

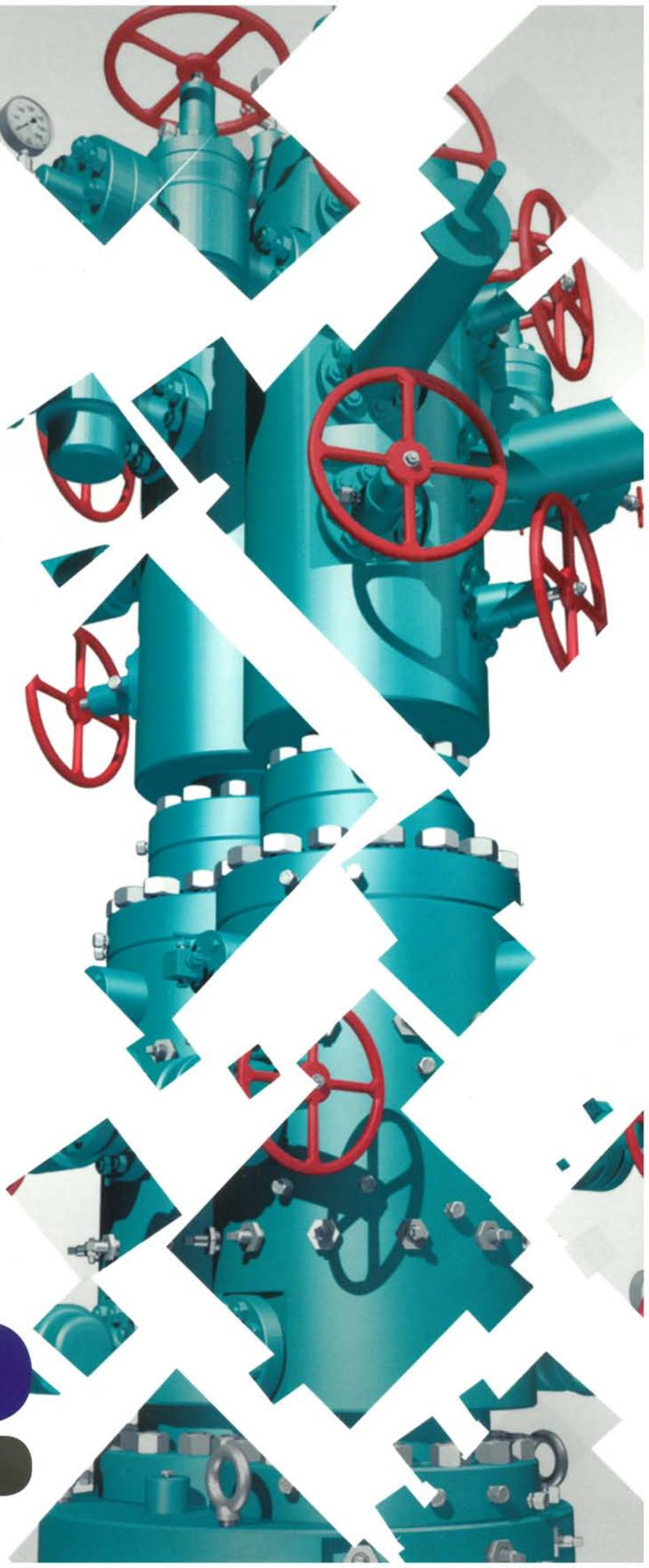


# solaralert

With Us, You Have A Committed Partner

**PRODUCT AND SERVICES  
CATALOGUE**

[www.solaralert.com.my](http://www.solaralert.com.my)



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# MILESTONES

**1995**

Solar Alert Sdn Bhd was incorporated

**2000**

Became a PETRONAS licensed company for wellhead equipment & christmas tree with technical partner TIX Inc. of Japan

**2001**

Secured the first contract from Carigali Triton Operating Company (CTOC) now known as Carigali Hess Operating Company (CHess)

**2015**

**Successfully installed the newly developed full Metal To Metal (MTM) pack-off for all hangers on Bulan C 2 in 1 system (Carigali Hess)**

**2005**

Secures the 1st international contract with PETRONAS Carigali Bahrain

**2007**

Moved to the current facility and deliver the first Compact System (2 in 1) to Carigali

**2011**

Acquired a fully automated cladding system for sour gas

**2013**

Deliver its 1st Compact System (3 in 1) system to Petrofac

**2014**

Successfully deliver the 1st mudline suspension system (MLS) to Petrofac



# INTRODUCTION

Solar Alert Sdn Bhd is the leading Malaysian company that manufactures and supply wellhead equipment and christmas tree in support of the oil & gas exploration and development activities.

Together with its other related businesses such as Wellhead Maintenance, H2S Services, Mudline Suspension System, Supply of Welding Habitat and other Driling equipment, Solar Alert has establish itself as a major player in the industry.

Incorporated in 1995, Solar Alert has continue to grow and develop home grown talent to sustain its growth and expand its business presence globally.



# CORPORATE OBJECTIVES

# QUALITY, HEALTH, SAFETY & ENVIRONMENT VALUES

- ▶ **COMMITMENT** towards our customer satisfaction, by
- ▶ **DELIVERING** quality product and services with strong after sales support, through
- ▶ **ENRICHMENT** of our human capital and empowerment, while
- ▶ **SUSTAINING** growth through best business practises, guided by professionalism, honesty and respect to all and
- ▶ **CONDUCTING** our business in a safe and environmentally friendly manner.

Solar Alert is committed to conduct its business in a manner that ensures health and safety of all the people involved in its activities and protection to the environment where it operates and deliver products and services that meet customer's specifications through its Quality Management System. This is achieved by making:-

- ▶ **COMMITMENT** from everyone involved a must,
- ▶ **CONTINUOUS** education and training of its workforce,
- ▶ **DEDICATION** of its workforce in adhering to the policy and procedures,
- ▶ **ESTABLISH** a reliable indicator through continuous improvement programs,
- ▶ **CULTIVATE** a healthy and safe working culture and
- ▶ **CREATE** awareness towards environment, safety, energy conservation and the importance of sustainability.



At Solar Alert, we offer six (6) distinctive designs which are field proven to suit the requirement for offshore and onshore exploration and development requirements. They are:-

**1 | Conventional Flange Type**

**2 | Compact Flange Type**

**3 | Compact Clamp Type**

**4 | Unitised System**

**5 | Splitter 2 in 1**

**6 | Splitter 3 in 1**

All our designs are in compliance to API 6A and API 16A in terms of product specification levels and performance requirements.

Specification/ Type	Conventional Flange Type	Conventional Clamp Type	Compact Clamp Type	Unitised System	Splitter 2 In 1	Splitter 3 In 1
Pressure Rating	2K – 20K	2K – 15K	2K – 15K	2K – 15K	2K – 10K	2K – 5K
Temperature Rating	-0F - +350F -18C to +180C					
Casing Size	36" – 7"	36" – 7"	36" – 7"	36" – 7"	36" – 7"	36" – 7"
Tubing Size	5" – 2-1/2"	5" – 2-1/2"	5" – 2-1/2"	5" – 2-1/2"	5" – 2-1/2"	5" – 2-1/2"
Service Type	General / Sour	General / Sour	General / Sour	General / Sour	General / Sour	General / Sour
Tubing Hanger Seal	Metal to Metal					
Completion	Single / Dual					
Slip Hanger Type	Mechanical Set					

**Table 1 : General Specification – Wellhead & Christmas Tree**

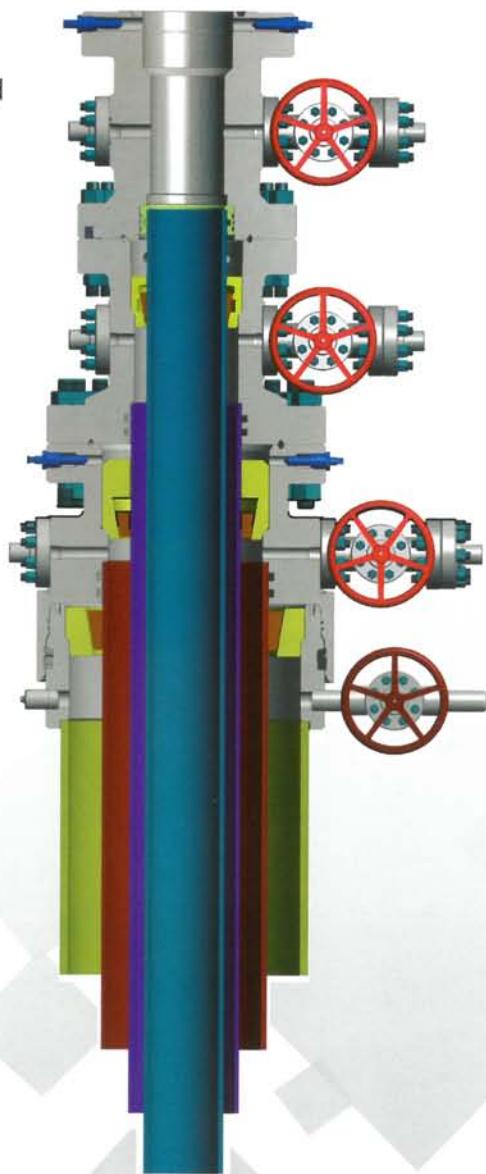
## 1 CONVENTIONAL FLANGE TYPE

The Conventional Wellhead System is the most established and cost effective design that is widely used worldwide. Its simple systems make it the most popular system in the market, particularly on onshore operations.

Suitability : Onshore / Offshore

### FEATURES:

- ▶ Implementation of industrial accepted seal
- ▶ Mechanical-set Slip Hanger type
- ▶ Metal-to-Metal seal in Tubing Hanger
- ▶ Single or Dual Completion
- ▶ Downhole control line connections and electrical feed-through assemblies available upon request
- ▶ Multi-purpose tool for BOP testing and wear bushing running / retrieval



# WELLHEAD & CHRISTMAS TREE

	<b>TYPE I</b>	<b>TYPE II</b>	<b>TYPE III</b>
<b>DRIVE PIPE HEAD / HOUSING / LANDING RING</b>	MIN ID	21.3"	26.5"
	WORKING PRESSURE	500 PSI	1000 PSI
	OUTLET	2" LP VALVE	2" LP & 3" LP VALVE
	LANDING PROFILE		20" / 18 - 5/8" CASING
	CASING HANGER		SLIP HANGER
	PACKOFF		YES
	LOCKDOWN		EXTERNAL
	TOP CONNECTION		API FLANGE
	BOTTOM CONNECTION		SLIP ON LOCK / SLIP ON WELD
	NACE MR 0175		YES
<b>CASING HEAD</b>	PSL		1/2
	MIN ID		17.6"
	WORKING PRESSURE	3000 PSI	5000 PSI
	OUTLET	2 - 1/16" 3K RX - 24	2 - 1/16" 5K RX - 24
	LANDING PROFILE	13 - 3/8" CASING	13 - 5/8" CASING
	CASING HANGER		MANDREL / SLIP
	PACKOFF		YES
	TOP CONNECTION		API FLANGE
	BOTTOM CONNECTION		API FLANGE
	LOCKDOWN		EXTERNAL
<b>LOWER COMPACT HOUSING</b>	NACE MR 0175		YES
	PSL		1/2
	MIN ID		12.5"
	WORKING PRESSURE	5000 PSI	10000 PSI
	OUTLET	2 - 1/16" 5K RX - 24	2 - 1/16" 10K BX - 152
	LANDING PROFILE	9 - 5/8" CASING	9 - 7/8" CASING
	CASING HANGER		MANDREL / SLIP
	PACKOFF		ELESTOMER
	LOCKDOWN		EXTERNAL
	TOP CONNECTION		API FLANGE
<b>UPPER COMPACT HOUSING</b>	BOTTOM CONNECTION		API FLANGE
	NACE MR 0175		YES
	PSL	2	3/3G/4
	MIN ID		8.8"
	WORKING PRESSURE	5000 PSI	10000 PSI
	OUTLET	2 - 1/16" 5K RX-24	2 - 1/16" 10K BX-152
	LANDING PROFILE		2 - 1/2" ~ 7" TUBING
	COMPLETION	SINGLE / DUAL	SINGLE
	PACKOFF		ELESTOMER
	LOCKDOWN		EXTERNAL
<b>CHRISTMAS TREE</b>	TOP CONNECTION		API FLANGE
	BOTTOM CONNECTION		API FLANGE
	DOWNHOLE GAUGE EXIT	3 PORTS (SINGLE / DOUBLE EXIT BLOCK)	
	NACE MR 0175		YES
	PSL	2/3	3/3G/4
	SIZE	2 - 1/16" TO 6-3/8"	
	WORKING PRESSURE	5000 PSI	10000 PSI
	TOP CONNECTION		STANDARD BOWEN
	BOTTOM CONNECTION		API HUB
	COMPLETION	SINGLE / DUAL	SINGLE
	LOWER MASTER VALVEE		MANUAL
	SURFACE SAFETY VALVE		HYDRAULIC / PNEUMATIC
	CROWN VALVE		MANUAL
	WING VALVE		MANUAL / HYDRAULIC / PNEUMATIC
	KILL LINE VALVE		YES
	NACE MR 0175		YES
	PSL	2/3	3/3G/4

