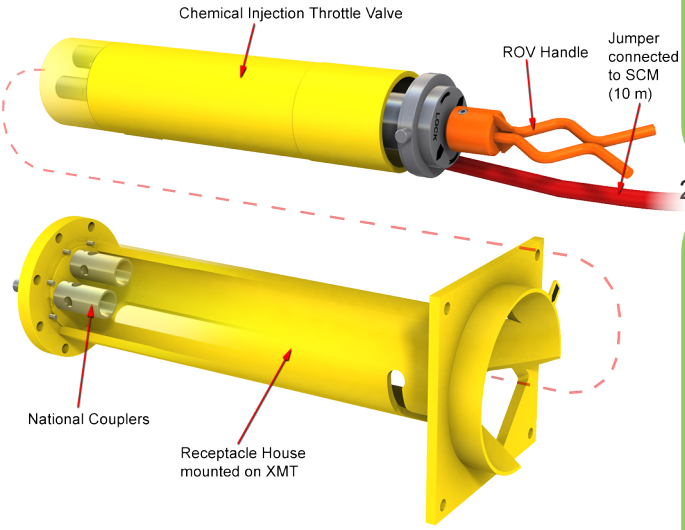
Manifold Control Module (MCM):
GA drawing: 11-KC0343-26 / AO32-2-101-020-NK-12-DN-107
Data Sheet: 21-KC0542-05 / AO32-2-101-022-NK-12-EN-112

Subsea Control Module



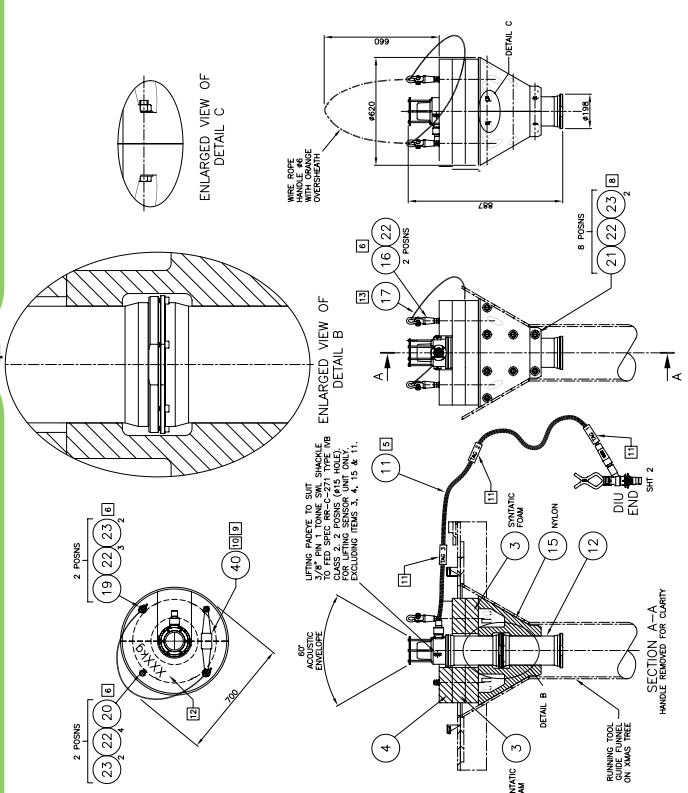
11.2.2 Chemical Injection Throttle Valve (CITV)

GA drawing: 35-KC0209-05 / AO32-2-101-361-NK-12-DL-101
Data Sheet: 21-KC0542-24 / AO32-2-101-361-NB-12-EL-100