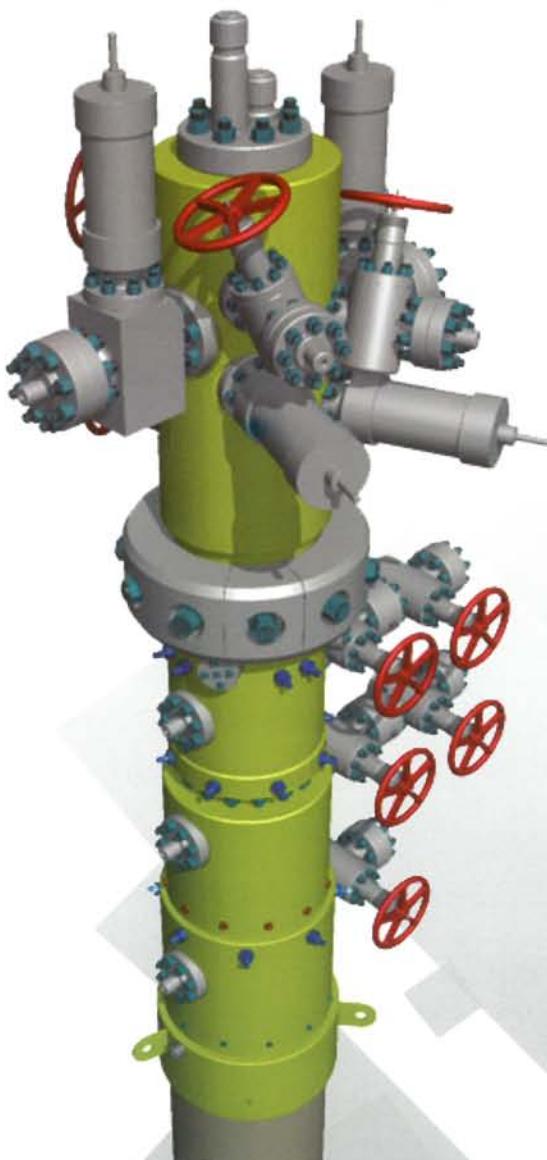
## 2 COMPACT FULL THRU BORE TYPE

The Conventional Wellhead System is the most established and cost effective design that is widely used worldwide. Its simple systems make it the most popular system in the market, particularly on onshore operations.

Suitability : Onshore / Offshore

### FEATURES:

- ▶ System flexibility allows adaptation to most casing programs
- ▶ Fewer connections reduce possible leak paths and save BOP nipple-up/nipple-down
- ▶ Single or Dual Completion
- ▶ Tubing sizes varies from 5" to 2-1/2"
- ▶ Down hole control line connections and electrical feed-through assemblies available upon request
- ▶ Multi-purpose tool for BOP testing and wear bushing running/retrieval
- ▶ Multi-purpose tool for BOP testing and wear bushing running/retrieval
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# WELLHEAD & CHRISTMAS TREE

		TYPE I	TYPE II	TYPE III
DRIVE PIPE HEAD HOUSING / LANDING RING	MIN ID	21.3"	26.5"	15000 PSI
	WORKING PRESSURE	500 PSI	1000 PSI	1000 PSI
	OUTLET	2" LP VALVE	2" LP & 3" LP VALVE	
	LANDING PROFILE		20" / 18 - 5/8" CASING	
	CASING HANGER		SLIP HANGER	
	PACKOFF		YES	
	LOCKDOWN		EXTERNAL	
	TOP CONNECTION		QUICK CONNECT / FLANGE	
	BOTTOM CONNECTION		SLIP ON LOCK / SLIP ON WELD	
	NACE MR 0175		YES	
CASING HEAD	PSL		1/2	
	MIN ID		17.6"	
	WORKING PRESSURE	3000 PSI	5000 PSI	
	OUTLET	2 - 1/16" 3K RX - 24	2 - 1/16" 5K RX - 24	
	LANDING PROFILE	13 - 3/8" CASING		13 - 5/8" CASING
	CASING HANGER		MANDREL / SLIP	
	PACKOFF		YES	
	TOP CONNECTION		QUICK CONNECT / API HUB / API FLANGE	
	BOTTOM CONNECTION		QUICK CONNECT / FLANGE	
	LOCKDOWN		INTERNAL / EXTERNAL AVAILABLE	
LOWER COMPACT HOUSING	NACE MR 0175		YES	
	PSL		1/2	
	MIN ID		12.5" X 13.0"	
	WORKING PRESSURE	5000 PSI	10000 PSI	
	OUTLET	2 - 1/16" 5K RX - 24	2 - 1/16" 10K BX - 152	
	LANDING PROFILE	9 - 5/8" CASING		9 - 7/8" CASING
	CASING HANGER		MANDREL / SLIP	
	PACKOFF		ELESTOMER / METAL TO METAL SEAL	
	LOCKDOWN		INTERNAL / EXTERNAL AVAILABLE	
	TOP CONNECTION		FLANGE	
UPPER COMPACT HOUSING	BOTTOM CONNECTION		QUICK CONNECT / API HUB / API FLANGE	
	NACE MR 0175		YES	
	PSL	2	3/3G/4	3/3G/4
	MIN ID		13.625" STRAIGHT BORE	
	WORKING PRESSURE	5000 PSI	10000 PSI	15000 PSI
	OUTLET	2 - 1/16" 5K RX-24	2 - 1/16" 10K BX-152	2 - 1/16" 15K BX-152
	LANDING PROFILE		2 - 1/2" ~ 7" TUBING	
	COMPLETION		SINGLE / DUAL	SINGLE
	PACKOFF		ELESTOMER / METAL TO METAL SEAL	
	LOCKDOWN		INTERNAL / EXTERNAL AVAILABLE	
CHRISTMAS TREE	TOP CONNECTION		API HUB	
	BOTTOM CONNECTION		STUDED FLANGE	
	DOWNHOLE GAUGE EXIT		3 PORTS (SINGLE / DOUBLE EXIT BLOCK)	
	NACE MR 0175		YES	
	PSL	2/3	3/3G/4	3/3G/4
	SIZE		2 - 1/16" TO 6-3/8"	
	WORKING PRESSURE	5000 PSI	10000 PSI	15000 PSI
	TOP CONNECTION		STANDARD BOWEN	
	BOTTOM CONNECTION		API HUB	
	COMPLETION		SINGLE / DUAL	SINGLE
CHRISTMAS TREE	LOWER MASTER VALVE		MANUAL	
	SURFACE SAFETY VALVE		HYDRAULIC / PNEUMATIC	
	CROWN VALVE		MANUAL	
	WING VALVE		MANUAL / HYDRAULIC / PNEUMATIC	
	KILL LINE VALVE		YES	
	NACE MR 0175		YES	
	PSL	2/3	3/3G/4	3/3G/4

## 3 COMPACT CLAMP TYPE

Comes with compact body thus reducing the installation time due to less nipple up / nipple down and easy installation.

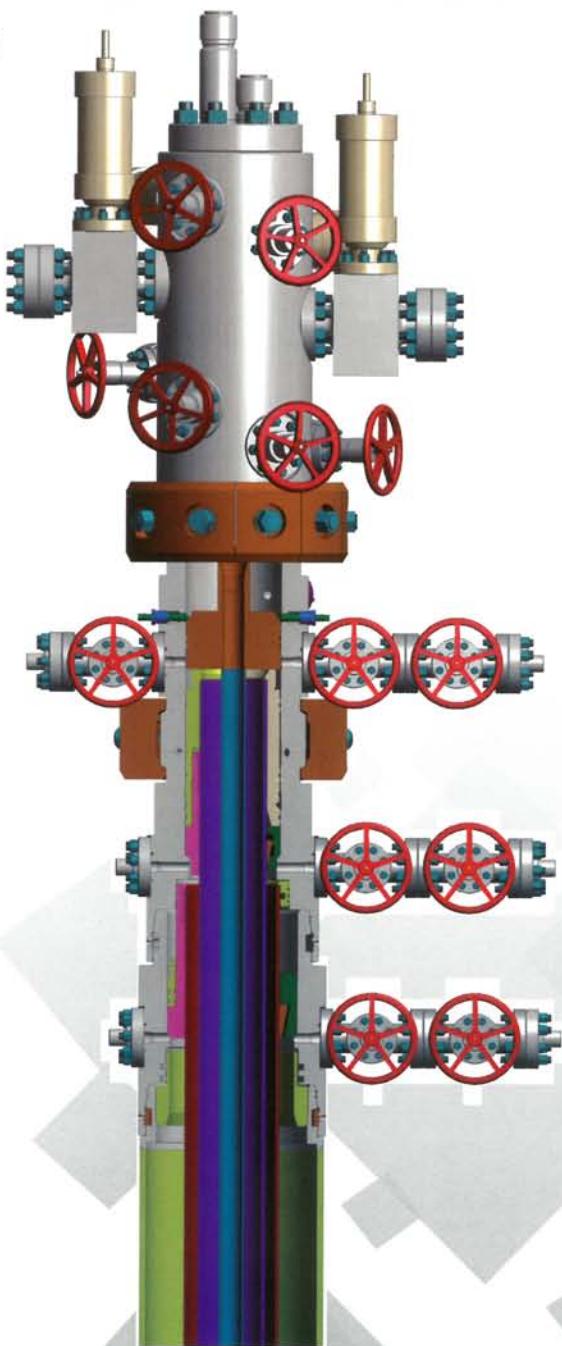
Offers "straight bore" profile with casing spool and tubing head in one compact housing

Clamp type system allows faster installation w/o welding.

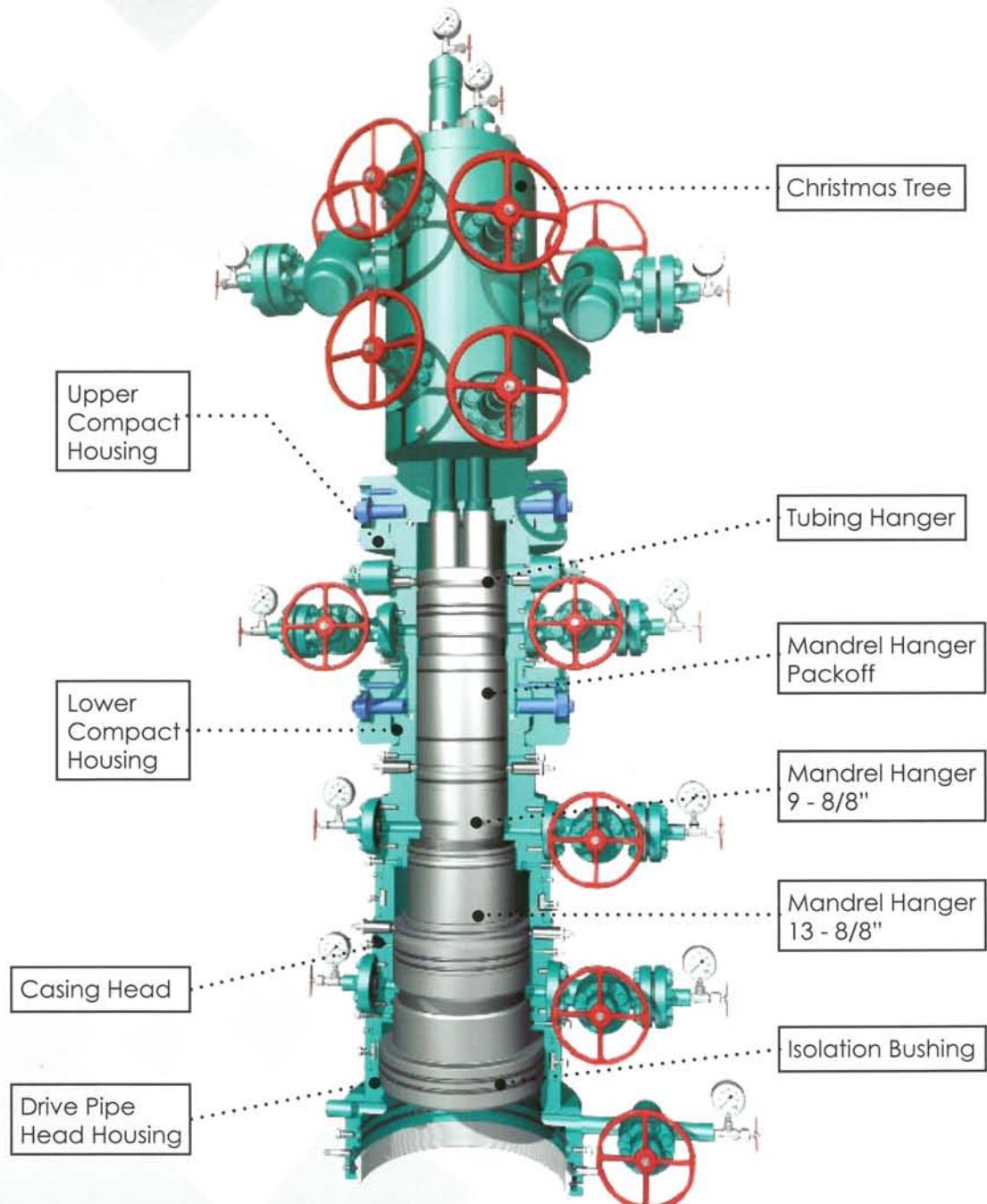
Suitability : Onshore / Offshore

### FEATURES:

- ▶ System flexibility allows adaptation to most casing programs
- ▶ Fewer connections reduce possible leak paths and save BOP nipple-up/nipple-down
- ▶ Single or Dual Completion
- ▶ Tubing sizes varies from 5" to 2-1/2"
- ▶ Downhole control line connections and electrical feed- through assemblies available
- ▶ Multi-purpose tool for BOP testing and wear bushing running/ retrieval



# WELLHEAD & CHRISTMAS TREE



Development Wellhead & Tree - Compact Clamp System

# WELLHEAD & CHRISTMAS TREE

	<b>TYPE I</b>	<b>TYPE II</b>	<b>TYPE III</b>
<b>DRIVE PIPE HEAD HOUSING / LANDING RING</b>	5000 PSI	10000 PSI	15000 PSI
	MIN ID	21.3"	26.5"
	WORKING PRESSURE	500 PSI	1000 PSI
	OUTLET	2" LP VALVE	2" LP & 3" LP VALVE
	LANDING PROFILE	20" / 18 - 5/8" CASING	
	CASING HANGER	SLIP HANGER	
	PACKOFF	YES	
	LOCKDOWN	EXTERNAL	
	TOP CONNECTION	QUICK CONNECT / FLANGE	
	BOTTOM CONNECTION	SLIP ON LOCK / SLIP ON WELD	
<b>CASING HEAD</b>	NACE MR 0175	YES	
	PSL	1/2	
	MIN ID	17.6"	
	WORKING PRESSURE	3000 PSI	5000 PSI
	OUTLET	2 - 1/16" 3K RX - 24	2 - 1/16" 5K RX - 24
	LANDING PROFILE	13 - 3/8" CASING	13 - 5/8" CASING
	CASING HANGER	MANDREL / SLIP	
	PACKOFF	YES	
	TOP CONNECTION	QUICK CONNECT / API HUB / API FLANGE	
	BOTTOM CONNECTION	QUICK CONNECT / FLANGE	
<b>LOWER COMPACT HOUSING</b>	LOCKDOWN	INTERNAL / EXTERNAL AVAILABLE	
	NACE MR 0175	YES	
	PSL	1/2	
	MIN ID	12.5" X 13.625" STRAIGHT BORE	
	WORKING PRESSURE	5000 PSI	10000 PSI
	OUTLET	2 - 1/16" 5K RX - 24	2 - 1/16" 10K BX - 152
	LANDING PROFILE	9 - 5/8" CASING	9 - 7/8" CASING
	CASING HANGER	MANDREL / SLIP	
	PACKOFF	ELESTOMER / METAL TO METAL SEAL	
	LOCKDOWN	INTERNAL / EXTERNAL AVAILABLE	
<b>UPPER COMPACT HOUSING</b>	TOP CONNECTION	API HUB	
	BOTTOM CONNECTION	QUICK CONNECT / API HUB / API FLANGE	
	NACE MR 0175	YES	
	PSL	2	3/3G/4
	MIN ID	13.625" STRAIGHT BORE	
	WORKING PRESSURE	5000 PSI	10000 PSI
	OUTLET	2 - 1/16" 5K RX-24	2 - 1/16" 10K BX-152
	LANDING PROFILE	2 - 1/2" ~ 7" TUBING	
	COMPLETION	SINGLE / DUAL	SINGLE
	PACKOFF	ELESTOMER / METAL TO METAL SEAL	
<b>CHRISTMAS TREE</b>	LOCKDOWN	INTERNAL / EXTERNAL AVAILABLE	
	TOP CONNECTION	API HUB	
	BOTTOM CONNECTION	API HUB	
	DOWNHOLE GAUGE EXIT	3 PORTS (SINGLE / DOUBLE EXIT BLOCK)	
	NACE MR 0175	YES	
	PSL	2/3	3/3G/4
	SIZE	2 - 1/16" TO 6-3/8"	
	WORKING PRESSURE	5000 PSI	10000 PSI
	TOP CONNECTION	STANDARD BOWEN	
	BOTTOM CONNECTION	API HUB	
	COMPLETION	SINGLE / DUAL	SINGLE
	LOWER MASTER VALVE	MANUAL	
	SURFACE SAFETY VALVE	HYDRAULIC / PNEUMATIC	
	CROWN VALVE	MANUAL	
	WING VALVE	MANUAL / HYDRAULIC / PNEUMATIC	
	KILL LINE VALVE	YES	
	NACE MR 0175	YES	
	PSL	2/3	3/3G/4
			3/3G/4

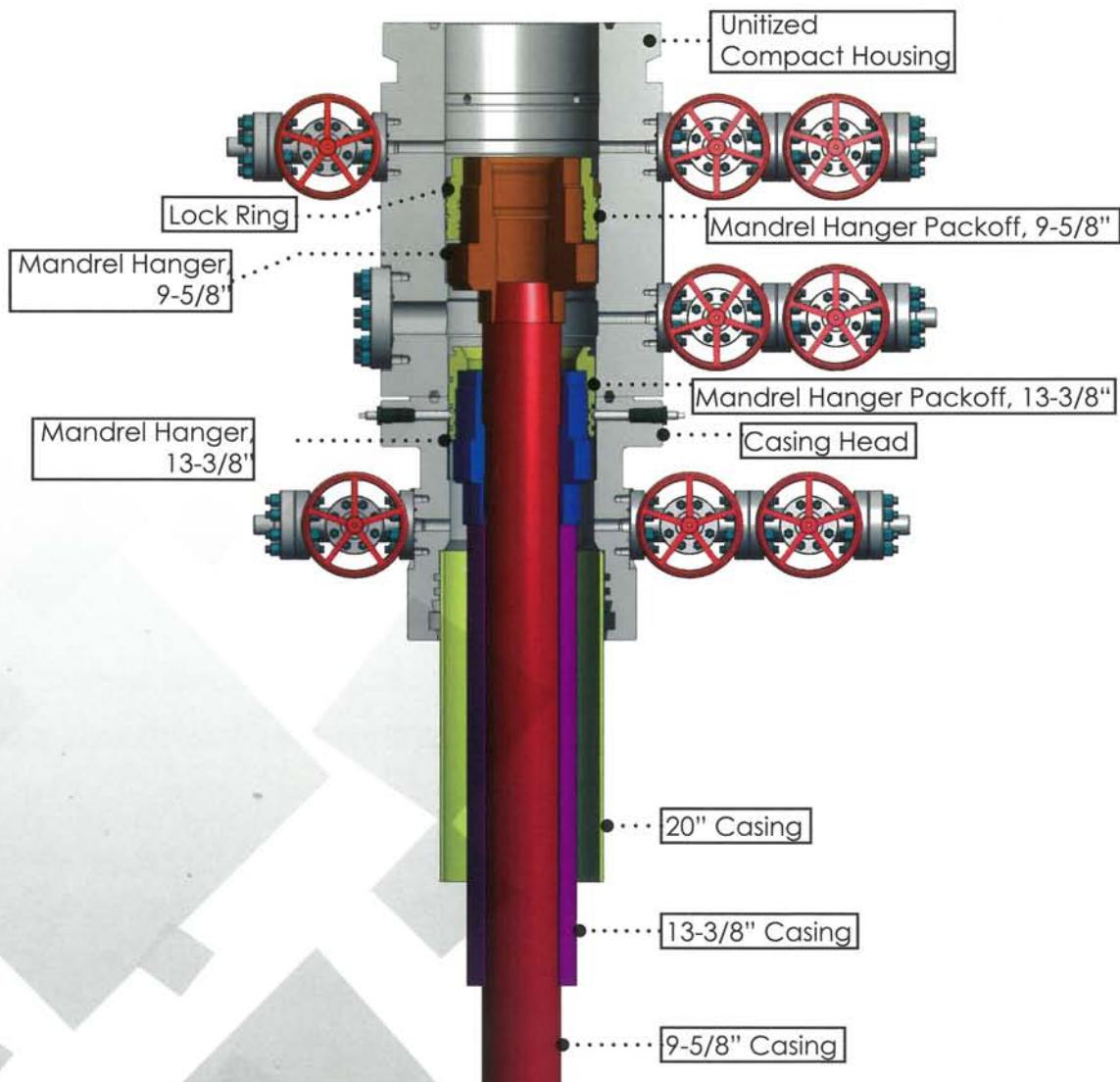
#### 4 UNITISED SYSTEM

The unitized wellhead is the one-piece body in which typically run on 13-3/8" casing through the BOP & land on a landing shoulder that is located inside the starting head or on top of the conductor itself.

Besides saving valuable rig time, the other advantage of this system is complete BOP control throughout the entire drilling process

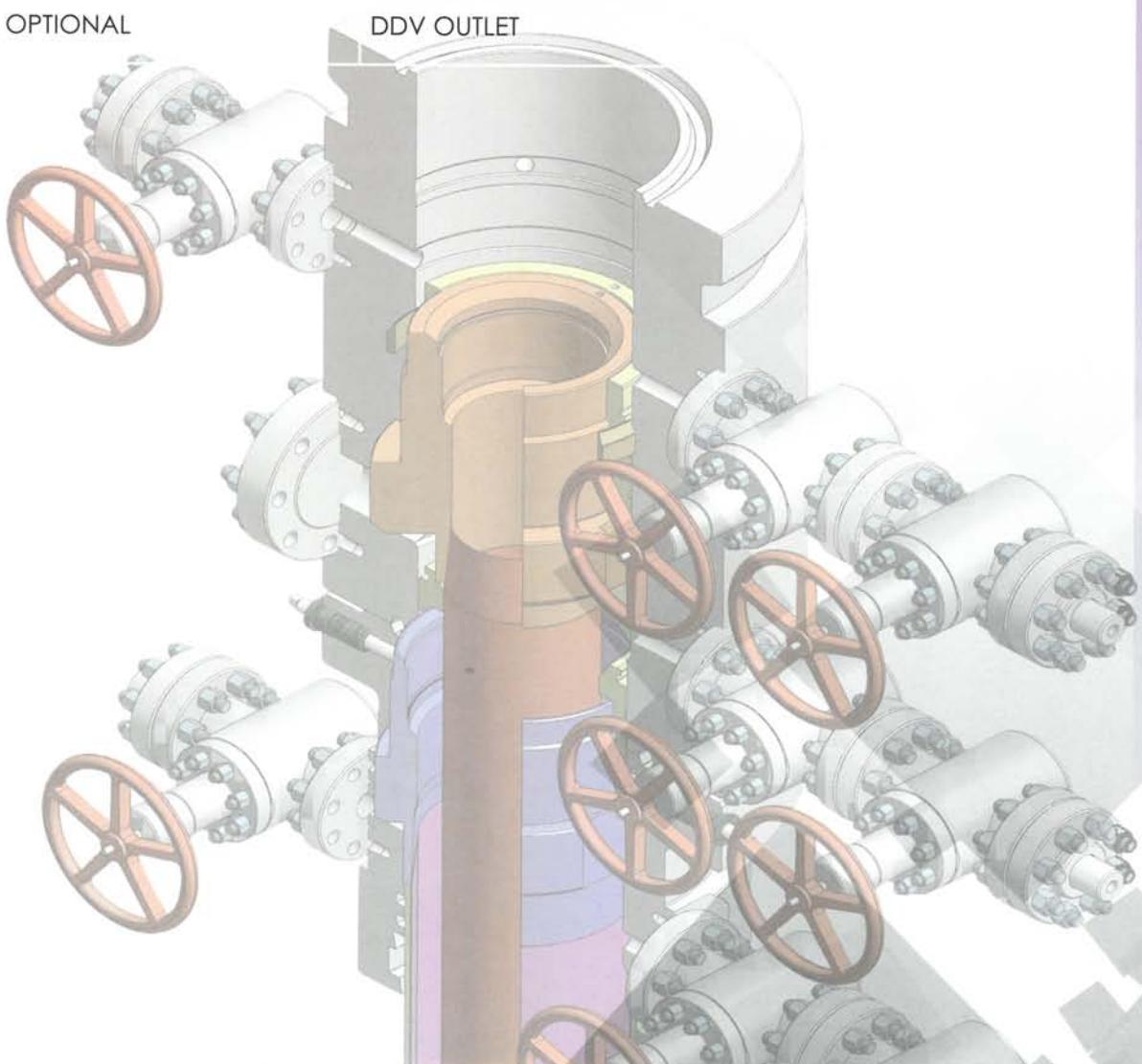
##### FEATURES:

- ▶ Simplifies drilling operation by replacing spooled wellhead components
- ▶ Working pressure up to 10K - 15K psi
- ▶ Simplifies height adjustment of wellhead stacks on platform so it can be installed to identical height



# WELLHEAD & CHRISTMAS TREE

MIN ID	17.6"	
WORKING PRESSURE	10,000 PSI	15,000 PSI
OUTLET	2-1/16" 10K BX-152	2-1/16" 15K BX-152
LANDING PROFILE	13-3/8" CASING & 9-5/8" CASING & COMPLETION TUBING	
CASING HANGER	MANDREL / SLIP HANGER	
PACKOFF	YES OPTIONAL WITH METAL TO METAL SEAL	
LOCKDOWN	INTERNAL / EXTERNAL AVAILABLE	
TOP CONNECTION	18-3/4" 10K BX-164 API HUB    18-3/4" 15K BX-164 API HUB	
BOTTOM CONNECTION	SLIP ON LOCK OR SLIP ON WELD	
NACE MR 0175	YES	
PSL	2 / 3 / 3g / 4	

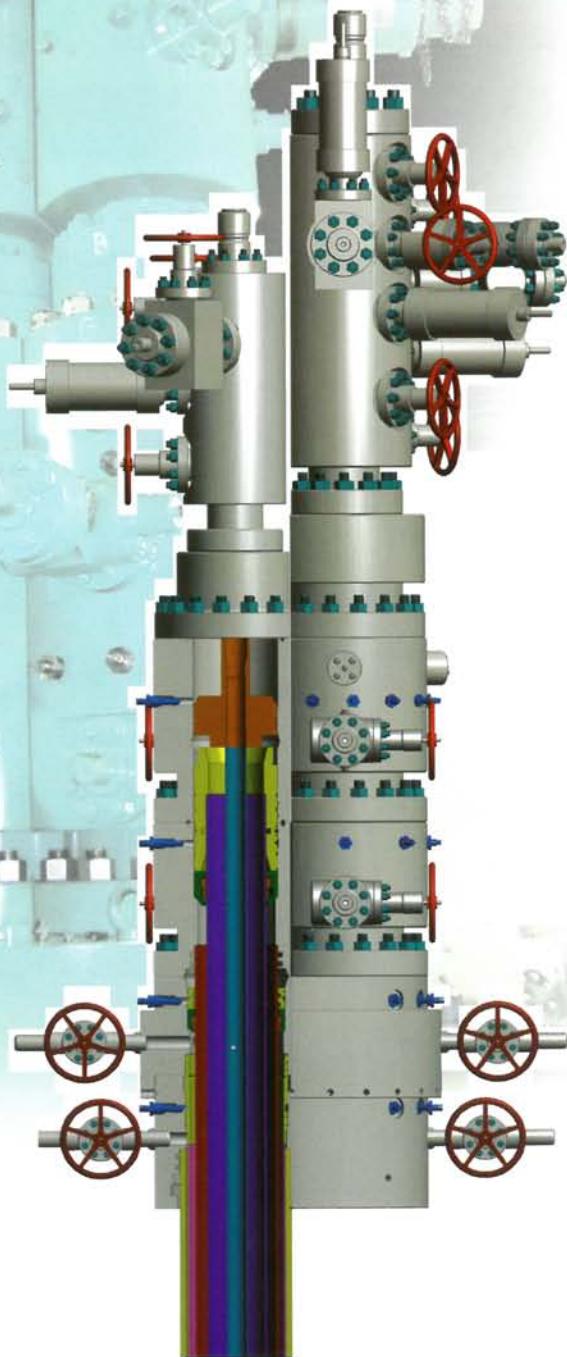


## 5 COMPACT SYSTEM (2 IN 1)

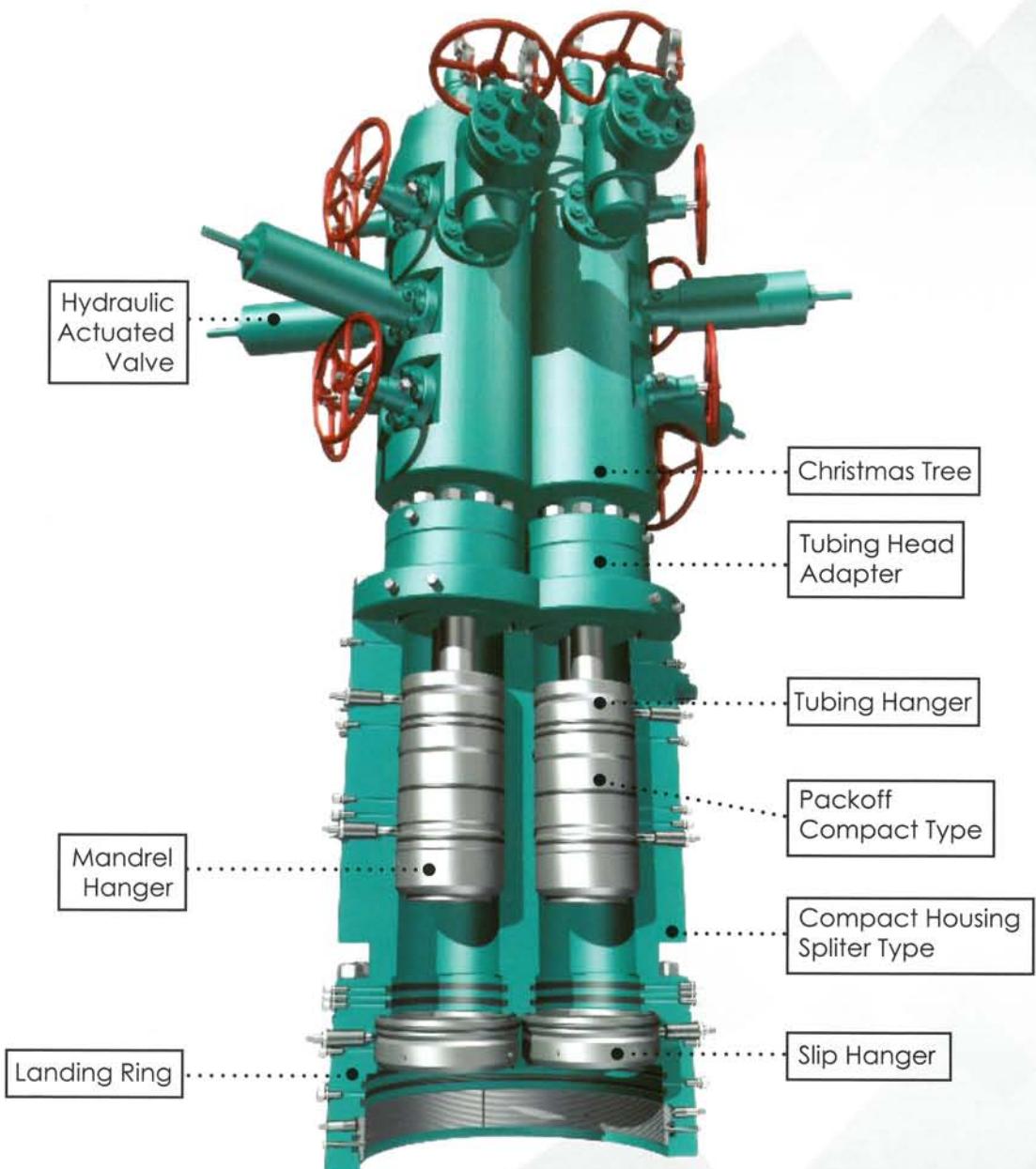
The compact 2 in 1 system offers flexibility of completing 1 or 2 wells in a single conductor. Not only it minimizes the development cost through maximizing the number of well per slot, it also provides flexibility to produce from 2 different zones or use one as injection well.

### FEATURES:

- ▶ Separate dual starting head may be used
- ▶ Each well can be completed as single or dual completions
- ▶ Workover activities can be done Independently
- ▶ Maximum conductor size is 42" with a maximum of 4 casing strings per well excluding the production tubing.
- ▶ For tubing, maximum size is 7" to 4-1/2" for single completion and 3-1/2" and below for dual completion.
- ▶ Available in 2 x 2 or 2 x 1 completion configuration.
- ▶ Downhole control line connections and electrical feed-through assemblies available upon request
- ▶ Multi-purpose tool for BOP testing and wear bushing running/ retrieval



# WELLHEAD & CHRISTMAS TREE



Development Wellhead & Tree - Compact System (2 in 1)

# WELLHEAD & CHRISTMAS TREE

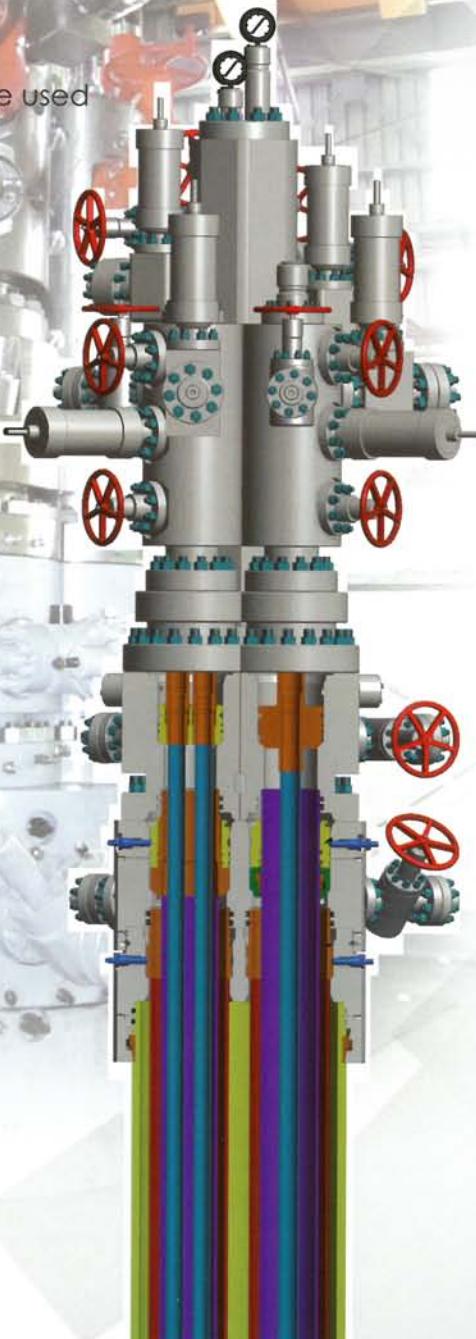
		TYPE I	TYPE II
		CONDUIT	WITHOUT CONDUIT
DUAL BORE LOWER LANDING RING	MIN ID	16.2"	
	WORKING PRESSURE	500 PSI	
	OUTLET	2" LP & 3" LP VALVE	
	LANDING PROFILE	16" CASING	13 - 3/8" CASING
	CASING HANGER	MANDREL / SLIP HANGER	
	PACKOFF	YES	
	LOCKDOWN	EXTERNAL	
	TOP CONNECTION	DUAL BORE QUICK CONNECT	
	BOTTOM CONNECTION	SLIP ON LOCK / SLIP ON WELD	
	NACE MR 0175	YES	
DUAL BORE UPPER LANDING RING	PSL	1/2	
	MIN ID	17.6"	
	WORKING PRESSURE	3000 PSI	
	OUTLET	2 - 1/16" 3K RX - 24	
	LANDING PROFILE	13 - 3/8" CASING	
	CASING HANGER	MANDREL / SLIP HANGER	
	PACKOFF	YES	
	TOP CONNECTION	2 X STUDDED D-FLANGE	
	BOTTOM CONNECTION	QUICK CONNECT	
	LOCKDOWN	EXTERNAL	
LOWER COMPACT HOUSING	NACE MR 0175	YES	
	PSL	1/2	
	MIN ID	12.5" X 13.625" STRAIGHT BORE	
	WORKING PRESSURE	5000 PSI	
	OUTLET	2 - 1/16" 5K RX - 24	
	LANDING PROFILE	9 - 5/8" CASING	
	CASING HANGER	MANDREL / SLIP	
	PACKOFF	ELESTOMER / METAL TO METAL SEAL	
	LOCKDOWN	INTERNAL / EXTERNAL AVAILABLE	
	TOP CONNECTION	STUDDED FLANGE	
UPPER COMPACT HOUSING	BOTTOM CONNECTION	D-FLANGE	
	NACE MR 0175	YES	
	PSL	2/3	
	MIN ID	13.625" STRAIGHT BORE	
	WORKING PRESSURE	5000 PSI	
	OUTLET	2 - 1/16" 5K RX-24	
	LANDING PROFILE	2 - 1/2" ~ 4 - 1/2" TUBING	
	COMPLETION	SINGLE / DUAL	
	PACKOFF	ELESTOMER / METAL TO METAL SEAL	
	LOCKDOWN	INTERNAL / EXTERNAL AVAILABLE	
CHRISTMAS TREE	TOP CONNECTION	STUDDED D-FLANGE	
	BOTTOM CONNECTION	D-FLANGE	
	DOWNHOLE GAUGE EXIT	3 PORTS (SINGLE / DOUBLE EXIT BLOCK)	
	NACE MR 0175	YES	
	PSL	2/3/3G/4	
	SIZE	2 - 1/16" TO 4-1/16"	
	WORKING PRESSURE	5000 PSI / 10000 PSI	
	TOP CONNECTION	STANDARD BOWEN	
	BOTTOM CONNECTION	D-FLANGE	
	COMPLETION	SINGLE / DUAL	

## 6 SPLITTER SYSTEM (3 IN 1)

First introduced in 2013, the Splitter 3 in 1 system is the latest design produced by Solar Alert. Similarly to the 2 in 1 system, this new system incorporates the same flexibility.