11.2.3 Acoustic Data Logger (ADL)

GA drawing: 11-KM0026-04 / AO32-2-101-020-NK-12-DN-196

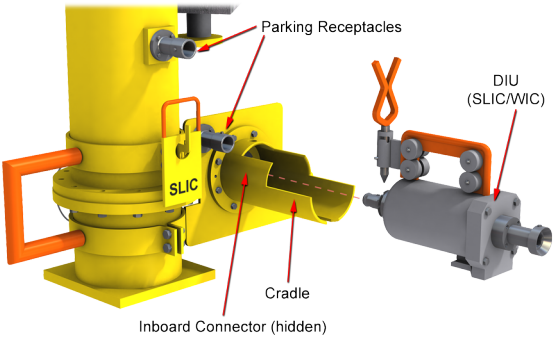


11.2.4 Downhole Interface Unit (DIU)

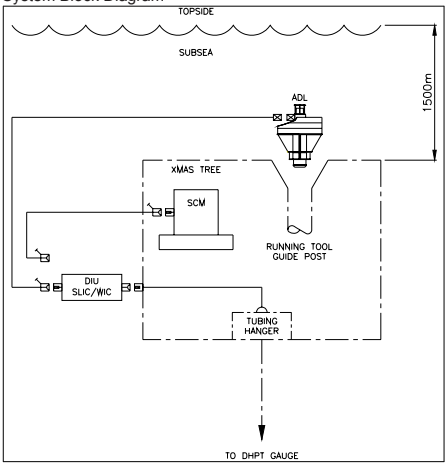
GA drawing (SLIC): 11-KC2550-02 / AO32-2-101-020-NK-12-DN-118
Data Sheet (SLIC): 21-KC0542-10 / AO32-2-101-020-NK-12-EN-114

GA drawing (WIC): 11-KC2550-03 / AO32-2-101-020-NK-12-DN-119
Data Sheet (WIC): 21-KC0542-11 / AO32-2-101-020-NK-12-EN-115

SLIC = Subsea Line Interface Card
WIC = WellNet Interface Card

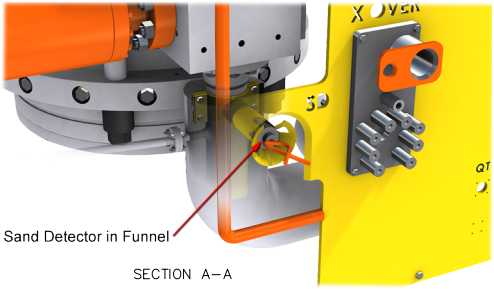


System Block Diagram

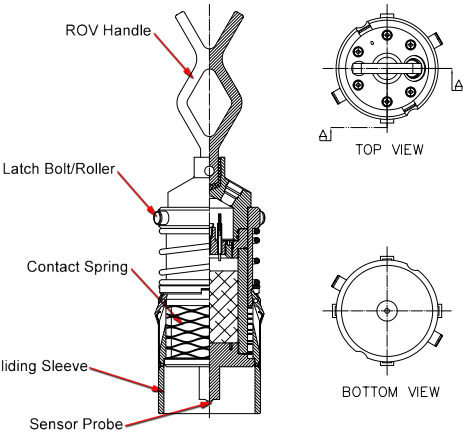


11.2.5 Sand Detector (SD)

GA drawing: 35-KC0209-06 / AO32-2-101-022-NA-12-DN-115
Data Sheet: 21-KC0542-22 / AO32-2-101-022-NA-12-EN-101



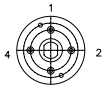
SECTION A–A



PENETRATOR PIN CONFIGURATION

1 +24VDC
2 0VDC
3 RS485 A (−)
4 RS485 B (+)