### FEATURES:

- ▶ Separate dual starting head may be used
- ▶ Allows flexibility to drill and complete 1 or 3 wells in a single conductor
- ▶ Each well can be completed as single or dual completions
- ▶ Work-over activities can be done independently
- ▶ Maximum conductor size is 42" with a maximum of 3 casing strings per well excluding the production tubing.
- ▶ For tubing, maximum size is 3-1/2" for single completion and 2-7/8" and below for dual completion.
- ▶ Available in 2 x 2 x 2 or 2 x 2 x 1 or 2 x 1 x 1 completion configuration
- ▶ Downhole control line connections and electrical feed-through assemblies available upon request
- ▶ Multi-purpose tool for BOP testing and wear bushing running/ retrieval



## 7 WELLHEAD AND CHRISTMAS TREE FOR WORKOVER

Solar Alert has the capability to customise its products and design to satisfy customer operational requirement.

# WELLHEAD & CHRISTMAS TREE

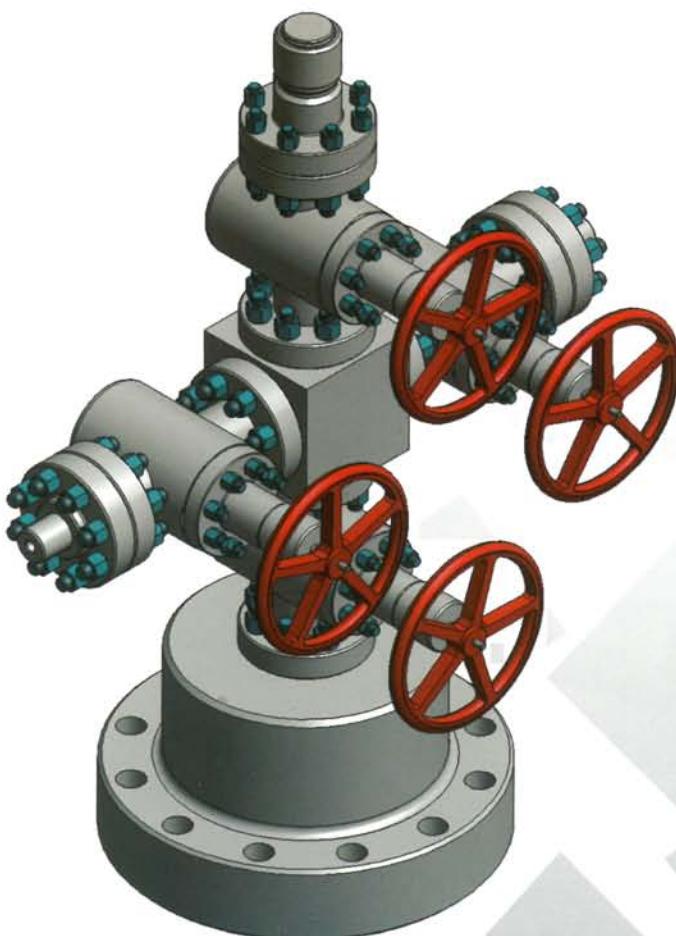
	TYPE I
<b>TRIPEL BORE LOWER LANDING RING</b>	MIN ID 13.6"
	WORKING PRESSURE 500 PSI
	OUTLET 2" LP & 3" LP VALVE
	LANDING PROFILE 13 - 3/8" CASING
	CASING HANGER MANDREL / SLIP HANGER
	PACKOFF YES
	LOCKDOWN EXTERNAL
	TOP CONNECTION TRIPEL BORE QUICK CONNECT
	BOTTOM CONNECTION SLIP ON LOCK / SLIP ON WELD
	NACE MR 0175 YES
<b>TRIPEL BORE UPPER LANDING RING</b>	PSL 1/2
	MIN ID 12.5"
	WORKING PRESSURE 3000 PSI
	OUTLET 2 - 1/16" 3K RX - 24
	LANDING PROFILE 9 - 5/8" CASING
	CASING HANGER MANDREL / SLIP HANGER
	PACKOFF YES
	TOP CONNECTION 3 X STUDDED C-FLANGE, 11" 5K
	BOTTOM CONNECTION QUICK CONNECT
	LOCKDOWN EXTERNAL
<b>TUBING HEAD</b>	NACE MR 0175 YES
	PSL 1/2
	MIN ID 8.8"
	WORKING PRESSURE 5000 PSI
	OUTLET 2 - 1/16" 5K RX - 24
	LANDING PROFILE 2 - 1/2" ~ 3 - 1/2" TUBING
	COMPLETION SINGLE / DUAL
	PACKOFF ELESTOMER / METAL TO METAL SEAL
	LOCKDOWN INTERNAL / EXTERNAL AVAILABLE
	TOP CONNECTION STUDDED C-FLANGE, 11" 5K
<b>CHRISTMAS TREE</b>	BOTTOM CONNECTION C-FLANGE, 11" 5K
	DOWNHOLE GAUGE EXIT 3 PORTS (SINGLE / DOUBLE EXIT BLOCK)
	NACE MR 0175 YES
	PSL 2/3/3G/4
	SIZE 2 - 1/16" TO 3 - 1/8"
	WORKING PRESSURE 5000 PSI
	TOP CONNECTION STANDARD BOWEN
	BOTTOM CONNECTION C-FLANGE, 11" 5K
	COMPLETION SINGLE / DUAL
	LOWER MASTER VALVE MANUAL
<b>CHRISTMAS TREE</b>	SURFACE SAFETY VALVE HYDRAULIC / PNEUMATIC
	CROWN VALVE MANUAL
	WING VALVE MANUAL / HYDRAULIC / PNEUMATIC
	KILL LINE VALVE YES
	NACE MR 0175 YES
	PSL 2/3/3G/4

# CHRISTMAS TREE SELECTION

## SINGLE STACKED CHRISTMAS TREE

### Features:

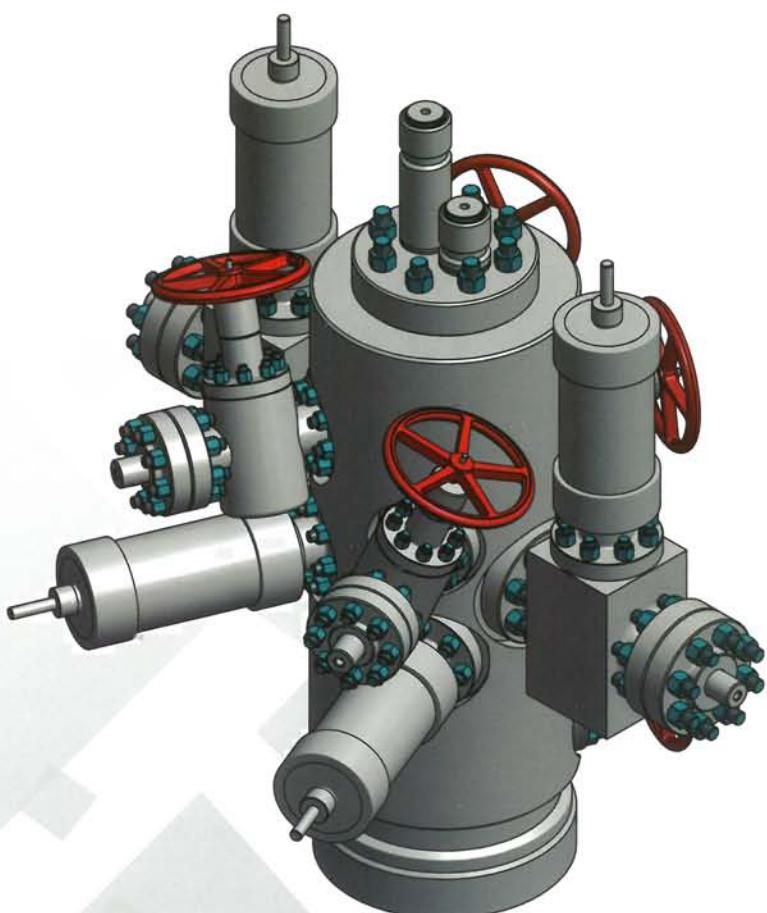
- ▶ Lower Master Gate Valve.
- ▶ Upper Master Gate Valve.
- ▶ Studded Cross.
- ▶ Production Gate Valve.
- ▶ Kill Valve and Swab Valve.
- ▶ Tree Cap Adapter.
- ▶ Pressure Gauge and Needle Valve.
- ▶ Adjustable Choke (optional).
- ▶ Bottom Connection - Flanged (for tubing head adapter).
- ▶ Top Connection - Studded (for tree cap adapter).



## SOLID BLOCK TYPE (DUAL TYPE)

### FEATURES:

- ▶ Lower Master Gate Valve (Manual or hydraulic actuated).
- ▶ Upper Master Gate Valve (Manual or hydraulic actuated).
- ▶ Production Gate Valve (Hydraulic actuated).
- ▶ Kill Valve (Hydraulic actuated).
- ▶ Swab Valve (Manual).
- ▶ Tree Cap Adapter (Dual).
- ▶ Pressure Gauge and Needle Valve.
- ▶ Bottom Connection - Quick Connect (for tubing head adapter).
- ▶ Top Connection - Studded (for tree cap adapter).
- ▶ Also available in T Block or Y Block type