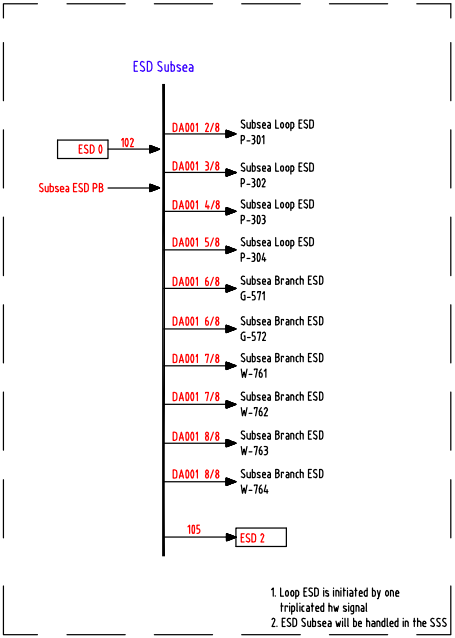
Note 10, 13



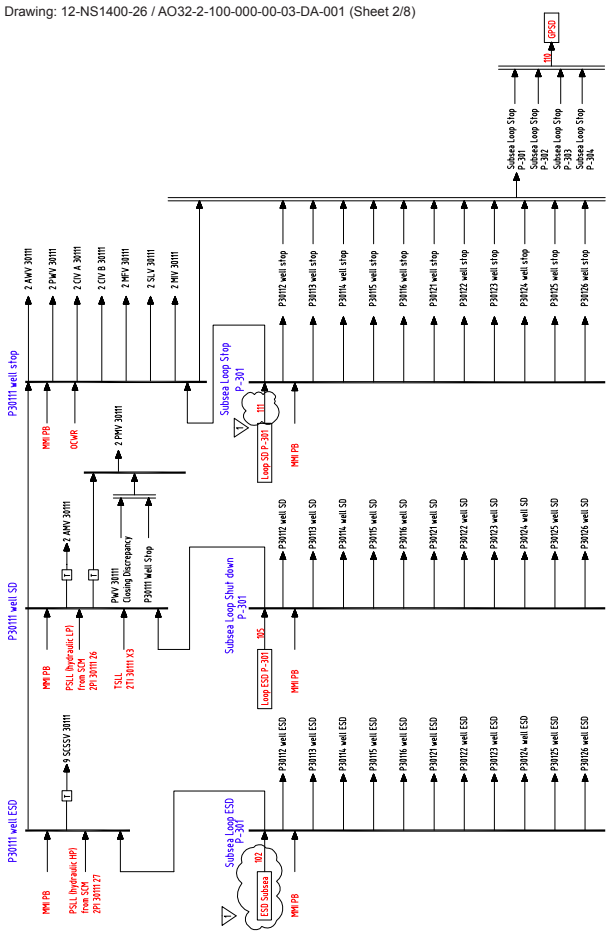
Penetrator top view
Scale 1:2

11.3 Safety Logic Diagram

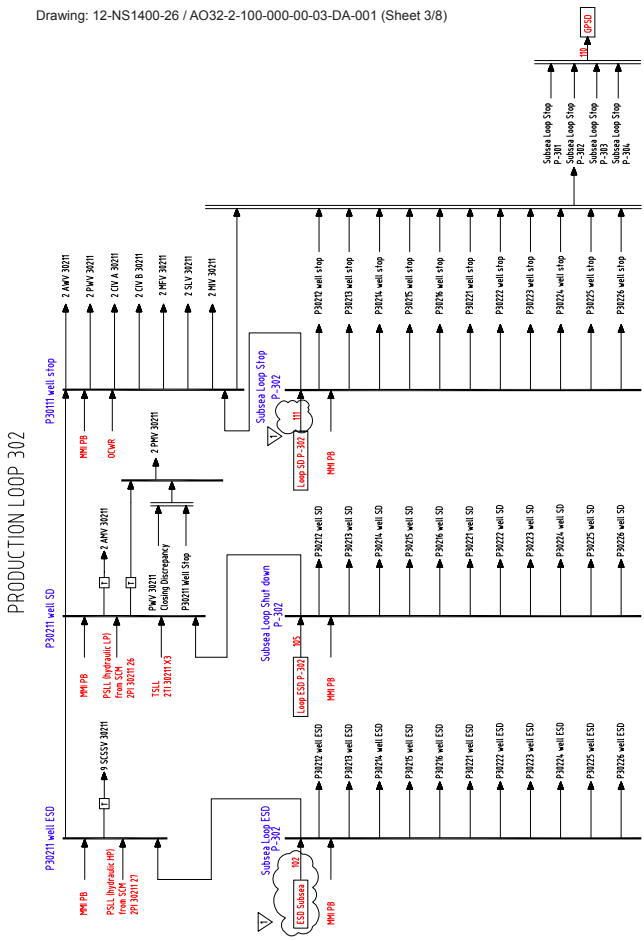
Drawing: 12-NS1400-26 / AO32-2-100-000-00-03-DA-001 (Sheet 1/8)



Drawing: 12-NS1400-26 / AO32-2-100-000-00-03-DA-001 (Sheet 2/8)



Drawing: 12-NS1400-26 / AO32-2-100-000-00-03-DA-001 (Sheet 3/8)