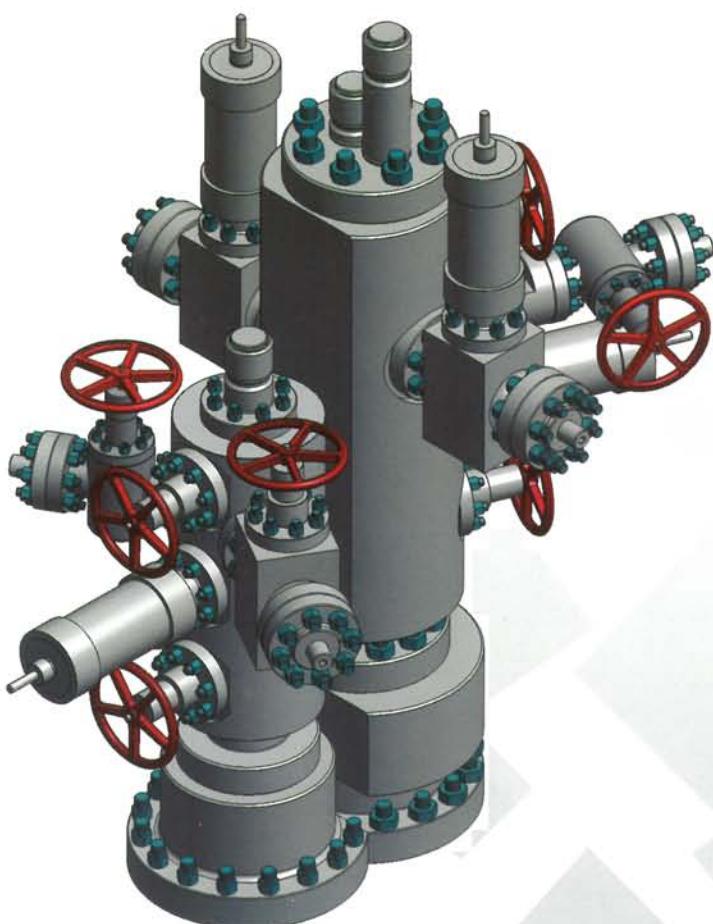


# CHRISTMAS TREE SELECTION

## 2 IN 1 TYPE

### Features:

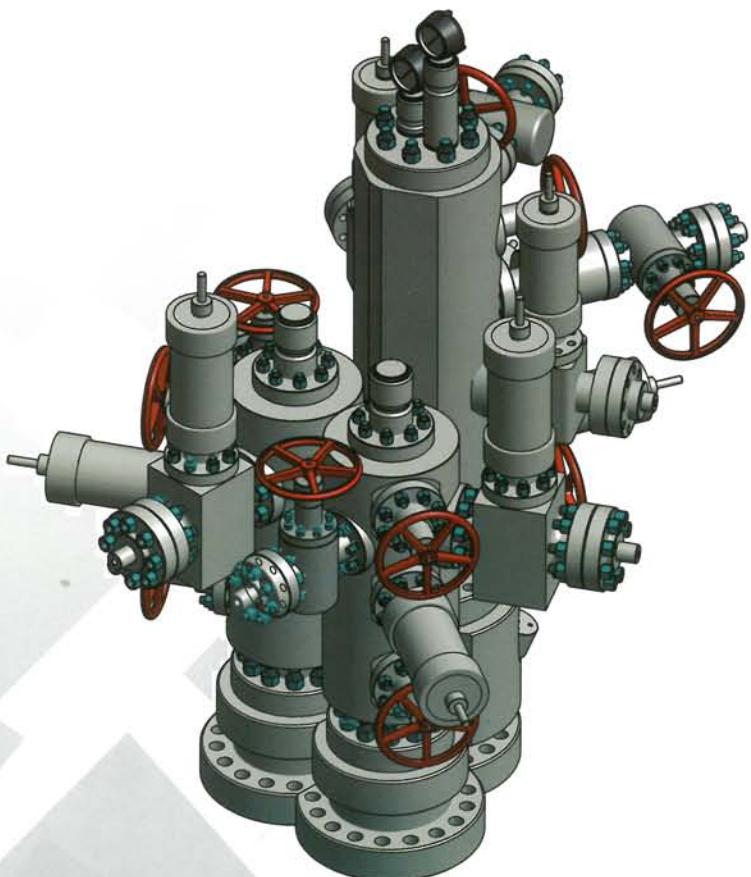
- ▶ Sizes; 2-1/16" 5,000 psi to 4-1/16" 10,000 psi
- ▶ Lower Master Gate Valve (Manual).
- ▶ Upper Master Gate Valve (Hydraulic or pneumatic actuated).
- ▶ Production Gate Valve (Manual, hydraulic or pneumatic actuated).
- ▶ Kill Valve (Manual or hydraulic actuated).
- ▶ Swab Valve (Manual).
- ▶ Tree Cap Adapter (Dual).
- ▶ Pressure Gauge and Needle Valve.
- ▶ Bottom Connection - "D" type Flange (for tubing head adapter).
- ▶ Top Connection - Studded (for Bowen tree cap).



## 3 IN 1 TYPE

### FEATURES:

- ▶ Sizes; 2-1/16" to 3-1/8" 5,000 psi
- ▶ Lower Master Gate Valve (Manual).
- ▶ Upper Master Gate Valve (Hydraulic or pneumatic actuated).
- ▶ Production Gate Valve (Manual, hydraulic or pneumatic actuated).
- ▶ Kill Valve (Manual or hydraulic actuated).
- ▶ Swab Valve (Manual).
- ▶ Tree Cap Adapter (Dual).
- ▶ Pressure Gauge and Needle Valve.
- ▶ Bottom Connection - "C" type 11" 5K Flange (for tubing head adapter).
- ▶ Top Connection - Studded (for Bowen tree cap).



## CASING HEAD

### PURPOSE:

- ▶ Seals off the surface casing.
- ▶ Provides a landing bowl for the next casing string.
- ▶ Provides attachment point for BOP Stack.
- ▶ Provides low pressure containment (approx. 2000 to 3000 psi)

### FEATURES:

- ▶ Bottom Connection - Welded or Slip-on / Threaded /Quick Connect.
- ▶ Top Connection – Flanged / Quick Connect.
- ▶ ID Profile
  - 45 deg Landing shoulder for slip-type or mandrel type casing hanger.
  - Holes for Lockdown screws and ported for testing.
- ▶ Side Outlets - Studded and prep for VR plug or Line pipe.



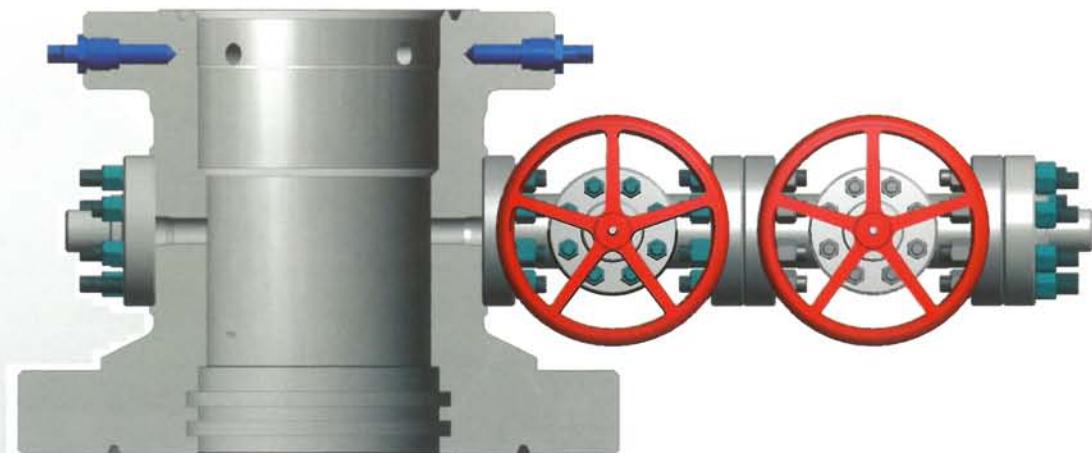
## CASING AND TUBING SPOOL

### PURPOSE:

- ▶ Seals intermediate casing string.
- ▶ Provides support for next casing string.
- ▶ Provides support for BOP Stack.
- ▶ For Casing Spool it provides intermediate pressure containment (approx. 5000 to 1000 psi)
- ▶ For Tubing Spool it provides production pressure containment (approx. 10000 to 15000 psi)

### FEATURES:

- ▶ Bottom and Top Connections – Flanged / Quick Connect.
- ▶ ID Profile
  - 45 deg landing shoulder for slip-type or mandrel type casing hanger.
  - Holes for Lockdown screws and ported for testing.
- ▶ Side Outlets - Studded and prep for VR plug.



## MANDREL TYPE CASING HANGER C/W ELASTOMERIC PACKOFF

### PURPOSE:

- ▶ Hangs the surface casing and seals off the annulus.

### FEATURES:

- ▶ Primary and secondary sealing.
- ▶ Primary sealing - Elastomeric packoff.
- ▶ Secondary sealing – O-rings.
- ▶ Manually energized by lockdown screws.
- ▶ One-piece solid forging.
- ▶ Extended neck.
- ▶ 45 deg Landing shoulder.
- ▶ Straight thru bore.
- ▶ Square running threads.
- ▶ Long tonging neck for bottom connection.
- ▶ Large flow-by areas.
- ▶ Allows retrievable of elastomeric packoff.



## SLIP TYPE CASING HANGER

### PURPOSE:

- ▶ Hangs the surface casing and seals off the annulus.
- ▶ Used during stuck casing (for emergency).
  - Manually Energized Slip-Type Casing Hanger
  - Automatic (Weight-Set) Slip-Type Casing Hanger

### FEATURES:

- ▶ Manually and Automatic energized.
- ▶ 45 deg Landing shoulder.
- ▶ Specially sharp and hardened teeth on all slips segment.
- ▶ Robust hinge design.
- ▶ Long lock screw.
- ▶ Resilient slab seal.
- ▶ Allows tension to be pulled on casing.
- ▶ Mud returns can be routed up annulus during cementing before hanger landed.



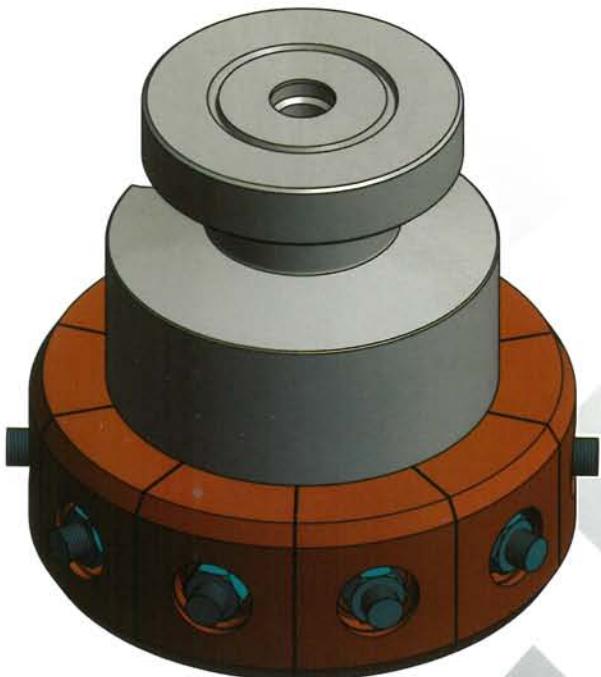
## TUBING HEAD ADAPTER

### PURPOSE:

- ▶ Provides interface between the tubing spool and X'mas tree.
- ▶ Provides secondary seal between the tubing bonnet and the X'mas tree.

### FEATURES:

- ▶ Bottom Connection – Flanged / Quick Connect.
- ▶ Top Connection – Flanged / Studded.
- ▶ ID Profile
  - Straight thru bore; same as X'mas tree bore.
  - Tubing hanger neck seal profile.
  - Holes ported for testing.
  - Provision for control lines.
  - Provision for electrical penetrator.



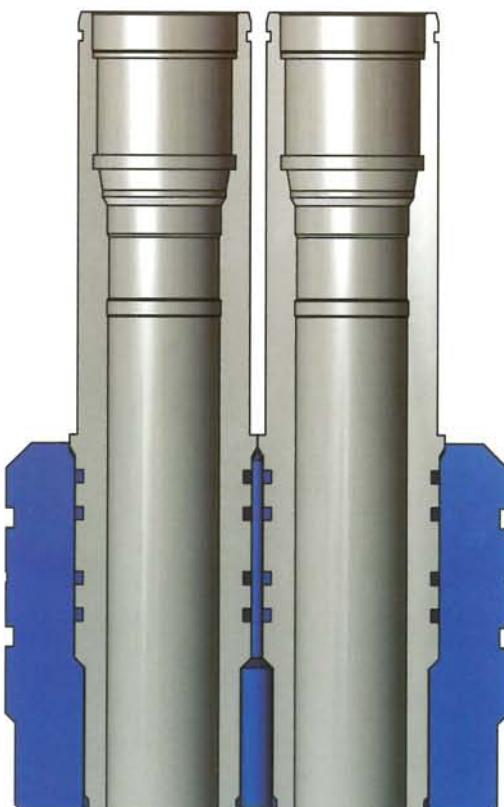
## EXTENDED NECK TUBING HANGER C/W NECK SEAL

### PURPOSE:

- ▶ Hangs the tubing and seals off the annulus.
- ▶ Provides communication for control lines and chemical injection.
- ▶ Provides isolation point for BOP Stack.
  - Extended Neck Tubing Hanger
  - Dual Type Tubing Hanger

### FEATURES:

- ▶ Primary and secondary sealing.
- ▶ Tubing hanger neck seal runs separately.
- ▶ Manually energized by lockdown screws.
- ▶ One-piece solid forging.
- ▶ 45 deg Landing shoulder.
- ▶ Facilitates BPV profile.
- ▶ Square running threads.
- ▶ Provision for continuous control lines(SCSSV) and electrical neutrator (ESP).
- ▶ Provision for anti-rotation.
- ▶ Tonging neck for bottom connection.
- ▶ Allows retrievable of tubing hanger neck seal.



# WELLHEAD COMPONENTS

## WEAR BUSHING

### PURPOSE:

- ▶ Protects the sealing surfaces of the casing head or casing / tubing spool.