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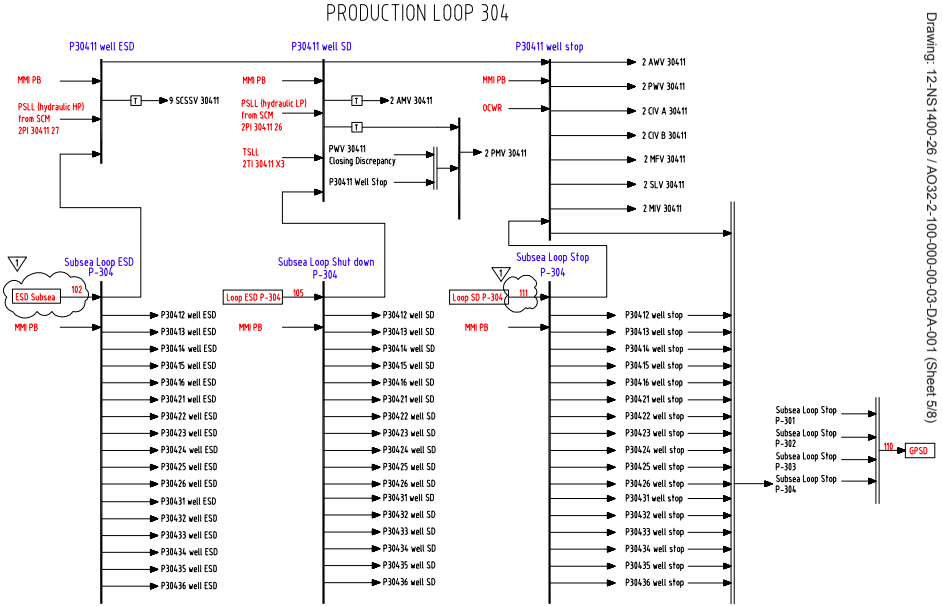
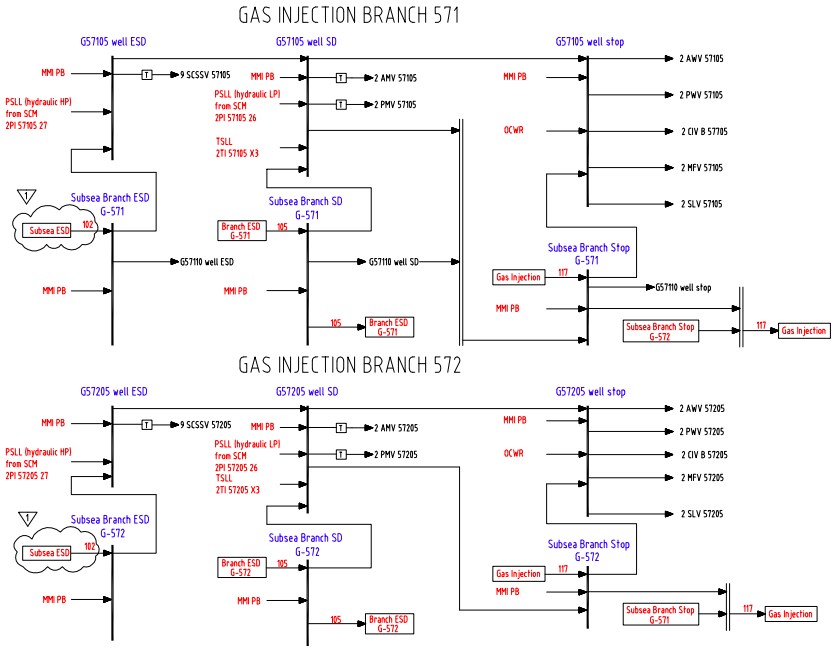
PRODUCTION LOOP 303


PRODUCTION LOOP 304
P30411 well ESD
P30411 well SD
P30411 well stop
MMI PB
PSLL (hydraulic HP) from SCM 2PI 30411 27
9 SCSSV 30411
PSLL (hydraulic LP) from SCM 2PI 30411 26
2 AMV 30411
TSLL 2TI 30411 X3
PWV 30411 Closing Discrepancy
2 PMV 30411
P30411 Well Stop
OCWR
2 AWV 30411
2 PWV 30411
2 CIV A 30411
2 CIV B 30411
2 MFV 30411
2 SLV 30411
2 MIV 30411
Subsea Loop ESD P-304
ESD Subsea
102
Subsea Loop Shut down P-304
Loop ESD P-304
105
Subsea Loop Stop P-304
Loop SD P-304
111
P30412 well ESD
P30413 well ESD
P30414 well ESD
P30415 well ESD
P30416 well ESD
P30421 well ESD
P30422 well ESD
P30423 well ESD
P30424 well ESD
P30425 well ESD
P30426 well ESD
P30431 well ESD
P30432 well ESD
P30433 well ESD
P30434 well ESD
P30435 well ESD
P30436 well ESD
P30412 well SD
P30413 well SD
P30414 well SD
P30415 well SD
P30416 well SD
P30421 well SD
P30422 well SD
P30423 well SD
P30424 well SD
P30425 well SD
P30426 well SD
P30431 well SD
P30432 well SD
P30433 well SD
P30434 well SD
P30435 well SD
P30436 well SD
P30412 well stop
P30413 well stop
P30414 well stop
P30415 well stop
P30416 well stop
P30421 well stop
P30422 well stop
P30423 well stop
P30424 well stop
P30425 well stop
P30426 well stop
P30431 well stop
P30432 well stop
P30433 well stop
P30434 well stop
P30435 well stop
P30436 well stop
Subsea Loop Stop P-301
Subsea Loop Stop P-302
Subsea Loop Stop P-303
Subsea Loop Stop P-304
110
GPSD