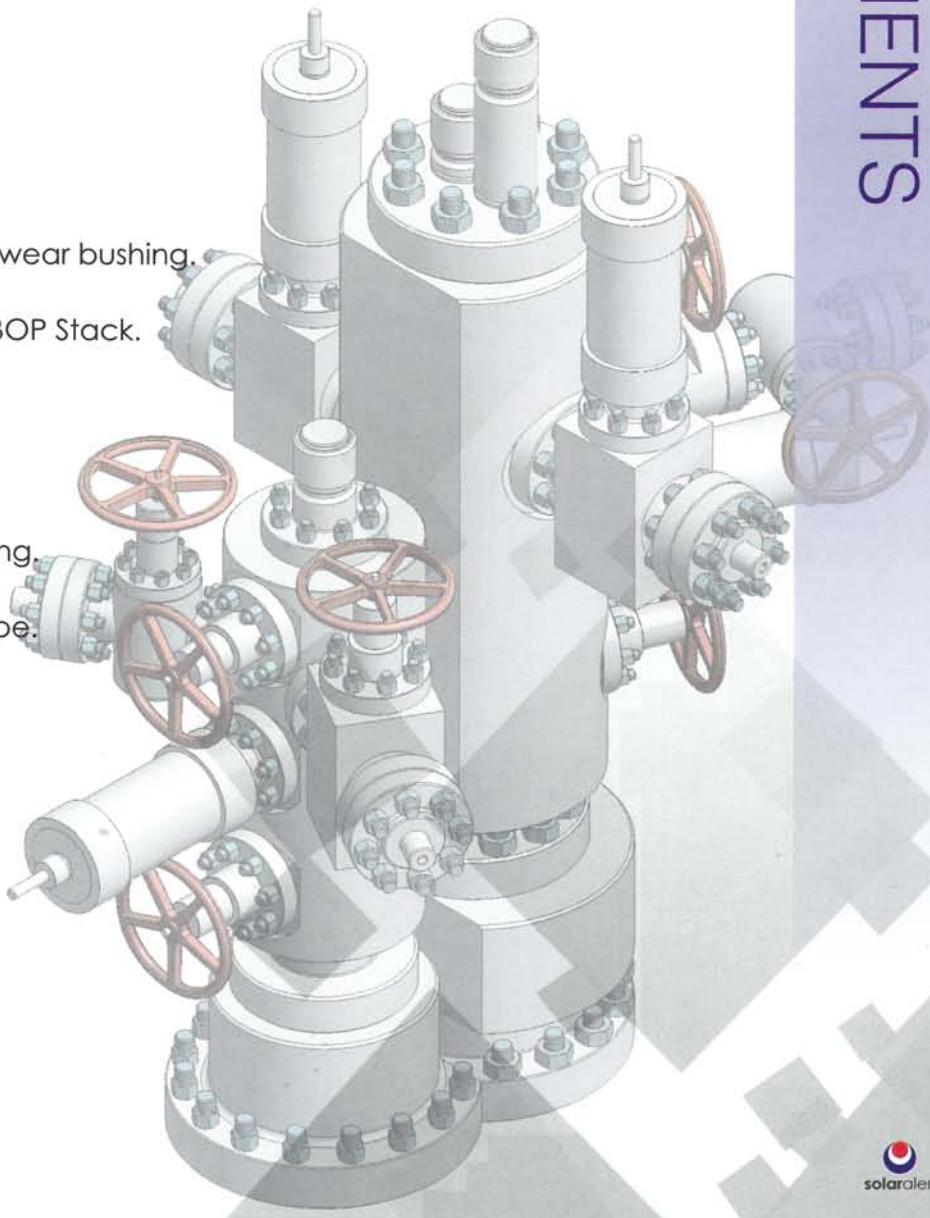
### FEATURES:

- ▶ Straight thru bore.
- ▶ "J" slot profile for running.
- ▶ Profile for lockscrew retention.

## RUNNING TEST TOOL

### PURPOSE:

- ▶ Run and retrieve the wear bushing.
- ▶ Facilitates testing of BOP Stack.



### FEATURES:

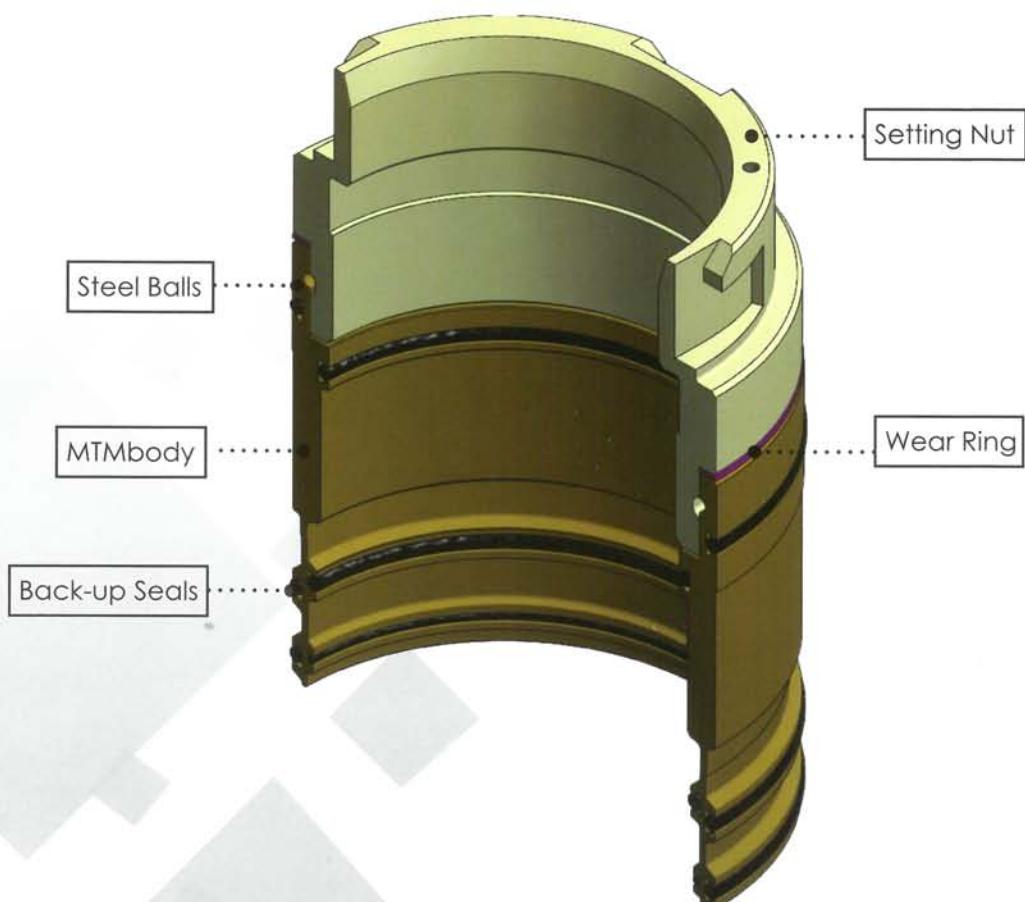
- ▶ One piece solid forging.
- ▶ Runs on 4-1/2" drill pipe.

# METAL TO METAL PACK-OFF

**Metal To Metal ( MTM ) Pack Off** provides annular seal between the ID of housing and OD of hanger. The pack off is interchangeable with all casing hangers.

## THE FEATURES OF METAL-TO-METAL PACKOFF:

- ▶ Torque-Set/Pressure Set
- ▶ High pressure and high containing capacity.
- ▶ True Metal-to-Metal sealing technology.
- ▶ One piece Metal-to-Metal body.
- ▶ Steel balls provide bearing support against upward and downward loads.
- ▶ Allow testing in between seals.
- ▶ Positive "J" slots locking mechanism.



# MATERIAL SELECTION SHEET

## Solar Alert Wellhead Material Selection Sheet

API NACE MATERIAL CLASS	AA	BB	CC	DD-NL	EE-1.5	FF-1.5	FF-NL	HH-NL
Trim Designation	AA	BB	CC	DD	EE	FF	FF	Trim Clad
Service Limitations (psi)	H2S<0.5 CO2<7	H2S<0.5 7<CO2<30 Cl: No limit	H2S<0.5 7<CO2<30 Cl: No limit	H2S: No limit CO2<7	H2S<1.5 7<CO2<30 Cl: No limit	H2S<1.5 CO2>30 Cl: No limit	H2S: No limit CO2>30<200 Cl: No limit	H2S: No limit CO2>200 Cl: No limit
API Temperature Rating	K-V	K-V	K-V	K-V	K-V	K-V	K-V	K-V
Body / Bonnet	AISI 4130	AISI 4130	AISI 410	AISI 4130	AISI 4130	AISI 410	AISI 410	AISI 4130 C/W Inconel 525
Mandrel Hanger, Packoff, Tubing Hanger, Stem, Seat, Gate	AISI 4130	AISI 410	AISI 410	AISI 4130	AISI 410	AISI 410	F6NM	Incoloy 718
Gasket	316	316	316	316	316	316	316	825
Stud / Nut	L7/2H	L7/2H	L7/2H	L7/2H	L7/2H	L7/2H	L7/2H	L7/2H

1. The information above is gathered from NACE MR0175 and API 6A Latest Edition.
2. The above temperature and Chloride concentration are no limit, unless specified by NACEMR-0175.
3. The above information should be used for reference only.



# API GENERAL SPECIFICATION

Solar Alert has the capability to customise and design its products to meet customer specific requirements to suit their current operational requirement.

## General Specification

Product Specification Level	PSL 1 - PSL 4
Material Class (Trim)	AA - HH
Working Pressure	Wellhead: 3,000 - 15,000 psi X'mas Tree: 3,000 - 5,000 psi
Operating Temperature	K - V
Connection Type	Top: Quick Connect / Clamp Hub Bottom: Quick Connect / Slip Lock / Clamp Hub

## Temperature Classes

API Classification	Operating Temperature Min (deg F) Max		Operating Temperature Min (deg C) Max	
K	-75	180	-60	82
L	-50	180	-46	82
N	-50	140	-46	60
P	-20	180	-29	82
S	0	140	-18	60
T	0	180	-18	82
U	0	250	-18	121
V	35	250	2	121

## Material Class

API Classification	Operating Temperature Min (deg F) Max	Operating Temperature Min (deg C) Max
AA - General Service	Carbon or Low Alloy Steel	Carbon or Low Alloy Steel
BB - General Service	Carbon or Low Alloy Steel	Stainless Steel
CC - General Service	Stainless Steel	Stainless Steel
DD - Sour Service <sup>a</sup>	Carbon or Low Alloy Steel <sup>b</sup>	Carbon or Low Alloy Steel <sup>b</sup>
EE - Sour Service <sup>a</sup>	Carbon or Low Alloy Steel <sup>b</sup>	Stainless Steel <sup>b</sup>
FF - Sour Service <sup>a</sup>	Stainless Steel <sup>b</sup>	Stainless Steel <sup>b</sup>
HH - Sour Service <sup>a</sup>	Corrosion Resistant Alloy <sup>bcd</sup>	Corrosion Resistant Alloy <sup>bcd</sup>

a - As defined by ISO 15156 ( all parts) (NACE MR0175; see Clause 2)

b - In accordance with ISO 15156 ( all parts) (NACE MR0175; see Clause 2)

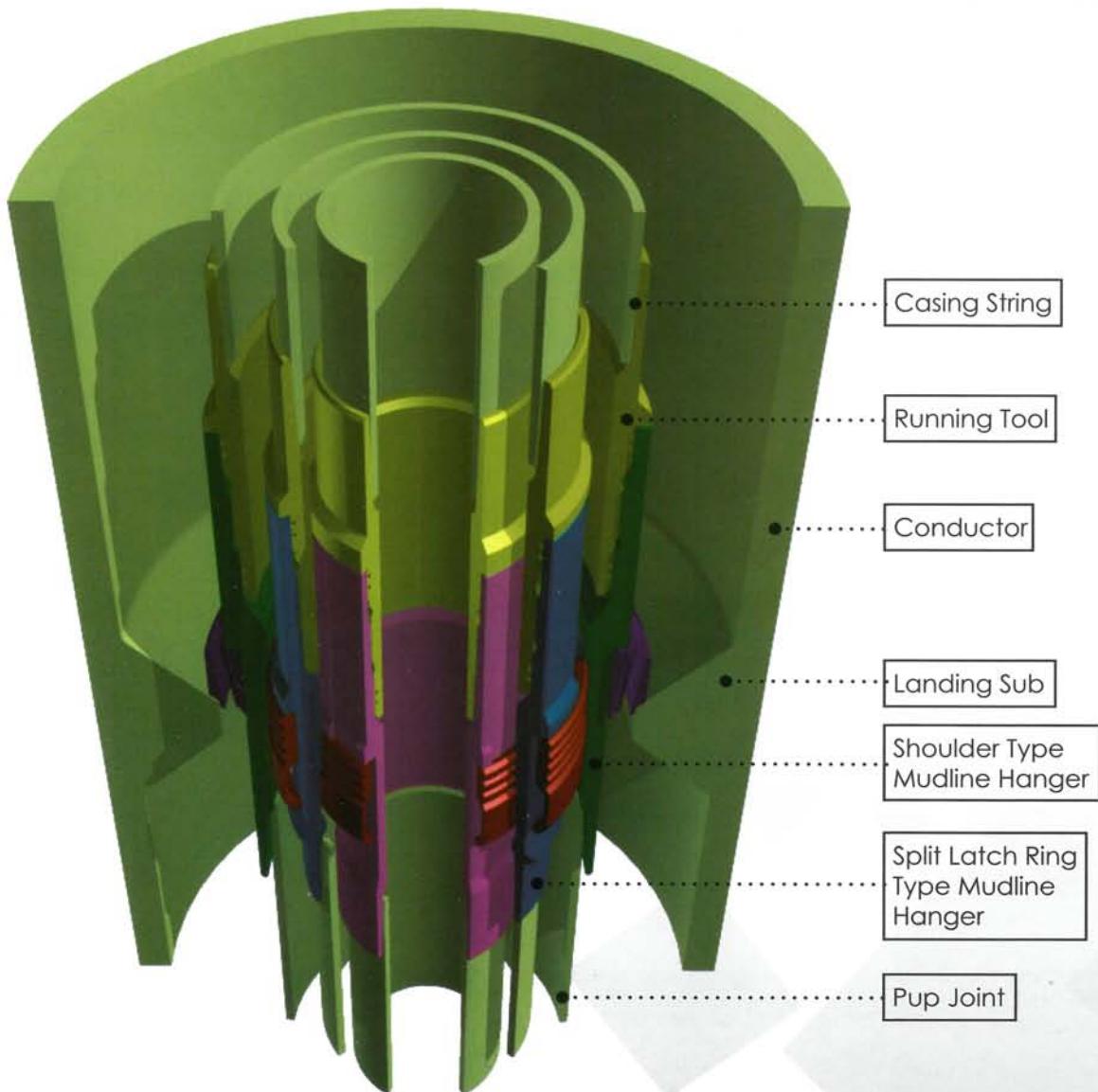
c - CRA required on retained fluid-wetted surface only; CRA cladding of low-alloy or stainless steel is permitted

d - CRA as defined in Clause 3; ISO 15156 ( all parts) (NACE MR0175; see Clause 2) definition of CRA does not apply.