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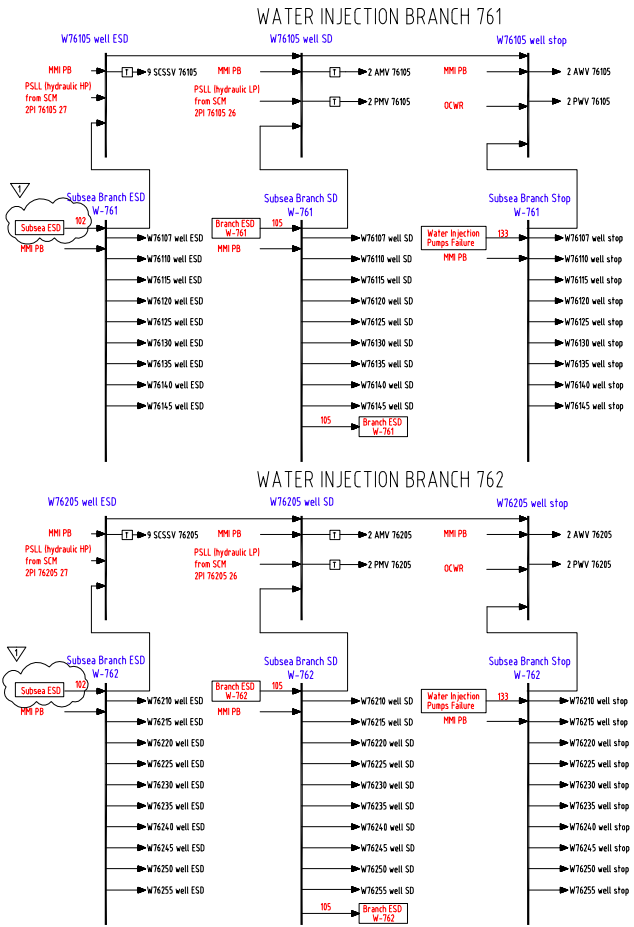
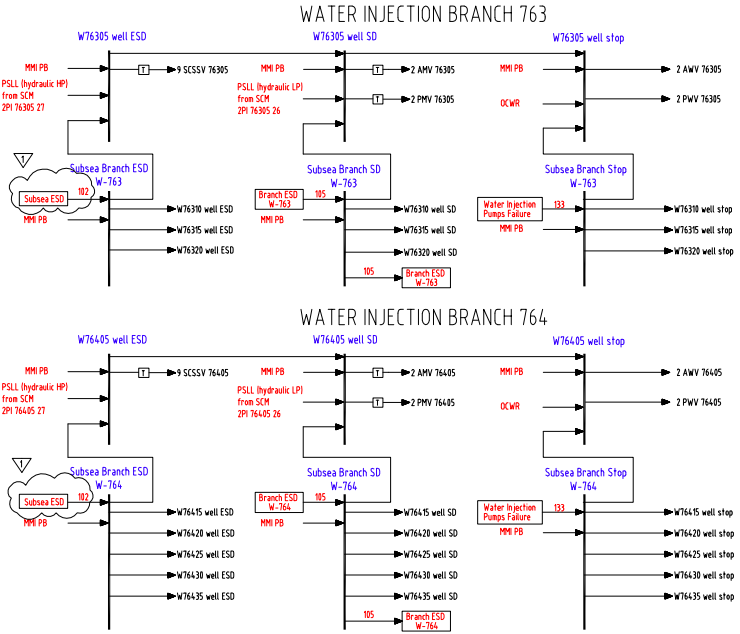
Drawing: 12-NS1400-26 / AO32-2-100-000-00-03-DA-001 (Sheet 7/8)





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12 Registry

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