# MUDLINE SUSPENSION SYSTEM

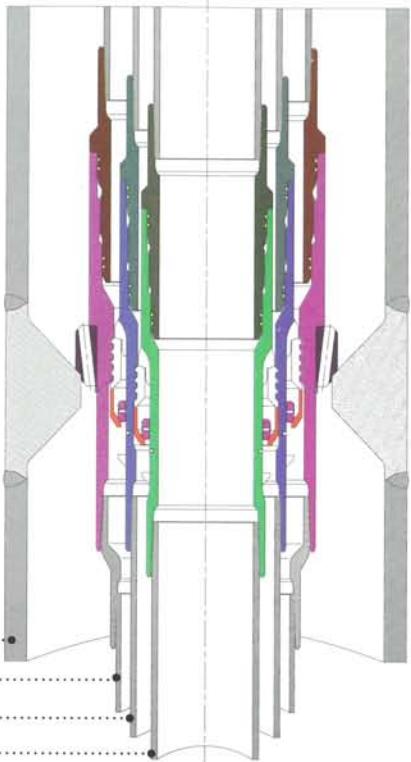
OUR INNOVATIVE MUDLINE SUSPENSION SYSTEM PROVIDES HIGH CAPACITY AND UNMATCHED SIMPLICITY

Our Mudline Suspension System features a 10,000 psi WP stack-down system specially designed for a single exploration/appraisal drilling well from a jack-up rig.



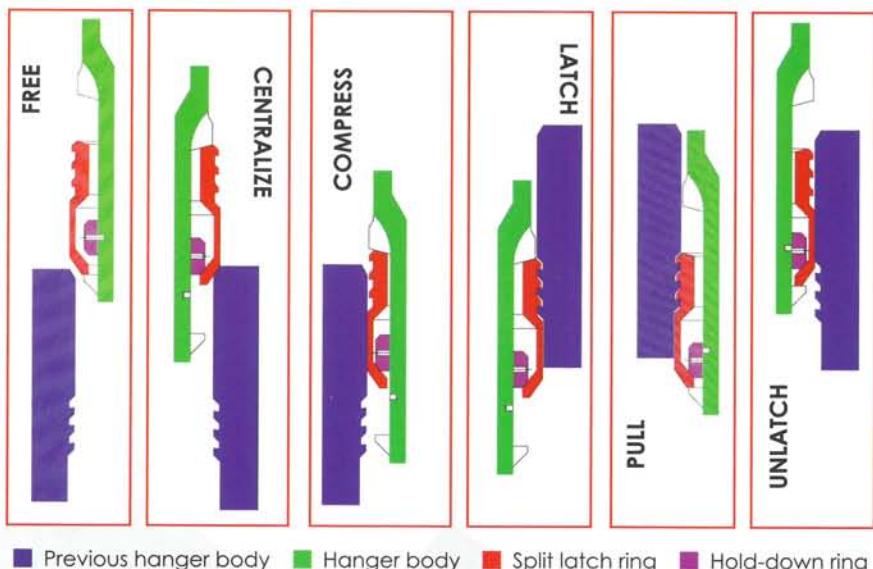
## FEATURES:

- ▶ Easy handling and trouble-free operation.
- ▶ High Pressure and High Load Capacity.
- ▶ Single-trip Installation and Weight Set.
- ▶ All Hangers come with unique Automatic Centralization.
- ▶ One piece Latch Ring design.
- ▶ Large Flow-by Areas.
- ▶ Hanger Cleaning Tool for previous hanger landing profile cleanout.
- ▶ Tools available for Running and Tie-Back.
- ▶ Right-hand rotation for running tool release.



Casing Programme:  
36" COND. x 16"(18-5/8") CSG. x 3-3/8" CSG. x 9-5/8"  
CSG 10,000 PSI MWP

## SEQUENCE OF THE SPLIT LATCH RING



Close-up photo  
of the Split  
Latch Ring

## Technical Specification

36" Landing Sub	18 - 5/8" Shoulder Type Mudline Hanger	13 - 3/8" Split Latch Ring Type Mudline Hanger	9 - 5/8" Split Latch Ring Type Mudline Hanger
MAX. O.D = 36.00"	MAX. O.D = 21.125"	MAX. O.D = 16.475"	MAX. O.D = 12.180"
MIN. I.D = 22.50"	MIN. I.D = 16.608" (15.200")	MIN. I.D = 12.530	MIN. I.D = 8.560"
MAX. BIT SIZE 20"	MAX. BIT SIZE 14-3/4"	MAX. BIT SIZE 12-1/4"	MAX. BIT SIZE 8-1/2"
	MIN. ANNULUS RETURN AREA 23 SQ. IN.	MIN. ANNULUS RETURN AREA 13 SQ. IN	MIN. ANNULUS RETURN AREA 10 SQ. IN
	MAX. PRESSURE RATING 3,000 PSI	MAX. PRESSURE RATING 5,000 PSI	MAX. PRESSURE RATING 10,000 PSI
	MAX. RUNNING CAPACITY 1200 KLB	MAX. RUNNING CAPACITY 1000 KLB	MAX. RUNNING CAPACITY 600KLB
	MAX. HANGING CAPACITY 1700 KLB	MAX. HANGING CAPACITY 1500 KLB	MAX. HANGING CAPACITY 800 KLB

# WELLHEAD MAINTENANCE

Solar Alert offers a comprehensive wellhead maintenance services for all major wellhead and Christmas tree which covers :-

- ▶ Physical inspection of wellhead and
- ▶ Christmas tree component
- ▶ Lubrication of valves and actuator
- ▶ Corrosion and erosion inspection on wellhead and Christmas tree
- ▶ Replacement of component or parts
- ▶ Modification to obsolete wellhead and Christmas tree system
- ▶ Prepare or assist in the wellhead and Christmas tree maintenance program

Being a manufacturer of wellhead and Christmas tree, we also offer refurbishment of components or built replacement parts (particularly for old / obsolete design) subject to availability of original drawings and commercial viability.



**Solar Alert provides a comprehensive one – stop center for H<sub>2</sub>S Service which comprises :-**

- ▶ Complete H<sub>2</sub>S Services comprising of H<sub>2</sub>S Emergency Response Procedure & Contingency Planning, equipment rental, personnel and H<sub>2</sub>S training on equipment utilization & procedure.
- ▶ Consultancy work to formulate H<sub>2</sub>S Emergency Response Procedure & Contingency Planning
- ▶ H<sub>2</sub>S Safety Training
- ▶ Confine Space Entry Inspection

Our H<sub>2</sub>S Services cover both exploration and development drilling (conventional, under balance or HPHT) and production operations.



**For the performance of the services, the following equipment and procedure has to be made available :-**

- ▶ Fix point monitor, sensor and alarm systems Accuracy of  $\pm 1\%$  FS ; Range 0 - 99
- ▶ Personal detector (Single / Multi Gas) , H<sub>2</sub>S, O<sub>2</sub>, CO and LEL for Multi gas
- ▶ Cascade System (Air bank system) - 6 x 300 ft<sup>3</sup> quad
- ▶ Air compressors (3,200 – 4,700 psi)
- ▶ Bug Blowers (Air remover) – 36", 1140 rpm, 5hp, 25000 CFM
- ▶ Emergency Escape Breathing Apparatus (EEBA) – 10 minutes
- ▶ Supply Air Breathing Apparatus (SABA)  
NIOSH approved, Type C Airline Respirator – 10 mins
- ▶ Self-Contained Breathing Apparatus (SCBA) – 30-60 mins
- ▶ Manifold assembly – may supply air to two or more persons from one air source using four to twelve outlets
- ▶ Gastec plunger handle portable pump H<sub>2</sub>S detector
- ▶ Wind Socks
- ▶ H<sub>2</sub>S Contingency Plan



# WELDING HABITAT – POSITIVE PRESSURE WELDING ENCLOSURE (PPWE)

PPWE are used to create a safe module within a hazardous area to allow field welding be conducted in place or at times when it could otherwise be impractical or prohibited.

The PPWE two main objectives are:

- ▶ To contain sparks from hot work inside the habitat and thus prevent them from reaching flammable gas.
- ▶ To prevent flammable gas from entering the habitat by using internal overpressure.

The PPWE are typically used for:

- ▶ Hot work at Zone 1
- ▶ Hot work at Zone 2
- ▶ Maintaining ambient temperatures for coating or insulation work where containment is an important requirement.

Solar Alert habitat are :-

- ▶ Constructed using special flame retardant flexible panels which are zipped together and sealed with velcro. This allows any size and shape of habitat to be created.
- ▶ Constructed to include an air lock. This is typically used when building large scale welding habitats.
- ▶ Inclusive of an escape panel configured to allow easy access to a predetermined escape route.
- ▶ Flexible in shape and size depending on requirement
- ▶ Equipped with marine aluminum door frame with a window to allow the fireguard to observe the work party inside, while monitoring the pressure control gauge, which is fixed to the door manifold.
- ▶ Equipped with a transit panel fitted into the door that allows all temporary cables and leads to be tidied away.



## 1 RISERS

Solar Alert manufactures customized drilling risers to suit the respective connection and length for wellhead and the rig BOP system. Risers are offered either on rental or purchased basis.



## 2 GATE VALVE

Our valves are engineered to comply with all applicable specifications in accordance to API 6A. It is available in 2 models i.e. Model "SAE" for 5,000 psi working pressure and Model "SA2M" for 10,000 psi and above.

### Benefits of IKS Gate Valve

- ▶ True metal to metal sealing
- ▶ In 2000 psi to 15,000 psi rating with forged bodies and bonnets.
- ▶ One piece solid forged gate.
- ▶ Compliance with NACE MR-01-75 requirement.
- ▶ Hard facing Gate and Seat with Stelite#6
- ▶ High load taper roller bearings reduce torque requirement for opening & closing of gate valve
- ▶ Bi-directional sealing capability
- ▶ Floating gate & seat design
- ▶ Non-rising stem
- ▶ PR-2 tested



# OUR FACILITIES

Located on a 3 acres of land in Berjaya Industrial Park, Shah Alam, Malaysia, Solar Alert fully integrated manufacturing facility is equipped with the state-of-the-art Computerized Numerical Control (CNC) Turning, Milling and Boring machines and a comprehensive & modern welding, blasting & painting system, together with testing and assembly facilities. The plant is also equipped with semi-robotic cladding machine to produce products for sour services.

Solar Alert support facilities are currently located in Kemaman and Labuan in Malaysia and Vung Tau in Vietnam.



Our facility is currently equipped with the following:-

NO	FUNCTION	TYPE	CAPACITY
1.	TURNING – HORIZONTAL	AUTO	MAX SWING: 2.06 m
2.	TURNING – VERTICAL	AUTO	MAX DIAMETER: 1.8 m
3.	MILING / BORING – HORIZONTAL	AUTO	MAX DIAMETER: 2.5 m
4.	MILING/BORING/TURNING – HORIZONTAL	AUTO	MAX DIAMETER: 0.45 m
5.	CUTTING / SAWING	AUTO	MAX DIAMETER: 1.3 m
6.	CLADDING SYSTEM - WELDING	AUTO	MAX SWING: 1.2 m
7.	BLASTING & PAINTING SYSTEM		
8.	PRESSURE TEST AREA		
9.	WET TEST AREA		

# OUR GLOBAL PRESENCE



## OUR CLIENTELES



**CARIGALI HESS**



**ExxonMobil**

Petrofac

**Santos**  
We have the energy.

**NEWFIELD**

**LAMSON**  
JOINT OPERATING COMPANY

**Topco**



**Dragon Oil**



**thanglong**  
JOINT OPERATING COMPANY

**TRUONG SON**  
JOINT OPERATING COMPANY

**NPOC**

**PCP OPERATING CO. SDN BHD**



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**E-mail** : info@solaralert.com.my  
**Website** : www.solaralert.com.my

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87000 Labuan

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**Fax** : +6087-418549



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## OUR CONTACTS